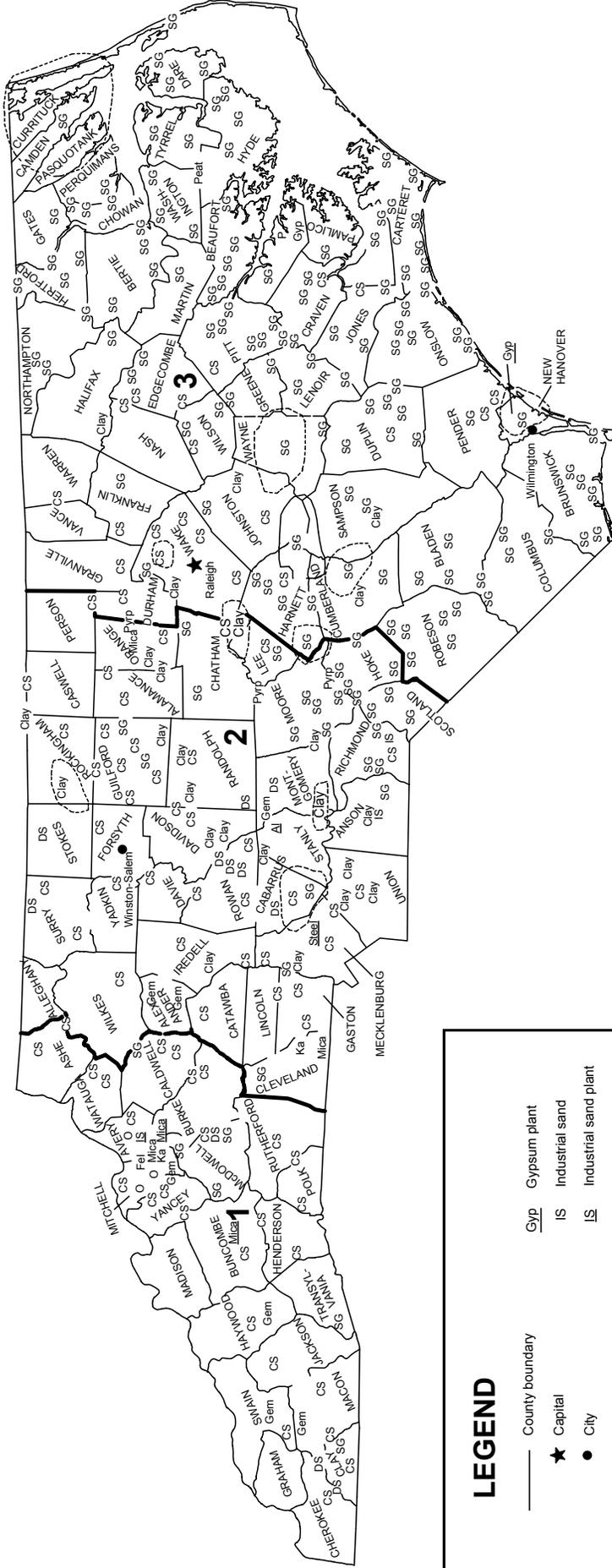


NORTH CAROLINA



LEGEND

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

MINERAL SYMBOLS (Major producing areas)

Al	Aluminum plant	Gyp	Gypsum plant
Clay	Common clay	IS	Industrial sand
CS	Crushed stone	IS	Industrial sand plant
DS	Dimension stone	Ka	Kaolin
Fel	Feldspar	Mica	Mica
Gem	Gemstones	Mica	Mica plant
Gyp	Gypsum	O	Olivine
		P	Phosphate rock
		Peat	Peat
		Pyrp	Pyrophyllite
		SG	Construction sand and gravel
		Steel	Steel plant
		○	Concentration of mineral operations

THE MINERAL INDUSTRY OF NORTH CAROLINA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the North Carolina Geological Survey for collecting information on all nonfuel minerals.

In 2002, the estimated value¹ of nonfuel mineral production for North Carolina was \$708 million, based upon preliminary U.S. Geological Survey (USGS) data, about a 3% decrease from that of 2001² and followed a 1.5% decrease from 2000 to 2001. For the sixth consecutive year, the State was 19th in rank among the 50 States in total nonfuel mineral production value, of which North Carolina accounted for about 2% of the U.S. total.

