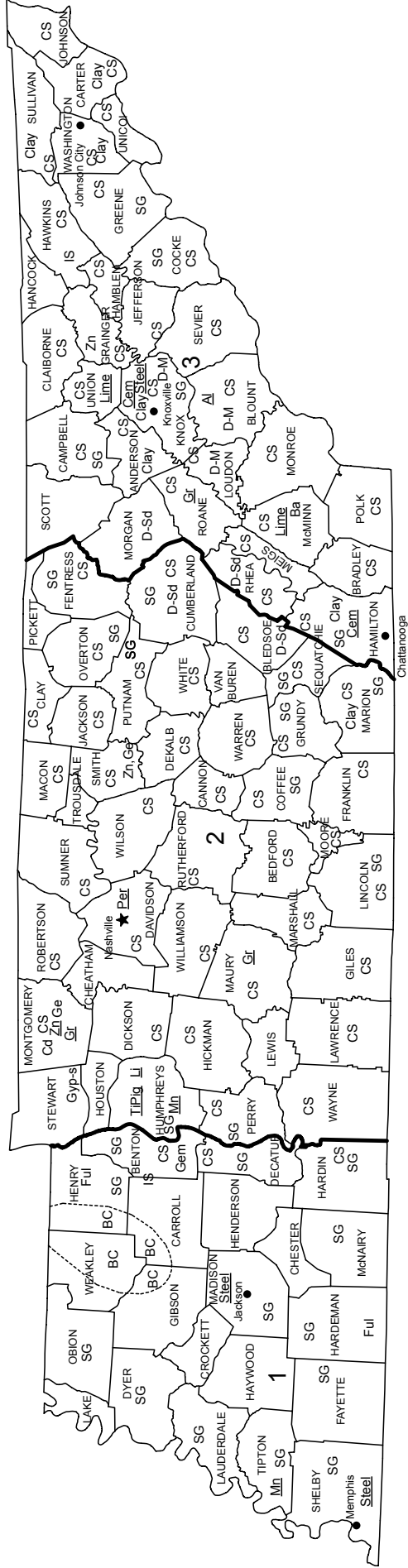


TENNESSEE



LEGEND

- County boundary
- ★ Capital
- City
- 1 — Crushed stone/sand and gravel districts

MINERAL SYMBOLS (Major producing areas)

Al	Aluminum plant	CS	Crushed stone	Gyp-s	Synthetic gypsum	SG	Construction sand and gravel	○	Concentration of mineral operations
Ba	Barite	D-M	Dimension marble	IS	Industrial sand	Steel	Steel plant		
BC	Ball clay	D-Sd	Dimension sandstone	Li	Lithium plant	TiPig	Titanium dioxide pigment plant		
Cd	Cadmium (See Zn)	Ful	Fuller's earth	Lime	Lime plant	Zn	Zinc		
Cem	Cement plant	Ge	Germanium	Mn	Manganese dioxide plant	Zn	Zinc plant (Cd byproduct cadmium) (Ge byproduct germanium)		
Clay	Common clay	Gem	Gemstones	Per	Perlite plant				
		Gr	Graphite plant						



THE MINERAL INDUSTRY OF TENNESSEE

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Tennessee Department of Environment and Conservation, Division of Geology, for collecting information on all nonfuel minerals.

In 2003, the estimated value¹ of nonfuel raw mineral production for Tennessee was \$606 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 6.5% decrease from that of 2002² and followed an 8.9% decrease from 2001 to 2002. Tennessee was 23d in rank (22d in 2002) among the 50 States in total nonfuel mineral production value, of which the State accounted for more than 1.5% of the U.S. total.

Crushed stone has been Tennessee's leading nonfuel mineral commodity, by value, for more than 25 years, except in 1981 when zinc was first. In 2003, crushed stone accounted for more than one-half of the State's total nonfuel mineral production value. Cement (portland and masonry) was the second leading nonfuel mineral commodity, followed by construction sand and gravel, zinc, and ball clay. A significant decrease in the production and value of zinc, down more than \$45 million, and a decrease in the value of crushed stone accounted for most of the State's drop in value in 2003.

In 2002, most of the State's decrease in value similarly resulted from a decrease in the production and value of zinc, down more than \$60 million, and a decrease in the production and value of crushed stone, down \$14 million. These decreases were offset somewhat by increases in the values of cement, up more than \$6 million, construction sand and gravel, up \$5.5 million, and industrial sand and gravel, up nearly \$3 million (table 1). The decrease for zinc mostly resulted from the November 2001 closing of ASARCO Incorporated's Coy, Immel, and Young Mines and processing operations in Jefferson and Knox Counties because of low prices and continued sluggish market conditions.

