

The Mineral Industry of West Virginia

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

By Donald K. Harrison¹

The value of West Virginia's nonfuel mineral production in 1978 and 1979 was \$103.5 million and \$118.6 million, respectively. Both quantity and value of mineral output increased in each consecutive year since 1977. In 1979, crushed stone accounted for 32% of the total nonfuel mineral value in the State. The combined value of cement, fire clay, lime, and salt production in 1979 added another 36% to the total.

Salt production continued to be utilized primarily by chemical companies for the manufacture of chlorine and caustic soda. The chemical industry in West Virginia contributes the largest share of value added to the State's gross manufacturing product.

West Virginia is one of the leading manufacturers of glassware because of the abundance and quality of industrial sand in the State. In 1979, there were 29 companies involved in glassmaking employing 64,000 workers earning \$70 million.

Trends and Developments.—In 1979 West Virginia reached an agreement with the Environmental Protection Agency to coordinate environmental activities. The agreement is a new approach designed to address, coordinate, and resolve environmental problems in the State. Major areas of focus include acid mine drainage, hazardous waste handling and disposal, and solid waste management.

Despite an increase in the production of crushed stone in the State, local shortages occurred. The State Department of Highways' road stabilization program, aimed at improving the State's road system, raised the demand for aggregate above normal levels. The shortage forced many road contractors to obtain stone from as far away as Indiana and Kentucky. In 1977, the highway agency earmarked \$2 million for the program but expanded the figure in 1978 to nearly \$15 million.

Investments in new and expanded processing and manufacturing plants directly dependent on mineral raw materials fell to \$30 million in 1978 from \$40.5 million in 1977. Investments in 1979 made a marked recovery, amounting to \$42 million. As a result, more than 1,300 jobs were created by the new and additional processing facilities.

Legislation and Government Programs.—In late 1978, the Secretary of the Interior designated West Virginia University at Morgantown as a State Mining and Mineral Resources and Research Institute. West Virginia University is one of 31 schools and universities in the United States chosen to establish training programs in mining and minerals extraction pursuant to Title III of Public Law 95-87. Annual allotments were provided to the university through fiscal 1984. The institute initially received a basic grant of \$110,000

Table 1.—Nonfuel mineral production in West Virginia¹

Mineral	1977		1978		1979	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays ² ----- thousand short tons	389	\$599	343	\$575	330	\$592
Gem stones-----	NA	2				
Salt----- thousand short tons	1,048	W	1,030	W	1,078	W
Sand and gravel ³ ----- do.	3,891	10,402	3,264	13,050	4,138	18,501
Stone (crushed)----- do.	10,495	28,022	11,582	32,897	11,713	37,624
Combined value of cement, clays (fire), lime, sand and gravel (industrial), stone (dimension), and values indicated by symbol W	XX	47,569	XX	56,996	XX	61,878
Total-----	XX	86,594	XX	103,518	XX	118,595

NA Not available. W Withheld to avoid disclosing company proprietary data; value included in "Combined value" figure. XX Not applicable.

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

²Excludes fire clay; value included in "Combined value" figure.

³Excludes industrial sand; value included in "Combined value" figure.

Table 2.—Value of nonfuel mineral production in West Virginia, by county¹

(Thousands)

County	1977	1978	Minerals produced in 1978 in order of value
Berkeley-----	\$26,188	\$29,841	Cement, stone, lime, clays.
Boone-----	210	210	Stone.
Braxton-----	2	(²)	Do.
Brooke-----	--	W	Sand and gravel.
Cabell-----	16	18	Clays.
Fayette-----	W	W	Stone.
Gilmer-----	W	W	Do.
Grant-----	258	266	Do.
Greenbrier-----	W	W	Do.
Hampshire-----	W	W	Do.
Hancock-----	W	W	Sand and gravel, clays.
Harrison-----	603	W	Stone.
Jackson-----	W	W	Stone.
Jefferson-----	W	W	Do.
Kanawha-----	8	W	Clays.
Lincoln-----	190	21	Stone.
Marion-----	W	W	Salt.
Marshall-----	44	77	Sand and gravel.
Mason-----	W	1,372	Stone.
Mercer-----	W	W	Do.
Mineral-----	W	W	Do.
Monongalia-----	1	W	Do.
Monroe-----	W	W	Sand and gravel.
Morgan-----	W	W	Lime, stone.
Pendleton-----	W	663	Stone.
Pocahontas-----	W	989	Do.
Preston-----	1,271	1,358	Do.
Raleigh-----	3,567	3,897	Do.
Roane-----	64	W	
Tucker-----	W	W	Stone.
Tyler-----	W	W	Salt.
Wetzel-----	W	W	Sand and gravel.
Wirt-----	20	W	
Wood-----	--	W	Sand and gravel.
Wyoming-----	W	W	Do.
Undistributed ³ -----	54,151	64,810	
Total ⁴ -----	86,594	103,518	

