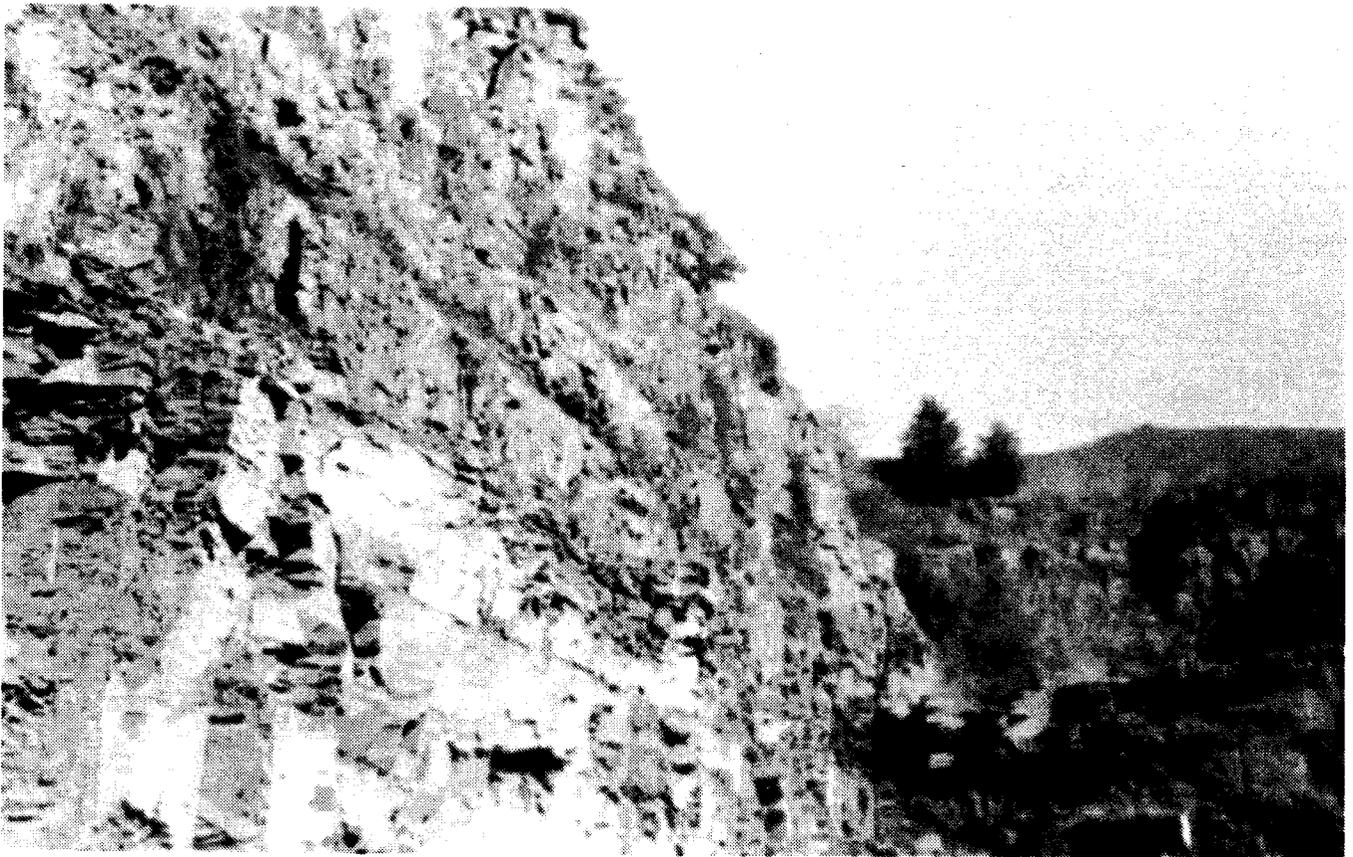


VIRGINIA DIVISION OF MINERAL RESOURCES

PUBLICATION 139

**COAL, OIL AND GAS, AND INDUSTRIAL AND METALLIC
MINERALS INDUSTRIES IN VIRGINIA, 1993**

Palmer C. Sweet and Jack E. Nolde



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

CHARLOTTESVILLE, VIRGINIA
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FRONT COVER: Quarry highwall, in sandstone of Triassic-age, Martin Marietta Aggregates, Culpeper Quarry, Culpeper County.

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COAL, OIL AND GAS, AND INDUSTRIAL AND METALLIC MINERALS INDUSTRIES IN VIRGINIA, 1993

Palmer C. Sweet and Jack E. Nolde

INTRODUCTION

The total value of mineral production in Virginia in 1993 was 1.67-billion dollars (Table 1; Figure 1). About 1.07-billion dollars resulted from coal sales, a 10 percent decrease in value from the 1992 figure of 1.19-billion dollars. This difference was due to the drop in coal prices. About 85-million dollars was produced from the sale of petroleum and natural gas, with the remaining 515-million dollars from production of industrial rocks and minerals (Table 2 and 3). This represents a 90-million dollar increase for 1993, when compared with 1992 statistics. Natural gas production was up 45 percent, while petroleum production was down almost 13 percent. The value of crushed stone was up almost 19 percent and the value of sand and gravel was up 6 percent. On a slight decline were 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 feldspar, marketed as "Virginia aplite"; and was one of three states mining vermiculite. Virginia also ranked fifth in crushed stone production and 34th in the production of sand and gravel. Several mineral commodities, including lithium carbonate, manganese, mica, perlite, and phosphate rock were imported for processing.

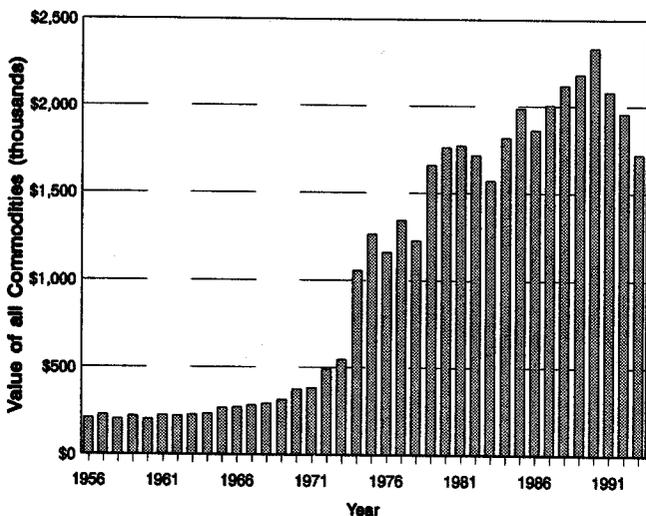


Figure 1. Total mineral resource production in Virginia, 1956 to 1993.

COAL

Coal production in Virginia declined from 42.6 million short tons in 1992 to 40.1 million short tons in 1993 (Table 1), a 5.8

percent decrease. Coal was produced from 415 surface and underground mines in the southwest Virginia coalfields (Plate) located in Buchanan, Dickenson, Lee, Russell, Scott, Tazewell, and Wise Counties (Figure 2). Total production from 313 underground mines was 30,548,018 short tons and from 102 surface mines was 9,542,629 short tons. Total value was \$1,074 million; average mine price was \$26.80 per ton. Tables 4 through 6 show production data by county, coalbed, type of mining method, and also employment statistics. Almost 34 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. A large percentage of 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.

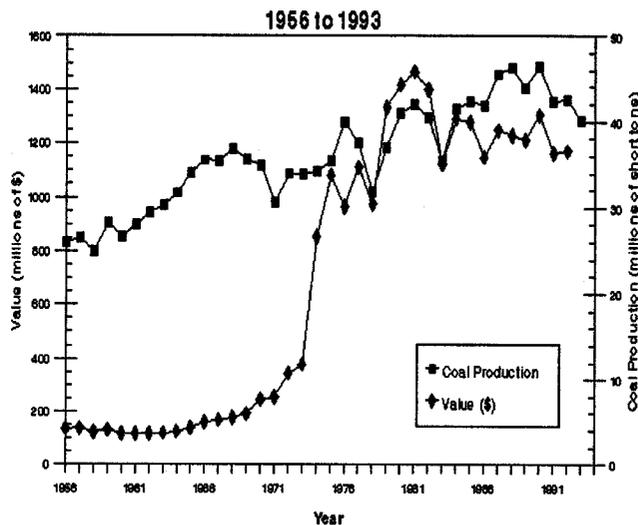


Figure 2. Trend of coal production and value, 1956 to 1993; value (\$) based on average mine price.

OIL AND GAS

Crude oil and gas condensate production in Virginia totaled 12,120 barrels in 1993, a 5.9 percent decrease from the 1992 production of 12,881 barrels (Figure 3). The 1993 production of 12,120 barrels of oil had a value of \$196,465; average unit value was \$16.21 per barrel. Production was by 7 companies from 50 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). Almost all of Virginia oil comes from the Ordovician Trenton Limestone and the gas condensate comes from the Mississippian Greenbrier Limestone ("Big Lime").

Total natural gas production increased 49.8 percent, from 24,733,611 Mcf in 1992 from 1153 wells to 37,051,735 Mcf in

1993 from 1428 wells (Table 8; Figure 4). Conventional gas wells produced 17,128,272 Mcf from 963 wells; 46.2 percent of the total production. Coalbed methane wells produced 19,923,463 Mcf from 465 wells; 53.8 percent of the total production in the state. The average price paid to Virginia's natural gas producers in 1993 was 2.29 dollars per Mcf. The market value for Virginia's natural gas was \$84,848,473.

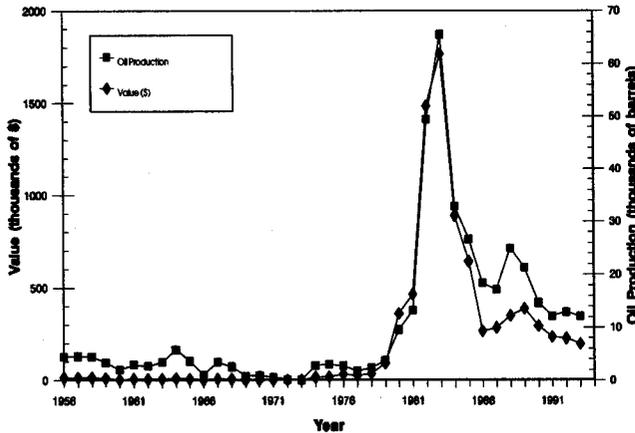


Figure 3. Trend of oil and gas condensate production and value 1956 to 1993; value (\$) based on average wellhead price.

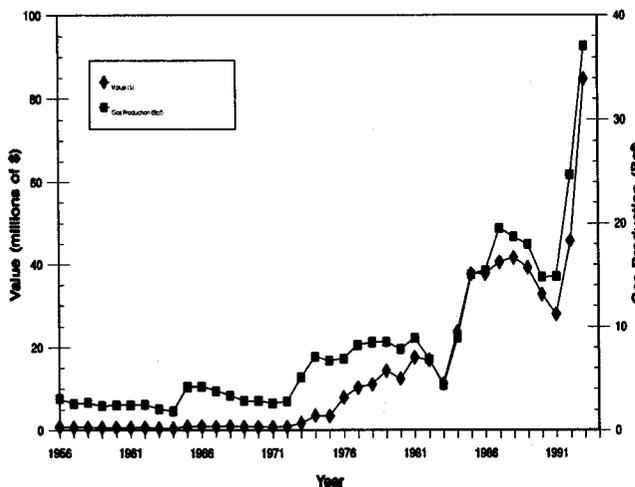


Figure 4. Trend in natural gas production, 1956 to 1993; value (\$) based on average wellhead price.

PERMITTING ACTIVITY

Overall permitting activity decreased. The Department of Mines, Minerals, and Energy, Division of Gas and Oil issued 516 permits in 1993, a decrease of 32.9 percent from 1992 figures. Of these, 102 permits were issued to drill new coalbed methane wells, 53 permits were for new conventional wells, and 115 permits were for pipeline construction (Table 9). Two-hundred and thirty-two permits were for transfer of existing gas and oil wells, facilities, and pipelines. The remaining 14 permits were for conversion of existing 13 vertical ventilation holes to coalbed methane wells and one permit for a geophysical survey.

DRILLING ACTIVITY

In 1993, a total of 152 wells were drilled in Virginia. This represents an 18.3 percent decrease from the 186 wells drilled in 1992. Of the 152 wells drilled, 57 were completed as conventional wells (37.5 percent)(Table 9) and 95 were completed as coalbed methane wells (62.5 percent); 9 of the coalbed methane wells are converted vertical ventilation holes. Virginia oil and gas owners/operators submitted 205 well completion reports to the Division of Gas and Oil; 44 of these were wells drilled in 1991, 9 wells drilled in 1992, and the remaining 152 wells were drilled in 1993. Total footage drilled in 1993 was 513,782 feet (Table 10), a 27 percent decrease from 704,087 feet drilled in 1992. Of the 1993 total footage, 294,839 feet were for conventional wells and 218,943 feet were for coalbed methane wells. Of the total for coalbed methane wells, 17,607 feet were for wells converted from vertical ventilation holes that were drilled prior to 1993. In 1993, the average depth drilled for a conventional gas well was 5,173 feet and for coalbed methane was 2,305 feet. The county with the most active natural gas and coalbed methane wells drilled was Buchanan with 56, followed by Wise with 39, and Dickenson with 50. Five additional coalbed methane wells were drilled in Russell County and 2 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 1993.

Buchanan County

Conventional wells: Ashland Exploration, Inc. completed two development wells with a total footage of 11,073 feet; average depth of 5,537 feet. Two development wells were completed by Columbia Natural Resources during 1993 with a total footage of 10,824 feet; average depth of 5412 feet. Three development wells were completed by Virginia Gas Company in 1993 with a total footage of 13,475 feet; average footage drilled was 4,492 feet. These seven wells are located in the Breaks-Haysi gas field in the western part of the county.

