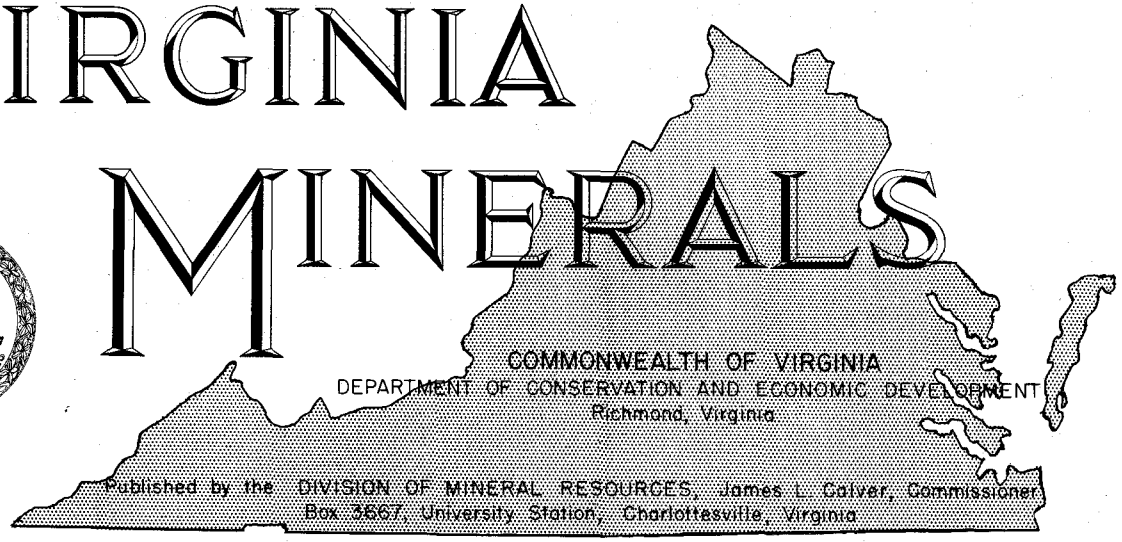
VIRGINIA MINERALS



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THE MINERAL INDUSTRY OF VIRGINIA IN 1963

The data presented here were taken from the 1963 Minerals Yearbook, Volume 3, Area Reports, prepared by the Bureau of Mines, U. S. Department of the Interior, under a cooperative agreement with the Virginia Division of Mineral Resources for collecting information on all minerals except fuels. The value of Virginia's mineral production in 1963 totaled $229 million, 3 percent greater than in 1962 and only 1 percent less than in 1957, the record year. Production and value of stone, sand and gravel, and kyanite rose to new highs. Records also were established in tonnage of coal mined and in value of clay produced. Moderate increases in quantity were made by lime, masonry cement, gypsum, and titanium concentrates, while decreases were reported in output of clay, portland cement, feldspar, and lead and zinc. Accelerated highway and other construction was a prime influence in the 7 percent increase in tonnage for stone, sand and gravel, and gypsum, and the 6 percent rise in shipments of masonry cement. Output of clays and portland cement were only slightly under 1962. Coal, stone, sand and gravel, portland cement, lime, and zinc led in value of production. Fuels comprised 53 percent of the total value of mineral production in the State, the same percentage as in 1962. The value of nonmetals rose to 44 percent of the total value, while the value of metals declined to 3 percent.

A constant dollar series has been prepared in which the bias caused by price level variations is reduced, thus showing more nearly the real change in the annual value of mineral production. The series is constructed by summing the constant dollar value of several mineral groups. These groups were converted to 1957-59 constant dollars by dividing the group current dollar value by the appropriate group implicit price deflator.

Trends and Developments.—Norfolk & Western Railway's Lambert's Point pier 6 coal loading facilities added a second 17-story, 180-foot high tower, completed in July (the first tower was placed in operation in December 1962). Electronic control of custom-blended coals, twin 8-foot-wide conveyor belts, self-propelled loading towers, and 120-foot retractable loading booms allow a rated capacity of 16,000 tons per hour and a maximum capacity of 20,000 tons per hour. Four ships may be loaded at the same time along the 1,600-foot pier. In the continuing effort to transport coal economically and particularly to supply the coming unit train movement of bulk commodities, the Norfolk & Western Railway also is testing an experimental 150-ton capacity coal hopper car in trial runs from tipples to consumers.

An effort to reconcile production and preservation of raw material resources and the normal growth of residential, commercial, and industrial facilities, particularly in and around large centers of population, led to the preparation of a Natural Resources Development plan by the sand and gravel producers of Fairfax County, with substantial aid from the National Sand & Gravel Association. This plan would provide for the mining

Table 1. Mineral production in Virginia.[1]

Mineral		1962 Quantity	1962 Value (thousands)	1963 Quantity	1963 Value (thousands)
Aplite	thousand long tons	125	$912	([2])	([2])
Clays	thousand short tons	1,464	1,444	1,410	$1,558
Coal (bituminous)	do	29,474	117,560	30,531	120,972
Gem stones		([3])	6	([3])	6
Lead (recoverable content of ores, etc.)	short tons	4,059	747	3,500	756
Lime	thousand short tons	615	7,668	639	8,058
Natural gas	million cubic feet	2,499	677	2,085	488
Petroleum (crude)	thousand 42-gallon barrels	3	([2])	3	([2])
Sand and gravel	thousand short tons	9,745	16,375	10,400	17,752
Soapstone	short tons	([2])	([2])	3,696	9
Stone	thousand short tons	25,766	43,121	27,653	45,529
Zinc (recoverable content of ores, etc.)[4]	short tons	26,479	6,141	23,988	5,725
Value of items that cannot be disclosed: Portland cement, masonry cement, feldspar, gypsum, iron ore (pigment material), petroleum (crude), kyanite, pyrites (1962), salt, titanium concentrate (ilmenite and rutile), and values indicated by footnote 2		——	27,843	——	28,212
Total		——	222,494	——	229,065

[1] Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2] Figure withheld to avoid disclosing individual company confidential data.
[3] Weight not recorded.
[4] Recoverable zinc valued at the yearly average price of prime western slab zinc, East St. Louis market. Value established after transportation, smelting, and manufacturing charges have been added to the value of ore at the mine.

of valuable reserves of sand and gravel prior to residential, commercial, or industrial development, followed by carefully planned restoration of worked-out areas. Although designed at the start as a master plan for the many regions facing aggregate depletion, it was discovered that because of special needs or conflicts, each area must chart its own course.

