

The Mineral Industry of Pennsylvania

This chapter has been prepared by the Bureau of Mines, U.S. Department of the Interior, and the Pennsylvania Bureau of Topographic and Geologic Survey, Department of Environmental Resources (DER), under an agreement for collecting information covering mineral production from mines and quarries.

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Pennsylvania mineral production reached a record output value of \$3,044 million, an increase of about \$7 million above that of 1976, but \$57 million less based on 1967 constant dollars. Compared with that of 1976, increases in value were attained by masonry and portland cement, lime, natural gas, petroleum, and stone. Decreases in value occurred in clays, sand and gravel, and zinc.

Table 1.—Mineral production in Pennsylvania¹

| Mineral | 1976 | | 1977 | |
|---|----------|------------------------|----------|------------------------|
| | Quantity | Value (thousands) | Quantity | Value (thousands) |
| Cement: | | | | |
| Masonry ----- thousand short tons .. | 379 | \$16,903 | 411 | \$19,927 |
| Portland ----- do. | 5,989 | 185,170 | 6,162 | 196,443 |
| Clays ² ----- do. | 2,291 | 16,037 | 2,304 | 13,075 |
| Coal: | | | | |
| Anthracite ----- do. | 6,228 | 209,234 | 5,861 | 205,138 |
| Bituminous ----- do. | 85,777 | 2,173,009 | 84,639 | 2,166,685 |
| Gem stones ----- do. | NA | 9 | NA | 10 |
| Lime ----- thousand short tons .. | 2,069 | 68,356 | 2,007 | 72,591 |
| Mica (scrap) ----- do. | W | W | 1 | W |
| Natural gas ----- million cubic feet .. | 89,386 | 61,229 | 91,717 | 73,374 |
| Peat ----- thousand short tons .. | W | W | 16 | 353 |
| Petroleum (crude) ----- thousand 42-gallon barrels .. | 3,019 | 36,700 | 2,715 | 38,810 |
| Sand and gravel ----- thousand short tons .. | 19,038 | 55,611 | 18,846 | 52,578 |
| Stone: | | | | |
| Crushed ----- do. | 63,542 | 161,250 | 63,522 | 163,652 |
| Dimension ----- do. | 65 | 4,639 | 66 | 5,362 |
| Zinc (recoverable content of ores, etc.) ----- short tons .. | 22,280 | 16,487 | 22,825 | 15,703 |
| Combined value of clays (kaolin), copper, iron ore, natural gas liquids, tripoli, and items indicated by symbol W ----- | XX | [†] 32,716 | XX | 20,263 |
| Total ----- | XX | [†] 3,037,350 | XX | 3,043,964 |
| Total 1967 constant dollars ----- | XX | 1,559,072 | XX | ^P 1,502,501 |

^PPreliminary [†]Revised. 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 kaolin; value included in "Combined value" figure.

Table 2.—Value of mineral production in Pennsylvania, by county^{1 2}
(Thousands)

| County | 1976 | 1977 | Minerals produced in 1977 in order of value |
|----------------------------|------------|-----------|---|
| Adams | W | W | Stone, lime, clays, mica. |
| Allegheny | \$134,474 | \$25,455 | Cement, stone, clays, sand and gravel. |
| Armstrong | W | 9,667 | Sand and gravel, stone, clays. |
| Beaver | W | W | Sand and gravel, clays. |
| Bedford | W | 2,334 | Stone, sand and gravel. |
| Berks | 59,430 | 47,702 | Cement, iron ore, stone, sand and gravel, copper, clays. |
| Blair | W | W | Stone, sand and gravel. |
| Bradford | W | W | Sand and gravel, stone. |
| Bucks | W | W | Stone, sand and gravel, clays. |
| Butler | 57,039 | 26,089 | Lime, cement, stone, clays, sand and gravel. |
| Cambria | 284,363 | W | Stone. |
| Cameron | W | W | Sand and gravel. |
| Carbon | W | W | Sand and gravel, stone. |
| Centre | W | W | Lime, stone, clays. |
| Chester | W | W | Stone, lime, clays. |
| Clarion | W | W | Stone. |
| Clearfield | 181,484 | W | Clays, stone, sand and gravel. |
| Clinton | W | W | Stone, clays, sand and gravel. |
| Columbia | W | W | Stone, sand and gravel. |
| Crawford | W | 1,549 | Sand and gravel. |
| Cumberland | W | 4,544 | Stone, sand and gravel, clays. |
| Dauphin | W | W | Stone, sand and gravel. |
| Delaware | W | W | Stone. |
| Elk | W | W | Do. |
| Erie | W | 4,591 | Sand and gravel, peat. |
| Fayette | 67,959 | W | Stone, clays. |
| Forest | W | W | Sand and gravel, stone. |
| Franklin | W | W | Stone, sand and gravel. |
| Fulton | W | W | Do. |
| Greene | W | W | Do. |
| Huntingdon | 8,902 | W | Sand and gravel, stone. |
| Indiana | W | W | Stone. |
| Jefferson | 48,996 | W | Clays, stone. |
| Juniata | 193 | W | Do. |
| Lackawanna | 10,869 | W | Stone, sand and gravel, peat. |
| Lancaster | W | W | Stone, clays, sand and gravel. |
| Lawrence | W | W | Cement, stone, sand and gravel, clays, peat. |
| Lebanon | W | W | Lime, stone. |
| Lehigh | W | W | Cement, zinc, stone. |
| Luzerne | W | 5,041 | Stone, sand and gravel, peat. |
| Lycoming | 10,269 | W | Sand and gravel. |
| McKean | W | W | Stone, clays. |
| Mercer | W | W | Sand and gravel, stone. |
| Mifflin | W | W | Stone, sand and gravel, lime. |
| Monroe | W | W | Stone, sand and gravel, clays, peat. |
| Montgomery | W | W | Stone, lime, cement, clays. |
| Montour | W | W | Stone. |
| Northampton | W | W | Cement, stone, sand and gravel. |
| Northumberland | W | W | Stone, sand and gravel, clays, tripoli. |
| Perry | W | W | Stone. |
| Pike | W | W | Stone, sand and gravel, peat. |
| Potter | W | 36 | Stone. |
| Schuylkill | 105,872 | 1,192 | Stone, sand and gravel. |
| Snyder | W | W | Stone. |
| Somerset | W | W | Stone, clays, sand and gravel. |
| Sullivan | 1,560 | W | Do. |
| Susquehanna | W | 1,122 | Stone. |
| Tioga | W | 1,468 | Stone, sand and gravel. |
| Union | W | W | Stone, clays. |
| Venango | 23,133 | 1,137 | Sand and gravel. |
| Warren | 6,758 | 1,365 | Do. |
| Washington | W | W | Do. |
| Wayne | W | 2,010 | Stone, sand and gravel. |
| Westmoreland | W | W | Do. |
| Wyoming | W | W | Sand and gravel. |
| York | 43,327 | 47,632 | Cement, stone, lime, sand and gravel, clays. |
| Undistributed ³ | †1,992,723 | 2,861,031 | |
| Total ⁴ | †3,037,350 | 3,043,964 | |

¹Revised. W Withheld to avoid disclosing company proprietary data; included with "Undistributed."

²Philadelphia County is not listed because no production was reported.

³Value of petroleum is based on an average price per barrel for the State.

⁴Includes some natural gas liquids that cannot be assigned to specific counties, natural gas, petroleum, coal, gem stones, and values indicated by symbol W.

⁵Data may not add to totals shown because of independent rounding.

