

PHOSPHATE ROCK

(Data in thousand metric tons unless otherwise noted)

Domestic Production and Use: In 2021, phosphate rock ore was mined by five companies at 10 mines in four States and processed into an estimated 22 million tons of marketable product, valued at \$1.7 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. About 25% of the wet-process phosphoric acid produced was exported in the form of upgraded granular diammonium phosphate (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:

	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021^e</u>
Production, marketable	27,900	25,800	23,300	23,500	22,000
Sold or used by producers	26,300	23,300	23,400	22,600	23,000
Imports for consumption	2,470	2,770	2,140	2,520	2,400
Consumption, apparent ¹	28,800	26,000	25,500	25,100	25,000
Price, average value, f.o.b. mine, ² dollars per ton	73.67	70.77	67.98	75.86	75.00
Stocks, producer, yearend	8,440	10,600	9,830	11,000	10,000
Employment, mine and beneficiation plant, number ^e	1,800	1,900	1,900	1,800	1,900
Net import reliance ³ as a percentage of apparent consumption	5	2	11	5	13

Recycling: None.

Import Sources (2017–20): Peru, 87%; Morocco, 13%.

<u>Tariff:</u>	<u>Item</u>	<u>Number</u>	<u>Normal Trade Relations</u> <u>12–31–21</u>
	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 2021, domestic consumption of phosphate rock was estimated to be about the same as that in 2020. DAP and MAP production decreased as a result, in part, of technical problems at a phosphate plant in Florida and owing to the effects of Hurricane Ida in August, which damaged phosphate facilities in Louisiana. The affected facilities reopened in the fourth quarter.

World production was estimated to be about the same as that in 2020, with China, Morocco, and the United States remaining the leading producers. Production in Jordan, Morocco, and Saudi Arabia increased as expansions to capacity were being ramped up in 2021. Capacity expansion projects were ongoing in Brazil, Kazakhstan, Mexico, Russia, and South Africa; however, none of the projects were expected to be completed until after 2024.

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One producer in Idaho submitted plans to shift production to a new phosphate rock mine when its existing mine is exhausted in about 5 years. The new mine would be located close to the current mine in Caribou County, and annual production capacity was expected to remain the same.

World consumption of P₂O₅ contained in fertilizer products was estimated to have increased by 7% in crop-year 2021 (July 1, 2020, to June 30, 2021) compared with that in crop-year 2020. The increases in world consumption and trade were driven by high crop prices, increased planted crop area, and increased crop exports. This was a continuation of the trend that began late in 2020, as markets rebounded from poor weather conditions in the growing season. South America and Asia were leading regions of growth in consumption of phosphate fertilizer, in terms of percentage increase over that in 2020.

World Mine Production and Reserves: Reserves for Israel, Jordan, and South Africa were updated with information from the producing companies in the respective countries. Turkey was listed separately from "Other countries."

	Mine production		Reserves ⁴
	2020	2021 ^e	
United States	23,500	22,000	1,000,000
Algeria	1,200	1,200	2,200,000
Australia	2,000	2,200	⁵ 1,100,000
Brazil	6,000	5,500	1,600,000
China ⁶	88,000	85,000	3,200,000
Egypt	4,800	5,000	2,800,000
Finland	995	1,000	1,000,000
India	1,400	1,400	46,000
Israel	3,090	3,000	53,000
Jordan	8,940	9,200	1,000,000
Kazakhstan	1,300	1,500	260,000
Mexico	577	530	30,000
Morocco	37,400	38,000	50,000,000
Peru	3,300	3,800	210,000
Russia	14,000	14,000	600,000
Saudi Arabia	8,000	8,500	1,400,000
Senegal	1,600	2,200	50,000
South Africa	1,800	2,000	1,600,000
Togo	942	1,200	30,000
Tunisia	3,190	3,200	100,000
Turkey	600	600	50,000
Uzbekistan	900	900	100,000
Vietnam	4,500	4,700	30,000
Other countries	870	1,000	2,600,000
World total (rounded)	219,000	220,000	71,000,000

World Resources:⁴ 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, the Middle East, China, 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 sold or used by producers + imports. U.S. producers stopped exporting phosphate rock in 2003.

²Marketable phosphate rock, weighted value, all grades.

³Defined as imports + adjustments for industry stock changes.

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

⁵For Australia, Joint Ore Reserves Committee-compliant or equivalent reserves were 110 million tons.

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