CEMENT

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As the binding agents in concrete and mortars, hydraulic cements are key construction materials. Hydraulic cements are those that can set and harden under water and are dominated by varieties that can be loosely grouped as portland cement and masonry cement. Only portland and masonry cements are covered in this report. In 2000, U.S. production of portland and masonry cements, combined, continued a multiyear trend of new annual records with a 2.2% increase to 87.8 million metric tons (Mt) (table 1). Output of clinker—the unground intermediate product of cement manufacture—increased by almost 3% to a new record of 78.1 Mt. The United States continued to rank third in the world in overall hydraulic cement output, behind China (about 36% of the world's total) and India; world output was about 1.6 billion metric tons (Gt).

Domestic consumption of cement again reached new record levels, but the growth in 2000 was significantly slower than annual rates over the period 1995-99 and reflected weakness in the overall U.S. economy. Apparent consumption of cement in 2000 (calculated as production plus imports minus exports minus the change in yearend stocks) rose only by 1.5% to 110.5 Mt; it had grown by 5.2% in 1999 (table 1). Cement consumption measured as sales to final domestic customers increased by 1.0% to 109.7 Mt (table 9); the growth rate was only one-fifth of that of the previous year. The large production shortfall in 2000, as in previous years, continued to be met by imports of cement and clinker but at a slightly lower level overall; it was the first decline since 1992. Exports, in contrast, rose in 2000 but remained an almost insignificant component of total cement commerce. Cement prices were virtually unchanged during the year. The total ex-factory value of annually reported cement sales to final domestic customers rose by 2.6% to $8.3 billion (table 1). If the unit value of the cement is applied to the larger, monthly-based sales tonnages in table 9, the total rises to $8.6 billion but is an increase of only 1.2%. By using typical cement-in-concrete mix ratios, the delivered value of concrete, excluding mortar, in the United States was estimated to be at least $37 billion in 2000.

Portland and masonry cements are based upon portland cement clinker, made up mostly of calcium silicates and manufactured by controlled high-temperature burning in a kiln of a measured blend of calcareous rocks (usually limestone) and, as needed, lesser quantities of siliceous, aluminous, and ferrous materials. The clinker is finely ground together with a small (generally about 5%) amount of calcium sulfate in the form of gypsum and/or anhydrite to make (straight) portland cement. Straight portland cement can be sold directly to concrete manufacturers or other customers, converted at the cement (or concrete) plant into a blended (portland) cement product of similar properties by adding other cementitious or pozzolanic (siliceous materials requiring added lime to become cementitious) extenders, or mixed with such plasticizing materials as ground limestone or lime to make masonry-type cements used in mortar. A full listing of cement varieties included within the portland cement designation as used in this report is given in table 16. Although included within the portland cement designation in this report, data showing blended cements separately from the other forms of portland cement are available within the monthly cement reviews of the

Cement in the 20th Century

In 1900, the hydraulic cement industry of the United States was less than a century old, and until that year, its output had been dominated by natural and pozzolanic cements. Portland cement had been manufactured domestically since only the early 1870s, and by 1900, its output of 1.46 million metric tons had just exceeded that of natural and pozzolanic cements (1.22 million tons, combined) for the first time. In 1900, hydraulic cement production was valued at $19.4 million. Cement was being manufactured at 114 plants, 50 of which produced portland cement. Total world cement production was probably only about 60 million tons, of which 44 million tons was in Europe. Cement consumption in the United States totaled 3.07 million tons in 1900, or about 24 kilograms per person. About 13% of the total cement consumed was imported, mostly from Europe. Most of the consumption was for concrete blocks and mortars.

In 2000, production of cement reached 87.8 million tons, valued at about $6.9 billion; about 95% of output was portland cement. Output was from 116 plants, most of which were owned by European-based multinational corporations. Consumption of cement totaled 109.7 million tons, or about 380 kilograms per person; the 22-million-ton production deficit was met by imports from around the world. The dramatic increase in production and consumption during the course of the century reflected increasing diversity of use of concrete in large office buildings, houses, roads, bridges, sewers, and dams. Except for major disruptions during the Great Depression and World War II, production had risen fairly continuously, reaching about 30 million tons by 1928 and again by 1947, surging through the 1950s onwards to about 78 million tons in 1973, fluctuating at lower levels over the period 1974-93, and resuming steady growth thereafter. World production in 2000 totaled about 1.6 billion tons, almost 60% of which was from Asia; China and India together contributed 40%.

U.S. Geological Survey (USGS) Mineral Industry Surveys series, starting with January 1998. Excluded from the portland and masonry categories and from this report are such hydraulic cement varieties as pure pozzolan cements [especially so-called slag cement, which is simply ground granulated blast furnace slag (GGBFS)] and aluminous cements. These cements contain no portland cement clinker and, cumulatively, make up only a small fraction of the U.S. cement market.

The bulk of this report incorporates data compiled from USGS annual questionnaires sent to individual cement and clinker manufacturing plants and associated distribution facilities and import terminals (some independent of U.S. cement manufacturers). For 2000, responses were received from 143 of 144 facilities canvassed, which included all producers, covering 100% of actual production and more than 99% of sales. For 1999, responses were received from 139 of 141 facilities canvassed, including all but 1 small producer, and covering more than 99% of total U.S. production and sales. Two tables (9 and 10) of this report are based on monthly shipment surveys of the cement-producing companies and importers, for which the response rate was 100% for both years. Trade data are from the U.S. Census Bureau. The world hydraulic cement production data (table 23) were derived from data collected by USGS country specialists from a variety of sources.

As in previous years, significant tonnage differences exist between the annual (survey) sales totals for portland cement listed in tables 1 and 11 through 16 and the larger monthly-survey-based totals listed in tables 9 and 10. The differences, amounting to 5.3 Mt in 1999 and 4.0 Mt in 2000, likely represent imported cement handled by certain terminals acting independently of the manufacturing plants; although incorporated within the monthly data set, some of these terminals' sales appear to be missing from the annual survey. Accordingly, the monthly data are believed to be the more complete measure of cement consumption. The equivalent discrepancy for masonry cement is insignificant, likely because little of this material is imported.

Where required to protect proprietary information, State data are combined within groupings or districts, generally corresponding to census districts or subsets thereof. To provide additional market information, some major cement-producing States have been subdivided along county lines; the county breakouts are given in table 2.

There were three significant ownership changes within the U.S. cement industry in 2000. In June, Australian-owned CSR America, Inc. (owner of Miami, FL, cement producer CSR Rinker Materials, Inc.) purchased Florida Crushed Stone Co., which operates a dry plant at Brooksville, FL. Two months later, Greek producer Titan Cement S.A. purchased the assets of Anglo American plc's subsidiary Tarmac America, Inc., thereby gaining full control of Roanoke Cement Co. in Virginia (in which Titan was already a joint-venture partner) and Pennsuco Cement Co. in Florida. Titan also owned Essex Cement Co., a New Jersey-based cement importer. By far the most important ownership transfer, however, took place at the end of September, when Cemex S.A. de C.V. of Mexico (CEMEX) announced its purchase of Southdown, Inc., the second largest U.S. cement producer and (hitherto) the largest U.S.-owned cement company. Prior to this purchase, CEMEX's only production facility in the United States was the Balcones Plant (formerly operated under the name Sunbelt Cement Co.) in Texas, and the company owned large import terminals in California and Arizona. With the purchase of Southdown, CEMEX gained control of a dozen more plants spread throughout the country—namely at Brooksville, FL; Charlevoix, MI; Clinchfield, GA; Demopolis, AL; Fairborn, OH; Knoxville, TN; Kosmosdale, KY; Lyons, CO; Odessa, TX; Pittsburgh, PA; Victorville, CA; and Wampum, PA—as well as a number of terminals. The Kosmosdale and Pittsburgh plants were joint ventures with Lone Star Industries, Inc. (25%).

Early in the year, Lafarge, the world's second largest cement producer, launched a well publicized hostile takeover bid for British company Blue Circle Industries, a major rival world and U.S. cement producer. Had it been successful, the merger would have made Lafarge the largest cement producer in the world and the United States. The bid failed when, in May, Blue Circle shareholders rejected Lafarge's bid.

Legislation and Government Programs

Economic Issues.—Government economic policies and programs affecting the cement industry chiefly are those affecting cement trade, interest rates, and public sector construction spending. In terms of trade, the major issue in 2000 remained that of antidumping tariffs against Japan and Mexico and a related voluntary restraint (import price) agreement with Venezuela that were imposed in the early 1990s following complaints in the late 1980s by a large coalition of U.S. producers. On March 6, 2000, the U.S. Department of Commerce (DOC) released its determination for the (eighth) review period covering August 1997 to July 1998; the dumping margin for the period was set at 45.84% (Southern Tier Cement Committee, 2000a). Pursuant to a World Trade Organization agreement, which became effective in 1995 and which required a sunset review after 5 years to determine the necessity of continued antidumping tariffs, a review was begun in mid-1999 of the antidumping remedies imposed on Japan, Mexico, and Venezuela. On June 27, 2000, the DOC issued the results of its part of the sunset review (as to whether dumping would continue or resume if tariffs were removed). The determination was that dumping would continue/resume at high margins by all three countries (Southern Tier Cement Committee, 2000b). The second investigation under the sunset review process was conducted by the U.S. International Trade Commission (ITC) and was to determine whether or not dumping, if continued or resumed, would cause injury to the U.S. cement industry. On October 5, the ITC concluded its investigation, determining, on a majority vote, that injury would occur if dumping resumed or continued by Japan and Mexico. Accordingly, the antidumping remedies against these two countries would be maintained for another 5 years. However, in a unanimous vote, the ITC terminated the antidumping remedy (pricing agreement) against Venezuela (Southern Tier Cement Committee, 2000c). The ruling on Mexico was a surprise to some analysts who had speculated that continued injury to the industry from Mexican cement imports would be difficult to prove following the withdrawal in late 1999 of Southdown, Inc., a major proponent of the original tariffs, from the industry coalition that was supporting the continuation of the antidumping remedies. Southdown had cited the strong U.S. cement market conditions in recent years and substantial control of imports by U.S.

producers as evidence that the tariffs were no longer needed. It was unclear whether CEMEX, the main Mexican company targeted by the antidumping order on Mexican cement, would appeal the ITC ruling based on a change of circumstances following its purchase of Southdown.

In terms of Government funding of construction projects, the cement industry had anticipated much higher spending levels in 1999 and 2000 on road and related infrastructure repair and construction as a result of the signing into law in June 1998 of the Transportation Equity Act for the 21st Century (TEA-21). This law authorized $216.3 billion in funding for the 6-year period from 1998 to 2003 for the purpose of upgrading the country's transportation infrastructure. The level of funding exceeded previous spending levels by an average of about 44% per State, and the bill contained substantial funding guarantees. Funding provided for various facets of highways, including new roads and bridges and existing infrastructure upgrades and repair, totals about $173 billion, of which about 95% was guaranteed. Estimates varied as to how much added cement consumption [typically 6 million to 8 million metric tons per year (Mt/yr)] would result from full-level TEA-21 spending, but nowhere near this level of added consumption had materialized as of yearend 2000. It appeared that the impact of delays in State funding (for cofunded projects) and of lag times between project initiation and actual cement consumption was greater than had been anticipated.

***Environmental Issues.*—**Both mining and manufacturing are involved in cement production. As shown in table 6, approximately 140 Mt/yr of raw materials are directly or indirectly mined in the United States to produce cement, and the clinker that is imported converts to another almost 8 Mt/yr of raw materials, albeit mined outside the country. Calcareous feeds, such as limestone, make up about 85% of the raw materials mined by the cement companies themselves; most of the remaining materials are obtained locally as well. In addition, as shown in table 7, the cement industry burns significant quantities of fossil fuels. Most mines and quarries supplying the cement industry are open pit operations. Environmental issues affecting mining of cement raw materials are mostly local and are common to most surface mines; they include potential problems with dust, increased sediment loads to local streams, noise, and ground vibrations from blasting. Of greater concern, however, are the environmental impacts of the cement manufacturing process itself, most of which stem from the manufacture of clinker.

In 2000, U.S. clinker kilns burned about 15 Mt of fossil and/or other organic fuels (table 7). In the debate over climate change, the impact of greenhouse gases on atmospheric warming is a major issue. The most common greenhouse gas is carbon dioxide (CO_2), and fuel combustion and calcination of carbonate (limestone) feed in the clinker kilns both generate large quantities of this gas. Calcination basically follows the equation: $CaCO_3 \rightarrow CaO + CO_2\uparrow$. Although precise determinations of CO_2 emissions by the U.S. industry are unavailable from the companies themselves, reasonable estimates (within 5% to 10%) of the emissions for the industry overall can be made based on certain assumptions as to the composition of the raw materials and fuels consumed and the clinker produced. These assumptions are explained in more detail in the 1999 and earlier editions of this report, but generally, the production of 1 metric ton (t) of clinker releases 0.51 t of CO_2, and the combustion of fuels releases on the order of 0.4 to 0.5 t of CO_2, depending on the types of fuel consumed and the pyroprocessing technology used. Thus, approximately 1 t of CO_2 is released per ton of clinker, and very slightly less (because of the added gypsum) per ton of straight (unblended) portland cement. Based on the clinker production shown in table 5, the U.S. industry released about 77 Mt of CO_2 in 2000. Additionally, U.S. cement plants consumed electricity (table 8) equivalent to about 7 to 8 Mt of CO_2, but this "emission" generally would be assigned to the electrical power industry.

Although dwarfed by the collective CO_2 emissions of powerplants and motor vehicles, the cement industry is one of the largest remaining industrial sources of this gas and is perhaps the largest single industrial source (or possibly second to the iron and steel industry) of CO_2 not derived from the combustion of fuels. Because of this ranking, the cement industry receives more attention concerning its CO_2 emissions than it would like, notwithstanding the fact that its CO_2 emissions are only about 1.5% of the U.S. total (U.S. Environmental Protection Agency, 2001, p. ES-4). The concern of the cement industry with CO_2 continues to be the possibility that the Government, either under the obligations of international environmental treaties or by its own volition, will seek to substantially reduce the cement industry's emissions by such means as the imposition of carbon taxes, the enactment of emissions quotas, or the requirement that low(er) emissions production technologies be used.

As discussed in more detail in the 1999 edition of this report, the Kyoto Protocol, signed at the United Nations Framework Convention on Climate Change held in Kyoto, Japan, in 1997, calls for reductions in CO_2 output by countries to levels substantially below those in 1990, to be achieved by 2012. As of yearend 2000, the U.S. Congress had not ratified the protocol nor had most of the other signatories. To meet its Kyoto Protocol target (7% below 1990 emissions levels), the United States would need to reduce its emissions by 20% or more by 2012 from what they would potentially be at current emissions growth rates. Roughly similar reductions would apply to other countries bound by the protocol. Given that the overwhelming majority of nonagricultural emissions of CO_2 are from the burning of fossil fuels, any major reductions in CO_2 emissions would have to be through proportional reductions in energy consumption, and the economic ramifications of this could be substantial. Most objections to the Kyoto Protocol revolved around the fact that only the so-called developed countries would be bound by it (although all the others would be encouraged to reduce emissions), leaving them at economic disadvantage to countries not so bound. Various proposals for emissions trading, and receiving credit for so-called carbon-sinks, have been debated to reduce the potential economic impacts. In late November, the Sixth Conference of the Parties to the United Nations Framework Convention on Climate Change was held in the Hague (a followup meeting to that in Kyoto in 1997) to discuss these proposals, but no agreement was achieved.

There has been substantial interest in developing precise and auditable inventories of CO_2 and other greenhouse gas emissions to aid emissions reduction strategies. In mid-2000, the Intergovernmental Panel on Climate Change released its so-called good practices methodologies, designed to calculate national emissions levels (Intergovernmental Panel on Climate

Change, 2000).

For the U.S. cement industry, mandated major reductions in CO_2 emissions could require shutting a number of older plants, especially those operating wet kilns, and/or upgrading plant equipment to more efficient technologies. Upgrading, for various reasons, is already underway at many plants but is an expensive process. Mandated emissions reductions could force plants to burn less carbon-intensive fuel, for example, natural gas rather than coal. Many U.S. cement plants already are able to switch among a variety of fuels, but large-scale shifts of cement plants and other fuel-intensive facilities (e.g., powerplants) to natural gas could lead to local shortages and price increases for that fuel. An alternative emissions-reduction strategy, market permitting, would be to increase the output of blended cements and perhaps allow the addition of small amounts of inert extenders (as bulking agents) in straight portland cement. Either strategy would reduce the clinker (and hence emissions) component of the finished cement, which in turn would reduce total emissions by the cement industry or at least constrain emissions increases if cement demand (and output) grows. A major shift to blended cements could lead to local shortages of suitable pozzolans, as well as increased prices for them. The U.S. concrete industry is itself a significant direct consumer of pozzolans, which are used as a partial substitute for portland cement in ready-mixed concrete and some other concrete mixes. A recent review of CO_2 emissions reduction strategies, focusing on reductions of specific energy consumption, is given in Martin, Worrell, and Price (1999). Cement kilns are considered to be an environmentally benign way of burning a variety of hazardous and nonhazardous wastes, owing to the very high temperatures at which clinker is made and the long residence times of materials in the kiln. A waste fuel that has received recent attention in Europe is bone meal, which has become abundant through the necessity of slaughtering vast numbers of diseased livestock and which, from such contaminated sources, is unusable for most other applications (Whitehorn, 2001).

Another approach to reducing emissions from clinker manufacture is to use a noncarbonate source for some of the CaO in the kiln feed. A process patented by Texas Industries, Inc. (TXI), and known as CemStar, makes use of ferrous (particularly steel) slag as a CaO raw material in the kiln feed. As noted in a review by Perkins (2000), use of CemStar increases clinker output by as much as 10% or more, with commensurate reductions in unit CO_2 emissions. The process has been licensed to a number of plants and is reflected in the steel slag consumption data in table 6.

Other emissions of the cement industry include cement kiln dust (CKD), nitrogen and sulfur oxides (NOx and SOx, respectively), and dioxins and furans. The U.S. Environmental Protection Agency issued regulations concerning these and other emissions from the industry in 1999, but most of these regulations were still under one form or another of review or debate in 2000. Except for CKD (virtually all of which is captured and a majority of which is recycled to the kilns), the cement industry is not considered a major source of these pollutants compared with a number of other industries. The cement industry is nonetheless concerned about new emissions limits and prescribed monitoring methods, namely the degree that they can or cannot be realistically implemented and/or the emissions controlled. Many plants are already improving their burning systems to reduce NOx emissions; a review of methods to do this is given by Wahlquist (2000).

