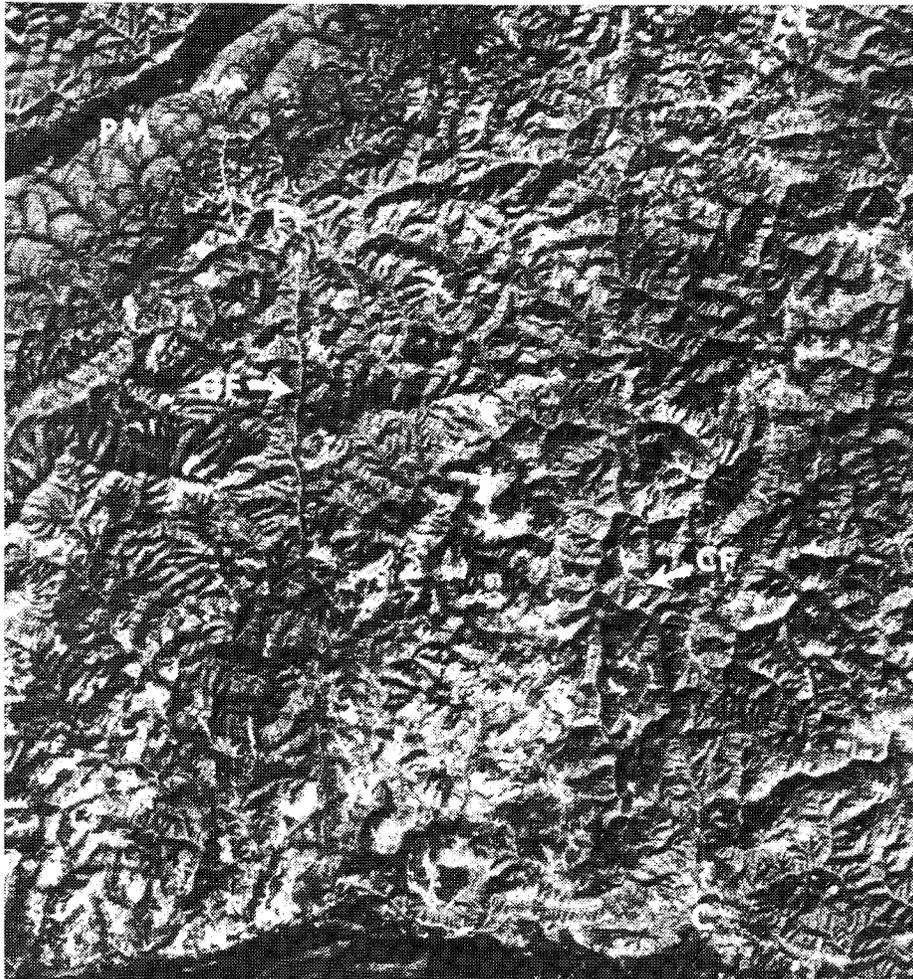




VIRGINIA DIVISION OF MINERAL RESOURCES PUBLICATION 84

## **GEOLOGY OF THE POUND AND CANEY RIDGE QUADRANGLES, VIRGINIA**

Jack E. Nolde, William W. Whitlock, and James A. Lovett



**COMMONWEALTH OF VIRGINIA**

**DEPARTMENT OF MINES, MINERALS AND ENERGY  
DIVISION OF MINERAL RESOURCES**

Robert C. Milici, Commissioner of Mineral Resources and State Geologist

CHARLOTTESVILLE, VIRGINIA

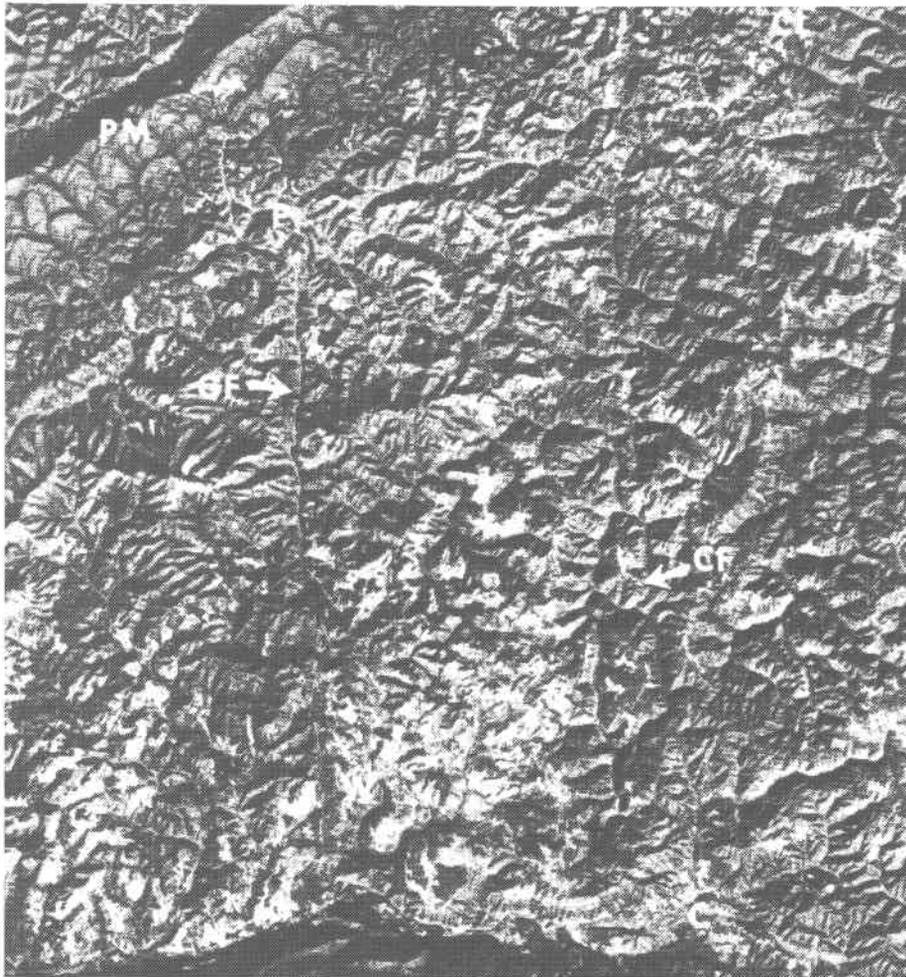
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FRONT COVER: Satellite image (LANDSAT, RBV) centered on Pound and Caney Ridge quadrangles, showing the two northward trending lineaments coincident with the Glamorgan and Coeburn faults. PM = Pine Mountain, CL = Clintwood, P = Pound, W = Wise, N = Norton, C = Coeburn, CF = Coeburn fault, GF = Glamorgan fault.



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**DEPARTMENT OF MINES, MINERALS AND ENERGY**  
**RICHMOND, VIRGINIA**  
O. GENE DISHNER, Director

Commonwealth of Virginia  
Department of Purchases and Supply  
Richmond

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# GEOLOGY OF THE POUND AND CANEY RIDGE QUADRANGLES, VIRGINIA

Jack E. Nolde, William W. Whitlock, and James A. Lovett

## INTRODUCTION

The Pound and Caney Ridge quadrangles (Plate 1) are located in northeastern Wise and southwestern Dickenson counties and have a combined area of 118.8 square miles (Figure 1). The quadrangles lie entirely within the Appalachian Plateaus physiographic province. The maximum and minimum elevations are 2789 and 1340 feet respectively. Field work for this report began in the fall of 1986 and was completed in the fall of 1987. Mapping was done on a scale of 1:24,000. Detailed mapping of Pound quadrangle was completed by W. W. Whitlock and J. A. Lovett; Caney Ridge quadrangle was completed by J. E. Nolde.