Indicating the increasing importance of Virginia in nuclear activity and programs were the $705,000 National Science Foundation grants to the University of Virginia for a 6-million-volt Van de Graaff nuclear accelerator and a new nuclear physics laboratory. The accelerator, costing $526,000, will be the only such equipment in the world other than a similar accelerator at Los Alamos Scientific Laboratory in New Mexico. The new laboratory, to cost $358,000 (including a National Science Foundation grant of $179,000), will house not only the 6-million-volt nuclear accelerator, but also a 75-million-volt synchrotron given to the university several years previously by General Electric Co. The Van de Graaff accelerator accelerates protrons and heavier nuclear particles while the synchrotron accelerates electrons.

Table 2. Value of mineral production in constant 1957-59 dollars (thousands).

Year	Value	Year	Value
1952	$168,601	1958	$205,257
1953	154,516	1959	230,552
1954	137,760	1960	214,308
1955	174,562	1961	234,464
1956	209,566	1962	233,985
1957	222,906	1963	240,744

Mineral Fuels

Coal (Bituminous).—Output of 30.5 million tons of bituminous coal in 1963 was a new record, 1 percent higher than in the former record year, 1961, and 4 percent greater than in 1962. The value of the output increased 3 percent over that of 1962 and was only 4 percent below the record high value of 1961. The average value per ton continued to decline and was $3.96 compared with $3.99 in 1962, and $4.16 in 1961. Virginia produced high- and low-volatile coals for domestic and industrial heating and industrial power as well as a small amount of semianthracite for domestic heating. Large tonnages of both high- and

low-volatile coals were exported. Output in Buchanan County comprised 43 percent of the total Virginia coal production, and Dickenson County an additional 27 percent. The four chief producing counties, Buchanan, Dickenson, Wise, and Russell, produced 97 percent of the total Virginia output. Underground production totaled 88 percent of the State's total, strip mine output 7 percent, and auger mine production 5 percent.

Coke.—Coke was produced by six companies in 1963, five in Wise County and one in Buchanan County. There were 877 beehive ovens in operation, of which 390 were rectangular or horizontal-bed internal combustion ovens. Machine-drawn ovens totaled 756, and hand-drawn ovens 121. No slot ovens were operated and no byproducts recovered. Output increased substantially compared with 1962.

Fuel Briquets and Packaged Fuel.—Packaged fuel prepared from bituminous coal was produced by Wright Coal & Oil Co., Inc., Norfolk. Fuel briquets were not made in Virginia.

Petroleum and Natural Gas.—Production of natural gas during 1963 totaled 2,084,946 thousand cubic feet, a decrease of 17 percent from the production of 1962. Buchanan County reported production of 1,479,776 thousand cubic feet which was delivered to the pipelines of Hope Natural Gas Co. and United Fuel Gas Co. Dickenson County produced 605,170 thousand cubic feet which was placed in the lines of the Kentucky-West Virginia Gas Co.

In Lee County, production of oil from the Rose Hill field was 3,466 barrels. A small oil well was completed in the Trenton Limestone near Ben Hur, about 19 miles northeast of the Rose Hill field.

The American Oil Co. operated a skimming, cracking, and coking refinery at Goodwin Neck, York County, with a crude capacity of 38,000 barrels per calendar day, a cracking capacity of 36,500 barrels, and a reforming capacity of 6,800 barrels.

Nonmetals

Aplite.—Output of aplite for glass manufacture in 1963 decreased chiefly because two of the four companies producing in 1962 discontinued mining. One firm each in Hanover and Nelson Counties remained in operation.

Cement.—Shipments of portland cement declined only slightly in 1963 (2 percent). Shipments of masonry cement continued to increase and were 6 percent in quantity and 8 percent in value over those of 1962. Portland-cement-producing capacity remained virtually unchanged during the year. The dry process of manufacturing portland cement was used by two plants and the wet process by one. Both portland and masonry cement were made by three plants, and one firm made masonry cement only. Production was confined to Augusta, Botetourt, and Warren Counties and the City of Chesapeake. The cement companies mined calcareous marl, limestone, and shale for their own use. Included among purchased materials used in the manufacturing process were sand, gypsum, oyster shells, mill scale, various air-entrained compounds, and certain grinding aids. General-use and moderate-heat cement (Types I-II) comprised 93 percent of the portland cement marketed. High-early-strength cement also was produced and nearly half of the portland cement was air entrained.

Clays.—Production of clays declined slightly, although tonnage was higher than in 1961. Value, however, rose to nearly $1,560,000, a new record, about 8 percent above 1962, the previous high year in value. The only type of clay mined was miscellaneous or "common" clay and shale, over 60 percent of which was used in making building brick. Most of the remainder was consumed in the manufacture of lightweight aggregate and portland cement. Smaller tonnages were used in making vitrified sewer pipe, flue linings, and various other heavy clay products. Clay was produced by 15 companies at 21 operations in 16 counties. Three companies expanded clay or shale for lightweight aggregate, one each in Botetourt, Pittsylvania, and Russell Counties. The chief clay producing counties, in order of output, were Botetourt, Chesterfield, Russell and Nansemond, and in order of value, Botetourt, Orange, Prince William and Nansemond. A study of the raw materials used in making lightweight aggregates in Virginia, covering specifications, properties, and processing was published.

Feldspar.—Feldspar was produced in Bedford County by one company. Combined output from three mines dropped over 28 percent compared with 1962. Potash and mixed spar were mined. Production and sale of ground feldspar from the company mill at Bedford also declined. The chief markets were for pottery and enamel manufac-

ture. Smaller uses included welding rods and soaps and abrasives. Maryland, New Jersey, and Ohio were the chief consuming States.

