

VIRGINIA DIVISION OF MINERAL RESOURCES

PUBLICATION 142

**Coal, Oil and Gas, and Industrial and Metallic
Minerals Industries in Virginia, 1994**

Palmer C. Sweet and Jack E. Nolde

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DEPARTMENT OF MINES, MINERALS AND ENERGY
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Stanley S. Johnson, State Geologist

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COAL, OIL AND GAS, AND INDUSTRIAL AND METALLIC MINERALS INDUSTRIES IN VIRGINIA, 1994

Palmer C. Sweet and Jack E. Nolde

INTRODUCTION

The total value of mineral production in Virginia in 1994 was almost 1.70-billion dollars (Table 1; Figure 1). About 1.08-billion dollars resulted from coal sales, a 1.01 percent increase in value from the 1993 figure of 1.07-billion dollars. About 108.3-million dollars was produced from the sale of crude oil, gas condensate, and natural gas, with the remaining 502.3-million dollars from production of industrial rocks and minerals (Table 2 and 3). This represents a 12.7-million dollar decrease for 1994, when compared with 1993 statistics. Natural gas production was up 35.6 percent, while petroleum production was up almost 38.3 percent. The value of crushed stone was up almost 7.23 percent and the value of sand and gravel was up 1.03 percent. On a slight decline was the production of clay materials and lime.

The number of producers, and the number of processing plants remained constant during the year for cement, feldspar, gemstones, gypsum, industrial sand, iron-oxide pigments, kyanite, ornamental aggregate, sand and gravel, and vermiculite.

Virginia led the nation in the production of kyanite; was the only producer of a feldspar, marketed as "Virginia aplite"; and was one of three states mining vermiculite. Virginia also ranked sixth in crushed stone production and 35th in the production of sand and gravel. Several mineral commodities, including lithium carbonate, manganese, mica, perlite, phosphate rock, and sulfur were imported for processing.

Table 1. Mineral resource production in Virginia, 1994.

MINERAL COMMODITY	QUANTITY	VALUE (thousands)
Clay ₁ ----- short tons -----	959,001	\$3,252
Coal (bituminous) ₂ (\$28.00/ton) -thousand short tons ----	38,805	\$1,086,541
Gem stones ₁ -----	NA	W
Lime ₁ ----- thousand short tons-----	742	\$40,179
Natural gas ₂ (\$2.15/cu.ft.)-----million cubic feet-----	50,259	\$108,058
Petroleum (crude) ₂ (\$14.90/bl) ----42-gallon barrels ----	16,767	\$249
Sand and Gravel ₁ -----thousand short tons -----	8,055	\$33,409
Stone:		
Crushed ₁ -----thousand short tons-----	56,726	\$327,263
Combined value of cement (portland \$54,666,000), clay (fuller's earth), dimension stone, feldspar, gypsum, industrial sand and gravel, iron oxide pigments (crude), kyanite, sulfur, and vermiculite ₁ -----	XX	\$98,221
TOTAL -----	XX	\$1,697,172

NA Not available. XX Not applicable.

W Withheld to avoid disclosing company proprietary data.

₁ Measured by mine shipments, sales, or marketable production (includes consumption by producers) - from U.S. Bureau of Mines.

₂ Virginia Department of Mines, Minerals and Energy

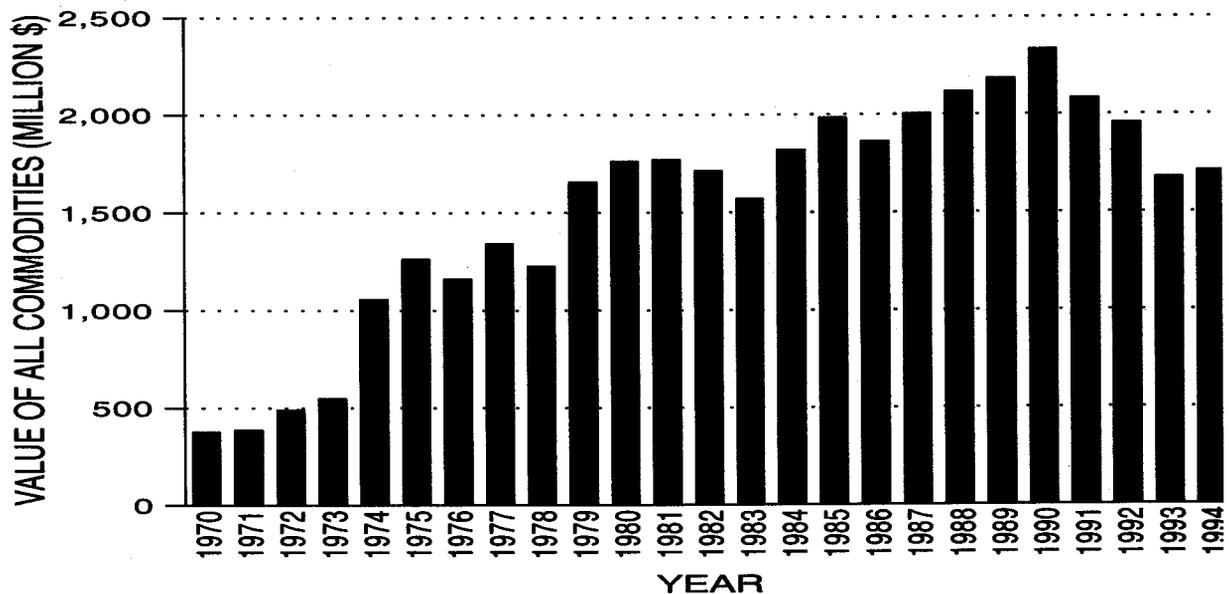


Figure 1. Total value of mineral production in Virginia, 1970 - 1994.

FUEL COMMODITIES

COAL

Coal production in Virginia declined from 40.1 million short tons in 1993 to 38.8 million short tons in 1994 (Table 1), a 3.24 percent decrease. Coal was produced from 422 surface and underground mines in the southwest Virginia coalfields in Buchanan, Dickenson, Lee, Russell, Scott, Tazewell, and Wise Counties (Figure 2). Total production from 321 underground mines was 29,434,576 short tons and from 101 surface mines was 9,370,668 short tons. Total value was \$1,086 million; average mine price was \$28.00 per ton. Tables 4 through 6 show production data by county, coal bed, type of mining method, and employment statistics. Almost 31.5 percent of the total production was from the Pocahontas No. 3, Jawbone, and Dorchester coals.

Coal from Virginia is used for metallurgical purposes, electrical power generation (steam coal), industrial purposes, and residential heating. Most Virginia coal is contracted for export to overseas markets. This coal is exported through ports at Hampton Roads in Virginia and at Wilmington in North Carolina.

OIL AND GAS

Crude oil and gas condensate production in Virginia totaled 16,766 barrels in 1994, which was a 38.3 percent increase from the 1993 production of 12,120 barrels (Figure 3). The 1994 production of 16,766.77 barrels of which oil (6646.71 barrels) and gas condensate (10,120.06 barrels) had a value of \$249,825; average unit value was \$14.90 per barrel. Production was by seven companies from 54 wells in three fields (Table 7), the Ben Hur-Fleenortown and Rose Hill in Lee County (crude oil) and the Roaring Fork in western Wise County (gas condensate). Most of the oil in Virginia comes

from the Ordovician Trenton Limestone and the gas condensate comes from the Mississippian Greenbrier Limestone ("Big Lime").

Total natural gas production increased 35.6 percent, from 37,051,735 Mcf in 1993 from 1428 wells to 50,259,473 Mcf in 1994 from 1,470 wells (Table 8; Figure 4). Conventional gas wells produced 21,927,657 Mcf from 978 wells, 43.6 percent of the total production. Coalbed methane wells produced 28,331,816 Mcf from 492 wells, 56.4 percent of the total production in the Commonwealth. The average price paid to Virginia's natural gas producers in 1994 was \$2.15 per Mcf. The market value for Virginia's natural gas was \$108,057,870, an increase of 127.3 percent from 1993.

Permitting Activity

Overall permitting activity decreased. The Department of Mines, Minerals and Energy, Division of Gas and Oil, issued 266 permits in 1994, a decrease of 48.8 percent from 1993. Of these, 97 permits were issued to drill new coalbed methane wells, 37 permits were for new conventional gas wells, and 83 permits were for facilities and pipeline construction. The remaining 49 permits were for modifications (39), transfer (9), and waste disposal (1).

Drilling Activity

In 1994, 149 holes were drilled in Virginia (Table 9). Of the 149 wells drilled, 41 were drilled for conventional gas, 103 were for coalbed methane, one was for waste disposal associated with coalbed methane operations, and four for underground storage. One-hundred and fifty-six wells were completed in 1994 including two conventional gas wells and six coalbed methane wells drilled during 1993. Of these, 42 were completed as conventional wells (26.9 Percent)(Table 9), 109 were completed as coalbed methane wells (69.8 percent), four

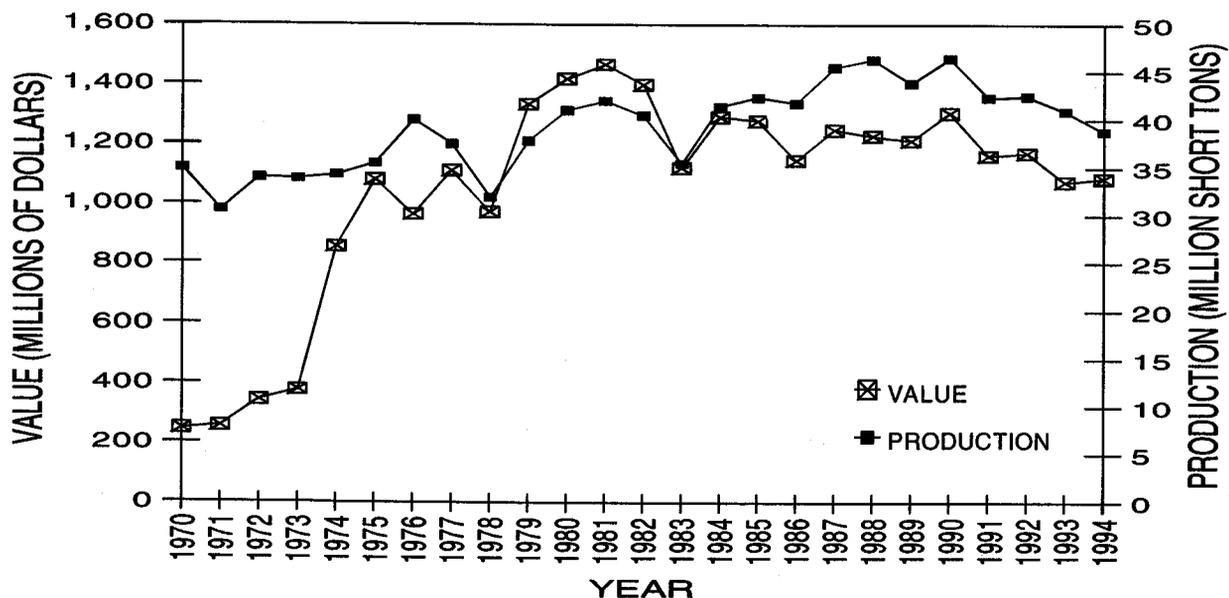


Figure 2. Trend of coal production and value, 1970-1994.

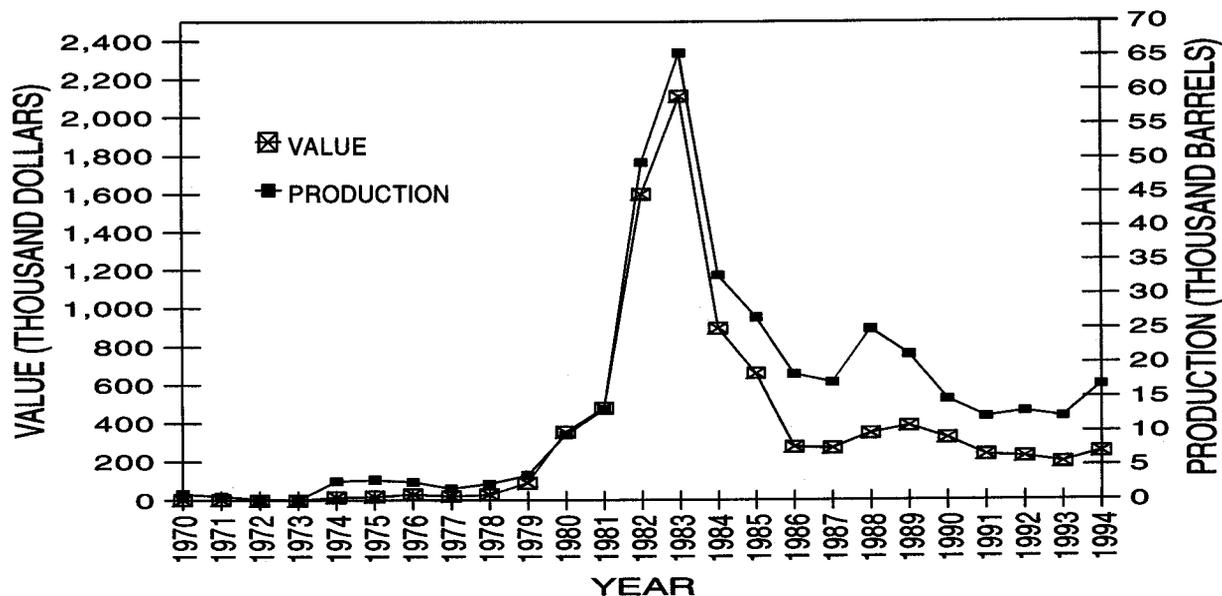


Figure 3. Trend of oil and gas condensate production and value, 1970-1994.

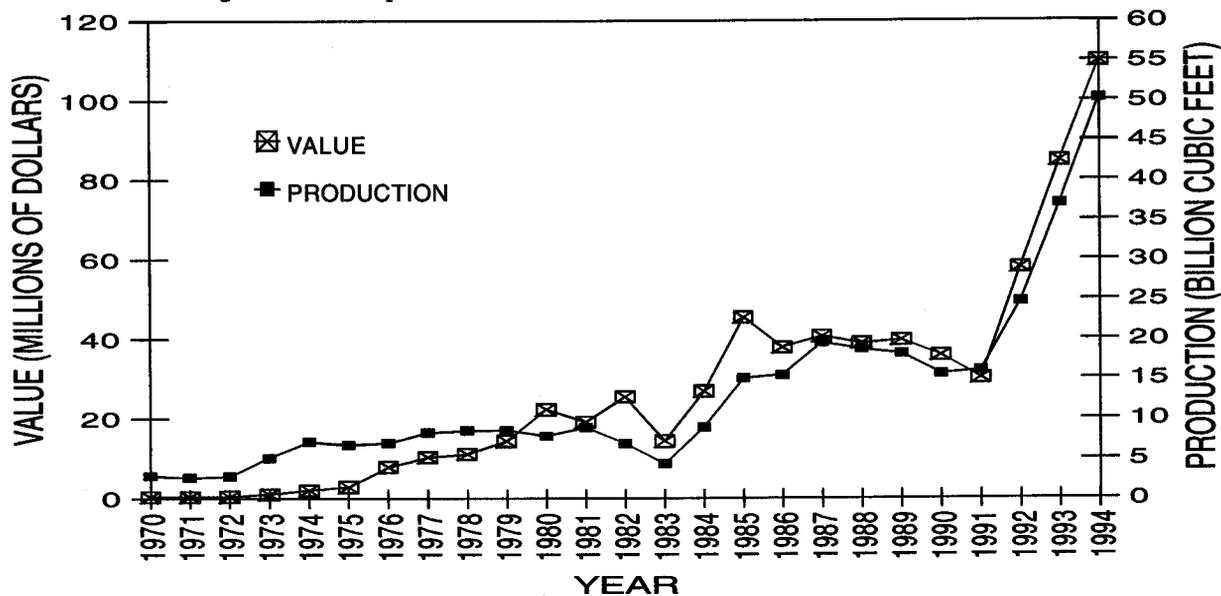


Figure 4. Trend in natural gas production and value, 1970-1994.

were completed for underground storage (2.6 percent), and one for waste disposal (0.7 percent). Total footage drilled in 1994 was 460,441 feet (Table 10), a 11.5 percent decrease from 513,782 feet drilled in 1993. Of the 1994 total footage, 224,506 feet were for conventional wells, 218,415 feet were for coalbed methane wells, 16,165 feet were for underground storage wells, and 1,355 feet were for waste disposal. In 1994, the average conventional gas well was drilled 5,475 feet and drilling depth for coalbed methane was 2,004 feet. The county with the most active natural gas and coalbed methane wells drilled was Buchanan with 61, followed by Dickenson with 46, and Wise with 37. Four wells were drilled in Scott County and one in Lee County. Completion zones ranged from the Pennsylvanian Lee Formation to the Mississippian-Devonian Chattanooga Shale. Table 11 provides data on the wells drilled and/or completed in Virginia in 1994.