Table 3.—Indicators of Pennsylvania business activity

| | 1976 | 1977 ^P | Change, percent |
|---|-----------|-------------------|--------------------|
| Employment and labor force, annual average: | | | |
| Total civilian labor force ----- thousands | 5,094.0 | 5,168.0 | +1.5 |
| Unemployment ----- do | 404.0 | 398.0 | -1.5 |
| Employment (nonagricultural): | | | |
| Mining ----- do | 48.3 | 47.2 | -2.3 |
| Manufacturing ----- do | 1,335.2 | 1,341.6 | +5 |
| Contract construction ----- do | 180.3 | 181.1 | +4 |
| Transportation and public utilities ----- do | 256.5 | 258.7 | +9 |
| Wholesale and retail trade ----- do | 919.3 | 925.7 | +7 |
| Finance, insurance, real estate ----- do | 211.4 | 217.3 | +2.8 |
| Services ----- do | 839.7 | 864.3 | +2.9 |
| Government ----- do | 721.6 | 714.3 | -1.0 |
| Total nonagricultural employment ----- do | 4,512.3 | 4,550.2 | +8 |
| Personal income: | | | |
| Total ----- millions | \$75,562 | \$82,630 | +9.4 |
| Per capita ----- do | \$6,402 | \$7,011 | +9.5 |
| Construction activity: | | | |
| Number of private and public residential units authorized ----- | 42,111 | 50,298 | +19.4 |
| Value of nonresidential construction ----- millions | \$564.4 | \$464.4 | -17.7 |
| Value of State road contract awards ----- do | \$199.0 | \$150.0 | -24.6 |
| Shipments of portland and masonry cement to and within the State thousand short tons | 3,024 | 3,126 | +3.4 |
| Mineral production value: | | | |
| Total crude mineral value ----- millions | \$3,037.4 | \$3,044.0 | +2 |
| Value per capita, resident population ----- do | \$256 | \$258 | +8 |
| Value per square mile ----- do | \$67,085 | \$67,147 | +1 |

^PPreliminary. ^RRevised.

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

Leading producing counties, with primary commodities in parentheses, were Northampton and Lawrence (cement), Clearfield (clays), Centre (lime), Montgomery, Lancaster, Bucks, Northampton, and Chester Counties (stone).

Pennsylvania led the Nation in smelter production of cadmium, was second in production of crushed stone, and seventh in dimension stone and zinc production.

Legislation and Government Programs.—Legislation approved by the Pennsylvania General Assembly and signed by the Governor on July 25 guarantees landowners that water supplies will not be contaminated or diminished by surface coal mining operations without replacement. Any mine operator affecting a water supply by contamination or diminution shall restore or replace the affected supply with an alternate source of water adequate in quantity and quality for the purposes served by the supply.

The Department of Environmental Resources' (DER) bonding schedule effective February 25, 1977, applies to all coal and noncoal surface mine operations, with the exception of noncoal quarry-type pits where blasting and sloping is necessary to carry out the approved reclamation plan. A bonding schedule for noncoal quarry-type pits is presently being drafted.

DER's amendments to Pennsylvania Code Chapters 121, 123, 124, 127, 129, and 139 became effective August 28, 1977. Amend-

ments pertain to general provisions, standards for contaminants, emission standards for hazardous air pollutants, construction, modification, reactivation, and operation of sources standards for sources and to sampling and testing. The purpose of these amendments are to establish a program for regulating air pollution discharges from coke ovens, to define the term stockpiling, to establish a clear mechanism for evaluating minor fugitive emissions and providing written approval of such emissions, to provide a standard for vinyl chloride, to clarify meaning of section 121.8, and to inform the agriculture industry that DER should not regulate air contaminants from production of agricultural commodities in their unmanufactured state.

Chapter 95 of DER's regulations relating to waste water treatment requirements was proposed and approved during 1977. Waste water treatment will require a minimum of secondary treatment for all wastes.

DER's Chapter 97 deleting discharge requirements for phenols and cyanides, modifying discharge limits for oil-bearing waste waters, and establishing special oil discharge requirements based upon technology installation for petroleum marketing terminals became effective July 24, 1977.

A February 18, 1977, decision by the Pennsylvania Supreme Court required Barnes & Tucker Co. operating in Cambria and Indiana Counties, to treat acid mine drainage discharges from the company's

abandoned Lancashire No. 15 mine and to reimburse the Commonwealth for expenses incurred in treatment of mine discharges during court litigations. Lancashire No. 15 mine was closed in 1969 and the Commonwealth had been treating the acid mine discharge to protect the waters in the Susquehanna River since August 1970. In September 1977, Barnes & Tucker filed a brief with the U.S. Supreme Court to reverse the Pennsylvania Supreme Court decision on grounds of a former Pennsylvania State law allowing companies in 1965 to choose between treating mine drainage or closing and sealing the mine.

A pending case before the Greene County Court filed late in 1977 concerned ownership of methane in coal seams. The official opinion, Number 53, of the Pennsylvania Attorney General dated October 31, 1974, stated that those persons who own or have obtained the right to extract gas have the right to assert legal title thereto. This opinion was supported by Mary Cunningham, the plaintiff, but challenged by United States Steel Corp., the defendant.

In early March, Governor Shapp lifted an 8-year ban on offshore drilling for natural gas in Lake Erie and ordered DER to prepare offshore leases for sections of the 430,000 areas under Pennsylvania's jurisdiction.

Environment.—The Environmental Quality Board proposed policies for critical environmental areas for the Commonwealth's Environmental Master Plan which were published in the Pennsylvania Bulletin on January 22, 1977. The policies are not rules or regulations but do provide the foundation for environmentally sensitive growth and development. They also identify environmental concerns which must be studied and considered in the decision-making process. Nine critical areas of concern in the Plan are for prime farmlands, watersheds with high-quality streams, flood plains, coal resources, areas with limited water supply, clean air resource areas, open space in metropolitan areas, geologic areas with development restraints, and areas with carbonate geology.

Detailed land-use maps of the entire Commonwealth were completed in early 1977 by United States Geological Survey under an agreement with DER. The Land Use Data Analysis utilizes high-altitude plane photo imagery to delineate as many as 37 separate land-use categories. A total of 98 maps, 7 for each of the 14 subdivisions within the Commonwealth, are available for review at DER's Topographic and Geologic Survey

Bureau.

During 1977, three areas were being studied for inclusion into Pennsylvania Scenic Rivers System. They were Pine Creek from Ansonia to the West Branch of the Susquehanna River, the Lehigh River from the Francis E. Walter Dam to Jim Thorpe, and the Schuylkill River from Port Clinton to Fairmount Dam in Philadelphia. Intent of the Scenic Rivers legislation is to protect and enhance outstanding and unique natural, cultural, aesthetic, and recreational values of designated waterways.

The Commonwealth's air pollution control program received support from a State Supreme Court decision authorizing DER to close a Bethlehem Steel Corp. coke battery in Johnstown. Bethlehem Steel's appeal to the U.S. Supreme Court was refused in early April.

The State Environmental Hearing Board (EHB) discussed two Bethlehem Steel appeals concerning a State order to install emission control devices on six furnaces at the company's Steelton plant.

DER also asked the EHB to assess civil penalties against Wheeling-Pittsburgh Steel Corp. for continuous violations of the State requirement to desulfurize coke oven gas at the Monessen Works located in Westmoreland County.

DER negotiated a consent order and agreement with New Jersey Zinc Co., Palmerton, Carbon County, for the reduction of air pollution from 12 sources at the firm's smelting plant not covered by previous agreements.

In early January, United States Steel signed a 7-year agreement with Federal, State, and local environmental agencies that will require it to spend \$600 million to eliminate air pollution from its Clairton Coke Works in Pittsburgh.

At St. Joe Minerals Corp. located at Monaca, construction began in early August on a \$12.7 million commercial-size experimental plant for scrubbing sulfur dioxide from coal-fired powerplant stack gas using the Citrate Process developed by the Interior Department's Bureau of Mines. Originally the Citrate Process was developed by the Bureau in the late 1960's to help curb sulfur dioxide (SO₂) emissions from base metal smelters. Construction of the demonstration project will be completed in late 1978 followed by a 1-year period to test emissions.

The Allegheny County Health Department, located in Pittsburgh with jurisdiction to regulation air contaminants within the county, issued a permit to allow Jones &

Laughlin Steel Corp. to replace six obsolete open hearth furnaces at its Pittsburgh Works with two electric furnaces. This replacement will reduce particulate emissions from steelmaking processes by nearly 90%. The City of Philadelphia with its own monitoring and pollution control programs is the only other area in the State with jurisdiction to regulate emissions within its boundaries.