Gypsum.—Crude gypsum was mined at Plasterco, Washington County, by United States Gypsum Co. The product was calcined and manufactured into plasterboard and other gypsum products at a nearby plant. Production rose moderately. The newly developed mine in Smyth County at Locust Cove was expected to be in operation in early 1964. The United States Gypsum Co. also calcined gypsum of both domestic and Nova Scotian origin at a company mill in Norfolk. Several firms in the Norfolk area ground Nova Scotian crude gypsum for use as a land dressing, especially for peanut growing.

Kyanite.—Kyanite Mining Corp. operated two mines and flotation plants and a pulverizing mill in Virginia. Sales of refined kyanite increased 11 percent. Recovery of crude kyanite also was greater than in 1962. Refractory and other ceramic manufacturers were the principal users of this material. Mines and flotation mills were in Buckingham and Prince Edward Counties and the pulverizing plant in Prince Edward County.

Lime.—Increased demand for lime led to a rise of 4 percent in tonnage and 5 percent in value over that of 1962. Sales of agricultural lime were less than in 1962, while sales of building and chemical lime increased compared with those of 1962. There were nine companies which burned lime in seven counties. One company operating during 1962 was idle. The Kimballton plant (Giles County) of the Standard Lime & Cement Co., division of Martin-Marietta Corp., was sold to Foote Mineral Co., Exton, Pa., on October 31, and operated by the new owner for the remainder of the year. Oystershell was calcined by two firms near Norfolk for use as an agricultural land dressing. The chief lime-burning counties were Giles, Smyth, and Shenandoah. Natural gas, bituminous coal, and coke were used for firing lime in several types of equipment, including pot, shaft, and rotary kilns and batch and continuous hydrators.

Nitrogen Compounds.—The Nitrogen Division, Allied Chemical Corp., Hopewell, Prince George County, manufactured nitrogen compounds for use in fertilizer. Ammonium sulfate, urea solution, ammonia and other compounds were prepared for various industrial uses.

Perlite.—Colorado perlite was expanded by a company at Hopewell, Prince George County, for use in concrete aggregate, soil conditioning and building plaster. Total sales decreased compared with 1962, although the amount of perlite sold for concrete aggregate was higher than in previous years.

Salt.—Salt brine mined by a Saltville (Smyth County) corporation was consumed chiefly in the manufacture of soda ash, chlorine, and other chemicals. Production increased slightly compared with that of 1962.

Sand and Gravel.—Production of sand and gravel was 6 percent higher than in 1961, the former peak year, and the value was 8 percent above the previous record value in 1962. The average value of commercial sand and gravel rose 2 percent, from $1.69 to $1.72 per ton. The increase in production was due chiefly to active highway and building construction programs during the year. Paving and building uses combined accounted for 84 percent of the total commercial production (47 percent paving, 37 percent building). Included among other types of sand and gravel produced were glass sand, engine sand, filtration, fill, and miscellaneous sand, including sand for ice control. Building and paving sand and gravel output increased substantially over that of 1962, while the production of glass, molding, and engine sands was much less than in 1962. Commercial output totaled 98 percent of all production, of which 91 percent was washed, screened, or otherwise prepared. The balance, 2 percent, consisted of State, Federal, and local government output, of which 63 percent was processed material. Sand and gravel production was reported from 43 counties. Commercial output was divided almost equally between sand and gravel (49 percent sand, and 51 percent gravel).

There were 78 sand and gravel pits in 1963, operated by 73 firms. Nearly three-quarters of the commercial output was shipped by truck, and the balance by railroad and waterway. Waterway shipments were somewhat less than in 1962.

The principal counties producing sand and gravel were Fairfax, Henrico, Chesterfield, city of Virginia Beach (formerly Princess Anne County), and Prince George. Commercial sand and gravel produced in these five areas totaled 79 percent of the quantity and 82 percent of the total value of Virginia production. Measured by size

of output, 41 of the commercial mines (52 percent of the pits) produced less than 25,000 tons each and accounted for only 20 percent of the total output. Twenty-four mines producing between 25,000 and 200,000 tons annually (31 percent of the pits) mined 19 percent, and 13 operations (17 percent of the producing mines), each producing more than 200,000 tons annually, accounted for 61 percent of the production of commercial sand and gravel.

Soapstone.—One company in Franklin County continued to market ground or crushed soapstone. Another firm operating in Nelson and Albemarle Counties, formerly crushing and grinding soapstone (Alberene Stone Division of Georgia Marble Co.), discontinued its grinding operations at Schuyler before the end of 1962. Sales declined slightly in 1963. Foundry facings and insecticides were the chief uses.

Stone.—Production of stone in Virginia in 1963 broke all records in both quantity and value for the sixth consecutive year and remained the second most important mineral commodity produced in Virginia, exceeded only by bituminous coal. Output in 1963 totaled 27.7 million tons valued at $45.5 million, an increase of 7 percent in quantity and 6 percent in value over that of 1962. Especially influencing the large rise in production of stone were substantial increases for granite, basalt, limestone, sandstone, and crushed and broken stone. Agricultural limestone (agstone) also had a large increase. Stone used as concrete aggregate and roadstone represented 71 percent of the total production, cement 7 percent, lime 5 percent, and metallurgical flux 4 percent. Of the metallurgical flux, 53 percent was consumed in open-hearth furnaces, and 43 percent in blast furnaces. Other sizable tonnages of limestone were consumed as stone sand, fertilizer and asphalt filler, and in ammonium nitrate and glass manufacture.

Many types of stone were quarried in Virginia, including limestone, granite, basalt, sandstone, marble, miscellaneous stone, (soapstone, greenstone, and aplite) calcareous marl, and slate. Shell, a byproduct of the oyster and mollusk industries, also was used chiefly as an agricultural liming material similar to agstone, and in the manufacture of lime. One firm in Buckingham County also produced roofing granules from slate. The two firms in Nelson County formerly producing crushed and broken aplite discontinued the production of aplite for construction purposes. Limestone comprised 60 percent of the total stone, granite 24 percent, and basalt 11 percent. Crushed and broken stone accounted for by far the bulk of the total tonnage produced (99.8 percent). Dimension miscellaneous stone, dimension slate, and dimension sandstone accounted for the balance of the Virginia output.

