CEMENT

(Data in thousand metric tons, unless otherwise noted)[1]

Domestic Production and Use: In 1999, about 81.5 million tons of portland cement and 4.0 million tons of masonry cement were produced at a total of 115 plants, spread among 37 States, by 1 State agency and about 40 companies. In addition, there were two cement plants in Puerto Rico. The ex-plant value of production, excluding Puerto Rico, was about $7.4 billion, and the dominant portland cement component was used to make concrete worth at least $30 billion. Total domestic cement consumption (sales) reached new record levels. There were 106 plants making clinker—the main intermediate product in cement manufacture—with a total calculated annual production capacity of about 83 million tons. Together with seven other facilities just for grinding clinker produced elsewhere, total finished cement (grinding) capacity at yearend amounted to about 95 million tons. If Puerto Rico is included, the clinker and cement grinding capacities become about 85 million tons and 97 million tons, respectively. The top 5 cement companies together accounted for about 41% of total U.S. clinker production and capacity, and the top 10 companies accounted for about 62%. California, Texas, Pennsylvania, Michigan, Missouri, and Alabama, in descending order, were the six largest cement-producing States and together accounted for about 50% of total U.S. production. In terms of use, cement manufacturers sold about 70% of their portland cement output to ready-mixed concrete producers; 12% to producers of concrete products, such as block, pipe, and precast slabs; 11% to contractors (largely for roadpaving); 4% to building material dealers; and 3% to miscellaneous users.

Salient Statistics—United States:[2]	1995	1996	1997	1998	1999[e]
Production, portland and masonry[3]	76,906	79,266	82,582	83,931	86,000
Production, clinker	69,983	70,361	72,686	74,523	76,100
Shipments to final customers, including exports	86,561	91,438	96,801	103,696	110,000
Imports of hydraulic cement for consumption	10,969	11,565	14,523	19,878	25,000
Imports of clinker for consumption	2,789	2,402	2,867	3,905	5,000
Exports of hydraulic cement and clinker	759	803	791	743	750
Consumption, apparent[4]	86,003	90,354	96,018	102,457	110,700
Price, average mill value, dollars per ton	67.87	71.19	73.49	76.46	78.00
Stocks, mill, yearend	5,814	5,488	5,784	5,393	5,000
Employment, mine and mill, number[e]	17,800	17,900	17,900	17,900	18,000
Net import reliance[5] as a percent of apparent consumption	11	12	14	19	23

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.

Import Sources (1995-98):[6] Canada, 31%; Spain, 10%; Venezuela, 10%; Greece, 9%; and other, 40%. Imports were coming from an increasing number of countries, with Asian sources (especially Thailand and China) becoming major suppliers in 1998 and 1999.

Tariff: Item	Number	Normal Trade Relations 12/31/99
Cement clinker	2523.10.0000	Free.
White portland cement	2523.21.0000	Free.
Other portland cement	2523.29.0000	Free.
Aluminous cement	2523.30.0000	Free.
Other hydraulic cement	2523.90.0000	Free.

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

Government Stockpile: None.

Events, Trends, and Issues: Bolstered by continued low interest rates and higher levels of public spending, particularly on highways, the construction market in 1999 continued strong and again generated record consumption levels for cement. The increased demand was met by a small increase in domestic production and a very large increase in imports. One new cement plant came on-line in Florida towards yearend and several other plants continued to be engaged in projects to upgrade their capacities. Antidumping tariffs against Mexico and Venezuela were under "sunset" review, and a decision whether or not to continue the tariffs was expected to be made in 2000.

There continued to be concern over the environmental impact of cement manufacture, particularly the emissions of carbon dioxide and cement kiln dust (CKD). A yearend 1997 accord was reached in Kyoto, Japan that would have

Prepared by **Hendrik G. van Oss [(703) 648-7712, hvanoss@usgs.gov, fax: (703) 648-7722]**

CEMENT

so-called developed countries, including the United States, reduce their carbon dioxide emissions to levels below those in 1990. This accord had yet to be ratified by the U.S. Congress, and there continued much debate as to how this reduction was to be achieved and what its cost would be to the economy. The Environmental Protection Agency in June 1999 published standards for (trace material) hazardous waste emissions, and in August the agency published standards for handling CKD; the public comment period for both documents was extended to February 2000.

A number of cement companies burn a proportion of solid or liquid waste materials in their kilns as a low-cost substitute for fossil fuels. Technically, 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 applicable current and future environmental regulations and their associated costs. The overall trend, tempered by administrative constraints, appears to be towards increased use of waste fuels. A number of environmental issues, such as restrictions on silica in dust, also affect cement raw materials quarries, but these are common to other types of mines as well.

Although still relatively minor in the United States, there is growing use worldwide of natural and synthetic pozzolans as partial or complete replacements for portland cement. Pozzolans are materials that, in the presence of free lime, have hydraulic cementitious properties; examples include certain volcanic rocks and industrial byproducts such as granulated blast furnace slag, fly ash, and silica fume. Pozzolonic 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 unit monetary and environmental costs of cement manufacture. In the United States, most pozzolan consumption continued to be as sales directly to concrete manufacturers rather than within blended cements sold by cement plants.

World Production and Capacity:

	Cement production		Yearend clinker capacity	
	1998	1999[e]	1998[e]	1999[e]
United States (includes Puerto Rico)	85,612	87,300	84,390	85,100
Brazil	[e]43,000	43,000	45,000	45,000
China	513,500	520,000	520,000	500,000
Egypt	19,203	20,000	20,000	20,000
France	[e]19,500	19,500	24,000	24,000
Germany	36,610	37,000	42,000	42,000
India	[e]85,000	87,000	90,000	92,000
Indonesia	[e]22,000	25,000	45,000	48,000
Italy	[e]35,000	35,000	46,000	46,000
Japan	81,328	80,000	95,500	90,000
Korea, Republic of	46,791	55,000	57,000	57,000
Mexico	27,744	30,000	43,000	43,000
Russia	26,726	27,000	63,000	63,000
Spain	27,943	28,000	34,000	34,000
Taiwan	19,538	21,000	24,000	24,000
Thailand	[e]30,000	34,000	45,000	45,000
Turkey	38,200	37,000	28,600	30,000
Other countries (rounded)	[e]360,000	370,000	410,000	420,000
World total (rounded)	[e]1,520,000	1,560,000	1,720,000	1,710,000

World Resources: 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 outside purchases, and both clinker and cement are widely traded.

Substitutes: Virtually all portland cement is utilized either in making concrete or mortars and, as such, competes with substitutes for concrete in the construction sector. These substitutes include brick clay, glass, aluminum, steel, fiberglass, wood, stone, and asphalt. There is a moderate but growing use in the United States of pozzolans and similar materials as partial or complete substitutes for portland cement for some concrete applications.

[e]Estimated.

[1]See Appendix A for conversion to short tons.

[2]Portland plus masonry cement, unless otherwise noted. Excludes Puerto Rico.

[3]Includes cement made from imported clinker.

[4]Production of cement (including imported clinker) + imports (excluding clinker) - exports - changes in stocks.

[5]Defined as imports - exports + adjustments for Government and industry stock changes.

[6]Hydraulic cement and clinker.