Buchanan County

Conventional wells: Three conventional gas wells were completed during 1994 with a total footage drilled of 15,434 feet with an average depth drilled of 5,145 feet. Ashland Exploration, Inc. completed one development well in the Glick-Keen Mountain gas field with a total footage of 5,310 feet with an average depth of 5,310 feet. Columbia Natural Resources completed two-development wells during 1994 with a total footage of 10,124 feet and an average depth drilled of 5,062 feet in the Breaks-Haysi and Race Fork gas fields. Formation at total depth in the three wells is the Chattanooga Shale. Completion zones in the Columbia wells are the Chattanooga Shale, Berea Sandstone, and Greenbrier Limestone. The Ashland well was completed in the Berea Sandstone and Greenbrier Limestone.

Coalbed methane wells: Fifty-seven coalbed methane wells were completed during 1994 with a total footage of 109,515 feet; average depth 1921 feet. Of these, Consol., Inc. completed 20 development wells with a total footage drilled of 40,712 feet; average depth 2,036 feet. Consol., Inc. also completed one waste disposal well for fluids produced during their coalbed methane operations.

Island Creek Coal Company completed six development wells and one exploratory well. The total development footage was 12,323 feet; average depth 2,045 feet and the exploratory well footage was 1,703 feet. Pocahontas Gas Partnership completed twenty-eight development wells with a total footage of 50,202 feet; average depth 1,793 feet. Equitable Resources Exploration completed two development wells during 1994. Total footage drilled was 4,575 feet; average depth 2288 feet. Two of the Equitable wells were drilled to the Mississippian Bluestone Formation and the other 55 wells were drilled into the Pennsylvanian Pocahontas Formation. Fifty-six of the wells were completed in the Glick-Keen Mountain gas field. One was completed in the Lucky Branch gas field and one in an unnamed gas field in the Prater 7.5-minute quadrangle. Gas production in the wells is by commingling of gas from coal beds and associated strata in the Lee and Pocahontas Formations.

Dickenson County

Conventional wells: Eight development and one exploratory wells were completed during 1994. Equitable Resources Exploration completed six development wells in the Nora gas field. Total footage drilled in these wells was 28,652 feet; average depth 4,775 feet. Formation at total depth in the six wells is the Chattanooga Shale. One well was completed in the Berea Sandstone, one in the Berea Sandstone and Price Formation, three were completed in the Berea Sandstone and Chattanooga Shale and one well was not stimulated.

Coalbed methane wells: Equitable Resources Exploration completed thirty-eight development wells and one exploratory well during 1994. Development footage was 88,075 feet; average depth was 2,318 feet and exploratory footage was 2,379 feet. All the wells were completed in the Nora gas field. Formation at total depth for eight of the wells is the Mississippian Bluestone Formation and the remaining 30 wells were in the Pennsylvanian Pocahontas Formation. Gas production in the wells is by commingling of gas from coal beds and associated strata in the Lee and Pocahontas Formations.

Lee County

Conventional wells: AMVEST Oil and Gas Company, Inc. drilled one exploratory well to 5,805 feet into the Wildcat Valley Sandstone during 1994 in the Pennington Gap area. The Chattanooga Shale, Price Formation, and Greenbrier Limestone were stimulated. The well will be completed in early 1995.

Russell County

Coalbed methane wells: Equitable Resources Exploration completed one development well in the Skeen Creek gas field

with a total depth of 1995 feet. Formation at total depth is the Pocahontas Formation. Gas production in the well is by commingling of gas from coal beds and associated strata in the Lee and Pocahontas Formations.

Scott County

Underground Storage: The Early Grove Gas Storage Project remained fully operational during 1994. Virginia Gas Company completed four development wells in the Early Grove field. Total footage drilled was 16,165 feet; average depth 4,041 feet. Formation at total depth is the Mississippian Price Formation.

Wise County

Conventional wells: Equitable Resources Exploration completed 29 development wells during 1994. Two of these wells were drilled in 1993. Total footage drilled was 155,273 feet; average depth was 5334 feet. Nine of the wells were completed in the Nora gas field with a total footage of 50,431 feet; average depth was 5,603 feet. Ten wells were completed in the Roaring Fork gas field with total footage of 56,226 feet; average depth 5,623 feet. Seven wells were completed in the High Knob gas field with total footage of 33,002 feet; average depth was 4,714 feet. The remaining three gas wells had a total footage of 15,614 feet with an average depth of 5,205 feet. Formation at total depth in all of the wells is the Chattanooga Shale.

Coalbed methane wells: Equitable Resources Exploration completed 12 development wells with a total footage of 30,940 feet; average depth was 2,578 feet. Four of the wells were completed in the Nora gas field with a total footage of 10,929 feet; average depth was 2,732 feet. The remaining eight wells were completed in the Roaring Fork gas field. Total footage drilled in the Roaring Fork field was 20,011 feet; average depth was 2501 feet. Gas production in the wells in the Nora gas field is by commingling of gas from coal beds and associated strata in the Lee and Pocahontas Formations. Gas production in the wells in the Roaring Fork gas field is by commingling of gas from coal beds and associated strata in the Lee and Norton Formations.

INDUSTRIAL AND METALLIC COMMODITIES

CEMENT

Three companies produce cement in Virginia. One million and twenty-five thousand short tons of portland cement were produced for a value of \$54,666,000. Roanoke Cement Company operates a plant in western Botetourt County and manufactures portland cement from locally mined limestone and shale and purchased iron scale from Roanoke Electric Steel Company. Calcium-and iron-aluminate-clinker is manufactured in five coal-fired kilns and ground into cement. Three-fourths of the cement is sold to ready-mix companies. The

Riverton Corporation in Warren County produced masonry cement at its plant north of Front Royal. There, crushed limestone (Edinburg Formation) is calcined, hydrated, and mixed with portland cement from out-of-state sources to produce the masonry cement sold to building supply dealers in Virginia and surrounding states. LaFarge Calcium Aluminate, Inc. operated a cement manufacturing plant in the City of Chesapeake using imported cement clinker from France. The clinker was ground and made into six types of calcium aluminate cement at the facility. The advantages of this cement include rapid hardening, resistance to wear and corrosion and it can be used under a wide range of temperatures.

CLAY MATERIALS

Residual and transported clay, weathered phyllite and schist, and shales are used as raw material to produce bricks in Virginia. About 959,001 short tons of clay (exclusive of fuller's earth) was produced in Virginia in 1994 (Figure 5). The annual total capacity of all brick plants in the Commonwealth is almost one-half-billion bricks. The clay-material industry in the western part of the state mines Paleozoic-age shale primarily to produce face-brick. Face-brick producers, in the central-to-eastern part of Virginia, mine Triassic-age shale and clay residuum in Orange and Prince William Counties. They also mine PreCambrian-age schist and residual and transported clay in Amherst, Brunswick, Chesterfield, and Greensville Counties (Figure 6).

Lightweight aggregate is produced in Buckingham and Pittsylvania Counties. Solite Corporation, in northern Buckingham County, uses the Arvonite Slate to produce lightweight aggregate. Virginia Solite Company mines Triassic-age shale southwest of Danville in Pittsylvania County, to produce a similar product.

Bennett Mineral Company, in the Walkerton area of King and Queen County, in eastern Virginia, mines and processes montmorillonite clay to produce an industrial and sanitary absorbent. The facility uses wood waste as a fuel to dry the clay in a rotary kiln. Virginia Clay Co., Inc., in King William

County, received approval during the year from the county to construct a plant to produce cat litter.



Figure 6. Schist pit, near Winterpock, Chesterfield County, of Riverside Brick and Supply Company.

CONSTRUCTION SAND AND GRAVEL

Construction sand and gravel producers accounted for 8.05 million short tons of material in 1994 at a value of more than 33 million dollars (Figure 7). The value of construction sand and gravel production was 20.6 percent lower than in 1993. Sand and gravel is extracted from river terraces and dredged from the rivers in eastern, central, and western Virginia (Figure 8). Some construction sand is also produced from Carroll, Craig, Rockbridge, Smyth, and Warren Counties in the western part of the State, in the Blue Ridge and Valley and Ridge provinces. Large tonnages of construction sand and gravel, from southeast of Fredericksburg, are shipped by rail in the northern Virginia-Washington, D.C. market area. A large portion of the production by the Tidewater Quarries, Inc. and Tarmac Mid Atlantic, Inc., near Richmond is barged down the James River to the Norfolk area. Shipments are

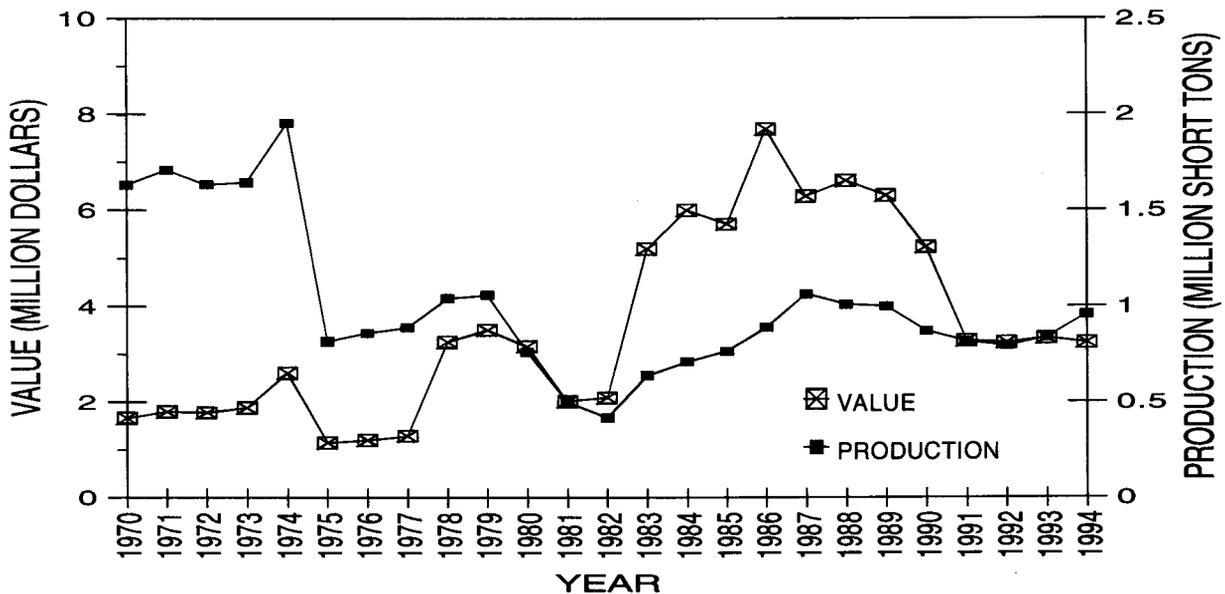


Figure 5. Trend of clay material production and value, 1970-1994.

Riverton Corporation in Warren County produced masonry cement at its plant north of Front Royal. There, crushed limestone (Edinburg Formation) is calcined, hydrated, and mixed with portland cement from out-of-state sources to produce the masonry cement sold to building supply dealers in Virginia and surrounding states. LaFarge Calcium Aluminate, Inc. operated a cement manufacturing plant in the City of Chesapeake using imported cement clinker from France. The clinker was ground and made into six types of calcium aluminate cement at the facility. The advantages of this cement include rapid hardening, resistance to wear and corrosion and it can be used under a wide range of temperatures.

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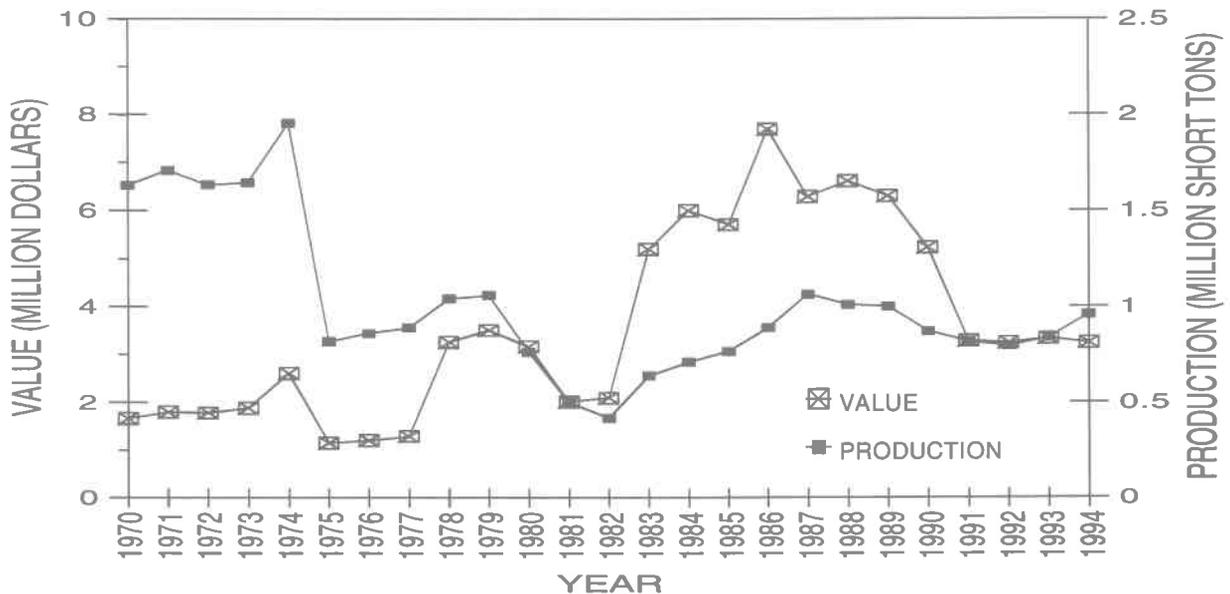


Figure 5. Trend of clay material production and value, 1970-1994.