Measured by tonnage the principal stone-producing counties were Frederick, Botetourt, Loudoun, Roanoke and Washington. Measured by value of product, the most important counties were Frederick, Botetourt, Loudoun, Roanoke, and Fairfax. There were 8 counties with over 1 million tons of output, and 18 counties with production valued at over $1 million each. Commercial stone was obtained in 50 counties by 93 producers. Five State or municipal agencies in 10 counties produced Government-and-contractor stone. Two firms in two counties produced and marketed shell, and one other company purchased and processed shell for sale. The number of producers by types of commercial stone was as follows: limestone, 53 companies (69 quarries); granite, 13 companies (21 quarries); basalt, 9 companies (9 quarries); sandstone, 11 companies (15 quarries); marble, 1 company (1 quarry); miscellaneous stone, 5 companies (5 quarries); calcareous marl, 2 companies (2 quarries); and slate, 4 companies (4 quarries). The number of quarries does not add to the total shown above because five firms produced more than one kind of stone.

Sulfur.—Sulfur was produced at the Yorktown (York County) refinery of the American Oil Co. by processing hydrogen sulfide recovered from fuel gas. Both production and shipments were more than 20 percent less than in 1962. The average value of shipments also declined.

Water.—The need for background statistics to implement programs for water conservation and to provide guide lines for proper and efficient utilization of water resources for commercial, industrial, and recreational use and consumption led to a survey for the year 1962 of the actual quantities of water used in the mineral industries.

Only a little more than 1 percent of the total water was used in mining, nearly 98 percent in processing operations, and the remainder chiefly as cooling and condensing water, including that used for electric power generation, boiler feed, sanitary, and miscellaneous uses.

Table 3. Water use in the mineral industry in 1962.

	Millions of gallons					Gallons
Types of operation	New water	Water recirculated	Total water used	Water discharged	Water consumed	New water per dollar value of production
Coal mines	1,594	8,010	9,603	1,316	278	29.37
Metal mines and mills	934	239	1,173	817	117	116.21
Quarries and mills	1,185	539	1,724	1,073	112	27.73
Sand and gravel mines	2,797	1,472	4,269	2,655	142	170.79
Other nonmetal mines and mills	458	882	1,341	282	176	56.26
Petroleum and natural gas	1	——	1	1	—	——
Total	6,969	11,142	18,111	6,144	825	——

Of the new water used, 12 percent was consumed, and the balance discharged, chiefly as surface water to streams or lakes (73 percent) and as ground water into the earth (26 percent). Minor quantities were discharged into sewers or transferred to others.

Only 7 percent of the new water used by the mineral industries was treated before use, virtually all of the recycled water was treated, and over 60 percent of the discharged water was treated before release. Of the new water treated, over three-quarters was settled, and most of the remainder was treated by filtration or with bactericides. About 95 percent of the recirculated water was settled and the balance filtered or precipitated. Nearly 75 percent of the discharged water was settled before release, about 11 percent each precipitated and treated for pH content, and the balance filtered.

Metals

Ferroalloys.—Production of ferromanganese by E. J. Lavino & Co. at Reusens, near Lynchburg, Campbell County, had been discontinued about mid-1962, but small quantities were sold from stock during 1963.

Gold and Silver.—Henry Cassell of Collinsville, Clifford Adams and associates located gold prospects in the Polebridge Creek section in Patrick County, about 14 miles northeast of Stuart. Assays were said to indicate favorable showings of gold and some possibilities for silver.

Iron and Steel.—The first U. S. commercial continuous steel casting plant, built by Babcock & Wilcox Co. for Roanoke Electric Corp., Roanoke, was an operating success. The unit produces approximately 700 feet of 4½-inch-square billits or cast bars from 22-ton heats. More bars also can be produced than in the conventional ingot mold method, as only the beginning and end of the total cast bar are removed, not the top and bottom of each ingot.

Iron Ore (Pigment Material).—One firm near Henry, Franklin County, produced red iron oxide pigments from Minnesota hematite. Another company produced and sold crude brown and yellow oxide pigments near Hiwassee, Pulaski County. This firm also produced, near Hiwassee and Pulaski, natural red and yellow iron oxide pigments, and a large number of finished natural and manufactured pigments. Total sales of these iron oxide pigments decreased sharply.

Lead and Zinc.—Output of recoverable zinc declined 9 percent in tonnage from 1962, and value of zinc was only 7 percent less than in 1962, the previous peak year. Production came from Wythe and Rockingham Counties. Tri-State Zinc, Inc., in Rockingham County, however, discontinued the mining of zinc in July, as the ore body had been depleted. Production of lead dropped sharply. Because of a 17-percent rise in average value per ton, however, total value of lead increased slightly. Wythe County zinc-lead ores were concentrated at Austinville and Rockingham, zinc ore at Timberville. Zinc concentrates were smelted at Palmerton and Josephtown, Pa., and East Chicago, Ind. Lead concentrate was shipped to Baton Rouge, La., and La Salle, Ill.

Titanium Concentrates.—Marketed production of titanium concentrate increased slightly with a moderate rise in value. Output of both ilmenite and rutile rose, although rutile increased more rapidly compared with 1962 output. American Cyanamid Co., Piney River, Amherst County, produced ilmenite, and M & T Chemicals Inc., near Montpelier, Hanover County, produced ilmenite and rutile.

THE MINERAL INDUSTRY OF VIRGINIA IN 1964*

PRELIMINARY DATA

Value of mineral output in Virginia in 1964 was a record $237.8 million, a 4-percent increase over the previous year and a 3-percent increase over 1957, the former record high year, according to estimates by the Bureau of Mines, United States Department of the Interior. Thirteen of the nineteen reported commodities gained in output and value over the previous year, while only one (zinc) showed any significant decline. Slight to substantial gains were made, or new records set, in output and value for commodities supplying construction industries, with the exception of gypsum, which showed a slight decline. The output and value of metals or metal concentrates, excepting zinc, increased.

