GYPSUM

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Production of crude gypsum in the United States increased by 3% to 17.2 million metric tons (Mt), and its value increased by 9% to $124 million in 2004 compared with 16.7 Mt valued at $114 million in 2003 (table 1). The United States remained the world's leading producer and consumer of gypsum. Calcined gypsum production increased by 14% to 23.2 Mt in 2004 compared with 20.4 Mt produced in 2003. The use of synthetic gypsum increased by 9% to 9.04 Mt in 2004 from 8.30 Mt in 2003. The use of synthetic gypsum from flue gas desulfurization (FGD) is expected to continue to increase as more coal-fired electric powerplants convert their desulfurization processes to produce marketable gypsum and as more wallboard plants are constructed near these powerplants. Most coal-burning powerplants in the United States are required by U.S. Environmental Protection Agency mandates to install sulfur dioxide removal systems within the next few years and this has created a significant potential source for gypsum.

Domestic Data Coverage

Gypsum industry data for this report are collected by the U.S. Geological Survey (USGS) from semiannual and annual surveys of gypsum operations and from monthly statistics provided by the Gypsum Association in Washington, DC. In 2004, the USGS annual survey canvassed 108 gypsum production operations that accounted for all known domestic output (figure 1). Ninety-four of the operations canvassed responded. Of the 14 operations that did not respond, 5 were idle or shut down. This survey's response rate was 94 out of 103 current operations or 91%. The output of the producers who did not respond to the survey was determined from company reports or was estimated from their previous years' survey responses.

Description and Terminology

Pure gypsum is a white-to-transparent mineral, though impurities can give the mineral a gray, brown, or pink coloration. Its chemical name is calcium sulfate dihydrate, and its chemical formula is $CaSO_4 \cdot 2H_2O$. When gypsum is heated, it loses approximately three-quarters of its water and becomes hemihydrate gypsum ($CaSO_4 \cdot \frac{1}{2}H_2O$), which is soft and can easily be ground to a powder called hemihydrate gypsum plaster or plaster of paris. If the powder is mixed with water to form a slurry or paste, it will dry and set rock hard. As the plaster and water mixture dries, water will chemically recombine with the hemihydrate gypsum, and the material will revert back to the original composition of gypsum. While the hemihydrate gypsum plaster is in slurry form, it can be poured between two paper and adhesive layers to make wallboard, poured into molds, or used to fill cracks and crevices. Gypsum makes an ideal building material because it is abundant, economical, fire resistant, strong, and versatile. It can also reduce the transmission of sound and its use can have other environmental benefits, such as reducing waste delivered to landfills.

Gypsum has been known for centuries as a building material. The earliest known use of gypsum as a building material was in Anatolia around 6000 B.C. Gypsum has been found on the interiors of the great pyramids in Egypt, which were erected in about 3700 B.C. Gypsum is found on every continent in the world and is one of the most widely used minerals. Gypsum mines are located all across North America, and some Western States contain huge deposits of powdery gypsum rock (figure 1).

Synthetic gypsum is generated as a byproduct of industrial processes. In the United States the most common source of synthetic gypsum is FGD systems used to reduce sulfur dioxide emissions from coal-fired electric powerplants. These FGD systems not only keep the air clean but they also can provide a sustainable, ecologically sound source of very pure gypsum. Synthetic gypsum also is generated by various other acid-neutralizing processes.

In the United States, most gypsum is used to manufacture wallboard and plaster for homes, offices, and commercial buildings. An average new American home of 2,000-square-foot floor area uses approximately 7.31 metric tons (t) of gypsum in more than 571 square meters (6,144 square feet) of gypsum wallboard (Mineral Information Institute, 2001). Worldwide, gypsum is used in portland cement, which is used in concrete for bridges, buildings, highways, and many other structures that are part of our everyday life. Gypsum also is extensively used as a soil conditioner on large tracts of land in suburban areas and in agricultural regions.

Production

The United States continued to lead the world in gypsum production in 2004, accounting for about 15.6% of reported global output (table 8). During 2004, domestic output of crude gypsum increased by 3% from 2003 to about 17.2 Mt valued at $124 million (table 1). Crude gypsum was mined by 20 companies in the United States at 46 mines in 19 States (figure 1). More than 80% of the crude gypsum produced was mined by 7 companies at 29 mines in 13 States. The top gypsum producing States in 2004, in descending order, were Oklahoma, Texas, Nevada, Iowa, California, Arkansas, and Indiana (table 2). These 7 States with 28 mines produced more than 1 Mt each and together accounted for 14.1 Mt or 82% of the total domestic output of gypsum.

The U.S. gypsum industry consisted primarily of a few large, vertically integrated companies that mined gypsum and manufactured wallboard, plaster, and other gypsum products. Companies with the most mines were U.S. Gypsum Corporation (USG) with nine mines; Georgia-Pacific Corporation, six mines;

National Gypsum Company, six mines; BPB America Inc. (BPB), five mines; Harrison Gypsum Company, three mines; and American Gypsum Company, two mines. These companies produced almost 74% of the total U.S. crude gypsum. The 10 leading gypsum mines in the United States accounted for almost 50% of domestic output in 2004. These 10 mines were owned by 5 companies, and their average output was 856,000 metric tons per year (t/yr).

During 2004, gypsum was calcined (partially dehydrated by heating) at 62 plants operated by 9 companies in 29 States, principally to produce feedstock for wallboard and plaster manufacturing plants (figure 1). The leading calcining States in 2004, in descending order, were California, New York, Iowa, Arkansas, Florida, Texas, Nevada, and Indiana (table 3). These 8 States with 29 plants produced more than 1 Mt of calcined gypsum each and together accounted for more than 59% of national output. In 2004, domestic output of calcined gypsum increased by 14% to 23.2 Mt valued at more than $489 million (table 1).