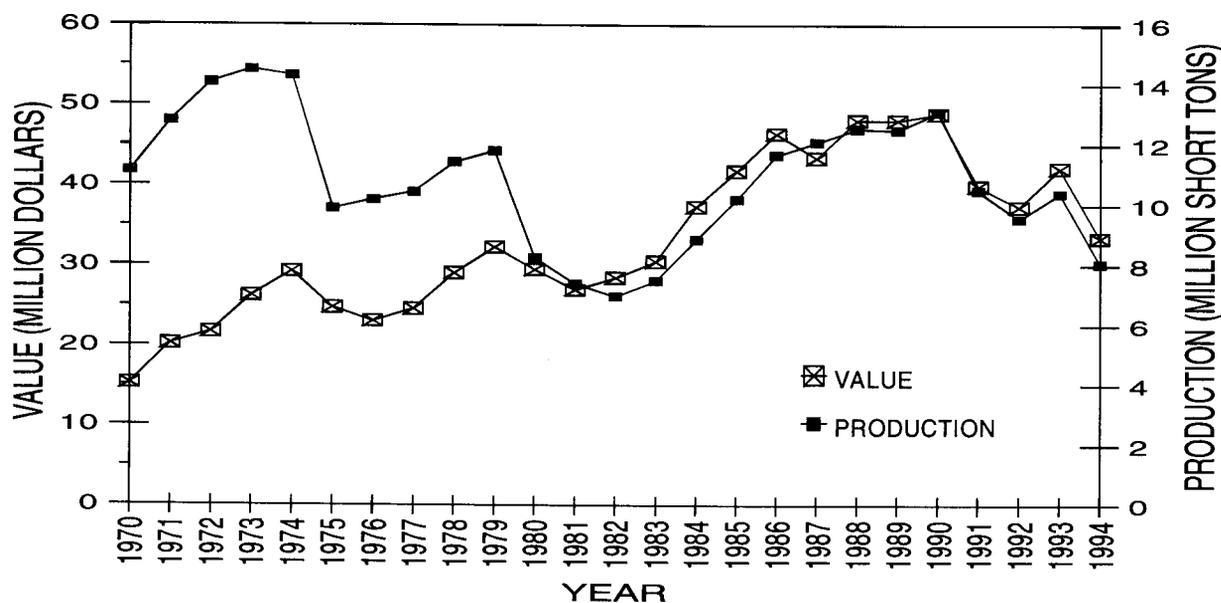


Figure 7. Trend of sand and gravel production and value, 1970-1994.

also made by rail and truck to the western part of the Commonwealth. Construction sand (concrete and masonry) is also produced from operations that crush and process sandstone.

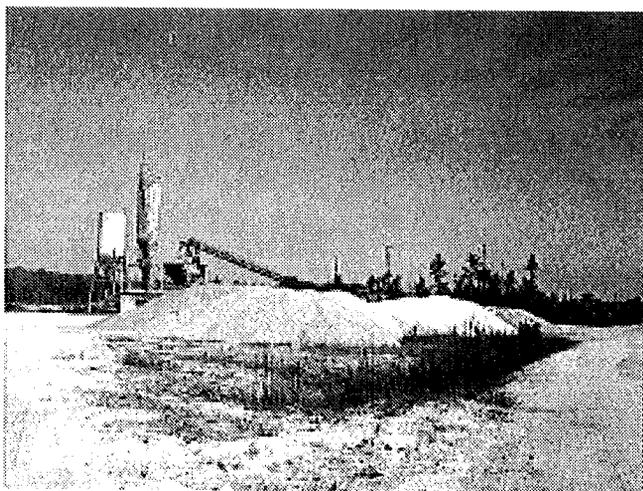


Figure 8. Plant of Custom Sand and Gravel, along the Chickahominy River, south of Providence Forge, in Charles City County.

CRUSHED STONE

Almost fifty-seven million tons of crushed stone including limestone, dolomite, sandstone, quartzite, granite, gneiss, diabase, basalt, greenstone, slate, "Virginia aplite," and marble, was produced in Virginia in 1994 (Figure 9). Virginia's crushed stone was valued at more than 327 million dollars and it was the sixth leading producer in the United States. Crushed stone production figures for 1994 in Virginia were 5.3 percent higher than the final figures for 1993.

Producers of limestone, dolomite, shale, sandstone, and quartzite are in the Valley and Ridge and Appalachian Plateau provinces in the western part of the Commonwealth. Principal end uses for these commodities were for roadstone, con-

crete aggregate, asphalt stone, and agricultural application. Mine safety dust is produced in southwest Virginia from limestone. Safety dust is used in coal mines to coat the roof, walls, and floor to prevent coal dust explosions. The safety dust should contain less than 5 percent SiO_2 and 100 percent should pass 20 mesh, with 70 percent passing minus 200 mesh. Several operations also market finely-ground dolomite and limestone for use as a filler material.

Shale is excavated in Frederick and Rockingham Counties for use in local roadstone and fill material. Sandstone and quartzite are quarried in Carroll, Culpeper, Pittsylvania, Rockbridge, and Wythe Counties for production of roadstone, concrete aggregate, asphalt stone, and manufactured fine aggregate.

Granite, gneiss, diabase, slate, and marble are quarried in the central part of Virginia (Figure 10). Major uses of these materials are for roadstone, concrete aggregate, and asphalt stone. The Solite Corporation crushes slate for lightweight aggregate near Arvonnia in Buckingham County. LeSueur-Richmond Slate Corporation increased production of crushed slate, as a by-product of dimension slate operations, for local highway construction. Appomattox Lime Company, Inc. mines marble (Mt. Athos Formation) near Oakville in Appomattox County for agricultural lime.

Fines produced at granite quarries in the Petersburg and Red Oak Granites, in the southern part of Virginia have been used for low-grade fertilizer. Chemical analyses of these granitic materials from Brunswick and Nottoway Counties in the southern Piedmont province, show a K_2O (potash) content higher than 10 percent. Potassium-aluminum feldspars (orthoclase and microcline), common in igneous and metamorphic rocks, release potassium upon weathering. Additional uses for these fines are for roads, bedding for concrete pipe, and for warning tracks for baseball fields, etc.

DIMENSION STONE

Slate, diabase, quartzite, and soapstone were quarried for

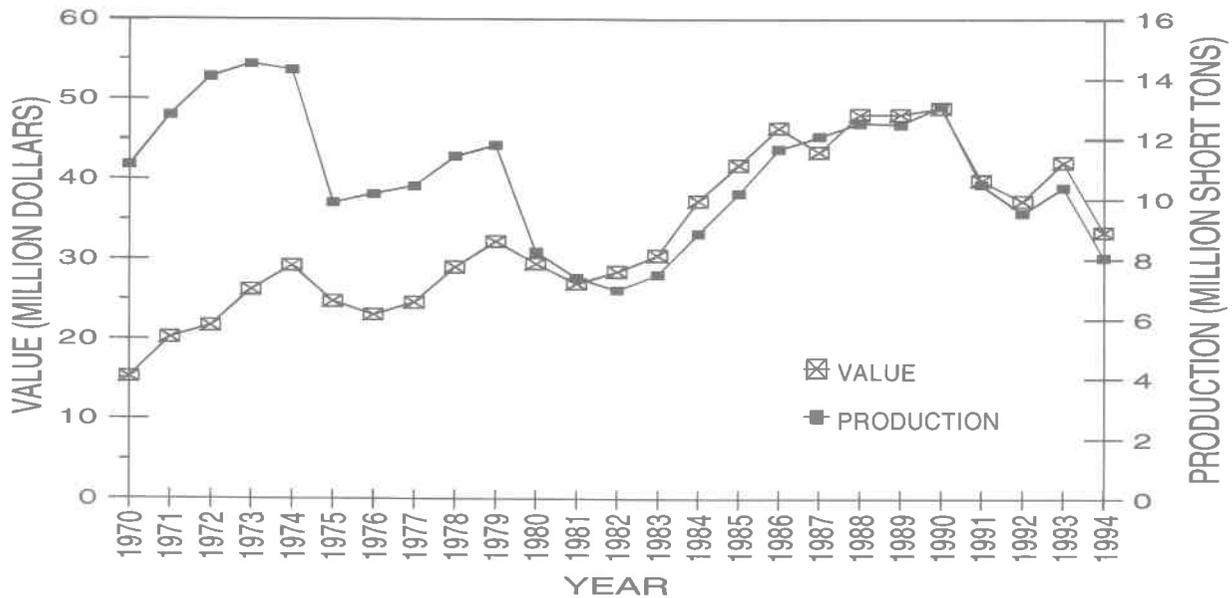


Figure 7. Trend of sand and gravel production and value, 1970-1994.

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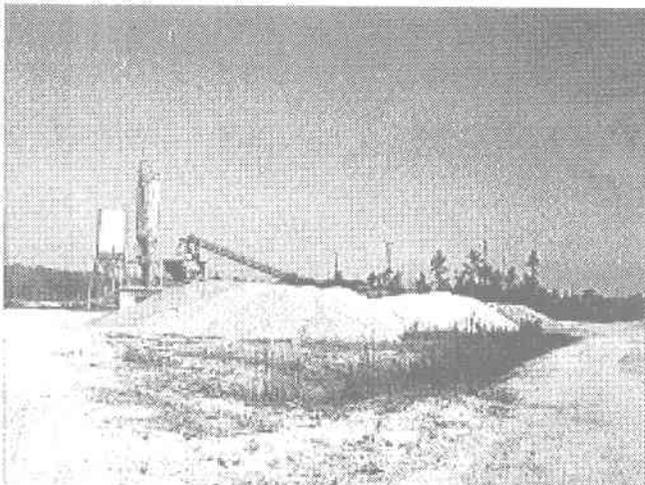


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crete aggregate, asphalt stone, and agricultural application. Mine safety dust is produced in southwest Virginia from limestone. Safety dust is used in coal mines to coat the roof, walls, and floor to prevent coal dust explosions. The safety dust should contain less than 5 percent SiO_2 and 100 percent should pass 20 mesh, with 70 percent passing minus 200 mesh. Several operations also market finely-ground dolomite and limestone for use as a filler material.

Shale is excavated in Frederick and Rockingham Counties for use in local roadstone and fill material. Sandstone and quartzite are quarried in Carroll, Culpeper, Pittsylvania, Rockbridge, and Wythe Counties for production of roadstone, concrete aggregate, asphalt stone, and manufactured fine aggregate.

Granite, gneiss, diabase, slate, and marble are quarried in the central part of Virginia (Figure 10). Major uses of these materials are for roadstone, concrete aggregate, and asphalt stone. The Solite Corporation crushes slate for lightweight aggregate near Arvon in Buckingham County. LeSueur-Richmond Slate Corporation increased production of crushed slate, as a by-product of dimension slate operations, for local highway construction. Appomattox Lime Company, Inc. mines marble (Mt. Athos Formation) near Oakville in Appomattox County for agricultural lime.

Fines produced at granite quarries in the Petersburg and Red Oak Granites, in the southern part of Virginia have been used for low-grade fertilizer. Chemical analyses of these granitic materials from Brunswick and Nottoway Counties in the southern Piedmont province, show a K_2O (potash) content higher than 10 percent. Potassium-aluminum feldspars (orthoclase and microcline), common in igneous and metamorphic rocks, release potassium upon weathering. Additional uses for these fines are for roads, bedding for concrete pipe, and for warning tracks for baseball fields, etc.

DIMENSION STONE

Slate, diabase, quartzite, and soapstone were quarried for

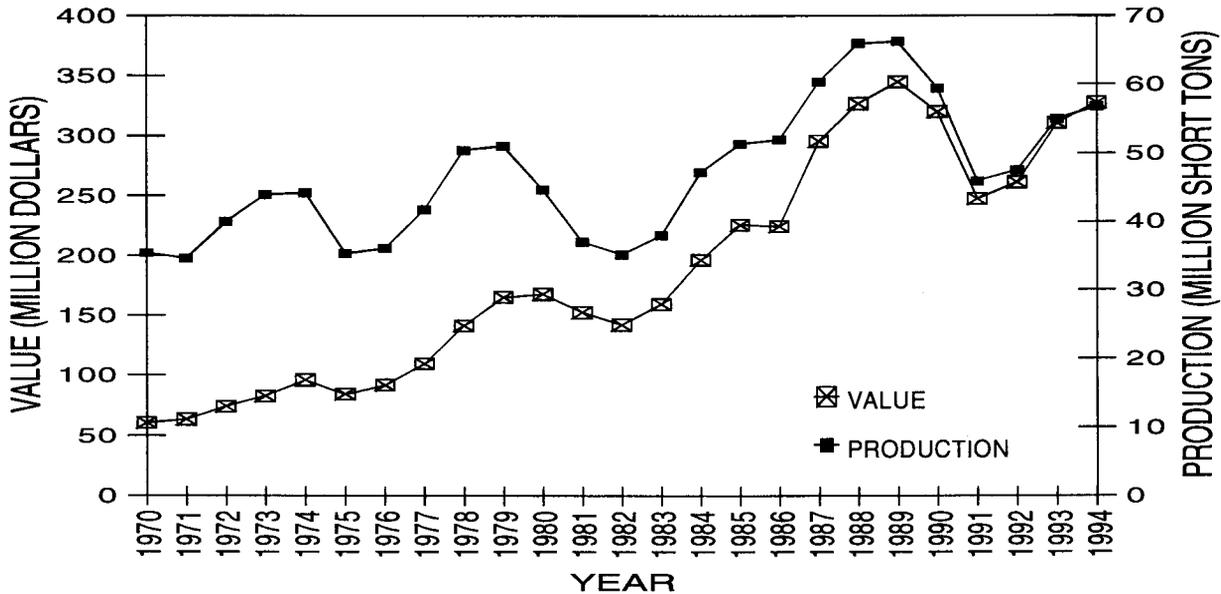


Figure 9. Trend of crushed stone production and value, 1970-1994.

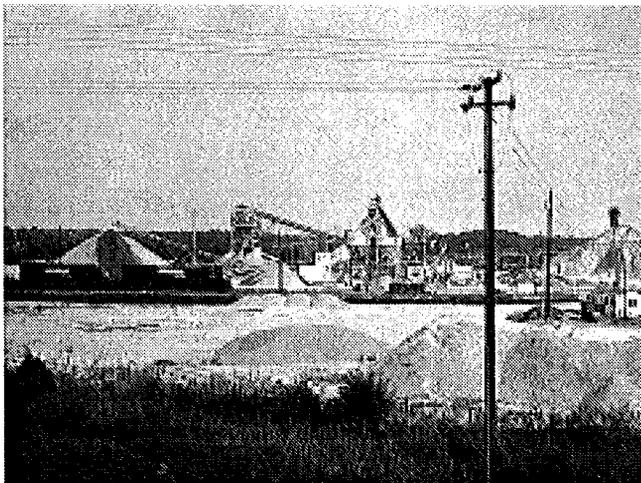


Figure 10. Crushed granite quarry and plant (Jack Stone) of Tarmac America, Inc., Dinwiddie County.



Figure 11. Dimension diabase facility of New England Stone, Culpeper County.

dimension stone in the Piedmont province in 1994. Slate was the leading type of dimension stone quarried, as to cubic feet and value; LeSueur-Richmond Slate Corporation mines slate from two quarries in the Arvonias area of Buckingham County. Arvonias slate production dates from the late 1700s when slate was quarried for use as roofing shingles for the state capital in Richmond. Slate producers supply the building trade with a variety of products ranging from material for exterior applications, such as roofing shingles and for flooring tile, hearths and sills. Diabase is produced by New England Stone in southern Culpeper County for use as monument stone (Figure 11). Quartzite, used as flagging material, was extracted from the Mower Quarry in Fauquier County, north of Warrenton. The new Alberene Stone Company, Inc. began quarrying soapstone at Alberene in Nelson County in 1988. They opened a new quarry site in late 1989 in Albemarle County, just north of the Alberene site. Their products include soapstone fireplaces, fireplace facings, wood stoves, cooking ware, and other products made of solid soapstone.

FELDSPAR

The Feldspar Corporation, which U.S. Silica Corporation acquired for \$5.5 million in November 1993, operates a mine and plant near Montpelier in Hanover County in east-central Virginia. They produce a feldspar-rich material marketed as "Virginia aplite," which they sell to the glass industry. The "aplite" improves the work-ability of the molten glass and imparts a chemical stability to the finished glassware. Feldspar is mined from medium-to coarse-grained meta-anorthosite by open pit methods. The rock is trucked to the plant next to the mine for crushing, grinding, classifying, and drying. After processing, the aplite is stored in silos. Gravity concentration removes clay minerals. Electrostatic and magnetic processes remove the heavy minerals (ilmenite, rutile, and sphene) in the feldspar. These minerals contain titanium and were stockpiled until the early 1980s, but are currently being placed in settling ponds. The processed feldspar is shipped by truck and rail to markets in New Jersey, Pennsylvania, Ohio, Indiana and Virginia.