Mineral Fuels

Output of bituminous coal was the largest of record. Production totaled 31.3 million tons and exceeded the record high set only last year by 3 percent. Production of petroleum declined, compared with 1963, while output of natural gas remained at the same level.

Nonmetals

Production of sand and gravel and stone reached new highs in 1964, being 12 and 9 percent, respectively, above previous records set only last year. Greater activity in highway and building construction was chiefly responsible for the increased output of sand and gravel. The rise in stone production was principally due to increased demand for crushed limestone, especially for aggregate, metallurgical, and agricultural uses. Other construction materials—clay and cement (portland and masonry)—also increased; gypsum production, however, showed a slight decline. Output of salt produced in Smyth County was comparable to the previous year. Substantial increases in output were reported for kyanite, produced in Prince Edward and Buckingham Counties, and aplite, produced in Hanover and Nelson Counties. Production of feldspar increased, while soapstone output declined.

Table 1. Mineral production in Virginia.[1]

Mineral	1963 Quantity	1963 Value (thousands)	Preliminary 1964 Quantity	Preliminary 1964 Value (thousands)
Clays ..... thousand short tons	1,410	$1,558	1,480	$1,636
Coal (bituminous ..... do	30,531	120,972	31,300	([2])
Gem stones	([3])	6	([3])	6
Lead (recoverable content of ores, etc.) .. short tons	3,500	756	3,745	976
Lime ..... thousand short tons	639	8,058	667	8,402
Natural gas ..... million cubic feet	2,085	488	2,100	500
Sand and gravel ..... thousand short tons	10,400	17,752	11,629	19,601
Soapstone ..... short tons	3,696	9	3,300	8
Stone ..... thousand short tons	27,653	45,529	30,148	48,694
Zinc (recoverable content of ores, etc.[4]) .. short tons	23,988	5,725	20,242	5,283
Value of items that cannot be disclosed: Aplite, cement (portland and masonry), feldspar, gypsum, iron ore (pigment material), kyanite, petroleum (crude), salt, titanium concentrate (ilmenite and rutile), and value of items indicated by footnote 2	——	[5]/28,211	——	152,719
Total	——	[5]/229,064	——	237,825

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
2/ Figure withheld to avoid disclosing individual company confidenial data; included with "Value of items that cannot be disclosed."
3/ Weight not recorded.
4/ Recoverable zinc valued at the yearly average price of Prime Western slab zinc, East St. Louis market. Value estimated after transportation, smelting, and manufacturing charges have been added to the value.
5/ Revised figure.

*Prepared by David J. Kusler, U. S. Bureau of Mines, Pittsburgh, Pa., December 1964.

Metals

Production and value of iron oxide pigments increased substantially. Titanium concentrate (ilmenite and rutile) increased in output and value. Zinc production was less in 1964 as a direct result of the closing of the Bowers-Campbell mine (Tri-State Zinc, Inc.) near Timberville, Rockingham County, in July of 1963. Lead production was comparable to that of the previous year, however, the weighted average value increased from 10.80 cents per pound in 1963 to 13.03 in 1964.

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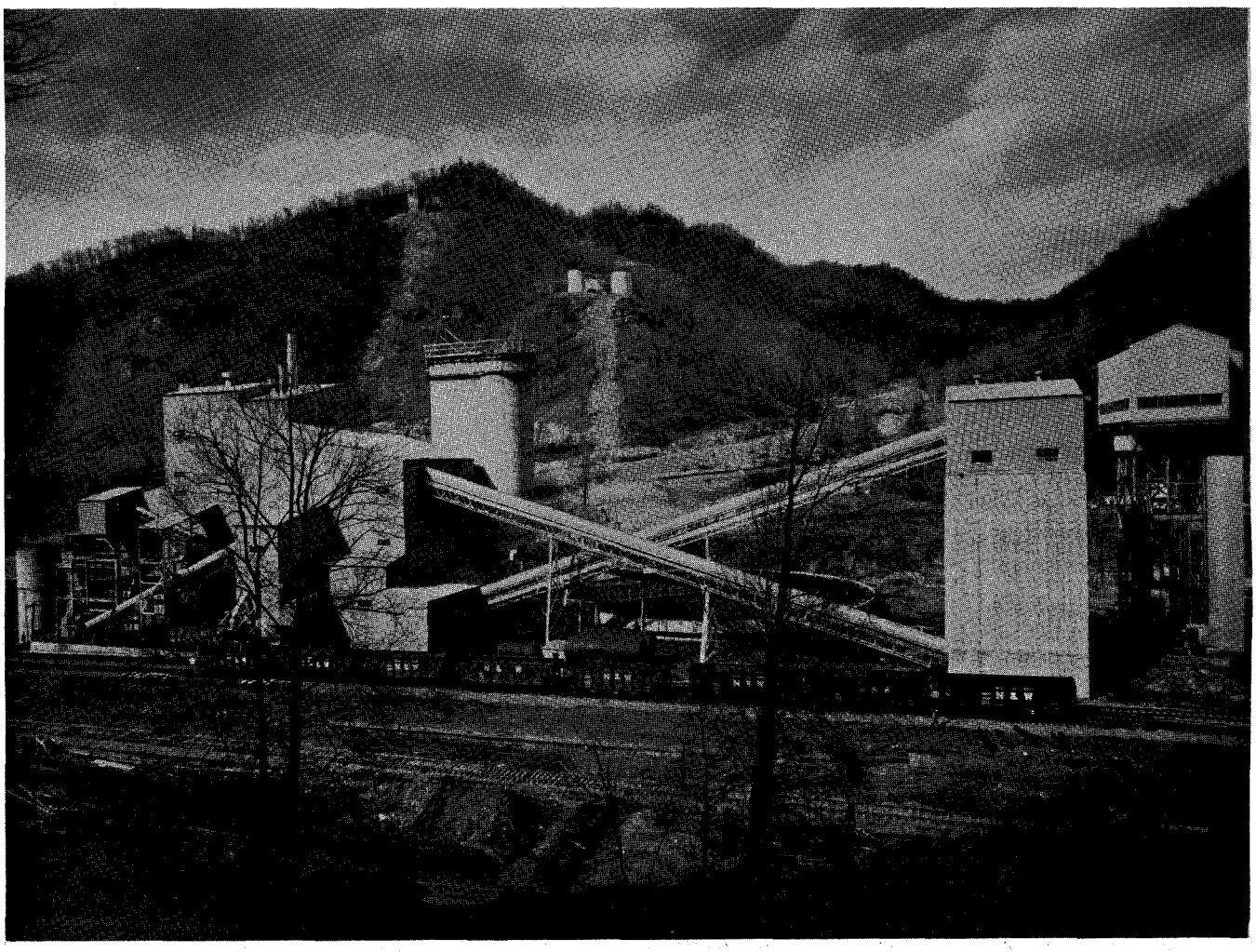
BEATRICE POCAHONTAS MINE, BUCHANAN COUNTY, VIRGINIA[1]