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

¹Barbour, Brooke, Calhoun, Clay, Doddridge, Hardy, Lewis, Logan, McDowell, Mingo, Nicholas, Ohio, Pleasants, Putnam, Ritchie, Summers, Taylor, Upshur, Wayne, and Webster Counties are not listed because no nonfuel mineral production was reported.

²Less than 1/2 unit.

³Includes gem stones (1977) that cannot be assigned to specific counties and values indicated by symbol W.

⁴Data may not add to totals shown because of independent rounding.

Table 3.—Indicators of West Virginia business activity

	1977	1978	1979 ^P	1978-79 percent change
Employment and labor force, annual average:				
Total civilian labor force ----- thousands...	691.0	720.0	751.0	+4.3
Unemployment ----- do.....	49.0	46.0	51.0	+10.9
Employment (nonagricultural):				
Mining ¹ ----- do.....	66.7	56.7	66.0	+16.4
Manufacturing ----- do.....	123.8	126.6	126.0	+ .5
Contract construction ----- do.....	39.0	43.7	40.5	-7.3
Transportation and public utilities ----- do.....	40.7	40.2	43.7	+8.7
Wholesale and retail trade ----- do.....	123.4	131.8	132.7	+ .7
Finance, insurance, real estate ----- do.....	20.0	21.2	21.5	+1.4
Services ----- do.....	86.9	92.7	95.1	+2.6
Government ----- do.....	111.0	116.6	120.2	+3.1
Total nonagricultural employment ¹ ----- do.....	611.6	629.5	² 645.6	+2.6
Personal income:				
Total ----- millions...	\$11,118	\$12,327	\$14,029	+13.8
Per capita ----- do.....	\$5,999	\$6,629	\$7,470	+12.7
Construction activity:				
Number of private and public residential units authorized -----	3,519	³ 4,352	4,317	- .8
Value of nonresidential construction ----- millions...	\$72.0	\$89.2	\$469.6	-22.0
Value of State road contract awards ----- do.....	\$250.0	NA	\$390.0	--
Shipments of portland and masonry cement to and within the State thousand short tons...	632	673	631	-6.2
Nonfuel mineral production value:				
Total crude mineral value ----- millions...	\$86.6	\$103.5	\$118.6	+14.6
Value per capita, resident population ----- do.....	\$47	\$56	\$63	+12.5
Value per square mile ----- do.....	\$3,581	\$4,281	\$4,904	+14.6

^PPreliminary. NA Not available.

¹Includes bituminous coal and oil and gas extraction.

²Data do not add to totals shown because of independent rounding.

³Series revised in 1978; data not comparable with those of prior years.

Sources: U.S. Department of Commerce, U.S. Department of Labor, Highway and Heavy Construction Magazine, and U.S. Bureau of Mines.

plus \$160,000 for scholarships and fellowships.

In accordance with the provisions of the Wilderness Act (PL 88-577) and the Eastern Wilderness Act (PL 93-622), the mineral resource potential of two wilderness areas in West Virginia were jointly investigated by the Federal Bureau of Mines and the U.S. Geological Survey (USGS). A USGS Open-File Report (OFR 78-142), entitled "Mineral Resources of the Cranberry Wilderness Study Area, Pocahontas and Wyoming Counties, W. Va.," was published in 1978. Bureau of Mines and USGS personnel conducted a field investigation in 1978 in the Otter Creek Wilderness Area, Tucker

and Randolph Counties. Results of the investigation are scheduled to be published in 1980.

