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 1999, the preliminary estimated value[1] of nonfuel mineral production for Virginia was $667 million, according to the U.S. Geological Survey (USGS). This was a 5% increase from that of 1998,[2] and followed a 7.6% increase from 1997 to 1998. For the fourth consecutive year, Virginia was 22d in rank 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, Virginia's leading nonfuel mineral, accounted for 61% of the State's total value (table 1). From 1990 through 1998, Virginia produced more than 558 million metric tons of crushed stone, or an average of almost 56 million metric tons per year. In 1999, the increased values of crushed stone (up $17 million), zirconium concentrates (up more than $5 million), and construction sand and gravel and lime (each up $2.5 million) accounted for a large majority of the State's increase. Portland cement, feldspar, vermiculite, masonry cement, and titanium concentrates (from ilmenite) had smaller yet significant increases; talc, gypsum, and gemstones values also rose slightly (all in descending order of change). There were no significant decreases in value for any mineral commodity. In 1998, crushed stone with a $13 million increase, fuller's earth rising almost as much, and significant increases for titanium concentrates and portland cement accounted for a large majority of the State's increase in value. Smaller yet significant increases also occurred in the values of lime and construction sand and gravel, whereas decreases totaling about $9 million occurred in kyanite, dimension stone, masonry cement, and vermiculite.

Based upon USGS estimates of quantities produced in the 50 States during 1999, Virginia remained the only State to mine kyanite; second in feldspar, second of 2 States that produce titanium concentrates, zircon concentrates and vermiculite; seventh in fuller's earth; eighth in lime; and ninth in crushed stone. The State decreased from fifth to sixth in iron oxide pigments. It also produced significant quantities of construction sand and gravel and common clays. Although the only producing kyanite mine and calcined kyanite (mullite) 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.

The following narrative information was provided by the Virginia Division of Mineral Resources[3] (VDMR).

In late summer 1999, RGC (USA) Mineral Sands Inc. became Iluka Resources Inc., Virginia, Old Hickory Operations. The company continued titanium mining and initial processing operations in Dinwiddie County and final processing near the town of Stony Creek, Sussex County. From the commencement of operations in fall 1997 through the end of 1998 the company produced 203,000 metric tons (t) of titanium and zirconium concentrates.

W.W. Boxley's Blue Ridge Stone Corp. was granted a State permit to quarry limestone for roadstone at the Santana Plant, which is located north of Fincastle, Botetourt County. Vulcan Materials Co. received a State permit to reopen the Cashion quarry in Chesterfield County, which is southwest of Richmond; granitic rock will be crushed to produce roadstone. The Shooting Creek Quarry, LLC, obtained a State permit in late 1998 to reopen the quarry (formerly operated by Pine Creek Stone Co.), which is about 3 miles east of Floyd, Floyd County. The company began quarrying and processing amphibolite in early 1999; the main product from the operation is roadstone, which is transported by truck. In late 1998, Luck Stone Corp. acquired Smith Sand and Gravel Co.'s operation in Caroline County northeast of Richmond. The company will operate as the Caroline Plant of Luck Stone Corp.

Golden Cat, a Division of Ralston Purina Co., continued producing cat box litter at its manufacturing plant, which is located about 40 kilometers northeast of Richmond in King William County. At its on-site mining operation, 136,000 t of raw clay material has been mined between its opening in the late summer of 1997 through the end of 1998.

The New World Stone Co. began operating the former Tulikivi soapstone plant at Schuyler, Nelson County, in November 1998. The company continued to use existing soapstone blocks to produce sculpture, etc., for special orders.

PCS Phosphates, Inc., closed its defluorinating plant in Saltville, Smyth County, on August 31, 1999. The closure was due to the high cost of transporting raw materials from Aurora, NC, and the cost of removing waste products from the facility.

U.S. Gypsum Co. closed its Locust Cove gypsum mine and its wallboard plant in Smyth and Washington Counties. The closing, which was initially planned for May 1999, was delayed

[1]The 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 1999 USGS mineral production data published in this chapter are preliminary estimates as of May 2000, 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. A telephone listing for the specialists may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals/contacts/comdir.html, by using MINES FaxBack at (703) 648-4999 from a fax machine with a touch-tone handset (request Document #1000 for a telephone listing of all mineral commodity specialists), or by calling USGS information at (703) 648-4000 for the specialist's name and number. All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL http://minerals.usgs.gov/minerals; facsimile copies may be obtained from MINES FaxBack.

[2]Values, percentage calculations, and rankings for 1998 may vary from the Minerals Yearbook, Area Reports: Domestic 1998, Volume II, owing to the revision of preliminary 1998 to final 1998 data. Data for 1999 are preliminary and are expected to change; related rankings may also be subject to change.