Beatrice Pocahontas is jointly owned by the Island Creek Coal Co. and Republic Steel Corp. The new mine taps the Pocahontas No. 3 seams, 1350 ft. deep—one of the highest grade metallurgical coal deposits in the world. The product is shipped by rail to Republic coking plants and to other customers in Ohio, West Virginia and Pennsylvania.

The Beatrice Pocahontas mine has an estimated 75 million-ton reserve, enough to furnish production for about 50 years. (Island Creek Coal Co. properties in Buchanan County total 65,000



The Beatrice Pocahontas mine at Oakwood, Va. Skip shaft arises at corner of the preparation plant (shown with scaffolding on top in this photo). Inclined conveyors carry crushed coal to raw storage bin and from bin to plant at 700 tph.

[1] Reprinted from *Mining Congress Journal*, November 1964.

acres, containing an estimated 500 million tons of No. 3 Pocahontas.) By the end of this year [1964], the mine is expected to produce 100,000 tons per month, with two daily shifts.

Three Shafts on Property

Three shafts have been sunk on the property, one for the skip hoist, another for supplies and personnel, and a third for air return. The skip shaft—extending a bit below the seam itself—is the deepest, at 1480 ft. (The bottom is 120 ft. below sea level.) The friction-type skip hoist, said to be the first used in coal mining in the U. S., can bring an 18-ton load to the surface every 72 seconds.

The raw coal is discharged into a surge hopper, from which it is reclaimed by reciprocating feeder at 900 tph and screened on a bar grizzly; a crusher reduces the oversize to minus 4-in., discharging to a 42-in. transfer belt conveyor, where a magnet belt removes tramp iron. The transfer conveyor discharges to an inclined belt conveyor handling the raw coal to the top of a 2000-ton capacity storage bin about 150 ft. from the plant proper. A rotary discharge chute distributes the coal into each of the four divisions of the bin equally, or can be set to index automatically and feed any of the divisions in any sequence.

A vibrating feeder under each of the four cells proportions the raw coal onto the 42-in. feed conveyor which inclines upward from the base of the storage bin to the uppermost level of the nine-story plant, where the various processing circuits begin.

The plant feed conveyor discharges onto a 48-in. flight conveyor which distributes the raw coal to a battery of four inclined single-deck vibrating screens. On the screens a wet separation of the product is made at ⅜-in., the oversize discharging to a coarse coal belt conveyor and the undersize into the fine coal classifiers.

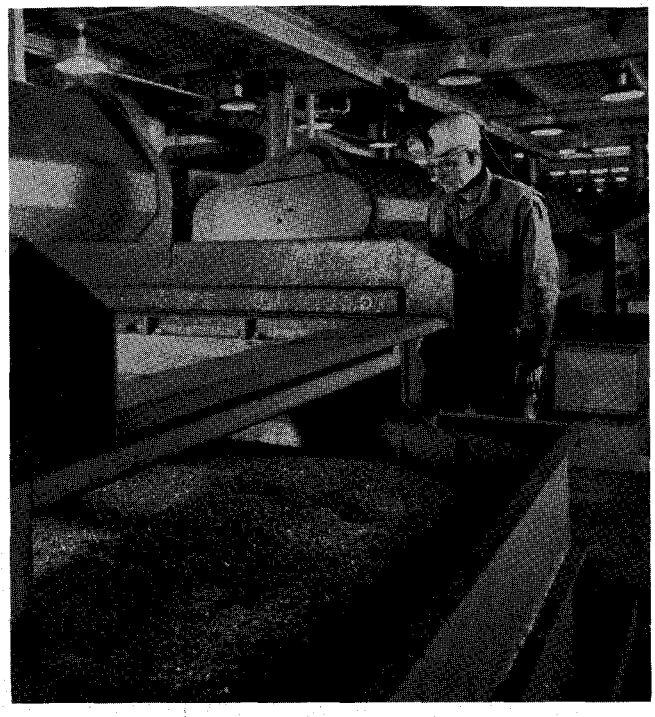
Preparation Plant Feed is 700 TPH

A wood skimmer is used at the beginning of the coarse coal section, to remove scrap wood. Basically, it consists of a tank with a double-strand skimmer running crosswise to skim floating material off the pool, and a double-strand flight conveyor running lengthwise to remove settled coal.

Coal and water flow together into the vessel at the conveyor discharge chute, so that the current of the pool is always crosswise, in the direction of the skimmer. The flight conveyor removes the coal from the bottom and discharges it onto a conditioning screen, which serves as a pre-wetting step before the heavy media process and also provides an extra screening at ⅜-in.

Pre-wetted coal is fed into a heavy media vessel along with the magnetite and water mixture. Inlet and outlet sluices are on opposite sides of the tank so that the current carries the float product directly across the medium bath. The float coal flows over the outlet weir, with a floating paddle wheel to nudge the larger pieces. This permits a shallow weir depth and quiet pool. Refuse material sinks in the bath and is carried to a discharge chute at the end of the inclined trough by a double-strand flight conveyor.

Coal and refuse are drained and rinsed of media on their respective vibrating screens, with the media returning to the sump. Magnetite from the rinse water is reclaimed on a magnetic separator and returned to the medium circuit.