Coalbed methane wells: One-hundred and two coalbed methane wells were completed during 1993 in Buchanan County. Of these, fifty-four development wells were completed by Consol, Inc./Oxy USA. Total footage drilled was 105,579 feet; average total depth was 1955 feet. Equitable Resources Exploration completed 3 development wells with a total footage of 6578 feet; average total depth of 2193 feet. The Island Creek Coal Company completed 16 conversions of vertical ventilation holes to coalbed methane wells with a total footage of 31,976 feet; average total depth of 1999 feet. Twenty-six development wells were completed by Pocahontas Gas Partnership with a total footage of 49,120 feet; average footage of 1889 feet. Formation at total depth for six of the wells was the Mississippian Bluestone Formation and the remaining 96 were completed in the Pennsylvanian Pocahontas Formation. Gas production in the wells is by commingling of gas from coalbeds and associated strata in the Lee and upper part of the Pocahontas Formations.

Dickenson County

Conventional wells: Three development wells were completed by Virginia Gas Company during 1993 with a total footage of 12,828 feet; average 4276 feet. Formation at total depth in the three wells is the Chattanooga Shale. One of these wells produces from the Berea Sandstone and the other two by commingling gas from the Greenbrier Limestone and Berea Sandstone.

Equitable Resources Exploration, Inc. completed 5 development wells in the Nora gas field. Total footage drilled in these wells was 23,051 feet; average depth of 4610 feet. Formation at total depth in the three wells is the Chattanooga Shale. One of these wells produced from the Berea Sandstone and the other two by commingling gas from the Greenbrier Limestone and Berea Sandstone.

Coalbed methane wells: Thirty-two development wells were completed by Equitable Resources Exploration, Inc. during 1993. Total footage drilled was 71,795 feet; average total depth was 2,244 feet. Formation at total depth for 23 of the wells was the Mississippian Bluestone Formation and the remaining 9 were completed in the Pennsylvanian Pocahontas Formation. Gas production in the wells is by commingling of gas from coalbeds and associated strata in the Lee and upper part of the Pocahontas Formations.

Lee County

Conventional wells: AMVEST Oil and Gas Co., Inc. completed 2 development wells. Total footage drilled was 10,944 feet; average depth was 5472 feet. Both wells were drilled into the Devonian Wildcat Valley Sandstone.

Russell County

Coalbed methane wells: Equitable Resources Exploration, Inc. completed 5 development wells with a total footage of 10,986 feet; average total depth was 2197 feet. Formation at total depth for 2 of the wells was the Mississippian Bluestone Formation and the remaining 3 were completed in the Pennsylvanian Pocahontas Formation.

Wise County

Conventional wells: Equitable Resources Exploration, Inc. completed 43 development wells with a total footage of 229,845 feet; average total depth was 5345 feet.

Coalbed methane wells: Equitable Resources Exploration, Inc. completed 5 development wells with a total footage of 12,402 feet; average total depth was 2480 feet. Formation at total depth in three of the wells is the Mississippian Bluestone Formation and the remaining two wells were completed in the Lee Formation.

INDUSTRIAL AND METALLIC COMMODITIES

CEMENT

Three companies produce cement in Virginia. Roanoke Cement Company operates a plant in western Botetourt County

that 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 that is sold to building suppliers in Virginia and surrounding states. LaFarge Calcium Aluminate, Inc. operated a cement manufacturing plant in the City of Chesapeake. Cement clinker is imported from France, 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 the capacity to be used under a wide range of temperatures.

CLAY MATERIALS

Residual and transported clay, weathered phyllite and schist, and shale are used as raw material to produce bricks in Virginia. More than 762,000 metric tons of clay (exclusive of fuller's earth) were produced in Virginia in 1993 and the annual total capacity of all brick plants in the Commonwealth is almost one-half-billion bricks (Figure 5). The clay-material industry in the western part of Virginia mines Paleozoic-age shale primarily to produce face-brick (Figure 6). Face-brick producers, in the central-to-eastern part of Virginia, mine Triassic-age shale and clay residuum in Orange and Prince William Counties, and Precambrian-age schist and residual and transported clay in Amherst, Brunswick, Chesterfield, Greensville, and Henrico Counties.

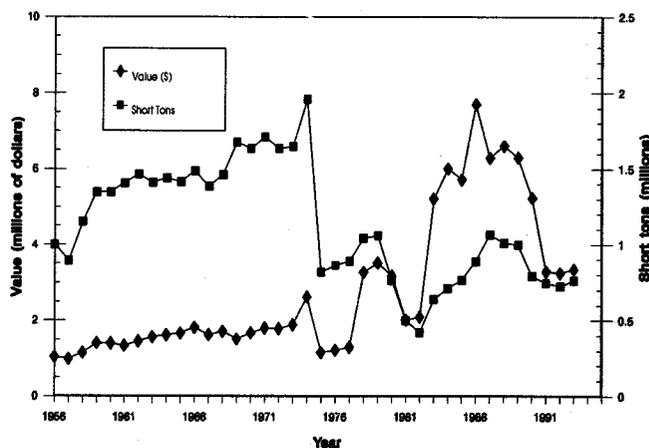


Figure 5. Trend in clay material production and value, 1956 to 1993; 1987 - 1993 Fuller's earth production not included.

Lightweight aggregate is produced in Buckingham and Pittsylvania Counties. Before it closed in the Fall of 1992, Weblite Corporation, located in Botetourt County, mined shale from the Rome Formation to produce lightweight aggregate by the sintering-process, using semianthracite waste coal from Montgomery County to fire its kilns. They utilized about 100 tons of coal per day to yield a lightweight product having a weight as low as 31 lb/ft³ for particle sizes of 5/16 to 3/4 inches. Solite Corporation, located in northern Buckingham County,

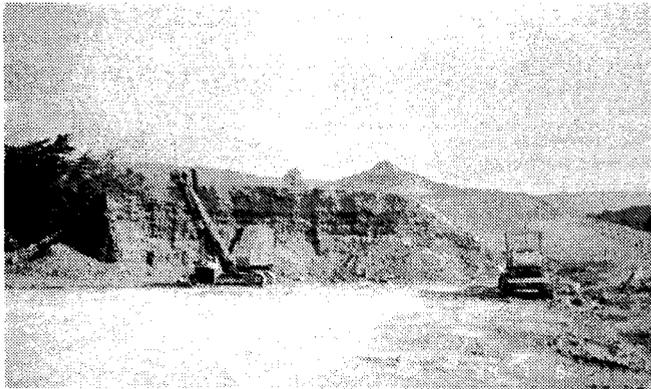


Figure 6. Pit in shale in the Brallier Formation of Devonian age, Old Virginia Brick Co., Inc.

utilizes the Arvonja Slate to produce lightweight aggregate. Triassic-age shale is mined by Virginia Solite Company southwest of Danville, Pittsylvania County, to produce a similar product.

Bennett Mineral Company located 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. During the year, Virginia Clay Co., Inc., located in King William County, received approval from the county for their plans to construct a plant to produce cat litter.

CONSTRUCTION SAND AND GRAVEL

Construction sand and gravel production in Virginia was 10.4 million short tons of material in 1993 at a value of 42 million dollars (Figure 7). Construction sand and gravel production was 3.6 percent higher than in 1992. Sand and gravel is extracted from river terraces and dredged from the rivers in central, eastern, and western parts of the Commonwealth. Some construction sand is also produced in Carroll, Craig, Rockbridge, Smyth, and Warren Counties, which are located in the Valley and Ridge Province, in the western part of the State (Figure 8).

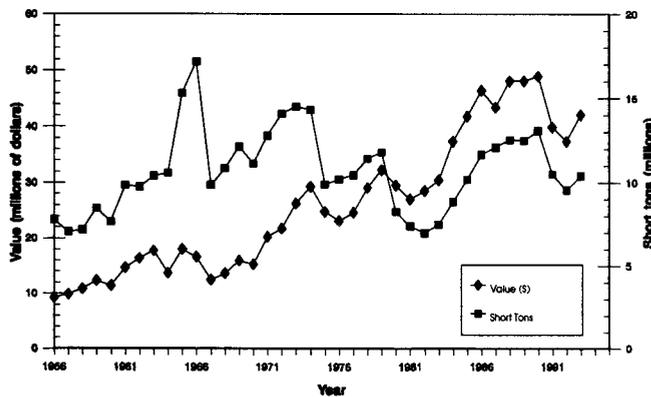


Figure 7. Trend of sand and gravel production and value, 1956 to 1993; 1976-1993 excludes industrial sand and gravel.

Large tonnages of construction sand and gravel, from southeast of Fredricksburg, are shipped by rail into the northern Virginia-Washington, D.C. market area. A large portion of the

production by the Tidewater Quarries, Inc. and Tarmac Mid Atlantic, Inc., located near Richmond, is barged down the James River to the Norfolk area. Shipments are 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 site and stockpile of Castle Sands Co., New Castle, Craig County.

CRUSHED STONE

Fifty-five million tons of crushed stone; including limestone, dolostone, sandstone, quartzite, granite, gneiss, diabase, basalt, greenstone, slate, "Virginia aplite," and marble, were produced in Virginia in 1993 (Figure 9). Virginia's crushed stone was valued at almost 311 million dollars and the State was the fifth leading producer in the United States. Crushed stone production in Virginia was 14.7 percent higher than in 1992.

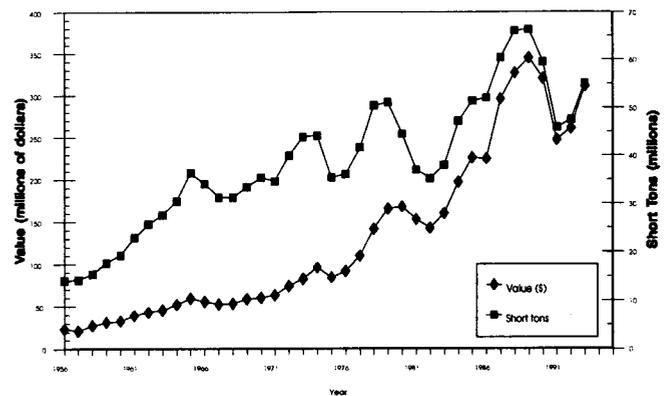


Figure 9. Trend of crushed stone production and value, 1956 to 1993.

Producers of limestone, dolostone, shale, and sandstone and quartzite are located in the Valley and Ridge and Appalachian Plateaus provinces in the western part of the Commonwealth (Figures 10 and 11). Principal end use for these commodities were for roadstone, concrete 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

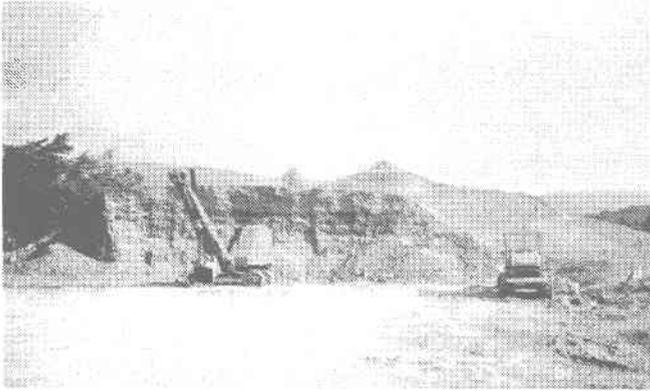


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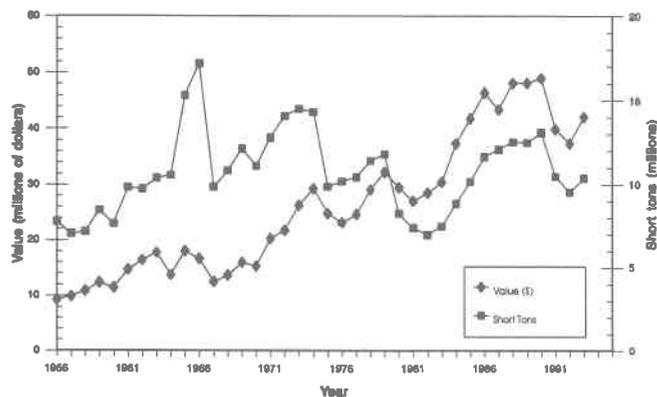


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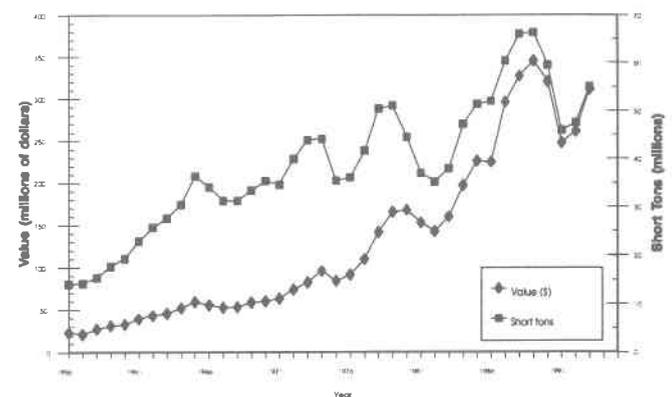


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SiO_2 and 100 percent should pass 20 mesh, with 70 percent passing minus 200 mesh. Finely-ground dolostone and limestone is also marketed by several producers for use as a filler material.



Figure 10. Quarry and primary crushing plant of Charles W. Barger and Son Construction Co. Inc., Lexington, Rockbridge County.

Shale is excavated in Frederick and Rockingham Counties for use as 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 12). Major uses for these materials are for roadstone, concrete aggregate, and asphalt stone. Slate is crushed near Arvonnia in Buckingham County by the Solite Corporation for lightweight aggregate. Production of crushed slate, as a by-product of dimension slate operations, was increased by LeSueur-Richmond Slate Corporation as a result of local highway construction. Appomattox Lime Company, Inc. mines a marble (Mt. Athos Formation) near Oakville in Appomattox County for agricultural lime.