Electric.—A report by the Public Utility Commission predicts power generating capacities will jump 50% in the next 9 years. Power increase is based on utilities planned additions of 2,990 megawatts coal-fired capacity, 820 megawatts of oil-fired power, and 6,864 megawatts of nuclear capacity.

Of the 67 licensed nuclear reactors in the Nation today, 5 are located in Pennsylvania, generating 8% of the State's electrical needs. Six other nuclear plants are under construction. Pennsylvania has a tradition of being the leader in nuclear power with the first plant in the Nation built by the Atomic Energy Commission (AEC) and the Duquesne Light Co. at Shippingport in 1957. Another first occurred in July 1977 when the experimental light water breeder reactor became operational. The Shippingport power center has been shut down for 2 years for installation of the test core for the light water breeder reactor. Conversion costs were estimated in excess of \$200 million.

REVIEW BY MINERAL COMMODITIES

MINERAL FUELS

Coal.—Pennsylvania's bituminous coal production totaled 84.6 million tons, a decrease of 1% compared with that of 1976. Surface mining operations accounted for 53.8% and underground operations, for 44.7% of the total bituminous production; auger and refuse production contributed the remaining 1.5%. Although production from surface mines increased 16% compared with that of 1976, underground production actually decreased 12.5% even though total number of deep-mine employees increased by 700 to 24,779. There were two less deep mines operating in 1977 than in 1976. This trend resulted in reduced productivity per employee for the underground sector.

The total number of strip employees increased 10% to 10,139 with nearly 17% more surface operations than in 1976. This trend may change with passage of Public Law 95-87 known as the "Surface Mining Control and Reclamation Act of 1977" which requires compliance with numerous environmental standards.

Anthracite production has been declining steadily since 1917 when over 100 million tons were produced. The 1977 production totaled 5.06 million tons, a decrease of more than 4% compared with 1976 production. Of the total 1977 production, 10% was from underground mines; 57%, from surface operations; and 33%, from washery and bank production. Leading anthracite-producing counties in declining order of production with percentage of total coal produced were Schuylkill, 52.7%; Luzerne, 23.8%; North-

umberland, 14.6%; Carbon, 2.9%; Lackawanna, 2.8%; Sullivan, 1.0%; Columbia, 1.0%; and Bradford and Dauphin, 0.5%.

The improved safety trend in the anthracite field over the past years was reversed on March 1, 1977, when a sudden inundation occurred in the Kocher Coal Co., located near Tower City, Schuylkill County, claimed the lives of nine mine workers. Recovery operations were completed on March 31, followed by a Federal/State investigation as to the cause. In the interim, the Pennsylvania Commissioner of Deep Mine Safety issued a directive increasing the number and depth of test holes in underground mines approaching abandoned areas to eliminate further mine inundations.

In the bituminous region, a fire which began on February 7, 1977, at Bethlehem Steel Corp.'s Revloc Portal No. 32 was brought under control 2 months later after 120 million gallons of water were used to quell a smoldering fire. The fire was apparently started by a roof fall that caused a trolley wire to arc resulting in ignition of mine timbers and eventually the coal seam. Two of Bethlehem's adjacent mines, closed because of the fire, reopened in early April, and in May, Revloc Portal No. 32 resumed operations.

Another underground coal mine fire of major importance occurred in the anthracite region near the town of Centralia. Previously, a fly ash barrier was used to control an outcrop fire from spreading towards city residences. Efforts will again be directed to control the fire and protect surface property from possible effects of

subsidence and noxious gases.

Rain began to fall in the Johnstown area late Tuesday evening, July 19, 1977, and continued the following day creating a major disaster. The U.S. Geological Survey stated that streams in the Conemaugh River Valley flowed at rates that could be expected only once in 500 years. At the height of the storm, Stony Creek flowed at a rate of 41 billion gallons of water per day. The Little Conemaugh was gaged at 26 billion gallons per day, and the Laurel Run Dam collapsed releasing 110 million gallons of water causing excessive damage downstream. The Bethlehem Steel plant was closed due to high water and two of the company's coal mines were flooded and two other mines closed due to lack of electricity. Near Seward, the Conemaugh No. 1 and the Florence No. 2 underground coal mines owned by North American Coal were flooded and were expected to reopen at yearend. Pennsylvania Electric Co.'s 137,000-kilowatt plant in Seward was damaged by the flood and didn't reopen until November 25. Pennsylvania Electric also reported 8,000 tons of stockpiled coal washed away by the floodwaters. A month after the flood, the death toll stood at 73. Seventeen others were unaccounted for, 160 people were hospitalized, 2,697 were injured or taken ill, and 4,600 people were homeless.

NONMETALS

Cement.—Portland cement shipments from 16 plants in 7 counties totaled 6.16 million tons valued at \$196 million with an average value of \$31.88 per ton. Compared with that of 1976, sales of portland cement increased 3% in quantity and 6% in value, with an increase of \$0.96 per ton in unit value.

Masonry cement shipments from 14 plants in 8 counties totaled 410,714 tons valued at \$19.9 million, with an average value of \$48.52 per ton. Compared with that of 1976, sales of masonry cement increased 8% in quantity, 18% in value with an increase in unit value of \$3.90 per ton.

Northampton and Lawrence Counties were the largest producers of both portland and masonry cements. Other producing counties in alphabetical order included Allegheny, Berks, Butler, Lehigh, Montgomery, and York. Of the 6,161,919 tons of portland cement sold, 11.6% was used by building material dealers; 22%, concrete product manufacturers; 58.1%, ready-mix companies; 5.8%, highway contractors; 1.6%, other contractors; and less than 1% for government agencies and miscellaneous customers.

Consumption of energy for the 17 producing plants was 404,136,000 cubic feet natural gas, 725,000 42-gallon barrels fuel oil, 1.24 million tons of bituminous coal, and 972,714,000 kilowatt-hours of electricity.

Major producers of portland and masonry cement were Amcord, Inc., Medusa Corp., National Gypsum Co., Penn-Dixie Cement Corp., and United States Steel Corp.

The cement companies are adopting new energy-saving techniques borrowed from the Europeans. The Coplay Cement Manufacturing Co., acquired in 1976 by Eurocem Inc., an American subsidiary of one of the largest French cement manufacturers, the Société des Ciments Francais, is building a \$55 million plant at Nazareth with a 1.1-million-ton cement capacity per year. Replacing 11 smaller plants built years ago, the Coplay kilns are huge, measuring 17 feet in diameter with a length of 276 feet. Fuel savings will occur by using coal instead of natural gas or oil. The Nazareth plant has been designed around a four-stage preheater that will pour the crushed limestone, sand, and clay into the kiln at about 1,500° Fahrenheit reducing fuel requirements. Older kilns use 5.5 million Btu's per ton of cement compared with 2.9 million to 3.2 million Btu's per ton of cement in the newer facility.

Lehigh Portland Cement located in Allentown was acquired by Heidelberg Cement, Inc., an American subsidiary of Portland Zementwerke Heidelberg A.G. of West Germany, in October of 1977.

Clays.—During 1977, clay was produced at 67 operations in 23 of Pennsylvania's 67 counties. Production increased less than 1% in quantity, with an 18% decrease in value compared with that of 1976. Unit value per ton was \$5.91 compared with \$7.22 per ton in 1976.

Clearfield County with 13 operations was the leading clay producer with 309,622 short tons valued at \$5,795,870 with a unit value of \$18.72 per ton due mainly to a high production of fire clay. Other counties with a high production of clay and shale in order of decreasing production included Lawrence, Beaver, York, Bucks, Armstrong, and Jefferson Counties.

Leading producers in order of decreasing production included Glen-Gery Corp., Veon, Darlington Brick and Clay Products Co., Medusa Corp., Hanley Co., and Resco Products.

Clay was used mainly for common and face brick, fire brick, and portland and other cements. Other minor uses included flue linings, high-alumina refractory pottery, sewer pipe and drain, and quarry and structural tile.