Production

In 2000, cement was produced in 37 States and in Puerto Rico. All of the facilities were in the private sector with the exception of one plant (Dacotah Cement Co.) that was State-owned. At yearend 2000, about 79% of U.S. portland cement output and 85% of its production capacity were foreign-owned, a major increase from the 68% foreign ownership status at yearend 1999 and mostly owing to the CEMEX purchase of Southdown. In addition to the portland and masonry cement plants, there were several grinding facilities that produced GGBFS from unground slag from domestic or foreign sources. When ground, this material (GGBFS) is sold to the cement and concrete industries as a cementitious additive; it is also known as “slag cement,” but the use of this term is confusing as it already refers to a specific type of high GGBFS-content blended portland cement. GGBFS plants will not be dealt with in this report except to the extent that their product makes its way into blended cements, and with respect to the fact that all or most of them could grind clinker instead, should market conditions so warrant.

Although, technically, there were no new (greenfields) plant openings in 2000, a facility in Florida that had commenced clinker production in late December 1999 had its first output and sales of portland cement in January 2000 and reached full capacity production levels (clinker and cement) later during the year. One small grinding facility that had in recent years only been operated as a terminal resumed grinding on an intermittent basis. New plants are planned or are under construction in Colorado, Florida, Missouri, New York, and Texas.

Following the startup of clinker production at yearend 1999, Florida Rock Industries, Inc., had its first production and sales of portland cement from its new 0.68-Mt/yr Newberry, FL, plant in January 2000, a project reviewed by Cohrs (2001). The facility reached full output levels after several months of ramp-up operations. Suwannee American Cement Co. received some of its environmental permits to construct a greenfields plant near Branford, FL (Portland Cement Association, 2000b).

Many existing plants had expansion projects completed during the year or which were within 1 to 2 years of completion. A few of the larger projects will be mentioned here. Ash Grove Cement Co. was replacing the two wet kilns at its Chanute, KS, facility with a single dry kiln of about 1.5 Mt/yr capacity; the work was expected to be completed by mid-2001 (Ash Grove Cement Co., 2001). Blue Circle was adding a new kiln line at its Calera, AL, plant, with a completion date anticipated for 2002 (World Cement, 2000). The company also commissioned a new slag grinding mill at its Detroit, MI, clinker-grinding plant. Early in the year, Holnam, Inc., fired up its newly constructed second kiln line at its Midlothian, TX, plant. The new line doubled the plant’s existing capacity to 2 Mt/yr (Arthur, 2000). Essroc Cement Corp. was planning to expand the capacity of its Speed, IN, plant by 75% by converting its long dry kiln to short dry technology. The work was anticipated to be completed around yearend 2001 (International Cement Review, 2000a). At yearend, Holnam broke ground for a new 2,000 Mt/yr dry kiln to replace the existing pair of wet kilns at its Holly Hill, SC, plant. The kiln was expected to come online in mid-2003. Holnam was also constructing a new 1.9 Mt/yr dry kiln line to replace the three existing wet lines (total capacity 0.77 Mt/yr) at its Florence, CO, facility; the new line was targeted to start production in early to mid-2001. At yearend, Holnam announced its decision to proceed with a project to build a 4 Mt/yr greenfields cement plant in St. Genevieve County, MO. This would be the largest single kiln line in the country (Cement Americas, 2001). Lehigh Portland Cement Co. was replacing the four long dry kilns at its Union Bridge, MD, plant with a new, single, dry precalciner kiln. The new line was due to be fired in early 2001 (Barzoloski, 2000). At midyear, Lone Star completed the conversion of its Greencastle, IN, wet kiln to semidry technology, thereby almost doubling its capacity to 1.17 Mt/yr. This was the first semidry line in the country (Mining Engineering, 2001). In August, RC Cement Co. brought online a new finish mill at its Signal Mountain Cement Co. subsidiary in Tennessee; the project's new 0.72-Mt/yr kiln line was due to be fired up in early 2001, at which time the existing pair of wet kilns would be shut down (Maranzana, 2000). RC's subsidiary River Cement Co. was planning to expand the capacity of its Selma, MO, plant by about 0.4 Mt/yr (Portland Cement Association, 2000a). Late in the third quarter, Southdown, Inc. (prior to its takeover by CEMEX), completed the kiln line upgrade of the Kosmos Cement plant in Louisville, KY; announced in 1999; the plant is a joint ventured with Lone Star. Work on the new finish mill at TXI's Midlothian, TX, was completed late in the year and the company expected to have the plant's new kiln fired in January 2001. This will increase the plant's capacity to about 2.5 Mt/yr (International Cement Review, 2000b).

Portland Cement.—Portland cement was manufactured in the United States in 2000 at a total of 115 plants out of 116 claiming clinker grinding capacity (the remaining plant produced only GGBFS). There were also two portland cement plants in Puerto Rico. Seven of the portland-cement-producing facilities were only grinding plants (that did not produce their own clinker); one of these was operated only intermittently during the year, and several also ground slag in addition to clinker. The regional distribution of these plants, cement production and capacities, and yearend cement stockpiles are listed in table 3.

In 2000, production of portland cement rose by 2.4% to 83.5 Mt, a new record but still well below total consumption (table 9). Further, the production was slightly enhanced (0.27%) by the added production day (2000 was a leap year). The production shortfall continued to be met by imports (tables 18-22). As shown in table 3, portland cement production increases were noted in all but 10 districts. The decreases were all in districts accessible to imported cement. The top five producing States, in descending order, continued to be California, Texas, Pennsylvania, Michigan, and Missouri.

Cement (grinding) capacity increased by 6.0% to 103.4 Mt as a result of upgrades at several plants; large increases were reported in a dozen districts, and only four districts showed decreases. Capacity utilization was high virtually everywhere, although it fell slightly (to 80.7% utilization) for the country overall. Where the annual utilization rates appeared to be low or had fallen significantly, the cause was generally the coming on-stream of additional capacity, which was fully counted but not fully used during the year. Florida remained a case in point, with a new plant starting its grinding mill in January 2000 (clinker production commenced at yearend 1999) and upgrades coming on-line at other facilities. The capacity utilization figure is understated because it is calculated using only the production of portland cement, whereas the grinding capacities reported by the plants include that for masonry cement. If masonry cement production (table 4) is included, national grinding capacity utilization in 2000 recalculates to 84.9%, compared with 88.1% in 1999. Given the fact that reported capacities take into account shutdowns only for routine maintenance, the capacity utilization rates shown are likely close to full practical operational levels.

The 2000 district and national annual grinding capacities exceeded, sometimes by large amounts, the corresponding clinker production capacities listed in table 5. This is owing to a number of factors. Some districts have dedicated grinding facilities that import all of their clinker. It is generally easier and cheaper for an integrated plant to add grinding capacity than to add clinker capacity. Extra grinding capacity allows a plant to quickly increase product output and to change cement formulations by the expedient of importing clinker and/or cementitious additives. The exceptionally large excess grinding capacity in Michigan in part reflects restricted cement-shipping capabilities of one plant during the winter—all of its cement must be made (ground) and shipped during the open-water months.

The grinding capacity declines shown in a few districts may simply represent temporary mill shutdowns during upgrade projects or the permanent retirement of obsolete grinding equipment. In some years, declines may also reflect the transfer of some grinding capacity to nonclinker applications where the reporting company chose not to consider it as available for cement.

Yearend 2000 stockpiles of portland cement were 11% higher than at yearend 1999; although this change affects the apparent consumption statistics in table 1, it has little significance for the cement industry itself. Shifts in stockpiles can result from buildups or drawdowns related to maintenance and upgrade shutdowns of mills, changes in sales volumes, interruptions to delivery schedules, and the conversion of one type of cement to another higher tonnage type (such as portland converted to blended cement).

Although the sales of various types of portland cement are listed, split out, on table 16, data are not collected on the actual production of the different varieties of portland cement. However, it is likely that the production, for most types, is at least somewhat proportional to the sales in table 16, both in relative percentage and absolute tonnage terms, after adjustment for sales of imported cement (see tables 18-22). The import adjustment can only be approximate, because import tariff numbers only allow differentiation of clinker from hydraulic cement, and within hydraulic cement, differentiation only among gray portland (this would include most of the table 16 listings), white portland, aluminous cement, and "other" hydraulic cement. In terms of the gray portland imports, it may be assumed that the majority qualifies as Types I or II (imports into southern California include a lot of Type V). An import adjustment for white cement is made difficult because of problems with the import data (see the "Values" subsection under the "Consumption" section below). Finally, imports feed stockpiles, not just sales. The import cautions notwithstanding, it can at least be stated that production of Types I and II (or hybrids thereof) accounted for about 90% of total portland cement output.

Portland cement producers in the United States ranged from those having a single, perhaps very small, plant to large, multiplant corporations having in excess of 10% of total U.S. capacity. The ranking of these companies in terms of production and capacity is complicated by how one defines the term “company;” some entities are subsidiaries of common parent corporations and some plants are jointly owned by two or more companies. If companies having common parents are lumped under the larger subsidiary’s name, and if the joint ventures are apportioned, the top 10 companies at yearend 2000, in descending order of production, were Holnam, CEMEX (Southdown), Lafarge, Lehigh, Ash Grove, Blue Circle, Essroc, Lone Star, RC Cement, and TXI. Together, these accounted for 72% and 69% of total U.S. production and production capacity, respectively, and all except Ash Grove and TXI were foreign-owned as of yearend.

Masonry Cement.—Production of masonry cement (including plastic and portland lime cements) fell by 1% to 4.3 Mt in 2000 (table 4), following an almost 10% increase the previous year. Unlike portland cement, masonry cement production was virtually identical to its reported domestic consumption, and very little of that consumed was imported (table 9). The data in both tables 4 and 9, however, underrepresent true production and consumption levels of masonry cement, because it is common for masonry cement (particularly the portland lime variety) to be made at the job site itself, from purchased portland cement and lime. There are no data on this jobsite activity, but it is likely to be substantial. The reported production decline reflects lackluster demand during the year (see “Consumption” section below) and cold-weather-induced work delays towards yearend. In 2000, all but 5% of the masonry cement was reported by cement companies as having been made directly from clinker rather than starting from a finished portland cement. This ratio has not varied much in recent years.

Clinker.—Table 5 lists district-level information on clinker production, capacity, capacity utilization, and yearend stockpiles. Output of clinker increased by 2.8% to 78.1 Mt in 2000, yet another record. As with cement, clinker production in 2000 reflected a 0.3% increase owing to the 1-day longer leap year. The increase was widespread, with only a few districts (Illinois, Kentucky, Mississippi, and Tennessee; Arizona and New Mexico; and northern California) showing declines, and most of these were small. As in 1999, clinker was produced by a total of 111 integrated cement plants, operating 201 kilns. Two of these plants and kilns were in Puerto Rico. About 70% of the plants used dry-process kiln technology. Two facilities operated both wet and dry kilns, and one facility completed its kiln conversion during the year from wet to semidry technology (listed as dry in table 5).

California, Texas, Pennsylvania, Missouri, and Michigan, in descending order, remained the top five clinker-producing States in 2000. Combining companies as much as possible under common ownership, the top 5 companies had 49% of total U.S. clinker production and capacity, and the top 10 companies had about 72% of both. The top 10 companies, in descending order of production, were CEMEX (including Southdown), Holnam (remained first in capacity, however), Lafarge, Lone Star, Lehigh, Ash Grove, Essroc, Blue Circle, RC Cement, and TXI.

Apparent clinker capacity increased by 4.0% to 89.3 Mt/yr; as with production, the capacity statistic benefited from the additional workday in 2000. Capacity utilization fell slightly to 87.5% (from 88.5% in 1999), but there continued to be only very few districts that showed utilization rates below 85%. The low rate in Indiana was due to a kiln conversion (upgrade) shutdown for part of the year. With few exceptions, the capacity utilization rates depict an industry at full practicable production levels nationwide.

Annual clinker capacity and capacity utilization data are sensitive to reporting errors related to the classification of kiln downtimes. For each kiln, apparent annual capacity is calculated as the reported daily capacity times the “expected working year,” which is the full year (366 days in 2000) minus the number of days that the kiln was shut down for routine maintenance. Emergency shutdowns, scheduled shutdowns for plant upgrades, and those for slow market conditions are not counted, except to the extent that they overlap the days planned for routine maintenance. Typically, one or two outages, totaling 1 to 4 weeks, are scheduled for annual routine maintenance, and this work mostly revolves around replacement or repair of the refractory brick linings in kiln and other pyroprocessing equipment. Company interpretations vary, however, as to what should be counted as routine maintenance, and those interpretational differences affect the length of the expected working year and hence the calculated annual capacity. This downtime uncertainty or sensitivity means that small changes in regional annual capacity or capacity utilization have little, if any, statistical significance. This differs from the grinding (cement) capacity data noted earlier, which are directly reported by the plants. The daily clinker capacities listed in table 5 should be viewed with caution as they are particularly sensitive to propagation of rounding errors.

Within the above constraints, average plant clinker capacity in 2000 was 0.82 Mt/yr, up by 3.7%, and average kiln capacity was 0.45 Mt/yr, up by 4.4%. Plants operating only dry (including one semidry plant) process kilns produced 75.5% of the total clinker (table 7), those operating wet kilns accounted for 22.5% of the clinker, and the two plants that operate both types of kilns contributed the remainder. The dry kiln contribution in 1999 was 73.7%.

Yearend 2000 clinker stockpiles totaled 5.3 Mt, up by 1.5 Mt, but the significance of this is uncertain. Clinker stocks are generally built up ahead of planned kiln shutdowns, most but not all of which are held in the winter months. Some clinker is also imported. Nevertheless, the yearend increase in 2000 is in line with reported monthly clinker production increases late in the year (and in all other months except May) combined with an 11% drop in portland cement sales in November and a 17% drop in December. The stockpile increase, combined with an increase in production, is consistent with the decline of 0.8 Mt in clinker imports for the year (table 22).

Raw Materials and Energy Consumed in Cement Manufacture.—Nonfuel raw materials used for cement manufacture may be divided into materials used to make the clinker and those added subsequently in the grinding phase (finish mill) to make the cement itself. The differentiation is primarily of environmental interest; materials used to make clinker are burned in the kiln and are associated with various chemical changes and emissions; those used in the finish mill are merely comminuted. Table 6 lists these materials as well as the amount of imported (foreign) clinker ground. About 1.7 t of nonfuel raw materials are needed to make 1 t of clinker, and the ratio also approximately holds to make portland cement (provided that the foreign clinker used to make cement is also back-converted to raw materials). Limestone or other calcareous materials account for about 87% of the total raw materials required. The mass ratios among various major raw materials were essentially the same for 2000 and 1999. The listing of materials under headers like "Calcareous" and "Siliceous" is to some degree artificial because many of the raw materials supply more than one oxide.

The clinker versus cement differentiation of nonfuel raw materials is subject to reporting errors, as this was not requested prior to the 1998 survey and some plants remain unaccustomed to it. Accordingly, some of the increases in 2000 may simply reflect improved reporting rather than a net change in true consumption. Additionally, some materials may be inconsistently classified from year to year or among plants. For example, one plant's limestone might be another's cement rock; likewise with clay and shale and among the several ferrous slags. Furthermore, some materials are generally not routinely fully measured by the plant, most notably CKD, where the component automatically recycled to the kiln is generally unmeasured. Accordingly, the CKD consumption listed in table 6 (clinker column) is substantially too low. Increasing environmental interest in CKD may lead the industry to begin measuring this material more completely in the future.

Among the siliceous raw materials, some of the pozzolans appear to be out of balance with the sales (as a proxy for production) of blended cements listed in table 16. This is true especially for GGBFS, consumption of which is much too high for the sales of the appropriate blended cement. The explanation for this is that most of this slag was not consumed by the cement industry to make blended cements but was used as a grinding aid in States that allow an addition of a minor amount (up to about 3%) of GGBFS within Type I portland. However, the amount of GGBFS listed in table 6 is perhaps only 10% of the true consumption of this material by, ultimately, the concrete (especially ready-mixed) producers, who buy GGBFS directly from slag processors and blend it as a partial portland cement substitute into their concrete mixes. Likewise, the amount of fly ash listed in the table 6 cement column is but a small fraction of the roughly 9 Mt/yr of this material purchased directly by the concrete industry for use as a cement extender (American Coal Ash Association, 1999). It should be reiterated that table 6 reflects consumption by the cement producers, not the concrete manufacturers. The large increase in steel slag consumption (for clinker) in table 6 appears to reflect the increasing popularity of the CemStar process developed by TXI, as discussed earlier.

Table 7 lists the consumption of fuels by type of kiln process. Many cement plants are able to switch among a variety of primary fuel types, and many routinely burn a mix of fuels. It is difficult to analyze changes in the ratios among fuels on a national basis, save that the high costs of petroleum-based fuels and natural gas in 2000 led to widespread shifts back to coal and increased use of solid and liquid wastes. The decline in use of waste tires is surprising but may reflect unreported problems with environmental permits held or sought by specific plants. It could also represent data omissions or misinclusion of tires in the "Solid" waste rather than "Tires" category.

As in past years, dry plants produced the majority of the clinker and consumed the majority of fuels (although less fuel per ton of clinker), with the exception of wet process consumption of liquid waste fuels. High production costs associated with the wet kiln process made the cost savings achievable through use of liquid wastes (which the plants are paid to take) very attractive, and the very long residence times in the kilns made for environmentally efficient burning of this material.

Table 8 lists the consumption of electricity by the cement industry, differentiated by process type. As expected, dry process plants had a higher average unit electricity consumption that wet kilns, reflecting the complex array of fans and blowers associated with modern dry kilns. The average unit consumption for dry plants increased slightly in 2000, possibly reflecting the inclusion of one semidry plant that was converted from wet technology during the year. The large increase in unit consumption by plants operating both wet and dry kilns is of little significance, as it represents only two plants. The increase listed for grinding plants, which follows a decrease in 1999, may reflect increased output of GGBFS from some of these plants. Slag-processing plants have higher unit electricity consumption levels than do cement mills because slag is harder to grind and is ground finer than clinker.