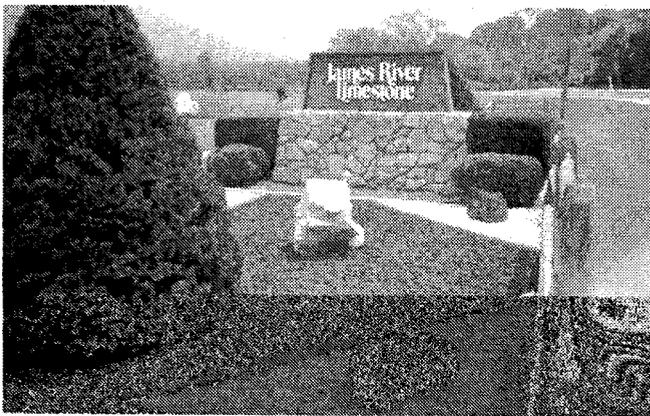


Figure 11. Landscaped entrance to main office of James River Limestone Co., Inc., Buchanan, Botetourt County.

Fines produced at granite quarries that are located in the Petersburg and Red Oak Granites, in the southern part of Virginia, have been used for low-grade fertilizer. Chemical analyses for granitic materials from quarries located in Brunswick

and Nottoway Counties in the southern Piedmont province indicate 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.

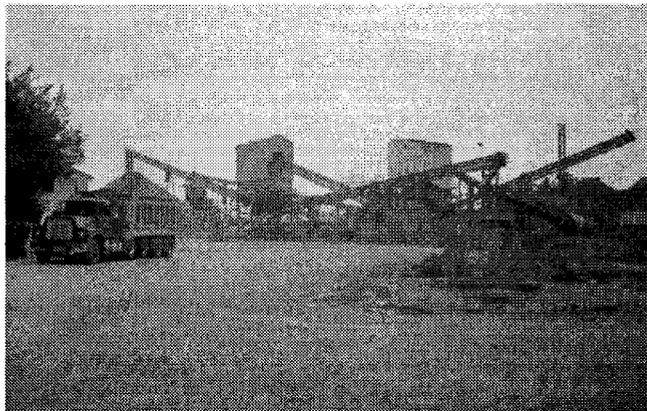


Figure 12. Plant site of Luck Stone Corporation.

DIMENSION STONE

Slate, diabase, quartzite, and soapstone were quarried for dimension stone in the Piedmont province in 1993. Slate was the leading dimension stone type quarried, in terms of cubic feet and value; LeSueur-Richmond Slate Corporation mines slate from two quarries in the Arvonnia area of Buckingham County. Arvonnia slate production dates from the late 1700s and this slate was quarried for use as roofing shingles to cover the State Capitol 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 for use as monument stone is produced by New England Stone in southern Culpeper County. Quartzite, used as flagging material, was extracted from two quarries: Carter Stone Company in Campbell County, south of Lynchburg; and Mower Quarry in Fauquier County, north of Warrenton. The New Alberene Stone Company, Inc. began quarrying soapstone at Alberene in Nelson County in 1988 and opened a new quarry in late 1989 in Albemarle County, just north of the Alberene site. Their products include soapstone fireplaces, fireplace facings, woodstoves, cooking ware, and other products made of solid soapstone.

FELDSPAR

The Feldspar Corporation, which was acquired by U.S. Silica Corporation in November 1993, operates a mine and plant near Montpelier in Hanover County in east-central Virginia and produces a feldspar-rich material. This material is marketed as "Virginia aplite," which is sold to the glass industry. The "aplite" improves the work-ability of molten glass and imparts a chemical stability to the finished glassware. The feldspar is mined from medium-to coarse-grained meta-anorthosite by open pit methods. The rock is trucked to the plant adjacent to the mine for crushing, grinding, classifying, and drying. After processing, the aplite is stored in silos. Clay minerals are removed by

SiO_2 and 100 percent should pass 20 mesh, with 70 percent passing minus 200 mesh. Finely-ground dolostone and limestone is also marketed by several producers for use as a filler material.

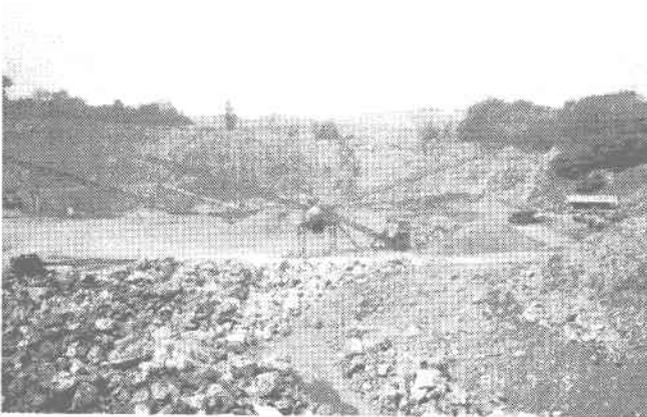


Figure 10. Quarry and primary crushing plant of Charles W. Barger and Son Construction Co. Inc., Lexington, Rockbridge County.

Shale is excavated in Frederick and Rockingham Counties for use as 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 12). Major uses for these materials are for roadstone, concrete aggregate, and asphalt stone. Slate is crushed near Arvonnia in Buckingham County by the Solite Corporation for lightweight aggregate. Production of crushed slate, as a by-product of dimension slate operations, was increased by LeSueur-Richmond Slate Corporation as a result of local highway construction. Appomattox Lime Company, Inc. mines a marble (Mt. Athos Formation) near Oakville in Appomattox County for agricultural lime.

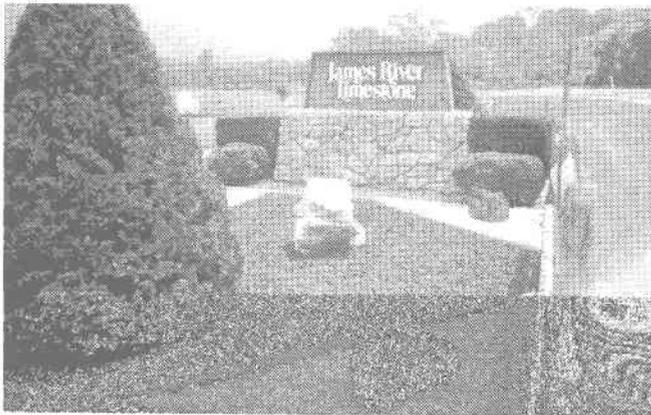


Figure 11. Landscaped entrance to main office of James River Limestone Co., Inc., Buchanan, Botetourt County.

Fines produced at granite quarries that are located in the Petersburg and Red Oak Granites, in the southern part of Virginia, have been used for low-grade fertilizer. Chemical analyses for granitic materials from quarries located in Brunswick

and Nottoway Counties in the southern Piedmont province indicate 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.

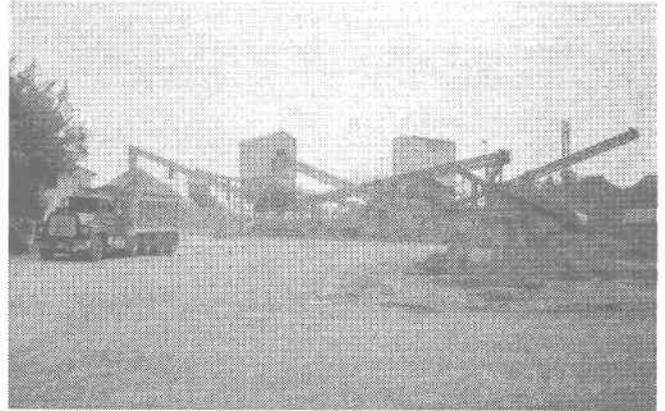


Figure 12. Plant site of Luck Stone Corporation.

DIMENSION STONE

Slate, diabase, quartzite, and soapstone were quarried for dimension stone in the Piedmont province in 1993. Slate was the leading dimension stone type quarried, in terms of cubic feet and value; LeSueur-Richmond Slate Corporation mines slate from two quarries in the Arvonnia area of Buckingham County. Arvonnia slate production dates from the late 1700s and this slate was quarried for use as roofing shingles to cover the State Capitol 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 for use as monument stone is produced by New England Stone in southern Culpeper County. Quartzite, used as flagging material, was extracted from two quarries: Carter Stone Company in Campbell County, south of Lynchburg; and Mower Quarry in Fauquier County, north of Warrenton. The New Alberene Stone Company, Inc. began quarrying soapstone at Alberene in Nelson County in 1988 and opened a new quarry in late 1989 in Albemarle County, just north of the Alberene site. Their products include soapstone fireplaces, fireplace facings, woodstoves, cooking ware, and other products made of solid soapstone.

FELDSPAR

The Feldspar Corporation, which was acquired by U.S. Silica Corporation in November 1993, operates a mine and plant near Montpelier in Hanover County in east-central Virginia and produces a feldspar-rich material. This material is marketed as "Virginia aplite," which is sold to the glass industry. The "aplite" improves the work-ability of molten glass and imparts a chemical stability to the finished glassware. The feldspar is mined from medium-to coarse-grained meta-anorthosite by open pit methods. The rock is trucked to the plant adjacent to the mine for crushing, grinding, classifying, and drying. After processing, the aplite is stored in silos. Clay minerals are removed by

in the feldspar (ilmenite, rutile, and sphene) are removed by electrostatic processes and by magnets. These minerals are titanium bearing and therefore 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, and Indiana as well as Virginia.

In Amherst County, feldspar is marketed as aggregate by the Piney River Quarry of the W. W. Boxley Company, Blue Ridge Stone Corporation. The fines that result from the crushing of the feldspar are stockpiled. In the past, feldspar has been mined from several pegmatite bodies in the Piedmont province including those of 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 was found to be suitable for use in face brick and drain tile; the material fires dark brown to gray. These fines may have potential as a flux material for the brick industry.

GEMSTONES

In 1993, 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 of the minerals found in this pegmatite. The company mines and sells "hand picked" mica. Stone Cross Mountain operates a fee basis collecting operation north of Stuart, Patrick County in southern Virginia. At this site mica pseudomorphs after staurolite crystals (fairystone crosses) are the main interest to collectors and, for a fee, collectors can sift through and wash a bucket of material and extract the fairystones.

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 Commonwealth. 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. The gypsum, after being run through a primary crusher, is trucked to their processing plant at Plasterco, near Saltville, in adjacent Washington County. At Plasterco, the gypsum is ground into "landplaster" ($\text{CaSO}_4 + 2\text{H}_2\text{O}$). The material is calcined to remove the water and produce "stucco". Water is then added to the stucco with additional ingredients (sugar, starch, etc.) and poured, molded and dried between sheets of paper to produce wallboard. Eighty-three different kinds of wallboard are produced at Plasterco; average daily production at the plant could supply the needs for construction of 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 (land plaster) for the peanut industry. The Norfolk facility re-

ceives a few shipments of anhydrite from Nova Scotia for sale to cement manufacturers. This anhydrite is used as a source of sulfur in producing cement clinker.

INDUSTRIAL SAND

Traction sand is produced in Dickenson County by Howard L. Daniels Sand Company. Glass sand is produced by Unimin Corporation near Gore in Frederick County from the Ridgeley Sandstone of Devonian-age. CED Enterprises, in Frederick County, recrystallizes purchased sand in a rotary kiln to produce cristobalite, which is marketed as a fine grit.

IRON-OXIDE PIGMENTS

Virginia is one of four states that produce pigments from natural iron-oxide. Hoover Color Corporation, located 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 between the Erwin Formation and the overlying Shady Dolomite. Deposits, which may be associated with Cambrian age gossans, are concentrated as pockets composed of insoluble clay and iron oxide. Some iron oxide is also concentrated by precipitation from groundwater. The raw material is trucked to the company plant at Hiwassee where it is pulverized, dried, ground, air separated, blended, and packaged prior to 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) as well as building products (colored cinderblocks, brick, etc.). 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. The majority 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. Since September, 1986, Virginia is the only state producing kyanite. The majority of the world's kyanite is produced by Kyanite Mining Corporation from their 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. By calcining, the kyanite is converted to mullite 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 at the Willis Mountain mine, one at the East Ridge mine, and one north of Dillwyn. At these locations, 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 sulfide minerals that are present to magnetic oxides. Pyrite is converted to ferrous iron oxide (Fe_3O_4) or magnetite, which is then removed by magnetic separators and stockpiled.

The Willis Mountain plant processes the raw kyanite, which is then trucked to the East Ridge facility for calcining. Mullite is ground and bagged at the company's Dillwyn Plant and 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. 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 other applications such as sand blasting.

LIME

Virginia's lime production is from six companies located in Frederick, Giles, Shenandoah, and Warren Counties. Production in 1993 was 798,000 short tons valued at more than 38-million dollars (Figure 13). The paper industry uses lime for regeneration of sodium hydroxide and for neutralization of sulfate water. Lime is used in iron furnaces to remove impurities and for water purification. During the last few years, lime has been used to neutralize acid mine water. It is used also for mason's lime, sewage treatment, and for agricultural purposes. One of the most important uses in the 1990s will be to abate the SO_2 and NO_x emissions 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 Eastern 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 their 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. This material is 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 utilized 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 CaCO_3 , 3 to 6 percent $\text{Ca}(\text{OH})_2$,

and 40 to 80 percent H_2O .

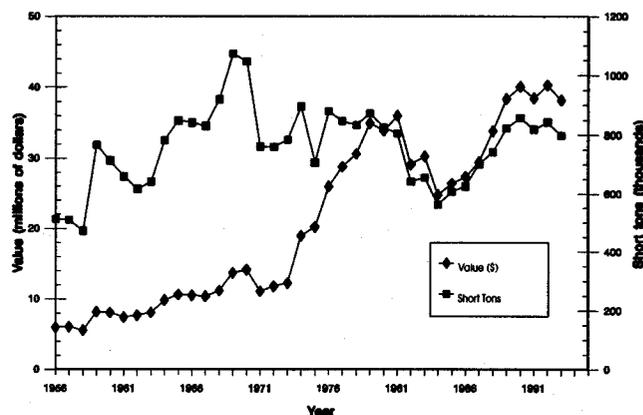


Figure 13. Trend in lime production and value, 1956 to 1993.

