



# 2006 Minerals Yearbook

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## VIRGINIA

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**LEGEND**

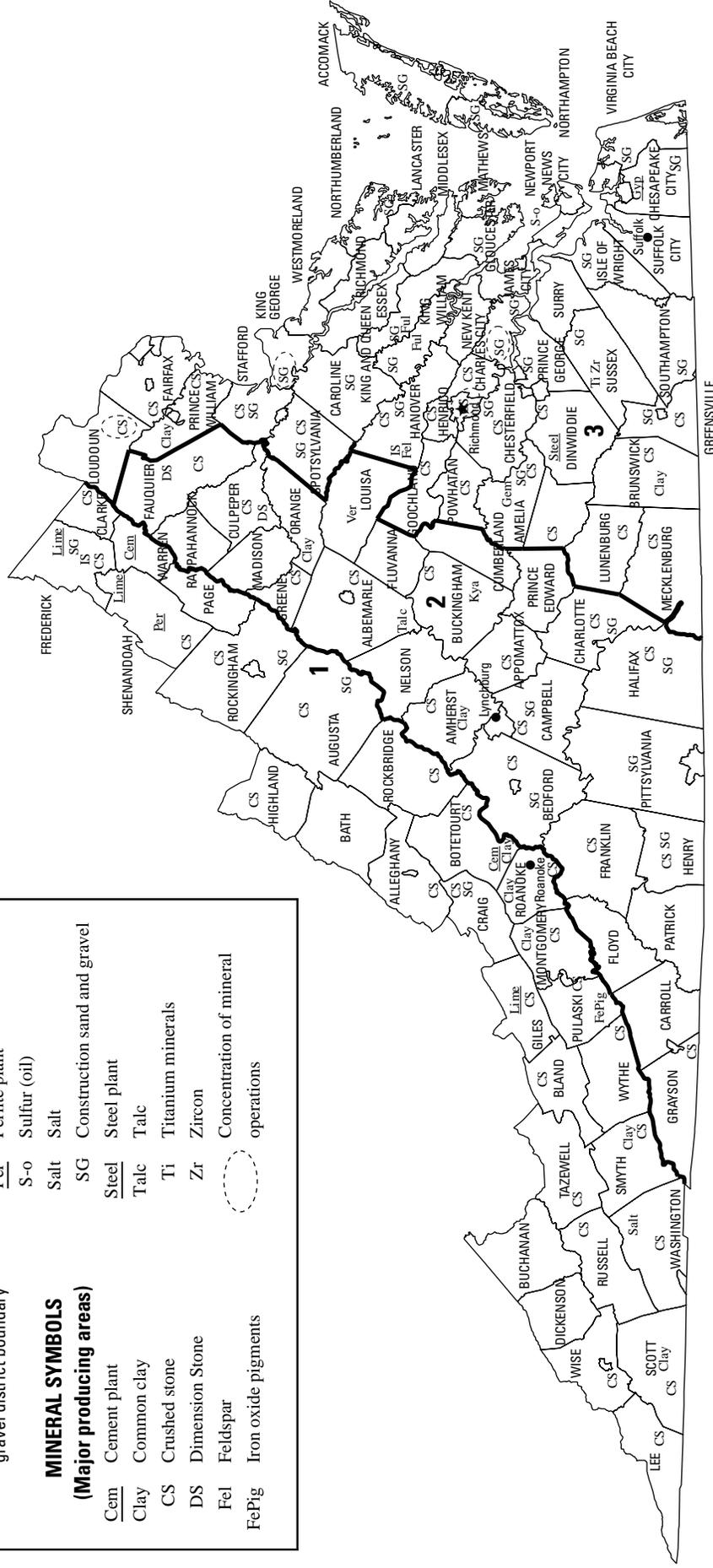
— County boundary  
 ★ Capital  
 ● City  
 1— Crushed stone/sand and gravel district boundary

