

THE MINERAL INDUSTRY OF VIRGINIA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Virginia Department of Mines, Minerals and Energy for collecting information on all nonfuel minerals.

In 2001, the estimated value¹ of nonfuel raw mineral production for Virginia was \$751 million, based upon preliminary U.S. Geological Survey (USGS) data. This was a 5.8% increase from that of 2000² and followed a 9.2% increase from 1999 to 2000. Virginia rose in rank to 18th from 21st among the 50 States in total nonfuel mineral production value, of which the State accounted for nearly 2% of the U.S. total.

Crushed stone was, by value, Virginia's leading raw nonfuel mineral, accounting for more than 60% of the State's total mineral production value. From 1990 through 2001, the State produced nearly 700 million metric tons of crushed stone, or an average of almost 58 million metric tons per year. Cement (masonry and portland) was the second leading nonfuel mineral commodity, followed by construction sand and gravel and lime. These four mineral commodities represented 88% of the State's nonfuel mineral value. In 2001, an increase in the value of crushed stone plus smaller increases in ilmenite and portland cement accounted for most of Virginia's increase in value for the year (table 1). (All listings by value are in descending order of change.) In 2000, the increased values of crushed stone (up \$35 million), portland cement (up about \$20 million), construction sand and gravel (up nearly \$10 million), and zirconium (zircon) (up more than \$5 million) led the State's increase in value. The largest decreases were those of about \$3 million each in masonry cement and lime, as well as a somewhat smaller decrease in gypsum; all other changes were of less than \$1 million.

Based upon USGS estimates of quantities produced in the 50 States during 2001, Virginia remained the only State to mine kyanite; 2d in feldspar; 2d in both titanium (ilmenite) and zirconium (zircon), each being produced only in Virginia and Florida; 2d of 2 vermiculite-producing States; one of the top 6 fuller's earth-producing States; 9th in crushed stone; 10th in lime; and virtually tied for 10th in common clays. Although the only producing kyanite mine and calcined kyanite (mullite)

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 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 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 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 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

facilities in the United States were in Virginia, synthetic mullite, which is a calcined bauxite, was produced in one other State. About 90% of the U.S. kyanite and mullite output is used in refractories for the smelting and processing of a variety of metals and in glass and high-temperature ceramics manufacturing. Additionally, significant quantities of cement (both portland and masonry), construction sand and gravel, and industrial sand and gravel were produced in the State.

The following narrative information was provided by the Virginia Division of Mineral Resources³ (VDMR). Some production data in the text that follows are those reported by the VDMR, based on that agency's own surveys and estimates; data may differ from some USGS preliminary estimates and production figures as reported to and estimated by the USGS.

During 2001, Gold Crown Mining Co. continued to permit the Kentuck Mine, east of Danville in Pittsylvania County. Southern Piedmont Mining Corp. abandoned its permit at the Moss Gold Mine in Goochland County, in March.

Golden Cat, a Division of Ralston Purina Co., continued producing cat box litter at a site about 40 kilometers northeast of Richmond in King William County. According to the VDMR, the production of clay, mined as a raw material at this site since the operation opened in the late summer of 1997, totaled 455,000 metric tons (t) through 2000.

Iluca Resources, Inc., Virginia Old Hickory Operations continued with its heavy-mineral mining and initial processing operations in Dinwiddie County; final processing was done near the town of Stony Creek, in adjacent Sussex County. Operations were expanded in 2000 to allow for more producing capacity. According to the VDMR, since production started in the fall of 1997, 517,000 t of titanium and zirconium concentrates had been produced through 2000.

The Shooting Creek Quarry, LLC, obtained a State permit in late 1998 to reopen the quarry, about 3 miles east of Floyd in Floyd County, that was formerly operated by Pine Creek Stone Co. Shooting Creek began quarrying and processing amphibolite in early 1999; production of about 64,000 t of crushed stone in 2000 was an increase of almost 2.4 times from the year before.

The New World Stone Co. continued to utilize existing soapstone blocks to produce sculpture stone and special orders in Schuyler, Nelson County. Production during 2000 was 105 t.

W. W. Boxley's Blue Ridge Stone Corp. was granted a State permit to quarry limestone for roadstone at the Santana site in September 1999. The quarry will be located along Catawba Creek, north of Fincastle, in Botetourt County. The company reported no production from that site in 2000.

