

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 1997, Virginia remained 22d in rank among the 50 States in total nonfuel mineral production value,¹ according to the U.S. Geological Survey (USGS). The estimated value for 1997 was \$600 million, about a 9% increase from that of 1996. This followed a 6.6% increase from 1995 to 1996 (based on final 1996 data). The State accounted for 1.5% of the U.S. total nonfuel mineral production value.

Virginia mines produce industrial minerals and coal. The last significant metal production took place in 1981 when the State's only consistently active metal mine, an underground zinc operation, closed down because of the recession and a depressed metal market. While a diverse variety of minerals was produced in Virginia in 1997, crushed stone accounted for 65% of the State's nonfuel mineral value. From 1990 through 1997, Virginia produced more than 430 million metric tons of crushed stone, or an average of almost 54 million metric tons per year. In 1997, the value of crushed stone increased by about \$41 million, the most of any nonfuel mineral in the State; construction sand and gravel also had a significant increase (*table 1*). Crude gypsum and talc showed small decreases; gemstones, crude iron oxide pigments, and industrial sand and gravel remained unchanged. In 1996, crushed stone accounted for the largest portion of the State's increase in mineral value; lime, construction sand and gravel, masonry cement, and kyanite also contributed to the rise in value. Portland cement production and value dropped by about 11%.

Based on USGS estimates of quantities produced in the 50 States during 1997, Virginia remained the only State to mine kyanite; second of 2 States that produce vermiculite; third in feldspar; fourth in crude iron oxide pigments; and ninth in lime. The State climbed in rank to seventh from eighth in the production of crushed stone. Additionally, significant quantities of masonry cement and common clays were produced in the State. While the only producing kyanite mine in the United States was in Virginia, mullite, a calcined kyanite, was synthetically produced in one other State. About 90% of 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.

The following narrative information was provided by the Virginia Division of Mineral Resources (VDMR).² A division of Ralston Purina Co., Golden Cat, began producing cat box filler, during the summer, at its new manufacturing plant, located about 25 miles northeast of Richmond. The plant uses fuller's earth from King and Queen County.

In mid-October, RGC (USA) Mineral Sands, Inc. officially opened its titanium mining and processing operations in the town of Stony Creek, Dinwiddie County, south of Richmond. The company has invested almost \$50 million in the operation; the processing and mining operations have created 70 jobs, and hauling and supply services and contract mining operations have created an additional 25 jobs.

Vulcan Materials Co., Winston Salem, NC, announced in the fall the reopening of its Low Moor Quarry in Alleghany County. This quarry, located in Middle Ordovician limestones in the western part of the State, in the past produced roadstone, asphalt stone, and riprap.

The VDMR continued geologic mapping in several counties at a detailed (1:24,000) scale and continued to map, compile, and digitize 1:100,000-scale maps. The agency also continued field studies and compilation of mineral resources on 1:24,000 scale maps; a coalbed methane resources study; oil and gas studies of Dickenson and Russell Counties; a paper updating byproduct resources in the State; articles on clay deposits in Augusta and Rockbridge Counties; and a history of brick production in the Albemarle County and City of Charlottesville area. Published during the year were two statistics reports on coal, oil and gas, and industrial and metallic mineral resources produced in the State for 1995-96. Additional work included a study on ancient warm springs deposits in Bath and Rockingham Counties; a report on the metallic mines, prospects, and occurrences in the gold-pyrite belt of Virginia; a geologic map of the Roanoke 30 x 60-minute quadrangle; a report on Virginia's coal ages; and a brochure on the "Geology of Virginia." During the year, two brochures, "Virginia Diamonds" and "Gold in Virginia," were revised.

The Division continued to move forward with implementation of digital mapping technology, with the intent being to make data available to customers in computer-ready formats and to reduce map printing and storage costs by printing maps "on-demand." Many topographic maps and several geologic maps are already available in digital form, and many other products were being prepared.