Consumption

Apparent consumption of cement is listed in table 1 and rose by 1.5% in 2000 to 110.5 Mt. Although apparent consumption is a standard statistic for comparing consumption of various commodities, the measure of consumption preferred by the cement industry for its market analyses (because the data are available monthly and are sourced directly from the cement companies) is that of cement sales or shipments to final customers. These monthly data are listed totaled for 1999 and 2000 in tables 9 and 10. Consumption (sales) in 2000 of portland and masonry cement rose by 1.0% to 109.7 Mt. The definition of "final customer" is left to the reporting cement producer, but is generally understood to include concrete manufacturers, building supply dealers, construction contractors, and the like. The monthly data are collected in terms of the destination of sales (location of final customer, i.e., consumption by State), and by State or country of origin (manufacture). Although the monthly reports differentiate between portland cement and (portland-based) blended cement, both are included in the term "portland cement" in this report (including table 9).

Tables 11 through 16 list various annual survey data on or derived from shipments of cement reported by cement producers and import terminals. Some of the data, especially those in tables 12 and 13, look superficially similar to the data in tables 9 and 10, but there are important differences between the two data sets, particularly for portland cement. Tables 9 and 10 show the larger totals, and these data are believed to be more complete (especially regarding imported cement) and thus a better measure of true consumption levels. Tables 9 and 10 also show the true location of the sales (customers) for the cement; however, the cement could have been sourced elsewhere. In contrast, the regional data in tables 12 through 16 simply reflect the location of the reporting facilities, not their customers nor necessarily where the cement was manufactured.

Examination of the data for Michigan and Ohio will illustrate the interpretational difference between the two data sets. Michigan consumed 3.5 Mt of portland cement in 2000 (table 9), but Michigan producers shipped almost 5.8 Mt (table 12) to final customers, not necessarily all in Michigan. Michigan was thus a net exporter of cement. Ohio consumed 3.9 Mt of portland cement, but its producers (and terminals) shipped only 1.2 Mt (table 12). Ohio was thus a net importer of cement. Nonproducing States like New Jersey import all of the cement they consume (table 9).

National Consumption.—In 2000, portland cement consumption grew by only 1.1% (compared with 5.0% in 1999) but still achieved a new record of 105.3 Mt (table 9). The imported cement component of this fell by 2.5% to 21.9 Mt; the decline was mainly because of domestic production increases, but imports still were about 21% of total consumption. However, the cement import volumes understate the importance of imports, because the country also brought in 3.8 Mt of clinker (table 22), equivalent to about 3.9 Mt of portland cement, so the true import dependence for portland cement in 2000 was closer to 25%. Masonry cement consumption declined by 0.5% to 4.3 Mt from the record level of 1999. The import component of this was only about 1%.

Because cement is a key construction material, growth in cement consumption reflects trends in construction spending. Overall construction spending levels increased by 2.1% in 2000 (relative to revised 1999 data) to $706.9 billion (constant 1996 dollars), according to U.S. Census Bureau data quoted by the Portland Cement Association (2001). Within this total, residential construction grew by 2.1% to $323.7 billion, of which single-family dwellings accounted for $204.8 billion, up by 1.1%. Despite continued very low mortgage rates, the residential construction growth rate in 2000 was modest compared with the 6% level seen in 1999 and reflected a generally slowing economy; much of the growth was in residential improvements rather than new units. Private nonresidential construction grew by 3.6% to $179.7 billion, powered by a 12.0% increase in office construction to $47.6 billion. This performance likely reflects the long lead times on orders placed in 1999 or earlier. Industrial construction fell by 6.2% to $27.4 billion and followed a 17.2% drop in 1999. Public sector construction spending was essentially stagnant (down by 0.2%) in 2000 at $151.8 billion. Public building construction increased by 2.8% to $70.4 billion. The important road construction component of public spending fell by 3.6% to $45.2 billion, a disappointment given the anticipated increase in spending related to TEA-21 funding, and the 8.8% (revised) spending increase in 1999. The explanation, in part, was that a higher than anticipated percentage of TEA-21 work during 2000 was for repairs rather than for more concrete-intensive new construction. Further, the slowing general economy was apparently hurting State revenues and hence State contributions to projects that involved joint State and Federal funding sources.

In contrast with recent years, the growth rate in overall construction spending in 2000 was higher than that, in tonnage terms, of portland plus masonry cement consumption. In the latter half of the 1990s, an increase in "penetration rate" (tons of cement consumed per million dollars of construction spending) was seen more or less each successive year. The improved penetration rate was generally credited to promotional efforts by the cement industry, in some years aided by moderate (relative to other construction materials) cement price increases. For example, in 1996, $1 million in construction spending "bought" 147.9 t of cement, and in 1999, $1 million (in 1996 dollars) "bought" 156.7 t of cement. Despite the virtually stagnant cement prices in 2000 (see "Values" subsection that follows), the penetration rate per $1 million (1996 dollars) declined to 155.2 t. The reasons for the decline are unclear, but probably include a combination of factors. Ignoring speculation on construction spending data accuracy (caused by to reporting delays, for example) and the likelihood of revisions to the 2000 inflation rates, major factors could be lag times in construction schedules relative to payment reporting, construction design (i.e., use of concrete versus competing construction materials), construction categories (e.g., single family versus multiple family dwellings versus roads versus factories, etc.), and type of work (e.g., concrete-intensive new construction versus less concrete-intensive repairs). Regarding the type of work, it might be speculated that, in a slowing economy, new construction might be deferred in favor of repairs to existing structures. Another factor, although difficult to quantify, is the fact that even the USGS monthly cement surveys do not capture 100% of the cement imports, but these missing imports are being consumed nonetheless. If this missing material amounted to just 1 Mt more in 2000 than in 1999, the penetration rate for 2000 would be unchanged from that in 1999. Yet another factor, also difficult to quantify, is that the true total consumption of hydraulic cement in the United States would include that of cementitious or pozzolan extenders bought directly by the concrete producers. These extenders have been mentioned in the raw materials discussion in the "Production" section and also will be discussed in the "Types of Portland Cement Consumed" subsection that follows; the tonnages involved (especially pre-1998) are not known with certainty, but would likely be in the range of 7 Mt/yr to 12 Mt/yr for the period 1996-2000. Finally, total construction spending involves many material and other costs (e.g., labor) besides those for cement or concrete.

Table 9 lists consumption of portland cement by State, and the general origins of the (total) cement consumed. About half of the States showed consumption declines, although many of these were small and likely would have registered a net increase for the year but for cold-weather-induced declines almost nationwide in November and December. Consumption increases were maintained in most of the strong-performing States of recent previous years, although strong increases (of 0.1 Mt or more) were seen only in California, Colorado, Florida, Nevada, and Virginia. Texas, usually a strong performer, managed to eke out a modest increase courtesy of the northern half of the State. Overall, in contrast with recent years, consumption in the southeastern Atlantic and Gulf Coast States was generally weak throughout the year, notably southern Texas (except during the summer). Several of the Rocky Mountain States, notably Utah, showed a slowdown in consumption, although Nevada remained very strong. Consumption grouped by census district is listed in table 10. In terms of portland cement, the 10 largest consuming States, in declining order, were California, Texas, Florida, Ohio, Illinois, Michigan, Georgia, Pennsylvania, Arizona, and New York. These combined had 53.5% of the U.S. total consumption.

Consumption of masonry cement also declined in about half of the States, but most of the declines were small. As noted in the "Production" section, data for masonry cement sales to final customers (table 9) underrepresent true consumption because it is common for masonry cement to be mixed from components at the job site rather than being brought in as a finished product. Also, the data exclude the output of a small number of small masonry cement blending plants, which are treated instead as final customers for portland cement. The very small (reported) consumption decline is likely because of to late year cold weather construction delays compared with the warmer 1999 winter.

Table 11 lists portland cement shipments to final customers in terms of transportation method. As in previous years, bulk deliveries by truck directly from plants or via terminals continued to dominate deliveries to customers. In contrast, railroad and waterborne transport were the most important methods of shipping cement from plants to terminals.

Values.—Tables 12 through 14 list mill net values provided by the plants and import terminals for their total shipments to domestic final customers of gray portland cement, white cement, and masonry cement. Because value data are highly proprietary and some companies express misgivings about providing value data of any type, values are not requested for shipments by individual types of portland cement. However, the tonnages shipped, by type, are reported (table 16). For the value of total shipments, no distinction is made between bulk and container (bag) shipments; however, container shipments would be expected to have higher unit values. Regional values for white cement have been lumped with those for gray portland cement, with the exception of the national total for white in table 14. Fewer than 10% of respondents to the 2000 survey declined to provide mill net value data—a modest improvement from the 1999 survey. Where value data were not provided, values supplied by plants in the same market area were averaged and applied as an estimate.

Mill net values for integrated plants can be defined as the (sales) value at, or free on board (f.o.b.), the manufacturing plant, including any packaging charges but excluding any discounts and shipping charges to the final customers. For independent terminals, particularly import terminals, the equivalent statistic sought would be the terminal net value. In the case of imports, this would essentially represent the cost, insurance, and freight (c.i.f.) value of the imports plus unloading and storage costs plus the terminal's markup.

Because the values listed in table 12 incorporate more than one type of portland cement, in both bulk and bag shipments, and some overall estimates, readers are cautioned that the values listed should be considered to be estimates, even though they are presented unrounded. Indeed, the mill net values are better viewed as price indices for cement, suitable for crude comparisons among regions and during time. Most especially, the unit value data cannot be viewed as actual shopping prices for cement. The data for portland cement are assumed to be dominated by bulk sales of the Types I and II varieties.

The average mill net value of portland cement in 2000 was $77.34 per ton, up by only 0.2%— a change of no statistical significance. Combined with a 2.4% increase in shipment tonnage (table 12), the total value of shipments rose by 2.6% to $7.8 billion. The same average unit value applied to the larger portland sales tonnage in table 9 yields a total value of $8.1 billion, up by 1.4%. The lower percentage increase in the value of the table 9 sales reflects the inclusion therein of a higher tonnage of (inexpensive) imported material than in table 12. Although the tonnage of imported cement grew by 0.7% in 2000, the unit value of the imports fell by 2.2% to $49.57 per ton (tables 18-22). Another constraint on portland cement prices continued to be that ready-mixed concrete companies (customers), for cost and performance reasons, were using a substantial fraction of cementitious or pozzolanic extenders in their mixes, which they would blend themselves, and were thus buying less straight or blended portland cement than they would have otherwise. By comparison with the average customs value (comparable to mill net plus, possibly, shipping to the export terminal) of imported gray portland cement, which was $35.50 per ton (table 20), and which is a rough indicator of sales prices in foreign countries, U.S. sales prices were very high by world standards. This made the United States a very attractive export target for many foreign producers.

Table 13 lists masonry cement sales and values in terms of the location of the reporting facilities. The average unit value of sales rose by 4.1% to $107.42 per ton and total sales rose by 2.6% to $459 million ($465 million for the volume in table 9). It should be noted, however, that the mill net values for masonry cement contain more component estimates than those for portland cement, and for a number of respondents, the masonry cement mill net values appear to have been reported on a bulk-equivalent basis instead of being inclusive of bagging charges.

Table 14 is a summary of cement unit values for the country overall. The data for white cement should be viewed with caution because there are only a few producers and importers of this product, and a significant share of white cement sales to final customers is as (marked up) resales by gray cement companies. Additionally, white cement includes a larger component of relatively costly package shipments, of imported material, and of estimates overall. Thus, the 4% unit mill net value decrease in 2000 to $159.45 per ton, if real, may not be statistically significant. A discussion of prices for imported white cement is given in the "Foreign Trade" section that follows.

The only data for domestic delivered prices for cement are those for Type I portland (per short ton) and masonry cement (per 70-pound bag) published monthly by the journal Engineering News-Record. The data represent a survey of customers, which most likely are ready-mixed concrete producers for portland cement and building supply depots for masonry cement, in 20 U.S. cities. The 20-city average delivered price in 2000 for Type 1 portland cement converts to $88.79 per metric ton, up by 1.7%, and ranged by only $1.29 per ton during the year. In contrast to some recent years, prices declined in the fourth quarter from their summer highs, reflecting cold-weather-related construction activity declines in the winter. The $12.18 difference between the Engineering News-Record average price and the average mill net value for gray portland cement in table 14 is an indicator of the approximate average delivery charge for bulk cement. This was significantly higher than the $10.86 per ton delivery differential in 1999 and likely reflects, at least in part, the higher fuel costs in 2000. District variations in mill net values in table 12 do not parallel very well the variations among Engineering News-Record prices for comparably located cities, possibly reflecting local transportation and related variables and the fact that the mill net regionality (table 12) reflects the location of the survey respondent, not the customer. The Engineering News-Record 20-city average for masonry cement in 2000 was $6.23 per bag, which literally converts to $196.21 per ton and which was a 26% increase from the price in 1999. The average price and the price shift both greatly exceed the $107.42 per ton (up by 4%) mill net value shown in tables 13 and 14. The large differences for masonry cement would seem excessive, even accounting for a large component of packaging, handling, and (higher) delivery charges, and may reflect price reporting inaccuracies in either or both surveys.

Cement Customer Types.—Data on (portland) cement usage is collected on the basis of the types of customers to whom the cement is sold (table 15) rather than the direct application itself. The distinction is that a given customer, although classified in one category, may in fact have used the cement in more than one way. The data in table 15, as with values, are approximations. The main reason for this is that the surveys request more details (user categories) than many respondents are able to provide. Although much improved in recent years' surveys, there remain a number of companies or plants that either do not track their customers by user type at all or do so only broadly. A persistent problem is that of overlap of categories, the most common example of which is in cases where the customer is a ready-mixed concrete producer that is also engaged in road paving. The dilemma for the respondent is whether to assign the sales to the "Ready-mixed concrete" or to the "Contractors—road paving" subcategory on the form or whether to attempt a split. Further, for several user categories, the subset "Other" commonly gets used as a catch-all instead and is thus overused. Where estimates are made, either by the companies themselves or by the USGS, there is a bias towards the major usage categories; the minor categories are, therefore, likely underrepresented. As with the shipment data in table 12, the regional divisions in table 15 are the locations of the respondents, not the customers.

Notwithstanding these limitations, a number of comments on cement user types in 2000 can be made. As in past years, the dominance of ready-mixed concrete producers in the cement market is very evident. Ready-mixed concrete companies purchased almost 75 Mt of portland cement in 2000, or almost 74% of total sales, although there is undoubtedly significant overlap with the almost 5 Mt assigned to road paving contractors (table 15, footnote 5) and with the 1 Mt assigned to the "Government and miscellaneous" category. Compared with the respective levels in 1999, the ready-mixed tonnage in 2000 was up by 3.4%, the road paving category was down by 18%, and the two combined increased by 1.8%. Because the ready-mixed plus road paving combination would be expected to closely track the 2.4% increase in total (all categories) portland cement sales, some of the ready-mixed tonnage would be better assigned to the road paving category. That the road paving tonnage is likely too low is further supported by the 3.6% decline in road and highway construction spending noted earlier. A transfer of just 0.9 Mt, either all from the ready-mixed category or split 50-50 with the "other or unspecified" contractor subcategory, to the road paving category would shrink the road paving tonnage decline for the year to 3.6%. But this would not be statistically justified given that the overall error range in the table 15 data likely exceeds this adjustment amount significantly. Further, the tonnages do not reflect some of the imported cement used by ready-mixed concrete companies and road pavers.

Portland cement sales to concrete product manufacturers increased by 10.4% to 13.5 Mt, with sales to brick and block manufacturers up by 9.1% to 6.1 Mt; precast concrete companies, up by 22% to 3.1 Mt; and pipe manufacturers up by 8.2% to 1.7 Mt (table 15, footnote 4). These growth rates exceed those for building construction noted earlier, but this may not be suspicious given the large component of value added in building construction. Overall consumption by contractors fell by almost 13% to about 7.1 Mt, with large percentage declines seen in all the specific categories, not just road paving (table 15, footnote 5). These declines, again, seem to be out of step with the construction spending levels noted earlier but in part may reflect consumption of imported cement not captured by the annual survey. Sales to building materials dealers fell by 16.3% to 3.5 Mt, which would appear to be out of phase with the increased spending levels for residential construction; the decline probably, at least partially, reflects incomplete reporting.

The general category "Oil well, mining, waste" lumps minor categories that are prone to underrepresentation. Portland cement sales to customers engaged in oil well drilling were up by 41% to 1.2 Mt (table 15, footnote 6), although the rate of change is out of line with the almost 80% increase, to 1.0 Mt, in sales of oil well cement (table 16). The discrepancy is hard to evaluate because the user tonnage is likely underreported, and ordinary types of portland cement (e.g., Types I, II), which tend to get assigned to major use categories, can be used for shallow oil wells in lieu of specialized oil well cements. A large increase in such sales was expected, however, given higher crude petroleum prices and drilling levels during the year. There was an almost 48% increase in the average weekly Baker Hughes (oil and gas drilling) rig count for 2000 (Oil & Gas Journal, 2001). Reported sales to mining companies fell by 28%, but the data are likely incomplete and subject to large relative errors because of the small tonnages involved. A large decrease in 2000, however, was expected given generally depressed metal commodity prices during the year and anecdotal accounts of mine closures and layoffs. Cement is used by mining companies as an agglomeration agent for heap leaches and in concrete for machinery foundations and for backfill of underground excavations.

Types of Portland Cement Consumed.—Sales to final customers of varieties falling within the broad definition of portland cement are listed in table 16. In 2000, Types I and II, combined, accounted for 88% of total portland sales, a typical proportion though slightly lower than in 1999. As noted in the introduction, the annual survey tonnages (e.g., table 16) are smaller by several million tons than those derived from the monthly surveys. It is believed that most of the "missing" tons are imports, and it is known that the great majority of cement imports are of Type I and II portland. Accordingly, the entries for Types I and II and the grand totals in table 16 could be augmented by about 5 Mt and 4 Mt in 1999 and 2000, respectively. Minor augmentations would also be justified for the white cement and Type V categories. Reported sales of Type V portland cement jumped by 46% in 2000, but much of this increase can be accounted for by a reclassification of some Type I and II material made and sold in California based on its actual chemical performance (Type V cements exhibit high sulfate resistance).