Table 4.—Pennsylvania: Clays¹ sold or used by producers, by use

(Short tons)

| Use | 1976 | 1977 |
|---|-----------|-----------|
| Common brick | 192,506 | 249,749 |
| Face brick | 862,955 | 957,680 |
| Firebrick, block and shapes | 681,675 | 473,438 |
| Flue linings | 93,807 | 162,993 |
| Lightweight aggregates | 13,642 | 10,700 |
| Mortar and cement, refractory | 30,675 | 62,525 |
| Portland and other cements | 149,774 | 162,256 |
| Sewer pipe | W | W |
| Drain, quarry, and structural tile | 56,910 | 58,149 |
| Other uses ² | 111,730 | 82,720 |
| Exports: Mortar and cement and other refractories | 97,812 | 84,180 |
| Total | 2,291,486 | 2,304,390 |

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

¹Excludes kaolin.

²Includes fertilizers (1976), flower pots (1976), pottery, roofing granules, terra cotta, and data indicated by symbol W.

Gem Stones.—Collectors and dealers collected mineral specimens from several localities, refuse areas, and abandoned quarries throughout the State. The value of the material was estimated to be \$10,000, nearly the same as that in 1976.

Graphite.—Two companies in Elk County and one company in Northampton County produced synthetic graphite. Principal uses for the synthetic graphite were for anodes, graphite shapes, crucibles and vessels, and electric motor brushes. Compared with that of 1976, production was 16% less in quantity but 8% more in value.

Gypsum.—One company in Philadelphia County calcined gypsum. Output increased 32%, but value decreased 21%, compared with that of 1976. Calcined gypsum was used mainly for prefabricated products such as regular wallboard, type X wallboard, and lath.

Iodine.—The Whitmoyer Laboratories Inc., Lebanon County, and West Agro Chemical Inc., Washington County, consumed crude iodine in the manufacture of calcium iodate, hydriodic acid, ethylenediamine dihydriodide, and iodofors, which are used in pharmaceuticals, catalysts, stabilizers, and sanitary uses. Iodine consumed was 4% less than that consumed in 1976.

Lime.—Ten plants operated by eight companies in eight counties produced 2 million tons valued at \$72.6 million, 3% less in

quantity but 6% greater in value than that in 1976. Nearly 84% of the total lime produced and 82% of the total value was attributed to the production of quicklime; hydrate lime accounted for the remaining 16% of the total production and 18% of the total value.

Centre County with three plants was the leading producer in the State with 33% of the total production and 31% of the total value. Other producing counties in alphabetical order were: Adams, Butler, Chester, Lebanon, Mifflin, Montgomery, and York.

The steel industry was the largest consumer of lime. Lesser amounts of lime were used for water purification, sewage treatment, agricultural purposes, and for other purposes.

Dravo Corp. announced in early May a 17-year contract valued at approximately \$45 million to supply lime for sulfur dioxide removal at a third unit of the Bruce Mansfield powerplant in Shippingport. Previously, Dravo signed a 20-year contract valued at \$200 million to supply lime for units one and two at the Shippingport facility. Other Dravo contracts to supply lime were with the Allegheny Power System Inc. and the Columbus and Southern Ohio Electric Co. Power companies used the lime to scrub sulfur dioxide from stack gases at coal-fired plants.

Table 5.—Pennsylvania: Lime sold or used by producers, by use

(Thousand short tons and thousand dollars)

| Use | 1976 | | 1977 | |
|-------------------------|----------|--------|----------|--------|
| | Quantity | Value | Quantity | Value |
| Steel, BOF | 1,034 | 32,937 | 980 | 34,971 |
| Water purification | 258 | 9,043 | 255 | 9,106 |
| Steel, electric | 151 | 4,662 | 164 | 5,845 |
| Sewage treatment | 94 | 3,092 | 120 | 4,300 |
| Mason's lime | 64 | 1,778 | 75 | 2,627 |
| Steel, open-hearth | 93 | 2,983 | W | W |
| Paper and pulp | 24 | 729 | 39 | 1,389 |
| Agriculture | 66 | 2,181 | 24 | 930 |
| Acid mine water | 27 | 966 | W | W |
| Tanning | 7 | 262 | 7 | 249 |
| Petroleum refining | W | W | 4 | 155 |
| Soil stabilization | W | W | 2 | 55 |
| Other uses ¹ | 252 | 9,724 | 337 | 12,963 |
| Total ² | 2,069 | 68,356 | 2,007 | 72,591 |

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

¹Includes refractory dolomite, open-hearth steel furnaces, other chemical uses, finishing lime, alkalies, explosives, sand-lime brick, ore concentration (1977), wire drawing, paint, petrochemicals (1977), sugar refining, coke (1977), glass (1977), other ore concentration (1976), other metallurgy (1976), and uses indicated by symbol W.

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

Mica.—Scrap and flake mica was produced by one company in Adams County. Compared with that of 1976, production and value of mica decreased. Mica was used in vacuum tube capacitors and various electrical and nonelectrical items.

Mullite.—One company produced high-temperature sintered mullite in Philadelphia County. Compared with 1976 figures, production increased 136% and value increased 110%. Mullite is a heat-resistant silicate of aluminum used in furnace linings.

Peat.—Peat production totaled 15,803 tons valued at \$352,713 with a unit value of \$22.32 per ton. Peat was produced by seven companies having eight operations in six counties. Three peat-producing operations were located in Luzerne County and one each in Erie, Lackawanna, Lawrence, Monroe, and Pike Counties.

Peat is a partially decomposed plant matter that has accumulated under water or in a water-saturated environment. Although peat is not classified as a coal, it is the initial stage in the formation of coal from vegetable materials. Virtually all peat is used for agricultural and horticultural purposes to improve the soil. Peat is classified as moss peat, reed-sedge, peat, and humus, according to the materials from which it has been formed and its degree of decomposition. Moss peat is a type that has been formed principally from sphagnum, hypnum, and/or other mosses; reed-sedge peat has originated mainly from reeds, sedges, and other swamp plants; and humus is peat too decomposed for identification of its geological origin.²

In Pennsylvania, moss peat comprised 6.3% of the total peat production; reed-sedge, 56.2%; and humus, the remaining 37.5%.

Perlite.—Crude perlite was shipped into the State and expanded at six plants by four companies in six counties. Quantity sold or used in 1977 totaled 34,916 tons with an average value per ton of \$99.29 compared with 33,085 tons valued at \$81.74 per ton in 1976. Principal uses for the product were for horticulture, construction aggregates, and formed products. Minor uses were for filter aid, low-temperature insulation, fillers, foundry uses, insulating board, castable insulation, and bonding mortars.

Sand and Gravel.—The total output of sand and gravel decreased slightly from 19 million tons in 1976 to 18.8 million tons in 1977. Construction sand and gravel accounted for 94% of the total production, and industrial sand and gravel production, the remaining 6%. Construction sand and gravel was used mainly for concrete aggregate and roadbase and coverings. Other lesser uses were for asphaltic concrete aggregates and other bituminous mixtures, and other uses. Of the 17,727 short tons of construction sand and gravel used, 86% was used for commercial purposes and 14% for government projects. The unit value of construction sand averaged \$2.56 per ton and \$2.46 per ton for construction gravel. Industrial sand and gravel was used mainly for glass manufacturing, molding, fire and furnace, and foundry uses. Unit price for industrial sand was \$7.23 per short ton.

The number of sand and gravel deposits throughout the State totaled 135 of which 33 produced less than 25,000 tons each, 16

deposits produced between 25,000 to 50,000 tons each, 25 deposits produced between 50,000 and 100,000 tons each, and 36 deposits produced between 100,000 and 200,000 tons each. Only three deposits produced in excess of 1 million tons each. The remaining 22 deposits produced between 200,000 and 1 million tons each. Five of the deposits produced industrial sand and gravel and the remaining 130 deposits produced construction sand and gravel.

Sand and gravel was produced in 42 of the State's 67 counties. The leading county was Beaver with 11% of the State's total. Other leading counties in order of decreasing production were Erie, Armstrong, Bucks, and Huntingdon. Collectively, these five coun-

ties produced 46% of the State's total.

The leading producers of construction sand and gravel in alphabetical order were Davison Sand & Gravel Corp., Dravo Corp., Erie Sand Steamship Co., Glacial Sand and Gravel Co., and Warner Co.