Complete State topographic coverage is available as Digital Raster Graphics, referred to as DRG's. These color-compressed, georeferenced raster images of USGS topographic maps are at

¹The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending on 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 1997 USGS mineral production data published in this chapter are estimates as of January 1998. For some commodities (for example, 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. Call MINES FaxBack at (703) 648-4999 from a fax machine with a touch-tone handset, and request Document # 1000 for a telephone listing of all mineral commodity specialists, or call USGS information at (703) 648-4000 for the specialist's name and number. This telephone listing may also be retrieved over the Internet at <http://minerals.er.usgs.gov/minerals/contacts/comdir.html>. All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved by way of MINES FaxBack or over the Internet at <http://minerals.er.usgs.gov/minerals/>.

²Palmer Sweet, Head Geologist with the VDMR, authored the text of mineral industry information submitted by that agency.

1:24,000, 1:100,000, and 1:250,000 scales. For the coal-bearing portion of Virginia, all 1:24,000-scale topographic maps have been vectorized and are available on CD-ROM. A program to vectorize topographic contours for the remaining quadrangles in the Commonwealth is in the planning stage.

Many published geologic maps are undergoing digitization, and some newer maps are being produced by digital processes,

completely bypassing conventional printing. For example, a new geologic overview map of the Southwest Virginia Coalfields will be available as a digital dataset or as a "map-on-demand." The Division has worked closely with suppliers of plotter media to develop and test papers and inks that will stand up to the rigors of field use.

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

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1995		1996		1997 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays:						
Common	844	3,200	883	3,220	862	3,340
Fuller's earth	46	W	46	W	48	W
Gemstones	NA	W	NA	11	NA	11
Lime	731	41,900	766	45,700	774	46,200
Sand and gravel, construction	9,710	42,300	9,780	45,800	11,300	54,200
Stone, crushed	55,400	326,000	59,700	351,000	66,000	392,000
Combined value of cement, feldspar, gypsum (crude), iron oxide pigments (crude), kyanite, sand and gravel (industrial), stone [dimension dolomite, slate, and traprock (1995), dimension dolomite, granite, slate, and traprock (1996-97)], talc and pyrophyllite (1996- 97), vermiculite, and values indicated by symbol W	XX	101,000	XX	103,000	XX	104,000
Total	XX	515,000	XX	549,000	XX	600,000

p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

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

2/ Data are rounded to three significant digits; may not add to totals shown.

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

Kind	1995				1996			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	42	15,800	\$89,600	\$5.69	43	16,500	\$94,600	\$5.73
Dolomite	10	3,650	28,100	7.71	12	4,480	30,900	6.91
Granite	32	21,100	119,000	5.64	30	24,000	138,000	5.74
Traprock	10	12,600	73,200	5.84	11	12,500	71,900	5.74
Sandstone and quartzite	7	1,390	7,310	5.27	7	1,190	6,810	5.71
Slate	2	W	W	W	2	W	W	W
Other miscellaneous stone	2	W	W	W	2	W	W	W
Total	XX	55,400	326,000	5.89	XX	59,700	351,000	5.87

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

1/ Data are rounded to 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 1996, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Coarse aggregate (+1 1/2 inch):			
Macadam	318	\$1,230	\$3.87
Riprap and jetty stone	1,320	10,500	7.91
Filter stone	982	5,780	5.88
Other coarse aggregate	267	2,040	7.65
Coarse aggregate, graded:			
Concrete aggregate, coarse	6,610	41,800	6.32
Bituminous aggregate, coarse	3,770	23,700	6.29
Bituminous surface-treatment aggregate	2,750	18,900	6.88
Railroad ballast	519	2,850	5.50
Other graded coarse aggregate	1,170	7,070	6.02
Fine aggregate (-3/8 inch):			
Stone sand, concrete	744	5,240	7.04
Stone sand, bituminous mix or seal	837	5,240	6.26
Screening, undesignated	1,790	9,990	5.59
Coarse and fine aggregates:			
Graded road base or subbase	10,300	53,300	5.18
Unpaved road surfacing	663	3,750	5.66
Crusher run or fill or waste	3,370	15,700	4.67
Other coarse and fine aggregates	327	1,540	4.70
Other construction materials 3/	798	6,760	8.47
Agricultural:			
Agricultural limestone	570	5,880	10.32
Poultry grit and mineral food	108	1,240	11.51
Other agricultural uses	96	1,060	10.99
Chemical and metallurgical:			
Cement manufacture	W	W	3.71
Lime manufacture	796	4,280	5.38
Flux stone	W	W	10.17
Chemical stone	W	W	10.97
Glass manufacture	W	W	12.39
Sulfur oxide removal	W	W	7.89
Special:			
Mine dusting or acid water treatment	192	3,320	17.29
Asphalt fillers or extenders	136	1,160	8.54
Whiting or whiting substitute	W	W	31.00
Other fillers or extenders	W	W	11.42
Other specified uses not listed	1,470	7,440	5.07
Unspecified: 4/			
Actual	17,000	95,400	5.62
Estimated	2,870	15,700	5.48
Total	59,700	351,000	5.87