Blended cement sales in 2000 grew by 8.6% to 1.3 Mt, representing 1.3% of total portland cement sales, about the same as in 1999. The 2000 sales (table 16) of blended cements are slightly higher than those derived from the monthly surveys (1.2 Mt and 1.2% of total portland plus blended sales), but the difference appears to be of little statistical significance. Overall, the proportion of total blended to total portland cement sales have remained virtually unchanged during the past several years, despite anecdotal evidence that concrete producers (particularly of ready-mixed product) have increased their use of cementitious extenders during this period. Evidently, although blended cement paste is becoming more popular with the concrete producers and their customers for cost and performance reasons, the concrete companies find it cheaper to do their own purchasing of extenders and their own blending rather than purchasing blended cements from the cement companies.

Notwithstanding similar total blended cement sales tonnages during the years, the ratios among specific types of blended cement have been variable. In 2000, sales of blends containing natural pozzolans fell by almost 16% (relative to levels in 1999) to 0.2 Mt; those of blends containing GGBFS rose almost by 29% to about 0.4 Mt; sales of blends with fly ash rose by 27% to 0.4 Mt; and sales of miscellaneous blended cements (e.g. containing CKD or silica fume) dropped by 9% to 0.3 Mt. In contrast, sales in 1999 (relative to 1998) of natural pozzolan blended cements declined by 19%; blends with GGBFS were up by 81%; those with fly ash were down by 27%; and those with miscellaneous pozzolans rose by 47%. For the 2000 blended cement sales, the tonnages listed are in line with the raw materials consumption (for cement rather than clinker) shown in table 6, except for blends with GGBFS and "Other pozzolans." The comparisons assume a typical pozzolan content in blended cement of 15% to 30% and that none of the pozzolan consumption in table 6 was for masonry cements. For GGBFS, the consumption for cement listed in table 6 is two to three times the amount needed to make the blended cement sold (table 16). The excess represents material used in the finish mills as a grinding aid; this is permitted within Type-I portland designations in some States provided that the slag content in the cement does not exceed about 3%. Although actual consumption data were lacking, based on the reported capacities of various slag-grinding facilities, it may be estimated that the amount of GGBFS consumed to make cement (table 6) is likely only about 10% of that which ultimately makes its way into concrete. Likewise, the amount of ash consumed for cement is only a small fraction of the 9 Mt reported as consumed for cement (other than for clinker) and concrete manufacture in 1999 (American Coal Ash Association, 1999) and probably in 2000 (actual 2000 data are unavailable); the inference is that most of this consumption is directly by the concrete manufacturers.

White portland cement sales increased by about 5%, but some of the cement may represent material that was actually sold within a white or colored masonry product. Oil well cement sales rose by almost 80%, reflecting substantially increased drilling activities during the year.

Foreign Trade

Tables 17 through 22 list trade data from the U.S. Census Bureau. Exports of hydraulic cement and clinker (table 17) increased in 2000 but, excepting sales to Canada, were essentially insignificant, and overall, the exports continued to be of almost no consequence to the U.S. cement economy. Almost all of the exported material was cement.

The U.S. cement economy continued to be significantly import dependent, although total imports of hydraulic cement and clinker (tables 18-19) declined by 2.3% to 28.7 Mt (including Puerto Rico). This was the first annual decline since 1992 and reflected a combination of a slowing growth in demand and an increase in domestic production capacity. The import tonnage decrease was in stark contrast to increases of 22% in 1999, 37% in 1998, and 24% in 1997. The 2000 tonnage represents approximately 25% of the total world trade in cement and clinker, based on global estimates (International Cement Review, 2001). The average unit c.i.f. value of imports fell by 1.4% to $48.72 per ton; the decline was a combination of a 4.0% decrease in base (customs) value to $37.44 per ton and an 8.4% increase in combined shipping (mostly fuel-related) and insurance costs to $11.28 per ton.

The hydraulic cement component of imports (derived by subtracting clinker imports in table 22 from the table 18 data) totaled 24.9 Mt, virtually unchanged from that in 1999. Gray portland cement imports were 95.7% of this total and were up by only 0.7% (table 20). The c.i.f. value of gray portland cement imports fell by 2.3% to $46.65 per ton, within which the customs value fell 5.1% to $35.50 per ton, and the freight and insurance charges rose by 7.7% to $11.15 per ton. In 1999, the customs value had fallen by 4.7% and the shipping charges had risen by almost 10%. The total c.i.f. value of gray portland imports fell by 1.7% to $1.11 billion. Customs values in 2000 ranged from $21.13 per ton for cement from the Philippines to $51.81 per ton for Canadian cement. Shipping charges ranged from $3.43 per ton from Canada (railroad) to $24.07 per ton from the Philippines, but there was considerable overlap of shipping charge rates among various source countries and regions and the cement landing points (table 19); because of this overlap and the large number of variables within shipping charges, no firm shipping charge trends could be discerned. As noted in the "Values" subsection, the customs values listed are much lower than the U.S. mill net and/or terminal net values of portland cement sold to final customers (tables 12 and 14), making the United States an attractive market for surplus foreign production, and making it relatively easy for U.S. importers to absorb rising transportation costs, even for material sourced from vast distances.

Although Thailand replaced Canada as the largest single source of hydraulic cement and clinker imports combined, in 2000, Canada remained the largest source of gray portland cement (table 20). Gray portland imports from Canada fell by 3.5% in 2000 to 3.9 Mt. Thailand was second, with 3.6 Mt, up by 16.3%. China, which had been second in 1999, was third with 3.3 Mt, down by 19.3%.

White cement imports are listed in table 21, and rose by almost 12% during the year to 0.92 Mt. The unit value (c.i.f.) rose by 1.2% to $110.70 per ton. However, this average value and several of the specific country annual average values appear to be too low (see, for example, the entries for Norway and various Asian countries), reflecting very low unit values on certain individual monthly shipments (not shown). Likewise, the import tonnage appears to be too high. Unless reflecting dumped material, the most likely explanation for the low unit values is that the data include some gray portland cement, supposed to be reported under the Harmonized Tariff Schedule of the United States (HTS) code 2523.29.00 or that the importers mistakenly invoiced under the white cement HTS code (2523.21.00). Coding errors are difficult to verify, but past experience indicates that they do occur, though infrequently. Apart from the low overall value, evidence for misinclusion of gray cement is also found in some price differences between imported gray and white portland cement. For example, the 2000 imports of white cement from Indonesia calculate to a (suspiciously low) unit value (c.i.f.) of $54.61 per ton, which was only $10.43 per ton more than the unit value for imported Indonesian gray portland cement. This white cement premium is far smaller than normal, even considering expected general variability because of the imports perhaps comprising a mix of bulk and bag shipments. For U.S. cement imports overall, the premium for white cement was $64.05 per ton, and that for overall sales (table 14), $82.84 per ton. Finally, the white cement import tonnage appears to be out of line with the market for this material. Although the white cement market is very difficult to analyze—it being a fairly specialized product that is sensitive to a relatively small number of individual construction projects—the import tonnage increase exceeds the construction spending trends noted earlier. A final indication of problems with the white cement import data is that the total import volume exceeds the total white portland cement sales volume in table 16, which is inclusive of sales of domestically produced material. The excess appears to be much larger than could be reasonably accommodated by apportioning some imports to masonry cement sales (not included in table 16) or to yearend stockpiles. However, despite misgivings about some of the entries in table 21, the data therein for at least the major country sources calculate to realistic unit values and thus appear to be accurate. In 2000, Mexico was the largest source of white cement imports, followed by Canada, Denmark, and Spain.

Imports of clinker are listed in table 22. Total imports in 2000 fell by 17.7% to 3.8 Mt, and the unit c.i.f. value of the imports rose by 1.8% to $43.13 per ton. However, the data for both years are bolstered by the inclusion of a small quantity of very expensive aluminous cement clinker from France, the cement from which has very different applications than those for portland cement. If the French material is removed, the total remaining imports drop to 3.7 Mt (down by 17.1%), at a unit customs value of $29.41 per ton (down by 3.7%), and a unit c.i.f. value of $40.13 per ton (up by 2.2%).

Thailand continued to be the largest country source of the clinker imports, followed by Canada, which had been the largest source in 1999. The remaining major suppliers of clinker to the United States, in decreasing order, were Turkey, Colombia, China, and the Republic of Korea; neither Korea nor Turkey had supplied clinker to the United States in 1999. Excluding aluminous cement clinker, customs values for imported clinker ranged from $18.70 per ton for Chinese material to $51.42 per ton for imports from Canada. Thailand clinker had an average customs value of $19.82 per ton. Because of shipping costs, the price range was less extreme on a c.i.f. basis: Chinese clinker was $27.22 per ton, Canadian clinker was $53.67 per ton, and Thailand clinker was $35.10 per ton.

Imports of cement and clinker, by customs district of entry, are listed in table 19. New Orleans continued to be by far the busiest entry point for both cement and clinker; Detroit had been the largest clinker import venue in 1999. Much of the material coming into New Orleans was destined to be transferred onto barges for transport up the Mississippi River system. In terms of serving local markets, the largest cement-importing States were California, Florida, and Texas.

World Review

Individual country cement production data are listed in table 23. The data for some countries may include their exports of clinker. Although the data are supposed to include all forms of hydraulic cement, the data for the United States are for portland plus masonry cement only, and the data for some other countries also may not be all inclusive. Because data for many countries are estimated, the annual world totals (which have been rounded) must be viewed as estimates. As estimated, world hydraulic cement production increased by about 2.5% in 2000 to 1.64 Gt.

With production reported at 583.2 Mt, China was by far the largest cement producer in the world in 2000. Although precise data are lacking, India was in second place, and the United States was in third. The remainder of the top 15 cement-producing countries in 2000, in decreasing order, were Japan, the Republic of Korea, Brazil, Germany, Italy, Turkey, Russia, Thailand, Mexico, Spain, Indonesia, and Egypt. These top 15 countries accounted for about 75% of total world production and much of the growth in world production in the past decade. China alone, since 1995, has increased its output by 107 Mt/yr.

On a regional basis, Asia again accounted for about 59% of the world total production. This region, particularly Southeast Asia, was slowly recovering from the economic crisis that began in late 1997, and local cement production and consumption levels among the major cement economies increased in 2000; consumption, however, had yet to recover to precrisis levels. This meant that there were still substantial regional cement surpluses available for export at low base prices. Because of higher fuel (hence transportation) costs and generally weaker economies in the export target countries (particularly the United States), the cost advantage of importing cement from Southeast Asia was somewhat less than in 1999.

Europe retained its position as the second largest producing region; Western Europe accounted for 11.6% of world production, and Eastern Europe, 2.6%. North America, including Mexico, was the third largest producing region, with 8.1% of the total, and Latin America and the Caribbean had 5.4% of world output (this would be 7.3% if Mexico were included here). The Middle East, including Turkey, produced 6.3% of the world’s cement, and Africa contributed 4.4%. Countries of the former Soviet Union produced only 2.9% of the world’s cement in 2000 but had a great deal of surplus production capacity available.

There continued to be a large number of cement plant construction and/or modernization projects throughout the world, in many regions spurred by privatization programs and by the need for plants to conform to increasingly universal and stricter environmental standards. Much of the international investment was by a few major international cement companies, most based in Europe. For the most part, these were the same companies that controlled the U.S. cement industry. Geographic diversification of holdings was seen as an advantage, as it allowed a spreading of investment risk among many countries, a market share in regions of large economic growth potential, and access to a diversity of supply sources as needed. Many of the new plants under construction were very large, and many were geared, at least partly, to exports.

Outlook

Cement industry analysts at yearend were anticipating fairly stagnant or declining market conditions in 2001, followed by a small decline in demand for the next year or two, followed by a resumption in steady demand growth, albeit at modest rates of 1% to 3% per year, for the next few years thereafter. The pessimistic short-term outlook was based in part on the cold-weather-induced drastic falloff in cement consumption in November and December 1999 and a general slowdown in the U.S. economy, which looked not to be short-lived. Having been disappointed in 1999 and 2000 by highway construction levels that fell well short of predictions under the TEA-21 funding scenarios, the industry was adopting a wait-and-see attitude towards highway spending levels in 2001 though remaining optimistic that the TEA-21 funding would eventually generate large cement sales.

New plant and/or capacity expansion projects planned or underway in the United States total about 25 Mt/yr of new capacity coming on-line by 2005. Whether or not all of these projects come to fruition, significant capacity additions are certain. These additions likely will substantially reduce the need for imported cement and clinker, although plenty of this material was expected to remain available at attractive base prices. With the termination of antidumping remedies against Venezuela, it was expected that imports from that country could increase at the expense of material from other regional exporters.

Although there was little expectation that the Kyoto Protocol would be ratified, the industry expected that pressures to reduce emissions of CO_2 and that other pollutants would increase, and several companies were taking steps to adopt proactive policies on their plants' environmental performances.

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TABLE 1
SALIENT CEMENT STATISTICS 1/

(Thousand metric tons unless otherwise specified)

		1996	1997	1998	1999	2000
United States: 2/						
Production 3/		79,266	82,582	83,931	85,952	87,846
Production of clinker		70,361	72,686	74,523	76,003	78,138
Shipments from mills and terminals 4/		83,963	90,359	96,857	103,271	105,557
Value 5/	thousands	$5,952,203	$6,637,464	$7,404,394	$8,083,247	$8,292,625
Average value per ton 6/		$70.89	$73.46	$76.45	$78.27	$78.56
Stocks at mills and terminals, yearend 3/		5,488	5,784	5,393	6,367	7,566
Exports 7/		803	791	743	694	738
Imports for consumption:						
Cement 8/		11,565	14,523	19,878	24,578	24,561
Clinker		2,402	2,867	3,905	4,164	3,673
Total		13,967	17,390	23,783	28,742	28,234
Consumption, apparent 9/		90,355	96,018	103,457	108,862	110,470
World production e/ 10/		1,493,000 r/	1,547,000	1,547,000 r/	1,603,000 r/	1,643,000

e/ Estimated. r/ Revised.
1/ Portland and masonry cements only, unless otherwise indicated.
2/ Excludes Puerto Rico.
3/ Includes cement produced from imported clinker.
4/ Shipments are to final customers. Includes imported cement. Data are based on annual survey of individual plants and terminals and may differ from tables 9 and 10, which are based on consolidated monthly shipments data from companies.
5/ Value at mill or import terminal of portland (all types) and masonry cement shipments to final domestic customers. Although presented unrounded, the data contain estimates for survey nonrespondents.
6/ Total value at mill or import terminal of cement shipments to final customers divided by total tonnage of same. Although presented unrounded, the data contain estimates for survey nonrespondents.
7/ Hydraulic cement (all types) plus clinker.
8/ Hydraulic cement, all types.
9/ Production (including that from imported clinker) of portland and masonry cement plus imports of hydraulic cement minus exports of cement minus change in stocks.
10/ Total hydraulic cement. May incorporate clinker exports for some countries.

TABLE 2
COUNTY BASIS OF SUBDIVISION OF STATES IN CEMENT TABLES

State subdivision	Defining counties
California, northern	Alpine, Fresno, Kings, Madera, Mariposa, Monterey, Tulare, Tuolumne, and all counties farther north.
California, southern	Inyo, Kern, Mono, San Luis Obispo, and all counties farther south.
Chicago, metropolitan	Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will Counties in Illinois.
Illinois	All counties other than those in metropolitan Chicago.
New York, eastern	Delaware, Franklin, Hamilton, Herkimer, Otsego, and all counties farther east and south, excepting those within Metropolitan New York.
New York, western	Broome, Chenango, Lewis, Madison, Oneida, St. Lawrence, and all counties farther west.
New York, metropolitan	New York City (Bronx, Kings, New York, Queens, and Richmond), Nassau, Rockland, Suffolk, and Westchester.
Pennsylvania, eastern	Adams, Cumberland, Juniata, Lycoming, Mifflin, Perry, Tioga, Union, and all counties farther east.
Pennsylvania, western	Centre, Clinton, Franklin, Huntingdon, Potter, and all counties farther west.
Texas, northern	Angelina, Bell, Concho, Crane, Culberson, El Paso, Falls, Houston, Hudspeth, Irion, Lampasas, Leon, Limestone, McCulloch, Reeves, Reagan, Sabine, San Augustine, San Saba, Tom Green, Trinity, Upton, Ward, and all counties farther north.
Texas, southern	Brazos, Burnet, Crockett, Jasper, Jeff Davis, Llano, Madison, Mason, Menard, Milam, Newton, Pecos, Polk, Robertson, San Jacinto, Schleicher, Tyler, Walker, Williamson, and all counties farther south.

TABLE 3
PORTLAND CEMENT PRODUCTION, CAPACITY, AND STOCKS IN THE UNITED STATES, BY DISTRICT

(Thousand metric tons unless otherwise specified)

District	1999 Plants active 2/	1999 Produc-tion 3/	1999 Capacity 1/ Finish grinding	1999 Capacity 1/ Percentage utilized	1999 Stocks at yearend 4/	2000 Plants active 2/	2000 Produc-tion 3/	2000 Capacity 1/ Finish grinding	2000 Capacity 1/ Percentage utilized	2000 Stocks at yearend 4/
Maine and New York	4	3,285	3,756	87.5	237	5	3,140	3,846	81.6	313
Pennsylvania, eastern 5/	7	4,710	5,205	90.5	263	7	4,685	5,374	87.2	251
Pennsylvania, western	4	1,980	2,222	89.1	107	4	1,950	2,540	79.8	183
Illinois	4	2,939	3,507	83.8	193	4	2,861	3,787	75.5	290
Indiana	4	2,511	3,052	82.2	190	4	2,634	3,456	76.2	303
Michigan	5	5,813	7,663	75.8	418	5	5,785	7,881	73.4	411
Ohio	2	1,132	1,515	74.7	65	2	1,034	1,497	69.1	73
Iowa, Nebraska, South Dakota	5	4,092	5,452	75.1	342	5	4,255	5,479	77.7	424
Kansas	4	1,974	2,085	94.7	133	4	1,983	2,085	95.1	206
Missouri	5	4,910	5,330	92.1	589	5	4,884	5,186	94.2	634
Florida	7	3,497	6,355	55.0	411	7	3,753	6,817	55.1	411
Georgia, Virginia, West Virginia	4	2,712	3,396	79.8	190	4	3,042	4,656	65.3	209
Maryland	3	1,728	1,837	94.1	97	3	1,756	1,992	88.2	107
South Carolina	3	2,610	3,335	78.3	80	3	2,912	3,361	86.6	172
Alabama	5	4,301	5,005	85.9	267	5	4,337	5,020	86.4	331
Kentucky, Mississippi, Tennessee	4	2,361	2,631	89.8	172	4	2,209	3,545	62.3	191
Arkansas and Oklahoma	4	2,650	3,162	83.8	183	4	2,663	3,162	84.2	281
Texas, northern 5/	6	4,203	4,878	86.2	242	6	4,752	6,012	79.0	370
Texas, southern	5	4,479	4,840	92.6	212	5	4,515	4,842	93.2	247
Arizona and New Mexico	3	2,238	2,336	95.8	83	3	2,175	2,336	93.1	111
Colorado and Wyoming	4	2,128	2,428	87.7	147	4	2,253	2,453	91.9	133
Idaho, Montana, Nevada, Utah	7	2,781	3,306	84.1	222	7	2,818	3,415	82.5	260
Alaska and Hawaii	1	254	499	50.9	49	1	286	288	99.5	27
California, northern	3	2,770	2,862	96.8	159	3	2,811	2,880	97.6	124
California, southern 5/	8	7,519	8,315	90.4	395	8	8,066	9,015	89.5	334
Oregon and Washington	4	1,999	2,598	77.0	238	4	1,953	2,498	78.2	170
Total or average 6/	115	81,577	97,568	83.6	5,902 7/	116	83,514	103,426	80.7	6,564 7/
Puerto Rico	2	1,825	2,065	88.4	34	2	1,664	2,065	80.6	33

1/ Reported annual grinding capacity based on fineness necessary to grind individual plants' normal product mixes, making allowance for downtime required for routine maintenance.
2/ Includes one plant that reported portland cement (clinker) grinding capacity but no production of portland cement.
3/ Includes cement produced from imported clinker.
4/ Includes imported cement. Includes mills and terminals.
5/ Includes data for white cement.
6/ Data may not add to totals shown because of independent rounding.
7/ Total stocks include inventory, not included on a district basis, held by independent importers.

