



# 2008 Minerals Yearbook

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## WEST VIRGINIA

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# THE MINERAL INDUSTRY OF WEST VIRGINIA

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

In 2008, West Virginia's nonfuel raw mineral production<sup>1</sup> was valued at \$238 million, based upon annual U.S. Geological Survey (USGS) data. This was a \$12 million, or 5.3%, increase from the State's total nonfuel mineral value of \$226 million in 2007, which was a \$4 million, or 1.7%, decrease from that of 2006.

Based upon production value, crushed stone continued to be West Virginia's leading nonfuel mineral commodity in 2008, accounting for 55% of the State's total nonfuel mineral production value. Portland cement, lime, industrial sand and gravel, and masonry cement followed (in descending order of value) and accounted for, along with crushed stone, about 96% of the State's total value of nonfuel raw mineral production.

Crushed stone led the State's rise in nonfuel raw mineral production value with a \$16 million, or 14%, increase in production value, resulting from a 2.7% increase in production. This was followed by increases that took place in salt and lime (data withheld—company proprietary data). The largest decrease in value took place in portland cement, followed by smaller decreases in construction sand and gravel, industrial sand and gravel, and masonry cement (data withheld). Production of construction sand and gravel was down almost 37% in 2008 and the production value declined almost \$1.8 million, or 32%. Industrial sand and gravel saw a smaller decline in both production and production value, down 2% and 2.3%, respectively (table 1).

West Virginia continued to rank 10th among 16 salt-producing States. The State's mines produced industrial minerals and coal; no metals were mined in West Virginia. Primary aluminum and raw steel were produced in the State, but both metals were processed from materials acquired from foreign and other domestic sources. In 2008, West Virginia fell from 9th to 10th in the Nation in the production of primary aluminum among 11 producing States.

The following narrative information was provided by the West Virginia Geological and Economic Survey (WVGES).<sup>2</sup>

## Industry Trends and Developments

According to the WVGES, while coal continued to dominate economic mineral production in the State in 2008, West Virginia also produced crushed stone (mainly limestone), clay, shale, sandstone, sand and gravel, and sand limestone.

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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 2008 USGS mineral production data published in this chapter are those available as of July 2010. 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>.

<sup>2</sup>J.Q. Britton, B.M. Blake, and D.A. Jones of the WVGES authored the text of the State mineral industry information provided by that State agency.

## Commodity Review

### Industrial Minerals

**Stone, Crushed.**—Limestone quarry production, which accounts for 90% of the total noncoal mineral production in the State (based upon tonnage), totaled approximately 15.4 million metric tons (Mt) (17 million short tons), from 46 mining permits, a decrease of 3% from that of 2007. The majority of West Virginia's limestone production was from a northeast-southwest trend in the counties along the State's eastern border with Virginia. The trend extended northeastward into the State's eastern panhandle along outcrop belts of thick carbonate units of Ordovician, Silurian, Devonian, and Mississippian age (spanning an age from about 480 million years to about 320 million years). Monongalia County has been the leading limestone-producing county in the State since 2005, from which more than 3.9 Mt (4.3 million short tons) was quarried from the Greenbrier Limestone of Mississippian age in 2008. Monongalia County was followed by Jefferson and Randolph Counties, which produced 2.8 and 2.0 Mt, respectively (3 and 2.2 million short tons) (Britton, Blake, and Jones, 2008). Away from the main limestone-producing area near the Virginia border, one operation in Ritchie County, in the northwestern portion of the State, produced approximately 100,000 t (110,000 short tons) of limestone.

Although aggregate, by far, was the largest use for the State's limestone resources, additionally, limestone was processed for use in the production of cement and steel and for such uses as agricultural lime and ballast, flue gas desulfurization, fluidized bed combustion, low silica rock dust for the coal industry, metallurgical flux, stream revitalization, various chemical applications, and wastewater treatment. Almost half of this limestone is shipped and sold in Virginia, Maryland, and the District of Columbia.

**Other Industrial Minerals.**—The majority of West Virginia's sand and gravel was produced from Tucker and Grant Counties in the northern part of the State or in Logan and Raleigh Counties in southern West Virginia. Raleigh County reported total crushed sandstone production of 608,000 t (670,000 short tons), with Logan and Randolph Counties reporting 190,000 and 59,000 t, respectively (210,000 and 65,000 short tons). Common clay and shale production, mostly used in the brick manufacturing industry, was limited to Berkeley County in the eastern panhandle (Britton, Blake, and Jones, 2008).

## Government Programs

The WVGES continued geologic operations conducting geologic mapping, geochemical surveys, and research of the geology, mineral resources, and topography of the State and was

an active participant in the STATEMAP program. STATEMAP is a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP), through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which is a matching-funds grant program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. In cooperation with and as part of the STATEMAP program, reconnaissance bedrock mapping and geochemical sampling were carried out during 2008 on the Hightown quadrangle on the border of West Virginia and Virginia, located in the Valley and Ridge physiographic province. A preliminary bedrock geologic map was produced for the Hightown quadrangle (McDowell, 2008).

