# PHOSPHATE ROCK

(Data in thousand metric tons unless otherwise noted)

**Domestic Production and Use:** Phosphate rock ore was mined by 6 firms at 15 mines in 4 States, and upgraded to an estimated 38.3 million tons of marketable product valued at $1.1 billion, f.o.b. mine. Florida and North Carolina accounted for more than 85% of total domestic output; the remainder was produced in Idaho and Utah. More than 95% of the U.S. phosphate rock ore mined 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 45% of the wet-process phosphoric acid produced was exported in the form of upgraded granular diammonium and monoammonium phosphate (DAP and MAP, respectively) fertilizer, merchant-grade phosphoric acid, and triple superphosphate fertilizer. The balance of the phosphate rock mined was for the manufacture of elemental phosphorus, which was used to produce phosphorus compounds for a variety of food-additive and industrial applications.

| Salient Statistics—United States: | 2001 | 2002 | 2003 | 2004 | 2005[e] |
|---|---|---|---|---|---|
| Production, marketable | 31,900 | 36,100 | 35,000 | 35,800 | 38,300 |
| Sold or used by producers | 32,800 | 34,700 | 36,400 | 36,500 | 37,700 |
| Imports for consumption | 2,500 | 2,700 | 2,400 | 2,500 | 2,800 |
| Exports | 9 | 62 | 64 | — | — |
| Consumption[1] | 35,300 | 37,400 | 37,400 | 39,000 | 40,500 |
| Price, average value, dollars per ton, f.o.b. mine[2] | 26.82 | 27.47 | 27.01 | 27.79 | 27.89 |
| Stocks, producer, yearend | 7,510 | 8,860 | 7,540 | 7,220 | 7,100 |
| Employment, mine and beneficiation plant, number[e] | 3,400 | 3,200 | 3,200 | 3,100 | 2,900 |
| Net import reliance[3] as a percentage of apparent consumption | 9 | 3 | 9 | 7 | 7 |

**Recycling:** None.

**Import Sources (2001-04):** Morocco, 99%; and other, 1%.

| Tariff: Item | Number | Normal Trade Relations 12-31-05 |
|---|---|---|
| Natural calcium phosphates: | | |
| Unground | 2510.10.0000 | Free. |
| Ground | 2510.20.0000 | Free. |

**Depletion Allowance:** 14% (Domestic), 14% (Foreign).

**Government Stockpile:** None.

**Events, Trends, and Issues:** Phosphate rock production, sales, and consumption increased in 2005 owing to higher exports of phosphate fertilizer, primarily DAP. The leading producer of phosphate rock closed one mine in Florida because of depleted reserves; however, it increased production at other mines to compensate for the closure.

U.S. phosphate fertilizer production from the Gulf of Mexico region was lower for the year because of damage to facilities from Hurricane Katrina in late August. Most plants in Louisiana resumed operations in several weeks; however, one plant in Mississippi sustained $15 million to $25 million in damage and was closed for several months.

U.S. production of marketable phosphate rock is not likely to rise above much 40 million tons per year because of gradual depletion of high-quality deposits in Florida and the subsequent decreases in production capacity. Three new mines are in the development and permitting stages in Florida. These mines will be needed in the next decade to replace existing mines after they are depleted. However, the time necessary to complete the permitting process has increased significantly because of opposition from local governments and regional environmental organizations in southwestern Florida. There are concerns that new mines in DeSoto and Hardee Counties may adversely affect downstream water resources in the Peace River, which is a major source of drinking water.

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The International Fertilizer Industry Association has predicted that worldwide demand for phosphate fertilizers will grow at an average rate of 2.3 % per year during the next 5 years. In the United States, phosphate fertilizer consumption was expected to remain slightly above 4 million tons per year of phosphorus pentoxide ($P_2O_5$) nutrient content. The United States is the leading supplier of processed phosphates in the world, accounting for about 45% of world trade. Since 2000, increased exports of MAP, primarily to South America, have helped to offset lower exports of DAP to markets in Asia. Continued growth in world population and the need for dependable food supplies ensures the importance of phosphate fertilizers.

**World Mine Production, Reserves, and Reserve Base:**

| | Mine production | | Reserves[4] | Reserve base[4] |
|---|---|---|---|---|
| | 2004 | 2005[e] | | |
| United States | 35,800 | 38,300 | 1,200,000 | 3,400,000 |
| Australia | 2,010 | 2,000 | 77,000 | 1,200,000 |
| Brazil | 5,400 | 6,400 | 260,000 | 370,000 |
| Canada | 1,000 | 1,000 | 25,000 | 200,000 |
| China | 25,500 | 26,000 | 6,600,000 | 13,000,000 |
| Egypt | 2,220 | 2,230 | 100,000 | 760,000 |
| India | 1,180 | 1,200 | 90,000 | 160,000 |
| Israel | 2,950 | 3,200 | 180,000 | 800,000 |
| Jordan | 6,220 | 7,000 | 900,000 | 1,700,000 |
| Morocco and Western Sahara | 26,700 | 28,000 | 5,700,000 | 21,000,000 |
| Russia | 11,000 | 11,000 | 200,000 | 1,000,000 |
| Senegal | 1,600 | 1,800 | 50,000 | 160,000 |
| South Africa | 2,740 | 2,000 | 1,500,000 | 2,500,000 |
| Syria | 2,880 | 3,000 | 100,000 | 800,000 |
| Togo | 1,120 | 1,120 | 30,000 | 60,000 |
| Tunisia | 8,050 | 8,000 | 100,000 | 600,000 |
| Other countries | 4,820 | 4,900 | 800,000 | 2,000,000 |
| World total (rounded) | 141,000 | 148,000 | 18,000,000 | 50,000,000 |

**World Resources:** Foreign reserve data were derived from information received from Government sources, individual companies, and independent sources. Reserve data for China were based on official government data and included deposits of low-grade ore. Domestic reserve data were based on U.S. Geological Survey and individual company information. Phosphate rock resources occur principally as sedimentary marine phosphorites. The largest deposits are found in northern Africa, China, the Middle East, and the United States. Significant igneous occurrences are found in Brazil, Canada, 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, but cannot be recovered economically with current technology.

**Substitutes:** There are no substitutes for phosphorus in agriculture.

[e]Estimated. — Zero.

[1]Defined as sold or used + imports – exports.

[2]Marketable phosphate rock, weighted value, all grades, domestic and export.

[3]Defined as imports – exports + adjustments for Government and industry stock changes.

[4]See Appendix C for definitions.