Refinements of previous mapping by Hinds (1916), Giles (1921), and Eby, (1923) include: 1) identification of the stratigraphic pinchout of the Gladeville Sandstone in central Wise County; 2) redefinition of the Norton and Wise formation boundary and revision of coal bed correlations; 3) extension of the Glamorgan fault system from Wise quadrangle across the Pound quadrangle; 4) extension of the Coeburn fault system from Coeburn quadrangle across the Caney Ridge quadrangle; and 5) identification of a widespread "marine" zone (Eagle Shale of White, 1891) approximately 80 feet above the Hagy coal as a key bed for stratigraphic correlations.

## SUBSURFACE STRATIGRAPHY

### PENNSYLVANIAN SYSTEM

The Pocahontas Formation, which is absent in the north-central part of the map area, is 450 feet thick in the southeast corner. Throughout the area the formation has a prominent sandstone at its base and top. These sandstones are medium gray, fine grained, and carbonaceous. Siltstones are medium- to dark-gray, thin- to medium-laminated, and contain plant material. Two coals, the Pocahontas Nos. 1 and 3, are present in the subsurface.

The Lee Formation ranges from 1450 feet thick in the northwest corner to 850 feet thick in the southeast corner of the map area (Figure 2). This southeastward thinning of the Lee Formation occurs because the Bee Rock Sandstone Member, which marks the top boundary, grades laterally into the feldspathic McClure Sandstone Member of the Norton Formation. With loss of the quartzose character of the Bee Rock sandstone the top of the Lee Formation is defined by the stratigraphically

lower upper quartzarenite of the Middlesboro Member of the Lee Formation. Rocks between this quartzarenite and the McClure Sandstone Member are included in the lower part of the Norton Formation (Miller, 1974). The Lee Formation contains two to three clean, very-light-gray quartzarenite members that intertongue with light- to medium-gray feldspathic sandstone, siltstone, and coal. Coal beds observed in gas test wells are equivalent to the Pocahontas No. 7, Little Fire Creek, War Creek, Middle Horsepen, Greasy Creek, Jawbone, and Raven.

There are two prominent and persistent sandstone members in the interval between the quartzarenite unit at the top of the Middlesboro Member and the Bee Rock—McClure sandstone horizon: 1) the Council Sandstone Member below the Jawbone coal; and 2) a sandstone below the Raven coal. The McClure Sandstone Member crops out in the vicinity of McClure in the northeastern corner of the Caney Ridge quadrangle.

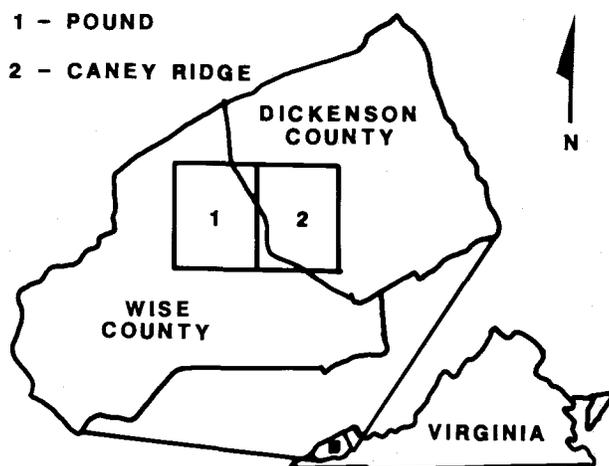


Figure 1. Index map showing the location of the Pound and Caney Ridge 7.5-minute quadrangles.

## SURFACE STRATIGRAPHY

### PENNSYLVANIAN SYSTEM

Surface rocks exposed in Pound and Caney Ridge quadrangles include approximately 1760 feet of siltstone, sandstone, shale, coal, and "marine" shale zones. The "marine" zones are interpreted to represent bay-fill sequences. The Pennsylvanian rocks are divided into the Norton Formation, Gladeville Sandstone, and Wise Formation, which are overlain locally by a thin cover of Quaternary (?) deposits.

Six coal beds have been mapped in the Norton Formation. They are, in ascending order, Kennedy, Lower Banner, Upper Banner, Splash Dam, Hagy, and Norton coals. Three "marine" sequences present in the Norton Formation are located: 1) just above the Lower Banner coal; 2) above the Splash Dam coal; and 3) about 80 feet above the Hagy coal. The "marine" sequence above the Hagy coal correlates with the Eagle Shale of White (1891). This correlation is based on position and character of the unit as seen on geophysical logs from gas wells in Virginia and West Virginia.