MAGNETITE

Reiss Viking Corporation in Tazewell County processed out-of-state magnetite for use in cleaning coal. In the coal cleaning process, magnetite is mixed with water to form a heavy-media slurry into which raw coal is fed. The heavier impurities sink with the magnetite whereas the lighter coal floats and is recovered. This processing operation closed on October 7, 1993 as the plant was too far from the market. Plans were to move the plant to Elkhorn City, Kentucky.

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; quality control of the manganese content and potential contaminants are monitored through continual chemical and mineralogical analyses. The manganese is dried in a gas-fired rotary kiln and crushed with jaw and ball crushers into two basic sizes. Ground manganese is 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

Plate mica is marketed for use in hair dryers and for other electrical applications; reconstituted mica composed 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, process several grades of crude mica, which are imported from Madagascar and India, at facilities in the City of Newport News. Asheville Mica Company produces fabricated plate-mica; Mica Company of Canada uses splittings from Asheville Mica Company to produce reconstituted plate-mica. Presently some "hand-picked" mica is produced in Amelia County. It has been produced in the past from pegmatite bodies in several counties in Virginia, including Henry, and Powhatan.

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 (metabasalt) from the Piedmont province, have been used as aggregate for terrazzo. Exposaic Industries, Inc. in Spotsylvania County utilizes a variety of rock materials in exposed panels, including greenstone from Albemarle County and Triassic-age sandstone from Culpeper County.

In past years several rock types have been utilized for ornamental aggregate. Vein quartz was quarried in Albemarle, Buckingham, Fauquier, Fluvanna, Greene, and Rappahannock Counties, and quartz pebbles were extracted from the flood plain deposits along the Mattaponi River in Caroline County.

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. James River Limestone Co., Inc., near Zion Crossroads, Louisa County, purchases some of the vermiculite, which they exfoliate and market in 4 cubic foot bags. They also pre-mix exfoliated vermiculite with purchased cement and market the product as "Poolcrete". Other uses for the exfoliated material include packing, insulation, lightweight aggregate, and potting material.

PERLITE

Manville Sales Corporation operates a plant at Woodstock in Shenandoah County to expand perlite (volcanic glass with high water content that has developed an "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 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 after which it is marketed as a poultry and animal feed supplement in southern and midwestern states.

SULFUR

Elemental sulfur is recovered from hydrogen sulfide gas by the Claus process during crude-oil refining by Amoco Oil Company. The refinery is adjacent 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 in Richmond.

VERMICULITE

Virginia is one of three states where vermiculite, a hydrated magnesium-iron-aluminum silicate, is mined. Virginia Vermiculite, Ltd. operates an open-pit mine and processing facility near Boswells Tavern in Louisa County. The vermiculite is mined with a backhoe and 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

Table 1. Mineral Resource Production In Virginia, 1993^{1/p}

Mineral Commodity	Quantity	Value (thousands)
Clay _____ metric tons _____	762,000	\$ 3,344
Coal (bituminous) ₂ (\$26.80) ₃ - thousand short tons _____	40,091	1,074,439
Gemstones _____	NA	W
Lime _____ thousand short tons _____	798	38,168
Natural Gas ₂ (\$2.29/1000 cu. ft.) ₂ - million cubic feet _____	37,052	84,848
Petroleum (crude) ₂ (\$16.21/bl) ₂ - 42-gallon barrels _____	12,120	196
Sand and gravel ₂ _____ thousand short tons _____	10,400	42,100
Stone:		
Crushed _____ thousand short tons _____	55,000	310,800
Dimension _____ short tons _____	W	W
Combined value of cement, clay (fuller's earth), dimension stone, feldspar, gemstones, gypsum, industrial sand iron-oxide pigments, kyanite, sulfur, vermiculite _____	XX	120,877
Total _____	XX	\$1,674,772

NA, Not available. XX, Not Applicable p, Preliminary e, Estimated

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

3/Average Mine Price - From Energy Information Administration.

Table 2. Summary of metal/nonmetal mining by commodity, 1993; source: Virginia Division of Mineral Mining.

Commodity	Annual Tonnage	Office Workers	Office Hours	Office Wages	Plant Workers	Quarry Workers	Production Hours	Production Wages
Aplite	380,527.00	7	5,734	\$98,937	34	7	32,477	\$331,937
Basalt	821,250.00	2	4,800	\$48,931	0	16	41,877	\$494,827
Clay	162,384.00	7	3,633	\$49,006	0	19	9,199	\$112,279
Diorite	287,543.85	5	11,179	\$233,149	15	5	46,841	\$508,155
Dolomite	1,314,907.06	16	32,877	\$1,052,044	21	21	81,808	\$1,363,533
Feldspar	148,236.00	4	7,381	\$140,805	28	5	60,193	\$806,876
Fullers Earth	50,900.00	8	12,780	\$200,629	42	2	93,344	\$795,000
Gemstones	0.00	0	0	\$0	0	1	200	\$0
Gold	7.00	0	0	\$0	0	0	0	\$0
Granite	22,408,966.00	113	7,078,547	\$3,858,062	257	318	1,326,310	\$17,360,327
Gravel	123,710.00	4	59	\$470	0	11	2,731	\$45,297
Greenstone	467,319.00	1	3,119	\$30,903	9	2	27,331	\$282,700
Gypsum	285,321.00	8	18,663	\$302,356	0	59	138,640	\$1,525,100
Iron Oxide	400.00	3	46	\$60	0	2	40	\$1,600
Kyanite	581,825.00	18	36,852	\$718,109	112	30	285,350	\$3,052,490
Limestone	20,203,556.00	298	614,147	\$10,930,042	957	516	2,926,577	\$32,520,820
Limonite	761.00	11	23,637	\$438,413	28	0	68,044	\$460,720
Marl	19,317.75	4	5,132	\$80,069	0	9	20,099	\$189,320
Quartz	15,431.00	1	5	\$70	0	1	1,885	\$16,740
Quartzite	909,130.00	5	10,649	\$139,439	42	10	117,183	\$1,241,883
Sand	6,171,764.61	121	96,198	\$1,471,293	161	196	495,758	\$4,269,325
Sand & Gravel	7,748,383.50	56	63,813	\$1,298,946	156	144	568,757	\$5,961,817
Sandstone	920,765.00	5	9,293	\$128,529	30	15	86,106	\$889,209
Shale	803,516.00	64	67,147	\$1,796,987	299	43	627,121	\$5,309,419
Slate	377,225.00	27	59,428	\$871,824	122	19	256,221	\$2,258,535
Soapstone	301.00	7	10,185	\$218,052	4	0	3,242	\$45,866
Traprock	8,016,902.50	48	102,682	\$2,066,997	79	141	428,384	\$6,306,340
Vermiculite	3,333,896.00	5	12,348	\$170,700	14	6	46,103	\$446,500
Total	72,254,245.83	848	8,290,323	\$26,344,822	2,410	1,598	7,791,821	\$86,596,615

Table 3. Summary of metal/nonmetal mining by county/city, 1993; source: Virginia Division of Mineral Mining.

COUNTY/CITY	ANNUAL TONNAGE	OFFICE WORKERS	OFFICE HOURS	OFFICE WAGES	PLANT WORKERS	QUARRY WORKERS	PRODUCTION HOURS	PRODUCTION WAGES
Accomack	24,992.00	1	150	\$1,646	1	9	5,818	\$48,692
Albemarle	1,093,983.00	4	9,117	\$147,654	22	17	71,505	\$902,877
Amelia	0.50	0	0	\$0	0	0	200	\$0
Amherst	340,277.00	2	4,211	\$73,259	0	8	21,615	\$196,800
Appomattox	237,763.00	5	9,588	\$184,657	10	9	49,437	\$369,306
Augusta	1,109,758.00	9	5,061	\$199,140	24	43	84,049	\$1,168,942
Bedford	860,548.00	12	16,977	\$186,352	14	25	72,938	\$720,847
Bland	77,155.00	1	2,281	\$48,442	2	4	9,288	\$156,894
Botetourt	2,157,451.00	46	92,368	\$1,813,129	242	44	578,597	\$7,432,401
Brunswick	1,682,899.00	21	42,501	\$861,753	138	63	303,965	\$2,791,228
Buckingham	999,505.00	32	63,600	\$1,391,622	195	55	489,633	\$4,807,266
Campbell	1,444,535.00	10	14,097	\$150,504	34	15	103,480	\$1,157,141
Caroline	829,777.00	10	18,972	\$174,363	10	14	46,413	\$432,471
Charles City	558,647.00	4	9,095	\$123,711	12	9	45,221	\$440,107
Charlotte	6,785.00	0	0	\$0	3	0	1,540	\$11,000
Chesapeake(City of)	1,874,027.00	13	25,437	\$225,700	2	20	33,675	\$296,628
Chesterfield	1,342,751.00	23	36,969	\$418,879	57	21	206,386	\$1,675,689
Clarke	113,603.00	1	2,515	\$23,648	3	8	20,231	\$176,793
Craig	108,804.00	5	4,928	\$116,489	6	2	21,900	\$164,513
Culpeper	529,513.00	7	8,176	\$106,267	17	23	53,302	\$706,031
Danville (City of)	13,895.00	1	131	\$1,050	1	1	2,232	\$19,762
Dinwiddie	1,213,334.00	2	4,160	\$70,000	21	10	89,275	\$1,134,000
Essex	500.00	1	0	\$0	0	0	0	\$0
Fairfax	3,613,375.00	13	22,526	\$505,647	21	43	123,506	\$2,264,680
Fauquier	724,447.00	6	10,326	\$196,000	7	16	38,692	\$570,655
Franklin	10,400.00	0	0	\$0	0	2	975	\$6,135
Frederick	2,337,316.00	30	59,430	\$762,096	118	69	338,503	\$3,780,913
Giles	1,166,017.00	39	43,908	\$664,277	181	91	432,423	\$4,270,461
Gloucester	254,689.00	5	4,614	\$50,623	3	5	10,809	\$100,753
Goochland	2,582,307.00	14	26,491	\$420,038	18	53	111,145	\$1,630,864
Grayson	363,434.00	2	4,410	\$21,011	12	11	38,870	\$315,143
Greene	560,827.00	1	2,400	\$26,407	0	15	31,266	\$447,355
Greensville	1,735,570.00	28	55,185	\$1,071,931	138	68	305,115	\$2,852,452
Halifax	977,873.00	6	11,670	\$237,612	14	9	36,306	\$580,806
Hampton (City of)	148,622.00	1	2,224	\$30,858	0	6	3,256	\$32,605
Hanover	1,999,306.00	17	24,170	\$474,949	67	22	165,571	\$2,392,854
Henrico	3,613,906.00	8	8,718	\$75,184	37	56	188,461	\$2,066,576
Henry	898,843.00	13	23,366	\$312,004	26	16	98,556	\$1,027,446
Highland	9,294.00	1	1,541	\$10,460	0	2	2,687	\$17,600
Isle of Wight	397,092.00	14	22,695	\$365,849	2	35	74,355	\$865,679
James City	211,233.00	6	577	\$1,280	1	7	1,944	\$32,635
King and Queen	160,119.00	12	17,030	\$21,410	43	4	90,912	\$848,570
King George	1,128,866.00	5	10,432	\$108,123	14	17	46,737	\$448,296
King William	474,051.00	4	4,755	\$69,087	6	18	29,064	\$351,249
Lancaster	20,894.00	3	50	\$640	0	15	725	\$15,957
Lee	467,887.00	5	8,821	\$80,183	12	17	36,313	\$247,548
Loudoun	3,716,212.00	31	64,375	\$1,022,656	46	58	216,156	\$3,374,822
Louisa	417,301.00	8	17,237	\$197,371	18	21	82,525	\$816,411
Mathews	6,350.00	1	10	\$40	0	2	1,080	\$3,600
Mecklenburg	497,001.00	7	10,113	\$83,680	12	8	44,922	\$431,950
Middlesex	75,172.00	2	17	\$72	1	12	3,983	\$19,481
Montgomery	1,504,201.00	12	26,712	\$453,027	18	24	98,440	\$856,147
Nelson	3,220.00	6	5,760	\$174,105	27	3	23,293	\$180,037
New Kent	100.00	1	40	\$500	1	0	40	\$500

Table 3. Summary of metal/nonmetal mining by county/city, 1993 (continued).