[3]Palmer C. Sweet, Head Geologist with the Virginia Division of Mineral Resources, authored the text of mineral industry information submitted by that agency.

to near yearend owing to high demand for the wallboard product manufactured in the Saltville plant. The main reasons for closing were that it was a "high-cost plant" and that the plant was not close to its major markets.

In 1999, Gold Crown Mining Co. continued to permit and work intermittently the old Kentuck Mine, east of Danville, Pittsylvania County, for small amounts of gold. Southern Piedmont Mining Co. continued to permit the old Moss gold mine in Goochland County, although no processing of ore was reported from the company's permitted site near the Goochland-Fluvanna County line.

Government Activities and Programs

During the latter part of the year, the Governor of Virginia proposed a transportation spending program of $2.5 billion. Most of the funds were targeted for fast-growing, "traffic-choked" northern Virginia. The Governor appointed the Commission on Transportation Policy to make interim recommendations by December 1999 and final recommendations by the end of 2000.

The VDMR continued its geologic mapping of several counties at a detailed 1:24,000 scale, mapping and compiling 1:100,000-scale maps, and digitizating its 1:24,000- and 1:100,000-scale maps. Field studies and compilation of mineral resources on 1:24,000-scale maps continued, and a project to prepare county geology and mineral resources data also was underway. During 1999, reports were published on the statistics of industrial and metallic mineral resources, coal, oil and gas produced in the State in 1998, and 53-million-year-old vertebrates and plants from the Fisher/Sullivan site in Stafford County. Also published were articles in the quarterly *Virginia Minerals* on the geology of the Culpeper basin, vein quartz, mineral resources in comprehensive planning, and a Mammoth tooth found in Endless Caverns.

An ambitious program to digitize all previously published VDMR geologic maps continued with all the maps at some stage of completion. In a separate program, plans were being made to scan all the reports the agency has published since 1905. These will be made available as Portable Document Format (PDF) files on CD-ROM. Aside from the convenience of having all the maps and reports available in digital form, previously out-of-print publications will be available.

The Geologic Map of Virginia (1:500,000 scale), which was fully digitized and in the final stages of editing, was being prepared to be published on CD-ROM as a color raster image accompanied by digital vector data in a variety of standard formats; for example, ARC/INFO, ArcView, and Auto CAD. Additionally, the digital Geologic Map of Virginia was being processed for presentation on the Internet as a set of interactive maps using MapGuide software.

In cooperation with Radford University, the VDMR produced and released a CD-ROM "The Geology of Virginia," which describes the basics of rocks, minerals, fossils, etc. It emphasizes the Virginia Standards of Learning in Earth Science and is accompanied by a Teacher's Guide. This is the first of a planned set of four CD-ROM's, the remaining three of which will address the detailed geology of the physiographic provinces.

The Mineral Resources of Virginia data base, which contains location and identification information on mines, quarries, prospects, pits, and occurrences, is being updated as field work is completed. Checking and verification of data is also being accomplished as the project continues. In four counties, pilot projects to develop water-well data bases were underway in an effort to establish the relation between bedrock geology and well yields.

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

(Thousand metric tons and thousand dollars)

Mineral	1997		1998		1999 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays: Common	830	3,160	872	3,310	877	3,240
Kyanite	W	W	90	13,200	90	13,000
Lime	818	49,300	859	51,700	900	54,200
Sand and gravel: Construction	10,700	52,700	11,900	54,800	12,100	57,300
Stone:						
Crushed	61,300 r/	377,000 r/	65,900	390,000	67,000	407,000
Dimension	W	W	5,430	600	4,880	595
Combine values of cement, clays (fuller's earth), feldspar, gemstones, gypsum (crude), iron oxide pigments (crude), sand and gravel (industrial), stone [dimension dolomite, granite, slate, and traprock (1997)], talc and pyrophyllite (1997, 1999), vermiculite, zirconium concentrates (1998-99), and values indicated by symbol W	XX	109,000	XX	122,000	XX	132,000
Total	XX	591,000 r/	XX	636,000	XX	667,000

p/ Preliminary. r/ Revised. W Withheld to avoid disclosing company proprietary data; value 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	1997				1998			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	41	15,700	$93,500	$5.97	44	18,500	$103,000	$5.56
Dolomite	10	4,880	33,700	6.92	10	3,800	22,600	5.96
Granite	38	27,000 r/	167,000 r/	6.17 r/	39	28,600	186,000	6.50
Sandstone and quartzite	6	1,410	8,460	6.00	8	2,460	12,000	4.90
Traprock	9 r/	11,200 r/	63,300 r/	5.64 r/	9	11,400	59,300	5.22
Slate	2	W	W	18.61 r/	1	W	W	6.07
Miscellaneous stone	3	W	W	6.44 r/	4	W	W	6.25
Total or average	XX	61,300 r/	377,000 r/	6.14 r/	XX	65,900	390,000	5.92

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, except unit value; may not add to totals