TABLE 4
MASONRY CEMENT PRODUCTION AND STOCKS IN THE UNITED STATES, BY DISTRICT

(Thousand metric tons unless otherwise specified)

District	1999 Plants active	1999 Production 1/	1999 Stocks at yearend 2/	2000 Plants active	2000 Production 1/	2000 Stocks at yearend 2/
Maine and New York	4	122	18	4	130	11
Pennsylvania, eastern	6	219	35	6	225	41
Pennsylvania, western	4	111	13	4	99	16
Indiana	4	W	51	4	444	62
Michigan	5	283	31	5	296	37
Ohio	2	85	17	2	92	27
Iowa, Nebraska, South Dakota	3	W	6	3	W	10
Kansas	2	W	W	2	W	W
Missouri	1	W	W	1	W	W
Florida	4	494	40	5	543	35
Georgia, Virginia, West Virginia	5	370	46	5	331	36

See footnotes at end of table.

TABLE 4--Continued
MASONRY CEMENT PRODUCTION AND STOCKS IN THE UNITED STATES, BY DISTRICT

(Thousand metric tons unless otherwise specified)

District	1999 Plants active	1999 Production 1/	1999 Stocks at yearend 2/	2000 Plants active	2000 Production 1/	2000 Stocks at yearend 2/
Maryland	3	110	19	3	78	19
South Carolina	3	421	32	3	411	25
Alabama	4	429	56	4	401	57
Kentucky, Mississippi, Tennessee	3	W	W	3	83	6
Arkansas and Oklahoma	4	138	13	4	142	25
Texas, northern	4	153	10	4	156	9
Texas, southern	3	108	7	3	112	7
Arizona and New Mexico	3	W	6	3	W	W
Colorado and Wyoming	2	W	W	2	W	W
Idaho, Montana, Nevada, Utah	--	--	(3/)	1	W	W
Alaska and Hawaii	1	3	(3/)	1	3	--
California	6	417 4/	14 4/	6	484	18
Total 5/	76	4,375 6/	466 7/	78	4,332 6/	492

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.
1/ Includes cement produced from imported clinker.
2/ Includes imported cement.
3/ Less than 1/2 unit.
4/ Includes data for southern California only. Northern California data are withheld.
5/ Data may not add to totals shown because of independent rounding. Includes withheld districts.
6/ Production directly from clinker accounted for almost 94% of the total in 1999 and 95% in 2000. Production from portland cement accounted for the remainder.
7/ Total stocks include inventory, not shown on a district basis, held by independent importers.

TABLE 5
CLINKER CAPACITY AND PRODUCTION IN THE UNITED STATES IN 2000, BY DISTRICT

(Thousand metric tons unless otherwise specified)

District	Active plants 1/ Process used Wet	Active plants 1/ Process used Dry	Active plants 1/ Process used Both	Active plants 1/ Total	Number of kilns	Daily capacity	Average days of routine mainte-nance	Apparent annual capacity 2/	Produc-tion	Percentage of capacity utilized	Yearend stocks 3/
Maine and New York	3	1	--	4	5	10.4	39.2	3,411	3,090	90.6	133
Pennsylvania, eastern	2	5	--	7	14	15.2	24.4	5,101	4,590	90.0	189
Pennsylvania, western	3	1	--	4	8	6.1	23.0	2,110	1,964	93.1	235
Illinois	--	4	--	4	8	8.4	19.6	2,829	2,484	87.8	276
Indiana	1	3 4/	--	4	8	10.2	26.0	3,430	2,544	74.2	186
Michigan	1	2	--	3	8	13.5	23.0	4,604	4,347	94.4	346
Ohio	1	1	--	2	3	3.5	24.7	1,196	1,038	86.7	66
Iowa, Nebraska, South Dakota	--	4	1	5	9	13.6	25.7	4,632	3,983	86.0	282
Kansas	2	2	--	4	11	5.6	19.5	1,958	1,789	91.4	207
Missouri	2	3	--	5	7	14.0	24.9	4,662	4,558	97.8	315
Florida	1	4	--	5	7	12.6	23.0	4,315	3,472	80.5	226
Georgia, Virginia, West Virginia	1	3	--	4	7	10.6	29.3	3,608	2,937	81.4	209
Maryland	1	2	--	3	7	5.5	29.0	1,871	1,654	88.4	52
South Carolina	2	1	--	3	7	8.7	16.9	3,015	2,507	83.2	162
Alabama	--	5	--	5	6	14.1	17.8	4,808	4,161	86.5	264
Kentucky, Mississippi, Tennessee	2	2	--	4	5	8.8	17.6	3,038	2,132	70.2	336
Arkansas and Oklahoma	2	2	--	4	10	7.7	19.0	2,665	2,526	94.8	89
Texas, northern	3	3	--	6	15	16.4	20.4	5,752	4,607	80.1	165
Texas, southern	--	4	1	5	6	13.4	22.0	4,606	4,266	92.6	230
Arizona and New Mexico	--	3	--	3	9	6.5	17.4	2,240	2,184	97.5	151
Colorado and Wyoming	1	3	--	4	7	7.0	12.0	2,463	2,182	88.6	180
Idaho, Montana, Nevada, Utah	3	4	--	7	9	8.7	20.7	3,014	2,786	92.4	192
Alaska and Hawaii	--	--	--	--	--	--	--	--	--	--	35

See footnotes at end of table.

TABLE 5--Continued
CLINKER CAPACITY AND PRODUCTION IN THE UNITED STATES IN 2000, BY DISTRICT

(Thousand metric tons unless otherwise specified)

District	Active plants 1/ Process used Wet	Dry	Both	Total	Number of kilns	Daily capacity	Average days of routine mainte-nance	Apparent annual capacity 2/	Produc-tion	Percentage of capacity utilized	Yearend stocks 3/
California, northern	--	3	--	3	3	8.7	33.0	2,872	2,721	94.7	145
California, southern	--	8	--	8	17	26.2	26.1	8,979	7,897	88.0	560
Oregon and Washington	1	2	--	3	3	6.3	35.3	2,085	1,721	82.5	88
Total or average 5/	32	75	2	109	199	261.5	23.0	89,264	78,138	87.5	5,321
Puerto Rico	--	2	--	2	2	5.9	34.0	1,964	1,518	77.3	252

-- Zero.
1/ Includes white cement plants.
2/ Calculated on a per-kiln basis using 366 days (leap year) minus reported days for routine maintenance and multiplied by the reported unrounded daily capacity.
3/ Includes imported clinker.
4/ Includes one semidry plant.
5/ Data may not add to totals shown because of independent rounding.

TABLE 6
RAW MATERIALS USED IN PRODUCING CLINKER AND CEMENT IN THE UNITED STATES 1/ 2/

(Thousand metric tons)

Raw materials	1999 Clinker	1999 Cement 3/	2000 Clinker	2000 Cement 3/
Calcareous:				
Limestone (includes aragonite, marble, chalk, coral)	91,021	1,138	93,947	1,263
Cement rock (includes marl)	23,981 r/	149 r/	21,820	133
Cement kiln dust 4/	305	112	351	155
Lime 5/	10	46	19	49
Other	--	--	21	225
Aluminous:				
Clay	4,770	23	4,205	8
Shale	3,679	--	3,743	3
Other (includes staurolite, bauxite, aluminum dross, alumina, and other)	387	--	400	--
Ferrous, iron ore, pyrites, millscale, other	1,259	--	1,310	--
Siliceous:				
Sand and calcium silicate	2,959	4	3,142	--
Sandstone, quartzite, other	745	--	925	--
Fly ash	1,521	85	1,679	88
Other ash, including bottom ash	760	--	930	--
Granulated blast furnace slag	--	349	--	303
Other blast furnace slag	97	--	43	--
Steel slag	591	--	805	--
Other slags	45	--	12	10
Natural rock pozzolans 6/	--	16	--	40
Other pozzolans 7/	38	4	38	8
Other:				
Gypsum and anhydrite	--	4,643	--	4,655
Clinker, imported 8/	--	4,607	--	4,573
Other, n.e.c.	--	51	--	46
Total 9/	132,169 r/	11,227 r/	133,391	11,558

r/ Revised. -- Zero.
1/ Includes Puerto Rico.
2/ Nonfuel materials only.
3/ Includes portland, blended, and masonry cements.
4/ Data are probably underreported.
5/ Data are probably underreported on the basis of reported volumes of masonry cements.
6/ Includes pozzolana and burned clays and shales.
7/ Includes diatomite, other microcrystalline silica, silica fume, and other pozzolans, whether or not used as such.
8/ Outside purchases by domestic plants; excludes purchases of domestic clinker.
9/ Data may not add to totals shown because of independent rounding.

TABLE 7
CLINKER PRODUCED AND FUEL CONSUMED BY THE CEMENT INDUSTRY IN THE UNITED STATES, BY PROCESS 1/ 2/

	Clinker produced			Fuel consumed					Waste fuel		
Kiln process	Plants active	Quantity (thousand metric tons)	Percentage of total	Coal 3/ (thousand metric tons)	Coke (thousand metric tons)	Petroleum coke (thousand metric tons)	Oil (thousand liters)	Natural gas (thousand cubic meters)	Tires (thousand metric tons)	Solid (thousand metric tons)	Liquid (thousand liters)
1999:											
Wet	34	18,912	24.5	2,394	123	410	25,313	137,105	90	241	819,209
Dry	75	57,014	73.7	6,610	220	1,183	108,509 r/	433,682	586	575	86,319
Both	2	1,411	1.8	202	--	29	--	82,349	9	--	--
Total 4/	111	77,337	100.0	9,206	343	1,622	133,822 r/	653,136	685	816	905,527
2000:											
Wet	32	17,911	22.5	2,409	96	390	32,513	51,482	106	149	801,288
Dry	77	60,172	75.5	7,479	346	920	91,153	206,729	259	867	127,799
Both	2	1,574	2.0	208	--	41	--	80,049	8	--	--
Total 4/	111	79,656	100.0	10,095	442	1,351	123,666	338,261	374	1,016	929,087

r/ Revised. -- Zero.
1/ Includes portland and masonry cement. Excludes grinding plants.
2/ Includes Puerto Rico.
3/ All reported to be bituminous.
4/ Data may not add to totals shown because of independent rounding.

TABLE 8
ELECTRIC ENERGY USED AT CEMENT PLANTS IN THE UNITED STATES, BY PROCESS 1/

	Electric energy used							
	Generated at plant		Purchased		Total			
Plant process	Number of plants	Quantity (million kilowatt-hours)	Number of plants	Quantity (million kilowatt-hours)	Quantity (million kilowatt-hours)	Percentage	Finished cement 2/ produced (thousand metric tons)	Average consumption (kilowatt-hours per ton of cement produced)
1999:								
Integrated plants:								
Wet	--	--	34	2,859	2,859	23.5	21,789	131
Dry	4	486	75	8,601	9,087	74.6	61,804	147
Both	--	--	2	238	238	2.0	1,652	144
Total or average 3/	4	486	111	11,699	12,185	100.0	85,245	143
Grinding plants 4/	--	--	5	154	154	--	2,368	65
Exclusions 5/	--	--	3	--	--	--	165	--
2000:								
Integrated plants:								
Wet	--	--	32	2,685	2,685	21.4	20,544	131
Dry	4	497	77	9,095	9,592	76.6	64,930	148
Both	--	--	2	249	249	2.0	1,593	157
Total or average 3/	4	497	111	12,029	12,526	100.0	87,067	144
Grinding plants 4/	--	--	6	164	164	--	2,294	71
Exclusions 5/	--	--	2	--	--	--	149	--

-- Zero.
1/ Includes Puerto Rico.
2/ Includes portland and masonry cements.
3/ Data may not add to totals shown because of independent rounding.
4/ Excludes plants that reported production only of masonry cement.
5/ Tonnage of cement produced by plants that reported production of masonry cement only. One plant reported portland cement grinding capacity and so is included in table 3.

TABLE 9

CEMENT SHIPMENTS TO FINAL CUSTOMER, BY DESTINATION AND ORIGIN 1/ 2/

(Thousand metric tons)

Destination and origin	Portland cement 1999	Portland cement 2000	Masonry cement 1999	Masonry cement 2000
Destination:				
Alabama	1,514	1,565	155	145
Alaska 3/	120	127	--	--
Arizona	3,199	3,236	112	109
Arkansas	994	952	59	54
California, northern	4,309	4,706	60	63
California, southern	7,432	7,959	367	368
Colorado	2,476	2,597	30	43
Connecticut 3/	785	838	15	15
Delaware 3/	230	165	11	11
District of Columbia 3/	133	178	(4/)	2
Florida	7,094	7,694	553	591
Georgia	3,386	3,434	301	302
Hawaii	251	288	4	4
Idaho	536	558	1	1
Illinois, excluding Chicago	1,612	1,524	28	24
Illinois, Chicago, metropolitan 3/	2,297	2,312	57	62
Indiana	2,311	2,208	103	96
Iowa	1,766	1,710	10	8
Kansas	1,545	1,490	16	15
Kentucky	1,425	1,322	106	98
Louisiana 3/	1,874	1,790	59	55
Maine	219	221	6	5
Maryland	1,237	1,333	83	88
Massachusetts 3/	1,585	1,580	24	23
Michigan	3,486	3,489	160	160
Minnesota 3/	1,987	2,010	32	37
Mississippi	1,016	936	63	56
Missouri	2,590	2,562	42	42
Montana	334	318	1	1
Nebraska	1,114	1,079	10	9
Nevada	1,844	1,963	30	31
New Hampshire 3/	280	268	8	6
New Jersey 3/	1,836	1,915	75	73
New Mexico	777	831	5	6
New York, eastern	602	637	25	30
New York, western 3/	915	871	37	36
New York, metropolitan 3/	1,552	1,677	55	57
North Carolina 3/	2,733	2,764	336	319
North Dakota 3/	336	308	4	3
Ohio	4,171	3,907	199	190
Oklahoma	1,376	1,421	48	45
Oregon	1,053	1,003	1	1
Pennsylvania, eastern	2,134	2,212	60	66
Pennsylvania, western	1,261	1,162	73	66
Rhode Island 3/	178	154	4	3
South Carolina	1,357	1,318	141	139
South Dakota	401	432	3	3
Tennessee	2,264	2,097	236	223
Texas, northern	5,463	5,540	194	198
Texas, southern	6,064	6,005	121	126
Utah	1,509	1,432	(4/)	1
Vermont 3/	138	145	3	3
Virginia	2,074	2,216	154	156
Washington	2,020	2,016	3	3
West Virginia	406	417	30	26
Wisconsin 3/	2,363	2,185	36	33
Wyoming	228	248	1	1
U.S. total 5/	104,195	105,322	4,353	4,333
Foreign countries 6/	315	393	(4/)	--
Puerto Rico	1,810	1,663	(4/)	--
Grand total 5/	106,320	107,378	4,353	4,333

See footnotes at end of table.

TABLE 9--Continued
CEMENT SHIPMENTS TO FINAL CUSTOMER, BY DESTINATION AND ORIGIN 1/ 2/

(Thousand metric tons)

Destination and origin	Portland cement 1999	Portland cement 2000	Masonry cement 1999	Masonry cement 2000
Origin:				
United States	82,032	83,787	4,296	4,281
Puerto Rico	1,810	1,663	--	--
Foreign countries 7/	22,478	21,927	56	52
Total shipments 5/	106,320	107,378	4,353	4,333

-- Zero.
1/ Includes cement produced from imported clinker and imported cement shipped by domestic producers and importers.
2/ Data are developed from consolidated monthly surveys of shipments by companies and may differ from data in tables 1, 11-13, 15, and 16, which are from annual surveys of individual plants and importers.
3/ Has no cement plants.
4/ Less than 1/2 unit.
5/ Data may not add to totals shown because of independent rounding.
6/ Includes shipments to U.S. possessions and territories.
7/ Imported cement distributed in the United States by domestic producers and other importers.