COUNTY/CITY	ANNUAL TONNAGE	OFFICE WORKERS	OFFICE HOURS	OFFICE WAGES	PLANT WORKERS	QUARRY WORKERS	PRODUCTION HOURS	PRODUCTION WAGES
Northampton	17,703.00	1	320	\$1,920	0	11	1,545	\$9,446
Northumberland	31,897.20	5	112	\$576	1	9	1,176	\$5,501
Nottoway	574,194.00	1	2,400	\$29,184	0	18	33,762	\$298,407
Orange	95,858.00	2	2,752	\$40,771	0	1	1,381	\$11,907
Patrick	10.00	1	48	\$6,000	0	1	8	\$0
Pittsylvania	163,468.00	15	25,804	\$373,476	28	9	52,763	\$458,607
Powhatan	519,774.00	1	2,400	\$22,408	0	12	27,319	\$293,947
Prince Edward	0.00	1	14,195	\$14,744	16	0	34,443	\$398,446
Prince George	959,042.00	4	8,320	\$173,000	12	23	74,161	\$712,000
Prince William	2,314,561.00	16	23,007	\$632,309	24	25	79,952	\$1,942,769
Pulaski	408,644.00	14	30,057	\$464,442	39	9	100,394	\$741,410
Richmond	2,000.00	1	10	\$0	0	1	150	\$1,500
Richmond (City of)	1,901,753.00	1	2,600	\$25,779	22	23	94,038	\$1,194,168
Roanoke	1,154,014.00	22	45,120	\$911,886	100	15	242,603	\$2,223,374
Rockbridge	359,406.00	11	19,396	\$243,655	10	24	46,699	\$352,216
Rockingham	1,637,996.00	22	40,489	\$690,355	46	54	115,516	\$1,023,076
Russell	1,504,373.00	20	45,568	\$691,313	66	29	202,210	\$1,741,126
Scott	378,251.00	2	3,716	\$31,848	2	15	28,292	\$342,067
Shenandoah	1,198,702.00	31	63,422	\$1,361,123	55	32	194,656	\$2,190,805
Smyth	563,676.00	15	25,052	\$426,670	5	78	174,414	\$1,798,313
Southampton	207,495.00	3	1,952	\$17,728	6	7	21,849	\$182,542
Spotsylvania	1,900,195.00	8	11,567	\$169,237	43	29	125,279	\$1,310,367
Stafford	1,670,165.00	11	19,321	\$367,353	14	19	61,729	\$881,406
Suffolk (City of)	638,042.00	3	3,120	\$30,300	1	13	4,274	\$34,796
Surry	410.00	0	0	\$0	0	0	0	\$0
Sussex	51,889.00	2	605	\$2,000	3	3	7,790	\$93,529
Tazewell	1,221,865.00	8	18,409	\$351,172	30	31	112,140	\$700,447
Virginia Beach (City of)	1,200,727.00	14	11,297	\$235,805	2	26	20,456	\$313,399
Warren	627,270.00	29	58,126	\$1,841,185	46	22	138,918	\$2,360,674
Washington	531,903.00	3	7,006	\$223,469	11	9	40,991	\$404,646
Westmoreland	67,038.00	3	2,565	\$63,998	1	3	2,765	\$35,798
Wise	500,849.00	2	3,236	\$26,775	2	19	39,790	\$403,936
Wythe	1,097,853.00	14	24,563	\$241,945	53	30	384,484	\$1,423,218
York	12,216.00	0	0	\$0	0	1	0	\$10,080
TOTAL	70,209,573.15	797	1,376,492	\$23,656,811	2,296	1,726	7,453,277	\$79,553,491

Table 4: Summary of coal mine production in Virginia, 1993; source: Virginia Division of Mines.

	Buchanan	Dickenson	Lee	Russell	Scott	Tazewell	Wise	Total
Number of Mines								
Auger	0	9	3	0	0	0	12	24
Strip	17	22	3	8	0	1	26	78
Surface Total	17	31	6	8	0	1	38	102
Undg. Total	163	35	22	11	1	36	45	313
Total	180	66	28	19	1	37	83	415
Tonnages								
Auger	0	233,815	21,124	0	0	0	208,854	463,793
Strip	1,216,646	1,994,842	175,980	809,897	0	1,694	4,879,779	9,078,837
Surface Total	1,216,646	2,228,657	197,103	809,897	0	1,694	5,088,633	9,542,630
Undg. Total	12,747,541	3,888,436	2,600,605	495,548	53,122	2,910,026	7,852,830	30,548,018
Total	13,964,187	6,117,093	2,797,708	1,305,355	53,122	2,911,719	12,941,463	40,090,647
Mining Method								
Longwall	4,579,815	742,702	759,017	0	0	0	1,165,716	7,247,250
Cont. miner	8,103,020	3,139,114	1,841,588	464,843	0	2,888,193	6,687,114	23,123,872
Other	64,706	6,620	0	30,615	0	21,833	0	176,895
Undg. Total	12,747,541	3,888,436	2,600,605	495,458	53,122	2,910,026	7,852,830	30,548,018
Auger	0	233,815	21,124	0	0	0	208,854	463,793
Strip	1,216,646	1,994,842	175,980	809,897	0	1,694	4,879,779	9,078,837
Surface Total	<u>1,216,646</u>	<u>2,228,657</u>	<u>197,103</u>	<u>809,897</u>	<u>0</u>	<u>1,694</u>	<u>5,088,633</u>	<u>9,542,630</u>
Total	13,964,187	6,117,093	2,797,708	1,305,355	53,122	2,911,719	12,941,463	40,090,647

Table 5. Summary of coal mining in Virginia by coalbed, 1993; source: Virginia Division of Mines.

Coal Bed	Buchanan	Dickenson	Lee	Russell	Scott	Tazewell	Wise	Total
Addington	0	0	0	0	0	0	4,513	4,513
Aily	41,224	18,794	0	0	0	0	0	60,018
Big Fork	0	0	0	630	0	0	0	630
Blair	627,278	0	0	0	0	0	109,268	736,546
Campbell Creek	46,021	0	0	0	0	0	216,943	262,964
Cedar Grove	0	0	0	0	0	0	192,340	192,340
Clintwood	114,400	1,392,027	300	0	0	0	686,142	2,192,869
Cove Creek	0	0	0	0	53,122	0	0	53,122
Dorchester	504,615	552,032	0	0	0	0	1,752,657	2,809,305
Darby	0	0	314,489	0	0	0	0	314,489
Eagle	232,519	19,432	0	0	0	0	0	251,951
Greasy Creek	0	0	0	0	0	520,428	0	520,428
Hagy	372,886	0	0	0	0	0	0	372,886
High Splint	0	0	0	0	0	0	615,743	615,743
Harlan	0	0	302,353	0	0	0	0	302,353
Imboden	0	0	0	0	0	0	1,209,101	1,209,101
Jawbone	1,732,413	1,590,617	0	426,606	0	34,172	567,098	4,350,907
Kelly	0	0	10,075	0	0	0	1,315,663	1,325,738
Kennedy	643,868	0	0	409,643	0	1,694	0	1,055,205
Low Splint	0	0	0	0	0	0	675,665	675,665
Lower Banner	80,152	748,072	0	27,822	0	0	82	856,127
Lower Horsepen	0	0	0	0	0	149,012	0	149,012
Lower Seaboard	0	0	0	0	0	985,494	0	985,494
Lower St. Charles	0	0	597,656	0	0	0	0	597,656
Lyons	0	0	0	0	0	0	176,379	176,379
Middle Seaboard	0	0	0	0	0	21,833	0	21,833
Norton	0	71,238	0	0	0	0	436,115	507,353
Pardee	0	0	69,311	0	0	0	759,371	828,682
Phillips	0	0	438,538	0	0	0	118,491	557,029
Pinhook	0	0	0	0	0	0	186,573	186,573
Pocahontas No. 3	6,158,029	0	0	0	0	163,102	0	6,321,131
Pocahontas No. 8	0	0	0	0	0	0	49,670	49,670
Raven	1,005,000	505,843	0	0	0	267,450	0	1,778,294
Red Ash	29,644	0	0	0	0	0	0	29,644
Splash Dam	2,065,905	526,066	0	8,384	0	0	0	2,600,355
Taggart	0	0	789,715	0	0	0	324,839	1,114,554
Taggart Marker	0	0	18,838	0	0	0	157,014	175,852
Tiller	310,233	100,957	0	0	0	174,934	0	586,123
Upper Banner	0	592,015	0	432,270	0	0	1,270,480	2,294,765
Upper Horsepen	0	0	0	0	0	593,601	0	593,601
Upper Standiford	0	0	36,663	0	0	0	1,105,084	1,141,747
Wax	0	0	219,770	0	0	0	2,296	222,066
Wilson	0	0	0	0	0	0	1,009,936	1,009,936
Total	13,964,187	6,117,093	2,797,708	1,305,355	53,122	2,911,719	12,941,463	40,090,647

Table 6. Summary of coal mine employment in Virginia, 1993; source: Virginia Division of Mines.

	Buchanan	Dickenson	Lee	Russell	Scott	Tazewell	Wise	Total
Prod. Employees								
Auger	0	44	18	0	0	0	124	186
Strip	147	317	61	149	0	5	583	1,262
Surface Total	147	361	79	149	0	5	707	1,448
Undg Total	3,704	1,040	561	147	12	545	1,689	7,698
Total	3,851	1,401	640	296	12	550	2,396	96,146
Man Days								
Auger	0	2,266	272	0	0	0	2,340	4,878
Strip	2,570	3,736	948	2,264	0	100	8,532	18,150
Surface Total	2,570	6,002	1,220	2,264	0	100	10,872	23,028
Undg Total	31,132	9,190	6,098	1,154	500	8,728	15,952	72,754
Total	33,702	15,192	7,318	3,418	500	8,828	26,824	95,782
Man Hours								
Auger	0	62,248	5,292	0	0	0	253,346	320,886
Strip	308,188	401,199	76,679	197,034	0	1,844	1,194,281	2,179,225
Surface Total	308,188	463,447	81,971	197,034	0	1,844	1,447,627	2,500,111
Undg Total	5,100,231	1,947,645	982,387	184,962	21,504	821,292	3,025,146	12,083,167
Total	5,408,419	2,411,092	1,064,358	381,996	21,504	823,136	4,472,773	14,583,278
Prod. Wages								
Auger	0	1,334,513	65,498	0	0	0	3,904,737	5,304,748
Strip	4,839,209	6,322,798	683,290	3,223,050	0	26,100	19,032,550	34,126,997
Surface Total	4,839,209	7,657,311	748,788	3,223,050	0	26,100	22,937,287	39,431,745
Undg Total	90,526,041	34,810,833	15,916,499	3,538,482	269,500	14,518,981	47,319,897	206,900,233
Total	95,365,250	42,468,144	16,665,287	6,761,532	269,500	14,545,081	70,257,184	246,331,978
Office Employees								
Auger	0	5	0	0	0	0	0	5
Strip	2	2	4	3	0	0	26	37
Surface Total	2	7	4	3	0	0	26	42
Undg Total	126	9	19	3	1	24	54	236
Total	128	16	23	6	1	24	80	278
Office Wages								
Auger	0	46,706	0	0	0	0	0	46,706
Strip	40,000	14,150	58,403	15,391	0	0	2,366,750	2,494,694
Surface Total	40,000	60,856	58,403	15,391	0	0	2,366,750	2,541,400
Undg Total	3,478,438	211,851	679,867	5,500	6,000	471,840	1,911,980	6,765,476
Total	3,518,438	272,707	738,270	20,891	6,000	471,840	4,278,730	9,306,876

Table 7. Oil and gas condensate production by county and company, 1993; source: Virginia Division of Gas and Oil.

County	Operator	Number of Producing Wells	Volume (barrels)
Lee	APACO Petroleum	5	477.19
	Ben Hur Oil and Gas	5	1,228.00
	Eastern States Exploration	1	1,206.00
	Maverick Oil and Gas	9	1,531.00
	Pride Oil Company	1	1,648.01
	Witt Oil Drilling	1	229.70
Lee Total		22	6,319.90
Wise	Equitable Resources Exploration	28	5,800.24
Wise Total		28	5,800.24
State Total		50	12,120.14

Table 8. Natural gas production by county and company, 1993; source: Virginia Division of Gas and Oil.

County	Operator	Number of Producing wells	Volume (Mcf)
Buchanan	Conventional Gas		
	Ashland Exploration, Inc	56	742,275
	Berea Oil and Gas	1	10,951
	C D & G Development	2	17,532
	Cabot Oil and Gas	5	62,342
	Columbia Natural Resources	104	946,243
	Eastern America Energy	4	63,907
	P & S Oil and Gas Corp.	6	12,132
	Panther Creek ltd Partnership	2	25,421
	Peake Operating	1	36,360
	Pocahontas Gas Partnership	2	29,680
	Virginia Gas Company	19	279,339
	Coalbed Methane		
	Consol, Inc	74	2,387,756
Island Creek Coal Company	41	5,398,875	
Pocahontas Gas Partnership	183	7,482,011	
Virginia Gas Company	5	42,762	
Total	505	17,537,586	
Dickenson	Conventional Gas		
	Columbia Natural Resources	33	417,731
	Equitable Resources Exploration	356	5,825,235
	Elliott Production	2	26,290
	Pine Mountain Oil and Gas	9	102,564
	Virginia Gas Company	23	1,237,879
	Coalbed Methane		
Equitable Resources Exploration	136	3,930,216	
Total	559	11,539,915	
Russell	Conventional Gas		
	Pine Mountain Oil and Gas	2	25,632
Coalbed Methane			
Equitable Resources Exploration	22	678,011	
Total	24	703,643	
Scott	Conventional Gas		
	Equitable Resources Exploration	3	8,967
Virginia Gas Company	14	74,756	
Total	17	83,723	

Table 8. Natural gas production by county and company, 1993 (Continued).

County	Operator	Number of Producing wells	Volume (Mcf)
Tazewell	Conventional Gas		
	CNG Producing	2	9,226
	Columbia Natural Resources	6	104,483
	Consol-Ray	14	212,679
	EMAX	2	46,998
	Exploration Partners	1	35,507
	R & B Petroleum	2	12,387
Total		27	421,280
Washington	Conventional Gas		
	Virginia Gas Company	7	13,893
Total		7	13,893
Wise	Conventional Gas		
	Amvest Oil and Gas, Inc	6	50,333
	Equitable Resources Exploration	279	6,697,530
	Coalbed Methane		
	Equitable Resources Exploration	2	3,832
Total		287	6,751,695
Total	Conventional Gas		
		963	17,128,272
State Total	Coalbed Methane		
		465	19,923,463
		1428	37,051,735

Table 9: Drilling activity by county and well type, 1993; source: Virginia Division of Gas and Oil.

County	Conventional gas Drilled	Coalbed Methane Drilled	Wells Drilled	Conventional gas Completed	Coalbed methane Completed	Wells Completed
Buchanan	6	50	56	7	103	110
Dickenson	7	32	39	8	32	40
Lee	2	0	2	2	0	2
Russell	0	5	5	0	5	5
Wise	42	8	50	43	5	48
Total	57	95	152	60	145	205

Table 10: Total footage drilled for natural gas, 1993; source: Virginia Division of Gas and Oil.