A stratigraphic problem involving the Gladeville Sandstone was identified during mapping of the Pound and Caney Ridge quadrangles. It was determined that the Gladeville Sandstone is thin to discontinuous in the northern half of the map area. Where this occurs, Campbell (1893), Hinds (1916), Giles (1921), and Eby (1923) identified, as the Gladeville Sandstone, a 50 to 75 foot thick sandstone that lies 10 to 40 feet below the Norton coal. As a result, much of the Gladeville Sandstone mapped by Eby (1923) and Giles (1921) in this area is the sandstone below the Norton coal. Adjacent coal beds are identified by their stratigraphic relationship to the Gladeville. Therefore, previous mapping of a stratigraphically different sandstone as the Gladeville led to problems in coal bed correlation (Figure 3). Figure 3 addresses previous and current coal correlations.

The lower 960 to 1000 feet of the Wise Formation is exposed in the map area. The lower 200 feet includes the Dorchester, Lyons, Blair, Clintwood, and Addington coals and coal zones interbedded with siltstone, lenticular sandstone, and shale. Above this interval is another "marine" sequence which correlates with the Cannelton Shale of White (1885). The upper 760 to 800 feet of the Wise Formation exposed in the map area contains the Imboden Marker, Imboden, Kelly, Upper St. Charles, Wilson, Taggart Marker, and Taggart coals interbedded with siltstone and massive, extensive sandstone bodies. The Marcum Hollow Sandstone Member, youngest locally preserved member of the Wise Formation, crops out on Bold Camp Mountain.

#### QUATERNARY (?) SYSTEM

Alluvial deposits of the floodplains of the Guest, Pound, Cranesnest, and McClure rivers and their tributaries consist of cobbles, gravel, sand, and silt. The maximum thickness of the medium-gray to grayish-brown alluvial deposits is unknown but is probably less than 20 feet.

#### STRUCTURE

The mapped area is entirely within the Pine Mountain fault block. Rocks have a regional dip of 1.5° Northwest towards the axis of the Middlesboro syncline. Two major structures in the map area are the Glamorgan fault system in the western half of Pound quadrangle and the Coeburn fault system in the western half of Caney Ridge quadrangle. The faults were first recognized as prominent surface lineaments on High-altitude CIR photography and ERTS-1 imagery (Johnston and others, 1975).

Three major north-trending geologic structures, extensions of features mapped in Wise quadrangle, are present in the western half of Pound quadrangle: 1) The Dorchester syncline, a north-south trending fold west of the Glamorgan fault system, varies from a broad fold in the southern two-thirds of the quadrangle, to a tight syncline between Lick Branch and Hays Branch, to a down-to-the-west fault west of the town of Pound. 2) The Glamorgan fault system parallels U. S. Highway 23 in Pound quadrangle. It is a steeply dipping to near-vertical, down-to-the-west fault with local variations in vertical displacement and an apparent left-lateral strike-slip component of undetermined displacement. The main fault splits at Indian Mountain, forming a dome-like structure with a steeply dipping east limb and a gently dipping west limb. In addition, several small-displacement, north and northwest trending faults are associated with the main fault. 3) The Gladeville anticline is an asymmetrical, open-fold, east of the Glamorgan fault system. North of Tank Hollow, this fold flattens and the rocks dip uniformly northwestward to the axis of the Middlesboro syncline.

The Coeburn fault system has a north-south trend in Caney Ridge quadrangle. It occupies the drainage of Trace Fork, Bear Fork, Tempest Branch, and Long Fork. Vertical throw along the Coeburn fault ranges between 20 and 140 feet down-to-the-east and deformation is restricted to a zone several tens of feet to several hundreds of feet wide.

Four unnamed, broad, low amplitude, gently northeastward plunging folds are present east of the Coeburn fault. The four folds, labeled A through D on Plate 1, have planar troughs and crests. The flanks of the folds are generally inclined less than three degrees. Small scale contractional faults and flexures are present along the southeast limb of syncline D in and adjacent to the Upper Banner and Splashdam coals.