TABLE 3
VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 1998, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Coarse aggregate (+1 1/2 inch):			
Macadam	394	$1,360	$3.44
Riprap and jetty stone	1,180	8,790	7.46
Filter stone	710	4,180	5.88
Other coarse aggregate	608	4,070	6.70
Coarse aggregate, graded:			
Concrete aggregate, coarse	7,530	47,100	6.25
Bituminous aggregate, coarse	4,090	28,400	6.94
Bituminous surface-treatment aggregate	2,140	16,600	7.75
Railroad ballast	552	3,060	5.54
Other graded coarse aggregate	2,180	14,000	6.41
Fine aggregate (-3/8 inch):			
Stone sand, concrete	485	3,160	6.52
Stone sand, bituminous mix or seal	1,070	6,370	5.94
Screening, undesignated	2,170	11,100	5.11
Other fine aggregate	1,200	6,400	5.35
Coarse and fine aggregates:			
Graded road base or subbase	8,490	50,200	5.92
Unpaved road surfacing	562	3,050	5.43
Terrazzo and exposed aggregate	W	W	4.00
Crusher run or fill or waste	4,450	22,600	5.08
Other coarse and fine aggregates	1,880	8,940	4.77
Other construction materials	5	23	4.60
Agricultural:			
Agricultural limestone	453	3,310	7.30
Poultry grit and mineral food	W	W	10.34
Other agricultural uses	156	1,580	10.10
Chemical and metallurgical:			
Cement manufacture	W	W	4.41
Lime manufacture	W	W	4.41
Chemical stone	W	W	3.85
Glass manufacture	30	233	7.77
Other chemical and metallurgical	2,470	10,900	4.40
Special:			
Mine dusting or acid water treatment	(3/)	(3/)	3.33
Asphalt fillers or extenders	144	710	4.93
Other fillers or extenders	(3/)	(3/)	7.54
Other miscellaneous uses:			
Waste material	(3/)	(3/)	4.60
Other specified uses not listed	2	10	4.95
Unspecified: 4/			
Actual	16,700	98,400	5.88
Estimated	6,110	35,200	5.76
Total or average	65,900	390,000	5.92

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
2/ Includes dolomite, granite, limestone, limestone-dolomite, miscellaneous stone, sandstone-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 1998, 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/	1,050	5,230	357	2,790	1,520	10,800
Coarse aggregate, graded 3/	4,530	27,400	2,290	17,500	9,770	65,100
Fine aggregate (-3/8 inch) 4/	1,630	8,740	663	4,550	2,640	13,800
Coarse and fine aggregate 5/	4,530	21,500	2,500	14,500	8,500	50,100
Other construction materials	W	W	W	W	W	W
Agricultural 6/	594	4,760	W	W	W	W
Chemical and metallurgical 7/	2,500	11,100	--	--	--	--
Special 8/	W	W	--	--	--	--
Other miscellaneous uses	--	--	W	W	W	W
Unspecified: 9/						
Actual	1,200	7,280	4,680	27,900	W	W
Estimated	4,850	27,800	1,260	7,360	--	--
Total	21,100	115,000	11,800	74,800	33,000	201,000

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 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 (undesignated), 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, poultry grit and mineral food, and other agricultural uses.
7/ Includes cement manufacture, chemical stone or alkali works, glass manufacture, and lime manufacture.
8/ Includes asphalt fillers or extenders, mine dusting or acid water treatment, and other fillers or extenders.
9/ Reported and estimated production without a breakdown by end use.

TABLE 5
VIRGINIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1998,
BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate 2/	5,550	$30,500	$5.50
Concrete products (blocks, bricks, pipe, decorative, etc.)	200	1,870	9.36
Asphaltic concrete aggregates and other bituminous mixtures	727	3,990	5.48
Road base and coverings	845	1,850	2.19
Fill	2,030	4,120	2.04
Snow and ice control	55	305	5.55
Other miscellaneous uses	151	1,020	6.72
Unspecified: 3/			
Actual	851	4,750	5.58
Estimated	1,460	6,420	4.41
Total or average	11,900	54,800	4.63

1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Includes plaster and gunite sands.
3/ Reported and estimated production without a breakdown by end use.

TABLE 6
VIRGINIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1998,
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 2/	W	W	W	W	5,150	27,600
Concrete products (blocks, bricks, pipe, decorative, etc.)	--	--	--	--	199	1,870
Asphaltic concrete and road base materials	106	769	108	592	1,270	3,990
Fill	2	13	(3/)	1	2,020	4,110
Snow and ice control	W	W	W	W	41	199
Other miscellaneous uses	2	14	(3/)	1	151	1,010
Unspecified 4/	233	1,050	110	749	1,960	9,370
Total	782	5,030	267	1,650	10,800	48,200

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 plaster and gunite sands.
3/ Less than ½ unit.
4/ Reported and estimated production without a breakdown by end use.