Heavy media separator handles 4 by ⅜-in. raw coal. Unit is fed by conditioning screens; float coal discharges from weir in foreground, assisted by a power-operated rotary paddle. Sink refuse is carried out by double-strand drag conveyor.

A secondary single-deck horizontal dewatering screen removes additional water from the clean coal. The coal is discharged from the screen into an 18 by 48-in. clean coal triple roll crusher and reduced to minus 5/8-in. square.

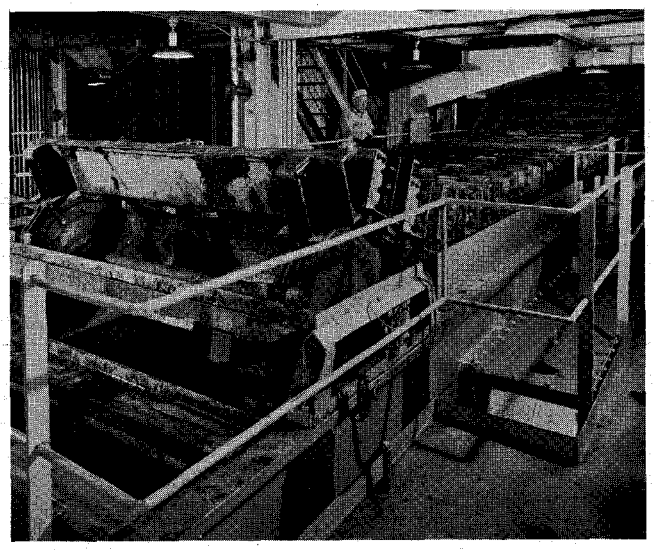
The crusher product is sized on an inclined single-deck vibrating screen, by-passing minus 3/8-in. coal to a transfer conveyor and discharging oversize to a hammermill crusher for reduction to minus 3/8-in.

The coal from the crushers is then transferred to the loading out conveyor system.

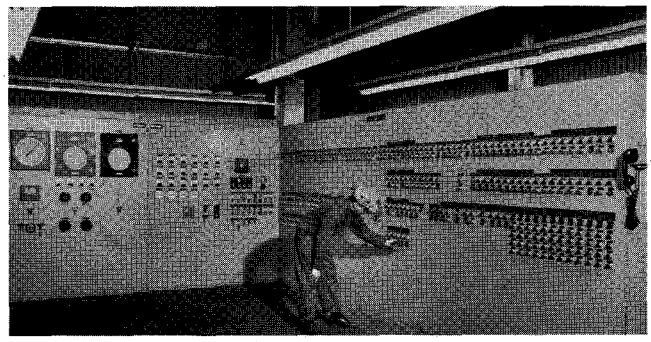
Fine Coal Section Handles 2/3 of Output

Since the fines section handles over 2/3 of the input (the plant is built for a 70—30 ratio), it is designed with four independent fines circuits, so that with any partial shutdown, operations can continue at quarter or half-plant.

Minus 3/8-in. coal separated out by the four raw coal sizing screens is flumed into four fine coal classifiers, each of which handles 131 tph, hydraulically separating it at 28-mesh. The plus 28-mesh is removed from the classifier tank by a drag conveyor while the minus overflows with the water over skimmer boxes. From skimmer troughs inside the 9 by 11 by 40-ft. welded steel tanks, fine mesh product is piped to flotation cells, while coarse mesh is chuted to table distributors.



In the fines section, four classifiers separate fine coal into 3/8-in. by 28-mesh and minus 28-mesh sizes. Skimmer within the tank collects minus 28-mesh fraction, which overflows with makeup water into flotation cell distribution system. Drag conveyor removes settled larger mesh coal and discharges to tables.



Pushbutton panel provides central control over all phases of preparation, except loading out and heat drying.

There are 16 of the twin-deck diagonal tables, four for each fine coal section—eight each on two floors. Clean coarse mesh coal from these coal launders is flumed to four dewatering screens, while refuse is flumed to a refuse sump pump and then to a refuse dewatering screen.

The screens chute dewatered coal into four centrifugal dryers, and underflow water is piped to black water sumps. The coal has about 20 percent surface moisture when it leaves the screens, and the concluding drying processes eliminate practically all of it. The centrifugal dryers discharge onto a clean coal collecting conveyor, while effluent is collected in a sump.

The minus 28-mesh coal from the classifiers is proportioned through two stationary distributors into 12 banks of flotation cells. Froth (about 25 percent solids) overflows the cells to two 12½-ft. diam vacuum disc filters, each handling 88 tph. Clean coal filter cake is chuted onto a flight conveyor which discharges to a belt conveyor, where it combines with the 3/8-in. by 0 clean coal from the centrifugals. This conveyor carries about 470 tph to a 36-in. diam twin paddle mixer, which breaks up caked fine coal and conditions the plus and minus 28-mesh for heat drying.

At this point the product has about 15 percent surface moisture. From the mixer it is chuted onto an inclined belt conveyor and then transferred to a flight conveyor which feeds into two larger dryer surge bins, distributing the coal into them through four adjustable slide gates.

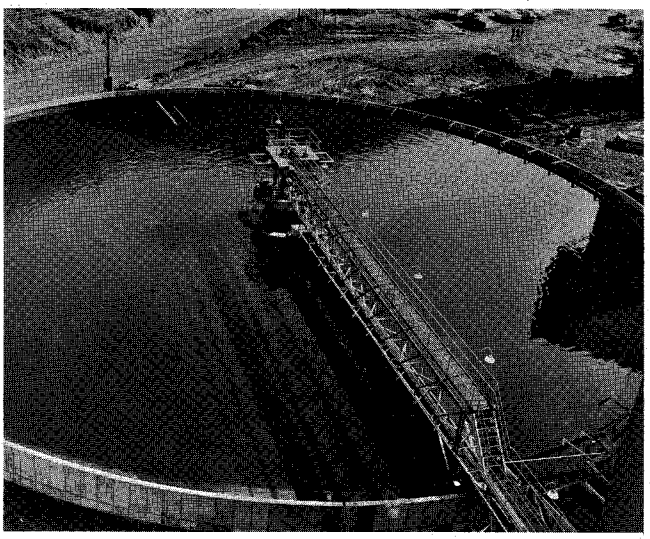
A 16-in. diam triple screw conveyor on each bin feeds the fine coal into two 10 by 16-ft. heat dryers. The furnaces for these are designed for a neat heat liberation of 127,000,000 Btu's per hour and furnish 1000° F temperature. Dust from

the dryers can be burned in the furnaces; it is fed into the furnace system through screw conveyors and rotary air-locks, or it may be loaded out via the dried coal collecting belt.