Compared with USGS estimates of the quantities produced in the 50 States in 2003, Tennessee remained the leading ball-clay- and gemstone-producing State, third in zinc, ninth in industrial

¹The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2003 USGS mineral production data published in this chapter are preliminary estimates as of July 2004 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals/contacts/comdir.html>; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—also may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

²Values, percentage calculations, and rankings for 2002 may differ from the Minerals Yearbook, Area Reports: Domestic 2002, Volume II, owing to the revision of preliminary 2002 to final 2002 data. Data for 2003 are preliminary and are expected to change; related rankings also may change.

sand and gravel, and it continued to be a significant producer of crushed stone, portland cement, and fuller's earth (descending order of value). Primary aluminum and raw steel were produced in Tennessee but were processed from materials obtained from other domestic and foreign sources. The State remained eighth in rank in the production of primary aluminum.

The Tennessee Division of Geology (TDG) provided the following narrative information.³ Data and information in the following text are those reported by the TDG, based upon its own surveys and estimates. By the end of 2003, approximately 330 nonfuel mineral operations were permitted in 82 counties across the State. An economic downturn in the zinc market during the past few years resulted in the continued suspension of operations at all of Tennessee's zinc mines.

Commodity Review

Industrial Minerals

Clays and Shale.—Ball clay and kaolin were mined from the Eocene Claiborne and Wilcox Formations in northwest Tennessee. Boral Bricks Inc., H.C. Spinks Co. Inc., IMERYS (Kentucky-Tennessee Clay Co.), Old Hickory Clay Co., and Unimin Corp. (United Clays Inc.) operated mines in Carroll, Gibson, Henry, and Weakly Counties. On February 26, 2003, Franklin Industries Inc., a producer of chemical grade limestone, announced that it had acquired all of the outstanding stock of H.C. Spinks Clay Co. Inc., a leading producer of ball clay products in the State. While emphasizing that the Spinks name would be retained, Franklin worked to provide a smooth transition in the technical support, quality, service, and sales to Spinks' customers. The company's stated purpose for the merger was to reinforce the strengths of both privately held companies (H.C. Spinks Clay Company, Inc., 2004§⁴). Fuller's earth was mined in Hardeman County by Moltan Co. and in Henry County by American Colloid Co.

General Shale Brick, Inc. operated seven shale mines in Anderson, Carter, Knox, Sullivan, and Washington Counties in eastern Tennessee to supply its brick production plants. General Shale Brick celebrated its 75th anniversary and was one of the leading exterior building materials manufacturers in the country. Additional shale mining took place in Hamilton and Marion Counties in southeast Tennessee.

Construction Sand and Gravel and Crushed Stone.—The crushed stone industry produced limestone and dolomite at 152 quarries and underground mines located primarily in central Tennessee and eastern Tennessee (aggregate District 1 and

³Peter Lemiszki, Chief Geologist with the Tennessee Division of Geology in Knoxville, authored the text of the State mineral industry information provided by that agency.

⁴A reference that includes a section mark (§) is found in the Internet Reference Cited section.

District 3, respectively, shown on the Tennessee map). Crushed limestone and dolomite were produced in 65 counties by 46 different companies and 17 county highway departments. The top three producers were Vulcan Materials Co., which operated 41 quarries in 30 counties; Rogers Group Inc., which operated 31 quarries in 27 counties; and Rinker Materials Corp., which operated 10 quarries in 6 counties. Three quarries in Johnson County produced crushed granite and quartzite.

Construction sand and gravel was produced at 91 sites located in 29 counties and operated by 57 different companies, nearly the same as in 2002. Companies operating at least five sites were as follows: Ford Construction Co., Memphis Stone and Gravel Co., and Standard Construction Co., which are in western Tennessee (District 1), and Bradley Stone and Sand Inc., which is in the eastern part of District 2.

Dimension Stone.—Tennessee Marble Co. and Tennessee Valley Marble Inc. continued to quarry dimension marble in Blount, Knox, and Loudon Counties from the Holston Limestone Formation. Six companies operated eight sandstone quarries in Bledsoe, Cumberland, Morgan, and Rhea Counties for dimension sandstone, flagstone, and ashlar, which is not a rock type, but an application; ashlar refers to the production of rectangular pieces of stone cut to uniform size usually for random placement in a wall.