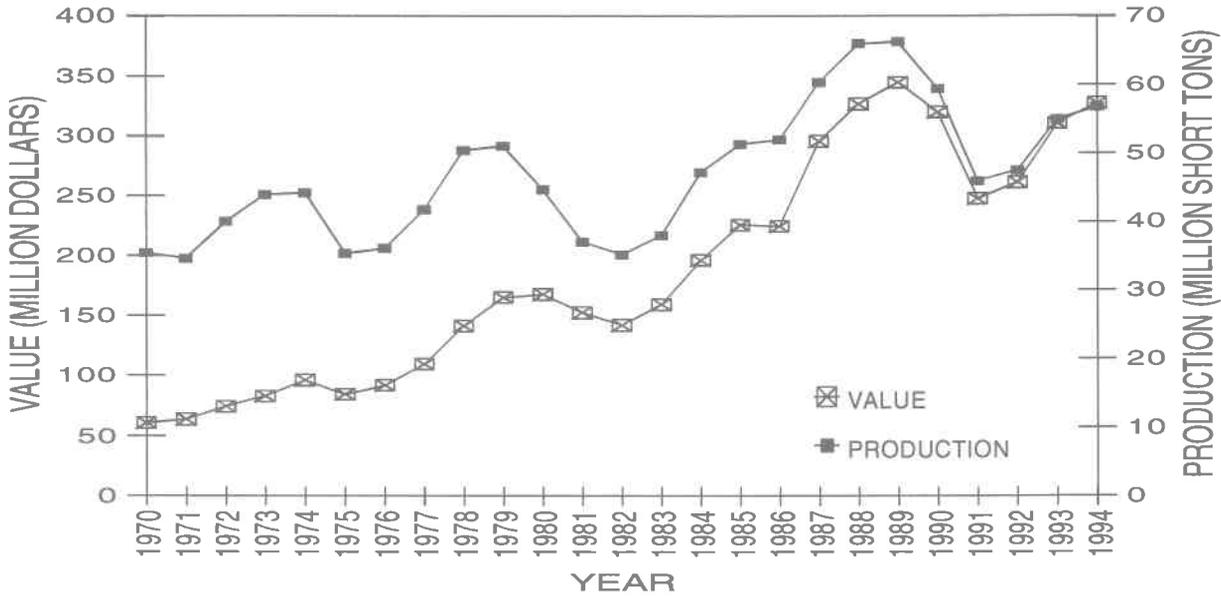


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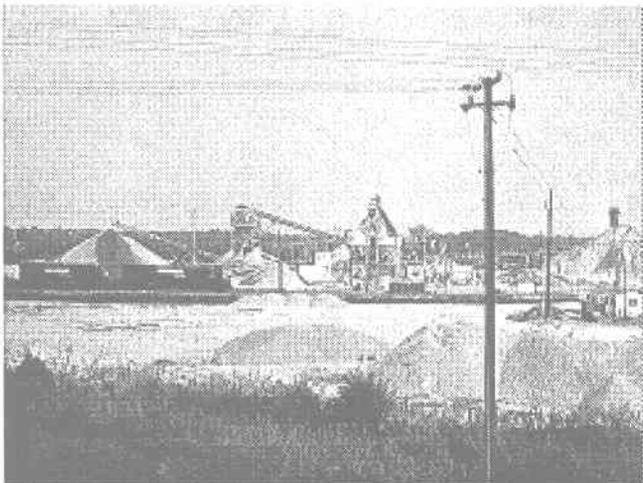


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In Amherst County, feldspar is marketed as aggregate at the Piney River Quarry of the W.W. Boxley Company, Blue Ridge Stone Corporation. The company stockpiles the fines that result from the crushing of the feldspar. In the past, feldspar was mined from several pegmatite bodies in the Piedmont province including those pegmatites in Amelia and Bedford Counties.

Clay and silt, with a high percentage of kaolinite and mica, has accumulated in settling ponds at the Feldspar Corporation operation in Hanover County. About 75,000 to 100,000 tons of this material are added to settling ponds per year. The waste "tailings" was evaluated in the mid-1960s and were found suitable for use in face brick and drain tile; the material fires dark brown to gray.

GEMSTONES

In 1994, mineral collectors and mining operations in Virginia produced natural gemstones. The Morefield pegmatite, operated by Piedmont Mining Company in Amelia County, is open to the public for collecting on a fee basis. Blue-green amazonstone, beryl, topaz, tantalite, tourmaline, and zircon are some minerals found in this pegmatite. The company also mines and sells "hand picked" mica. Stone Cross Mountain operated a fee basis collecting operation north of Stuart, Patrick County in southern Virginia, for mica pseudomorphs after staurolite crystals (fairy crosses). However the operation closed in 1994.

GYPSUM

U.S. Gypsum Company operates an underground mine and plant at Locust Cove, Smyth County in the southwestern part of Virginia and a processing plant in Norfolk in the eastern part of the state. The Locust Cove Mine is a slope-entry, multilevel operation. Isolated masses of gypsum in the Maccrady Formation are mined by a modified stoping system. After being run through a primary crusher, the gypsum is trucked to their processing plant at Plasterco, near Saltville, in adjacent Washington County. At Plasterco, the gypsum is ground into "land plaster" ($\text{CaSO}_4 + 2\text{H}_2\text{O}$). The material is calcined to remove the water and produce "stucco." Water is then added to the stucco with additional ingredients (sugar and starch) and poured, molded and dried between sheets of paper to produce a wallboard. Eighty-three different kinds of wallboard are produced at Plasterco; average daily production at the plant could supply the needs in constructing 80 three-bedroom homes.

The Norfolk plant processes crude gypsum from Little Narrows and Windsor, Nova Scotia to produce wallboard and other gypsum-based products. The plant also produces a fertilizer (landplaster) as a soil conditioner for the peanut industry. The Norfolk facility receives a few shipments of anhydrite from Nova Scotia for sale to cement manufacturers. The anhydrite is used as a source of sulfur in producing cement clinker.

INDUSTRIAL SAND

Unimin Corporation produces glass sand near Gore in Frederick County from the Ridgely Sandstone of Devonian-age. CED Enterprises, in Frederick County, recrystallizes purchased sand in a rotary kiln to produce cristobalite, which is sized and bagged on the site. The product is marketed as a fine grit, and used mainly as a filler in paint and in commercial casting molds. It is trucked to the Great Lakes area and to the western United States. Some is shipped overseas through the Port of Baltimore.

IRON-OXIDE PIGMENTS

Virginia is one of four states that produce pigments from natural iron-oxide. Hoover Color Corporation, in Hiwassee, Pulaski County, produces ocher, umber, and sienna. The Company is the only operation in the United States producing sienna. Raw materials are mined by open pit methods from deposits near the contact of the Erwin Formation with the overlying Shady Dolomite. Deposits, which may be associated with gossans in Cambrian-age rocks, are concentrated as small bodies or pockets composed of insoluble clay and iron oxide. Precipitation from ground-water also concentrates some iron oxide. The raw material is trucked to the company plant at Hiwassee where it is pulverized, dried, ground, air separated, blended, and packaged before shipping. The finished product is used as a coloring agent in a variety of products. The largest market continues to be for paint; additional markets are art supplies (crayons, chalk, water colors) and building products (colored cinder blocks and bricks). The pigments are shipped throughout the United States, Canada, and Mexico. Virginia Earth Pigments Company mines a small quantity of iron oxide from the Brubaker #1 mine in southeastern Wythe County. Most of this material is sold to the Hoover Color Corporation.

KYANITE

Kyanite, an aluminum silicate, was first produced in Prince Edward County in the 1920s. Virginia is the only state producing kyanite since September 1986. Kyanite Mining Corporation produces most of the world's kyanite from its deposit in Buckingham County. The company produces a concentrate with a maximum of 61.8 percent alumina and a minimum iron content of 0.16 percent. The kyanite is converted to mullite by calcining at temperatures greater than 3000 degrees Fahrenheit. Mullite is a superduty refractory with a pyrometric cone equivalent of 36 to 37. Products, which are sold in 35, 48, 100, 200, and 325 mesh sizes are used in the refractory, ceramic, glass, metallurgical, and foundry industries. Mullite aids ceramics and glass to resist cracking, warping, slagging, and deforming at high temperatures.

Kyanite Mining Corporation operates two surface mines and three processing plants in Central Buckingham County, one is at Willis Mountain, one is at East Ridge, and one is north of Dillwyn. At the Willis Mountain and East Ridge mines, kyanite-bearing quartzite is quarried from open pits;

this material is run through primary crushers, a log washer to remove clay, and onto classifiers to remove kyanite. The material then passes through a rod mill, which reduces it to a minus 35-mesh size, and through froth flotation cells where additional kyanite is skimmed off. The kyanite is dewatered and dried; the high temperature of the drier converts any sulphide minerals that are present to magnetic oxides. Pyrite is converted to ferrous iron oxide (Fe₃O₄) or magnetite, which is then removed by magnetic separators and stockpiled.

The Willis Mountain plant processes the raw kyanite, some of which is then trucked to the East Ridge facility for calcining; the mullite product is ground and bagged at the company's Dillwyn Plant. Raw kyanite is ground and bagged at Willis Mountain.

Approximately 40 percent of the production is shipped through ports at Hampton Roads to customers worldwide. Most of the mullite and kyanite shipped from the port at Norfolk is destined for Japan, Korea, United Kingdom, Netherlands, Italy, and Australia. The company also markets sand as a by-product from the processing of kyanite. This sand is used for golf courses, masonry and concrete sand, and for applications such as sand for blasting.

LIME

Virginia's lime production is from six companies in Frederick, Giles, Shenandoah, and Warren Counties. Production in 1994 was 742,000 short tons valued at more than 40.1-million dollars (Figure 12). The paper industry uses lime for regeneration of sodium hydroxide and for neutralization of sulphate water. Lime is used for water purification and in iron furnaces to remove impurities. During the last few years, lime has been used to neutralize acid mine water. It is also used for masons' lime, sewage treatment, and agriculture purposes. One of the most important uses in the 1990s will be to abate the SO₂ and NO_x emission from coal-fired boilers. Lime is presently supplied to several cogeneration coal-fired plants in southern Virginia. Two companies, in northwestern Virginia, W.S. Frey Company, Inc. and Chemstone Corporation

quarry and calcine the high-calcium New Market Limestone. The Riverton Corporation, in Warren County, quarries and calcines limestone from the Edinburg Formation. Shenvalley Lime Corporation in Stephens City, Frederick County purchases quicklime and produces a hydrated lime. Two companies in western Giles County, APG Lime Corporation and East Ridge Lime Company, operate underground mines in the Five Oaks Limestone. Both companies calcine the limestone in rotary kilns. Principal sales are to the paper and steel industries.

Lime kiln dust collected from the baghouse at the APG Lime Corporation, is presently marketed to neutralize and stabilize coal refuse from preparation plants in West Virginia.

LITHIUM

At its Sunbright plant in Scott County, Cyprus Foote Mineral Company processes lithium carbonate (derived from brines in Nevada) with calcium hydroxide (from Virginia sources) to produce lithium hydroxide. Some lithium carbonate is also imported from Chile into the port at Charleston, South Carolina and transported in bulk bags by truck to Sunbright. Lithium hydroxide is used in multipurpose grease. In the past, limestone from an underground mine at the Sunbright site was used in the manufacturing process and a calcium carbonate precipitate was formed as a waste product. This material remains on the site. The approximate analysis of the material is 43 to 50 percent CaCO₃, 3 to 6 percent Ca(OH)₂, and 40 to 80 percent H₂O.

MANGANESE

Eveready Battery Company, Inc., operates a manganese processing facility in the City of Newport News. Manganese ore, imported from Ghana, Africa and Mexico, is shipped to the Elizabeth River terminals in the City of Chesapeake. The ore is trucked to the processing plant. Manganese content and potential contaminants are monitored through continual chemical and mineralogical analyses. The manganese is dried in a

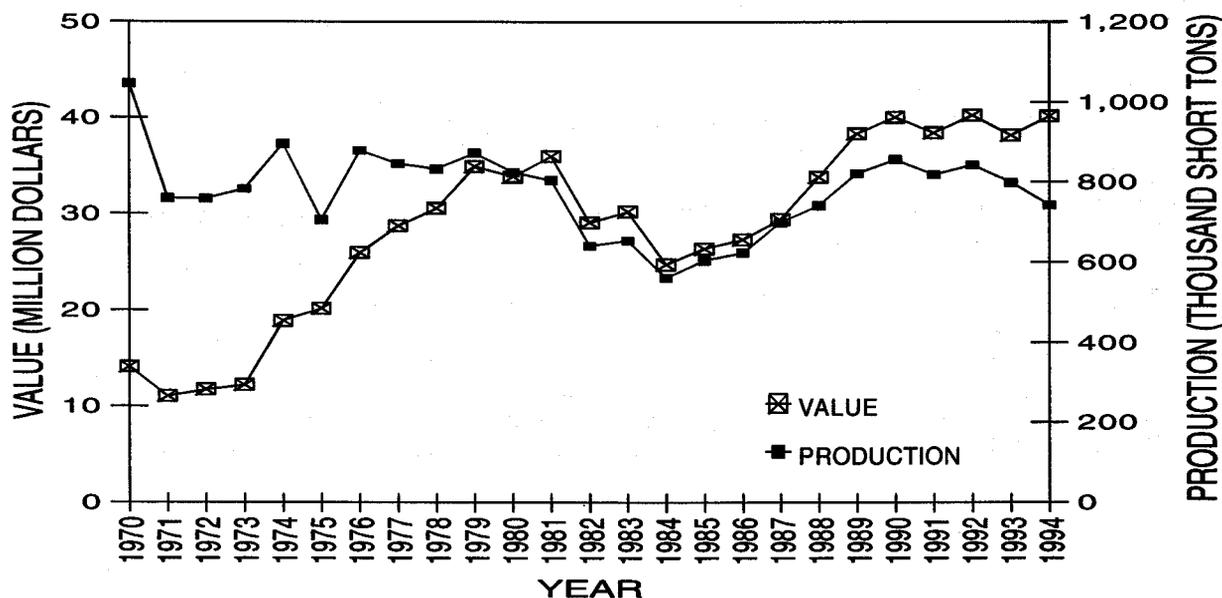


Figure 12. Trend in lime production and value, 1970-1994.

gas-fired rotary kiln and crushed with jaw and ball crushers into two basic sizes. Ground product is then shipped in bulk, bulk bags, or in bags to plants in Iowa, Ohio, and North Carolina. The product is used in the manufacture of dry cell batteries.

MICA

Presently no domestic mica is being produced, although it has been produced in the past from pegmatite bodies in several counties in Virginia, including Amelia, Henry, and Powhatan. Plate mica is marketed for use in hair dryers and other electrical applications; reconstituted mica, comprised of built-up mica plates, is used to manufacture mica washers for terminals and as shields in lithium batteries. Asheville Mica Company, an affiliate of the Mica Company of Canada, imports several grades of crude mica from Madagascar and India, then processes the mica in Newport News, Virginia. The Asheville Mica Company also produces fabricated plate-mica; Mica Company of Canada uses splittings from Asheville Mica Company to produce reconstituted plate mica.