In 2002, crushed stone remained North Carolina's leading nonfuel raw mineral, accounting for two-thirds of the State's total nonfuel mineral value. It was followed by phosphate rock, construction sand and gravel, industrial sand and gravel, and feldspar. Whereas industrial sand and gravel and kaolin showed increases in value for the year, most other nonfuel minerals remained relatively unchanged or showed decreases in production and value.

In 2001, the largest increases occurred in the values of crushed stone (up about \$7 million) and construction sand and gravel (up \$2.4 million). Dimension stone, pyrophyllite, gypsum, and peat (descending order of change) also increased in value. The most significant decreases were those of phosphate rock (down about \$12 million), common clay (down about \$7.5 million), and industrial sand and gravel (down slightly more than \$2 million).

Based upon 2002 USGS estimates of the quantities of minerals produced in the 50 States, North Carolina continued to lead the Nation in feldspar, mica, and pyrophyllite production, accounting for 42%, about 50%, and nearly all, of the U.S. total output, respectively. The State also remained third of four States that produce phosphate rock and eighth in the production of crushed stone. While North Carolina increased to 5th from 8th in industrial sand and gravel and to 10th from 11th in gemstones, it decreased to 2d from 1st of two olivine-producing States and to 3d from 1st in the production of common clays. Additionally, the State was a significant producer of construction sand and gravel and dimension stone. Metal production in the State, especially that of primary aluminum and raw steel, resulted from the processing of recycled materials or raw materials received from other domestic and foreign sources.

The following narrative information was provided by the North Carolina Geological Survey³ (NCGS).

Commodity Review

Alcoa, the world's biggest producer of aluminum, suspended production at a plant in Stanly County and eliminated 377 jobs because of difficult business conditions during 2002. Alcoa slowed production at its Badin plant before idling the facility on August 16. Casting operations at the plant ceased on December 31, 2002. The Badin plant had operated since 1916.

Zemex Corp., a producer of feldspar, mica, and quartz, announced in March 2003 that it had entered into an agreement with Peru's Cementos Pacasmayo S.A.A. for a Pacasmayo subsidiary to acquire all of the outstanding common shares of Zemex for a cash price of \$8.80 a share. The value of the transaction, including Zemex's debt, was about \$100 million. The transaction became effective by the end of May 2003.

The U.S. Forest Service reported about 63,000 metric tons of mineral production during 2002. This production came from seven permits in Cherokee County (dimension stone), Clay County (sand and gravel), Graham County (dimension stone and sand and gravel), Jackson County (dimension stone), Macon County (dimension stone), and Montgomery County (dimension stone).

On August 23, 2002, 3M Co. hosted a grand opening and public tour of its roofing granule manufacturing site. The 81-hectare site near Pittsboro in Chatham County employed about 40 people. The Luck Stone Co., adjacent to 3M, mined a green-colored andesite that is used onsite by 3M to produce roofing shingle granules. Luck Stone also blends volcanic tuffs with volcanic rock types for

¹The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or 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 2002 USGS mineral production data published in this chapter are preliminary estimates as of July 2003 and are expected to change. Construction sand and gravel and crushed stone 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 Mineral Industry Surveys—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 2001 may differ from the Minerals Yearbook, Area Reports: Domestic 2001, Volume II, owing to the revision of preliminary 2001 to final 2001 data. Data for 2002 are preliminary and are expected to change; related rankings may also change.

³Jeffrey C. Reid, Senior Geologist for Minerals and Geographic Information Systems, authored the text of the State mineral industry information provided by the North Carolina Geological Survey.

aggregate use.

Three brick plants in North Carolina use robots. Two of the automated plants were near Raleigh (Triangle Brick Co.'s Merry Oaks plant and General Shale Brick's Brickhaven plant). The other automated plant, operated by Triangle Brick Co., was in the Charlotte area and is known as the Wadesboro plant.

General Shale Brick announced in February 2003 that it was closing its 74-year-old Burlington plant and moving its production to Sanford. At least 45 workers will lose their jobs. General Shale Brick, the Nation's second largest brick manufacturer, also said it planned to invest several million dollars to increase production at its Brickhaven plant in Sanford, which was built in 1996. When the upgrades are completed in 2003, the company expects to boost production at the plant by 50% to 90 million bricks per year. Because of automation at the Sanford plant, the Johnson City, TN-based company will not hire any additional workers. The 40 employees at the Brickhaven plant make premium-facing bricks for housing and architectural bricks used in commercial structures in North Carolina, South Carolina, and Virginia. General Shale Brick holds 15.4% of the U. S. brick market share, according to the company. General Shale Brick acquired its Sanford plants in 2000 when it bought Sanford-based Cherokee Sanford, the sixth largest brickmaker in the Nation.