State legislation was enacted that limits mining in the Cranberry Wilderness Study Area. No new prospecting or surface mining permits are to be issued, and any existing permits for surface or underground mining within or underneath the area will be terminated. All land restoration and reclamation required by this legislation was to be completed before January 1, 1979. Since no recent mining has occurred in the Wilderness Study Area, no land restoration or reclamation was necessary.

REVIEW BY NONFUEL MINERAL COMMODITIES

NONMETALS

Cement.—Martin Marietta Corp., the only producer of both portland and masonry cement in the State, operated three coal-fired kilns at its plant at Martinsburg in Berkeley County. Most of the cement was used in ready-mixed concrete and concrete

products. In addition to in-State consumption, shipments were made to the District of Columbia, Maryland, North Carolina, Pennsylvania, and Virginia.

Clays.—Common clay and fire clay were produced by six companies in Berkeley, Cabell, Hancock, and Lincoln Counties. Fire clay production remained essentially con-

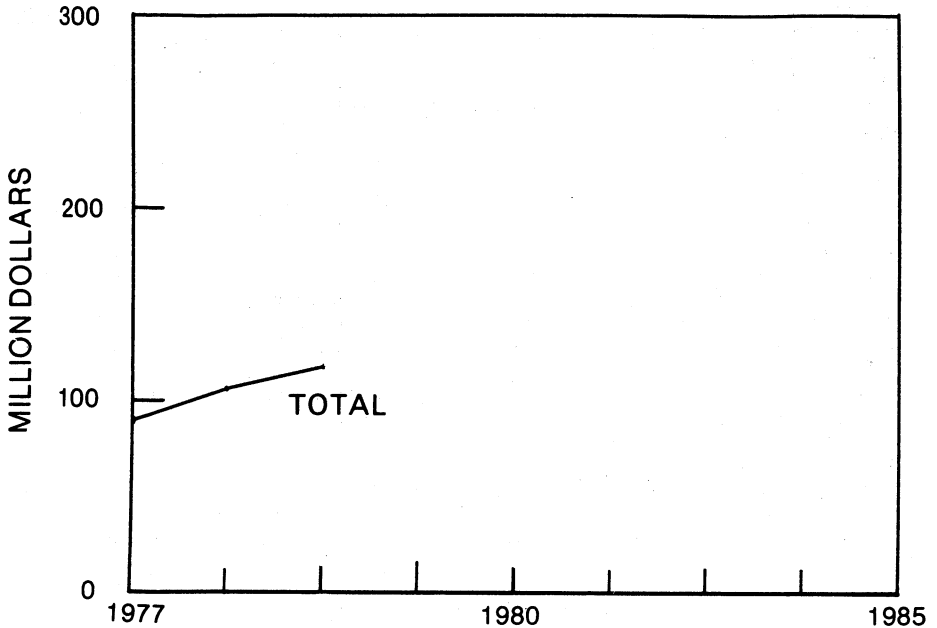


Figure 1.—Total value of nonfuel mineral production in West Virginia.

stant in 1978, but increased nearly 6% in 1979. Production of common clay decreased in 1978 and again in 1979. Berkeley County continued to be the leading producer of common clay; Hancock County was the only producer of fire clay. Principal uses were in the manufacture of face brick, fire brick, and cement.

Iron Oxide Pigments.—Production of synthetic iron oxide increased substantially in 1979 as the result of a new plant coming online at New Martinsville. The plant, owned by Mobay Chemical Corp., will be the largest facility of its kind in the United States when fully operational. Production of synthetic iron oxide pigments began in the last quarter of 1978; first shipments began early in 1979. Construction continued on the second stage of the plant, which will have an annual production capacity of 45,000 tons per year.

Lime.—Production of lime was reported by two companies during 1978 and 1979. Both quicklime and hydrated lime were

produced in Pendleton County; quicklime was also produced in Berkeley County. Output and value remained essentially the same in 1977 and 1978, but increased 19% in tonnage and 17% in value in 1979.