Companies with the most calcining plants were USG with 21 plants; National Gypsum, 18 plants; Georgia-Pacific, 12 plants; and BPB, 3 plants. These companies produced nearly 85% of the national calcined gypsum output. The 10 leading calcining plants in the United States accounted for more than 36% of production in 2004. These plants were owned by 6 companies, and the average output of the plants was 842,000 t/yr.

In addition to mined gypsum production, synthetic gypsum was generated as a byproduct of various industrial processes. The primary source of synthetic gypsum was FGD from electric powerplants. Eighteen domestic coal-fired powerplants sold synthetic gypsum to the wallboard industry in 2004 (figure 1). Smaller amounts of synthetic gypsum were derived as a byproduct of chemical processes, such as acid neutralization processes, citric acid production, sugar production from sugar beets, and titanium dioxide production. Synthetic gypsum was used as a substitute for mined gypsum, principally for wallboard manufacturing, cement production, and agricultural purposes. In response to USGS surveys, five companies with six operations in five States reported that 194,000 t of synthetic gypsum was produced as a byproduct of processes at their mines and plants and was sold in 2004. In addition to these companies, domestic coal-fired electric powerplants generated approximately 11.95 Mt of synthetic gypsum from their FGD systems during 2004 (American Coal Ash Association, 2004§[1]). About 9.04 Mt or 76% of all synthetic gypsum generated by domestic coal-fired electric utility FGD systems was used in 2004 compared with 70% in 2003. Of the 8.7 Mt of synthetic gypsum used during the year, about 93% was used for wallboard production, 5% was used in cement and concrete manufacture, and about 2% was used in agricultural applications.

Phosphogypsum is another industrial byproduct derived from manufacturing fertilizer. At present, phosphogypsum is not used in wallboard manufacturing because of the presence of radionuclides, which produce radioactive radon gas as they decay.

During 2004, 9 companies manufactured gypsum wallboard at 79 plants in the United States (figure 2). Wallboard shipments in 2004 were approximately 3.18 billion square meters (34.2 billion square feet), an increase of about 3% compared with those of 2003, representing 92% of the total domestic wallboard production capacity (Gypsum Association, 2004). No new wallboard plants were completed in 2004. However, construction of new plants and plant expansions were in progress during the year.

BPB announced plans to build a wallboard plant in North Carolina which will use FGD gypsum (Gypsum Today, 2004a§). This plant will have a capacity of 65 million square meters per year (700 million square feet per year). Lafarge North America Inc. announced that it will upgrade the wallboard plant in Westchester County, NY (Lafarge North America Inc., 2004§). This plant will have the capacity to produce 60 million square meters per year (650 million square feet per year) and may be in operation by mid- to late 2005. National Gypsum announced plans to build a high-speed wallboard plant near Charlotte, NC, that will utilize FGD gypsum generated by Duke Power Company (National Gypsum Company, 2004§). The power company plans to spend $1.5 billion on scrubbers for its plants in North Carolina and South Carolina (Sharpe, 2005). USG announced plans to expand the Bridgeport, AL, plant and is considering expanding the Norfolk, VA, plant (Gypsum Today, 2004b§).

Several million tons of gypsum waste is generated every year by wallboard manufacturing, wallboard installation, and building demolition. Only a small portion of this waste was recycled in 2004, but some wallboard manufacturers entered into new agreements to purchase wallboard waste from construction sites. Initially this will not affect gypsum supplies much, but as more and more waste is generated and room in landfills runs out, recycling could increase. Gypsum waste generated by the wallboard manufacturing process can be recycled easily. The gypsum core and paper covering are disaggregated and fed back into the raw material stream along with new material. About 10% to 12% of the wallboard used in new construction and renovation winds up as wallboard scrap. The costs of the disposal of this wallboard scrap in solid waste landfills are increasing. In addition to recycling scrap in wallboard plants, wallboard scrap may also be ground and used as a soil conditioner. Wallboard manufacturers and the construction industry have been exploring ways to return this scrap and waste to a plant for recycling. Other potential markets for recycled gypsum waste are in cement production, as a stucco additive, in sludge drying, in water treatment, in grease absorption, and for marking athletic fields (Turley, 1998).

Consumption

Apparent domestic consumption was more than 36.2 Mt in 2004. This was about a 9.3% increase in U.S. gypsum consumption compared with that of 2003. Domestic sources (mining plus an estimated 9.0 Mt of synthetic gypsum) met more than 72% of domestic consumption requirements; imports satisfied the remaining needs. In 2004, slightly more than 25% of the gypsum consumed in the United States came from synthetic sources, about the same as in 2003.

Gypsum output is categorized as either calcined or uncalcined (table 4). Calcined gypsum was produced domestically from crude gypsum to manufacture wallboard and plaster products. Uncalcined gypsum, used for portland cement production and agriculture, accounted for virtually all remaining consumption

[1]References that include a section mark (§) are found in the Internet References Cited section.

during the year. Miscellaneous uses, such as athletic field lines, accounted for only a fraction of a percent of consumption.

In 2004, slightly more than 44% of the calcined gypsum used to manufacture wallboard was consumed in the production of regular ½-inch wallboard. Fire-resistant wallboard, mobile-home wallboard, water- and moisture-resistant wallboard, lath, veneer base, and sheathing composed most of the balance (table 5). Metropolitan areas in the South Atlantic, Pacific, East North Central, West South Central, and Middle Atlantic regions (in decreasing order) were the leading sales areas for gypsum wallboard products.