Government Programs

The North Carolina State University Minerals Research Laboratory (MRL) in Asheville completed a report entitled "History of Mining in Western North Carolina." The publication contains firsthand accounts of the history of mining in western North Carolina from interviews with 12 pioneering minerals-processing veterans. The report emphasizes feldspar, mica, phosphate, and quartz. The MRL plans to post the report on its Internet site at URL <http://www.engr.ncsu.edu/mrl/>. The MRL also conducted studies on boiler ash, clay, feldspar, fly ash, garnet, iron oxide, kaolin, mica, phosphate, pumice, quartz, sand and gravel, smectite, and tantalite. The MRL, in cooperation with the NCGS, was close to completing an integrated mineral-processing and geology report of a glass sand resource in Richmond County.

The most recent mine permit statistics are for 2001 when 886 mines were permitted. Crushed stone (143 mines) and sand and gravel (579 mines) composed the bulk of permitted mines. Other permitted mines were in brick clay (43), dimension stone (14), flag stone (7), feldspar (6), gemstones (7), instream sand dipping (27), instream sand dredging (33), lithium (1), mica (2), olivine (6), other (borrow pits) (9), peat (3), phosphate (2), and pyrophyllite (4).

Hedrick Industries Inc. won the 2002 Mining Stewardship Award in the Public Outreach and Education categories. The company won the award for its outreach efforts at the Colburn Minerals Museum and at several of its quarries. Hedrick Industries also won the 2001 National Association of State Land Reclamationists' Outreach Award and the 2001 Interstate Mining Compact Commission's Minerals Education/Outreach Award.

Vulcan Materials Co.'s Cabarrus Quarry in Cabarrus County was the 2003 winner of the Mining Stewardship Award in the Public Outreach and Environmental Enhancement categories. It was the first quarry in North Carolina to receive the Wildlife and Industry Together certification from the North Carolina Wildlife Federation. The company developed a Boy Scout campground in the buffer portion of its quarry operation and created various butterfly gardens and wildlife habitats throughout the site, with cooperation from State and Federal agencies as well as the surrounding community.

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

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	2000		2001		2002 ^P	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays:						
Common	2,430	18,600	2,340	11,100	2,090	10,400
Kaolin	W	W	47 ^c	517 ^c	41	W
Feldspar	metric tons	W	344,000	19,400	341,000	19,200
Gemstones	NA	372	NA	284	NA	280
Gypsum, crude	--	--	71	788	64	519
Mica, crude	W	W	51	3,890	40	3,060
Sand and gravel:						
Construction	12,000	59,100	12,400	61,500	11,300	57,300
Industrial	1,480	28,300	1,300	26,000	1,760	29,700
Stone:						
Crushed	69,500	478,000	69,300	485,000	65,800	470,000
Dimension	metric tons	40,500	16,800	41,500	18,200	37,500
Combined values of olivine, peat, phosphate rock, pyrophyllite (crude), and values indicated by symbol W						
	XX	143,000	XX	106,000	XX	101,000
Total	XX	744,000	XX	733,000	XX	708,000

^cEstimated. ^PPreliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable. -- Zero.

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
NORTH CAROLINA: CRUSHED STONE SOLD OR USED, BY KIND¹

Kind	2000				2001			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	11	5,710	\$38,400	\$6.73	11	5,930	\$40,600	\$6.84
Dolomite	1	325	2,170	6.66	1	347	2,340	6.73
Granite	74 ^r	51,400 ^r	358,000 ^r	6.97 ^r	74	51,500	367,000	7.12
Traprock	6	5,330	39,600	7.43	6	5,050	38,100	7.55
Quartzite	1 ^r	W	W	8.19	1	W	W	8.03
Slate	2	W	W	6.61	2	W	W	6.72
Volcanic cinder and scoria	1	W	W	6.61	1	W	W	6.72
Miscellaneous stone	7 ^r	3,940 ^r	20,100 ^r	5.11 ^r	6	3,680	17,700	4.81
Total or average	XX	69,500	478,000	6.88	XX	69,300	485,000	7.00

^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.

