

THE MINERAL INDUSTRY OF PENNSYLVANIA

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

Pennsylvania continued to rank 11th among the 50 States in total nonfuel mineral production value¹ in 1997, according to the U.S. Geological Survey (USGS). The estimated value for 1997 was \$1.24 billion, a 6% increase from that of 1996. This followed an 8.3% increase from 1995 to 1996 (based on final 1996 data). The State accounted for more than 3% of the U.S. total nonfuel mineral production value.

Pennsylvania continued to be among the Nation's leading producers of crushed stone, portland cement, lime, and masonry cement (in descending order of value); these four commodities accounted for nearly 92% of the State's total nonfuel mineral production value. In 1997, most minerals increased in value, led by crushed stone with a \$50 million gain and portland cement with a rise of \$17 million (*table 1*). Only construction sand and gravel and common clays showed small decreases for the year. In 1996, a combined increase of \$89 million in the values of portland cement and crushed stone accounted for most of the year's increase. Masonry cement and industrial sand and gravel also increased in value that year.

Based on USGS estimates of the quantities produced in the 50 States in 1997, Pennsylvania remained first in crushed stone; third in portland cement; fourth of four States that produce tripoli; fifth in lime and masonry cement; and seventh in dimension stone. Additionally, significant quantities of construction and industrial sand and gravel and common clays were produced in the State.

Pennsylvania is exclusively an industrial mineral- and coal-producing State; metals that were produced in the State, especially steel, were processed from materials received from other domestic or foreign sources. Pennsylvania continued to be the Nation's third leading raw steel-manufacturing State with an estimated output of almost 7.3 million metric tons of raw steel, as reported by the American Iron and Steel Institute. Bethlehem Steel Corp., Bethlehem, PA, continued a year-long corporate

restructuring process, which began in October 1996. Bethlehem signed with Lukens, Inc., Coatesville, PA, a merger agreement that would result in Bethlehem acquiring Lukens for about \$650 million, including an assumption of about \$250 million in debt. Bethlehem announced its intent to discontinue operations at its Coke Division and to sell its coal mining operation in West Virginia. Bethlehem also sold its BethShip shipyard and Centec and BethForge operations and closed its Structural Products facility.

The following narrative information was provided by the Pennsylvania Geological Survey.² Pennsylvania's mining activities have changed little over the past 3 years. The State traditionally produces over 150 million tons of nonfuel mineral production worth more than \$1 billion annually (USGS data). More than 90% of this value and tonnage is consumed in the construction markets. On a tonnage basis, Pennsylvania produces more nonfuel mineral commodities than coal. Almost 80% of the bituminous coal production is now derived from deep mines.

Exploration continued, especially for industrial minerals, to both replace reduced and depleted reserves, as well as to expand reserves and meet new consumer demands. Annually, new mining applications request approximately 4,000 hectares of land area for actual mining operations (coal and industrial minerals).

The production of crushed stone continued to increase, accounting for an estimated 93 million tons in 1997 (87.4 million tons in 1996) representing about 46% of the total nonfuel mineral value in the Commonwealth (*tables 1-3*). To meet this demand, 15 producers sought new mining permits totaling more than 485 hectares. Approximately 20% of these applications were expansions to existing operations. Crushed stone quarries average about 32 hectares each in size, which in terms of numbers and acreage are divided equally between eastern and western Pennsylvania. Approximately 55% of these applications, filed with the Department of Environmental Protection (DEP), were for carbonate bedrock sources whereas approximately 35% were for sandstone sources. A glass sand producer in the central portion of the State expanded mining operations northward along strike in Devonian-age sandstone. Carboniferous age limestones in western Pennsylvania remain one of the few sources of quality aggregate and carbonate for cement manufacture in the Appalachian Plateau physiographic province. Underground mining of industrial minerals is not uncommon in flat, relatively thin (not exceeding 18 meters in

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/>.

²Samuel Berkheiser authored the text of Pennsylvania mineral industry information.

thickness) carbonate beds, as attested to by a 62-hectare permit application to mine the Loyalhanna Formation, a siliceous limestone.

Sand and gravel production is limited primarily to the formerly glaciated portions of northwestern and northeastern Pennsylvania where the population density is generally less than elsewhere. The State commonly averages approximately 15 million tons of sand and gravel production annually. These operations are generally much smaller than crushed stone operations, averaging about 14 hectares per site. More than 162 hectares of sand and gravel permits were applied for by 10 operators in northwestern Pennsylvania, while more than 6 operators in the northeastern portion of the State sought 40 hectares.