Leading producers of industrial sand and gravel in alphabetical order were Penn Glass Sand, Medusa Corp., and McCready Inc.

Nearly 70% of the construction sand and gravel was shipped to market by truck; 19%, by water; and the remaining 11% was used at the plant site.

Of the industrial sand and gravel shipped to market, 69% was by truck and 21% by rail.

Table 6.—Pennsylvania: Sand and gravel sold or used, by county

(Thousand short tons and thousand dollars)

| County | 1976 | | 1977 | | | |
|--------------------|-----------------|----------|--------|-----------------|----------|--------|
| | Number of mines | Quantity | Value | Number of mines | Quantity | Value |
| Allegheny | 1 | W | W | 1 | W | W |
| Armstrong | 6 | 1,960 | 6,639 | 6 | 1,945 | 6,891 |
| Beaver | 4 | 994 | 3,088 | 5 | 2,144 | 5,028 |
| Bedford | 1 | W | W | 1 | 3 | 7 |
| Berks | 2 | W | W | 2 | W | 405 |
| Blair | 1 | W | W | 1 | W | W |
| Bradford | 4 | W | W | 4 | W | W |
| Bucks | 5 | 3,469 | 9,113 | 4 | 1,519 | 2,760 |
| Butler | 4 | 294 | 847 | 2 | 1 | W |
| Cameron | 1 | W | W | 1 | W | W |
| Carbon | 3 | W | W | 2 | W | W |
| Clearfield | -- | -- | -- | 1 | W | W |
| Clinton | -- | -- | -- | 1 | W | W |
| Columbia | 2 | W | W | 2 | 300 | 525 |
| Crawford | 6 | 505 | 1,228 | 7 | 763 | 1,549 |
| Cumberland | 2 | W | W | 3 | 262 | 753 |
| Dauphin | 1 | W | W | 1 | W | W |
| Erie | 14 | 1,954 | 4,024 | 15 | 2,077 | 4,528 |
| Forest | 2 | W | W | 2 | W | W |
| Franklin | 2 | W | W | 2 | W | W |
| Fulton | 1 | W | W | 1 | W | W |
| Huntingdon | 1 | W | W | 1 | W | W |
| Lackawanna | 1 | W | W | 1 | 100 | 175 |
| Lancaster | 2 | W | W | 2 | W | W |
| Lawrence | 9 | 809 | 2,079 | 9 | 727 | 1,934 |
| Luzerne | 5 | 630 | 1,549 | 5 | 900 | 2,238 |
| Lycoming | 1 | W | W | 1 | W | W |
| Mercer | 3 | 298 | 604 | 3 | 443 | 965 |
| Mifflin | 1 | W | W | 1 | W | W |
| Monroe | 5 | 364 | 970 | 5 | 440 | 860 |
| Northampton | 3 | 680 | 1,556 | 2 | W | W |
| Northumberland | 1 | 230 | 619 | 1 | 238 | 707 |
| Pike | 2 | W | W | 2 | W | W |
| Schuylkill | 1 | 74 | 319 | 1 | 74 | 299 |
| Somerset | 1 | W | W | 1 | W | W |
| Tioga | 6 | 307 | 529 | 5 | 410 | 577 |
| Venango | 8 | 587 | 1,232 | 8 | 509 | 1,137 |
| Warren | 11 | 435 | 1,027 | 14 | 608 | 1,365 |
| Wayne | 4 | 242 | 662 | 3 | 232 | 738 |
| Westmoreland | 1 | W | W | 1 | W | W |
| Wyoming | 2 | W | W | 2 | W | W |
| York | 3 | W | W | 3 | W | W |
| Undistributed | -- | 5,204 | 19,529 | -- | 5,091 | 19,137 |
| Total ¹ | 133 | 19,038 | 55,611 | 135 | 18,846 | 52,578 |

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

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

Table 7.—Pennsylvania: Sand and gravel sold or used by producers, by use

(Thousand short tons and thousand dollars)

| Use | 1976 | | 1977 | |
|--------------------------------------|---------------|---------------|---------------|---------------|
| | Quantity | Value | Quantity | Value |
| Construction: | | | | |
| Sand | 9,669 | 24,886 | 8,899 | 22,808 |
| Gravel | 8,307 | 22,971 | 8,820 | 21,674 |
| Total¹ | 17,975 | 47,854 | 17,727 | 44,482 |
| Industrial sand | 1,063 | 7,757 | 1,120 | 8,095 |
| Grand total¹ | 19,038 | 55,611 | 18,846 | 52,578 |

¹Data may not add to totals shown because of independent rounding.**Table 8.—Pennsylvania: Construction sand and gravel sold or used, by major use category**

(Thousand short tons and thousand dollars)

| Use | 1976 | | 1977 | |
|---|---------------|---------------|---------------|---------------|
| | Quantity | Value | Quantity | Value |
| Concrete aggregate (residential, nonresidential, highways, bridges, dams, waterworks, airports, etc.) | 7,940 | 21,366 | 6,291 | 16,242 |
| Concrete products (cement blocks, bricks, pipe, etc.) | 3,267 | 8,935 | 1,500 | 5,062 |
| Asphaltic concrete aggregates and other bituminous mixtures | 3,109 | 9,778 | 3,446 | 8,788 |
| Roadbase and coverings | 1,673 | 3,494 | 4,258 | 10,878 |
| Fill | 1,465 | 3,539 | 1,782 | 2,252 |
| Railroad ballast | -- | -- | 45 | 126 |
| Other uses | 522 | 745 | 405 | 1,135 |
| Total¹ | 17,975 | 47,854 | 17,727 | 44,482 |

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

Stone.—Among the States, Pennsylvania led in production of crushed sandstone, dimension slate, and crushed miscellaneous stone; ranked second in production of crushed stone and dimension sandstone; third in production of dimension miscellaneous stone; and fifth in output of crushed limestone.

Crushed stone was produced by 140 companies at 227 quarries for roadbase aggregate, roadstone, cement, and other uses. Output was about the same as in 1976, 63.5 million tons valued at \$163.7 million. Leading producers were Koppers Co., Bethlehem Steel Corp., and New Enterprise Stone & Lime Co.

Dimension stone was produced by 29 companies at 28 quarries for rough construction, dressed flagging, cut stone, and other uses. Compared with that of 1976, output increased 1% to 65,880 short tons valued at \$5.4 million. Leading producers of dimension stone were A. Dalley & Sons, Inc.,

Delaware Quarries, and Media Quarry Co.

The unit value of all stone increased 5 cents per short ton to \$2.66 in 1977. Unit value of other types of crushed and broken stone were limestone, \$2.60; granite, \$4.39; sandstone, \$2.87; traprock, \$2.30; and other stone, \$2.29 per ton. Unit value of all dimension stone increased \$10.14 per ton to \$81.39 per ton in 1977.

Lancaster County with 4.69 million tons of crushed and broken stone was the leading producer in the State, followed by Montgomery, Bucks, York, Berks, Northampton, and Adams Counties. Collectively, these seven counties produced 46% of the State's total crushed and broken stone.

Northampton County was the leading producer of dimension stone, producing 21,962 tons, followed by Chester, Bucks, and Delaware Counties. Collectively, these four counties produced 82% of the State's dimension stone.