Salt.—Three companies recovered salt at deepwell solution mining operations in Marshall and Tyler Counties. Production essentially remained constant during the biennium. The salt was used by the producers for manufacturing chlorine, caustic soda, and other chemicals.

Sand and Gravel.—Output of construction sand and gravel in 1978 decreased 16% compared with that of 1977. The major cause of the decrease was the lowered demand for ready-mixed concrete used in the construction of houses and heavy industrial projects. The number of houses built in 1978 was down, and other types of commercial construction, as well as highway construction, also declined. Production in 1979 rose above the 1977 output primarily due to increased demand for the State's road stabi-

lization program. Sand and gravel constituted 13% and 16% of the State's total nonfuel mineral value in 1978 and 1979, respectively.

Seven companies produced sand and gravel at eight operations in seven counties in 1979. Leading counties, in order of output, were Wetzel, Brooke, and Morgan. Trucks transported approximately 75% of the material; the remainder was shipped by rail and barge.

Construction sand and gravel comprised the bulk of the aggregate produced. It was used primarily in concrete aggregate and asphalt.

Industrial sand was produced at two operations in Morgan and Wyoming Counties. Output increased in 1978, compared with that in 1977, and remained essentially the same in 1979. It was primarily used by the State's glass manufacturing industry.

In early 1979, Brockway Glass Co. sold its Clarksburg plant to Anchor Hocking Corp., a Lancaster, Ohio, tableware manufacturer. Anchor Hocking reopened the plant and announced plans to modernize and upgrade the facility. Most of the work force was

expected to be recalled within a year of the reopening. In the same year, Ashahi Glass Co. of Japan made a \$12 million investment in the Hordis Glass Co. in Clarksburg. The plant will reopen in June 1980, under the name of West Virginia Flat Glass, Inc.

Stone.—Crushed stone was produced by 41 companies at 47 mines and quarries in 22 counties in 1978. The industry was similarly structured in 1979. It was used principally for roadstone and concrete aggregate. In 1979 the leading producers of crushed stone in terms of tonnage were Greer Limestone Co., Martin Marietta Corp., and Shenandoah Quarry, Inc. Howard W. Fields Co. quarried dimension sandstone in Greenbrier County for rough flagging.

Crushed limestone was produced in 13 counties at 31 mines and quarries. Leading counties in production were Monongalia, Greenbrier, Berkeley, and Jefferson. Major uses were for construction aggregate, road-base, concrete, riprap, agriculture, railroad ballast, abrasives, and mine dusting.

Crushed sandstone was produced in 10 counties at 14 quarries. Counties that led in output were Raleigh, Logan, Wyoming, and

Table 4.—West Virginia: Construction sand and gravel sold or used, by major use category

Use	1977			1978			1979		
	Quantity (thousand short tons)	Value (thousands)	Value per ton	Quantity (thousand short tons)	Value (thousands)	Value per ton	Quantity (thousand short tons)	Value (thousands)	Value per ton
Concrete aggregate	1,587	\$4,996	\$3.15	2,138	\$8,829	\$4.13	2,638	\$11,822	\$4.48
Plaster and gunit sands	NA	NA	NA	W	W	4.25	W	W	4.85
Concrete products	1,462	3,760	2.57	W	W	4.08	W	W	4.84
Asphaltic concrete	89	342	3.86	W	W	3.60	W	W	4.27
Roadbase and coverings	169	253	1.50	W	W	4.01	W	W	4.48
Fill	367	537	1.47	W	W	3.88	W	W	4.59
Snow and ice control	—	—	—	W	W	3.25	—	—	—
Other uses	217	514	2.37	60	117	1.94	7	30	4.53
Total ¹ or average	3,891	10,402	2.67	3,264	13,050	4.00	4,138	18,501	4.47

NA Not available. W Withheld to avoid disclosing company proprietary data; included in "Total."

¹Data may not add to totals shown because of independent rounding.