The lime industry reported a small decrease in production in 1997. U.S. Lime and Minerals' Corson Lime Co., its subsidiary in Montgomery County, shut down after 175 years in operation. Carmeuse SA of Belgium purchased Tarmac America Inc.'s two lime plants in Adams and Lebanon Counties (formerly owned by Wimpey Minerals PA, Inc.).

According to USGS compilations, the annual value of the Commonwealth's dimension stone industry has begun to stabilize slightly below the recent peak years of 1994 and 1995, and more than 15% above the levels of the early 1990's. This

appears to be fueled by the demand for quality stone products in a largely colonial architectural market area. Major contributors to this niche are the flagstone (bluestone) producers in the northeastern portion of the State, slate producers in the north-central portion of the State, and diabase producers in the southeastern portion of the State. There are currently more than 100 permitted bluestone quarries, usually less than 2 hectares in size, located in the northeastern portion of the State. Susquehanna County is the focus of most flagstone mining efforts. A new diabase (black granite) operation has opened near Gettysburg, which will help satisfy the demand for dark-colored memorial stone applications. At least seven new sandstone building stone operations have applied for small operator permits throughout the State, according to DEP records. Other potential sources of dimension stone, including some carbonates, are currently being explored for and evaluated.

Another measure of the health of the construction industry is seen in 37 new borrow- and-fill permits that were sought in 22 of Pennsylvania's 67 counties. Most of these pits are small, less than 2-hectare operations, producing less than 1,810 tons per year. Similarly, five new topsoil mines sought permits accounting for a cumulative acreage exceeding 40 hectares. Most of this material is custom blended with other materials such as peat and sand for agricultural purposes.

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

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1995		1996		1997 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	267	21,200	274	28,000 e/	280	29,100 e/
Portland	5,610	355,000	5,670	418,000 e/	5,790	435,000 e/
Clays:						
Common	736	2,430	753	2,420	630	1,960
Kaolin	14	815	14	815	14	815
Gemstones	NA	1	NA	1	NA	1
Lime	1,640	107,000	1,530	105,000	1,550	106,000
Peat	11	294	4	166	8	181
Sand and gravel, construction	17,100	93,100	15,100	85,600	14,500	84,400
Stone:						
Crushed	80,900	492,000	87,400	518,000	93,000	568,000
Dimension	metric tons	57,600	12,300	54,300	11,800	54,600
Total 3/	XX	1,080,000	XX	1,170,000	XX	1,240,000

e/ Estimated. p/ Preliminary. NA Not available. 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.

3/ Partial total, excludes values for industrial sand and gravel and tripoli, which must be concealed to avoid disclosing company proprietary data.

TABLE 2
PENNSYLVANIA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1995				1996			
	Number of quarries	Quantity (thousands metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	126 r/	47,300 r/	\$279,000 r/	\$5.91 r/	130	55,200	\$318,000	\$5.76
Dolomite	16	14,700	91,800	6.25	14	10,800	66,900	6.20
Sandstone and quartzite	36 r/	5,240 r/	33,300 r/	6.35	33	6,020	35,500	5.89
Traprock	9 r/	3,360 r/	25,100 r/	7.46 r/	8	2,810	22,400	7.99
Granite	7	2,660	19,400	7.30	7	4,030	25,800	6.40
Marble	1	433	2,840	6.56	1	464	2,860	6.17
Miscellaneous stone	19 r/	7,220 r/	40,400 r/	5.60 r/	19	8,040	45,700	5.69
Total	XX	80,900	492,000	6.09	XX	87,400	518,000	5.92