Gemstones.—The pearl, taken from mussels in the freshwater rivers of the State, is the official State Gem. Tennessee's gem industry is in Benton County. The American Pearl Co. runs the only freshwater pearl farm in the United States and cultivates approximately 250,000 mussels each season. The American Shell Co. and Tennessee Shell Co. harvested mollusk shells from the Tennessee River to be used as seeds in the cultured pearl industry.

Other.—Industrial sand was mined in Hawkins County by Short Mountain Silica Co. and Fine Sands, LLC. Unimin Corp., which operated two industrial sand mines, was considered one of Benton County's major employers. Synthetic gypsum was produced from Tennessee Valley Authority byproducts at the Allied Custom Gypsum plant in Stewart County. A lime plant

operated by Bowater Southern Paper Corp. in McMinn County produced high-calcium quicklime for captive use, and Global Stone Tenn-Luttrell Inc.'s lime plant in Union County produced high-calcium quicklime and hydrated lime.

Metals

Zinc.—Asarco Inc., maintained a small staff for its Young, Immel, and Coy Mines in Jefferson and Knox Counties where zinc mining and processing operations have remained suspended since the 2001 closings; the staff has continued to process agricultural lime from existing production byproducts and to conduct ongoing care and maintenance of the mines and processing facilities.

Pasminco Ltd. operated the electrolytic zinc plant in Clarksville (Montgomery County) and the mines at Gordonsville (Smith County) and Clinch Valley (Grainger County). Pasminco closed the Gordonsville mine as part of its restructuring strategy in May 2003 and made plans to close the Clinch Valley mine within the year. On September 4, 2003, Pasminco agreed to sell its Gordonsville and Clinch Valley mines and facilities to Tennessee Valley Resources, which will recover and sell byproducts from former zinc mining operations as agricultural limestone; Tennessee Valley Resources bought Asarco's New Market and Young Mines in Tennessee as well.

At Pasminco's Clarksville zinc plant primary cadmium was produced as (an undesired) byproduct during the roasting and leaching of zinc concentrate. Raw material contracts for zinc have been put in place to cover future requirements for the Clarksville zinc plant. Pasminco will import zinc concentrates from its own mines in Australia (mainly Century Mine) and from Mexico and Peru.

Internet Reference Cited

H.C. Spinks Clay Company, Inc., 2004, Franklin Industries acquires H.C. Spinks, accessed September 13, 2004, at URL <http://www.spinkscay.com/News/news.html>.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN TENNESSEE^{1,2}

(Thousand metric tons and thousand dollars)

Mineral	2001		2002		2003 ^p	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays:						
Ball	680	28,800	660	28,100	660	28,100
Common	304	1,820 ^r	262	1,540	262	1,540
Sand and gravel:						
Construction	8,350	46,400	9,220	51,900	9,700	54,800
Industrial	W	22,900	1,070	25,700	1,040	22,500
Stone, crushed	58,600	344,000	54,900	330,000	53,500	321,000
Combined values of barite (2001), cement, clays (fuller's earth, kaolin), gemstones, lead (2001), lime, salt, silver (2001), stone (dimension marble), and zinc	XX	266,000	XX	212,000	XX	178,000
Total	XX	711,000 ^r	XX	648,000	XX	606,000

^pPreliminary. ^rRevised. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

¹Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

²Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
TENNESSEE: CRUSHED STONE SOLD OR USED, BY KIND¹

Kind	2001				2002			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone ²	111 ^r	54,400 ^r	\$317,000 ^r	\$5.83	111	51,500	\$309,000	\$5.99
Dolomite	7 ^r	W	W	7.01 ^r	6	W	W	6.58
Granite	1	W	W	4.63	1	W	W	4.63
Sandstone	1	W	W	3.64	1	W	W	3.64
Total or average	XX	58,600	344,000	5.88	XX	54,900	330,000	6.00