ORNAMENTAL AGGREGATE

Dolomite and quartzite from Botetourt and Rockbridge Counties are marketed as exposed-aggregate materials. Rock materials, such as black limestone (Edinburg Formation) from the Valley and Ridge province and greenstone from the Piedmont province, have been used as aggregate for terrazzo. Exposiac Industries, Inc. in Spotsylvania County uses a variety of rock materials for exposed panels, including greenstone from Albemarle County and Triassic-age sandstone from Culpeper County.

Many rock types have been used in the past for ornamental aggregate. Vein quartz was quarried in Albemarle, Buckingham, Fauquier, Fluvanna, Greene, and Rappahannock Counties, and quartz pebbles were extracted from floodplain deposits along the Mattaponi River in Caroline County.

PERLITE

Manville Sales Corporation operates a plant at Woodstock in Shenandoah County to expand perlite (volcanic glass with high water content and "onion" skin appearance) obtained from Taos, New Mexico. Raw material is trucked north from Taos County to the railhead at Antonito, Colorado, where it is loaded and shipped by rail to Virginia. Expanded perlite is used in the manufacture of roof insulation board, which is marketed throughout the eastern United States.

PHOSPHATE ROCK

Texas Gulf, Inc. ships phosphate rock by rail from its Lee Creek operation in North Carolina to Glade Spring, Washington County. It is then transported by truck to the Texas Gulf plant in Saltville, Smyth County. A coal-fired rotary kiln is used to defluorinate the phosphate rock. The product is marketed as a poultry and animal feed supplement in southern and midwestern states.

SULFUR

The Claus process recovers elemental sulfur from hydrogen sulphide gas during crude-oil refining by Amoco Oil Company. The refinery is next to the York River, near Yorktown. Crude oil is heated in a furnace and fed under pressure into a cylinder where it vaporizes, expands, and condenses into liquid. Hydrogen sulfide is produced and converted into elemental sulfur, which is marketed for production of sulfuric acid, mainly at E.I. DuPont Company in Richmond, Virginia.

VERMICULITE

Virginia is one of three states that mine vermiculite, a hydrated magnesium-iron-aluminum silicate. Virginia vermiculite, Ltd. operates an open-pit mine and processing facility near Boswell Tavern in Louisa County. The vermiculite is mined with a backhoe and a front-end loader and trucked to the adjacent plant where pieces greater than four inches across are removed. These pieces are washed and processed in a rod mill to shear the vermiculite into thin platelets. Biotite, feldspar, and other impurities are further concentrated and removed by froth flotation. The vermiculite is then dewatered, dried in a kiln, and screened to produce four basic sized products. Most of the crude vermiculite is shipped by rail in unexfoliated form to North Carolina, Ohio, West Virginia, other eastern states, and North Dakota.

Table 2. Summary of metal/nonmetal mining by commodity, 1994.

Commodity	Annual Tonnage	Office Workers	Office Hours	Office Wages	Plant Workers	Quarry Workers	Production Hours	Production Wages
Aplite	508,449.00	9	16,922	\$321,150	28	8	80,251	\$989,731
Basalt	765,683.00	2	4,570	\$50,748	0	18	40,536	\$535,264
Clay	380,886.00	6	4,106	\$58,289	0	24	6,389	\$123,236
Diorite	334,543.74	7	10,851	\$196,352	22	9	47,520	\$431,859
Dolomite	1,371,771.00	17	32,369	\$851,327	24	21	102,949	\$1,231,374
Fullers Earth	51,180.00	7	13,520	\$199,725	46	2	94,228	\$782,688
Gemstones	0.00	0	0	\$0	0	1	200	\$0
Gold	0.00	0	156	\$0	0	0	936	\$600
Granite	23,858,363.26	94	192,520	\$2,502,113	280	336	1,434,270	\$17,605,320
Gravel	154,450.00	5	229	\$2,172	0	21	2,896	\$53,445
Greenstone	363,017.00	4	9,556	\$120,563	7	3	25,570	\$238,040
Gypsum	321,999.00	8	16,672	\$290,738	0	66	135,316	\$1,522,148
Iron Oxide	550.00	3	68	\$80	0	2	55	\$2,200
Kyanite	677,475.00	18	36,805	\$1,019,456	126	29	283,672	\$3,444,315
Limestone	19,200,730.47	272	561,174	\$9,532,856	825	587	2,817,489	\$31,914,087
Limonite	346.00	15	21,340	\$561,876	30	0	63,425	\$488,903
Marl	29,321.00	5	11,525	\$165,453	0	9	15,135	\$160,014
Quartz	10,113.16	0	0	\$0	0	1	1,184	\$10,798
Quartzite	1,006,413.00	5	10,911	\$145,245	28	40	118,682	\$1,294,774
Sand	3,832,518.42	95	86,300	\$1,194,796	158	208	409,724	\$3,566,460
Sand & Gravel	9,219,690.37	67	89,276	\$1,280,549	173	184	632,045	\$7,193,798
Sandstone	1,210,074.00	10	17,723	\$210,860	31	18	92,402	\$885,689
Shale	723,607.00	71	125,625	\$1,989,529	337	55	716,259	\$5,933,914
Slate	475,737.00	28	53,323	\$903,467	148	19	308,839	\$2,388,561
Soapstone	200.00	7	10,912	\$128,274	3	0	6,381	\$56,843
Titanium	674.00	3	1,220	\$20,600	2	1	862	\$7,968
Trap rock	12,432,257.00	43	92,431	\$1,713,979	77	192	595,336	\$9,318,440
Vermiculite	40,270.00	5	12,230	\$198,600	13	7	44,780	\$460,500
Total	76,970,318.42	806	1,432,334	\$23,658,797	2,358	1,861	8,077,331	\$90,640,969

Table 3. Summary of metal/nonmetal mining by county/city, 1994.

County/City	Annual Tonnage	Office Workers	Office Hours	Office Wages	Plant Workers	Quarry Workers	Production Hours	Production Wages
Accomack	99,956.00	3	89	\$3,559	0	11	5,010	\$42,641
Albemarle	1,280,223.00	5	11,927	\$129,311	12	23	73,415	\$885,201
Amelia	159,442.00	2	2,268	\$27,216	7	1	2,720	\$181,766
Amherst	356,622.00	3	6,049	\$88,150	5	3	20,533	\$187,093
Appomattox	234,070.00	5	6,237	\$33,932	9	8	35,897	\$377,283
Augusta	1,772,835.74	11	21,705	\$246,766	25	48	126,376	\$1,369,675
Bedford	1,025,193.03	10	19,794	\$280,795	23	13	73,388	\$686,079
Bland	110,330.00	1	2,267	\$22,561	7	3	19,331	\$152,119
Botetourt	2,294,349.00	53	97,992	\$2,425,823	195	43	480,434	\$7,034,656
Brunswick	1,752,191.00	35	72,956	\$1,162,578	263	16	605,563	\$5,308,053
Buckingham	964,580.00	32	65,247	\$1,533,443	230	48	517,034	\$5,109,410
Campbell	1,953,030.79	16	27,609	\$377,273	25	18	99,226	\$1,013,414
Caroline	1,292,652.25	12	17,150	\$212,659	31	12	58,000	\$573,429
Charles City	454,779.00	6	4,527	\$59,095	13	11	26,278	\$334,233
Charlotte	42,231.01	0	0	\$0	7	0	4,250	\$38,900
Chesapeake	745,699.04	11	20,647	\$196,492	4	32	26,634	\$232,579
Chesterfield	1,124,757.00	9	10,531	\$189,565	21	37	92,634	\$1,016,433
Clarke	157,084.00	2	2,693	\$22,304	4	8	23,343	\$210,922
Craig	124,597.12	2	2,462	\$47,594	5	5	24,300	\$184,430
Culpeper	671,388.00	10	15,056	\$149,919	11	24	69,240	\$782,446
Danville City	12,330.00	1	325	\$0	0	1	1,940	\$0
Dinwiddie	813,930.00	10	16,012	\$213,327	14	11	38,522	\$482,268

Table 3. Continued.

County/City	Annual Tonnage	Office Workers	Office Hours	Office Wages	Plant Workers	Quarry Workers	Production Hours	Production Wages
Essex	18,150.00	1	2	\$0	0	0	60	\$12,100
Fairfax	5,076,842.00	10	23,842	\$296,515	30	58	211,070	\$3,089,112
Fauquier	1,134,098.00	4	6,651	\$92,158	9	21	55,485	\$759,845
Fluvanna	1,932.54	0	0	\$0	0	1	44	\$304
Frederick	2,181,993.00	33	58,345	\$822,358	110	62	319,308	\$3,616,285
Giles	1,144,579.56	23	42,445	\$735,291	135	69	415,352	\$5,105,890
Gloucester	307,772.00	5	2,663	\$16,861	2	6	13,675	\$114,733
Goochland	2,837,792.00	7	16,782	\$175,271	19	48	153,878	\$1,971,109
Grayson	513,266.26	3	4,403	\$30,786	12	8	49,904	\$416,565
Greene	710,587.00	2	4,891	\$56,108	0	15	35,895	\$430,790
Greensville	1,316,293.00	20	39,884	\$621,823	145	11	339,061	\$4,088,135
Hailfax	1,205,351.00	3	6,715	\$91,569	16	10	56,591	\$658,645
Hampton	266,619.90	1	2,080	\$29,380	0	5	7,114	\$74,809
Hanover	2,195,396.00	13	23,451	\$451,038	62	29	180,381	\$2,779,115
Henrico	2,818,170.00	16	22,417	\$257,910	29	60	207,565	\$2,640,708
Henry	1,026,506.74	12	21,966	\$400,196	33	17	101,973	\$1,007,762
Highland	15,720.00	2	1,802	\$19,680	0	2	3,117	\$26,921
Isle of Wright	762,834.00	7	13,551	\$179,762	2	10	20,111	\$197,534
James City	202,568.00	2	0	\$20	0	45	1,742	\$22,109
King and Queen	76,420.00	12	13,773	\$201,765	47	5	97,362	\$816,559
King George	1,432,924.00	5	10,261	\$187,223	22	16	63,235	\$629,403
King William	562,705.00	7	10,374	\$258,508	17	13	61,570	\$612,073
Lancaster	30,465.50	3	261	\$4,759	0	10	1,700	\$8,970
Lee	1,101,677.96	8	11,823	\$124,440	9	40	69,350	\$677,619
Loudoun	6,410,596.00	32	70,583	\$1,441,210	41	115	329,622	\$5,422,177
Louisa	443,500.00	11	21,887	\$348,243	13	31	81,079	\$851,859
Mathews	5,344.00	0	0	\$0	0	1	605	\$0
Mecklenburg	451,398.00	5	8,540	\$72,381	9	15	48,370	\$498,504
Middlesex	61,562.00	3	42	\$295	0	11	3,501	\$20,916
Montgomery	1,410,994.00	11	23,183	\$305,343	15	44	121,614	\$1,022,895
Nelson	807.00	9	10,916	\$128,314	3	2	6,447	\$57,503
New Kent	127,329.00	3	2,618	\$50,090	5	6	10,556	\$108,588
Northampton	44,082.00	1	300	\$2,400	0	8	2,669	\$24,283
Northumberland	13,643.00	8	101	\$2,616	1	9	2,090	\$7,555
Nottoway	703,622.00	1	2,400	\$32,950	0	23	46,668	\$562,387
Orange	64,330.00	2	3,024	\$48,455	0	1	1,512	\$13,964
Page	1,200.00	0	0	\$0	0	1	100	\$300
Pittsylvania	249,126.03	19	25,995	\$394,752	41	6	59,390	\$554,895
Powhatan	755,187.00	1	2,400	\$26,380	0	15	30,293	\$398,730
Prince Edward	0.00	1	1,478	\$15,459	12	0	26,557	\$282,165
Prince George	1,347,364.00	4	9,722	\$119,641	16	19	77,644	\$952,206
Prince William	3,349,973.00	8	12,161	\$169,690	37	23	156,284	\$2,477,225
Pulaski	453,242.00	17	26,222	\$606,813	37	29	106,566	\$870,492
Richmond	7,710.00	2	6	\$0	0	2	30	\$0
Richmond City	2,057,596.00	5	11,485	\$130,096	16	26	109,391	\$1,232,968
Roanoke	1,319,564.00	34	69,700	\$1,459,821	116	20	268,399	\$2,515,586
Rockbridge	470,570.00	11	19,036	\$250,908	4	24	48,637	\$400,431
Rockingham	1,853,356.00	23	44,324	\$589,573	62	68	216,711	\$2,343,095
Russell	1,408,820.00	19	44,149	\$415,978	68	32	210,661	\$1,957,088
Scott	118,694.00	2	30,705	\$35,336	0	17	41,982	\$285,684
Shenandoah	960,325.00	29	61,579	\$1,471,238	52	30	186,053	\$2,137,162
Smyth	507,116.28	14	24,352	\$409,895	2	84	165,383	\$1,766,355
Southampton	135,131.25	2	1,700	\$15,375	5	9	25,051	\$213,587
Spotsylvania	1,303,389.00	8	12,993	\$140,645	25	36	108,165	\$1,178,556
Stafford	1,979,662.00	6	12,112	\$173,639	17	19	87,630	\$1,181,709
Suffolk	163,341.75	4	3,171	\$36,853	0	15	6,132	\$76,840
Surry	2,565.00	0	0	\$0	0	0	0	\$0
Sussex	70,663.86	2	600	\$2,000	1	6	7,036	\$62,224

Table 3. Continued.

County/City	Annual Tonnage	Office Workers	Office Hours	Office Wages	Plant Workers	Quarry Workers	Production Hours	Production Wages
Tazewell	706,330.00	9	22,862	\$433,315	31	32	125,470	\$1,338,944
Virginia Beach	693,938.50	9	12,528	\$264,718	2	16	17,800	\$245,091
Warren	545,395.00	25	33,596	\$1,184,863	44	25	144,626	\$1,860,275
Washington	323,205.59	3	8,433	\$67,326	4	15	49,747	\$533,928
Westmoreland	84,538.72	3	2,996	\$21,697	0	5	3,846	\$51,261
Wise	578,645.00	5	5,114	\$50,950	4	16	29,988	\$372,201
Wythe	1,513,859.00	17	27,396	\$263,756	65	68	223,433	\$1,801,215
Total	76,970,318.42	806	1,432,334	\$23,658,797	2358	1861	8,077,331	\$90,640,969

Table 4. Summary of coal mine production in Virginia, 1994; source: Virginia Division of Mines.

	Buchanan	Dickenson	Lee	Montgomery	Russell	Scott	Tazewell	Wise	Total
Number of Mines									
Auger	0	9	5	0	0	0	0	13	27
Strip	13	18	4	1	8	0	0	30	74
Surface Total	13	27	9	1	8	0	0	43	101
Udg. total	156	36	21	0	14	2	40	52	321
Total	169	63	30	1	22	2	40	95	422
Tonnages									
Auger	0	155,092	79,420	0	0	0	0	97,117	331,629
Strip	1,209,263	1,852,961	625,189	0	571,763	0	0	4,779,863	9,039,039
Surface Total	1,209,263	2,008,053	704,609	0	571,763	0	0	4,876,980	9,370,668
Udg. total	13,341,435	2,451,450	2,042,010	0	646,579	36,727	2,543,219	8,373,156	29,434,576
Total	14,550,698	4,459,453	2,746,619	0	1,218,342	36,727	2,543,219	13,250,135	38,805,244
Mining Method									
Longwall	5,181,847	760,731	619,315	0	0	0	0	755,163	7,317,056
Cont. Miner	7,694,311	1,690,719	1,406,901	0	583,588	0	2,397,395	7,498,487	21,271,402
Other	465,277	0	15,794	0	62,991	36,727	145,824	119,505	846,118
Udg. Total	13,341,435	2,451,450	2,042,010	0	636,579	36,727	2,543,219	8,373,156	29,434,576
Auger	0	155,092	79,420	0	0	0	0	97,117	331,629
Strip	1,209,263	1,852,961	625,189	0	571,763	0	0	4,779,863	9,039,039
Surface Total	1,209,263	2,008,054	704,609	0	571,763	0	0	4,876,980	9,370,668
Total	14,550,698	4,459,504	2,746,619	0	1,218,342	36,727	2,543,219	13,250,135	38,805,244

Table 5. Summary of coal mining in Virginia by coal bed, 1994 ; source: Virginia Division of Mines..