During 2004, nearly 3,160 Mt, about 75%, of the uncalcined gypsum consumed in the United States was for portland cement production (table 4). Gypsum is added to cement to retard its setting time and makes up about 2% to 6% by weight of cement output (Roskill Information Services Ltd., 2004, p. 294). The remainder of the uncalcined gypsum consumed was used primarily in agriculture. Finely ground gypsum rock was used in agriculture and other industries to neutralize acidic soils, to improve soil permeability, to add nutrients, to stabilize slopes, and to provide catalytic support for maximum fertilizer benefits. Small amounts of high-purity gypsum also were used in a wide range of industrial applications, including the production of foods, glass, paper, and pharmaceuticals.

Prices

In 2004, the average values (free on board, mine or plant) reported by U.S. producers were $7.31 per metric ton for crude gypsum and about $21.10 per ton for calcined gypsum. The average value for plaster reported by domestic producers during the year was $15.83 per 100 kilograms ($7.08 per 100 pounds). In 2004, the average value of uncalcined gypsum used in agriculture and in cement production was about $16.84 per ton.

During 2004, prices for gypsum wallboard generally increased in response to increased demand. Prices for regular ½-inch wallboard rose in 16 of the 19 major U.S. metropolitan areas that were sampled. Wallboard prices decreased slightly in 3 of the 19 cities. The average wallboard price for 2004 in these 19 cities was $242.55 per 100 square meters ($225.00 per 1,000 square feet). The changes in prices for each metropolitan area ranged from a decrease of $16.17 per 100 square meters ($15.00 per 1,000 square feet) in St. Louis, MO, to an increase of $94.86 per 100 square meters ($88.00 per 1,000 square feet) in Pittsburgh, PA. Prices in these 19 cities ranged from $172.48 to $318 per 100 square meters ($160 to $295 per 1,000 square feet) at the beginning of the year. The averages of the prices in these 19 cities was $229.03 per 100 square meters ($212.46 per 1,000 square feet) in January and $256.75 per 100 square meters ($238.17 per 1,000 square feet) at yearend. This represented an overall increase in price of $27.72 per 100 square meters ($25.71 per 1,000 square feet), or 12%, from beginning to yearend 2004 (Engineering News-Record, 2004a, b).

Foreign Trade

In 2004, the United States was the world leader in the international trade of gypsum and gypsum products. The United States imported crude gypsum from 15 countries and exported gypsum wallboard to 69 countries and territories (tables 6, 7). Only a small amount of crude gypsum and gypsum products was exported by the United States in 2004.

Net imports of crude gypsum in 2004 increased by 22% from those of 2003 and accounted for 28% of apparent consumption. Much of this import dependence can be attributed to the lack of adequate domestic gypsum resources near large east coast wallboard markets. Canada and Mexico accounted for more than 90% of imported gypsum, while (in descending order) Spain, the Dominican Republic, China, and Jamaica supplied most of the remainder. Imports primarily supplied wallboard plants in coastal markets; most imports from Canada went to east coast plants, and Mexican sources chiefly served the west coast. Foreign subsidiaries of U.S. gypsum companies produced much of the gypsum that was imported for the wallboard plants. Most of the crude gypsum imported by the United States from Mexico was produced by Compania Minera Caopas de CV and Compania Occidental Mexicana SA de CV in Baja California (Sharpe, 2003). Almost all gypsum imported from Canada came from Nova Scotia. Smaller amounts of imported gypsum were used in portland cement production. The completion of large wallboard manufacturing plants near powerplants near the eastern seacoast may affect gypsum imports in the future.

Wallboard exports, totaling about 9.2 million square meters (100 million square feet) and valued at $51 million, went primarily to countries and territories in Asia, Europe, and Latin America. Wallboard imports were about 68.7 million square meters (740 million square feet) valued at $87.1 million.

World Review

In 2004, 90 countries produced gypsum, 9 of which accounted for about 76% of the total world production (table 8). Global natural gypsum production in 2004 was estimated to be more than 110.6 Mt, an increase of 3% compared with 2003. More than 200 million metric tons per year of synthetic gypsum (mostly phosphogypsum) is generated worldwide (Roskill Information Services Ltd., 2004, p. 20). However, only a small portion of that gypsum is consumed. North American production accounted for more than 31% of total crude gypsum production. The high demand for gypsum in the United States by the domestic construction industry, which consumes almost one-quarter of total world crude gypsum production, was not matched abroad. This trend may change as European and Asian markets begin to incorporate wallboard in their building styles. Worldwide, the leading use of gypsum is in the manufacture of cement and concrete, accounting for 50% to 60% of all consumption. The estimate for world production is probably lower than actual production because output that is used by gypsum producers in some countries to make other products onsite is not reported. Additionally, production from small deposits in developing nations was intermittent and in many cases unreported.

As a low-value, high-bulk commodity drawn from deposits widely distributed throughout the world, gypsum tended to be consumed within the many countries that mine it. Less than 20% of the world's crude gypsum production was estimated to

enter international trade. Only a few countries, such as Canada, Mexico, Spain, and Thailand, were major crude gypsum exporters; and of these, Canada and Mexico are significant gypsum exporters because of their large deposits in proximity to large U.S. wallboard markets. Little crude gypsum was exported from the United States.

Although use of gypsum wallboard increased worldwide, only industrialized nations, such as the United States, used gypsum primarily for wallboard products. In developing countries, especially in the Middle East and Asia, most gypsum was used in the production of cement or as a plaster product.