TABLE 3
NORTH CAROLINA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2001, BY USE¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	\$4.19
Riprap and jetty stone	609	\$6,180	10.14
Filter stone	254	1,700	6.68
Other coarse aggregates	255	1,420	5.57
Total or average	1,120	9,290	8.31
Coarse aggregate, graded:			
Concrete aggregate, coarse	3,460	24,800	7.17
Bituminous aggregate, coarse	2,180	17,900	9.04
Bituminous surface-treatment aggregate	2,010	17,400	8.68
Railroad ballast	1,230	6,830	5.57
Other graded coarse aggregates	4,000	39,000	9.75
Total or average	12,900	108,000	8.37
Fine aggregate (-3/8 inch):			
Stone sand, concrete	170	1,340	7.87
Stone sand, bituminous mix or seal	W	W	8.99
Screening, undesignated	2,210	12,700	5.73
Other fine aggregates	803	6,570	8.18
Total or average	3,180	20,600	6.46
Coarse and fine aggregates:			
Graded road base or subbase	8,340	49,000	5.88
Unpaved road surfacing	W	W	8.41
Terrazzo and exposed aggregate	W	W	18.28
Crusher run or fill or waste	894	7,850	8.79
Roofing granules	W	W	5.92
Other coarse and fine aggregates	3,020	18,600	6.15
Total or average	12,300	75,400	6.16
Other construction materials	691	5,510	7.97
Agricultural, poultry grit and mineral food	(2)	(2)	3.58
Unspecified:³			
Reported	37,000	250,000	6.76
Estimated	1,400	9,600	6.81
Total or average	38,400	260,000	6.76
Grand total or average	69,300	485,000	7.00

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

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 in "Grand total."

³Reported and estimated production without a breakdown by end use.

TABLE 4
NORTH CAROLINA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2001, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2	
	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1 1/2 inch) ²	W	W	W	W
Coarse aggregate, graded ³	W	W	W	W
Fine aggregate (-3/8 inch) ⁴	W	W	W	W
Coarse and fine aggregate ⁵	W	W	W	W
Other construction materials	49	538	642	4,970
Agricultural ⁶	--	--	W	W
Unspecified:⁷				
Reported	3,000	20,700	18,100	12,100
Estimated	350	2,300	80	530
Total	11,900	91,500	34,100	245,000
	District 3		Unspecified districts	
	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1 1/2 inch) ²	W	W	--	--
Coarse aggregate, graded ³	W	W	--	--
Fine aggregate (-3/8 inch) ⁴	W	W	--	--
Coarse and fine aggregate ⁵	W	W	--	--
Other construction materials	--	--	--	--
Agricultural ⁶	--	--	--	--
Unspecified:⁷				
Reported	15,800	107,000	163	1,100
Estimated	990	6,700	--	--
Total	23,200	147,000	163	1,100

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, macadam, 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, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.

⁶Includes poultry grit and mineral food.

⁷Reported and estimated production without a breakdown by end use.

TABLE 5
NORTH CAROLINA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2001, BY MAJOR USE CATEGORY¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregates (including concrete sand)	3,810	\$17,900	\$4.69
Plaster and gunite sands	54	278	5.15
Concrete products (blocks, bricks, pipe, decorative, etc.)	571	2,390	4.18
Asphalt concrete aggregates and other bituminous mixtures	617	2,140	3.47
Road base and coverings ²	1,620	5,750	3.55
Fill	738	1,740	2.36
Snow and ice control	33	135	4.09
Other miscellaneous uses ³	309	4,200	13.60
Unspecified: ⁴			
Reported	2,570	18,000	6.99
Estimated	2,100	9,000	4.38
Total or average	12,400	61,500	4.97

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

²Includes road and other stabilization (lime).

³Includes filtration and railroad ballast.

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

TABLE 6
NORTH CAROLINA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2001, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products ²	W	W	W	W	3,380	14,800
Asphaltic concrete aggregates and road base materials ³	W	W	W	W	1,690	4,250
Other miscellaneous uses ⁴	536	5,660	1,370	7,680	775	2,100
Unspecified: ⁵						
Reported	74	123	1,660	15,200	835	2,660
Estimated	--	--	510	2,000	1,500	7,000
Total	610	5,780	3,540	24,900	8,230	30,800

W Withheld to avoid disclosing company proprietary data; included with "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 (lime).

⁴Includes fill, filtration, railroad ballast, and snow and ice control.

⁵Reported and estimated production without a breakdown by end use.