**MINERAL SYMBOLS**  
**(Major producing areas)**

Cem Cement plant  
 Clay Common clay  
 CS Crushed stone  
 DS Dimension Stone  
 Fel Feldspar  
 FePig Iron oxide pigments

Full Fuller's earth  
 Gem Gemstones  
 Gyp Gypsum plant  
 IS Industrial sand  
 Kya Kyanite  
 Lime Lime plant  
 Per Perlite plant  
 S-o Sulfur (oil)  
 Salt Salt  
 SG Construction sand and gravel  
 Steel Steel plant  
 Talc Talc  
 Ti Titanium minerals  
 Zr Zircon

○ Concentration of mineral operations



Albers equal area projection

Source: Virginia Department of Mines, Minerals, and Energy/U.S. Geological Survey (2006).

# 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 2006, Virginia's nonfuel raw mineral production<sup>1</sup> was valued at \$1.27 billion, based upon annual U.S. Geological Survey (USGS) data. This was an increase of \$120 million, or nearly 10.5%, from the State's total of \$1.15 billion in 2005, which was up by \$259 million, or slightly more than 29% from 2004 to 2005. Virginia remained 18th in rank among the 50 States in total nonfuel raw mineral production value and accounted for nearly 2% of the U.S. total.

Crushed stone was, by value, Virginia's leading raw nonfuel mineral, accounting for about 64% of the State's total nonfuel mineral value in 2006. From 1990 through 2006, the State produced nearly 1.06 billion metric tons of crushed stone, or an average of 62.3 million metric tons per year (Mt/yr) during that 17-year period. Virginia's quarries during the past 6 years, on average, have produced more than 71.5 Mt/yr of crushed stone. Cement (masonry and portland) was the second leading nonfuel mineral commodity produced, followed by construction sand and gravel, lime, and zirconium concentrates. These five mineral commodities represented slightly more than 91% of the State's total nonfuel mineral value.

Nearly all of the State's nonfuel mineral commodities increased in value in 2006, led by the increases in the values of crushed stone, construction sand and gravel, crushed marble, titanium mineral concentrates (ilmenite), and lime. Although production did increase for a majority of the mineral commodities, much of the increase in 2005 and 2006 resulted

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<sup>1</sup>The 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 2006 USGS mineral production data published in this chapter are those available as of March 2008. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

from higher average unit prices for most of the mineral commodities.

The production value of crushed stone rose by \$42 million, despite a 13% decrease in production tonnage. Construction sand and gravel had a 28% value increase of about \$24 million followed by crushed marble (data withheld—company proprietary data); ilmenite with a 75% increase in value, in part the result of a modest increase in production; and lime with a more than \$12 million rise in value with a small increase having taken place in its production. Other mineral commodities having increases in value were cement and zirconium concentrates, up in the vicinity of \$7 million each, and common clays and fuller's earth, with about \$3 million each (table 1).

In 2006, Virginia continued to be the only State to mine and produce kyanite. It also continued to rank second in the production of zirconium of the two zirconium-producing States, second in feldspar, second in crude vermiculite of the two producing States, and eighth in the production of crushed stone. The State rose in rank to first in ilmenite of the two ilmenite-producing States, to third from fourth in iron oxide pigments, and to fourth from fifth in fuller's earth clays (within same rankings, commodities are listed in descending order of value). Additionally, significant quantities of portland cement, construction sand and gravel, masonry cement, common clays, and gemstones (in descending order of value) were produced in the State. Although the only producing kyanite mine and calcined kyanite (mullite) facilities in the United States were in Virginia, synthetic mullite, which in USGS terminology is a calcined bauxitic kaolin, was produced in one other State. About 90% of the U.S. kyanite and mullite output was used in refractories, mostly for the smelting and processing of a variety of metals (60% to 65% in ironmaking and steelmaking), as well as in the manufacture of chemicals, glass and high-temperature ceramics, and other materials.