Coalbed	Buchanan	Dickenson	Lee	Russell	Scott	Tazewell	Wise	Total
Addington	0	0	0	0	0	0	30,365	30,365
Aily	22	37,318	0	0	0	0	6,271	43,611
Blair	747,310	3,302	0	0	0	0	281,676	1,032,288
Bandy	0	0	0	6,491	0	0	0	6,491
Campbell Creek	38,829	0	0	0	0	0	108,946	147,775
Cedar Grove	0	0	0	0	0	0	50,981	50,981
Clintwood	143,957	780,840	0	0	0	0	536,471	1,461,268
Clintwood Marker	0	0	0	0	0	0	6,562	6,562
Cove Creek	0	0	0	0	36,727	0	0	36,727
Dorchester	227,813	467,061	0	125,386	0	0	1,883,576	2,703,835

Table 5. Continued.

Coalbed	Buchanan	Dickenson	Lee	Russell	Scott	Tazewell	Wise	Total
Darby	0	0	360,677	0	0	0	0	360,677
Eagle	376,300	0	0	0	0	0	0	376,300
Greasy Creek	0	0	0	0	0	321,166	0	321,166
Hagy	395,857	0	0	0	0	0	0	395,857
Harlan	0	0	567,424	0	0	0	0	567,424
Harlan Rider	0	0	84,748	0	0	0	0	84,748
High Splint	0	0	0	0	0	0	443,285	443,285
House	0	0	0	0	0	0	18,080	18,080
Imboden	0	0	0	0	0	0	1,775,221	1,775,221
Jawbone	1,303,288	1,359,782	0	589,862	0	32,030	604,009	3,888,972
Kelly	0	0	36,749	0	0	0	1,357,689	1,394,438
Kelly Rider	0	0	2,182	0	0	0	0	2,182
Kennedy	670,363	0	0	249,863	0	0	0	920,226
Low Splint	0	0	0	0	0	0	640,622	640,622
Lower Banner	66,331	503,535	0	30,204	0	0	0	600,070
Lower Horspen	0	0	0	0	0	70,018	0	70,018
Lower Seaboard	0	0	0	0	0	680,023	0	680,023
Low Splint A	0	0	36,107	0	0	0	0	36,107
Lower Clintwood	0	0	0	0	0	0	59,833	59,833
Lower Mason	0	0	167,850	0	0	0	0	167,850
Lyons	0	72,016	0	0	0	0	191,294	263,310
Middle Seaboard	0	0	0	0	0	50,245	0	50,245
Morris	0	0	0	0	0	0	44,924	44,924
Norton	0	165,816	0	0	0	0	190,848	356,663
Owl	0	0	0	0	0	0	39,465	39,465
Pardee	0	0	86,503	0	0	0	0	86,503
Parsons	0	0	0	0	0	0	858,835	858,835
Phillips	0	0	296,582	0	0	0	214,526	511,108
Pinhook	0	0	0	0	0	0	269,731	269,731
Pocahontas	1,349,079	0	0	0	0	176,658	0	1,525,737
Pocahontas No. 1	0	0	0	0	0	267,989	0	267,989
Pocahontas No. 3	5,605,776	0	0	0	0	21,617	0	5,627,393
Pocahontas No. 8	0	0	0	0	0	0	48,025	48,025
Raven	361,028	425,422	0	0	0	0	0	786,450
Red Ash	769,777	0	0	0	0	222,453	0	992,230
Splash Dam	2,168,975	81,313	0	0	0	0	0	2,250,288
Standiford	0	0	0	0	0	0	376,553	376,553
Taggart	0	0	639,707	0	0	0	304,636	944,343
Taggart Marker	0	0	70,445	0	0	0	5,292	75,737
Tiller	325,993	59,024	0	0	0	169,009	0	554,027
Upper Banner	0	504,074	0	216,536	0	0	1,303,914	2,024,524
Upper Clintwood	0	0	0	0	0	0	398	398
Upper Horspen	0	0	0	0	0	532,012	0	532,012
Upper Mason	0	0	397,645	0	0	0	0	397,645
Upper Standiford	0	0	0	0	0	0	568,007	568,007
Wax	0	0	0	0	0	0	861	861
Wilson	0	0	0	0	0	0	1,029,240	1,029,240
Total	14,550,698	4,459,503	2,746,619	1,218,342	36,727	2,543,220	13,250,136	38,805,245

Table 6. Summary of coal mine employment in Virginia, 1994; source: Virginia Division of Mines.

	Buchanan	Dickenson	Lee	Russell	Scott	Tazewell	Wise	Total
Prod. Employees								
Auger	0	25	41	0	0	0	21	87
Strip	186	404	101	167	0	0	597	1,455
Surface Total	186	429	142	167	0	0	618	1,542
Undg Total	<u>3,074</u>	<u>656</u>	<u>458</u>	<u>136</u>	<u>19</u>	<u>630</u>	<u>1,803</u>	<u>6,776</u>
Total	3,260	10,850	600	303	19	630	2,421	8,318
Man Days								
Auger	0	4,506	1,022	0	0	0	1,108	6,636
Strip	2,496	4,912	1,966	1,324	0	0	7,738	18,436
Surface Total	2,496	9,418	2,988	1,324	0	0	8,846	25,072
Undg Total	<u>27,768</u>	<u>6,108</u>	<u>4,724</u>	<u>1,486</u>	<u>380</u>	<u>7,850</u>	<u>14,668</u>	<u>62,984</u>
Total	30,264	15,526	7,712	2,810	380	7,850	23,514	88,056
Man Hours								
Auger	0	23,617	26,730	0	0	0	11,654	62,001
Strip	316,238	496,004	219,846	138,258	0	0	1,159,570	2,329,916
Surface Total	316,238	519,621	246,576	138,258	0	0	1,171,224	2,391,917
Undg Total	<u>8,608,530</u>	<u>1,127,810</u>	<u>771,228</u>	<u>224,740</u>	<u>13,458</u>	<u>906,169</u>	<u>4,018,015</u>	<u>15,669,950</u>
Total	8,924,768	1,647,431	1,017,804	362,998	13,458	906,169	5,189,239	18,061,867
Prod. Wages								
Auger	\$0	\$289,234	\$290,021	\$0	\$0	\$0	\$176,371	\$755,626
Strip	\$3,067,684	\$7,083,719	\$2,039,495	\$2,273,102	\$0	\$0	\$17,126,014	\$31,590,014
Surface Total	\$3,067,684	\$7,372,953	\$2,329,516	\$2,273,102	\$0	\$0	\$17,302,385	\$32,345,640
Undg Total	<u>\$128,376,015</u>	<u>\$21,330,194</u>	<u>\$12,713,459</u>	<u>\$4,806,515</u>	<u>\$198,000</u>	<u>\$14,670,689</u>	<u>\$53,579,078</u>	<u>\$235,673,950</u>
Total	\$131,443,699	\$28,703,147	\$15,042,975	\$7,079,617	\$198,000	\$14,670,689	\$70,881,463	\$268,019,590
Office Employees								
Auger	0	4	0	0	0	0	0	4
Strip	2	2	9	2	0	0	81	96
Surface Total	2	6	9	2	0	0	81	100
Undg Total	<u>99</u>	<u>6</u>	<u>13</u>	<u>5</u>	<u>2</u>	<u>26</u>	<u>52</u>	<u>203</u>
Total	101	12	22	7	2	26	133	303
Office Wages								
Auger	\$0	\$45,800	\$0	\$0	\$0	\$0	\$0	\$45,800
Strip	\$40,200	\$25,575	\$226,763	\$38,130	\$0	\$0	\$4,072,430	\$4,403,098
Surface Total	\$40,200	\$71,375	\$226,763	\$38,130	\$0	\$0	\$4,072,430	\$4,448,898
Undg Total	<u>\$3,631,362</u>	<u>\$145,576</u>	<u>\$414,696</u>	<u>\$87,100</u>	<u>\$6,000</u>	<u>\$577,356</u>	<u>\$1,852,931</u>	<u>\$6,615,021</u>
Total	\$3,571,562	\$216,951	\$641,459	\$125,230	\$6,000	\$577,356	\$5,925,361	\$11,063,919

VIRGINIA DIVISION OF MINERAL RESOURCES

Table 7. Oil and gas condensate production by company and county, 1994; source: Virginia Division of Gas and Oil.

County	Company	Number of Producing Wells	Volume (barrels)
Lee	APACO Petroleum	5	497.15
	Ben Hur Oil and Gas	5	1,406.00
	Eastern States Exploration	1	1,078.65
	Maverick Oil and Gas	9	1,914.00
	Pride Oil Company	1	1,477.91
	Witt Drilling	<u>1</u>	<u>273.00</u>
	Lee Total	22	6,646.71
Wise	Equitable Resources Exploration	<u>32</u>	<u>10,120.06</u>
Wise Total		32	10,120.06
State Total		54	16,766.77

Table 8. Natural gas production by county and company, 1994; source Virginia Division of Gas and Oil.

County	Company	Number of Producing Wells	Volume (Mcf)
Buchanan	Conventional Gas		
	Ashland Exploration, Inc	58	895,202.00
	C D & G Development	2	19,716.00
	Cabot Oil and Gas	5	51,388.00
	Columbia Natural Resources	106	1,281,691.00
	Eastern American Energy	4	70,265.00
	Panther Creek ltd Partnership	2	36,032.00
	Peake Operating	1	23,087.00
	Pocahontas Gas Partnership	2	67,459.00
	Virginia Gas Co.	<u>28</u>	<u>425,518.00</u>
		208	2,870,358.00
	Coalbed Methane		
	Consol, Inc	88	3,782,860.00
	Equitable Resources Exploration	6	14,546.00
	Island Creek Coal Co.	51	7,277,535.00
	Pocahontas Gas Partnership	115	11,908,699.00
	Ratiff Gas Co.	1	65.83
	Virginia Gas Co.	<u>5</u>	<u>36,162.00</u>
		266	23,019,867.83
	Buchanan Total		454

Table 8. Continued.

County	Company	Number of Producing Wells	Volume (Mcf)
Dickenson	Conventional Gas		
	Columbia Natural Resources	33	556,645.00
	Elliott Production	2	23,947.00
	Equitable Resources Exploration	357	7,746,771.00
	Pine Mountain Oil and Gas	9	96,434.00
	Virginia Gas Co.	26	1,315,213.00
		<u>427</u>	<u>9,739,010.00</u>
	Coalbed Methane		
	Equitable Resources Exploration	<u>186</u>	<u>4,526,040.00</u>
Dickenson Total		613	14,265,050.00
Russell	Conventional Gas		
	Pine Mountain Oil and Gas	2	20,954.00
	Coalbed Methane		
	Equitable Resources Exploration	<u>24</u>	<u>666,945.00</u>
Russell Total		26	687,899.00
Scott	Conventional Gas		
	Equitable Resources Exploration	<u>3</u>	<u>10,842.00</u>
Scott Total		3	10,842.00
Tazewell	Conventional Gas		
	CNG Producing	2	10,985.00
	Columbia Natural Resources	6	130,451.00
	Consol-Ray	14	176,583.00
	EMAX	2	54,188.00
	Exploration Partners	<u>1</u>	<u>38,689.00</u>
Tazewell Total		25	410,896.00
Wise	Conventional Gas		
	Amvest Oil and Gas	6	19,533.00
	Equitable Resources Exploration	<u>307</u>	<u>8,856,064.00</u>
		313	8,875,597.00
	Coalbed Methane		
	Equitable Resources Exploration	<u>16</u>	<u>118,964.00</u>
Wise Total		329	8,994,561.00
Total	Conventional Gas	978	21,927,657.00
	Coalbed Methane	<u>492</u>	<u>28,331,816.83</u>
State Total		1470	50,259,473.83

Table 9. Drilling and completion activity by county, 1994; source: Virginia Division of Gas and Oil.

County	Number of Wells Drilled					Number of Wells Completed				
	Conventional Gas	Coalbed Methane	Underground Storage	Waste Disposal	Total	Conventional Gas	Coalbed Methane	Underground Storage	Waste Disposal	Total
Buchanan	3	57	0	1	61	3	57	0	1	61
Dickenson	9	37	0	0	46	9	39	0	0	48
Lee	1	0	0	0	1	0	0	0	0	0
Russell	0	0	0	0	0	0	1	0	0	1
Scott	0	0	4	0	4	0	0	4	0	4
Wise	<u>28</u>	<u>9</u>	<u>0</u>	<u>0</u>	<u>37</u>	<u>30</u>	<u>12</u>	<u>0</u>	<u>0</u>	<u>42</u>
Total	41	103	4	1	149	42	109	4	1	156

Table 10. Total footage drilled for natural gas, 1994; source: Virginia Division of Gas and Oil.

County	Conventional Gas		Coalbed Methane		Waste Disposal	Underground Storage	Total Footage
	Development	Exploratory	Development	Exploratory			
Buchanan	15,434	0	107,812	1,703	1,355	0	12,6304
Dickenson	38,202	4,372	8,748	2,379	0	0	12,8701
Lee	0	5,805	0	0	0	0	5,805
Scott	0	0	0	0	0	16,165	16,165
Wise	<u>160,693</u>	<u>0</u>	<u>22,773</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>183,466</u>
Total	214,329	10,177	214,333	4,082	1,355	16,165	460,441

Table 11. Wells drilled and completed in Virginia, 1994; source: Virginia Division of Gas and Oil.