^rRevised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

¹Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

²Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
 TENNESSEE: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2002, BY USE¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	664	\$4,329	\$6.52
Filter stone	517	3,211	6.21
Other coarse aggregates	693	3,926	5.67
Total or average	1,874	11,466	6.12
Coarse aggregate, graded:			
Concrete aggregate, coarse	1335	9237	6.82
Bituminous aggregate, coarse	8856	60981	6.89
Bituminous surface-treatment aggregate	W	W	5.97
Railroad ballast	W	W	4.30
Other graded coarse aggregates	2,282	15,242	6.68
Total or average	12,660	86,493	6.83
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	7.45
Stone sand, bituminous mix or seal	W	W	8.00
Screening, undesignated	2,141	14,720	6.87
Other fine aggregates	1,399	10,428	7.45
Total or average	3,951	28,308	7.16
Coarse and fine aggregate:			
Graded road base or subbase	7,980	45,297	5.68
Unpaved road surfacing	314	1,315	4.18
Crusher run or fill or waste	674	3,004	4.46
Roofing granules	(2)	(2)	4.30
Other coarse and fine aggregates	1,391	8,633	4.74
Total or average	10,358	58,249	5.62
Agricultural limestone	157	1,183	7.54
Chemical and metallurgical:			
Cement manufacture	(3)	(3)	3.69
Lime manufacture	(3)	(3)	5.51
Chemical stone for alkali works	(3)	(3)	5.51
Sulfur oxide removal	(3)	(3)	6.08
Special:			
Mine dusting or acid water treatment	(3)	(3)	8.82
Other fillers of extenders	(3)	(3)	10.58
Unspecified: ⁴			
Reported	16,088	88,571	5.52
Estimated	7,767	44,661	5.75
Total or average	23,855	133,232	5.59
Grand total or average	54,894	329,523	6.00

W Withheld to avoid disclosing company proprietary data; included in "Total."

¹Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

²Withheld to avoid disclosing company proprietary data; included with "Other."

³Withheld to avoid disclosing company proprietary data; included in "Grand total."

⁴Reported and estimated production without a breakdown by end use.

TABLE 4
 TENNESSEE: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2002, BY USE AND DISTRICT ¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) ²	W	W	756	4,300	W	W
Coarse aggregate, graded ³	W	W	W	W	W	W
Fine aggregate (-3/8 inch) ⁴	W	W	1030	6,520	W	W
Coarse and fine aggregate ⁵	W	W	3,560	18,400	W	W
Other construction materials	--	--	--	--	223	1060
Agricultural ⁶	W	W	W	W	W	W
Chemical and metallurgical ⁷	--	--	W	W	W	W
Special ⁸	--	--	--	--	W	W
Unspecified: ⁹						
Reported	418	2,340	12,000	65,600	3,670	20,100
Estimated	--	--	6,360	36,100	1,410	8,570
Total	3,960	25,000	29,200	168,000	21,700	136,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

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

²Includes filter stone, riprap and jetty stone, and other coarse aggregates.

³Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregates.

⁴Includes screening (undesignated), stone sand bituminous mix or seal, stone sand (concrete), and other fine aggregates.

⁵Includes crusher run (select material or fill), graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and fine aggregates.

⁶Includes agricultural limestone.

⁷Includes cement manufacture, chemical stone for alkali works, lime manufacture, and sulfur oxide removal.

⁸Includes mine dusting or acid water treatment and other fillers or extenders.

⁹Reported and estimated production without a breakdown by end use.

TABLE 5
 TENNESSEE: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2002,
 BY MAJOR USE CATEGORY ¹

Use	Quantity	Value (thousands)	Unit value
	(thousand metric tons)		
Concrete aggregate (including concrete sand)	2,130	\$13,100	\$6.16
Concrete products (blocks, bricks, pipe, decorative, etc.) ²	419	3,140	7.49
Asphaltic concrete aggregates and other bituminous mixtures	735	4,410	6.00
Road base and coverings ³	755	4,030	3.78
Fill	156	951	6.10
Other miscellaneous uses	61	409	6.70
Unspecified: ⁴			
Reported	987	5,480	5.55
Estimated	4,000	20,000	5.00
Total or average	9,220	51,900	5.63

¹Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

²Includes plaster and gunite sands.

³Includes road and other stabilization (cement).

⁴Reported and estimated production without a breakdown by end use.

TABLE 6
 TENNESSEE: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2002,
 BY USE AND DISTRICT ¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products ²	1,500	9,030	W	W	W	W
Asphaltic concrete aggregates and road base materials ³	858	3,740	W	W	W	W
Fill	152	909	4	35	1	8
Other miscellaneous uses	60	396	922	4,800	758	7,130
Unspecified: ⁴						
Reported	987	5,480	--	--	--	--
Estimated	3,200	16,000	700	3,900	76	420
Total	6,790	35,600	1,600	8,780	835	7,560

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

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

²Includes plaster and gunitite sands.

³Includes road and other stabilization (cement).

⁴Reported and estimated production without a breakdown by end use.