TABLE 10
CEMENT SHIPMENTS, BY DESTINATION (REGION AND CENSUS DISTRICT) 1/ 2/

Region and census district	Portland cement Quantity (thousand metric tons) 1999	Portland cement Quantity (thousand metric tons) 2000	Portland cement Percentage of U.S. total 1999	Portland cement Percentage of U.S. total 2000	Masonry cement Quantity (thousand metric tons) 1999	Masonry cement Quantity (thousand metric tons) 2000	Masonry cement Percentage of U.S. total 1999	Masonry cement Percentage of U.S. total 2000
Northeast:								
New England 3/	3,185	3,206	3	3	60	55	1	1
Middle Atlantic 4/	8,300	8,474	8	8	325	328	7	8
Total 5/	11,485	11,680	11	11	385	383	9	9
South:								
South Atlantic 6/	18,650	19,519	18	19	1,609	1,634	37	38
East South Central 7/	6,219	5,920	6	6	560	522	13	12
West South Central 8/	15,771	15,708	15	15	481	478	11	11
Total 5/	40,640	41,147	39	39	2,650	2,634	61	61
Midwest:								
East North Central 9/	16,240	15,625	16	15	583	565	13	13
West North Central 10/	9,739	9,591	9	9	117	117	3	3
Total 5/	25,979	25,216	25	24	700	682	16	16
West:								
Mountain 11/	10,903	11,183	10	11	180	193	4	4
Pacific 12/	15,185	16,099	15	15	435	439	10	10
Total 5/	26,088	27,282	25	26	615	632	14	15
U.S. total 5/	104,195	105,322	100	100	4,353	4,333	100	100

1/ Includes imported cement shipped by importers and cement ground from imported clinker. Excludes Puerto Rico.
2/ Data are based on table 9.
3/ New England includes Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.
4/ Middle Atlantic includes New Jersey, New York, and Pennsylvania.
5/ Data may not add to totals shown because of independent rounding.
6/ South Atlantic includes Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia.
7/ East South Central includes Alabama, Kentucky, Mississippi, and Tennessee.
8/ West South Central includes Arkansas, Louisiana, Oklahoma, and Texas.
9/ East North Central includes Illinois, Indiana, Michigan, Ohio, and Wisconsin.
10/ West North Central includes Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota.
11/ Mountain includes Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming.
12/ Pacific includes Alaska, California, Hawaii, Oregon, and Washington.

TABLE 11
SHIPMENTS OF PORTLAND CEMENT FROM MILLS IN THE UNITED STATES, IN BULK AND IN CONTAINERS, BY TYPE OF CARRIER 1/

(Thousand metric tons)

	Shipments from plant to terminal		Shipments to final domestic consumer				
			From plant to consumer		From terminal to consumer		Total
	In bulk	In containers 2/	In bulk	In containers 2/	In bulk	In containers 2/	shipments to consumer
1999:							
Railroad	11,137	47	2,851	562	800	45	4,259
Truck	4,132	122	55,101	2,071	38,582	565	96,319
Barge and boat	9,993	--	149	--	(3/)	--	149
Other	--	--	--	--	20	--	20
Total 4/	25,262	169	58,101	2,634	39,402	611	100,746 5/
2000:							
Railroad	11,865	42	1,529	2	479	1	2,010
Truck	4,211	308	56,482	2,464	41,066	737	100,749
Barge and boat	8,082	--	183	--	6	--	188
Other	--	--	--	--	--	--	--
Total 4/	24,158	350	58,193	2,466	41,550	737	102,947 5/

-- Zero.
1/ Includes Puerto Rico. Includes imported cement and cement made from imported clinker.
2/ Includes bags and jumbo bags.
3/ Less than 1/2 unit.
4/ Data may not add to totals shown because of independent rounding.
5/ Shipments calculated on the basis of an annual survey of plants and importers; may differ from tables 9 and 10, which are based on consolidated company monthly data.

TABLE 12
PORTLAND CEMENT SHIPPED BY PRODUCERS AND IMPORTERS IN THE UNITED STATES, BY DISTRICT 1/ 2/

	1999			2000		
	Quantity	Value 3/		Quantity	Value 3/	
District 4/ 5/	(thousand metric tons) 6/	Total (thousands)	Average per metric ton	(thousand metric tons) 6/	Total (thousands)	Average per metric ton
Maine and New York	3,653	$267,464	$73.21	3,422	$267,991	$78.32
Pennsylvania, eastern	4,709	323,732	68.74	4,832	335,078	69.34
Pennsylvania, western	1,788	141,769	79.30	1,412	112,338	79.55
Illinois	2,862	208,919	73.00	2,868	218,777	76.27
Indiana	2,986	211,572	70.86	2,932	199,744	68.13
Michigan	5,922	447,474	75.56	5,766	448,703	77.81
Ohio	1,275	102,203	80.18	1,174	94,503	80.53
Iowa, Nebraska, South Dakota	4,764	369,329	77.52	4,779	376,357	78.76
Kansas	1,754	131,952	75.23	1,693	132,298	78.13
Missouri	6,377	459,575	72.07	5,988	455,724	76.11
Florida	6,790	505,609	74.47	7,325	549,569	75.02
Georgia, Virginia, West Virginia	3,042	236,815	77.85	3,055	238,729	78.13
Maryland	1,645	118,248	71.87	1,675	118,776	70.93
South Carolina	2,804	219,892	78.41	2,661	192,178	72.21
Alabama	4,303	348,740	81.05	4,539	357,813	78.83
Kentucky, Mississippi, Tennessee	2,676	210,448	78.63	2,544	197,836	77.77
Arkansas and Oklahoma	2,924	216,170	73.92	2,659	209,528	78.80
Texas, northern	4,904	384,512	78.40	5,282	410,079	77.64
Texas, southern	5,718	421,881	73.78	5,608	392,860	70.05
Arizona and New Mexico	3,668	339,823	92.66	3,610	350,231	97.03
Colorado and Wyoming	2,385	194,784	81.66	2,581	232,221	89.97
Idaho, Montana, Nevada, Utah	2,965	253,987	85.66	2,965	245,179	82.70
Alaska and Hawaii	335	32,558	106.29 r/	381	39,880	104.67
California, northern	3,052	261,235	85.60	3,749	303,316	80.90
California, southern	8,485	654,767	77.16	9,004	669,445	74.35
Oregon and Washington	3,040	240,578	79.13	2,225	177,615	79.83
Independent importers, n.e.c. 7/	4,105	331,593	80.78	6,552	506,655	77.33
Total or average 8/	98,933	7,635,631	77.21 r/	101,282	7,833,425	77.34
Puerto Rico	1,814	W	W	1,665	W	W

See footnotes at end of table.

TABLE 12--Continued

PORTLAND CEMENT SHIPPED BY PRODUCERS AND IMPORTERS IN THE UNITED STATES, BY DISTRICT 1/ 2/

r/ Revised. W Withheld to avoid disclosing company proprietary data.
1/ Includes imported cement and cement produced from imported clinker.
2/ Includes white cement.
3/ Values represent ex-plant (f.o.b. plant) data collected for total shipments to final customers, not for shipments by specific type of portland cement. Although presented unrounded, the data incorporate estimates for some plants. Accordingly, the data should be viewed as cement value indicators, accurate to no better than the nearest $0.50 or even $1.00.
4/ The district location is that of the reporting facility. Shipments may include material sold into other districts.
5/ Includes shipments by independent importers where district assignation is possible.
6/ Shipments calculated on the basis of an annual survey of plants and importers; may differ from tables 9 and 10, which are based on consolidated company monthly data.
7/ Shipments by importers for which district assignations were not possible.
8/ Data may not add to totals shown because of independent rounding.

TABLE 13

MASONRY CEMENT SHIPPED BY PRODUCERS AND IMPORTERS IN THE UNITED STATES, BY DISTRICT 1/ 2/ 3/

	1999			2000		
	Quantity	Value 4/		Quantity	Value 4/	
District 5/ 6/	(thousand metric tons) 7/	Total (thousands)	Average per metric ton	(thousand metric tons) 7/	Total (thousands)	Average per metric ton
Maine and New York	130	$12,516	$96.65	104	$10,258	$98.95
Pennsylvania, eastern	233	25,429	108.98	243	27,455	112.99
Pennsylvania, western	109	11,635	106.94	98	10,470	107.23
Illinois, Indiana, Ohio	525	52,667	100.34	491	52,949	107.76
Michigan	293	29,049	99.05	293	28,686	97.75
Iowa, Nebraska, South Dakota	44	4,071	92.38	40	3,750	93.69
Kansas and Missouri	145	9,918	68.42	141	11,957	85.07
Florida	477	49,187	103.09	519	61,952	119.43
Georgia, Virginia, West Virginia	311	40,948	131.51	306	40,029	130.72
Maryland	85	7,770	90.91	73	6,641	91.54
South Carolina	387	45,401	117.46	385	42,709	110.80
Alabama	458	50,836	111.01	442	50,166	113.61
Kentucky, Mississippi, Tennessee	94	9,212	97.89	87	8,516	97.96
Arkansas and Oklahoma	140	12,670	90.29	131	11,473	87.88
Texas	242	27,335	112.84	250	26,786	107.31
Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming	152	15,071	99.21	146	15,075	103.44
Alaska and Hawaii	3	331	96.98	4	772	214.95
California, Oregon, Washington	469	38,757	82.62	484	43,171	89.19
Independent importers, n.e.c. 8/	39	4,812	122.09	40	6,385	158.79
Total or average 9/	4,338	447,616	103.19	4,275	459,200	107.42

1/ Shipments are to final domestic customers and include shipments of imported cement and cement made from imported clinker.
2/ Includes white cement.
3/ Excludes Puerto Rico (did not record sales of masonry cement).
4/ Values are mill net and represent ex-plant (f.o.b. plant or import terminal) data collected for total shipments to final customers, not for shipments by cement type. Although presented unrounded, the data incorporate estimates for some plants. Accordingly, the data should be viewed as cement value indicators, accurate to no better than the nearest $0.50 or even $1.00 per ton.
5/ The district location is that of the reporting facility. Shipments may include material sold into other districts.
6/ Includes shipments by independent importers where district assignation is possible.
7/ Shipments calculated on the basis of an annual survey of plants and importers; may differ from tables 9 and 10, which are based on consolidated company monthly data.
8/ Shipments by importers for which district assignations were not possible.
9/ Total includes imports shipped by independent importers.

TABLE 14
AVERAGE MILL NET VALUE OF CEMENT IN THE UNITED STATES 1/ 2/

(Dollars per metric ton)

Year	Gray portland cement	White portland cement	All portland cement	Prepared masonry cement	All classes of cement
1999	76.41	166.04	77.18	103.19	76.45 r/
2000	76.61	159.45	77.34	107.42	78.56

r/ Revised.
1/ Excludes Puerto Rico. Mill net value is the actual value of sales to customers, f.o.b. plant or import terminal, less all discounts and allowances, less any freight charges from U.S. producing plant to distribution terminal and to final customers.
2/ Although unrounded, the data incorporate estimates for some plants and are accurate to no better than two significant figures.

TABLE 15
PORTLAND CEMENT SHIPMENTS IN 2000, BY DISTRICT AND TYPE OF CUSTOMER 1/

(Thousand metric tons)

District 2/ 3/	Ready-mixed concrete	Concrete product manufacturers 4/	Contractors 5/	Building material dealers	Oil well, mining, waste 6/	Government and miscellaneous 7/	District total 8/ 9/
Maine and New York	2,686	378	73	195	--	89	3,422
Pennsylvania, eastern	3,099	1,103	197	323	--	110	4,832
Pennsylvania, western	971	163	157	29	3	90	1,412
Illinois	2,112	399	77	28	252	--	2,868
Indiana	2,306	443	61	105	13	5	2,932
Michigan	4,231	667	484	364	21	--	5,766
Ohio	943	124	56	48	2	--	1,174
Iowa, Nebraska, South Dakota	3,611	688	356	60	57	7	4,779
Kansas	1,313	121	205	30	20	4	1,693
Missouri	4,427	757	690	84	--	30	5,988
Florida	5,135	1,561	108	373	2	145	7,325
Georgia, Virginia, West Virginia	2,230	372	94	339	11	9	3,055
Maryland	1,217	267	132	40	--	18	1,675
South Carolina	2,106	409	43	82	1	21	2,661
Alabama	3,473	689	209	156	3	9	4,539
Kentucky, Mississippi, Tennessee	2,122	270	119	28	5	--	2,544
Arkansas and Oklahoma	1,778	208	607	22	35	9	2,659
Texas, northern	3,305	456	1,069	75	354	22	5,282
Texas, southern	3,732	601	700	153	385	36	5,608
Arizona and New Mexico	2,679	355	266	162	39	108	3,610
Colorado and Wyoming	1,970	233	253	91	34	--	2,581
Idaho, Montana, Nevada, Utah	2,173	258	233	33	81	188	2,965
Alaska and Hawaii	318	37	4	22	--	--	381
California, northern	3,019	374	172	172	--	12	3,749
California, southern	6,669	1,434	399	380	73	49	9,004
Oregon and Washington	1,724	227	137	72	--	64	2,225
Independent importers, n.e.c. 10/	5,301	870	225	84	14	55	6,552
Total 9/	74,655	13,465	7,127	3,548	1,406	1,082	101,282
Puerto Rico	791	204	117	552	--	1	1,665

-- Zero.
1/ Includes shipments of imported cement and cement ground from imported clinker. Data other than district totals are presented unrounded but incorporate estimates for some plants and are likely accurate to only two significant figures.
2/ District location is that of the reporting facility. Shipments may include material sold into other districts.
3/ Includes shipments by independent importers, where district assignations were possible.
4/ Shipments to concrete product manufacturers include brick-block—6,092; precast—3,127; pipe—1,710; and other or unspecified—2,740.
5/ Shipments to contractors include airport—444; road paving—4,816; soil cement—950; and other or unspecified—1,034.
6/ Shipments to oil well, mining, and waste include oil well drilling—1,168; mining—78; and waste stabilization—160.
7/ Includes shipments for which customer types were not specified.
8/ Shipments calculated based on an annual survey of plants and importers; may differ from tables 9 and 10, which are based on consolidated monthly data.
9/ Data may not add to totals shown because of independent rounding.
10/ Shipments by independent importers for which district assignations were not possible.

TABLE 16
PORTLAND CEMENT SHIPPED FROM PLANTS IN THE
UNITED STATES TO DOMESTIC CUSTOMERS, BY TYPE 1/

(Thousand metric tons)

Type	1999	2000
General use and moderate heat (Types I and II) (Gray)	90,891	90,644
High early strength (Type III)	3,297	3,815
Sulfate resisting (Type V)	3,046	4,453
Block	632	636
Oil well	578	1,039
White	848	894
Blended:		
Portland, natural pozzolans	230	194
Portland, granulated blast furnace slag	299	385
Portland, fly ash	319	405
Other blended cement 2/	345	313
Total 3/	1,193	1,296
Expansive and regulated fast setting	85	60
Miscellaneous 4/	175	111
Grand total 3/ 5/	100,746	102,947

1/ Includes imported cement. Includes Puerto Rico.
2/ Includes blends with cement kiln dust and silica fume.
3/ Data may not add to totals shown because of independent rounding.
4/ Includes waterproof and low heat (Type IV) varieties.
5/ Shipments are derived from an annual survey of plants and importers; may differ from tables 9 and 10, which are based on consolidated company monthly data.

TABLE 17
U.S. EXPORTS OF HYDRAULIC CEMENT AND CLINKER, BY COUNTRY 1/

(Thousand metric tons and thousand dollars)

	1999		2000	
Country of destination	Quantity	Value 2/	Quantity	Value 2/
Aruba	5	255	2	218
Bahamas, The	9	1,294	15	1,883
Belize	--	--	6	1,054
Brazil	3	207	5	452
Canada	533	37,795	581	41,161
China	2	72	2	105
Colombia	4	337	2	289
Costa Rica	1	97	6	801
Czech Republic	1	21	7	308
Dominican Republic	6	1,410	1	158
Germany	10	473	(3/)	8
Hong Kong	2	123	9	434
Indonesia	9	415	--	--
Lebanon	(3/)	3	5	262
Mexico	44	7,017	51	10,347
Panama	4	265	3	263
Philippines	(3/)	25	3	711
Russia	1	37	3	128
Saudi Arabia	3	127	2	175
Taiwan	7	325	2	113
Trinidad and Tobago	8	363	2	103
United Kingdom	(3/)	209	4	568
Venezuela	3	313	3	745
Other	41 r/	4,007 r/	24	3,918
Total 4/	694	55,190	738	64,204

See footnotes at end of table.

TABLE 17--Continued
U.S. EXPORTS OF HYDRAULIC CEMENT AND CLINKER, BY COUNTRY 1/

r/ Revised. -- Zero.
1/ Includes portland and masonry cements.
2/ Free alongside ship (f.a.s.) value. The value of exports at the U.S. seaport or border point of export is based on the transaction price, including inland freight, insurance, and other charges incurred in placing the merchandise alongside the carrier. The value excludes the cost of loading.
3/ Less than 1/2 unit.
4/ Data may not add to totals shown because of independent rounding.

Source: U.S. Census Bureau.

TABLE 18
U.S. IMPORTS FOR CONSUMPTION OF HYDRAULIC CEMENT AND CLINKER, BY COUNTRY 1/

(Thousand metric tons and thousand dollars)

	1999			2000		
		Value			Value	
Country of origin	Quantity	Customs 2/	C.i.f. 3/	Quantity	Customs 2/	C.i.f. 3/
Australia	388	8,520	15,079	180	4,305	7,384
Bahamas, The	--	--	--	206	7,506	9,485
Belgium	182	6,163	8,449	8	1,040	1,372
Bulgaria	264	10,161	13,129	635	26,301	33,691
Canada	5,511	280,812	303,271	4,948	268,875	285,040
China	3,836	123,507	163,169	3,451	107,852	143,945
Colombia	1,250	51,348	63,762	1,524	59,173	75,694
Croatia	23	5,115	5,727	64	7,097	8,453
Cyprus	81	3,044	3,712	--	--	--
Denmark	643	33,914	45,853	554	27,934	38,105
France	129	18,912	20,255	79	15,223	16,513
Greece	2,086	80,366	101,404	1,479	51,897	69,159
Indonesia	59	2,596	3,455	197	5,300	9,079
Italy	665	25,588	33,710	249	9,645	12,986
Korea, Republic of	1,529	43,200	67,045	1,823	49,742	75,578
Lebanon	--	--	--	108	4,167	4,935
Mexico	1,286	55,216	67,416	1,409	60,700	74,006
Morocco	177	6,800	8,956	22	974	1,331
Norway	332	12,125	15,227	263	10,257	12,626
Philippines	26	604	1,061	160	3,360	7,187
Spain	1,900	80,403	103,170	1,177	45,673	60,433
Sweden	791	26,777	34,463	903	28,879	37,694
Switzerland	54	1,915	2,878	--	--	--
Taiwan	39	672	1,068	82	2,417	3,745
Thailand	5,140	144,546	217,925	5,693	142,787	231,235
Turkey	767	30,575	37,760	1,453	47,868	69,273
United Kingdom	60	3,688	4,793	5	1,575	1,946
Venezuela	2,073	84,273	102,818	1,878	75,173	95,353
Other	62 r/	3,685 r/	4,269 r/	136	8,223	11,292
Total 4/	29,351	1,144,525	1,449,823	28,684	1,073,943	1,397,541

r/ Revised. -- Zero.
1/ Includes portland, masonry, and other hydraulic cements. Includes imports into Puerto Rico.
2/ Customs value. The price actually paid or payable for merchandise when sold for exportation to the United States, excluding U.S. import duties, freight, insurance, and other charges incurred in bringing the merchandise to the United States.
3/ Cost, insurance, and freight. The import value represents the customs value plus insurance, freight, and other delivery charges to the first port of entry.
4/ Data may not add to totals shown because of independent rounding.

