

# PHOSPHATE ROCK

(Data in thousand metric tons unless otherwise noted)

**Domestic Production and Use:** In 2020, phosphate rock ore was mined by five firms at 10 mines in four States and processed into an estimated 24 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 (P<sub>2</sub>O<sub>5</sub>) 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 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.

<b>Salient Statistics—United States:</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020<sup>e</sup></b>
Production, marketable	27,100	27,900	25,800	23,300	24,000
Sold or used by producers	26,700	26,300	23,300	23,400	24,000
Imports for consumption	1,590	2,470	2,770	2,140	2,300
Consumption, apparent <sup>1</sup>	28,200	28,800	26,000	25,500	26,000
Price, average value, f.o.b. mine, <sup>2</sup> dollars per ton	76.90	73.67	70.77	67.98	70.00
Stocks, producer, yearend	7,450	8,440	10,600	9,940	9,500
Employment, mine and beneficiation plant, number <sup>e</sup>	2,000	2,000	2,000	2,000	2,000
Net import reliance <sup>3</sup> as a percentage of apparent consumption	4	5	2	11	10

**Recycling:** None.

**Import Sources (2016–19):** Peru, 85%; Morocco, 15%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–20</b>
	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:** The COVID-19 pandemic did not have a major effect on the domestic phosphate rock market in 2020. The fertilizer industry and related agricultural businesses were considered essential industries in the United States and most other countries. U.S. consumption and production of phosphate rock were estimated to have increased slightly in 2020, owing to a slight increase in phosphoric acid and combined DAP and MAP production.

The U.S. Department of the Interior, Bureau of Land Management, and the U.S. Department of Agriculture, Forest Service, approved an expansion to the largest phosphate rock mine in Idaho. The expansion will allow the operating company to continue mining at the site for about 10 years, after which it will shift mining to a new mine that is under development in the same area.

A new phosphate rock mine began operation near Spanish Forks, UT, in July 2020. The operating company will market its phosphate rock for direct application to soil for organic farming. Production initially was to be about 5,000 tons per year, eventually increasing to 48,000 tons per year after 5 years. The mine site was developed in the early 1980s by another company, but the project was cancelled after 2 years.

According to industry analysts, the rated capacity of global phosphate rock mines was projected to increase to 261 million tons in 2024 from 238 million tons in 2020, including production of marketable phosphate rock in China of between 80 million and 85 million tons per year, compared with official production statistics of 90 million to 95 million tons per year that included some crude ore production. Most of the increases in production capacity were planned for Africa and the Middle East, where major expansion projects were in progress in Algeria, Egypt, Guinea Bissau, Morocco, Senegal, and Togo.

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World consumption of P<sub>2</sub>O<sub>5</sub> contained in fertilizer and industrial uses was projected to increase to 49 million tons in 2024 from 47 million tons in 2020. Asia and South America are projected to be the leading regions of growth. U.S. consumption of contained P<sub>2</sub>O<sub>5</sub> has remained steady at about 4 million tons per year over the past decade.

**World Mine Production and Reserves:** Reserves for Australia, Brazil, Israel, and Jordan were revised based on company or Government reports. Reserves for Egypt were revised based on information from an independent research organization.

	Mine production		Reserves <sup>4</sup>
	2019	2020 <sup>e</sup>	
United States	23,300	24,000	1,000,000
Algeria	1,300	1,300	2,200,000
Australia	2,700	2,700	<sup>5</sup> 1,100,000
Brazil	4,700	5,500	1,600,000
China <sup>6</sup>	95,000	90,000	3,200,000
Egypt	5,000	5,000	2,800,000
Finland	995	1,000	1,000,000
India	1,480	1,500	46,000
Israel	2,810	2,800	57,000
Jordan	9,220	9,200	800,000
Kazakhstan	1,500	1,500	260,000
Mexico	558	600	30,000
Morocco and Western Sahara	35,500	37,000	50,000,000
Peru	4,000	4,000	210,000
Russia	13,100	13,000	600,000
Saudi Arabia	6,500	6,500	1,400,000
Senegal	3,420	3,500	50,000
South Africa	2,100	2,100	1,400,000
Syria	2,000	360	1,800,000
Togo	800	800	30,000
Tunisia	4,110	4,000	100,000
Uzbekistan	900	900	100,000
Vietnam	4,650	4,700	30,000
Other countries	1,140	1,100	840,000
World total (rounded)	227,000	223,000	71,000,000

**World Resources:**<sup>4</sup> 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.

<sup>e</sup>Estimated.

<sup>1</sup>Defined as phosphate rock sold or used by producers + imports. U.S. producers stopped exporting phosphate rock in 2003.

<sup>2</sup>Marketable phosphate rock, weighted value, all grades.

<sup>3</sup>Defined as imports + adjustments for industry stock changes.

<sup>4</sup>See Appendix C for resource and reserve definitions and information concerning data sources.

<sup>5</sup>For Australia, Joint Ore Reserves Committee-compliant reserves were 113 million tons.

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