Additionally, a total of 23 bedrock samples were collected for geochemical analysis during the 2008 field season. The analytical results were combined with results from past years' STATEMAP projects in a geochemical database available to the general public as West Virginia Geological Survey Report of Investigations RI-34. Concurrent with the year's STATEMAP project, the geochemical database was brought up to date and summary statistics fully revised. A GIS-compatible version of the database was available from the WVGES.

### References Cited

- Britton, J.Q., Blake, B.M., Jr., and Jones, D.A., 2009, West Virginia, *in* Annual review 2008: Mining Engineering, v. 60, no. 5, April, p. 24–27.
- McDowell, R.R., comp., 2008, Preliminary bedrock geological map of the West Virginia portion of the Hightown quadrangle: West Virginia Geological and Economic Survey, Publication OF-0804. (Accessed May 31, 2011, at <http://www.wvgs.wvnet.edu/www/statemap/statemap08.htm>.)

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

(Thousand metric tons and thousand dollars)

Mineral	2006		2007		2008	
	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural	NA	1	NA	1	NA	1
Sand and gravel:						
Construction	429	3,470	675	5,620	426	3,840
Industrial	333	17,200	345	17,600	338	17,200
Stone:						
Crushed	14,500	120,000	14,600 <sup>r</sup>	115,000 <sup>r</sup>	15,000	131,000
Dimension	W	W	W	W	1	229
Combined values of cement, clays (common), lime, peat (2006–07), salt, and values indicated by symbol W	XX	89,100	XX	87,400	XX	85,100
Total	XX	230,000	XX	226,000 <sup>r</sup>	XX	238,000

<sup>r</sup>Revised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in “Combined values” data. XX Not applicable.

<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.

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

Type	2007			2008		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands) <sup>r</sup>	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone	24 <sup>r</sup>	13,700 <sup>r</sup>	\$108,000	25	14,200	\$123,000
Sandstone & quartzite	7	858	7,710	6	781	8,240
Total	XX	14,600 <sup>r</sup>	115,000	XX	15,000	131,000

<sup>r</sup>Revised. XX Not applicable.

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

TABLE 3  
WEST VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2008, 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	183	1,950
Filter stone	W	W
Other coarse aggregate	121	1,010
Coarse aggregate, graded:		
Concrete aggregate, coarse	1,780	14,300
Bituminous aggregate, coarse	671	5,550
Bituminous surface-treatment aggregate	W	W
Other graded coarse aggregate	68	722
Fine aggregate (-¾ inch):		
Stone sand, concrete	195	1,470
Stone sand, bituminous mix or seal	750	5,590
Screening, undesignated	154	1,400
Other fine aggregate	45	386
Coarse and fine aggregate:		
Graded road base or subbase	869	5,910
Unpaved road surfacing	W	W
Crusher run or fill or waste	1,180	7,860
Other construction materials	630	5,930
Agricultural, limestone	W	W
Chemical and metallurgical, cement manufacture	W	W
Unspecified: <sup>2</sup>		
Reported	4,080	45,500
Estimated	2,700	26,000
Total	15,000	131,000

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

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

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

TABLE 4  
WEST VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2008, 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>	360	2,070	W	W	W	W
Fine aggregate (-¾ inch) <sup>4</sup>	214	1,230	W	W	W	W
Coarse and fine aggregate <sup>5</sup>	850	5,060	W	W	W	W
Other construction materials	628	5,920	--	--	2	10
Agricultural <sup>6</sup>	W	W	--	--	W	W
Chemical and metallurgical <sup>7</sup>	--	--	W	W	--	--
Unspecified: <sup>8</sup>						
Reported	3,270	36,600	193	2,090	617	6,890
Estimated	293	2,700	1,300	13,000	1,100	11,000
Total	5,690	54,300	5,650	42,300	3,620	34,800

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 aggregate.

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

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

<sup>5</sup>Includes crusher run or fill or waste, graded road base or subbase, and unpaved road surfacing.

<sup>6</sup>Includes limestone.

<sup>7</sup>Includes cement manufacture.

<sup>8</sup>Reported and estimated production without a breakdown by end use.

TABLE 5  
WEST VIRGINIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2008,  
BY MAJOR USE CATEGORY<sup>1,2</sup>

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregates and concrete products	W	W	\$12.89
Fill	W	W	\$5.51
Unspecified, estimated <sup>3</sup>	W	W	\$8.98
Total or average	426	\$3,840	\$9.00

<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>To avoid disclosing company proprietary data, no district tables were produced for 2008.

<sup>3</sup>Estimated production without a breakdown by end use.