Joints in sandstone, siltstone, and coal (cleat) are generally considered to be extension fractures. A

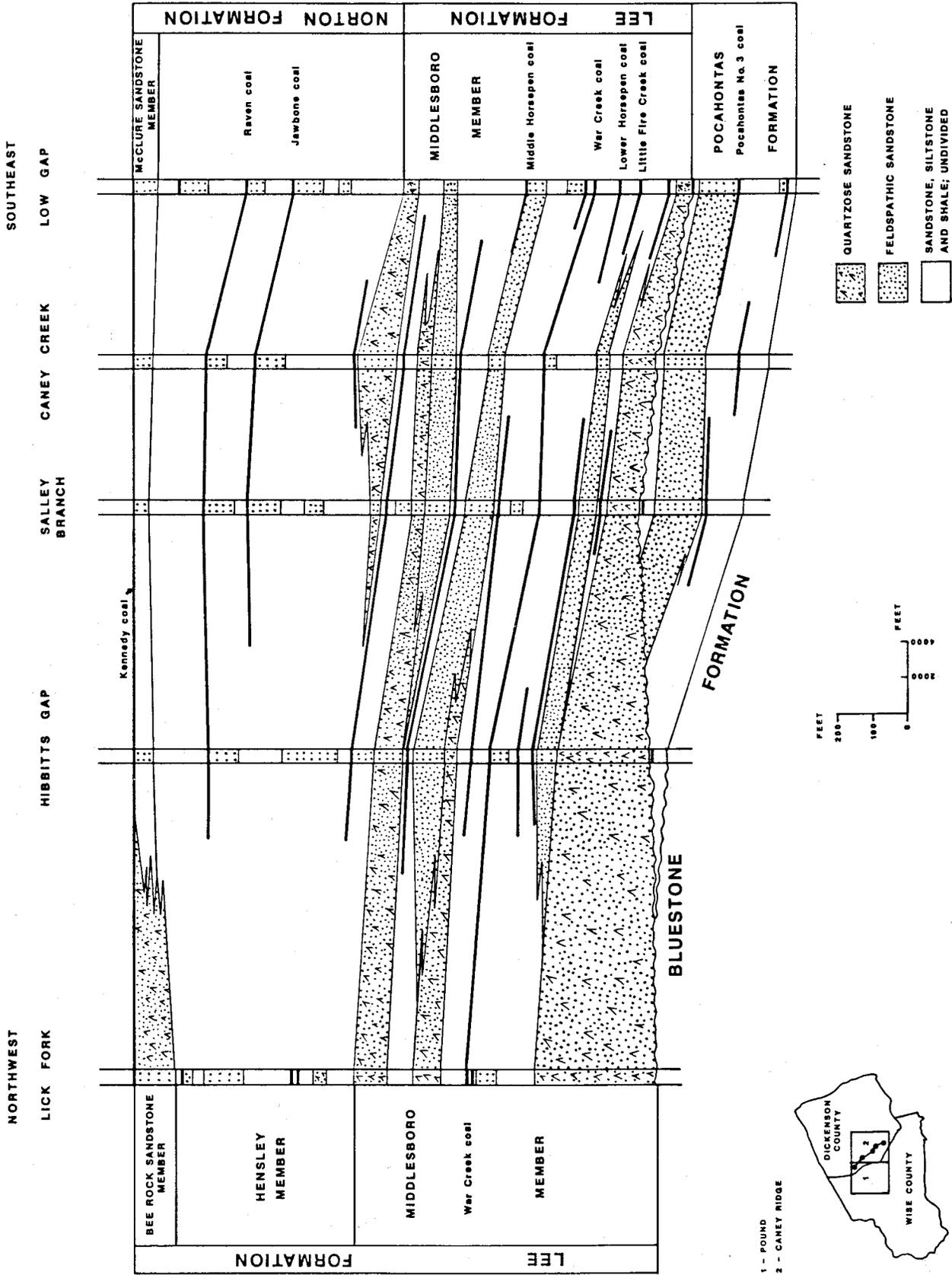


Figure 2. Northwest-southeast cross section of the Pocahontas and Lee formations and equivalent strata across Pound and Caney Ridge quadrangles.