W Withheld to avoid disclosing company proprietary data; included with "Other specified uses not listed."

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

2/ Data are rounded to three significant digits except unit value; may not add to totals shown.

3/ Includes lightweight aggregate (slate), waste material, and other fine aggregate.

4/ Includes production reported without a breakdown by end use and with estimates for nonrespondents.

TABLE 4
 VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 1996, 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 aggregates:						
Coarse aggregate (+1 1/2 inch) 2/	965	5,350	W	W	W	W
Coarse aggregate, graded 3/	3,900	22,300	2,340	16,700	8,590	55,400
Fine aggregate (-3/8 inch) 4/	1,360	8,300	W	W	W	W
Coarse and fine aggregate 5/	4,400	21,200	2,510	15,700	7,850	40,800
Other construction materials 6/	210	987	1,370	9,050	3,030	19,600
Agricultural 7/	645	7,010	(8/)	(8/)	(8/)	(8/)
Chemical and metallurgical 9/	(8/)	(8/)	--	--	--	--
Special 10/	(8/)	(8/)	--	--	--	--
Unspecified: 11/						
Actual	2,630	17,600	(8/)	(8/)	(8/)	(8/)
Estimated	2,340	12,700	535	3,010	--	--
Total	19,100	112,000	9,210	59,700	31,500	180,000

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

1/ Data are rounded to three significant digits; may not add to totals shown.

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

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

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

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

6/ Includes lightweight aggregate (slate) and waste materials.

7/ Includes agricultural limestone, poultry grit and mineral food, and other agricultural uses.

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

9/ Includes cement manufacture, chemical stone for alkali works, flux stone, glass manufacture, lime manufacture, and sulfur oxide removal.

10/ Includes asphalt fillers or extenders, mine dusting or acid water treatment, other fillers or extenders, whitening or whitening substitute, and other specified uses not listed.

11/ Includes production reported without a breakdown by end use and with estimates for nonrespondents.

TABLE 5
 VIRGINIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1996,
 BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Value per ton
Concrete aggregate (including concrete sand) 2/	1,600	\$8,900	\$5.57
Concrete products (blocks, bricks, pipe, decorative, etc.)	149	1,000	6.71
Asphaltic concrete aggregates and other bituminous mixtures	687	3,360	4.90
Road base and coverings	450	1,220	2.71
Fill	1,220	2,840	2.33
Snow and ice control	44	217	4.93
Other miscellaneous uses 3/	195	929	4.76
Unspecified: 4/			
Actual	4,820	24,900	5.17
Estimated	621	2,420	3.90
Total or average	9,780	45,800	4.68

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes filtration.

4/ Includes production reported without a breakdown by end use and with estimates for nonrespondents.

TABLE 6
 VIRGINIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1996,
 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/	W	W	W	W	1,320	6,820
Asphaltic concrete and road base materials 3/	258	1,610	118	583	1,980	5,220
Snow and ice control	W	W	W	W	29	117
Other miscellaneous uses 4/	385	2,790	61	401	193	918
Unspecified: 5/						
Actual	19	92	--	--	4,800	24,800
Estimated	215	911	72	257	334	1,250
Total	877	5,410	251	1,240	8,650	39,100

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

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes fill.

4/ Includes filtration.

5/ Includes production reported without a breakdown by end use and with estimates for nonrespondents.