r/ Revised. 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
PENNSYLVANIA: 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	587	\$3,980	\$6.79
Riprap and jetty stone	1,390	10,400	7.45
Filter stone	367	2,170	5.91
Other coarse aggregate	440	2,810	6.39
Coarse aggregate, graded:			
Concrete aggregate, coarse	5,080	29,900	5.89
Bituminous aggregate, coarse	7,160	41,800	5.84
Bituminous surface-treatment aggregate	3,220	20,200	6.28
Railroad ballast	890	5,230	5.87
Other graded coarse aggregate	3,440	22,100	6.42
Fine aggregate (-3/8 inch):			
Stone sand, concrete	813	4,500	5.54
Stone sand, bituminous mix or seal	3,210	18,800	5.87
Screening, undesignated	1,620	8,930	5.50
Other fine aggregate	238	1,820	7.65
Coarse and fine aggregates:			
Graded road base or subbase	13,900	71,900	5.19
Unpaved road surfacing	2,120	10,700	5.04
Terrazzo and exposed aggregate	195	1,670	8.54
Crusher run or fill or waste	1,800	9,340	5.21
Other coarse and fine aggregates	3,400	17,500	5.16
Other construction materials 3/	3,290	26,400	8.02
Agricultural:			
Agricultural limestone	494	4,980	10.07
Poultry grit and mineral food	74	437	5.91
Other agricultural uses	59	633	11.22
Chemical and metallurgical:			
Cement manufacture	6,100	29,200	4.78
Lime manufacture	1,250	8,940	7.17
Flux stone	58	385	6.64
Sulfur oxide removal	332	3,410	10.26
Special:			
Mine dusting or acid water treatment	31	471	25.43
Asphalt fillers or extenders	577	4,000	6.94
Whiting or whiting substitute	38	420	11.05
Other fillers or extenders	162	1,640	10.14
Other specified uses not listed	56	486	8.68
Unspecified: 4/			
Actual	12,900	78,300	6.06
Estimated	12,100	74,000	6.11
Total	87,400	518,000	5.92

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

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

3/ Includes building products and roofing granules.

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

TABLE 4
PENNSYLVANIA: 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		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction aggregates:								
Coarse aggregate (+1 1/2 inch) 2/	W	W	W	W	987	7,010	1,090	7,620
Coarse aggregate, graded 3/	W	W	W	W	5,670	37,700	12,400	71,800
Fine aggregate (-3/8 inch) 4/	W	W	W	W	1,150	7,140	3,790	21,600
Coarse and fine aggregate 5/	613	2,490	2,460	12,500	4,170	24,700	14,600	81,500
Other construction materials 6/	1,210	6,320	2,270	13,800	1,630	9,410	1,160	6,650
Agricultural 7/	4	31	(8/)	(8/)	(8/)	(8/)	542	5,060
Chemical and metallurgical 9/	929	7,230	173	2,190	2,020	13,000	4,620	19,500
Special 10/	48	400	(8/)	(8/)	(8/)	(8/)	722	5,100
Unspecified: 11/								
Actual	1,720	9,600	1,700	10,800	1,010	6,750	8,500	51,100
Estimated	3,410	21,800	1,480	7,780	1,480	9,600	5,740	34,800
Total	7,940	47,900	8,140	47,700	18,200	117,000	53,100	305,000

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, terrazzo and exposed aggregate, unpaved road surfacing, crusher run (select material or fill), and other coarse and fine aggregates.

6/ Includes building products and roofing granules.

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, flux stone, lime manufacture, and sulfur oxide removal.

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

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

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

Use	Quantity	Value	Value
	(thousand metric tons)	(thousands)	per ton
Concrete aggregate (including concrete sand)	4,970	\$34,200	\$6.88
Plaster and gunite sands	108	913	8.45
Concrete products (blocks, bricks, pipe, decorative, etc.)	298	2,250	7.55
Asphaltic concrete aggregates and other bituminous mixtures	1,680	10,500	6.25
Road base and coverings	2,050	10,300	5.06
Fill	1,910	6,000	3.14
Snow and ice control	282	1,730	6.15
Other miscellaneous uses 2/	410	3,100	7.57
Unspecified: 3/			
Actual	1,380	6,470	4.70
Estimated	1,990	10,100	5.08
Total or average	15,100	85,600	5.68

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

2/ Includes railroad ballast, and roofing granules.

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

TABLE 6
 PENNSYLVANIA: 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		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	964	5,450	1,420	9,390	1,660	13,000	1,330	9,540
Asphaltic/bituminous mixtures	447	2,580	383	2,390	759	4,860	87	648
Road base and coverings	1,390	6,820	165	934	385	2,030	109	561
Fill	112	317	119	732	385	1,710	1,300	3,240
Snow and ice control	76	429	47	387	146	814	13	103
Other miscellaneous uses 3/	189	1,240	20	220	138	982	64	661
Unspecified: 4/								
Actual	444	1,980	384	1,830	312	1,500	238	1,160
Estimated	973	4,130	500	2,990	389	2,070	130	929
Total	4,590	22,900	3,040	18,900	4,170	26,900	3,270	16,800

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

2/ Includes plaster and gunite sands.

3/ Includes railroad ballast, and roofing granules.

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