File Number	Permit Number	Operator	Well Name	7.5-minute Quadrangle	Latitude (feet from)	Longitude (feet from)	Well Class	Total Depth (feet)	Formation at Total Depth	Producing Formation
Buchanan County										
BU-593	2131	EREX, Inc.	VC-2566	Big A Mtn	6350' S. 37 15' 30"	3100' W. 81 52' 30"	Dev.	2195	Bluestone	Pocahontas, Lee
BU-787	2712	Columbia Natural Resources	CNR 21611	Elkhorn City	9950' S. 37 20' 00"	6820' W. 82 15' 00"	Dev.	5010	Chattanooga Sh	Chattanooga Sh, Berea Ss, Greenbrier Ls
BU-798	2779	Columbia Natural Resources	CNR 22307	Hurley	12225' S. 37 27' 30"	2010' W. 82 02' 30"	Dev.	5114	Chattanooga Sh	Chattanooga Sh
BU-329	1567	Consol, Inc	CBM N-33	Keen Mtn	11220' S. 37 15' 00"	12120' W. 81 52' 30"	Dev.	1822	Pocahontas	Pocahontas, Lee
BU-701	2362	Pocahontas Gas Partnership	PGP-062A	Keen Mtn	7200' S. 37 12' 30"	4900' W. 81 57' 30"	Dev.	1897	Pocahontas	Pocahontas, Lee
BU-704	2372	Pocahontas Gas Partnership	PGP-063A	Keen Mtn	7180' S. 37 12' 30"	2100' W. 81 57' 30"	Dev.	1891	Pocahontas	Pocahontas, Lee
BU-705	2373	Pocahontas Gas Partnership	PGP-062B	Keen Mtn	7340' S. 37 12' 30"	3100' W. 81 57' 30"	Dev.	1590	Pocahontas	Not Stimulated
BU-718	2408	Pocahontas Gas Partnership	PGP-118D	Keen Mtn	14490' S. 37 12' 30"	9650' W. 81 55' 00"	Dev.	1925	Pocahontas	Not Stimulated
BU-720	2410	Pocahontas Gas Partnership	PGP-118B	Keen Mtn	120' S. 37 10' 00"	9550' W. 81 55' 00"	Dev.	1955	Pocahontas	Not Stimulated
BU-732	2439	Pocahontas Gas Partnership	PGP-117B	Keen Mtn	2220' S. 37 10' 00"	9770' W. 81 55' 00"	Dev.	1811	Pocahontas	Pocahontas, Lee
BU-734	2445	Pocahontas Gas Partnership	PGP-118A	Keen Mtn	1290' S. 37 10' 00"	1590' W. 81 55' 00"	Dev.	2057	Pocahontas	Pocahontas, Lee
BU-741	2480	Pocahontas Gas Partnership	PGP-144	Keen Mtn	12900' S. 37 12' 30"	2300' W. 81 55' 00"	Dev.	1476	Pocahontas	Pocahontas, Lee
BU-745	2505	Pocahontas Gas Partnership	PGP-149	Keen Mtn	12890' S. 37 12' 30"	1410' W. 81 55' 00"	Dev.	1434	Pocahontas	Pocahontas, Lee
BU-752	2561	Pocahontas Gas Partnership	PGP-125B	Keen Mtn	3000' S. 37 10' 00"	7240' W. 81 55' 00"	Dev.	1900	Pocahontas	Pocahontas, Lee
BU-758	2585	Pocahontas Gas Partnership	PGP-123B	Keen Mtn	1600' S. 37 10' 00"	7800' W. 81 55' 00"	Dev.	1480	Pocahontas	Pocahontas, Lee
BU-760	2587	Pocahontas Gas Partnership	PGP-127B	Keen Mtn	14920' S. 37 12' 30"	7250' W. 81 55' 00"	Dev.	1505	Pocahontas	Pocahontas, Lee
BU-765	2626	Pocahontas Gas Partnership	PGP-117D	Keen Mtn	3540' S. 37 10' 00"	9635' W. 81 55' 00"	Dev.	1685	Pocahontas	Pocahontas, Lee
BU-766	2627	Pocahontas Gas Partnership	PGP-117C	Keen Mtn	3490' S. 37 10' 00"	9640' W. 81 55' 00"	Dev.	1645	Pocahontas	Pocahontas, Lee
BU-769	2642	Pocahontas Gas Partnership	PGP-135A	Keen Mtn	14435' S. 37 12' 30"	4695' W. 81 55' 00"	Dev.	2015	Pocahontas	Pocahontas, Lee
BU-770	2644	Pocahontas Gas Partnership	PGP-134A	Keen Mtn	1200' S. 37 10' 00"	4790' W. 81 55' 00"	Dev.	1955	Pocahontas	Pocahontas, Lee
BU-773	2652	Pocahontas Gas Partnership	PGP-130A	Keen Mtn	650' S. 37 10' 00"	5800' W. 81 55' 00"	Dev.	1895	Pocahontas	Pocahontas, Lee
BU-774	2654	Pocahontas Gas Partnership	PGP-131A	Keen Mtn	14400' S. 37 12' 30"	5800' W. 81 55' 00"	Dev.	1715	Pocahontas	Pocahontas, Lee

Table 11. Continued.

File Number	Permit Number	Operator	Well Name	7.5-minute Quadrangle	Latitude (feet from)	Longitude (feet from)	Well Class	Total Depth (feet)	Formation at Total Depth	Producing Formation
BU-775	2655	Pocahontas Gas Partnership	PGP-129A	Keen Mtn	3100' S. 37 10' 00"	5600' W. 81 55' 00"	Dev.	1715	Pocahontas	Pocahontas, Lee
BU-777	2673	Pocahontas Gas Partnership	PGP-132B	Keen Mtn	3500' S. 37 10' 00"	4700' W. 81 55' 00"	Dev.	1933	Pocahontas	Pocahontas, Lee
BU-782	2696	Pocahontas Gas Partnership	PGP-GMHG1	Keen Mtn	12500' S. 37 12' 30"	11300' W. 81 55' 00"	Dev.	1829	Pocahontas	Pocahontas, Lee
BU-784	2707	Pocahontas Gas Partnership	PGP-120B	Keen Mtn	3000' S. 37 10' 00"	8700' W. 81 55' 00"	Dev.	1715	Pocahontas	Pocahontas, Lee
BU-788	2714	Pocahontas Gas Partnership	PGP-62C	Keen Mtn	7300' S. 37 12' 30"	4300' W. 81 57' 30"	Dev.	2028	Pocahontas	Pocahontas, Lee
BU-789	2715	Pocahontas Gas Partnership	PGP-61A	Keen Mtn	3500' S. 37 10' 00"	9600' W. 81 55' 00"	Dev.	1596	Pocahontas	Pocahontas, Lee
BU-790	2721	Pocahontas Gas Partnership	PGP-119A	Keen Mtn	4400' S. 37 10' 00"	8700' W. 81 55' 00"	Dev.	1846	Pocahontas	Pocahontas, Lee
BU-796	2750	Pocahontas Gas Partnership	PGP-121E	Keen Mtn	1050' S. 37 10' 00"	8800' W. 82 55' 00"	Dev.	1572	Pocahontas	Pocahontas, Lee
BU-797	2751	Pocahontas Gas Partnership	PGP-061B	Keen Mtn	7200' S. 37 12' 30"	4900' W. 81 57' 30"	Dev.	1831	Pocahontas	Pocahontas, Lee
BU-808	2826	Pocahontas Gas Partnership	PGP NE-10-75	Keen Mtn	4600' S. 37 12' 30"	4700' W. 81 57' 30"	Dev.	2306	Pocahontas	Pocahontas, Lee
BU-772	2648	Ashland Expl.	Day Heirs 1	Patterson	350' S. 37 17' 30"	6092' W. 81 52' 30"	Dev.	5310	Chattanooga Sh	Berea Ss, Greenbrier Ls
BU-795	2749	EREX, Inc.	VC-3171	Prater	10600' S. 37 10' 00"	540' W. 82 10' 00"	Dev.	2380	Pocahontas	Pocahontas, Lee
BU-690	2318	Island Creek Coal Co.	CBM R-15D	Vansant	3600' S. 37 12' 30"	9050' W. 82 00' 00"	Dev.	1664	Pocahontas	Pocahontas, Lee
BU-694	2328	Island Creek Coal Co.	CBM S15C	Vansant	4450' S. 37 12' 30"	9050' W. 82 00' 00"	Dev.	1969	Pocahontas	Pocahontas
BU-715	2402	Island Creek Coal Co.	CBM P-3B	Vansant	14500' S. 37 15' 00"	6600' W. 82 05' 00"	Dev.	2094	Pocahontas	Not Stimulated
BU-716	2406	Island Creek Coal Co.	CBM Q-3C	Vansant	15650' S. 37 15' 00"	6650' W. 82 05' 00"	Dev.	2171	Pocahontas	Not Stimulated
BU-717	2407	Island Creek Coal Co.	CBM Q-3B	Vansant	1050' S. 37 12' 30"	6850' W. 82 05' 00"	Dev.	2210	Pocahontas	Not Stimulated
BU-723	2414	Island Creek Coal Co.	CBM P-3C	Vansant	14000' S. 37 15' 00"	6600' W. 82 05' 00"	Expl.	1703	Pocahontas	Pocahontas
BU-724	2422	Island Creek Coal Co.	CBM P-3A	Vansant	15150' S. 37 15' 00"	6600' W. 82 05' 00"	Dev.	2215	Pocahontas	Not Stimulated
BU-767	2630	Consol, Inc.	CBM Q-15D	Vansant	11900' S. 37 12' 30"	9050' W. 82 00' 00"	Dev.	2166	Pocahontas	Pocahontas, Lee
BU-768	2631	Consol, Inc.	CBM Q-15C	Vansant	1200' S. 37 12' 30"	9050' W. 82 00' 00"	Dev.	2208	Pocahontas	Pocahontas, Lee
BU-776	2660	Consol, Inc.	CBM X19D	Vansant	13600' S. 37 12' 30"	1850' W. 82 00' 00"	Dev.	1703	Pocahontas	Pocahontas, Lee

Table 11. Continued.

File Number	Permit Number	Operator	Well Name	7.5-minute Quadrangle	Latitude (feet from)	Longitude (feet from)	Well Class	Total Depth (feet)	Formation at Total Depth	Producing Formation
BU-778	2680	Consol, Inc.	CBM W-19D	Vansant	12050' S. 37 12' 30"	2425' W. 82 00' 00"	Dev.	1716	Pocahontas	Pocahontas, Lee
BU-779	2683	Consol, Inc.	CBM Q-15F	Vansant	1200' S. 37 12' 30"	9100' W. 82 00' 00"	Dev.	2223	Pocahontas	Not Stimulated
BU-780	2686	Consol, Inc.	CBM R-15C	Vansant	2600' S. 37 12' 30"	9050' W. 82 00' 00"	Dev.	2057	Pocahontas	Pocahontas, Lee
BU-783	2702	Consol, Inc.	CBM T-18	Vansant	7500' S. 37 12' 30"	4400' W. 82 00' 00"	Dev.	2192	Pocahontas	Pocahontas, Lee
BU-785	2709	Consol, Inc.	CBM T-17B	Vansant	7610' S. 37 12' 30"	5190' W. 82 00' 00"	Dev.	2190	Pocahontas	Pocahontas, Lee
BU-786	2710	Consol, Inc.	CBM T-17A	Vansant	7400' S. 37 12' 30"	4700' W. 82 00' 00"	Dev.	2394	Pocahontas	Pocahontas, Lee
BU-793	2746	Consol, Inc.	CBM T-17D	Vansant	7500' S. 37 12' 30"	6450' W. 82 00' 00"	Dev.	1703	Pocahontas	Pocahontas, Lee
BU-794	2747	Consol, Inc.	CBM U-17A	Vansant	7860' S. 37 12' 30"	5780' W. 82 00' 00"	Dev.	2013	Pocahontas	Pocahontas, Lee
BU-799	2781	Consol, Inc.	CBM S-3B	Vansant	4510' S. 37 12' 30"	7520' W. 82 00' 00"	Dev.	2156	Pocahontas	Pocahontas, Lee
BU-800	2782	Consol, Inc.	CBM S-3C	Vansant	4005' S. 37 12' 30"	7750' W. 82 05' 00"	Dev.	1840	Pocahontas	Pocahontas, Lee
BU-801	2783	Consol, Inc.	CBM S-3A	Vansant	3975' S. 37 12' 30"	7915' W. 82 05' 00"	Dev.	1854	Pocahontas	Pocahontas, Lee
BU-803	2808	Consol, Inc.	CBM U-7	Vansant	8810' S. 37 12' 30"	11900' W. 82 05' 00"	Dev.	1355	Pocahontas	Pocahontas, Lee
BU-804	2812	Consol, Inc.	CBM R-3F	Vansant	2300' S. 37 12' 30"	7740' W. 82 05' 00"	Dev.	2055	Pocahontas	Pocahontas, Lee
BU-805	2813	Consol, Inc.	CBM R-3G	Vansant	2750' S. 37 12' 30"	7800' W. 81 05' 00"	Dev.	1963	Pocahontas	Pocahontas, Lee
BU-806	2816	Consol, Inc.	CBM T-17C	Vansant	7600' S. 37 12' 30"	5400' W. 82 00' 00"	Dev.	2170	Pocahontas	Pocahontas, Lee
BU-810	2831	Consol, Inc.	CBM T-16A	Vansant	7600' S. 37 12' 30"	7100' W. 82 00' 00"	Dev.	1872	Pocahontas	Pocahontas, Lee
BU-816	2846	Consol, Inc.	CBM S-15D	Vansant	3400' S. 37 12' 30"	9000' W. 82 00' 00"	Dev.	2415	Pocahontas	Pocahontas, Lee
Dickenson County										
DI-727	2613	EREX, Inc.	P-452C	Caney Ridge	850' S. 37 02' 30"	9440' W. 82 22' 30"	Dev.	2366	Bluestone	Pocahontas, Lee
DI-730	2646	EREX, Inc.	VC-3170	Caney Ridge	1460' S. 37 05' 00"	2140' W. 82 27' 30"	Dev.	2401	Bluestone	Pocahontas, Lee
DI-737	2703	EREX, Inc.	VC-3166	Caney Ridge	9620' S. 37 05' 00"	4090' W. 82 22' 30"	Dev.	2638	Pocahontas	Lee
DI-738	2705	EREX, Inc.	VC-3167	Caney Ridge	14500' S. 37 05' 00"	7580' W. 82 02' 30"	Dev.	2724	Pocahontas	Lee

VIRGINIA DIVISION OF MINERAL RESOURCES

Table 11. Continued.

File Number	Permit Number	Operator	Well Name	7.5-minute Quadrangle	Latitude (feet from)	Longitude (feet from)	Well Class	Total Depth (feet)	Formation at Total Depth	Producing Formation
DI-753	2785	EREX, Inc.	VC-3218	Caney Ridge	5435' S. 37 02' 30"	7690' W. 82 25' 00"	Dev.	2073	Bluestone	Lee
DI-754	2786	EREX, Inc.	VC-3220	Caney Ridge	6700' S. 37 02' 30"	6080' W. 82 25' 00"	Dev.	2038	Pocahontas	Lee
DI-766	2841	EREX, Inc.	VC-3217	Caney Ridge	3980' S. 37 02' 30"	5120' W. 82 25' 00"	Dev.	2100	Lee	Lee
DI-597	1708	EREX, Inc.	P-496	Clintwood	6850' S. 37 10' 00"	8720' W. 82 22' 30"	Dev.	4362	Chattanooga Sh	Chattanooga Sh, Berea Ss
DI-718	2547	EREX, Inc.	V-2031	Clintwood	14660' S. 37 10' 00"	7700' W. 82 22' 30"	Dev.	4927	Chattanooga Sh	Chattanooga Sh, Berea Ss
DI-846	1992	EREX, Inc.	VCP-2112	Duty	11300' S. 37 07' 30"	1675' W. 82 12' 30"	Dev.	2471	Bluestone	Pocahontas, Lee
DI-717	2545	EREX, Inc.	V-2980	Duty	875' S. 37 05' 00"	2420' W. 82 12' 30"	Dev.	5497	Chattanooga Sh	Berea Ss, Price
DI-739	2728	EREX, Inc.	VC-3173	Duty	5220' S. 37 07' 30"	9920' W. 82 10' 00"	Dev.	2276	Pocahontas	Pocahontas, Lee
DI-742	2733	EREX, Inc.	VC-2966	Duty	37 07' 30"	82 10' 00"	Expl.	2379	Pocahontas	Pocahontas, Lee
DI-747	2767	EREX, Inc.	VC-2965	Duty	11890' S. 37 07' 30"	4450' W. 82 12' 30"	Dev.	2061	Pocahontas	Pocahontas, Lee
DI-765	2839	EREX, Inc.	VC-3172	Duty	2300' S. 37 07' 30"	1200' W. 82 12' 30"	Dev.	2488	Pocahontas	Pocahontas, Lee
DI-709	2526	EREX, Inc.	V-2016	Haysi	5500' S. 37 07' 30"	7450' W. 82 10' 00"	Dev.	4628	Chattanooga Sh	Not Stimulated
DI-710	2527	Virginia Gas Co.	EH-120	Haysi	3415' S. 37 10' 00"	2265' W. 82 17' 30"	Dev.	4844	Chattanooga Sh	Berea Ss
DI-746	2757	EREX, Inc.	VC-3082	Haysi	5600' S. 37 12' 30"	3790' W. 82 15' 00"	Dev.	1846	Pocahontas	Lee
DI-748	2772	EREX, Inc.	VC-3083	Haysi	14050' S. 37 10' 00"	1510' W. 82 17' 30"	Dev.	2102	Lee	Lee
DI-751	2780	EREX, Inc.	V-2266	Haysi	4550' S. 37 12' 30"	7925' W. 82 15' 00"	Dev.	4748	Chattanooga Sh	Chattanooga Sh, Berea Ss
DI-757	2790	Virginia Gas Co.	EH-129	Haysi	8066' S. 37 12' 30"	3563' W. 82 15' 00"	Dev.	4706	Chattanooga Sh	Berea Ss
DI-758	2971	Virginia Gas Co.	EH-128	Haysi	7200' S. 37 12' 30"	3241' W. 82 17' 30"	Expl.	4372	Chattanooga Sh	Berea Ss
DI-759	2802	EREX, Inc.	VC-3182	Haysi	5580' S. 37 12' 30"	11200' W. 82 17' 30"	Dev.	1959	Lee	Lee
DI-762	2821	EREX, Inc.	V-1824	Haysi	690' S. 37 12' 30"	9590' W. 82 20' 00"	Dev.	4490	Chattanooga Sh	Chattanooga Sh, Berea Ss
DI-659	2090	EREX, Inc.	VCP-2207	Nora	37 12' 30"	9850' W. 82 20' 00"	Dev.	2426	Bluestone	Pocahontas, Lee
DI-720	2550	EREX, Inc.	VC-2977	Nora	5040' S. 37 07' 30"	10380' W. 82 15' 00"	Dev.	2470	Bluestone	Lee
DI-722	2580	EREX, Inc.	VC-3045	Nora	6510' S. 37 05' 00"	9210' W. 82 17' 30"	Dev.	2411	Bluestone	Pocahontas, Lee

Table 11. Continued.