Table 9.—Pennsylvania: Crushed stone¹ sold or used by producers, by use

(Thousand short tons and thousand dollars)

| Use | 1976 | | 1977 | |
|--------------------------------|---------------|----------------|---------------|----------------|
| | Quantity | Value | Quantity | Value |
| Dense-graded roadbase stone | 15,006 | 34,818 | 14,704 | 35,850 |
| Roadstone | 10,496 | 24,350 | 12,283 | 27,530 |
| Cement manufacture | 8,345 | 18,551 | 8,035 | 15,590 |
| Bituminous aggregate | 6,989 | 18,081 | 6,462 | 17,300 |
| Concrete aggregate | 6,005 | 15,236 | 6,358 | 16,600 |
| Lime manufacture ² | 3,635 | 10,703 | 3,377 | 9,588 |
| Surface treatment aggregate | 3,700 | 8,196 | 2,784 | 6,875 |
| Flux stone | 2,773 | 9,273 | 2,306 | 8,026 |
| Railroad ballast | 1,306 | 3,430 | 1,630 | 4,646 |
| Agricultural limestone | 1,786 | 8,484 | 1,550 | 7,541 |
| Macadam aggregate | 1,114 | 2,418 | 1,389 | 3,175 |
| Riprap and jetty stone | 910 | 2,261 | 984 | 2,460 |
| Filter stone | 78 | 203 | 372 | 1,119 |
| Terrazzo and exposed aggregate | W | W | 157 | 598 |
| Mine dusting | 141 | 1,415 | 127 | 1,233 |
| Asphalt filler | W | W | 117 | 777 |
| Other filler | 92 | 1,304 | 102 | 1,463 |
| Mineral food | W | W | 58 | W |
| Refractory stone | 54 | 623 | 40 | 436 |
| Building products | 95 | 223 | 30 | W |
| Acid neutralization | 24 | W | 9 | W |
| Other uses ³ | 986 | 3,679 | 647 | 2,865 |
| Total⁴ | 63,542 | 161,250 | 63,522 | 163,652 |

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

¹Includes limestone, sandstone, miscellaneous stone, traprock, and granite.²Includes dead-burned dolomite.³Includes stone used in glass manufacture, abrasives, whiting, waste material, fill, sulfur dioxide (1976), unspecified uses, and uses indicated by symbol W.⁴Data may not add to totals shown because of independent rounding.Table 10.—Pennsylvania: Dimension stone¹ sold or used by producers, by use

| Use | 1976 | | | 1977 | | |
|----------------------------------|---------------|------------------------|-------------------|---------------|------------------------|-------------------|
| | Short tons | Cubic feet (thousands) | Value (thousands) | Short tons | Cubic feet (thousands) | Value (thousands) |
| Irregular-shaped stone | 15,960 | 201 | \$332 | 18,790 | 241 | \$373 |
| Cut stone | 10,810 | 138 | 387 | W | W | W |
| Dressed flagging | 11,160 | 47 | 542 | 10,704 | 124 | 569 |
| Roofing slate | 5,390 | 68 | 934 | 4,856 | 53 | 912 |
| Structural and sanitary purposes | 4,786 | 60 | 1,191 | 4,520 | 50 | 1,633 |
| Rough monumental | W | W | W | 3,583 | 43 | 439 |
| Billiard tables | 1,772 | 22 | 405 | 2,090 | 23 | 451 |
| Rubble | 2,519 | 32 | 31 | 1,749 | 22 | 19 |
| Flooring slate | W | W | W | 1,565 | 17 | 197 |
| Rough flagging | 1,946 | 25 | 55 | 1,494 | 19 | 48 |
| Blackboards | 193 | 2 | 100 | 134 | 1 | 107 |
| House stone veneer | 140 | 2 | 4 | -- | -- | -- |
| Other uses ² | 10,430 | 183 | 657 | 16,394 | 201 | 614 |
| Total³ | 65,112 | 780 | 4,639 | 65,879 | 794 | 5,362 |

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

¹Includes sandstone, slate, granite, and miscellaneous stone.²Includes stone used in dressed construction, slate for electrical fixtures, curbing stone (1976), unspecified uses, and uses indicated by symbol W.³Data may not add to totals shown because of independent rounding.

Sulfur.—Three petroleum refineries operated by three companies in Delaware and Philadelphia Counties plus one steel company in Allegheny County produced 82,000 tons of sulfur and sold or used 81,000 tons of sulfur in 1977. Compared with that of 1976, sulfur sold or used decreased nearly 11% in output and value.

Tripoli (Natural Abrasives).—Crude tripoli was mined by Keystone Filler & Manufacturing Co., Northumberland County. Compared with that of 1976, the tonnage sold or used was nearly 43% greater in quantity and 40% greater in value. Tripoli was used mainly for abrasive purposes.

Vermiculite.—Crude vermiculite shipped into the State was exfoliated by three companies: J. P. Austin Associates, Inc., Hyzer & Lewellen, and the W. R. Grace & Co., located in Allegheny, Bucks, and Lawrence Counties, respectively. The total quantity sold or used by producers was 45% greater and 51% more in value compared with that of 1976. Major uses in the building industry were for lightweight concrete aggregate, loose fill insulation, and other purposes.

METALS

Beryllium.—Kawecki-Berylco Industries, Inc., Reading, announced an increase in price of vacuum-grade ferro and nickel columbium master alloys by 13%. The new price will be \$13.45 per pound and \$16.47 per pound, respectively. The alloys are used to make high-strength nickel and cobalt-based alloys primarily in jet engines. Beryllium copper master alloy also increased in price to \$62 per pound of contained beryllium from \$59. The company produced specialty metals and chemicals.

Cadmium.—Pennsylvania ranked first among the States in smelter production of cadmium. Production of cadmium in the State increased 27% in quantity and 22% in value compared with that of 1976. Cadmium was used for electroplating parts of appliances, motor vehicles, and machinery, and was produced from smelting of zinc ores.

Copper.—Pennsylvania had a minimal production of copper during 1977. Copper was obtained as a byproduct from processing of other mined minerals.

Iron Ore.—Bethlehem Steel Corp. produced iron ore at its Grace underground mine located in Berks County. Production was reduced 46% compared with that of 1976 because of permanent closure of the underground mining operation on July 30, affecting 850 employees.

The Grace mine was the last iron ore mine operating in the State and with its closure, Pennsylvania steel mills must rely on imports of iron ore from other States or from foreign countries.

Iron Oxide Pigments.—Production occurred in five counties by six companies. United States Steel Corp. produced iron oxide from steel plant dust in Allegheny County. Both Pfizer Inc. and Reichard-Coulston, Inc., located in Northampton County produced natural and synthetic pigments. Other counties in which production occurred included Carbon, Chester, and Montgomery Counties. Production totaled 48,518 short tons valued at \$21.2 million compared with 46,584 short tons valued at \$17.4 million in 1976. Iron oxide pigments were used in paints, rubber, plastics, concrete products, paper, magnetic ink, fertilizers, and animal food.

Iron and Steel.—Shipments of Pennsylvania pig iron in 1977 totaled 17.3 million tons valued at \$3,104 million, a decrease of 4% in total shipments and a 2% decrease in value compared with that of 1976. Types of pig iron produced were basic, bessemer, malleable, and direct castings.

At the beginning of 1977, steel production for the year was estimated at 103 million tons, an increase of 14% over the 1976 total, but in late September, steel companies were feeling the effects of steel imports from foreign countries.

United States Steel filed a petition with the U.S. Treasury Department asking for protection guaranteed by the Anti-Dumping Act of 1921. The petition indicated 20 million tons of foreign steel entering the United States representing 20% of domestic steel consumption. Also filing anti-dumping complaints with the U.S. Treasury Department were Armco Steel Corp., Bethlehem Steel Corp., American Spring Wire Corp., CF&I Steel Corp., and Florida Wire and Cable Co.

In late November, the Pennsylvania Governor met with Washington officials to ease the burden of foreign steel imports, and in early December, a new plan was adopted which would help the steel industry. The plan would have a reference price system setting steel imports within 5% of the full cost of production of the most efficient steel producer in the world plus transportation costs. Selling steel in excess of the reference price would result in appropriate Federal remedies. This plan was expected to reduce imports to 14% of the

U.S. market resulting in employment increases by nearly 25,000.

To help the steel industry, Conrail planned to purchase domestic steel rails in preference to foreign rails. Bethlehem Steel Corp., a Conrail supplier, indicated this decision would help the company's Steelton plant located in Dauphin County.

United States Steel continued to investigate the 4,000-acre Conneaut Lake site for a new steel mill. The property is located on the border between Pennsylvania and Ohio and is expected to produce between 3 million to 4 million tons of steel by 1982. An environmental impact study is currently being conducted at the site by Arthur D. Little Inc., a Massachusetts-based consulting firm.