TABLE 1  
NONFUEL RAW MINERAL PRODUCTION IN VIRGINIA<sup>1,2</sup>

(Thousand metric tons and thousand dollars)

Mineral	2004		2005		2006	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays:						
Bentonite	5	W	--	--	--	--
Common	994	4,640	983	4,690	762	1,810
Kyanite	90	13,400	90	13,400	90	14,000
Sand and gravel, construction	12,800	75,800	12,000	85,800	14,200	110,000
Stone:						
Crushed	73,700 <sup>3</sup>	540,000 <sup>3</sup>	85,700 <sup>r</sup>	772,000 <sup>r</sup>	74,800 <sup>3</sup>	814,000 <sup>3</sup>
Dimension	5	594	6	631	6	631
Talc, crude	--	--	1	15	W	W
Combined values of cement, clays (fuller's earth), feldspar, gemstones (natural), iron oxide pigments (crude), lime, sand and gravel (industrial), stone [crushed marble (2004, 2006)], titanium concentrates (ilmenite), vermiculite (crude), zirconium concentrates, and values indicated by symbol W						
	XX	256,000	XX	272,000	XX	333,000
Total	XX	891,000	XX	1,150,000 <sup>r</sup>	XX	1,270,000

<sup>r</sup>Revised. W Withheld to avoid disclosing company proprietary data. Withheld value included in "Combined values" data. XX Not applicable. -- Zero.

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

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

<sup>3</sup>Excludes certain stones; kind and value included with "Combined values" data.

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

Kind	2005			2006		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone <sup>2</sup>	43 <sup>r</sup>	28,400 <sup>r</sup>	\$253,000 <sup>r</sup>	41	21,800	\$239,000
Dolomite	7	3,400	27,900	6	2,870	21,000
Marble	--	--	--	1	W	W
Granite	27 <sup>r</sup>	30,900 <sup>r</sup>	290,000 <sup>r</sup>	29	29,300	329,000
Sandstone and quartzite	5	2,180	19,900	5	1,860	17,200
Traprock	10	18,600	164,000	10	18,300	201,000
Slate	1	136	1,240	1	133	1,420
Miscellaneous stone	4 <sup>r</sup>	2,070 <sup>r</sup>	15,800 <sup>r</sup>	4	625	5,000
Total	XX	85,700 <sup>r</sup>	772,000 <sup>r</sup>	XX	74,800	814,000

<sup>r</sup>Revised. W Withheld to avoid disclosing company proprietary data. XX Not applicable. -- Zero.

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

<sup>2</sup>Includes limestone-dolomite reported with no distinction between the two.

TABLE 3  
VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2006, BY USE<sup>1</sup>

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
<b>Construction:</b>		
Coarse aggregate (+1½ inch):		
Macadam	W	W
Riprap and jetty stone	286	2,850
Filter stone	280	2,730
Other coarse aggregate	2,090	25,900
Total	2,650	31,500
Coarse aggregate, graded:		
Concrete aggregate, coarse	1,650	15,900
Bituminous aggregate, coarse	1,590	9,740
Bituminous surface-treatment aggregate	(2)	(2)
Railroad ballast	453	4,460
Other graded coarse aggregate	10,800	124,000
Total	14,500	154,000
Fine aggregate (-½ inch):		
Stone sand, concrete	776	4,690
Stone sand, bituminous mix or seal	223	1,500
Screening, undesignated	563	4,200
Other fine aggregate	3,870	34,600
Total	5,430	45,000
Coarse and fine aggregates:		
Graded road base or subbase	2,880	25,100
Unpaved road surfacing	1,000	7,690
Crusher run or fill or waste	1,660	9,360
Roofing granules	(3)	(3)
Other coarse and fine aggregates	9,460	99,500
Total	15,000	142,000
Other construction materials	118	483
<b>Agricultural:</b>		
Limestone	417	3,960
Poultry grit and mineral food	(4)	(4)
Other agricultural uses	36	296
Total	453	4,260
<b>Chemical and metallurgical:</b>		
Lime manufacture	(5)	(5)
Chemical stone	(5)	(5)
<b>Special:</b>		
Mine dusting or acid water treatment	(5)	(5)
Other fillers or extenders	(5)	(5)
<b>Other miscellaneous uses:</b>		
Waste material	(5)	(5)
Other specified uses not listed	(5)	(5)
<b>Unspecified:<sup>6</sup></b>		
Reported	28,800	322,000
Estimated	7,000	73,000
Total	35,900	395,000
Grand total	74,800	814,000

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

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

<sup>2</sup>Withheld to avoid disclosing company proprietary data; included with "Other graded coarse aggregate."