County	Conventional		Coalbed Methane		Conversion Total		Footage
	Dev.	Expl.	Dev.	Expl.	Dev.	Expl.	
Buchanan	30,645	0	80,356	0	17,607	0	128,608
Dickenson	29,422	0	89,617	0	0	0	119,039
Lee	10,944	0	0	0	0	0	10,944
Russell	0	0	10,650	0	0	0	10,650
Wise	223,828	0	20,713	0	0	0	244,541
Total	294,839	0	201,336	0	17,607	0	513,782

Table 11. Wells completed in Virginia, 1993; 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(s)
Buchanan County										
BU-333	1583	Consol, Inc.	CBM L-31	Duty	3380' S. 37 07'30"	11275' W. 82 07'30"	Dev.	1885	Bluestone	Pocahontas, Lee
BU-708	2387	EREX, Inc.	VC-1849	Duty	2375' S. 37 07'30"	880' W. 82 10'00"	Dev.	2138	Bluestone	Pocahontas, Lee
BU-564	2077	Virginia Gas Co.	EH-112	Harman	1400' S. 37 17'30"	10250' W. 82 10'00"	Dev.	4727	Chattanooga Sh	Berea Ss, Bluefield
BU-571	2089	Virginia Gas Co.	EH-116	Harman	6820' S. 37 22'30"	5110' W. 82 12'30"	Dev.	4138	Chattanooga Sh	Berea Ss
BU-572	2093	Virginia Gas Co.	EH-114	Harman	12840' S 37 20'00"	9190' W. 82 10'00"	Dev.	4610	Chattanooga Sh	Berea Ss, Greenbrier Ls
BU-681	2305	Columbia Natural Resources	CNR-22445	Harman	1200' S. 37 22'30"	8175' W. 82 10'00"	Dev.	5235	Chattanooga Sh	Chattanooga Sh, Berea Ss
BU-754	2566	Columbia Natural Resources	CNR-21732	Harman	11210' S. 37 20'00"	11725' W. 82 10'00"	Dev.	5589	Chattanooga Sh	Chattanooga Sh, Berea Ss
BU-671	2282	Ashland Exploration	GP A-4	Hurley	10290' S. 37 27'30"	12050' W. 82 00'00"	Dev.	5546	Chattanooga Sh	Chattanooga Sh Ravenclyff
BU-672	2283	Ashland Exploration	GP A-5	Hurley	9690' S. 37 27'30"	5250' W. 82 02'30"	Dev.	5527	Chattanooga Sh	Chattanooga Sh,
BU-680	2304	Pocahontas Gas Partnership	PGP-608	Jewell Ridge	11520 S. 37 15'00"	10870' W. 81 50'00"	Dev.	1466	Pocahontas	Not stimulated
BU-264	1401	OXY USA	CBM K-24	Keen Mtn	5160' S. 37 15'00"	4800' W. 81 57'30"	Dev.	1911	Pocahontas	Pocahontas, Lee
BU-265	1402	OXY USA	CBM L-24	Keen Mtn	6660' S. 37 15'00"	5200' W. 81 57'30"	Dev.	1885	Pocahontas	Pocahontas
BU-268	1406	OXY USA	CBM K-25	Keen Mtn	5760' S. 37 15'00"	3460' W. 81 57'30"	Dev.	1914	Pocahontas	Pocahontas, Lee
BU-269	1407	OXY USA	CBM L-25	Keen Mtn	6860' S. 37 15'00"	3460' W. 81 57'30"	Dev.	1890	Pocahontas	Pocahontas, Lee
BU-272	1417	OXY USA	CBM P-26	Keen Mtn	15000' S 37 15'00"	800' W. 81 57'30"	Dev.	2137	Pocahontas	Pocahontas
BU-273	1418	OXY USA	CBM R-26	Keen Mtn	2200' S. 37 12'30"	700' W. 81 57'30"	Dev.	2189	Pocahontas	Pocahontas
BU-298	1512	OXY USA	CBM N-32	Keen Mtn	10150' S. 37 15'00"	2600' W. 81 55'00"	Dev.	1942	Pocahontas	Pocahontas, Lee
BU-311	1539	OXY USA	CBM U-33	Keen Mtn	8390' S. 37 12'30"	12150' W. 81 52'30"	Dev.	1542	Pocahontas	Pocahontas, Lee
BU-317	1553	OXY USA	CBM O-35	Keen Mtn	13240' S. 37 15'00"	9140' W. 81 52'30"	Dev.	2037	Pocahontas	Pocahontas, Lee
BU-318	1554	OXY USA	CBM N-34	Keen Mtn	10740' S. 37 15'00"	9580' W. 81 52'30"	Dev.	2040	Pocahontas	Pocahontas, Lee

Table 11. Wells completed in Virginia, 1993 (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(s)
BU-319	1555	OXY USA	CBM L-32	Keen Mtn	7540' S. 37 15'00"	1400' W. 81 55'00"	Dev.	2140	Pocahontas	Pocahontas, Lee
BU-320	1556	OXY USA	CBM L-33	Keen Mtn	6980' S. 37 15'00"	12190' W. 81 52'30"	Dev.	2020	Pocahontas	Pocahontas, Lee
BU-322	1558	OXY USA	CBM Q-31	Keen Mtn	1220' S. 37 12'30"	2970' W. 81 55'00"	Dev.	1603	Pocahontas	Pocahontas, Lee
BU-323	1559	OXY USA	CBM P-35	Keen Mtn	14000' S. 37 15'00"	8040' W. 81 52'30"	Dev.	1853	Pocahontas	Pocahontas, Lee
BU-324	1560	OXY USA	CBM P-34	Keen Mtn	14740' S. 37 15'00"	10400' W. 81 52'30"	Dev.	1905	Pocahontas	Pocahontas, Lee
BU-326	1562	OXY USA	CBM M-33	Keen Mtn	9320' S. 37 15'00"	11780' W. 81 52'30"	Dev.	1960	Pocahontas	Pocahontas, Lee
BU-327	1565	OXY USA	CBM Q-33	Keen Mtn	16850' S. 37 15'00"	12150' W. 81 52'30"	Dev.	2009	Pocahontas	Pocahontas, Lee
BU-330	1568	OXY USA	CBM O-32	Keen Mtn	11780' S. 37 15'00"	2440' W. 81 55'00"	Dev.	2217	Pocahontas	Pocahontas, Lee
BU-334	1584	OXY USA	CBM O-34	Keen Mtn	12260' S. 37 15'00"	9700' W. 81 52'30"	Dev.	2072	Pocahontas	Pocahontas, Lee
BU-335	1585	OXY USA	CBM L-31	Keen Mtn	7900' S. 37 15'00"	3420' W. 81 55'00"	Dev.	2292	Pocahontas	Pocahontas, Lee
BU-337	1594	OXY USA	CBM Q-34	Keen Mtn	15800' S. 37 10'00"	10100' W. 81 52'30"	Dev.	1912	Pocahontas	Pocahontas, Lee
BU-338	1598	OXY USA	CBM K-30	Keen Mtn	5020' S. 37 15'00"	5400' W. 81 55'00"	Dev.	2348	Pocahontas	Pocahontas, Lee
BU-339	1599	OXY USA	CBM O-31	Keen Mtn	12560' S. 37 15'00"	3040' W. 81 55'00"	Dev.	2060	Pocahontas	Pocahontas, Lee
BU-340	1600	OXY USA	CBM M-34	Keen Mtn	8440' S. 37 15'00"	9960' W. 81 52'30"	Dev.	1447	Pocahontas	Pocahontas, Lee
BU-341	1601	OXY USA	CBM S-32	Keen Mtn	4280' S. 37 12'30"	1640' W. 81 55'00"	Dev.	1700	Pocahontas	Pocahontas, Lee
BU-342	1602	OXY USA	CBM K-33	Keen Mtn	5520' S. 37 15'00"	11180' W. 81 52'30"	Dev.	1472	Pocahontas	Pocahontas, Lee
BU-343	1603	OXY USA	CBM O-33	Keen Mtn	12920' S. 37 15'00"	200' W. 81 15'00"	Dev.	2041	Pocahontas	Pocahontas, Lee
BU-344	1604	OXY USA	CBM Q-35	Keen Mtn	15600' S. 37 15'00"	8800' W. 81 52'30"	Dev.	1916	Pocahontas	Pocahontas, Lee
BU-352	1623	OXY USA	CBM M-32	Keen Mtn	8820' S. 37 15'00"	1520' W. 81 55'00"	Dev.	2235	Pocahontas	Pocahontas, Lee
BU-353	1624	OXY USA	CBM K-32	Keen Mtn	4640' S. 37 15'00"	2420' W. 81 55'00"	Dev.	2175	Pocahontas	Pocahontas, Lee

Table 11. Wells completed in Virginia, 1993 (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(s)
BU-358	1639	OXY USA	CBM M-35	Keen Mtn	9680' S. 37 15'00"	8480' W. 81 52'30"	Dev.	1675	Pocahontas	Pocahontas, Lee
BU-359	1640	OXY USA	CBM N-35	Keen Mtn	10700' S. 37 15'00"	7650' W. 81 52'30"	Dev.	1774	Pocahontas	Pocahontas, Lee
BU-362	1653	OXY USA	CBM P-32	Keen Mtn	14300' S. 37 15'00"	14200' W. 81 52'30"	Dev.	1875	Pocahontas	Pocahontas, Lee
BU-363	1651	OXY USA	CBM K-23	Keen Mtn	5060' S. 37 15'00"	5680' W. 81 57'30"	Dev.	1620	Pocahontas	Pocahontas, Lee
BU-364	1652	OXY USA	CBM P-31	Keen Mtn	14500' S. 37 15'00"	4000' W. 81 55'00"	Dev.	2035	Pocahontas	Pocahontas, Lee
BU-365	1654	OXY USA	CBM P-33	Keen Mtn	14000' S. 37 15'00"	11400' W. 81 52'30"	Dev.	1675	Pocahontas	Pocahontas, Lee
BU-370	1675	OXY USA	CBM I-22	Keen Mtn	2150' S. 37 15'00"	9100' W. 81 57'30"	Dev.	2370	Pocahontas	Pocahontas, Lee
BU-371	1676	OXY USA	CBM I-21	Keen Mtn	1650' S. 37 15'00"	10450' W. 81 57'30"	Dev.	2109	Pocahontas	Pocahontas, Lee
BU-372	1677	OXY USA	CBM H-21	Keen Mtn	15300' S. 37 17'30"	10400' W. 81 57'30"	Dev.	2359	Pocahontas	Pocahontas, Lee
BU-374	1680	OXY USA	CBM J-21	Keen Mtn	3100' S. 37 15'00"	9950' W. 81 57'30"	Dev.	2205	Pocahontas	Pocahontas, Lee
BU-376	1682	OXY USA	CBM I-20	Keen Mtn	16400' S. 37 17'30"	11700' W. 81 57'30"	Dev.	2360	Pocahontas	Pocahontas, Lee
BU-379	1689	OXY USA	CBM J-20	Keen Mtn	4000' S. 37 15'00"	11200' W. 81 57'30"	Dev.	1893	Pocahontas	Pocahontas, Lee
BU-406	1739	OXY USA	CBM R-29	Keen Mtn	2760' S. 37 12'30"	7440' W. 81 55'00"	Dev.	1586	Pocahontas	Pocahontas, Lee
BU-407	1740	OXY USA	CBM R-30	Keen Mtn	2460' S. 37 12'30"	5280' W. 81 55'00"	Dev.	1590	Pocahontas	Pocahontas, Lee
BU-411	1753	OXY USA	CBM S-33	Keen Mtn	4320' S. 37 12'30"	320' W. 81 55'00"	Dev.	1693	Pocahontas	Pocahontas, Lee
BU-640	2231	Pocahontas Gas Partnership	PGP-139	Keen Mtn	13800' S. 37 12'30"	4300' W. 81 55'00"	Dev.	1944	Pocahontas	Pocahontas
BU-656	2253	Pocahontas Gas Partnership	PGP-124D	Keen Mtn	13190' S. 37 12'30"	7990' W. 81 55'00"	Dev.	1760	Pocahontas	Pocahontas, Lee
BU-657	2257	Pocahontas Gas Partnership	PGP-127C	Keen Mtn	14000' S. 37 12'30"	7240' W. 81 55'00"	Dev.	1540	Pocahontas	Pocahontas
BU-665	2270	Pocahontas Gas Partnership	PGP-65A	Keen Mtn	6260' S. 37 12'30"	5650' W. 81 57'30"	Dev.	2376	Pocahontas	Pocahontas, Lee
BU-667	2272	Pocahontas Gas Partnership	PGP-66A	Keen Mtn	6500' S. 37 12'30"	3950' W. 81 57'30"	Dev.	2058	Pocahontas	Pocahontas, Lee
BU-674	2285	Pocahontas Gas Partnership	PGP-121C	Keen Mtn	13800' S. 37 12'30"	8800' W. 81 55'00"	Dev.	1915	Pocahontas	Pocahontas