United States Steel also announced installation of environmental equipment at several of its plants near Pittsburgh. A \$125 million project was started on boilers at the Homestead, Irvin, Duquesne, Edgar Thomson, and Clairton plants. Fourteen projects for water quality were also underway and a \$22 million desulfurization plant at the Clairton works was started. At the Edgar Thomson and Duquesne plants, dust collection systems were installed. Also included in the 1977 expenditures for area plants were rehabilitation of a coke oven battery at Clairton costing \$13 million, improvements to a blast furnace at Edgar Thomson costing \$26 million, and installation of a new cooler for the hot strip mill at the Irvin Works costing \$5 million.

United States Steel, Republic Steel Corp., and Federal and State agencies also agreed on a plan to reduce water pollution along the Mahoning River which flows into the Beaver River in western Pennsylvania.

Bethlehem Steel Corp., located in Johnstown, announced reductions in employment totaling 3,900 workers due to heavy damage of the plant caused by the July 20 flood. To eliminate further reduction in the work force, the company requested permission from State and Federal environmental agencies to delay expenditures for additional environmental controls; however, Bethlehem planned to spend \$7 million for air and water pollution control equipment over the next 2 years.

In late June, Bethlehem announced a new type of coal-carrying rail cars called the coal porter to be built at the Johnstown plant with a capacity of 100 tons each. The design of the coal porter gives the car an extremely low center of gravity, additional

capacity, and a more stable ride.

Jones & Laughlin Steel Corp.'s (J&L) \$140 million capital improvement program at the Aliquippa steel facility covers additional air pollution controls on two existing batteries of coke ovens and the subsequent replacement of those batteries, air pollution controls on the sinter plant, removal of sulfur from coke oven gas, and a new boiler in the central powerplant. These programs are estimated to reduce particulate emissions from the Aliquippa plant by 78% and sulfur emissions by 87% by 1981.

At yearend, J&L and Youngstown Steel were planning to merge. Youngstown is owned by Lykes Corp. of New Orleans and J&L by LTV Corp. of Dallas, Tex. The combination of J&L and Youngstown, which are respectively the Nation's seventh and eighth largest steelmakers, would create a producer the size of National Steel Corp., the Country's third largest, behind United States Steel and Bethlehem.

Alan Wood Steel Co., located in Conshohocken near Philadelphia, filed a petition for arrangements under Chapter 11 of the Federal Bankruptcy Act on June 11, 1977, and officially closed the steel plant on September 15. The firm's main product was construction-oriented steel plates which was affected mainly by foreign imports. Lukens Steel Co., located in Coatesville, also reported effects of foreign steel imports resulting in reduction of work force.

Wheeling Pittsburgh Steel Corp., located at Monessen, Westmoreland County, planned to construct a rail mill if a \$70 million financial arrangement is completed. Under the \$70 million agreement, the State would guarantee \$10 million; Federal Economic Development Administration, \$40 million; and Farmers Home Administration, \$20 million.

Babcock and Wilcox Co., one of the Nation's largest producers of coal-fired and nuclear powerplants, is completing a \$60 million plant in Ambridge, producing specialty steel tubes for utility, oil, and other markets.

Allegheny Ludlum Steel Corp. plant located at Brackenridge began operating a new \$18 million argon oxygen decarburization vessel designed to increase stainless steel capacity by more than 35%. The 100-ton-capacity vessel is the first step in a \$31 million expansion project that also calls for completion of a continuous casting process by early 1981.

Ellwood Steel Casting Corp., located in Ellwood City, opened a new facility using latest technology in foundry operations. Previously installed were three high-frequency 2,000-pound induction furnaces and chemical analyses system of furnace charges.

Howmet Aluminum Corp., owned by Pechiney Ugine Kuhlmann Corp., one of Europe's largest aluminum and chemical producers, plans to spend \$20 million to build a casting facility and a new reversing mill in Lancaster.

Gulf Oil Corp. acquired Kewanec Industries Inc. of Bryn Mawr, a producer of oil and gas, chemicals, and coal interests. Gulf, located in Pittsburgh, is the Nation's seventh largest industrial company producing petroleum and various minerals.

Slag-Iron and Steel.—Production of iron slag totaled 5,314,074 tons valued at \$17.3 million and production of steel slag totaled 1,048,311 tons valued at \$2.27 million. Total slag produced equaled 6.4 million tons valued at \$19.6 million in 1977.

Iron slag consisted of air-cooled, expanded, and granulated slag. Major use of air-cooled slag was for asphaltic concrete aggregate, roadbase and shoulders, and for concrete aggregate. Expanded slag was used for concrete products, and granulated slag for roadbase and shoulders, fill, and cement manufacture. Steel slag uses were mainly for roadbase and shoulders, fill, and asphaltic concrete aggregate.

Compared with other States, Pennsylvania produced approximately 20% of the national total.

Zinc.—Pennsylvania ranked seventh among the States in the production of zinc, producing 22,825 tons valued at \$15.7 million with a unit price of \$688 per ton. Compared with that of 1977, production increased 2%, but value decreased nearly 5%. Zinc was used mainly for galvanizing, brass and bronze products, castings, and rolled zinc. Significant quantities of zinc were consumed as pigments or other chemicals.

¹State Liaison Officer, Bureau of Mines, Harrisburg, Pa.

²Mickelson, D. P. Peat. Ch. in *Mineral Facts and Problems*. U.S. BuMines Bull. 667, 1975, p. 771.

Table 11.—Pennsylvania: Iron and steel slag sold or used in 1977, by use

| Use | Iron blast-furnace slag | | | | | | Steel slag | | | Total slag | | | |
|--------------------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|--|
| | Air-cooled | | Expanded | | Granulated | | Total | | | Steel slag | | Total slag | |
| | Quantity (short tons) | Value f.o.b. plant | Quantity (short tons) | Value f.o.b. plant | Quantity (short tons) | Value f.o.b. plant | Quantity (short tons) | Value f.o.b. plant | Quantity (short tons) | Value f.o.b. plant | Quantity (short tons) | Value f.o.b. plant | |
| Concrete aggregate | 819,333 | \$2,707,549 | --- | --- | --- | --- | 819,333 | \$2,707,549 | --- | --- | --- | \$2,707,549 | |
| Concrete products | 418,676 | 1,411,550 | --- | --- | --- | --- | 661,647 | 2,435,687 | --- | --- | --- | 2,435,687 | |
| Cement manufacture | 100,000 | 320,000 | --- | --- | 38,540 | \$101,834 | 138,540 | 421,834 | --- | --- | --- | 421,834 | |
| Asphaltic concrete aggregate | 1,067,590 | 3,464,128 | --- | --- | --- | --- | 1,067,590 | 3,464,128 | --- | --- | --- | 3,464,128 | |
| Roadbase and shoulders | 981,970 | 2,969,133 | --- | --- | 372,087 | 915,507 | 1,354,057 | 3,884,640 | --- | --- | --- | 3,884,640 | |
| Fill | 514,059 | 1,485,079 | --- | --- | 134,629 | 379,676 | 648,688 | 1,864,755 | --- | --- | --- | 1,864,755 | |
| Railroad ballast | 187,000 | 602,960 | --- | --- | --- | --- | 187,000 | 602,960 | --- | --- | --- | 602,960 | |
| Mineral wool | 20,620 | 60,512 | --- | --- | --- | --- | 20,620 | 60,512 | --- | --- | --- | 60,512 | |
| Roofing, built-up and shingles | 71,167 | 240,438 | --- | --- | --- | --- | 71,167 | 240,438 | --- | --- | --- | 240,438 | |
| Soil conditioning | 120,000 | 1,020,000 | --- | --- | 5,000 | 13,250 | 5,000 | 13,250 | --- | --- | --- | 13,250 | |
| Glass manufacture | 27,152 | 75,920 | --- | --- | --- | --- | 27,152 | 75,920 | --- | --- | --- | 75,920 | |
| Fire protection | 153,280 | 426,528 | --- | --- | 40,000 | 107,000 | 193,280 | 533,528 | --- | --- | --- | 533,528 | |
| Ice control | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |
| Other uses | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |
| Total | 4,480,847 | 14,783,797 | W | W | 590,256 | 1,517,267 | 5,314,074 | 17,325,201 | 1,048,311 | 2,274,643 | 6,362,365 | 19,599,844 | |

W Withheld to avoid disclosing company proprietary data.