Estimated world production capacity for gypsum wallboard in 2004 exceeded 7.8 billion square meters per year (about 84 billion square feet per year) at more than 250 plants worldwide. Almost one-half of this capacity was in the United States; Asia and Western Europe each accounted for about one-fifth. Construction or expansion of dozens of wallboard plants was underway during the year in many countries, and as in the United States, the use of synthetic gypsum by other industrialized nations increased.

Asia.—Estimated gypsum production in Thailand increased by almost 10% in 2004 compared with that of 2003. In 2004, through its Asian subsidiaries, BPB announced plans to expand the wallboard plant in Thailand by adding a second wallboard manufacturing line and to begin construction of a plant in Malaysia that is expected to begin operations by early 2006 (Sharpe, 2005).

Europe.—BPB announced plans to construct a wallboard plant in Yorkshire, United Kingdom (Sharpe, 2005). This plant will be supplied by FGD gypsum from a local power company. Also in 2004, BPB began construction on a wallboard plant in Romania, which is expected to begin production in 2005 (Sharpe, 2005). Russia is becoming a major producer of gypsum, mostly for domestic consumption (Industrial Minerals, 2004). Russia's apparent consumption was more than 1.4 Mt of gypsum in 2002, more than double the consumption in 1998. Russia's production of plasterboard more than tripled in the same time period with approximately 80 million square meters produced in 2002 (Roskill Information Services Ltd., 2004, p. 181-184).

Canada.—Canada continued in 2004 to be the second ranked North American producer of gypsum. Canadian production totaled 9.3 Mt in 2004, 11% more than in 2004. About 6.9 Mt or 74% of Canadian production was exported to the eastern United States.

India.—BPB Indian Gypsum began construction in 2004 on a third plant in India. This plant will have a capacity of 11 million square meters per year (118 million square feet per year) of wallboard and will nearly double the company's capacity in India (Sharpe, 2005).

Outlook

One of the key economic indicators used by the wallboard and gypsum industry is the number of new housing starts. Housing starts in North America are expected to rise slightly in 2005, level off by yearend, and possibly decrease slightly in 2006 if interest rates rise as expected (National Association of Home Builders, 2004§). Gypsum production and consumption data for 2004 and the first part of 2005 suggest that use levels in 2005 will continue to rise slightly or at least match the levels of 2004. Other supply-and-demand indicators, such as construction rates for new office and commercial buildings and the continuing trend to construct larger homes with more rooms, also suggest that the gypsum industry will be close to the same level as in 2004.

The availability of more FGD gypsum will continue to increase as scrubbers come online at more and more electric powerplants. During the next several years, the use of mined gypsum may decline in the United States as greater quantities of synthetic gypsum are used in wallboard manufacturing. Some actual and planned mine closings already have been attributed to substitution by synthetic gypsum. This rate of substitution could accelerate additional mine closings during the rest of this decade. However, only those FGD plants that are near enough to wallboard plants to have a transportation advantage will be able to have their gypsum output utilized in the near future causing the percentage of synthetic gypsum use to eventually reach an equilibrium point. In the long term, as disposal areas fill and opening new disposal sites becomes more difficult, power companies may eventually have to calcine and clean the gypsum waste slurry that they produce. They may even have to subsidize transportation costs to rid themselves of this excess waste. This may increase the economic viability of using FGD gypsum from powerplants which may have been considered too far from wallboard plants in the past.

The production expansion of synthetic gypsum resources will continue in Europe and North America, but it is limited by the diminishing number of coal-fired electric powerplants without FGD systems. Most domestic powerplants built in recent years were natural-gas-fired. The trend towards using FGD gypsum as a raw material at the expense of natural product is set to continue as air pollution regulations spread across the globe to include developing nations.

The domestic gypsum industry is undergoing a change on the supply side. The U.S. gypsum industry has been changing towards the use of large-capacity wallboard plants supplied from multiple sources, including synthetic gypsum from coal-fired powerplants. These larger wallboard plants have been located in regions of high population and growth, which are the areas of highest consumption. The older, less efficient, and smaller, natural (mined) gypsum-fed plants will find it increasingly difficult to compete, and some will close (Harris, 2001).

As a response to increased public awareness, the gypsum industry probably will increase its recycling of scrap materials into raw materials streams. There also will be an increase in the use of ecolabels, such as the Scientific Certification System Green Cross, which certifies there is recycled and recovered content in each product.

Implementation of the Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2004, which was passed by the U.S. Senate in early 2004, will continue funding for the building and repair of the Nation's highway system (U.S. Senate, 2004§). This will be an important stimulus for the domestic cement industry and, thus, will increase the demand for gypsum as an integral component of cement.

Industry trends also indicate significant developments abroad in the coming decade. For example, the pace and magnitude of wallboard plant construction in Asia, particularly Thailand

and China, indicate that this market with billions of potential consumers could become one of the world's leading gypsum wallboard markets. Elsewhere, the extent of wallboard capacity growth in Central America, Europe, India, and South America reveals that wallboard manufacturing is likely to become a significant market for gypsum worldwide. The gypsum market in Japan will probably also grow at increasing rates. Future demand in emerging Asian markets is likely to be an important factor in gypsum sector growth (Industrial Minerals, 2004).

References Cited

Engineering News-Record, 2004a, Construction economics: Engineering News-Record, v. 252, no. 4, January 26, p. 20-21.

Engineering News-Record, 2004b, Construction economics: Engineering News-Record, v. 253, no. 24, December 20, p. 21-22.