Table 11. Wells completed in Virginia, 1993 (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(s)
BU-676	2296	Pocahontas Gas Partnership	PGP-131D	Keen Mtn	12900' S. 37 12'30"	6100' W. 81 55'00"	Dev.	1659	Pocahontas	Pocahontas, Lee
BU-684	2309	Pocahontas Gas Partnership	PGP-55B	Keen Mtn	8875' S. 37 12'30"	3480' W. 81 57'30"	Dev.	1985	Pocahontas	Not stimulated
BU-685	2310	Pocahontas Gas Partnership	PGP-54B	Keen Mtn	8600' S. 37 12'30"	4600' W. 81 57'30"	Dev.	2158	Pocahontas	Not stimulated
BU-688	2316	Pocahontas Gas Partnership	PGP-135D	Keen Mtn	12860' S. 37 12'30"	5540' W. 81 55'00"	Dev.	1931	Pocahontas	Pocahontas, Lee
BU-689	2317	Pocahontas Gas Partnership	PGP-139D	Keen Mtn	12920' S. 37 12'30"	4650' W. 81 55'00"	Dev.	1749	Pocahontas	Pocahontas
BU-693	2321	Pocahontas Gas Partnership	PGP-112B	Keen Mtn	5020' S. 37 10'00"	630' W. 81 57'30"	Dev.	2013	Pocahontas	Not stimulated
BU-696	2335	Pocahontas Gas Partnership	PGP-58A	Keen Mtn	8000' S. 37 12'30"	4990' W. 81 57'30"	Dev.	2040	Pocahontas	Not Stimulated
BU-697	2337	Pocahontas Gas Partnership	PGP-59A	Keen Mtn	8100' S. 37 12'30"	3900' W. 81 57'30"	Dev.	1924	Pocahontas	Not stimulated
BU-706	2374	Pocahontas Gas Partnership	PGP-114B	Keen Mtn	2400' S. 37 10'00"	10390' W. 81 55'00"	Dev.	1944	Pocahontas	Not stimulated
BU-707	2376	Pocahontas Gas Partnership	PGP 67A	Keen Mtn	6300' S. 37 12'30"	1625' W. 81 57'30"	Dev.	2015	Pocahontas	Pocahontas, Lee
BU-735	2450	Pocahontas Gas Partnership	PGP-115C	Keen Mtn	15040' S. 37 12'30"	10550' W. 81 55'00"	Dev.	1722	Pocahontas	Not stimulated
BU-736	2451	Pocahontas Gas Partnership	PGP-115D	Keen Mtn	14400' S. 37 12'30"	10600' W. 81 55'00"	Dev.	1595	Pocahontas	Not stimulated
BU-737	2460	Pocahontas Gas Partnership	PGP-121A	Keen Mtn	1820' S. 37 10'00"	8440' W. 81 55'00"	Dev.	1567	Pocahontas	Pocahontas, Lee
BU-738	2461	Pocahontas Gas Partnership	PGP-121B	Keen Mtn	14950' S. 37 12'30"	8620' W. 81 55'00"	Dev.	1897	Pocahontas	Pocahontas, Lee
BU-739	2463	Pocahontas Gas Partnership	PGP-71A	Keen Mtn	5600' S. 37 12'30"	2660' W. 81 57'30"	Dev.	1567	Pocahontas	Pocahontas, Lee
BU-740	2466	Pocahontas Gas Partnership	PGP-69A	Keen Mtn	5440' S. 37 12'30"	6680' W. 81 57'30"	Dev.	2500	Pocahontas	Pocahontas, Lee
BU-753	2562	Pocahontas Gas Partnership	PGP-124B	Keen Mtn	14810' S. 37 12'30"	7900' W. 81 55'00"	Dev.	1957	Pocahontas	Pocahontas, Lee
BU-367	1656	OXY USA	CBM G-20	Patterson	12950' S. 37 17'30"	11700' W. 81 57'30"	Dev.	2244	Pocahontas	Pocahontas, Lee
BU-373	1679	OXY USA	CBM H-20	Patterson	13950' S. 37 17'30"	11500' W. 81 57'30"	Dev.	2210	Pocahontas	Pocahontas, Lee
BU-659	2262	Virginia Gas Co.	EH-81	Prater	5800' S. 37 15'00"	6900' W. 82 07'30"	Dev.	2084	Bluestone	Pocahontas, Lee

Table 11. Wells completed in Virginia, 1993 (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(s)
BU-660	2263	Virginia Gas Co.	EH-70	Prater	7700' S. 37 15'00"	920' W. 82 10'00"	Dev.	2397	Bluestone	Pocahontas, Lee
BU-661	2264	Virginia Gas Co.	EH-82	Prater	5813' S. 37 15'00"	5525' W. 82 07'30"	Dev.	1922	Bluestone	Pocahontas, Lee
BU-747	2522	EREX, Inc.	VC-2914	Prater	9980' S. 37 12'30"	2680' W. 82 10'00"	Dev.	2313	Bluestone	Pocahontas, Lee
BU-261	1371	OXY USA	CBM BB-12	Vansant	6080' S. 37 10'00"	3100' W. 82 02'30"	Dev.	2196	Pocahontas	Pocahontas, Lee
BU-263	1399	OXY USA	CBM X-11	Vansant	14575' S. 37 12'30"	3900' W. 82 02'30"	Dev.	1770	Pocahontas	Pocahontas, Lee
BU-310	1538	OXY USA	CBM T- 5	Vansant	7250' S. 37 12'30"	2900' W. 82 05'00"	Dev.	1582	Pocahontas	Pocahontas, Lee
BU-355	1626	OXY USA	CBM AA-13	Vansant	5300' S. 37 10'00"	940' W. 82 02'30"	Dev.	1775	Pocahontas	Pocahontas, Lee
BU-652	2247	Island Creek Coal Co.	CBM Q-14A	Vansant	1500' S. 37 12'30"	11150' W. 82 00'00"	Dev.	2206	Pocahontas	Pocahontas
BU-653	2248	OXY USA	CBM S-14B	Vansant	5350' S. 37 12'30"	11250' W. 82 00'00"	Dev.	1900	Pocahontas	Pocahontas
BU-654	2249	Island Creek Coal Co.	CBM Q-14B	Vansant	1200' S. 37 12'30"	11299' W. 82 00'00"	Dev.	2125	Pocahontas	Pocahontas
BU-655	2250	OXY USA	CBM S-14A	Vansant	4500' S. 37 12'30"	11100' W. 82 00'00"	Dev.	2228	Pocahontas	Pocahontas
BU-663	2268	Island Creek Coal Co.	CBM R-7D	Vansant	3800' S. 37 12'30"	450' W. 82 05'00"	Dev.	1760	Pocahontas	Pocahontas
BU-668	2276	Island Creek Coal Co.	CBG Y-19D	Vansant	620' S. 37 10'00"	2020' W. 82 00'00"	Dev.	1951	Pocahontas	Pocahontas
BU-669	2280	Island Creek Coal Co.	CBG Y-16E	Vansant	300' S. 37 10'00"	2020' W. 82 00'00"	Dev.	1963	Pocahontas	Pocahontas
BU-682	2306	Island Creek Coal Co.	CBG Y-19C	Vansant	160' S. 37 10'00"	1000' W. 82 00'00"	Dev.	2107	Pocahontas	Pocahontas
BU-686	2311	Island Creek Coal Co.	CBG X-19E	Vansant	14960' S. 37 12'30"	1020' W. 82 00'00"	Dev.	2257	Pocahontas	Pocahontas
BU-691	2319	Island Creek Coal Co.	CBG DOE5	Vansant	14750' S. 37 12'30"	150' W. 82 00'00"	Dev.	2220	Pocahontas	Pocahontas
BU-692	2320	Island Creek Coal Co.	CBG DOE7	Vansant	12060' S. 37 12'30"	260' W. 82 00'00"	Dev.	1935	Pocahontas	Pocahontas
BU-700	2357	Island Creek Coal Co.	CBM S-6	Vansant	5650' S. 37 12'30"	2550' W. 82 05'00"	Dev.	1554	Pocahontas	Pocahontas, Lee
BU-713	2399	Pocahontas Gas Partnership	PGP-115B	Vansant	1300' S. 37 10'00"	10450' W. 81 55'00"	Dev.	2003	Pocahontas	Not stimulated
BU-726	2426	Island Creek Coal Co.	CBG AA-17A	Vansant	6000' S. 37 10'00"	5500' W. 82 00'00"	Dev.	2195	Pocahontas	Pocahontas

Table 11. Wells completed in Virginia, 1993 (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(s)
BU-727	2428	Island Creek Coal Co.	CBG Q-7A	Vasant	900' S. 37 12'30"	400' W. 82 05'00"	Dev.	1800	Pocahontas	Pocahontas
BU-728	2429	Island Creek Coal Co.	CBG M-8A	Vasant	9300' S. 37 15'00"	10050' W. 82 02'30"	Dev.	2065	Pocahontas	Pocahontas
BU-729	2430	Island Creek Coal Co.	CBG-BB-15A	Vasant	6550' S. 37 10'00"	9700' W. 82 00'00"	Dev.	1950	Pocahontas	Pocahontas
BU-731	2432	Island Creek Coal Co.	CBG BB-17A	Vasant	7050' S. 37 10'00"	5350' W. 82 00'00"	Dev.	2233	Pocahontas	Pocahontas
BU-746	2506	Island Creek Coal Co.	CBG AA-15A	Vasant	3800' S. 37 10'00"	9700' W. 82 00'00"	Dev.	1655	Pocahontas	Pocahontas
Dickenson County										
DI-678	2293	EREX, Inc.	P-261C	Caney Ridge	8610' S. 37 02'30"	12280' W. 82 25'00"	Dev.	2792	Bluestone	Pocahontas, Lee
DI-702	2499	EREX, Inc.	V-2027	Caney Ridge	3130' S. 37 07'30"	6480' W. 82 22'30"	Dev.	5090	Chattanooga Sh	Chattanooga Sh, Berea Ss, Greenbrier Ls
DI-707	2518	EREX, Inc.	VC-1872	Caney Ridge	8375' S. 37 02'30"	700' W. 82 22'30"	Dev.	2217	Bluestone	Pocahontas, Lee
DI-714	2539	EREX, Inc.	VC-2940	Caney Ridge	5500' S. 37 02'30"	6320' W. 82 25'00"	Dev.	1990	Bluestone	Pocahontas, Lee
DI-686	2338	EREX, Inc.	V-2817	Clintwood	8120' S. 37 12'30"	540' W. 82 22'30"	Dev.	2126	Bluestone	Lee
DI-689	2415	EREX, Inc.	V-1829	Clintwood	10520' S. 37 12'30"	7675' W. 82 22'30"	Dev.	4575	Chattanooga Sh	Chattanooga Sh, Berea Ss
DI-691	2418	EREX, Inc.	V-1831	Clintwood	10245' S. 37 12'30"	4640' W. 82 22'30"	Dev.	4419	Chattanooga Sh	Berea Ss, Greenbrier Ls, Bluefield
DI-692	2427	EREX, Inc.	V-1833	Clintwood	2740' S. 37 12'30"	820' W. 82 22'30"	Dev.	4392	Chattanooga Sh	Chattanooga Sh, Berea Ss
DI-652	2018	EREX, Inc.	VC-2472	Duty	10900' S. 37 05'00"	5200' W. 82 07'30"	Dev.	1917	Bluestone	Pocahontas, Lee
DI-658	2085	EREX, Inc.	VC-2479	Duty	12900' S. 37 07'30"	3780' W. 82 12'30"	Dev.	2233	Pocahontas	Lee
DI-668	2130	EREX, Inc.	VC-2595	Duty	12210' S. 37 07'30"	7060' W. 82 10'00"	Dev.	2533	Bluestone	Pocahontas, Lee
DI-669	2147	EREX, Inc.	VC-2478	Duty	11275' S. 37 07'30"	12045' W. 82 10'00"	Dev.	2243	Bluestone	Pocahontas, Lee
DI-676	2233	EREX, Inc.	VC-2584	Duty	900' S. 37 07'30"	1830' W. 82 12'30"	Dev.	2414	Bluestone	Lee
DI-677	2278	EREX, Inc.	PC-302	Duty	13450' S. 37 05'00"	8780' W. 82 07'30"	Dev.	2358	Bluestone	Pocahontas, Lee

Table 11. Wells completed in Virginia, 1993 (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(s)
DI-679	2301	EREX, Inc.	P-283C	Duty	5790' S. 37 07'30"	2050' W. 82 12'30"	Dev.	2128	Bluestone	Pocahontas, Lee
DI-684	2331	EREX, Inc.	PC-161	Duty	7910' S. 3705'00"	3600' W. 82 12'30"	Dev.	1975	Bluestone	Pocahontas, Lee
DI-685	2336	EREX, Inc.	PC-313	Duty	200' S. 37 02'30"	8700' W. 82 07'30"	Dev.	2404	Bluestone	Pocahontas, Lee
DI-687	2366	EREX, Inc.	VC-2277	Duty	14825' S. 37 07'30"	4400' W. 82 10'00"	Dev.	2441	Bluestone	Pocahontas, Lee
DI-688	2386	EREX, Inc.	VC-2845	Duty	3825' S. 37 07'30"	75' W. 82 12'30"	Dev.	2212	Bluestone	Pocahontas, Lee
DI-693	2438	EREX, Inc.	P-252C	Duty	7400' S. 37 07'30"	2800' W. 82 12'30"	Dev.	2258	Bluestone	Pocahontas, Lee
DI-695	2455	EREX, Inc.	VC-2846	Duty	3500' S. 37 07'30"	9120' W. 82 10'00"	Dev.	2241	Bluestone	Pocahontas, Lee
DI-696	2456	EREX, Inc.	VC-2844	Duty	1510' S. 37 05'00"	1190' W. 82 12'30"	Dev.	2472	Bluestone	Pocahontas, Lee
DI-698	2472	EREX, Inc.	VC-2592	Duty	9010' S. 37 07'30"	8820' W. 82 10'00"	Dev.	1905	Bluestone	Pocahontas, Lee
DI-705	2514	EREX, Inc.	P-280C	Duty	4510' S. 37 07'30"	3500' W. 82 12'30"	Dev.	2464	Bluestone	Pocahontas, Lee
DI-667	2124	Virginia Gas Co.	EH-051	Elkhorn City	8790' S. 37 17'30"	7420' W. 82 17'30"	Dev.	3970	Chattanooga Sh	Berea Ss, Greenbrier Ls
DI-674	2189	Virginia Gas Co.	EH-055	Elkhorn City	6830' S. 37 17'30"	6050' W. 82 17'30"	Dev.	4245	Chattanooga Sh	Berea Ss, Greenbrier Ls
DI-643	1954	Virginia Gas Co.	EH-021	Haysi	14660' S. 37 15'00"	12000' W. 82 15'00"	Dev.	4613	Chattanooga Sh	Berea Ss
DI-656	2068	EREX, Inc.	P-352C	Haysi	12190' S. 37 10'00"	12010' W. 82 15'00"	Dev.	2091	Bluestone	Lee
DI-700	2485	EREX, Inc.	V-2460	Haysi	11160' S. 37 12'30"	5400' W. 82 15'00"	Dev.	4575	Chattanooga Sh	Berea Ss, Greenbrier Ls
DI-721	2570	EREX, Inc.	VC-3084	Haysi	11230' S. 37 10'00"	750' W. 82 17'30"	Dev.	2095	Bluestone	Pocahontas, Lee
DI-308	928	EREX, Inc.	P-263C	Nora	7150' S. 37 07'30"	14550' W. 82 15'00"	Dev.	1759	Bluestone	Pocahontas, Lee
DI-611	1760	EREX, Inc.	VC-2148	Nora	10050' S. 37 07'30"	6200' W. 82 17'30"	Dev.	2300	Pocahontas	Lee
DI-627	1853	EREX, Inc.	VC-2206	Nora	2880' S. 37 05'00"	7850' W. 82 20'00"	Dev.	2162	Bluestone	Pocahontas, Lee
DI-670	2156	EREX, Inc.	P-454C	Nora	4650' S. 37 05'00"	11650' W. 82 20'00"	Dev.	2590	Bluestone	Pocahontas, Lee

