## CEMENT

(Data in thousand metric tons, unless otherwise noted)

Domestic Production and Use: In 2002, about 85 million tons of portland cement and 4 million tons of masonry cement were produced at a total of 115 plants in 36 States, by 1 State agency, and by about 40 companies. There were also two plants in Puerto Rico. The ex-plant value of cement production, excluding Puerto Rico, was about \$7 billion, and the value of total sales (including imported cement) was about \$8.5 billion. Most of the cement was used to make concrete, worth at least \$40 billion. Total cement consumption (sales) fell modestly, but remained at strong levels. Imported cement and clinker (to make cement) accounted for about 22% of the cement sold; total imports declined significantly, owing to higher domestic production capacity and a weakening construction market. Clinker, the main intermediate product in cement manufacture, was produced at 109 plants, with a combined apparent annual capacity of about 99 million tons. Including several facilities that merely ground clinker produced elsewhere, total finished cement (grinding) capacity was about 108 million tons. Texas, California, Pennsylvania, Michigan, Missouri, and Alabama, in descending order, were the six largest producing States and accounted for about one-half of U.S. production. About 75% of cement sales went to ready-mixed concrete producers, 13% to concrete product manufacturers, 6% to contractors (mainly road paving), 3% to building materials dealers, and 3% to other users.

Salient Statistics—United States:1	1998	1999	2000	<u>2001</u>	2002 <sup>e</sup>
Production:					
Portland and masonry cement <sup>2</sup>	83,931	85,952	87,846	88,900	89,000
Clinker	74,523	76,003	78,138	78,451	82,000
Shipments to final customers, includes exports	103,696	108,862	110,048	113,136	110,000
Imports of hydraulic cement for consumption	19,878	24,578	24,561	23,591	22,500
Imports of clinker for consumption	3,905	4,164	3,673	1,884	1,660
Exports of hydraulic cement and clinker	743	694	738	746	900
Consumption, apparent <sup>3</sup>	103,457	108,862	110,470	112,710	110,000
Price, average mill value, dollars per ton	76.46	78.27	78.56	76.50	77.00
Stocks, mill, yearend	5,393	6,367	7,566	6,600	7,600
Employment, mine and mill, number <sup>e</sup>	17,900	18,000	18,000	18,000	18,000
Net import reliance <sup>4</sup> as a percentage of					
apparent consumption	19	21	20	21	19

**Recycling:** Cement kiln dust is routinely recycled to the kilns, which can also burn a variety of waste fuels and recycled raw materials such as slags. Cement itself generally is not recycled, but there is a small amount of recycling of concrete for use as aggregate.

<u>Import Sources (1998-2001)</u>:<sup>5</sup> Canada, 20%; Thailand, 15%; China, 13%; Venezuela, 7%; Greece, 7%; and other, 38%. Import sources were diversifying, with China, Colombia, the Republic of Korea, and Thailand becoming major suppliers since 1998. Thailand was actually the single largest source of imported cement and clinker (combined) in 2000, although Canada was the largest source in 2001.

Number	Normal Trade Relations 12/31/02	
2523.10.0000	Free.	
2523.21.0000	Free.	
2523.29.0000	Free.	
2523.30.0000	Free.	
2523.90.0000	Free.	
	2523.10.0000 2523.21.0000 2523.29.0000 2523.30.0000	

**Depletion Allowance:** Not applicable. Certain raw materials for cement production have depletion allowances.

Government Stockpile: None.

<u>Events, Trends, and Issues</u>: Continued very low interest rates and strong public sector construction spending in 2002 mitigated construction declines relative to the much weaker general economy. Cement consumption in 2003 is expected to level off or rise slightly, a key determinant being tenuous State, or offsetting Federal, funding of public sector projects. Cement company ownership continued to consolidate.