Gypsum Association, 2004, Annual gypsumboard shipments & industry capacity: Washington, DC, Gypsum Association, January, 1 p.

Harris, Paul, 2001, Wallboard wonderland—The North American gypsum market: Industrial Minerals, no. 400, January, p. 28-37.

Industrial Minerals, 2004, Russian gypsum germination: Industrial Minerals, no. 435, December, p. 58-59.

Mineral Information Institute, 2001, Look around…Everything is made from something: Denver, CO, Mineral Information Institute poster, 1 p.

Roskill Information Services Ltd., 2004, The economics of gypsum and anhydrite (9th ed.): London, United Kingdom, Roskill Information Services Ltd., 342 p.

Sharpe, R.D., 2003, Gypsum: Mining Engineering, v. 55, no. 6, June, p. 30-32.

Sharpe, R.D., 2005, Gypsum: Mining Engineering, v. 57, no. 6, June, p. 34-36.

Turley, William, 1998, What's happening in gypsum recycling?: C&D Debris Recycling, v. 5, no. 1, January-February, p. 8-12.

Withington, C.F., 1962, Gypsum and anhydrite in the United States (exclusive of Alaska and Hawaii): U.S. Geological Survey Minerals Investigation Resource Map MR-33, scale 1:3,168,000.

Internet References Cited

American Coal Ash Association, 2004, Annual CCP survey, accessed August 18, 2005, at URL http://www.acaa-usa.org/2004_CCP_Survey(9-9-05).

Gypsum Today, 2004a, BPB announces new wallboard plant in North Carolina, accessed February 20, 2004, at URL http://www.gypsumtoday.com/news/viewnews.pl/id=307.

Gypsum Today, 2004b, USG expanding wallboard capacity at Bridgeport plant, accessed May 12, 2004, at URL http://www.gypsumtoday.com/news/viewnews.pl/id=401.

Lafarge North America Inc., 2004, Lafarge North America announces upgrade and expansion of Buchanan gypsum drywall plant, accessed December 2, 2004, at URL http://www.lafargecorp.com/lafargena/lafargenamain.nsf.

National Association of Home Builders, 2004, Housing and interest rate forecast, accessed January 20, 2005, at URL http://www.nahb.org/generic.aspx?sectionID=138&genericContentID=631.

National Gypsum Company, 2004, National Gypsum Company announces plans for new wallboard plant, accessed April 20, 2004, via URL http://www.nationalgypsum.com/about/news.

U.S. Senate, 2004, HR 3550—To authorize funds for Federal-aid highways, highway safety programs, and transit programs, and for other purposes, Bill Summary and Status, accessed December 18, 2004, at URL http://thomas.loc.gov/cgi-bin/bdquery/z?d108:HR03550:@@@D&summ2=m&.

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Coal Combustion Products. Ch. in Minerals Yearbook, annual (1994-2000).

Gypsum. Ch. in Mineral Commodity Summaries, annual.

Gypsum. Ch. in United States Mineral Resources, Professional Paper 820, 1973.

Gypsum. Mineral Industry Surveys, monthly.

Stone, R.W., and others, 1920, Gypsum deposits of the United States, Bulletin 697, 326 p.

Other

Gypsum. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.

Gypsum Association.

TABLE 1
SALIENT GYPSUM STATISTICS[1]

(Thousand metric tons and thousand dollars)

	2000	2001	2002	2003	2004
United States:					
Crude:					
Production:					
Quantity	19,500	16,300	15,700	16,700	17,200
Value	$165,000	$119,000	$108,000	$114,000	$124,000
Imports for consumption	9,210	8,270	7,970	8,300	10,100
Synthetic gypsum sales	4,950	6,820	9,900	8,300 r	9,040
Calcined:					
Production:					
Quantity	21,000	19,100	18,600	20,400	23,200
Value	$353,000	$352,000	$372,000	$400,000	$489,000
Products sold, value	$2,860,000	$2,470,000	$2,690,000	$2,880,000	$3,160,000
Exports, value	$102,000	$96,400	$102,000	$111,000	$127,000
Imports for consumption, value	$269,000	$231,000	$196,000	$184,000	$231,000
World, production	108,000 r	105,000 r	104,000 r	107,000 r	111,000

rRevised.

[1]Data are rounded to no more three significant digits.

TABLE 2
CRUDE GYPSUM MINED IN THE UNITED STATES, BY STATE[1]

State	2003 Active mines	2003 Quantity (thousand metric tons)	2003 Value (thousands)	2004 Active mines	2004 Quantity (thousand metric tons)	2004 Value (thousands)
Arizona and New Mexico	4	581	$3,930	4	619	$4,340
Arkansas, Kansas, Louisiana	4	2,080	21,100	4	2,250	23,100
California, Nevada, Utah	10 r	4,530 r	23,700 r	10	4,170	22,100
Colorado, South Dakota, Wyoming	5	1,790 r	13,200 r	5	934	6,420
Indiana, New York, Ohio, Virginia	2	1,090	5,650	2	1,150	8,000
Iowa	6	2,030	13,700	6	1,920	14,600
Michigan	2	500	6,130	2	452	5,660
Oklahoma	5	2,250	14,100	5	3,250	20,800
Texas	6	1,810	12,300	6	2,450	18,800
Total	44 r	16,700	114,000	44	17,200	124,000

rRevised.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
CALCINED GYPSUM PRODUCED IN THE UNITED STATES, BY STATE[1]