Source: U.S. Census Bureau.

TABLE 19
U.S. IMPORTS FOR CONSUMPTION OF HYDRAULIC CEMENT AND CLINKER, BY CUSTOMS DISTRICT AND COUNTRY

(Thousand metric tons and thousand dollars)

	1999			2000		
		Value			Value	
Customs district and country	Quantity	Customs 1/	C.i.f. 2/	Quantity	Customs 1/	C.i.f. 2/
Anchorage, AK:						
Canada	2	81	84	(3/)	12	14
China	88	3,113	4,497	94	2,875	4,197
Total 4/	90	3,194	4,582	95	2,887	4,211
Baltimore, MD:						
Colombia	64	2,905	4,108	141	5,645	8,043
Denmark	--	--	--	(3/)	32	40
Germany	(3/)	14	14	(3/)	291	336
Greece	--	--	--	199	7,273	10,334
Netherlands	(3/)	98	107	(3/)	96	105
Spain	--	--	--	15	474	834
Turkey	27	990	991	27	1,267	2,073
Venezuela	234	10,206	10,575	112	4,524	4,997
Total 4/	325	14,213	15,795	494	19,602	26,763
Boston, MA:						
Belgium	--	--	--	(3/)	69	72
Colombia	--	--	--	7	246	371
Netherlands	(3/)	138	146	(3/)	53	62
Norway	--	--	--	36	2,681	2,741
Spain	--	--	--	30	1,051	1,597
United Kingdom	--	--	--	(3/)	11	11
Venezuela	85	3,705	5,293	312	11,438	16,250
Total 4/	86	3,843	5,439	386	15,550	21,104
Buffalo, NY:						
Canada	626	32,195	33,928	546	29,548	31,133
Denmark	2	271	273	(3/)	10	10
United Kingdom	1	209	301	2	384	398
Total 4/	630	32,675	34,502	548	29,943	31,541
Charleston, SC:						
Australia	97	1,893	3,470	73	1,275	2,494
Canada	--	--	--	10	300	500
China	173	5,289	7,093	--	--	--
Colombia	6	234	322	101	3,932	5,337
Germany	--	--	--	(3/)	15	18
Greece	--	--	--	65	2,266	2,709
Indonesia	32	1,261	1,891	--	--	--
Korea, Republic of	--	--	--	36	1,075	1,558
Netherlands	--	--	--	(3/)	64	71
Spain	366	13,142	17,816	16	634	848
Sweden	14	300	360	--	--	--
Thailand	121	2,457	4,624	408	9,786	19,796
Turkey	--	--	--	204	6,178	11,806
United Kingdom	(3/)	151	198	1	370	463
Venezuela	21	876	1,085	--	--	--
Total 4/	830	25,602	36,860	915	25,895	45,601
Chicago, IL:						
Canada	--	--	--	34	1,902	1,992
Denmark	(3/)	2	4	--	--	--
India	--	--	--	(3/)	4	5
Japan	(3/)	25	27	(3/)	43	48
Total 4/	(3/)	28	31	35	1,949	2,046
Cleveland, OH:						
Canada	903	47,501	48,975	643	35,779	36,511
Spain	--	--	--	(3/)	2	3
United Kingdom	(3/)	60	83	1	221	285
Total 4/	903	47,560	49,058	644	36,002	36,799
Columbia-Snake, OR-WA, China	455	15,837	21,042	452	14,172	19,318
Detroit, MI:						
Canada	1,734	87,694	96,112	1,472	85,463	89,245
Denmark	(3/)	51	54	--	--	--
Germany	--	--	--	23	1,049	1,059

See footnotes at end of table.

TABLE 19--Continued

U.S. IMPORTS FOR CONSUMPTION OF HYDRAULIC CEMENT AND CLINKER, BY CUSTOMS DISTRICT AND COUNTRY

(Thousand metric tons and thousand dollars)

	1999			2000		
		Value			Value	
Customs district and country	Quantity	Customs 1/	C.i.f. 2/	Quantity	Customs 1/	C.i.f. 2/
Detroit, MI--Continued:						
Korea, Republic of	--	--	--	102	4,509	4,549
Morocco	96	3,761	5,614	22	974	1,331
Thailand	160	7,241	7,311	--	--	--
United Kingdom	(3/)	170	214	--	--	--
Total 4/	1,991	98,916	109,305	1,619	91,994	96,183
Duluth, MN, Canada	362	17,956	20,764	263	14,028	16,007
El Paso, TX, Mexico	426	17,490	21,952	489	19,295	24,414
Great Falls, MT:						
Belgium	--	--	--	(3/)	10	11
Canada	166	7,313	9,014	16	888	1,095
Total 4/	166	7,313	9,014	16	898	1,106
Honolulu, HI:						
Australia	56	1,064	1,981	--	--	--
China	147	3,579	4,589	122	2,201	3,216
Thailand	66	1,062	1,721	144	2,460	3,898
Total 4/	270	5,704	8,292	266	4,661	7,115
Houston-Galveston, TX:						
Belgium	--	--	--	(3/)	12	13
China	27	698	1,175	(3/)	37	45
Colombia	111	4,652	6,804	136	5,738	8,483
Croatia	--	--	--	18	612	965
Denmark	26	964	1,261	28	769	1,135
France	(3/)	93	102	(3/)	269	295
Germany	--	--	--	(3/)	75	86
Greece	290	10,593	14,182	104	3,347	4,658
India	--	--	--	(3/)	3	4
Indonesia	--	--	--	15	488	527
Japan	(3/)	45	56	(3/)	16	22
Korea, Republic of	1,513	42,531	66,135	1,609	41,700	66,232
Mexico	15	456	694	--	--	--
Peru	--	--	--	26	796	1,191
Philippines	26	604	1,061	--	--	--
Spain	287	11,136	13,567	--	--	--
Thailand	504	11,149	18,723	531	12,595	18,913
Turkey	56	2,214	3,190	513	14,827	21,440
United Arab Emirates	--	--	--	43	3,467	5,372
United Kingdom	31	816	1,357	(3/)	79	150
Venezuela	42	1,793	2,263	18	755	873
Total 4/	2,928	87,746	130,571	3,043	85,584	130,405
Laredo, TX, Mexico	137	15,413	16,117	159	17,861	18,621
Los Angeles, CA:						
Australia	(3/)	7	8	(3/)	4	5
China	1,690	54,905	70,357	1,475	47,719	61,992
Germany	(3/)	3	4	--	--	--
India	--	--	--	(3/)	4	5
Japan	29	1,097	1,328	33	1,001	1,324
Mexico	(3/)	8	9	--	--	--
Taiwan	--	--	--	(3/)	3	4
Thailand	--	--	--	85	2,386	3,541
United Arab Emirates	(3/)	12	15	--	--	--
United Kingdom	(3/)	18	20	(3/)	13	16
Total 4/	1,719	56,049	71,741	1,593	51,131	66,886
Miami, FL:						
Belgium	4	488	517	3	534	566
China	165	4,184	6,377	--	--	--
Colombia	11	553	703	3	318	403
Denmark	59	2,042	2,651	104	3,114	4,484
France	--	--	--	(3/)	5	6
Indonesia	--	--	--	20	662	896
Korea, Republic of	--	--	--	43	1,392	1,829

See footnotes at end of table.

TABLE 19--Continued
U.S. IMPORTS FOR CONSUMPTION OF HYDRAULIC CEMENT AND CLINKER, BY CUSTOMS DISTRICT AND COUNTRY

(Thousand metric tons and thousand dollars)

	1999			2000		
		Value			Value	
Customs district and country	Quantity	Customs 1/	C.i.f. 2/	Quantity	Customs 1/	C.i.f. 2/
Miami, FL--Continued:						
Mexico	5	450	529	5	446	568
Spain	889	40,803	52,077	776	31,763	40,768
Sweden	518	16,712	21,447	849	27,148	35,378
Thailand	55	1,359	2,092	18	600	840
United Kingdom	(3/)	80	102	(3/)	137	177
Venezuela	190	7,829	10,024	138	4,995	6,627
Total 4/	1,896	74,501	96,519	1,960	71,113	92,544
Milwaukee, WI:						
Canada	50	2,801	3,401	80	4,598	4,958
Croatia	--	--	--	18	468	468
Total 4/	50	2,801	3,401	99	5,066	5,426
Minneapolis, MN, Germany	(3/)	6	8	(3/)	--	--
Mobile, AL:						
Australia	70	1,172	2,410	--	--	--
Colombia	25	1,054	1,054	--	--	--
Greece	--	--	--	32	1,020	1,339
Indonesia	28	1,336	1,564	--	--	--
Taiwan	24	342	423	--	--	--
Thailand	293	6,171	10,747	459	9,443	18,322
Turkey	--	--	--	66	1,522	2,346
Total 4/	440	10,074	16,197	557	11,985	22,006
New Orleans, LA:						
Belgium	172	5,210	7,133	--	--	--
Bulgaria	130	5,093	6,652	344	12,530	17,489
China	25	577	615	2	155	204
Colombia	--	--	--	(3/)	9	11
Croatia	22	4,921	5,516	27	5,976	6,977
Cyprus	27	1,154	1,490	--	--	--
France	12	2,239	2,600	13	2,435	2,798
Greece	797	30,989	38,338	327	11,278	14,692
Italy	649	24,904	32,969	244	8,993	12,159
Lebanon	--	--	--	45	1,713	2,325
Sweden	259	9,765	12,657	26	830	1,115
Thailand	2,859	80,942	124,384	2,524	64,692	100,247
Turkey	146	7,833	9,232	290	11,773	14,909
Venezuela	231	9,515	11,885	429	18,949	22,812
Total 4/	5,330	183,144	253,469	4,271	139,333	195,738
New York City, NY:						
Bahamas, The	--	--	--	206	7,506	9,485
Colombia	(3/)	6	10	(3/)	11	17
Croatia	(3/)	151	168	(3/)	40	42
Denmark	170	10,459	12,051	68	4,359	5,150
Germany	--	--	--	(3/)	16	17
Greece	394	14,828	18,958	350	12,402	16,791
India	--	--	--	(3/)	5	6
Lebanon	--	--	--	(3/)	3	4
Liechtenstein	(3/)	16	17	--	--	--
Netherlands	(3/)	166	180	(3/)	88	100
Norway	332	12,125	15,227	227	7,576	9,885
Sweden	--	--	--	28	901	1,201
Turkey	265	9,567	11,180	300	10,533	14,185
United Kingdom	(3/)	72	84	(3/)	98	109
Venezuela	28	1,076	1,188	34	1,248	1,778
Total 4/	1,188	48,465	59,064	1,214	44,787	58,770
Nogales, AZ:						
Mexico	656	19,725	25,879	718	21,418	28,124
Netherlands	--	--	--	(3/)	17	21
Total 4/	656	19,725	25,879	718	21,434	28,145

See footnotes at end of table.

TABLE 19--Continued
U.S. IMPORTS FOR CONSUMPTION OF HYDRAULIC CEMENT AND CLINKER, BY CUSTOMS DISTRICT AND COUNTRY

(Thousand metric tons and thousand dollars)

	1999			2000		
		Value			Value	
Customs district and country	Quantity	Customs 1/	C.i.f. 2/	Quantity	Customs 1/	C.i.f. 2/
Norfolk, VA:						
Bulgaria	109	4,092	5,401	291	13,771	16,202
China	--	--	--	(3/)	2	2
Denmark	223	8,857	11,841	(3/)	67	88
France	90	15,768	16,502	65	12,471	13,361
Germany	--	--	--	(3/)	9	11
Greece	464	19,246	23,647	402	14,311	18,636
Indonesia	--	--	--	38	1,098	1,695
Netherlands	(3/)	34	36	(3/)	185	196
United Kingdom	2	516	629	1	208	261
Venezuela	8	248	337	--	--	--
Total 4/	896	48,761	58,394	798	42,122	50,453
Ogdensburg, NY:						
Canada	178	6,637	7,033	192	7,355	7,720
Croatia	(3/)	42	44	--	--	--
Total 4/	178	6,679	7,077	192	7,355	7,720
Pembina, ND, Canada	341	16,917	19,044	344	16,830	18,770
Philadelphia, PA:						
Germany	1	605	720	(3/)	310	348
Italy	--	--	--	4	560	700
Thailand	339	7,448	8,974	499	9,840	14,342
United Kingdom	(3/)	22	24	(3/)	7	8
Total 4/	340	8,075	9,718	503	10,717	15,399
Port Arthur, TX, Thailand	30	539	539	--	--	--
Portland, ME:						
Canada	66	5,988	6,171	68	6,445	6,812
Saudi Arabia	25	934	934	--	--	--
Turkey	--	--	--	46	1,090	1,761
Total 4/	92	6,922	7,105	114	7,535	8,574
Providence, RI:						
Colombia	24	956	1,373	15	513	727
Philippines	--	--	--	143	2,984	6,501
Spain	247	11,142	14,562	268	9,465	13,724
Venezuela	73	2,936	3,929	137	4,945	7,146
Total 4/	345	15,034	19,863	562	17,907	28,098
San Diego, CA:						
China	551	18,443	24,014	709	21,724	28,464
Mexico	45	1,446	1,888	30	1,001	1,310
Thailand	--	--	--	1	98	127
Total 4/	596	19,890	25,902	739	22,823	29,902
San Francisco, CA:						
Canada	--	--	--	12	579	672
China	354	11,315	16,343	421	13,018	18,628
Switzerland	16	654	1,203	--	--	--
Taiwan	--	--	--	82	2,415	3,742
Thailand	407	18,562	26,203	321	14,385	20,427
United Kingdom	--	--	--	(3/)	3	6
Total 4/	777	30,531	43,750	835	30,398	43,475
San Juan, PR:						
Belgium	6	464	799	5	415	710
Bulgaria	25	977	1,077	--	--	--
China	--	--	--	134	4,685	6,111
Colombia	13	851	878	31	1,142	1,240
Cyprus	54	1,890	2,222	--	--	--
Denmark	33	1,974	3,503	202	8,105	11,512
France	26	812	1,051	--	--	--
Italy	16	677	730	(3/)	8	9
Japan	(3/)	97	144	--	--	--
Lebanon	--	--	--	63	2,451	2,606
Mexico	3	229	347	7	679	968
Morocco	80	3,039	3,342	--	--	--

See footnotes at end of table.

TABLE 19--Continued
U.S. IMPORTS FOR CONSUMPTION OF HYDRAULIC CEMENT AND CLINKER, BY CUSTOMS DISTRICT AND COUNTRY

(Thousand metric tons and thousand dollars)

Customs district and country	1999 Quantity	1999 Value Customs 1/	1999 Value C.i.f. 2/	2000 Quantity	2000 Value Customs 1/	2000 Value C.i.f. 2/
San Juan, PR--Continued:						
Spain	34	1,170	1,233	7	204	214
Thailand	40	640	1,390	--	--	--
Turkey	111	3,843	5,090	--	--	--
Venezuela	168	5,395	6,040	--	--	--
Total 4/	609	22,058	27,847	450	17,688	23,369
Savannah, GA:						
Australia	33	574	1,166	--	--	--
China	5	180	231	--	--	--
Colombia	49	2,301	2,926	24	1,295	1,351
Denmark	18	1,594	2,332	5	366	507
Indonesia	--	--	--	82	1,484	3,642
Italy	(3/)	6	11	(3/)	76	108
Taiwan	15	330	645	--	--	--
Thailand	129	3,422	5,240	132	2,988	5,244
Turkey	--	--	--	6	679	754
United Kingdom	25	1,574	1,779	(3/)	45	61
Venezuela	87	3,689	4,063	69	2,746	2,805
Total 4/	362	13,670	18,393	318	9,679	14,471
Seattle, WA:						
Australia	132	3,810	6,044	106	3,027	4,885
Canada	833	40,654	42,182	1,077	51,724	55,005
China	126	4,449	5,618	44	1,264	1,767
Japan	1	238	344	(3/)	33	48
Total 4/	1,090	49,152	54,188	1,227	56,048	61,705
St. Albans, VT:						
Canada	250	15,076	16,564	178	13,084	14,018
France	--	--	--	(3/)	44	53
Total 4/	250	15,076	16,564	178	13,128	14,071
Tampa, FL:						
Canada	--	--	--	12	340	588
China	28	938	1,217	--	--	--
Colombia	946	37,835	45,584	1,054	39,767	48,961
Denmark	112	7,700	11,882	146	11,112	15,178
Greece	141	4,710	6,278	--	--	--
India	--	--	--	(3/)	8	10
Indonesia	--	--	--	20	650	880
Korea, Republic of	--	--	--	33	1,066	1,410
Philippines	--	--	--	16	376	687
Spain	79	3,010	3,914	64	2,081	2,444
Switzerland	38	1,261	1,675	--	--	--
Thailand	136	3,555	5,978	551	12,400	23,866
Turkey	161	6,128	8,077	--	--	--
United Arab Emirates	--	--	--	5	409	617
Venezuela	752	30,765	37,918	558	21,423	27,154
Total 4/	2,395	95,902	122,523	2,458	89,632	121,795
U.S. Virgin Islands:						
Barbados	--	--	--	2	74	94
Panama	5	156	187	3	92	117
Venezuela	53	1,964	2,357	71	4,149	4,911
Total 4/	57	2,120	2,543	75	4,315	5,122
Washington, DC, Italy	--	--	--	(3/)	5	6
Wilmington, NC:						
Colombia	--	--	--	13	557	750
Indonesia	--	--	--	21	918	1,438
Italy	--	--	--	(3/)	4	4
Korea, Republic of	16	669	910	--	--	--
Thailand	--	--	--	22	1,114	1,670
Venezuela	103	4,275	5,861	--	--	--
Total 4/	118	4,944	6,771	55	2,593	3,864
Grand total 4/	29,351	1,144,525	1,449,823	28,684	1,073,943	1,397,541

See footnotes at end of table.