Concern continued over the environmental impact of cement manufacture, particularly the emission of carbon dioxide, handling of cement kiln dust (CKD), emissions of trace metals, and emissions of nitrogen oxides. The cement industry is one of the largest sources of carbon dioxide emissions, and U.S. cement producers were voluntarily seeking ways to reduce emissions. Carbon dioxide reduction strategies by the cement industry were aimed at lowering emissions

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per ton of cement rather than by lowering total emissions. Emissions reduction strategies included installation of more fuel efficient kiln technologies, partial substitution of non-carbonate sources of calcium oxide in the kiln raw materials, and partial substitution of cementitious additives for portland cement in the finished cement products.

The continued rise in fossil fuel costs, which started in 2000, was of great concern to the cement industry. Some cement companies burn solid or liquid waste materials in their kilns as a low-cost substitute for fossil fuels. Cement kilns can be an effective and benign way of destroying such wastes; the viability of the practice and the type of waste(s) burned hinge on current and future environmental regulations and their associated costs. The trend, tempered by administrative constraints, appears to be toward increased use of waste fuels. Environmental issues common to mining, such as restrictions on silica in dust, also affect cement raw materials guarries.

Although not much used by cement companies in the United States, there is growing direct use by concrete manufacturers of natural and synthetic pozzolans as partial replacements for portland cement. The United States lags behind many foreign countries in pozzolan use. Pozzolans are materials that, in the presence of free lime, have hydraulic cementitious properties; examples include some volcanic ashes and industrial byproducts such as granulated blast furnace slag, fly ash, and silica fume. Pozzolanic cements, including blends with portland, can have performance advantages over some straight portland cements for certain applications. Because pozzolans do not require the energy-intensive clinker manufacturing (kiln) phase of production, their use reduces the monetary and environmental costs per ton of cement manufactured.

## **World Production and Capacity:**

	Cement production		Yearend clinker capacity <sup>e</sup>	
	<u>2001</u>	2002 <sup>e</sup>	2001	2002
United States (includes Puerto Rico)	90,450	90,600	<sup>6</sup> 10 <del>0,360</del>	102,000
Brazil	39,500	40,000	44,000	45,000
China	626,500	640,000	550,000	550,000
Egypt	24,500	26,000	28,000	35,000
France	19,839	20,000	22,000	22,000
Germany	28,034	28,000	31,000	31,000
India	100,000	100,000	120,000	120,000
Indonesia	31,100	32,000	40,000	40,000
Iran	26,650	28,000	30,000	30,000
Italy	39,804	39,000	46,000	46,000
Japan	76,550	75,000	90,000	90,000
Korea, Republic of	52,012	53,000	58,000	60,000
Mexico	29,966	30,000	37,000	40,000
Russia	35,100	39,000	65,000	65,000
Saudi Arabia	20,608	21,000	24,000	24,000
Spain	40,512	40,000	40,000	40,000
Thailand	27,913	28,000	48,000	50,000
Turkey	30,120	31,000	33,000	33,000
Other countries (rounded)	361,000	360,000	300,000	320,000
World total (rounded)	1,700,000	1,720,000	1,700,000	1,700,000

<u>World Resources</u>: Although individual company reserves are subject to exhaustion, cement raw materials, especially limestone, are geologically widespread and abundant, and overall shortages are unlikely in the foreseeable future. Local shortages generally can be met through imports of cement and/or clinker.

<u>Substitutes</u>: Virtually all portland cement is utilized either in making concrete or mortars and, as such, competes in the construction sector with concrete substitutes such as rammed earth, clay brick, glass, aluminum, steel, fiberglass, wood, stone, and asphalt. Pozzolans and similar materials are being used as partial or complete substitutes for portland cement in some concrete applications.

eEstimated.

<sup>&</sup>lt;sup>1</sup>Portland plus masonry cement, unless otherwise noted. Excludes Puerto Rico.

<sup>&</sup>lt;sup>2</sup>Includes cement made from imported clinker.

<sup>&</sup>lt;sup>3</sup>Production of cement (including from imported clinker) + imports (excluding clinker) - exports - changes in stocks.

<sup>&</sup>lt;sup>4</sup>Defined as imports - exports + adjustments for Government and industry stock changes.

<sup>&</sup>lt;sup>5</sup>Hydraulic cement and clinker.

<sup>&</sup>lt;sup>6</sup>Reported.