State	2003 Active mines	2003 Quantity (thousand metric tons)	2003 Value (thousands)	2004 Active mines	2004 Quantity (thousand metric tons)	2004 Value (thousands)
Alabama	1	544	$14,500	1	554	$15,800
Arizona, Colorado, New Mexico, Utah	3	799	10,400	3	849	11,200
Arkansas, Louisiana, Oklahoma	6	2,710	47,300	6	2,950	52,800
California	6	2,070	40,500	7	2,510	51,400
Maryland, North Carolina, Virginia	4	1,210	31,200	4	1,240	32,800
Florida	3	1,560	42,100	3	1,510	36,800
Georgia	2	474	8,610	2	481	9,000
Illinois, Indiana, Kansas	6	1,950	36,400	6	2,030	39,800
Iowa	3	1,290	20,000	5	1,930	28,500
Massachusetts, New Hampshire, New Jersey	5	1,310	34,700	5	1,430	35,100
Michigan	4	952	17,000	4	916	16,900
Nevada	2	1,390	9,430	2	1,410	9,970
New York	2	635	16,600	3	2,130	29,200
Ohio	2	205	4,030	2	223	4,410
Oregon	1	428	12,800	1	492	14,800
Pennsylvania	1	571	12,100	1	585	13,900
Texas	5	1,410	19,700	5	1,470	27,300
Washington and Wyoming	3	863	22,800	2	487	59,000
Total	59	20,400	400,000	62	23,200	489,000

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 4
GYPSUM PRODUCTS (MADE FROM DOMESTIC, IMPORTED, AND SYNTHETIC GYPSUM) SOLD OR USED IN THE UNITED STATES, BY USES[1]

(Thousand metric tons and thousand dollars)

Use	2003		2004	
	Quantity	Value	Quantity	Value
Uncalcined:				
Portland cement	3,250	43,800	3,160	41,100
Agriculture and miscellaneous[2]	689	24,900	1,030	29,300
Total	3,940	68,700	4,180	70,500
Calcined:				
Plasters	1,130	165,000	906	143,000
Prefabricated products[3]	30,200	2,640,000	29,500	2,940,000
Total calcined	31,300	2,810,000	30,400	3,090,000
Grand total	35,300	2,880,000	34,600	3,160,000

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes synthetic gypsum.
[3]Includes weight of paper, metal, or other materials and some synthetic gypsum.

TABLE 5
PREFABRICATED GYPSUM PRODUCTS SOLD OR USED IN THE UNITED STATES[1]

Product	2003			2004		
	Quantity (thousand square feet)	Quantity[2] (thousand metric tons)	Value (thousands)	Quantity (thousand square feet)	Quantity[2] (thousand metric tons)	Value (thousands)
Lath:						
3/8 inch	3,570	3	$1,570	967	1	$340
1/2 inch	12,600	8	2,770	2,350	2	509
Other	11,100	13	3,800	9,920	10	1,610
Total	27,300	24	8,140	13,200	13	2,450
Veneer base	499,000	497	53,900	452,000	462	51,200
Sheathing	203,000	201	25,100	268,000	270	32,300
Regular gypsumboard:						
3/8 inch	2,010,000	2,020	114,000	2,070,000	2,130	121,000
1/2 inch	14,100,000	11,700	1,110,000	13,500,000	11,800	1,330,000
5/8 inch	1,880,000	2,040	107,000	2,030,000	2,200	123,000
1 inch	494,000	540	55,100	551,000	600	60,100
Other[3]	1,590,000	1,690	109,000	963,000	1,000	103,000
Total	20,100,000	18,000	1,500,000	19,100,000	17,700	1,740,000
Type X gypsumboard	8,630,000	8,500	710,000	8,100,000	8,470	809,000
Predecorated wallboard	205,000	215	34,000	157,000	157	37,000
5/16-inch mobile home board	394,000	368	44,500	374,000	378	44,100
Water- and moisture-resistant board	2,080,000	2,000	174,000	1,720,000	1,730	168,000
Other	1,170,000	428	95,600	301,000	312	64,000
Grand total	33,300,000	30,200	2,640,000	30,500,000	29,500	2,940,000

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes weight of paper, metal, or other materials.
[3]Includes 1/4-, 7/16-, and 3/4-inch gypsumboard.

TABLE 6
IMPORTS FOR CONSUMPTION OF CRUDE GYPSUM, BY COUNTRY[1]

(Thousand metric tons and thousand dollars)

Country	2003		2004	
	Quantity	Value	Quantity	Value
Argentina	(2)	4	--	--
Austria	(2)	5	(2)	8
Canada[3]	5,700	51,000	6,890	67,300
China	--	--	42	280
Costa Rica	(2)	30	(2)	13
Dominican Republic	68	836	149	1,100
France	--	--	(2)	6
Germany	--	--	2	8
Guatemala	(2)	4	--	--
Italy	(2)	7	27	37
Jamaica	(2)	2	40	538
Japan	--	--	(2)	6
Mexico	1,820	16,600	2,250	20,000
Netherlands	--	--	(2)	8
Peru	--	--	(2)	46
South Africa	--	--	7	672
Spain	709	6,930	728	7,250
Sweden	(2)	3	--	--
United Kingdom	(2)	57	(2)	20
Total	8,300	75,500	10,100	97,300

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Less than ½ unit.

[3]Includes anhydrite.

Source: U.S. Census Bureau.