TABLE 19--Continued

U.S. IMPORTS FOR CONSUMPTION OF HYDRAULIC CEMENT AND CLINKER, BY CUSTOMS DISTRICT AND COUNTRY

-- Zero.

1/ Customs value. The price actually paid or payable for merchandise when sold for exportation to the United States, excluding U.S. import duties, freight, insurance, and other charges incurred in bringing the merchandise to the United States.

2/ Cost, insurance, and freight. The import value represents the customs value plus insurance, freight, and other delivery charges to the first port of entry.

3/ Less than 1/2 unit.

4/ Data may not add to totals shown because of independent rounding.

Source: U.S. Census Bureau.

TABLE 20

U.S. IMPORTS FOR CONSUMPTION OF GRAY PORTLAND CEMENT, BY COUNTRY 1/

(Thousand metric tons and thousand dollars)

	1999			2000		
		Value			Value	
Country	Quantity	Customs 2/	C.i.f. 3/	Quantity	Customs 2/	C.i.f. 3/
Australia	228	5,703	9,514	179	4,301	7,379
Bahamas, The	--	--	--	199	6,713	8,553
Belgium	74	2,605	3,463	--	--	--
Bulgaria	238	9,185	12,053	635	26,301	33,691
Canada	4,057	202,552	217,108	3,916	202,885	216,312
China	3,678	119,504	157,973	3,301	104,103	138,811
Colombia	1,096	45,329	56,701	1,314	51,444	66,633
Croatia	--	--	--	18	612	965
Cyprus	27	1,154	1,490	--	--	--
Denmark	438	16,861	21,960	385	12,721	17,756
Greece	1,843	71,910	90,203	1,392	48,417	64,535
Indonesia	56	1,852	2,584	161	3,894	7,113
Italy	665	25,529	33,625	248	9,557	12,863
Korea, Republic of	1,529	43,200	67,045	1,721	45,232	71,029
Mexico	1,080	31,948	42,586	1,174	34,282	45,756
Norway	332	12,125	15,227	226	7,576	9,885
Philippines	26	604	1,061	159	3,360	7,187
Spain	1,795	70,193	91,577	1,054	35,535	48,253
Sweden	789	26,387	33,949	903	28,879	37,694
Taiwan	15	330	645	81	2,417	3,745
Thailand	3,089	91,438	139,770	3,594	100,413	156,533
Turkey	767	30,575	37,760	1,225	40,632	59,230
United Kingdom	48	1,563	2,135	(3/)	33	37
Venezuela	1,725	72,309	88,758	1,851	73,376	93,495
Other	75 r/	2,861 r/	3,674 r/	106	3,672	4,723
Total 4/	23,672	885,716	1,130,861	23,842	846,355	1,112,178

r/ Revised. -- Zero.

1/ Includes imports into Puerto Rico.

2/ The price actually paid or payable for merchandise when sold for exportation to the United States, excluding U.S. import duties, freight, insurance, and other charges incurred in bringing the merchandise to the United States.

3/ Cost, insurance, and freight. The import value represents the customs value plus insurance, freight, and other delivery charges to the first port of entry.

4/ Data may not add to totals shown because of independent rounding.

Source: U.S. Census Bureau.

TABLE 21
U.S. IMPORTS FOR CONSUMPTION OF WHITE CEMENT, BY COUNTRY 1/

(Thousand metric tons and thousand dollars)

	1999			2000		
		Value			Value	
Country	Quantity	Customs 2/	C.i.f. 3/	Quantity	Customs 2/	C.i.f. 3/
Belgium	10	952	1,316	8	949	1,276
Canada	210 r/	22,725 r/	23,447 r/	181	21,118	21,892
China	5	202	327	26	1,359	1,674
Colombia	2	265	337	9	880	1,042
Denmark	205	17,054	23,893	170	15,211	20,343
Indonesia	3	744	871	36	1,406	1,966
Mexico	183	21,267	22,555	205	23,807	25,352
Norway	--	--	--	36	2,681	2,741
Spain	105	10,206	11,586	123	10,136	12,176
Thailand	80	9,663	14,523	23	1,212	1,798
Turkey	--	--	--	24	1,976	2,340
United Arab Emirates	--	--	--	48	3,876	5,988
United Kingdom	8	793	960	(4/)	17	18
Venezuela	15	635	836	22	1,560	1,612
Other	(4/)	263	287 r/	14	1,686	1,960
Total 5/	825 r/	84,769 r/	100,939 r/	923	87,872	102,178

r/ Revised. -- Zero.

1/ Includes imports into Puerto Rico.

2/ Customs value. The price actually paid or payable for merchandise when sold for exportation to the United States, excluding U.S. import duties, freight, insurance, and other charges incurred in bringing the merchandise to the United States.

3/ Cost, insurance, and freight. The import value represents the customs value plus insurance, freight, and other delivery charges to the first port of entry.

4/ Less than 1/2 unit.

5/ Data may not add to totals shown because of independent rounding.

Source: U.S. Census Bureau.

TABLE 22
U.S. IMPORTS FOR CONSUMPTION OF CLINKER, BY COUNTRY 1/

(Thousand metric tons and thousand dollars)

	1999			2000		
		Value			Value	
Country	Quantity	Customs 2/	C.i.f. 3/	Quantity	Customs 2/	C.i.f. 3/
Australia	159	2,810	5,557	--	--	--
Canada	1,221	53,203	60,268	847	43,552	45,459
China	153	3,776	4,843	122	2,282	3,321
Colombia	151	5,754	6,723	201	6,849	8,019
Croatia	--	--	--	18	468	468
Cyprus	54	1,890	2,222	--	--	--
France	127	17,853	19,112	76	13,177	14,312
Greece	141	4,710	6,278	--	--	--
Korea, Republic of	--	--	--	102	4,509	4,549
Lebanon	--	--	--	90	3,593	4,097
Morocco	177	6,800	8,956	22	974	1,331
Switzerland	39	1,261	1,675	--	--	--
Thailand	1,971	43,445	63,632	2,077	41,163	72,904
Turkey	--	--	--	204	5,261	7,703
Venezuela	328	11,014	12,883	--	--	--
Other	49 r/	1,319 r/	1,500 r/	(4/)	3	3
Total 5/	4,570 r/	153,834	193,650	3,760	121,830	162,167

See footnotes at end of table.

TABLE 22--Continued
U.S. IMPORTS FOR CONSUMPTION OF CLINKER, BY COUNTRY 1/

r/ Revised. -- Zero.
1/ For all types of hydraulic cement. Includes imports into Puerto Rico.
2/ Customs value. The price actually paid or payable for merchandise when sold for exportation to the United States, excluding U.S. import duties, freight, insurance, and other charges incurred in bringing the merchandise to the United States.
3/ Cost, insurance, and freight. The import value represents the customs value plus insurance, freight, and other delivery charges to the first port of entry.
4/ Less than 1/2 unit.
5/ Data may not add to totals shown because of independent rounding.

Source: U.S. Census Bureau.

TABLE 23
HYDRAULIC CEMENT: WORLD PRODUCTION, BY COUNTRY 1/

(Thousand metric tons)

Country	1996	1997	1998	1999	2000 e/
Afghanistan e/	116	116	116	116	120
Albania e/	203 r/	100 r/	84 r/	106 r/	110
Algeria e/	6,500 r/	7,096 2/	7,500 r/	7,500	8,300
Angola e/	270	301 2/	350	350	350
Argentina	5,117	6,858	7,091	7,187	7,150
Armenia	282	297	300	287 r/	219 2/
Australia e/	6,250 r/	6,450 r/	6,850 r/	7,450 r/	7,500
Austria	3,874	3,852	3,850 e/	3,950 e/	3,900
Azerbaijan	223	315	201	200	200
Bahrain	192	172	230	156 r/	89 2/
Bangladesh e/ 3/	650	865	900	950	980
Barbados	107	173	259	253 r/	268 2/
Belarus	1,467	1,876	2,035	2,100 r/	1,800 2/
Belgium	7,857	8,052	7,000 r/ e/	7,500 r/ e/	8,000
Benin e/	360	450	520	520	520
Bhutan e/	160	160	150	150	150
Bolivia	934	1,035	1,169 r/	1,214 r/	1,300
Bosnia and Herzegovina e/	150	200	300	300	300
Brazil	34,597	38,096	39,942	40,270	39,208 p/
Brunei	250 r/ e/	250 r/ e/	216	208 r/	232 2/
Bulgaria	2,137	1,656	1,700 e/	1,700 e/	1,700
Burkina Faso e/	30	40	40	50	50
Burma	505	516	365	338	393 2/
Cambodia e/	200	200	300	300	300
Cameroon	305	350	400	500 e/	500
Canada	11,587	12,015	12,124	12,634 r/	12,612 p/
Chile	3,634	3,735	3,888	3,036 r/	3,491
China	491,190	511,730	536,000	573,000	583,190 2/
Colombia	8,907	8,446	9,190	7,500 r/ e/	7,500
Congo (Brazzaville)	50 e/	20 r/	--	--	20
Congo (Kinshasa)	241	125	134 r/	158 r/	96
Costa Rica	830	940	1,200 r/	1,260 r/	1,150
Côte d'Ivoire e/	1,000	1,100	650	650	650
Croatia	1,842	2,134	2,295	2,712	2,852 2/
Cuba	1,453	1,713	1,800 e/	1,920 r/	1,700
Cyprus e/	1,000	910	1,200 2/	1,200	1,200
Czech Republic	5,015	4,877	4,604	4,241 r/	4,093 2/
Denmark	2,629	2,683	2,528	2,600 r/ e/	2,650
Dominican Republic	1,642	1,835	1,885	2,000 e/	2,000
Ecuador	3,028	2,900 e/	2,600 r/	2,300 r/	2,800
Egypt	18,700	19,700	21,000 e/	23,313 r/	24,143 2/
El Salvador	948	1,020	1,076 r/	1,031 r/	1,064 2/
Eritrea e/	47 2/	60 r/	50 r/	50 r/	45
Estonia	388	423	321	358	329 2/
Ethiopia e/	690	752	784	638 r/	880 2/

See footnotes at end of table.

TABLE 23--Continued
HYDRAULIC CEMENT: WORLD PRODUCTION, BY COUNTRY 1/

(Thousand metric tons)

Country	1996	1997	1998	1999	2000 e/
Fiji	84	96	90	95 e/	95
Finland	975	905	903 e/	1,310 r/	1,350
France	19,514	19,780	19,500 e/	19,527	20,000
French Guiana	52	51	50 e/	50 e/	50
Gabon	185	200 e/	196	200 e/	200
Georgia	85	91	200	300	300 2/
Germany	31,533	35,945	36,610	38,099	38,000
Ghana	1,500 e/	1,700 e/	1,630	1,870	1,950 2/
Greece e/	14,700	14,982 2/	15,000	14,000 r/	14,500
Guadeloupe e/	230	230	230	230	230
Guatemala	1,090	1,280	1,770 r/	1,900 r/	2,000
Guinea e/	260	260	260	250	250
Honduras	952	980 e/	1,020 r/	1,200 r/	1,280
Hong Kong	2,027	1,925	1,539	1,387	1,284 2/
Hungary	2,747	2,811	2,999	2,979 r/	3,000
Iceland	88	101	118 r/	131 r/	144 2/
India e/	75,000	80,000	85,000	90,000	95,000
Indonesia	24,646	27,505	22,341	23,925	27,789 2/
Iran	18,350	19,250	19,500 e/	20,000 e/	20,000
Iraq e/	1,600	1,700	2,000	2,000	2,000
Ireland	1,933	2,100	2,000 e/	2,000 e/	2,000
Israel	5,600 r/	5,400 e/	6,476 r/	6,354 r/	6,600
Italy	33,327	33,721	35,512	36,000 e/	36,000
Jamaica	557	588	558	504	500
Japan	94,492	91,938	81,328	80,120	81,300
Jordan	3,512 r/	3,251 r/	2,650 r/	2,687 r/	2,640 2/
Kazakhstan	1,120	661 e/	600 e/	838 r/	1,175 2/
Kenya	1,816	1,506	1,200 e/	1,204 r/	1,071 2/
Korea, North e/	17,000	17,000	17,000	16,000	15,000
Korea, Republic of	58,434	60,317	46,091	48,157	51,255 2/
Kuwait e/	2,000	2,000	2,000	2,000	2,000
Kyrgyzstan	544	658	709	386	500 2/
Laos e/	78 r/	84 r/	80 r/	80 r/	80
Latvia	325	246	W	W	W
Lebanon	3,500 r/ e/	2,703	3,310 r/	3,200 r/	3,200
Liberia e/	15	7	10	15	15
Libya	3,550	2,524	3,000 e/	3,000 e/	3,000
Lithuania	700 r/ e/	714 r/	788	666	570 2/
Luxembourg	667	683	700 e/	700 e/	700
Macedonia	491	500 e/	461	520	585 2/
Madagascar	44 r/	36 r/	44 r/	46 r/	48
Malawi	91	176	134 r/	187 r/	198
Malaysia	12,349	12,668	10,397	10,104 r/	11,445 2/
Mali e/	12	10	10	10	10
Martinique e/	220	220	220	220	220
Mauritania e/	100	80	50	50	50
Mexico	25,366	27,548	27,744	29,413	31,677 2/
Moldova	40	122	74	50	222 2/
Mongolia	106	112	109	104	92 2/
Morocco	6,585	7,236	7,200 e/	7,200 e/	7,200
Mozambique	180 e/	220 e/	260 r/	270 r/	310
Namibia e/	50	100	150	150	150
Nepal 3/	309	225	280 e/	290 e/	300
Netherlands	3,140	3,230	3,200 e/	3,200 e/	3,200
New Caledonia	100 e/	100 e/	--	--	100
New Zealand	974	976	950 r/ e/	960 r/ e/	950
Nicaragua	360	377	480 r/	570 r/	650
Niger e/	29 2/	30	30	30	30
Nigeria	2,545	2,520	2,700 e/	2,500 e/	2,500
Norway	1,664	1,724	1,676	1,700 e/	1,720
Oman	1,260	1,264	1,300 e/	1,300 e/	1,716 2/
Pakistan	8,900 e/	9,001	8,901	9,300 e/	9,500
Panama	647	700	750	900 r/	1,000

See footnotes at end of table.

TABLE 23--Continued
HYDRAULIC CEMENT: WORLD PRODUCTION, BY COUNTRY 1/

(Thousand metric tons)

Country	1996	1997	1998	1999	2000 e/
Paraguay	613	675 e/	620 r/	640 r/	650
Peru	3,848	4,301	4,340	3,799	3,800
Philippines	12,429	14,681	12,888	12,556	12,500
Poland	13,959	15,003	14,970	15,550 r/	14,807 2/
Portugal	8,455	9,395	9,500 e/	9,500 e/	9,200
Qatar	690	692	700 e/	1,025 r/	1,050
Réunion	299	277	380 r/	380 r/	400
Romania	6,956	7,298	7,300	6,252	8,264 2/
Russia	27,800	26,700	26,000	28,400	32,400 2/
Rwanda	42 r/	60 r/	59 r/	66 r/	70
Saudi Arabia	16,437	15,400	14,000 r/ e/	14,000 e/	15,000
Senegal	811	854	1,000	1,000 e/	1,000
Serbia and Montenegro	2,205	2,011	2,253	1,575	2,117 2/
Sierra Leone e/	160	50	100	100	100
Singapore e/	3,300	3,300	3,300	3,250	3,250
Slovakia	2,802	3,017	3,000 e/	3,000 e/	3,000
Slovenia	1,026	1,113	1,149	1,224 r/	1,300
South Africa e/	9,000	9,500	9,500	8,900	8,900
Spain (including Canary Islands)	25,157	27,632	27,943	30,800	30,000
Sri Lanka	928 e/	965 e/	874 r/	976 r/	1,008 2/
Sudan	380 e/	291	206 r/	267 r/	300
Suriname e/	60	65	65	65	65
Sweden	2,447	2,253	2,105	2,100 e/	2,150
Switzerland	3,638	3,568	3,600 e/	3,600 e/	3,600
Syria	4,500 e/	4,840 r/	4,607 r/	4,781 r/	4,830
Taiwan	21,537	21,522	19,652	18,283	18,500
Tajikistan	50	36	18	30	50 2/
Tanzania	726 r/	621 r/	778 r/	833 r/	833
Thailand	38,749 r/	37,086 r/	30,000 r/ e/	34,000 r/ e/	32,000
Togo	413	421	565	560	560
Trinidad and Tobago	617	653	690	688	743 2/
Tunisia	4,567	4,424 r/	4,588 r/	4,864 r/	5,409 2/
Turkmenistan e/	451 2/	450	450	450	450
Turkey	35,214	36,035	38,200	34,258 r/	35,825 2/
Uganda	250 r/	270 r/	285 r/	310 r/	320
Ukraine	5,017	5,098	5,591	5,828	5,311 2/
United Arab Emirates e/	6,000	5,250	6,000	6,000	6,000
United Kingdom	12,214	12,638	12,409	12,697 r/	12,800
United States (including Puerto Rico) 4/	80,818	84,255	85,522	87,777	89,510 2/
Uruguay	685	781	750 r/	720 r/	700
Uzbekistan	3,300	3,300	3,400 e/	3,300 e/	3,400 2/
Venezuela	7,556	8,145 r/	8,202 r/	8,500 r/ e/	8,600
Vietnam	6,586	8,019	9,700 r/	10,381 r/	12,500
Yemen	1,028	1,235	1,201	1,454	1,400
Zambia	348	384	351	300 r/ e/	380
Zimbabwe e/	1,000	1,100	1,100	1,000	1,000
Total 5/	1,493,000 r/	1,547,000	1,547,000 r/	1,603,000 r/	1,643,000

e/ Estimated. p/ Preliminary. r/ Revised. W Withheld to avoid disclosing proprietary data. -- Zero.
1/ Table includes data available through August 20, 2001. Data may include clinker exports for some countries.
2/ Reported figure.
3/ Data for year ending June 30 of that stated.
4/ Portland and masonary cements only.
5/ Data are rounded to four significant digits.