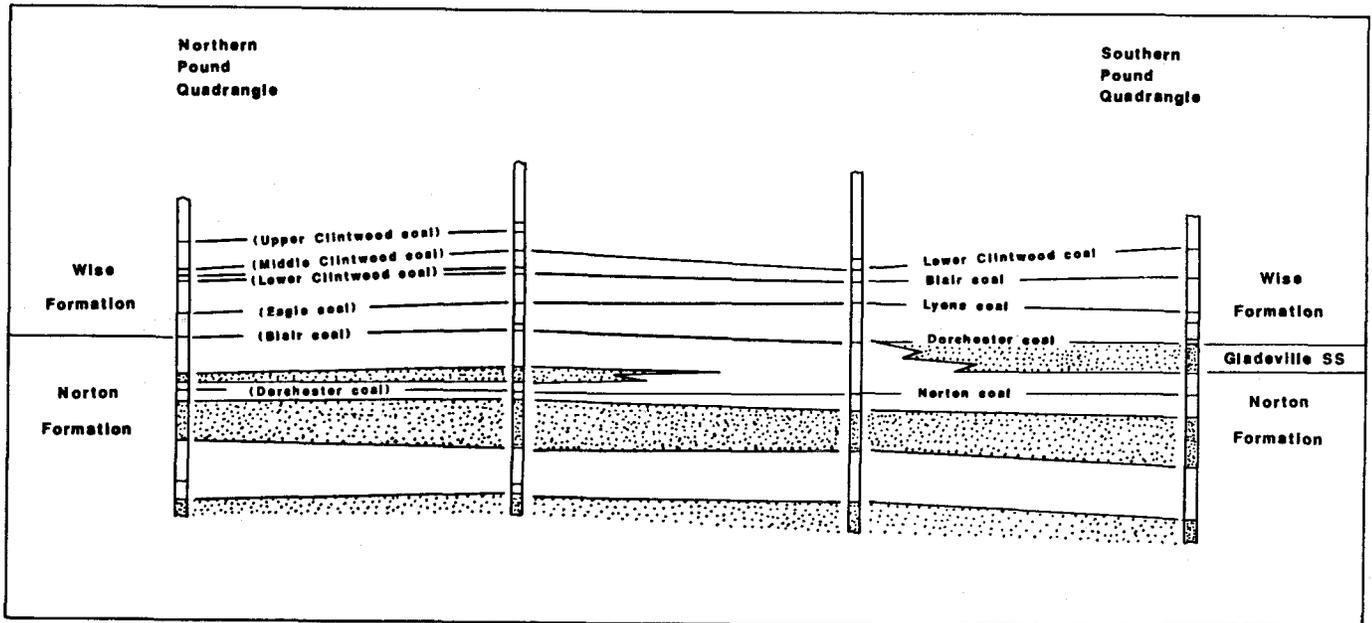


Figure 3. Stratigraphic diagram of the upper Norton and lower Wise formations showing the pinchout of the Gladeville Sandstone and the revised coal-bed correlations across Pound quadrangle from south to north.

compilation of the strike directions for the joints and cleats indicate orthogonal sets. The primary set of this joint system strikes about N35°W; the secondary set strikes about N53°E. The face cleat in the coal strikes roughly N48°W and the butt cleat strikes about N43°E. Spacing between the cleats ranges up to one-quarter inch.

## ECONOMIC GEOLOGY

### COAL

Coal is one of the primary mineral/energy resources in the map area. Coal is extracted by contour, hill-top removal, auger, and underground mining methods. Mines have produced from the Jawbone, Lower Banner, Upper Banner, Splash Dam, Hagy, Norton, Dorchester, Lyons, Blair, Clintwood, Addington, Imboden Marker, Imboden, Kelly, Upper St. Charles, Wilson, Taggart Marker, and Taggart coals.

