

## PHOSPHATE ROCK

(Data in thousand metric tons unless otherwise noted)

**Domestic Production and Use:** Phosphate rock ore was mined by 6 firms at 12 mines in 4 States, and upgraded to an estimated 30.9 million tons of marketable product valued at \$3.5 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. 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 U.S. phosphate rock 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.

<b>Salient Statistics—United States:</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008<sup>e</sup></b>
Production, marketable	35,800	36,100	30,100	29,700	30,900
Sold or used by producers	36,500	35,200	30,200	31,100	31,000
Imports for consumption	2,500	2,630	2,420	2,670	3,000
Consumption <sup>1</sup>	39,000	37,800	32,600	33,800	34,000
Price, average value, dollars per ton, f.o.b. mine <sup>2</sup>	27.79	29.61	30.49	51.10	113.00
Stocks, producer, yearend	7,220	6,970	7,070	4,970	4,900
Employment, mine and beneficiation plant, number <sup>e</sup>	2,700	2,700	2,500	2,350	2,350
Net import reliance <sup>3</sup> as a percentage of apparent consumption	7	7	7	14	9

**Recycling:** None.

**Import Sources (2004-07):** Morocco, 100%.

Tariff: Item	Number	Normal Trade Relations <u>12-31-08</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:** Beginning in late 2007 and continuing into 2008, the price of phosphate rock jumped dramatically worldwide owing to increased agricultural demand and tight supplies of phosphate rock. The average U.S. price was more than double that of 2007. Average spot prices from North Africa and other exporting regions approached \$500 per ton, which was more than five times the average price in 2007. Prices for nitrogen, potash, and sulfur also increased, thus causing the price of fertilizers to reach record highs.

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In 2008, domestic phosphate rock production increased slightly compared with that of 2007 and consumption and sales remained about the same. Three new phosphate rock mines are planned for development over the next decade in Florida to replace existing mines. The permitting process, however, has been delayed by opposition from local governments concerned about environmental and water use issues. In Idaho, one company received approval from the U.S. Forest Service to expand its mine and another company was developing a new mine to replace its existing mine that is near depletion. Worldwide phosphate rock production was estimated to have increased, primarily in China and North Africa.

Domestic phosphoric acid and MAP production was lower in 2008 and DAP production was higher than that of 2007. Overall exports of phosphoric acid and phosphate fertilizers were higher, led by sales of DAP to India. The United States remained the leading exporter of DAP and MAP, but China is now the leading producer of phosphate rock, phosphoric acid, DAP, and MAP. Most of the Chinese production supplies the growing demand for fertilizers within the country. China raised the export tariffs on phosphate rock and fertilizer products in 2008 to ensure its domestic requirements.

**World Mine Production, Reserves, and Reserve Base:** Reserves data for Australia were revised based on information provided by an Australian Government agency. Reserves data for China were revised based on a comprehensive study of Chinese phosphate rock reserves conducted by a major university in China.

	Mine production		Reserves <sup>4</sup>	Reserve base <sup>4</sup>
	2007	2008 <sup>e</sup>		
United States	29,700	30,900	1,200,000	3,400,000
Australia	2,200	2,300	82,000	1,200,000
Brazil	6,000	6,000	260,000	370,000
Canada	700	800	25,000	200,000
China	45,400	50,000	4,100,000	10,000,000
Egypt	2,200	3,000	100,000	760,000
Israel	3,100	3,100	180,000	800,000
Jordan	5,540	5,500	900,000	1,700,000
Morocco and Western Sahara	27,000	28,000	5,700,000	21,000,000
Russia	11,000	11,000	200,000	1,000,000
Senegal	600	600	50,000	160,000
South Africa	2,560	2,400	1,500,000	2,500,000
Syria	3,700	3,700	100,000	800,000
Togo	800	800	30,000	60,000
Tunisia	7,800	7,800	100,000	600,000
Other countries	8,110	10,800	890,000	2,200,000
World total (rounded)	156,000	167,000	15,000,000	47,000,000

**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 sources and other Chinese data. Production data for China do not include small "artisanal" mines. 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 sedimentary 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. High phosphate rock prices have renewed interest in exploiting offshore resources of Mexico and Namibia.

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

<sup>e</sup>Estimated.

<sup>1</sup>Defined as phosphate rock sold or used + imports.

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

<sup>3</sup>Defined as imports – exports + adjustments for Government and industry stock changes.

<sup>4</sup>See Appendix C for definitions.