File Number	Permit Number	Operator	Well Name	7.5-minute Quadrangle	Latitude (feet from)	Longitude (feet from)	Well Class	Total Depth (feet)	Formation at Total Depth	Producing Formation
DI-723	2581	EREX, Inc.	VC-3054	Nora	3440' S. 37 02' 30"	8590' W. 82 20' 00"	Dev.	2001	Bluestone	Pocahontas, Lee
DI-724	2588	EREX, Inc.	VC-3037	Nora	6890' S. 37 07' 30"	720' W. 82 20' 00"	Dev.	1857	Pocahontas	Pocahontas, Lee
DI-725	2600	EREX, Inc.	VC-2979	Nora	6910' S. 37 07' 30"	8640' W. 82 15' 00"	Dev.	2606	Bluestone	Lee
DI-726	2611	EREX, Inc.	VC-2943	Nora	11920' S. 37 02' 30"	3640' W. 82 20' 00"	Dev.	2770	Pocahontas	Pocahontas, Lee
DI-728	2619	EREX, Inc.	VC-2968	Nora	320' S. 37 05' 00"	1850' W. 82 12' 30"	Dev.	2330	Bluestone	Lee
DI-731	2656	EREX, Inc.	VC-3175	Nora	7990' S. 37 05' 00"	10850' W. 82 17' 30"	Dev.	2202	Bluestone	Pocahontas, Lee
DI-732	2657	EREX, Inc.	VC-2976	Nora	5395' S. 37 07' 30"	13550' W. 82 15' 00"	Dev.	2510	Pocahontas	Lee
DI-733	2658	EREX, Inc.	VC-3053	Nora	2540' S. 37 02' 30"	9980' W. 82 20' 00"	Dev.	2429	Bluestone	Pocahontas, Lee
DI-734	2669	EREX, Inc.	VC-3041	Nora	11780' S. 37 07' 30"	2310' W. 82 20' 00"	Dev.	2485	Pocahontas	Pocahontas, Lee
DI-735	2670	EREX, Inc.	VC-3036	Nora	7120' S. 37 07' 30"	3620' W. 82 20' 00"	Dev.	2180	Pocahontas	Pocahontas, Lee
DI-736	2671	EREX, Inc.	VC-3040	Nora	10530' S. 37 07' 30"	3410' W. 82 20' 00"	Dev.	2454	Pocahontas	Pocahontas, Lee
DI-740	2730	EREX, Inc.	VC-3049	Nora	7600' S. 37 05' 00"	2940' W. 82 17' 30"	Dev.	2830	Bluestone	Pocahontas, Lee
DI-743	2734	EREX, Inc.	VCP-2562	Nora	7420' S. 37 05' 00"	11980' W. 82 15' 00"	Dev.	2163	Pocahontas	Lee
DI-744	2740	EREX, Inc.	VC-3046	Nora	6240' S. 37 05' 00"	940' W. 82 17' 30"	Dev.	2736	Bluestone	Pocahontas, Lee
DI-745	2742	EREX, Inc.	VC-2942	Nora	7330' S. 37 02' 30"	9420' W. 82 17' 30"	Dev.	2414	Pocahontas	Pocahontas, Lee
DI-749	2775	EREX, Inc.	VC-3050	Nora	9350' S. 37 05' 00"	5760' W. 82 17' 30"	Dev.	2355	Bluestone	Pocahontas, Lee
DI-750	2777	EREX, Inc.	VC-3052	Nora	11150' S. 37 05' 00"	2470' W. 82 17' 30"	Dev.	2200	Pocahontas	Lee
DI-752	2784	EREX, Inc.	VC-3044	Nora	6225' S. 37 05' 00"	4965' W. 82 20' 00"	Dev.	1881	Pocahontas	Pocahontas, Lee
DI-755	2787	EREX, Inc.	VC-3048	Nora	8035' S. 37 05' 00"	8465' W. 82 20' 00"	Dev.	2606	Bluestone	Pocahontas, Lee
DI-760	2810	EREX, Inc.	VC-3212	Nora	5730' S. 37 07' 30"	7295' W. 82 17' 30"	Dev.	2046	Pocahontas	Lee
DI-763	2825	EREX, Inc.	VC-3051	Nora	9480' S. 37 05' 00"	2070' W. 82 17' 30"	Dev.	2170	Pocahontas	Lee

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Table 11. Continued.

File Number	Permit Number	Operator	Well Name	7.5-minute Quadrangle	Latitude (feet from)	Longitude (feet from)	Well Class	Total Depth (feet)	Formation at Total Depth	Producing Formation
Russell County										
RU-045	2579	EREX, Inc.	VC-1852	Nora	3425' S. 37 02' 30"	8050' W. 82 07' 30"	Dev.	1995	Pocahontas	Pocahontas, Lee
Scott County										
SC-037	2752	Virginia Gas Co.	EH-117	Mendota	11346' S. 36 40' 00"	1852' W. 82 20' 00"	Dev.	3956	Price	Price
SC-041	2758	Virginia Gas Co.	EH-066	Mendota	11203' S. 36 40' 00"	2773' W. 82 20' 00"	Dev.	4195	Price	Price
SC-042	2759	Virginia Gas Co.	EH-068	Mendota	9095' S. 36 40' 00"	1012' W. 82 20' 00"	Dev.	4026	Price	Price
SC-045	2763	Virginia Gas Co.	EH-057	Mendota	10469' S. 36 40' 00"	716' W. 82 20' 00"	Dev.	3988	Price	Price
Wise County										
WS-373	2384	EREX, Inc.	V-2693	Appalachia	12150' S. 37 00' 00"	5700' W. 82 50' 00"	Dev.	5792	Chattanooga Sh	Chattanooga Sh, Price
WS-402	2503	EREX, Inc.	V-2850	Appalachia	5200' S. 36 57' 30"	3350' W. 82 50' 00"	Dev.	5688	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls
WS-413	2555	EREX, Inc.	VCP-3099	Appalachia	11700' S. 37 00' 00"	5000' W. 82 45' 00"	Dev.	2741	Bluestone	Lee
WS-414	2556	EREX, Inc.	VCP-3101	Appalachia	2350' S. 36 57' 30"	2400' W. 82 47' 30"	Dev.	2703	Lee	Lee, Norton, Wise
WS-410	2540	EREX, Inc.	PC-019	Caney Ridge	10210' S. 37 02' 30"	11380' W. 82 25' 00"	Dev.	2390	Bluestone	Pocahontas, Lee
WS-442	2794	EREX, Inc.	VC-3035	Caney Ridge	12350' S. 37 02' 30"	4100' W. 82 27' 30"	Dev.	2830	Pocahontas	Pocahontas, Lee
WS-298	1382	EREX, Inc.	V-2344	Coeburn	8575' S. 36 55' 00"	11375' W. 82 27' 30"	Dev.	4904	Chattanooga Sh	Pocahontas, Lee
WS-379	2419	EREX, Inc.	V-2690	Coeburn	8950' S. 36 50' 00"	8750' W. 82 27' 30"	Dev.	5064	Chattanooga Sh	Chattanooga Sh, Berea Ss, Ravenciff
WS-385	2457	EREX, Inc.	VC-2926	Coeburn	4600' S. 37 00' 00"	7500' W. 82 25' 00"	Dev.	2915	Bluestone	Pocahontas, Lee
WS-406	2524	EREX, Inc.	V-2375	Coeburn	12060' S. 37 00' 00"	11540' W. 82 22' 30"	Dev.	6102	Chattanooga Sh	Berea Ss, Greenbrier Ls
WS-407	2525	EREX, Inc.	VC-2990	Coeburn	12700' S. 37 00' 00"	1150' W. 82 25' 00"	Dev.	2854	Bluestone	Pocahontas, Lee
WS-408	2528	EREX, Inc.	V-2706	Coeburn	4859' S. 36 57' 30"	8208' W. 82 22' 30"	Dev.	5691	Chattanooga Sh	Berea Ss
WS-409	2530	EREX, Inc.	V-2707	Coeburn	7532' S. 36 57' 30"	8853' W. 82 22' 30"	Dev.	5504	Chattanooga Sh	Berea Ss

Table 11. Continued.

File Number	Permit Number	Operator	Well Name	7.5-minute Quadrangle	Latitude (feet from)	Longitude (feet from)	Well Class	Total Depth (feet)	Formation at Total Depth	Producing Formation
WS-418	2609	EREX, Inc.	V-2714	Coeburn	14786' S. 37 00' 00"	10423' W. 82 22' 30"	Dev.	6121	Chattanooga Sh	Berea Ss
WS-422	2633	EREX, Inc.	V-2373	Coeburn	5816' S. 36 57' 30"	10670' W. 82 22' 30"	Dev.	5285	Chattanooga Sh	Berea Ss
WS-424	2678	EREX, Inc.	V-2717	Coeburn	8940' S. 36 57' 30"	5505' W. 82 22' 30"	Dev.	5450	Chattanooga Sh	Berea Ss
WS-425	2687	EREX, Inc.	V-2922	Coeburn	12900' S. 36 57' 30"	8580' W. 82 22' 30"	Dev.	5534	Chattanooga Sh	Berea Ss
WS-428	2693	EREX, Inc.	V-2716	Coeburn	5933' S. 36 57' 30"	5048' W. 82 22' 30"	Dev.	5116	Chattanooga Sh	Berea Ss
WS-432	2704	EREX, Inc.	V-2378	Coeburn	3127' S. 36 57' 30"	5807' W. 82 22' 30"	Dev.	5628	Chattanooga Sh	Berea Ss
WS-354	2255	EREX, Inc.	V-2538	Flat Gap	4800' S. 37 02' 30"	11300' W. 82 37' 30"	Dev.	5579	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls
WS-415	2557	EREX, Inc.	VCP-3097	Flat Gap	6300' S. 37 02' 30"	8900' W. 82 42' 30"	Dev.	2723	Lee	Lee, Norton, Wise
WS-421	2628	EREX, Inc.	V-3106	Flat Gap	2275' S. 37 02' 30"	1280' W. 82 37' 30"	Dev.	5290	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls
WS-426	2691	EREX, Inc.	V-3140	Flat Gap	3050' S. 37 05' 00"	8100' W. 82 40' 00"	Dev.	5060	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls
WS-434	2717	EREX, Inc.	VCP-3137	Flat Gap	12060' S. 37 00' 00"	3150' W. 82 37' 30"	Dev.	2182	Lee	Lee, Norton
WS-435	2718	EREX, Inc.	VC-3181	Flat Gap	13425' S. 37 00' 00"	900' W. 82 37' 30"	Dev.	2443	Lee	Lee, Norton
WS-449	2807	EREX, Inc.	VC-3222	Flat Gap	7450' S. 37 02' 30"	1790' W. 82 37' 30"	Dev.	2553	Lee	Norton
WS-417	2601	EREX, Inc.	V-2745	Norton	2910' S. 37 00' 00"	4075' W. 82 37' 30"	Dev.	5553	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls
WS-423	2664	EREX, Inc.	V-2749	Norton	7000' S. 37 00' 00"	4900' W. 82 37' 30"	Dev.	5836	Chattanooga Sh	Chattanooga Sh, Price
WS-427	2692	EREX, Inc.	V-2659	Norton	750' S. 37 00' 00"	2280' W. 82 37' 30"	Dev.	5658	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls
WS-429	2697	EREX, Inc.	V-2751	Norton	9650' S. 37 00' 00"	6825' W. 82 37' 30"	Dev.	5504	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls
WS-433	2711	EREX, Inc.	VCP-3095	Norton	225' S. 37 00' 00"	11225' W. 82 37' 30"	Dev.	2221	Lee	Lee, Norton
WS-436	2724	EREX, Inc.	V-2758	Norton	4950' S. 37 00' 00"	5660' W. 82 40' 00"	Dev.	5736	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls
WS-437	2727	EREX, Inc.	V-2759	Norton	8980' S. 36 57' 30"	5025' W. 82 30' 00"	Dev.	5590	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls
WS-447	2805	EREX, Inc.	VCP-3231	Norton	1442' S. 37 00' 00"	4327' W. 82 40' 00"	Dev.	2445	Lee	Lee, Norton
WS-461	2859	EREX, Inc.	V-2753	Norton	11295' S. 37 00' 00"	91 20' W. 82 37' 30"	Dev.	5420	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls

Table 11. Continued.

File Number	Permit Number	Operator	Well Name	7.5-minute Quadrangle	Latitude (feet from)	Longitude (feet from)	Well Class	Total Depth (feet)	Formation at Total Depth	Producing Formation
WS-454	2827	EREX, Inc.	V-3198	Pound	310' S. 37 02' 30"	4395' W. 82 32' 30"	Dev.	5650	Chattanooga Sh	Chattanooga Sh
WS-260	1161	EREX, Inc.	V-2343	Wise	8500' S. 36 55' 00"	4300' W. 82 30' 00"	Dev.	4470	Chattanooga Sh	Chattanooga Sh, Berea Ss
WS-420	2612	EREX, Inc.	V-2685	Wise	10650' S. 36 55' 00"	2125' W. 82 32' 30"	Dev.	4365	Chattanooga Sh	Chattanooga Sh
WS-431	2699	EREX, Inc.	V-2367	Wise	13520' S. 36 57' 30"	8960' W. 82 30' 00"	Dev.	4801	Chattanooga Sh	Chattanooga Sh, Berea Ss, Greenbrier Ls
WS-438	2738	EREX, Inc.	V-2364	Wise	2025' S. 36 55' 00"	1480' W. 82 30' 00"	Dev.	4828	Chattanooga Sh	Chattanooga Sh, Berea Ss
WS-441	2793	EREX, Inc.	V-2727	Wise	10200' S. 36 55' 00"	7200' W. 82 30' 00"	Dev.	4794	Chattanooga Sh	Chattanooga Sh, Berea Ss, Greenbrier Ls
WS-445	2803	EREX, Inc.	V-2325	Wise	5625' S. 36 55' 00"	3450' W. 82 30' 00"	Dev.	4680	Chattanooga Sh	Chattanooga Sh, Berea Ss