<sup>3</sup>Withheld to avoid disclosing company proprietary data; included with "Other coarse and fine aggregates."

<sup>4</sup>Withheld to avoid disclosing company proprietary data; included with "Other agricultural uses."

<sup>5</sup>Withheld to avoid disclosing company proprietary data; included in "Grand total."

<sup>6</sup>Reported and estimated production without a breakdown by end use.

TABLE 4  
VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2006, BY USE AND DISTRICT<sup>1</sup>

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch) <sup>2</sup>	W	W	W	W	W	W
Coarse aggregate, graded <sup>3</sup>	3,070	29,400	1,790	10,900	9,390	114,000
Fine aggregate (-¾ inch) <sup>4</sup>	2,960	25,000	563	3,140	1,920	16,900
Coarse and fine aggregate <sup>5</sup>	5,460	43,900	1,630	12,200	7,920	85,600
Other construction materials	118	483	--	--	--	--
Agricultural <sup>6</sup>	W	W	W	W	W	W
Chemical and metallurgical <sup>7</sup>	W	W	--	--	--	--
Special <sup>8</sup>	W	W	--	--	--	--
Other miscellaneous uses <sup>9</sup>	W	W	W	W	--	--
Unspecified: <sup>10</sup>						
Reported	2,420	26,900	5,540	62,300	20,900	233,000
Estimated	6,500	67,000	340	3,700	150	1,600
Total	22,700	246,000	10,300	97,500	41,700	470,000

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

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

<sup>2</sup>Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregates.

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

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

<sup>5</sup>Includes crusher run or fill or waste, graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and fine aggregates.

<sup>6</sup>Includes limestone, poultry grit and mineral food, and other agricultural uses.

<sup>7</sup>Includes chemical stone and lime manufacture.

<sup>8</sup>Includes mine dusting or acid water treatment and other fillers or extenders.

<sup>9</sup>Includes waste material and other specified uses not listed.

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

TABLE 5  
VIRGINIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2006,  
BY MAJOR USE CATEGORY<sup>1</sup>

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	5,380	\$50,900	\$9.47
Plaster and gunite sands	91	981	10.78
Concrete products (blocks, bricks, pipe, decorative, etc.)	214	2,370	11.07
Asphaltic concrete aggregates and road base materials	1,020	6,300	6.17
Fill	1,400	5,640	4.02
Snow and ice control	10	61	6.10
Golf course	35	405	11.57
Other miscellaneous uses	32	324	10.12
Unspecified: <sup>2</sup>			
Reported	2,590	17,100	6.62
Estimated	3,380	26,100	7.72
Total or average	14,200	110,000	7.79

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

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

TABLE 6  
 VIRGINIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2006,  
 BY USE AND DISTRICT<sup>1</sup>

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products <sup>2</sup>	535	6,220	--	--	5,150	48,000
Asphaltic concrete aggregates and road base materials	W	W	W	W	853	5,160
Fill	15	25	--	--	1,390	5,610
Other miscellaneous uses <sup>3</sup>	130	998	71	478	6	50
Unspecified: <sup>4</sup>						
Reported	23	204	--	--	2,570	16,900
Estimated	816	6,300	1,590	12,300	972	7,500
Total	1,520	13,700	1,660	12,800	10,900	83,300

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

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

<sup>2</sup>Includes plaster and gunite sands.

<sup>3</sup>Includes golf course and snow and ice control.

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