

PHOSPHATE ROCK

(Data in thousand metric tons, marketable phosphate rock, unless otherwise specified)

Domestic Production and Use: In 2023, phosphate rock ore was mined by five companies at nine mines in four States and processed into an estimated 20 million tons of marketable product, valued at \$2 billion, free on board (f.o.b.) mine. Phosphate rock was produced in Florida, Idaho, North Carolina, 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), monoammonium phosphate (MAP) fertilizer, merchant-grade phosphoric acid, and other phosphate fertilizer products. 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:	2019	2020	2021	2022	2023^e
Production, marketable	23,300	23,500	21,600	^e 19,800	20,000
Sold or used by producers	23,400	22,600	21,900	^e 19,800	21,000
Imports for consumption	2,140	2,520	2,460	2,500	2,600
Consumption, apparent ¹	25,500	25,100	24,400	^e 22,300	24,000
Price, average value, f.o.b. mine, ² dollars per metric ton	67.90	75.50	82.40	^e 98	100
Stocks, producer, yearend	9,940	11,000	10,700	^e 10,600	10,000
Employment, mine and beneficiation plant, number ^e	1,900	1,800	2,000	1,900	1,900
Net import reliance ³ as a percentage of apparent consumption	11	5	10	12	14

Recycling: None.

Import Sources (2019–22): Peru, 98%; and Morocco, 2%.

Tariff:	Item	Number	Normal Trade Relations 12–31–23
	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 production, sales, imports, and consumption of phosphate rock all were estimated to have increased in 2023, owing to increased phosphoric acid and fertilizer production. Favorable weather conditions in the planting seasons helped to boost fertilizer consumption and reduce phosphate fertilizer stocks that had accumulated in 2022.

In 2023, a U.S. Federal judge canceled permits issued by the Bureau of Land Management (BLM) for construction of a new phosphate rock mine in Caribou County, ID. The judge ruled that the BLM failed to analyze the effects of the mine and associated infrastructure on the habitat of the greater sage grouse. The mine was intended to be a replacement for an existing mine and was planned to start production within the next decade. The two other mining companies in Idaho were not affected by the ruling and remained on schedule with development of new mines to replace their existing mines.

Global production of phosphate rock was estimated to have been lower in 2023 than that in 2022. World consumption of P₂O₅ contained in fertilizers was estimated to have been 45.7 million tons in 2023 compared with 43.8 million tons in 2022. World consumption of P₂O₅ in fertilizers was projected to increase to 50 million tons by 2027. The leading regions for growth were expected to be Asia and South America.

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Global phosphate production capacity, in terms of P₂O₅ content, was projected to increase to 69.1 million tons by 2027 compared with 63.6 million tons in 2023. Capacity expansions to phosphate rock production that were expected to be completed by 2026 were ongoing in Brazil, Kazakhstan, Mexico, Morocco, and Russia. Significant new mining projects that were planned to be completed after 2027 were under development in Australia, Canada, Congo (Brazzaville), Guinea-Bissau, and Senegal. The new mines in Australia and Canada were planned to be primarily used to supply the manufacturing of lithium-iron-phosphate battery cathode active material.

World Mine Production and Reserves: Reserves for China, India, Russia, and Turkey were revised based on Government reports. Reserves for South Africa were revised based on company reports.

	Mine production		Reserves ⁴
	2022	2023 ^e	
United States	^e 19,800	20,000	1,000,000
Algeria	^e 1,800	1,800	2,200,000
Australia	^e 2,500	2,500	⁵ 1,100,000
Brazil	^e 6,200	5,300	1,600,000
China ⁶	^e 93,000	90,000	3,800,000
Egypt	^e 5,000	4,800	2,800,000
Finland	923	950	1,000,000
India	^e 1,740	1,500	31,000
Israel	2,170	2,500	60,000
Jordan	11,300	12,000	1,000,000
Kazakhstan	^e 1,500	2,000	260,000
Mexico	442	500	30,000
Morocco	39,000	35,000	50,000,000
Peru	4,200	4,200	210,000
Russia	^e 14,000	14,000	2,400,000
Saudi Arabia	^e 9,000	8,500	1,400,000
Senegal	^e 2,600	2,500	50,000
South Africa	1,990	1,600	1,500,000
Syria	^e 1,100	800	250,000
Togo	^e 1,500	1,500	30,000
Tunisia	3,560	3,600	2,500,000
Turkey	^e 900	800	71,000
Uzbekistan	^e 900	900	100,000
Vietnam	^e 2,000	2,000	30,000
Other countries	750	800	800,000
World total (rounded)	228,000	220,000	74,000,000

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 120 million tons.

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