Analyses of 49 samples of the Upper Banner through Imboden coals (Henderson and others, 1981, 1985; Wilkes, 1987, personal communication) indicate they are generally high volatile A bituminous; although, four samples ranged from high volatile C to medium volatile bituminous. Results of analyses are on an as-received basis: 0.54 to 4.4 percent total sulfur, 22.6 to 36 percent volatile matter, and 1.25 to 12.54 percent ash (one sample of Clintwood coal contained 36.6 percent ash). As-

received values for fixed carbon and Btu values were recalculated using the Parr Formula (ASTM, 1982). Btu values on a moist, mineral-matter-free basis ranged from 10,917 to 15,206 Btu per pound. Fixed carbon determined on a dry, mineral-matter-free basis ranged from 60.59 to 69.20 percent.

The coal bed names used in this report are the names used by the several active mining companies in central Wise County and are based largely on the work of Eby (1923). In areas where other coal names are used, or where these names are used out-of-sequence, the name of local usage will be shown in parentheses after the established name.

### Norton Formation Coals

A coal bed occurring about 270 feet above the Middlesboro Member of the Lee Formation, corresponds to the Jawbone. The coal is extensively mined underground in the vicinity of McClure, where the coal is at an elevation of about 1100 feet above sea level. The bed ranges between 42 and 76 inches in thickness.

The Kennedy coal commonly occurs a few feet above the McClure Sandstone Member. The coal is 0 to 70 inches thick. Where it crops out near McClure, the bed contains many antithetic and synthetic thrusts. The Kennedy has not been mined in the map area because of high ash content

and unfavorable mining conditions.

The Lower Banner coal crops out about 560 feet above the Jawbone and has been worked at the surface and underground along Big Branch of Caney Creek. The coal varies between 10 and 53 inches in thickness in this area.

Between 120 and 160 feet above the Lower Banner is the Upper Banner coal. The Upper Banner has been extensively underground, auger, and surface mined in the southeastern part of the area. It ranges in thickness from 28 inches along Steel Fork to 60 inches in the southeast corner of the map area.

The Splash Dam coal is 5 to 40 feet above the Upper Banner coal. (In areas where the two coals are close only the Upper Banner bed is shown on the map). The Splash Dam ranges from 6 to 24 inches in thickness and has been mined in association with the underlying Upper Banner coal.

The Hagy (Edwards) coal bed is 90 to 140 feet above the Splash Dam coal. Along the northern edge of Pound and Caney Ridge quadrangles the Hagy is overlain by a thin to discontinuous sandstone and a local coal bed called the Hagy No. 2. To the south, the Hagy is overlain by a 50 to 110 foot thick sandstone and underlain by a 40- to 60-foot sandstone. In the eastern part of the map area the Hagy is truncated by the overlying sandstone. The coal ranges from 0 and 28 inches in thickness.

The Norton (Dorchester) coal, which ranges from 12 to 40 inches thick, crops out 220 to 260 feet above the Hagy coal. It is 10 to 40 feet above the thick sandstone that was correlated with the Gladeville Sandstone (Campbell, 1893; Hinds, 1916; Giles, 1921; Eby, 1923).

Several thin coals are locally present above and below the Norton. An upper coal occurs 10 to 25 feet above the Norton. Along U. S. Highway 23 north of Indian Mountain, the upper coal is 17 inches thick. Ten to 30 feet below the Norton coal is a zone of 1 to 3 thin, discontinuous coals.

#### Wise Formation Coals

The Dorchester, Lyons, Blair, Clintwood, and Addington coals and coal zones in the lower Wise Formation vary in thickness, interval between beds, and number of beds. These coals are present throughout Pound quadrangle and the northern part of Caney Ridge quadrangle. They are often mined together at large surface mines. The Imboden Marker through the Taggart coals are present only in the Pound quadrangle.