Government Activities and Programs

In 2001, the VDMR continued geologic mapping in several counties at a detailed 1:24,000 scale and continued to map and

³Palmer C. Sweet, Geologist Supervisor—Economic Geology, Virginia Division of Mineral Resources, authored the text of the State's mineral industry information submitted by that agency.

compile 1:100,000-scale maps. Field studies and compilation of mineral resources on 1:24,000-scale maps continued. Published during the year were reports on the geology of the Virginia portions of the Lindsie 1:24,000-scale quadrangle and the Peterstown 1:24,000-scale quadrangle; the geologic map of the Augusta, Bath, Highland, Rockbridge, and Rockingham Counties portions of the Staunton 30 x 60-minute quadrangle; and the geologic map of Clarke, Frederick, Shenandoah, and Warren Counties portions of the 30 x 60-minute quadrangle. Also published during the year were the geologic map of the Augusta, Page, and Rockingham Counties portions of the Charlottesville 30 x 60-minute quadrangle and the Clarke, Page, Rockingham, Shenandoah, and Warren Counties portions of the Front Royal 30 x 60-minute quadrangle. Under STATEMAP, a component of the USGS National Cooperative Geologic Mapping Program (NCGMP), the geologic mapping of the Claybank, Gressit, and Toano 7.5-minute quadrangles was completed, and under the EDMAP component of the NCGMP, maps of Fletcher, Madison, Old Rag, and Thornton Gap 7.5-minute quadrangles were completed. Also published during the year were reports on selected karst features of the southwestern Valley and Ridge province; a hydrogeologic database for Fluvanna County; and an updated directory of the mineral industry in Virginia. Nineteen maps-on-demand depicting the mined portion and extent of coal beds in southwest Virginia, were prepared during the year. Articles published in the VDMR quarterly, Virginia Minerals, pertained to the analyses of

carbonate rocks in southwest Virginia; a reference section on the Cambrian-Ordovician rocks near Gate City, VA; imported and exported mineral commodities and products in Virginia; and the geology and history of Confederate saltpeter cave operations in western Virginia. Also, "Geographical and Cultural names in Virginia," originally published in 1974, was reprinted during the year.

A program to digitize all previously published VDMR geologic maps was well underway, with all maps in some stage of completion. The digitized version of the Geologic Map of Virginia (1:500,000-scale) was completed and was in the final stage of editing. It will be issued on CD-ROM as a color raster image accompanied by digital vector data in a variety of standard formats.

In 2001, the Division, in cooperation with Radford University, produced and released the Geology of Virginia CD-ROM 4 on the detailed geology of the "Valley and Ridge" and the "Appalachian Plateaus" physiographic provinces. CD-ROM 1 (2nd edition), "Introduction and Geologic Background," was also published during the year. The CD-ROM series emphasizes the Virginia Standards of Learning in Earth Science. A Teacher's Guide accompanies the CD.

The Mineral Resources of Virginia Database, which contains location and identification information on mines, quarries, prospects, pits, and occurrences, is being updated as ongoing fieldwork is completed.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN VIRGINIA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	881	3,240	1,010	2,380	1,010	2,380
Kyanite e/	90	12,700	90	13,400	90	13,400
Sand and gravel, construction	11,300	53,800	12,100	63,200	11,200	59,200
Stone:						
Crushed	66,400 r/	389,000 r/	68,800	424,000	74,000	470,000
Dimension metric tons	5,640	624	W	W	W	W
Combined values of cement, clays (fuller's earth), feldspar, gemstones, gypsum [crude (1999)], iron oxide pigments (crude), lime, sand and gravel (industrial), talc (crude), titanium (ilmenite), vermiculite, zirconium (zircon), and values indicated by symbol W	XX	176,000	XX	193,000	XX	206,000
Total	XX	650,000	XX	710,000	XX	751,000

e/ Estimated. p/ Preliminary. W Withheld to avoid disclosing company proprietary data; values included with "Combined values" data. XX Not applicable.

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

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

TABLE 2
VIRGINIA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	48	20,000 r/	\$106,000 r/	\$5.32 r/	46	21,300	\$118,000	\$5.53
Dolomite	10	4,440 r/	26,300 r/	5.92 r/	8	3,850	23,300	6.07
Granite	35	25,400	162,000	6.39	28	26,700	183,000	6.86
Sandstone and quartzite	7 r/	1,620	7,100	4.39	7	1,950	8,590	4.40
Traprock	10	13,800	80,100	5.78	10	13,900	85,000	6.10
Slate	1	W	W	8.79	1	W	W	5.50
Miscellaneous stone	17	W	W	5.94	4	W	W	6.05
Total or average	XX	66,400 r/	389,000 r/	5.86	XX	68,800	424,000	6.16