Table 5.—West Virginia: Construction sand and gravel sold or used by producers

Use	1977			1978			1979		
	Quantity (thousand short tons)	Value (thousands)	Value per ton	Quantity (thousand short tons)	Value (thousands)	Value per ton	Quantity (thousand short tons)	Value (thousands)	Value per ton
Sand	2,017	\$5,401	\$2.68	1,800	\$7,026	\$3.90	2,405	\$10,624	\$4.42
Gravel	1,874	5,001	2.67	1,464	6,028	4.12	1,733	7,876	4.55
Total ¹ or average	3,891	10,402	2.67	3,264	13,050	4.00	4,138	18,501	4.47

¹Data may not add to totals shown because of independent rounding.

Table 6.—West Virginia: Crushed stone¹ sold or used by producers, by use

(Thousand short tons and thousand dollars)

Use	1977		1978		1979	
	Quantity	Value	Quantity	Value	Quantity	Value
Agricultural limestone	126	487	106	401	83	348
Concrete aggregate	1,090	2,734	2,000	5,019	2,233	6,149
Bituminous aggregate	304	901	380	1,264	360	1,238
Macadam aggregate	9	27	W	W	W	W
Dense-graded roadbase stone	2,207	6,598	2,045	6,686	2,445	8,999
Surface treatment aggregate	554	1,416	545	1,493	526	1,728
Other construction aggregate and roadstone	2,311	6,552	2,593	7,897	2,728	9,342
Riprap and jetty stone	39	130	58	203	84	325
Railroad ballast	592	1,137	649	1,239	650	1,289
Manufactured fine aggregate (stone sand)	435	1,411	569	2,050	513	2,012
Abrasives	W	W	106	353	62	209
Mine dusting	173	1,415	121	496	139	1,216
Other uses ²	2,656	5,214	2,410	5,736	1,891	4,770
Total³	10,495	28,022	11,582	32,897	11,713	37,624

¹Revised. W Withheld to avoid disclosing company proprietary data; included with "Other uses."²Includes limestone and sandstone.³Includes stone used in agricultural marl and other soil conditioners, poultry grit and mineral food (1979), filter stone, cement manufacture, lime manufacture, flux stone, refractory stone, asphalt filler (1979), fill, disinfectant (1977), sulfur dioxide, unspecified uses, and uses indicated by symbol W.³Data may not add to totals shown because of independent rounding.

Kanawha. Major uses were in construction and glassmaking.

METALS

Although West Virginia has no metal mines, the metal-processing industry plays a significant role in the State's economy. Located largely near navigable waterways, producers of steel, ferroalloys, nickel, and aluminum processed imported ores. Locally produced raw materials and electrical power were used in their operations.

Aluminum.—Kaiser Aluminum & Chemical Corp. produced aluminum at its 163,000 tpy primary aluminum smelter at Ravenswood, Jackson County. Imported bauxite is refined to alumina in Louisiana, then shipped by rail or barge to Ravenswood where it is converted to molten aluminum by a reduction process in the plant's four potlines.

Since 1957, Kaiser has continually upgraded and modernized its Ravenswood plant. The company spent approximately \$18 million during 1979. In addition to improvements in the casting department and in handling equipment, Kaiser built a new barge and unloading facility at Ravenswood. The facility, on the Ohio River, was completed in early 1979, and can now receive boat shipments of alumina from Louisiana. Prior to completion of the barge facilities, all shipments were supplied by rail.

Alcan Aluminum Corp. began a \$5 million modernization program of its facilities at Fairmont in Marion County. The first

phase included installation of new electrical and hydraulic systems on a cold rolling mill. A second phase includes the rebuilding of floors in the plant to withstand heavier loads. The plant, which employs 300 workers, serves the specialty aluminum sheet markets, fabricating aluminum fin stock for heat exchangers, blanks for cookware, lamp base stock, and transformer strip.

Ferroalloys.—Three companies produced 150,126 short tons and 172,481 short tons of ferroalloys during 1978 and 1979, respectively. Ferroalloys were produced by Union Carbide Corp. at its alloy plant in Fayette County, the Foote Mineral Co. at its Graham plant in Mason County, and Chemetal Corp.'s plant at Kingwood in Preston County. The Chemetal Corp., previously owned by the Diamond Shamrock Chemical Co., was purchased by Sedema S.A. of Belgium in 1978.

Iron and Steel.—Production of pig iron increased 16% in 1978 and remained essentially the same in 1979.