TABLE 7
SUMMATION OF U.S. GYPSUM AND GYPSUM PRODUCTS TRADE DATA[1]

(Thousand metric tons and thousand dollars)

Year	Crude[2]		Plasters[3]		Boards[4]		Other, value[5]	Total, value
	Quantity	Value	Quantity	Value	Quantity	Value		
Exports:								
2003	166	18,600	161	31,000	50	39,300	21,800	111,000
2004	149	15,000	332	31,800	83	51,100	29,300	127,000
Imports for consumption:								
2003	8,300	75,500	6	3,040	484	59,600	45,800	184,000
2004	10,100	97,200	5	3,420	617	87,100	43,200	231,000

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Import and export data are for "Gypsum, anhydrite," Harmonized Tariff Schedule of the United States (HTS) code 2520.10.0000.

[3]Import and export data are for "Plasters," HTS code 2520.20.0000.

[4]Import and export data are for "Boards, sheets, panels, tiles, and similar articles, not ornamented—Faced or reinforced with paper or paperboard only," HTS code 6809.11.0000.

[5]Import and export data are for "Boards, sheets, panels, tiles, and similar articles, not ornamented: Other," HTS code 6809.1900.00, and "Other articles," HTS code 6809.90.0000.

Source: U.S. Census Bureau.

TABLE 8
GYPSUM: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Thousand metric tons)

Country	2000	2001	2002	2003	2004[e]
Afghanistan[e]	3	3	3	3	3
Algeria	1,341	281	322	350	300
Argentina	582 [r]	372 [r]	363 [r]	388 [r]	400
Australia[e]	3,800	3,800	4,000	4,000	4,000
Austria[e, 3]	1,000	1,000	1,000	1,000	1,000
Azerbaijan[e]	1 [r]	1 [r]	1 [r]	4 [r]	4
Bhutan[e]	54	55	55	56 [r]	56
Bosnia and Herzegovina[e]	30	30	30	30	30
Brazil[3]	1,498	1,507	1,614 [r]	1,515 [r]	1,515 [4]
Bulgaria[3]	170	167 [r]	156	168 [r]	170
Burma	48	65	90 [r]	66 [r]	66
Canada[3]	9,232	7,821	8,809 [r]	8,376 [r]	9,339 [4]
Chile	376	517	610 [r]	662 [r]	662
China[e]	6,800	6,800	6,850	6,850	7,000
Colombia[e]	560	560	560	560	560
Croatia	151	131	145 [r]	166 [r]	150
Cuba[e]	130	130	130	130	130
Cyprus	260	250	295 [r]	300 [r]	300
Czech Republic	82	24	102	104 [r]	100
Dominican Republic	98	173	163	214	220
Ecuador	1	1	5 [r]	5 [r]	5
Egypt[e, 3]	2,000	2,000	2,000	2,000	2,000
El Salvador[e]	6	6	6	6	6
Eritrea	(5)	1	1	1	1
Ethiopia[3]	47	51	28 [r]	48 [r]	50
France[e, 3]	4,500	4,500	3,500	3,500	3,500
Germany, marketable[e, 3]	2,300 [r]	2,000 [r]	1,761 [r, 4]	1,748 [r, 4]	1,750
Greece[e, 3]	600	600	500	500	500
Guatemala	212	97 [r]	81 [r]	67 [r]	67
Honduras	59	60	60	60	60
Hungary[e, 3]	251	252 [r]	72 [r]	75 [r]	75
India[e]	2,210	2,250	2,300	2,300	2,350
Indonesia	5	6	6	6	6
Iran[6]	10,700	10,890	10,380	12,000 [r]	13,000
Iraq[7]	NA	NA	NA	NA	NA
Ireland[e]	450	450	450	450	450
Israel	130	133 [e]	144	140	140
Italy[e]	1,300	1,300	1,300	1,200	1,200
Jamaica	330	320	165	249 [r]	250
Japan	5,917	5,874	5,645 [r]	5,764 [r]	5,765 [4]
Jordan	158	86 [r]	11 [r]	64 [r]	65
Kenya[3]	8	8	9	10	11
Laos	132	121	110	102 [r]	120
Latvia	122	125 [e]	217 [r]	159 [r]	160
Lebanon[e]	2	2	2	2	2
Libya[e]	175	150	150	150	150
Luxembourg[e, 3]	(5)	(5)	(5)	(5)	(5)
Macedonia[e]	25 [r]	20 [r]	20 [r]	20 [r]	20
Mali[e]	1	1	1	1	1
Mauritania[e]	100	100	100	100	100
Mexico[3]	5,654	6,237	6,703 [r]	6,986 [r]	7,000
Moldova	32	32 [e]	32	32 [e]	32
Mongolia[e]	25	25	25	25	25
Morocco[e]	475	550	600	600	600

See footnotes at end of table.

TABLE 8—Continued
GYPSUM: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Thousand metric tons)