Table 12.—Principal producers

| Commodity and company | Address | Type of activity | County |
|---|---|------------------------------|--|
| Abrasives: Satellite Alloy Corp. ----- | 98 McKnight Rd. Pittsburgh, PA 15237 | Plant ----- | Allegheny. |
| Cement: | | | |
| Amcord, Inc. ¹ ----- | 610 Newport Center Dr. Newport Beach, CA 92660 | ---do----- | Northampton. |
| Coplay Cement Manufacturing Co. ¹ ----- | Nazareth, PA 18064 ----- | ---do----- | Lehigh and Northampton. |
| Keystone Portland Cement Co. ¹ ----- | Box 1785 Allentown, PA 18105 | ---do----- | Northampton. |
| Louisville Cement Co. ----- | 501 South 2nd St. Louisville, KY 40202 | ---do----- | Lawrence. |
| Medusa Corp. ^{1 2} ----- | Box 5668 Cleveland, OH 44101 | ---do----- | Lawrence and York. |
| Penn-Dixie Industries, Inc. ^{1 2} ----- | 60 East 42nd St. New York, NY 10017 | ---do----- | Butler and Northampton. |
| United States Steel Corp. ^{1 3} ----- | 600 Grant St. Pittsburgh, PA 15230 | ---do----- | Allegheny and Northampton. |
| Clays: | | | |
| Dresser Industries, Inc. ----- | Box 6504 Houston, TX 77005 | Pit ----- | Clearfield and Somerset. |
| Glen-Gery Corp. ----- | 227 North 5th St. Reading, PA 19601 | Pit ----- | Adams, Berks, Northumberland, Union, York. |
| Hanley Co. ----- | 28 Kennedy St. Bradford, PA 16701 | Pit ----- | Jefferson and McKean. |
| Resco Products ----- | Box 108 Morristown, PA 19404 | Pit ----- | Clearfield and Huntingdon. |
| Coal, anthracite: | | | |
| Greenwood Stripping Corp. ----- | 1 Venice St. Nesquehoning, PA 18240 | Strip mine ----- | Carbon and Schuylkill. |
| Jeddo-Highland Coal Co. ----- | 800 Exeter Ave. West Pittston, PA 18643 | Strip mine and culm bank. | Luzerne. |
| Leon East Kocher Coal Co. ----- | Box 127 Valley View, PA 17983 | Underground mine. | Schuylkill. |
| Reading Anthracite Co. ----- | 200 Mahantongo St. Pottsville, PA 17901 | Culm bank and strip mine. | Northumberland and Schuylkill. |
| Coal, bituminous: | | | |
| Barnes & Tucker Co. ----- | 357 Lancaster Ave. Haverford, PA 19041 | Underground mine. | Cambria. |
| Bethlehem Mines Corp. ^{4 5} ----- | 701 East 3rd St. Bethlehem, PA 18016 | ---do----- | Cambria and Washington. |
| C&K Coal Co. ----- | Box 69 Clarion, PA 16214 | ---do----- | Greene. |
| Pittsburg & Midway Coal Co. ----- | Tenmain Center Kansas City, MO 64105 | ---do----- | Washington. |
| Graphite, synthetic: | | | |
| Air Reduction Co., Inc. ----- | Theresia St. St. Marys, PA 15857 | Plant ----- | Elk. |
| Charles Pfizer & Co. Inc. ⁵ ----- | 235 East 42nd St. New York, NY 10017 | ---do----- | Northampton. |
| Stackpole Carbon Co. ----- | St. Marys, PA 15857 ----- | ---do----- | Elk. |
| Gypsum, calcined: United States Gypsum Co.⁶ | 101 South Wacker Dr. Chicago, IL 60606 | ---do----- | Philadelphia. |
| Iron oxide pigments: | | | |
| The Prince Manufacturing Co. ----- | Bowmanstown, PA 18030 | ---do----- | Carbon. |
| Reichard-Coulston, Inc. ----- | 15 East 26th St. New York, NY 10010 | ---do----- | Northampton. |
| Lime: | | | |
| The J. E. Baker Co. ¹ ----- | Box 1189 York, PA 17405 | ---do----- | York. |
| Mercer Lime & Stone Co. ----- | 1640 Oliver Bldg. Pittsburgh, PA 15222 | ---do----- | Butler. |
| National Gypsum Co. ^{1 2 7} ----- | 325 Delaware Ave. Buffalo, NY 14202 | ---do----- | Centre. |
| Peat: | | | |
| Gouldsboro-Wayne Peat Co. ----- | Box 68 Gouldsboro, PA 18424 | Moss ----- | Wayne. |
| Lake Benton Peat Moss ----- | 1418 North Main St. Scranton, PA 18508 | Bog ----- | Lackawanna. |
| Perlite, expanded: | | | |
| Armstrong Cork Co. ----- | Lancaster, PA 17603 ----- | Plant ----- | Lancaster. |
| Atlantic Perlite ----- | Box 345 Primrose, PA 19018 | ---do----- | Delaware. |
| Pennsylvania Perlite Corp. ----- | Box 2002 Lehigh Valley, PA 18001 | ---do----- | Lehigh and York. |
| Perlite Manufacturing Co. ----- | Box 478 Carnegie, PA 15106 | ---do----- | Allegheny. |

See footnotes at end of table.

Table 12.—Principal producers —Continued

| Commodity and company | Address | Type of activity | County |
|---|---|------------------|---|
| Sand and gravel: | | | |
| Davison Sand and Gravel Co ----- | 34th Ave. & 4th St. New Kensington, PA 15068 | Dredge ----- | Westmoreland. |
| Dravo Corp.----- | One Oliver Plaza Pittsburgh, PA 15222 | -----do ----- | Beaver. |
| Erie Sand Steamship Co ----- | Erie, PA 16500 ----- | -----do ----- | Lycoming. |
| Shippingport Sand & Gravel Co -- | 1200 Slambaugh Bldg. Youngstown, OH 44501 | Pit ----- | Armstrong. |
| Warner Co. ^{1 4} ----- | 1721 Arch St. Philadelphia, PA 19103 | Pit ----- | Bucks. |
| Stone: | | | |
| G & West H. Corson, Inc. ⁴ ----- | Plymouth Meeting, PA 19462 | Quarry ----- | Montgomery. |
| The General Crushed Stone Co.--- | 712 Drake Bldg. Easton, PA 18042 | -----do ----- | Bucks, Chester, Delaware, Lancaster, Luzerne, Perry. |
| Glasgow Quarry, Inc ----- | Route 2, Box 121 Glasgow, MO 65254 | -----do ----- | Montgomery. |
| Martin Marietta Corp ----- | 11300 Rockville Pike Rockville, MD 20852 | -----do ----- | Centre, Chester, Fayette, Northampton. |
| New Enterprise Stone & Lime --- | New Enterprise, PA 16664 | -----do ----- | Bedford, Blair, Cumberland, Franklin, Huntingdon, Somerset. |
| Sulfur: | | | |
| Atlantic Richfield Co ----- | 3144 Passyunk Ave. Philadelphia, PA 19145 | Plant ----- | Philadelphia. |
| British Petroleum Corp., Ltd ----- | Box 428 Marcus Hook, PA 19061 | -----do ----- | Delaware. |
| Gulf Oil Corp ----- | Box 7408 Philadelphia, PA 19101 | -----do ----- | Philadelphia. |
| Sun Oil Co ----- | 1608 Walnut St. Philadelphia, PA 19103 | -----do ----- | Delaware. |
| Tripoli: Keystone Filler & Manufacturing Co. | Philadelphia, PA 19103 | Pit ----- | Northumberland. |
| Vermiculite, exfoliated: | | | |
| Hyzer & Lewellen ----- | Box 155 Southampton, PA 18966 | Plant ----- | Bucks. |
| W. R. Grace & Co ----- | 62 Whittemore Ave. Cambridge, MA 02140 | -----do ----- | Lawrence. |

¹Also stone.²Also clays.³Also coal.⁴Also lime.⁵Also iron ore.⁶Also expanded perlite.⁷Also cement.