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

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

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

TABLE 3
VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	242	\$1,820	\$7.51
Riprap and jetty stone	487	4,940	10.15
Filter stone	686	5,050	7.35
Other coarse aggregate	572	4,100	7.16
Coarse aggregate, graded:			
Concrete aggregate, coarse	4,920	36,600	7.43
Bituminous aggregate, coarse	3,070	23,500	7.66
Bituminous surface-treatment aggregate	1,840	14,300	7.82
Railroad ballast	350	2,470	7.05
Other graded coarse aggregate	1,890	11,900	6.27
Fine aggregate (-3/8 inch):			
Stone sand, concrete	426	3,280	7.71
Stone sand, bituminous mix or seal	5.38	3,900	7.25
Screening, undesignated	1,130	7,260	6.45
Other fine aggregate	1,760	7,640	4.35
Coarse and fine aggregates:			
Graded road base or subbase	6,370	41,400	6.50
Unpaved road surfacing	330	2,600	7.88
Terrazzo and exposed aggregate	W	W	9.23
Crusher run or fill or waste	1,190	6,640	5.58
Other coarse and fine aggregates	7,840	47,500	6.06
Other construction materials	61	259	4.25
Agricultural:			
Agricultural limestone	(3/)	(3/)	8.45
Other agricultural uses	(3/)	(3/)	8.99
Chemical and metallurgical:			
Cement manufacture	(3/)	(3/)	3.31
Lime manufacture	(3/)	(3/)	6.68
Special, mine dusting or acid water treatment	(3/)	(3/)	13.62
Other miscellaneous uses and other specified uses not listed	(3/)	(3/)	20.33
Unspecified: 4/			
Reported	24,500	139,000	5.68
Estimated	6,400	34,000	5.31
Total or average	68,800	424,000	6.16

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

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

2/ Includes dolomite, granite, limestone, limestone-dolomite, miscellaneous stone, sandstone and quartzite, slate, and traprock.

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

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

TABLE 4
 VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000, 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/	654	4,320	197	1,680	1,140	9,900
Coarse aggregate, graded 3/	3,170	19,800	1,050	7,970	7,840	61,000
Fine aggregate (-3/8 inch) 4/	2,070	10,700	W	W	W	W
Coarse and fine aggregate 5/	5,060	23,000	1,050	6,510	9,620	68,600
Other construction materials	61	259	--	--	--	--
Agricultural 6/	1,000	8,500	W	W	W	W
Chemical and metallurgical 7/	W	W	--	--	--	--
Special 8/	W	W	--	--	--	--
Other miscellaneous uses 9/	W	W	--	--	--	--
Unspecified: 10/						
Reported	1,410	8,190	8,110	46,200	15,000	84,600
Estimated	5,900	31,000	450	2,500	--	--
Total	22,500	122,000	11,300	68,200	35,100	234,000

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

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

2/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

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

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

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

6/ Includes agricultural limestone and other agricultural uses.

7/ Includes cement manufacture and lime manufacture.

8/ Includes mine dusting or acid water treatment.

9/ Includes other specified uses not listed.

10/ Reported and estimated production without a breakdown by end use.

TABLE 5
 VIRGINIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000,
 BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	2,340	\$14,100	\$6.00
Concrete products (blocks, bricks, pipe, decorative, etc.)	112	1,020	9.13
Asphaltic concrete aggregates and other bituminous mixtures	595	3,090	5.19
Road base and coverings	630	1,690	2.68
Fill	1,900	5,400	2.84
Snow and ice control	43	256	5.95
Unspecified: 2/			
Reported	5,070	32,500	6.41
Estimated	1,400	5,200	3.57
Total or average	12,100	63,200	5.20

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

2/ Reported and estimated production without a breakdown by end use.

TABLE 6
 VIRGINIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000,
 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 (including concrete sand)	W	W	--	--	W	W
Concrete products (blocks, bricks, pipe, decorative, etc.)	--	--	--	--	112	1,020
Asphaltic concrete aggregates and other bituminous mixtures	--	--	74	561	521	2,530
Road base and coverings	W	W	W	W	581	1,350
Fill	W	W	W	W	1,880	5,320
Other miscellaneous uses 2/	375	3,090	11	100	2,070	11,500
Unspecified: 3/						
Reported	168	1,080	40	232	4,860	31,200
Estimated	400	1,900	--	--	1,100	3,300
Total	940	6,050	124	893	11,100	56,200

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

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

2/ Includes snow and ice control.

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