Table 11. Wells completed in Virginia, 1993 (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(s)
DI-682	2302	EREX, Inc.	VC-2559	Nora	7425' S. 37 05'00"	7080' W. 82 15'00"	Dev.	2227	Bluestone	Pocahontas, Lee
DI-711	2531	EREX, Inc.	VC-2563	Nora	4990' S. 37 05'00"	9910' W. 82 15'00"	Dev.	2241	Bluestone	Pocahontas, Lee
DI-713	2538	EREX, Inc.	VC-3038	Nora	8790' S. 37 07'30"	10760' W. 82 17'30"	Dev.	2570	Bluestone	Pocahontas, Lee
DI-690	2416	EREX, Inc.	VC-2870	Prater	9360' S. 37 10'00"	6150' W. 82 12'30"	Dev.	2004	Bluestone	Pocahontas, Lee
DI-699	2473	EREX, Inc.	VC-2869	Prater	8210' S. 37 10'00"	5175' W. 82 12'30"	Dev.	2141	Bluestone	Pocahontas, Lee
Lee County										
LE-168	1455	Amvest Oil and Gas, Inc.	MC-1	Keokee	13300' S 36 52'30"	11900' W. 82 57'30"	Dev.	5560	Wildcat Valley Ss	Chattanooga Sh, Price
LE-169	2497	Amvest Oil and Gas, Inc.	DLC-1	Pennington Gap	1940' S. 36 50'00"	10500' W. 83 02'30"	Dev.	5384	Wildcat Valley Ss	Chattanooga Sh, Price, Greenbrier Ls
Russell County										
RU-037	2246	EREX, Inc.	VC-2623	Carbo	9100' S. 37 00'00"	10225' W. 82 10'00"	Dev.	2243	Pocahontas	Pocahontas, Lee
RU-038	2275	EREX, Inc.	VC-2831	Duty	1780' S. 37 02'30"	520' W. 82 07'30"	Dev.	2331	Pocahontas	Pocahontas, Lee
RU-039	2299	EREX, Inc.	VC-2547	Duty	2140' S. 37 02'30"	7820' W. 82 07'30"	Dev.	2100	Bluestone	Pocahontas, Lee
RU-041	2388	EREX, Inc.	VC-2863	Duty	4300' S. 37 02'30"	6830' W. 82 07'30"	Dev.	2162	Bluestone	Pocahontas, Lee
RU-044	2532	EREX, Inc.	VC-2949	St. Paul	6200' S. 37 00'00"	4030' W. 82 17'30"	Dev.	2150	Pocahontas	Pocahontas, Lee
Wise County										
WS-330	2003	EREX, Inc.	VP-2440	Appalachia	5100' S. 37 55'00"	2200' W. 82 50'00"	Dev.	5379	Chattanooga Sh	Chattanooga Sh, Price
WS-336	2063	EREX, Inc.	VAP-2436	Appalachia	11500' S. 36 57'30"	1500' W. 82 50'00"	Dev.	5860	Chattanooga Sh	Chattanooga Sh, Price
WS-337	2067	EREX, Inc.	V-2447	Appalachia	2300' S. 36 57'30"	9950' W. 82 47'30"	Dev.	5213	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls
WS-338	2109	EREX, Inc.	V-2509	Appalachia	1900' S. 37 00'00"	200' W. 82 50'00"	Dev.	5365	Chattanooga Sh	Chattanooga Sh, Price
WS-343	2150	EREX, Inc.	V-2448	Appalachia	11850' S. 37 00'00"	3300' W. 82 50'00"	Dev.	5836	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls
WS-350	2215	EREX, Inc.	V-2815	Appalachia	10150' S. 36 57'30"	9900' W. 82 45'00"	Dev.	4652	Price	Price, Greenbrier Ls

Table 11. Wells completed in Virginia, 1993 (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(s)
WS-351	2229	EREX, Inc.	V-2449	Appalachia	9150' S. 37 00'00"	1750' W. 82 50'00"	Dev.	5350	Chattanooga Sh	Chattanooga Sh, Price
WS-371	2382	EREX, Inc.	V-2671	Appalachia	4850' S. 36 55'00"	7800' W. 82 42'30"	Dev.	5459	Chattanooga Sh	Chattanooga Sh, Berea Ss
WS-374	2390	EREX, Inc.	V-2676	Appalachia	3950' S. 36 57'30"	7350' W. 82 47'30"	Dev.	5139	Chattanooga Sh	Chattanooga Sh, Greenbrier Ls Berea Ss, Price
WS-396	2487	EREX, Inc.	V-2697	Appalachia	6800' S. 36 55'00"	10300' W. 82 47'30"	Dev.	5350	Chattanooga Sh	Chattanooga Sh, Berea Ss, Price
WS-399	2490	EREX, Inc.	V-2851	Appalachia	6600' S. 36 57'30"	5500' W. 82 50'00"	Dev.	6010	Chattanooga Sh	Chattanooga Sh, Greenbrier Ls Berea Ss, Price
WS-403	2504	EREX, Inc.	V-2852	Appalachia	5500' S. 36 57'30"	150' W. 82 50'00"	Dev.	5664	Chattanooga Sh	Chattanooga Sh, Greenbrier Ls Berea Ss, Price
WS-241	1081	EREX, Inc.	V-2372	Coeburn	4750' S. 37 00'00"	2198' W. 82 25'00"	Dev.	6005	Chattanooga Sh	Berea Ss, Price
WS-309	1619	EREX, Inc.	VP-2357	Coeburn	10400' S. 36 55'00"	2650' W. 82 22'30"	Dev.	4681	Chattanooga Sh	Berea Ss, Greenbrier Ls
WS-368	2355	EREX, Inc.	V-2692	Coeburn	5200' S. 36 55'00"	9025' W. 82 27'30"	Dev.	4453	Chattanooga Sh	Berea Ss, Greenbrier Ls
WS-380	2435	EREX, Inc.	VC-2929	Coeburn	5575' S. 36 57'30"	625' W. 82 22'30"	Dev.	2530	Bluestone	Pocahontas, Lee
WS-381	2436	EREX, Inc.	V-2379	Coeburn	10010' S. 36 57'30"	7935' W. 82 22'30"	Dev.	5583	Chattanooga Sh	Berea Ss, Greenbrier Ls
WS-382	2437	EREX, Inc.	V-2376	Coeburn	106' S. 36 57'30"	1175' W. 82 25'00"	Dev.	5559	Chattanooga Sh	Berea Ss, Greenbrier Ls
WS-386	2458	EREX, Inc.	VC-2927	Coeburn	4700' S. 37 00'00"	5925' W. 82 25'00"	Dev.	2801	Bluestone	Pocahontas, Lee
WS-392	2469	EREX, Inc.	V-1835	Coeburn	6750' S. 36 57'30"	7300' W. 82 25'00"	Dev.	5538	Chattanooga Sh	Berea Ss, Greenbrier Ls
WS-398	2489	EREX, Inc.	V-2704	Coeburn	2705' S. 36 57'30"	578' W. 82 25'00"	Dev.	5609	Chattanooga Sh	Berea Ss
WS-401	2502	EREX, Inc.	V-2703	Coeburn	14075' S. 37 00'00"	4525' W. 82 25'00"	Dev.	5953	Chattanooga Sh	Berea Ss
WS-334	2057	EREX, Inc.	V-2420	Flat Gap	13975' S. 37 02'30"	1450' W. 82 40'00"	Dev.	6117	Chattanooga Sh	Chattanooga Sh, Greenbrier Ls
WS-339	2114	EREX, Inc.	VP-2535	Flat Gap	9100' S. 37 02'30"	11025' W. 82 37'30"	Dev.	5105	Chattanooga Sh	Chattanooga Sh, Price
WS-342	2149	EREX, Inc.	V-2543	Flat Gap	4950' S. 37 02'30"	1600' W. 82 37'30"	Dev.	5351	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls

Table 11. Wells completed in Virginia, 1993 (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(s)
WS-353	2252	EREX, Inc.	VP-2532	Flat Gap	14100' S. 37 02'30"	8680' W. 82 37'30"	Dev.	5208	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls
WS-357	2273	EREX, Inc.	V-2533	Flat Gap	12360' S. 37 02'30"	6600' W. 82 37'30"	Dev.	4997	Chattanooga Sh	Chattanooga Sh, Price
WS-365	2333	EREX, Inc.	VC-2838	Flat Gap	5840' S. 37 02'30"	2180' W. 82 37'30"	Dev.	2406	Bluestone	Lee
WS-384	2454	EREX, Inc.	V-2536	Flat Gap	10800' S. 37 02'30"	9300' W. 82 37'30"	Dev.	5060	Chattanooga Sh	Chattanooga Sh, Greenbrier Ls Berea Ss, Price
WS-387	2459	EREX, Inc.	V-2767	Flat Gap	13390' S. 37 02'30"	850' W. 82 37'30"	Dev.	5699	Chattanooga Sh	Chattanooga Sh, Greenbrier Ls Berea Ss, Price
WS-405	2520	EREX, Inc.	V-2665	Flat Gap	6940' S. 37 02'30"	3775' W. 82 37'30"	Dev.	5579	Chattanooga Sh	Chattanooga Sh, Greenbrier Ls Berea Ss, Price
WS-331	2007	EREX, Inc.	VP-2529	Norton	3800' S. 37 00'00"	10' W. 82 40'00"	Dev.	5200	Chattanooga Sh	Chattanooga Sh, Price
WS-332	2033	EREX, Inc.	VP-2528	Norton	1150' S. 37 00'00"	1500' W. 82 40'00"	Dev.	5319	Chattanooga Sh	Chattanooga Sh, Berea Ss, Price, Greenbrier Ls
WS-340	2116	EREX, Inc.	VP-2530	Norton	4850' S. 37 00'00"	6390' W. 82 37'30"	Dev.	5400	Chattanooga Sh	Chattanooga Sh, Price
WS-341	2139	EREX, Inc.	VAC-2628	Norton	3350' S. 37 00'00"	3240' W. 82 37'30"	Dev.	2500	Lee	50020, Price, Lee
WS-349	2200	EREX, Inc.	V-2431	Norton	2000' S. 37 00'00"	9275' W. 82 37'30"	Dev.	5409	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls
WS-360	2279	EREX, Inc.	V-2531	Norton	510'S. 37 00'00"	6500'W. 82 37'30"	Dev.	5306	Chattanooga 'Sh	Chattanooga Sh, Price
WS-366	2346	EREX, Inc.	V-2655	Norton	6450'S. 37 00'00"	3050'W. 82 40'00"	Dev.	5614	Chattanooga Sh.	Chattanooga Sh, Berea Ss, Greenbrier Ls
WS-369	2359	EREX, Inc.	V-2527	Norton	6970'S. 37 00'00"	7870'W. 82 37'30"	Dev.	5382	Chattanooga Sh	Chattanooga Sh, Berea Ss, Price, Greenbrier Ls
WS-375	2391	EREX, Inc.	V2525	Norton	6725'S 37 00'00"	11990'W. 82 37'30"	Dev.	5179	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls
WS-376	2398	EREX, Inc.	V-2656	Norton	9200'S. 37 00'00"	2300'W. 82 40'00"	Dev.	5320	Chattanooga Sh	Chattanooga Sh, Price, Greenbrier Ls
WS-394	2478	EREX, Inc.	V-2757	Norton	3750S. 37 00'00"	8240W. 82 40'00"	Dev.	5510	Chattanooga Sh	Chattanooga Sh, Berea Ss, Price, Greenbrier Ls

Table 11. Wells completed in Virginia, 1993 (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(s)
WS-397	2488	EREX, Inc.	VC-3006	Norton	4660'S. 37 00'00"	6440'W 82 37'30"	Dev.	2165	Lee	Lee
WS-400	2495	EREX, Inc.	VP-2756	Norton	1500'S. 37 00'00"	4500"W. 82 40'00"	Dev.	5383	Chattanooga Sh	Chattanooga Sh, Berea Ss, Price, Greenbrier Ls.
WS-246	1094	EREX, Inc.	V-2341	Wise	10500'S. 36 55'00"	10375'W. 82 30'00"	Dev.	4500	Chattanooga Sh	Chattanooga Sh
WS-352	2251	EREX, Inc.	V-2363	Wise	3000'S. 36 44'00"	4225'W. 82 30'00"	Dev.	4578	Chattanooga Sh	Chattanooga Sh, Berea Ss
WS-358	2274	EREX, Inc.	V-2366	Wise	11750'S. 37 57'30"	3400'W. 82 30'00"	Dev.	4518	Chattanooga Sh	Berea Ss, Greenbrier Ls