Country	2000	2001	2002	2003	2004[e]
Namibia	1	--	--	--	--
Nicaragua[3]	28	34 [r]	28	31	31
Niger	1	3	18 [r]	18 [r]	18
Nigeria[e]	530 [4]	610 [4]	300	100	100
Oman	132	44	56	50 [e]	60
Pakistan	377	350 [e]	360	360 [e]	360
Paraguay[e]	4	4 [3]	4	4	4
Peru	141 [r]	21 [r]	75	71	150 [4]
Poland[3]	1,282 [r]	1,094 [r]	1,147 [r]	1,328 [r]	1,272 [4]
Portugal[e, 3]	500	500	500	500	500
Romania	218 [r]	275 [r]	421 [r]	394 [r]	350
Russia	700	700	700	700	700
Saudi Arabia[e]	400	450	450	450	450
Serbia and Montenegro	47	58 [r]	55 [r]	55 [r]	55
Sierra Leone[e]	4	4	4	4	4
Slovakia[3]	108	169	122	125	125
Slovenia[e]	10	10	10	10	10
Somalia[e]	2	2	2	2	2
South Africa	413	383	415	394	400
Spain[e, 3]	9,929 [r]	11,909 [r]	11,218 [r]	11,500 [r]	11,500
Sudan[e, 3]	14	2	5	5	5
Switzerland[e]	300	300	250	250	250
Syria	333	290 [r]	351 [r]	375 [r, e]	375
Taiwan	2	1	--	--	--
Tajikistan[e]	35	35	35	35	35
Tanzania[3]	60	72	74 [r]	23 [r]	24
Thailand	5,830	6,191 [r]	6,326	7,291 [r]	8,000
Tunisia[e]	125	125	125	110	110
Turkey	303	329 [r]	264	197 [r]	200
Turkmenistan[e]	100	100	100	100	100
Uganda	--	--	(5)	(5)	(5)
United Arab Emirates[e]	90	90	90	100	100
United Kingdom[e, 3]	1,500	1,500	1,500	1,500	1,500
United States[8]	19,500	16,300	15,700	16,700	17,200 [4]
Uruguay	1,076	1,127	1,130 [e]	1,130 [e]	1,130
Venezuela	25	5	10	10	10
Yemen	42 [r]	44 [r]	41 [r]	42 [r]	44
Zambia[e]	10	10	10	10	10
Total	108,000 [r]	105,000 [r]	104,000 [r]	107,000 [r]	110,600

[e]Estimated. [r]Revised. NA Not available. -- Zero.

[1]World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Table includes data available through July 15, 2005.

[3]Reported figure.

[4]Includes anhydrite.

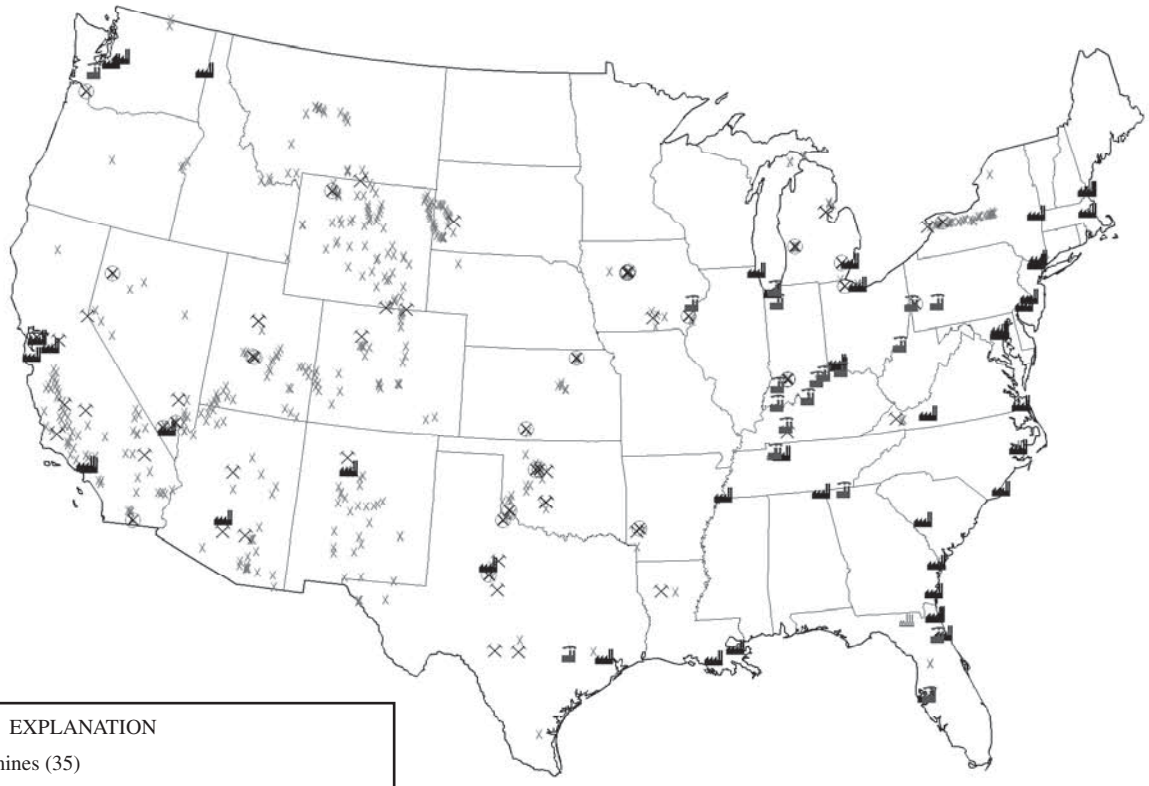
[5]Less than ½ unit.

[6]Data are for years beginning March 21 of that stated.

[7]Iraq may also produce gypsum, but definitive information on output levels, if any, is not available.

[8]Excludes byproduct gypsum.

FIGURE 1
GYPSUM MINES, PLANTS, AND OCCURRENCES IN THE CONTERMINOUS UNITED STATES IN 2004



EXPLANATION

- Operating gyspum mines (35)
- Gypsum mines and plants (30)
- Gypsum calcination plants (44)
- Flue gas desulfurization plants (18)
- Other plants producing synthetic gypsum (4)
- Gypsum deposits or occurrences (452) [Withington, C.F., 1962, Gypsum and anhydrite in the United States (exclusive of Alaska and Hawaii): U.S. Geological Survey Minerals Investigation Resource Map MR–33, scale 1:3,168,000.]

FIGURE 2
WALLBOARD MANUFACTURING PLANTS IN THE UNITED STATES IN 2004