Refuse Removed on Aerial Tramway

Refuse from the tables is collected in a refuse sump and pumped to an SS-1416 dewatering screen, with underflow piped to the refuse thickener and dewatered material chuted onto the refuse filter cake conveyor. Tailings from the flotation cells are flumed into two vacuum disc filters the same size as those used for drying the clean fine froth. Refuse cake is chuted to the refuse filter cake conveyor for disposal.

The 36-in. refuse belt conveyor handles process refuse to a bin located alongside the main building. Refuse is weighed on a belt scale and removed by aerial tramway to the refuse dump on a nearby mountainside.



The 160-ft. diam thickener handles 6600 gpm of washery water. Settled refuse is pumped to disc filter to remove water, and is then discharged to plant refuse conveyor. Overflow water from thickener is re-circulated into plant.

The coal is sampled just before loading out. The loading out system is controlled from a push-button panel overlooking the loading tracks. Cars are positioned for loading by a hoist retarder, and are fed through hydraulic discharge gates.

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News Notes

The Liberty Limestone Corporation began production of dolomite for crushed stone during the summer of 1964 from their Beaver Dam quarry located between Covington and Callaghan, Alleghany County.

The limestone and dolomite quarry of W. G. Mathews, Jr., Inc., located near Richpatch, Alleghany County, was acquired in July, 1964, by Lambert Brothers Division, Vulcan Materials Company. The new owners will continue operations at the quarry for the production of crushed stone.

The Albemarle Sand and Gravel Company located near Charlottesville, Albemarle County, was purchased in August, 1964, by the Southern Materials Company, Inc., Norfolk, Virginia. Southern Materials has installed new plant facilities and will continue dredging operations for sand and gravel at the Rivanna River site.

Additions to Staff

Mr. Robert Teifke joined the Division on October 16, 1964 to assist in the study of Coastal Plain stratigraphy. After serving in the U. S. Army for 3 years, he attended Harpur College, Binghamton, N. Y., and received the B. A. degree in 1962. He is presently completing his thesis for the M. A. degree in geology from the University of Kansas. Mr. Teifke is married.

Mr. Raymond J. Beach was employed by the Division on November 1, 1964. He entered the U. S. Army in 1954 and served 3 years as a military policeman in Germany and Austria. In 1963 he received the B. S. degree in geology from Ohio State University. Mr. Beach was formerly employed by Seismograph Service Corp. of Tulsa, Okla. He is married and has one son.

Division of Mineral Resources
Box 3667
Charlottesville, Virginia

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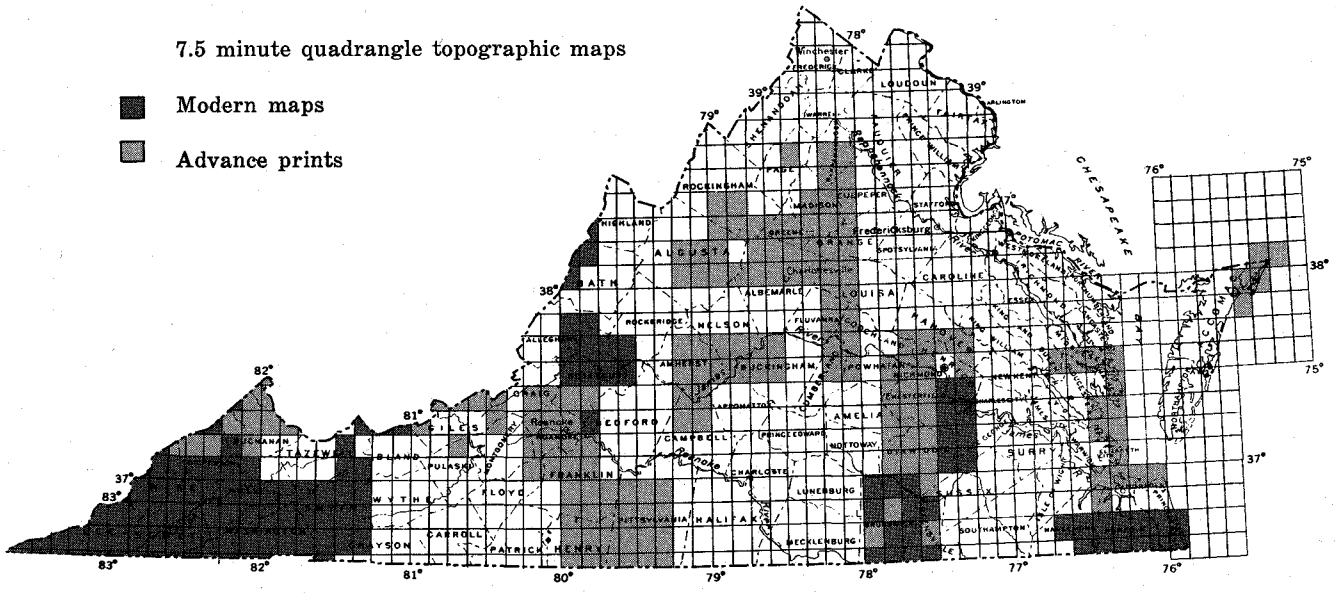
TOPOGRAPHIC MAPS



ADVANCE PRINTS

Advance prints (blue line) are available at 50 cents each from the U. S. Geological Survey, Topographic Division, 1109 N. Highland St., Arlington, Va.

PUBLISHED MAPS

State index is available free. Published maps are available at 30 cents each from the Virginia Division of Mineral Resources, Box 3667, University Station, Charlottesville, Virginia.