Weirton Steel Co. Division of National Steel Corp. was granted permission by the State Air Pollution Control Commission to delay shutdown of one of the firm's coke batteries because of the lack of air pollution controls. In 1978, the company had agreed to shut down the battery citing that it would not be economically feasible to retrofit the unit to meet air quality standards set by State and Federal agencies. This action, however, would have necessitated the import of foreign coke, ultimately affecting

approximately 230 steel and coal mining jobs in the State.

Nickel.—Huntington Alloys, Inc., Division of The International Nickel Co., Inc., produced wrought- and high-nickel alloys at its Huntington plant in Cabell County. These alloys are used by the chemical, aerospace, welding, and heating industries.

Zinc.—The Meadowbrook Corp., a wholly

owned subsidiary of T. L. Diamont and Co., Inc., operated a zinc plant at Spelter, Harrison County. Zinc drosses, ashes, and other residues were used to produce zinc dust, oxides, and other zinc products.

¹State mineral specialist, Bureau of Mines, Pittsburgh, Pa.

Table 7.—Principal producers

Commodity and company	Address	Type of activity	County
Cement: Martin Marietta Corp. ¹	6801 Rockledge Dr. Bethesda, MD 20034	Plant	Berkeley.
Clays:			
Barboursville Clay Manufacturing Co.	Box 253 Barboursville, WV 25504	Pit	Cabell.
Continental Clay Products Co.	Box 1111 Martinsburg, WV 25401	Pit	Berkeley.
Crescent Brick Co., Inc.	Box 368 New Cumberland, WV 26047	Underground mine	Hancock.
Globe Refractories, Inc.	Box D Newell, WV 24050	do	Do.
Iron oxide pigments, finished:			
Chemetron Corp.	491 Columbia Ave. Holland, MI 49423	Plant	Cabell.
National Steel Corp., Weirton Steel Div.	Weirton, WV 26062	do	Hancock.
Mobay Chemical Corp.	Penn Lincoln Parkway West Pittsburgh, PA 15205	do	Wetzel.
Lime:			
Greer Limestone Co.	Greer Bldg. Morgantown, WV 26505	do	Pendleton.
Riverton Corp.	Riverton, VA 22651	do	Berkeley.
Salt:			
Allied Chemical Corp.	Box 1219R Morristown, NJ 07960	Brine wells and plant	Marshall.
FMC Corp.	Box 8127 South Charleston, WV 25303	Brine wells	Tyler.
PPG Industries, Inc.	1 Gateway Center Pittsburgh, PA 15222	Brine wells and plant	Marshall.
Sand and gravel:			
Dravo Corp.	1 Oliver Plaza Pittsburgh, PA 15222	Dredge	Hancock.
McDonough Co.	Box 538 Parkersburg, WV 26100	do	Tyler and Wetzel.
Pennsylvania Glass Sand Corp	Berkeley Springs, WV 25411	Plant	Morgan.
Shippingport Sand and Gravel Co.	1200 Stambaugh Bldg. Youngstown, OH 44501	do	Hancock.
Smelters: Kaiser Aluminum & Chemical Corp.	300 Lakeside Dr. Oakland, CA 94626	do	Jackson.
Stone:			
Acme Limestone Co.	Box 27 Fort Spring, WV 24936	Mine and quarry	Greenbrier.
Elkins Limestone Co.	Box 1228 Elkins, WV 26241	do	Randolph.
The H. Frazier Co., Inc.	Box 1877 Richmond, VA 23211	Quarry	Greenbrier.
Greer Limestone Co., a division of Greer Steel Co.	Greer Bldg. Morgantown, WV 26505	Mine and quarries	Monongalia and Pendleton.
Martin Marietta Corp.	6801 Rockledge Dr. Bethesda, MD 20034	Quarry	Berkeley.
Pennsylvania Glass Sand Corp.	Box 187 Berkeley Springs, WV 25411	do	Morgan.
Shenandoah Quarry, Inc.	Box C Millville, WV 25432	do	Jefferson.
United States Steel Corp.	600 Grant St. Pittsburgh, PA 15230	do	Do.

¹Also clays.