The Dorchester (Blair) coal is 70 to 100 feet above the Norton coal and 0 to 30 feet above the Gladeville Sandstone where the sandstone is pres-

ent. The Dorchester generally crops out as one or two beds 0 to 15 feet apart with a maximum separation of 30 feet noted at one locality. Thicknesses range from 12 to 36 inches of solid coal to 61 inches of coal plus 30 inches of shale parting. The Dorchester has been extensively surface and underground mined.

The Lyons (Eagle) coal, which averages 25 inches in thickness, crops out about 45 feet above the Dorchester. This coal is generally surface mined in association with the thicker coals above and below.

The Blair (Lower Clintwood) coal bed crops out about 100 feet above the Dorchester coal. It ranges from 14 to 54 inches in thickness. A thin coal is locally present above the main Blair bench. The Blair coal has been extensively surface and underground mined and is presently being surface mined in conjunction with adjacent coals in several areas.

In the southern half of the map area, the Blair to Clintwood interval is 30 to 55 feet; however, the interval decreases northward. In the northwest corner, only 15 to 25 feet separate the Blair from the lowest Clintwood coal and in the north-central part of the map it appears that the Blair and Clintwood coals coalesce. This coalescing of the two beds is indicated by drill holes that show the Lyons coal consistently 60 feet below the main Clintwood bench. Also, the Clintwood is unusually thick in this area. Giles (1921) reported 13 feet of coal with 2.42 feet of shale, clay, and bone parting at the head of Lick Fork. During this project, an 83-inch coal with a 7-inch siltstone parting was measured at an abandoned surface mine on McFall Fork. This coal appears to be the combined Blair (Lower Clintwood) and Lower Clintwood (Middle Clintwood) beds. The combined Clintwood and Blair coals are shown on Plate 1 as a single coal in the northern part of the area.

The Clintwood coal zone consists of a 30 to 50 foot thick interval which contains 2 to 6 coals. Generally there are two thick coal beds in the Clintwood coal zone; the Lower Clintwood (Middle Clintwood) and the Upper Clintwood 10 to 20 feet above the lower. A thin Clintwood marker coal is often present about 5 feet above the Upper Clintwood coal. Several other thin coals may be present in the interval. Because of the small separation between the Upper and Lower Clintwood coals, this interval is shown locally as a single bed on the map (Plate 1). The Clintwood coal zone has been extensively surface and underground mined in Pound quadrangle. Presently it is being mined with underlying coals in several parts of the quadrangle.

The Addington (Clintwood marker) coal is present only in the southern half of Pound quadrangle. The coal bed occurs 30 to 60 feet above the Upper Clintwood coal and directly above a 10 to 45 foot thick sandstone. It is overlain by approximately 150 feet of siltstone, shale, and minor sandstone. The Addington is 17 inches thick in a roadcut east of U. S. Highway 23 on Indian Mountain.

The Imboden Marker (Lower Bolling) crops out 200 to 330 feet above the main Clintwood coal bed. It is 0 to 80 feet above a sandstone which ranges up to a maximum of 110 feet thick in the southern part of Pound quadrangle and grades northward into a sequence of interbedded sandstone and siltstone. The coal averages 26 inches in thickness throughout the area. The Imboden Marker has been surface mined near the top of many ridges in the area and is presently being mined underground south of Barn Branch.

The Imboden (Upper Bolling) coal is separated from the Imboden Marker by 20 to 30 feet of siltstone and sandstone. It is a laterally continuous coal that averages 36 inches in thickness with minor partings. The bed was surface mined with the underlying Imboden Marker and is often exposed in the highwall. The Imboden is presently being mined underground on the north slope of Bold Camp Mountain.

The Kelly is a discontinuous coal that occurs approximately 115 feet above the Imboden coal bed. It was seen as a bloom along a dirt road north of Barn Branch, south of Indian Mountain, and where it has been surface mined at the head of Lick Fork. It could not be measured at these locations.

The Upper St. Charles (Lower Standiford) coal bed occurs 180 feet above the Kelly coal and about 300 feet above the Imboden coal bed. It is separated from the overlying Wilson (Upper Standiford) coal by approximately 15 feet of siltstone. These coal beds are shown as a single line on Plate 1. The two coals have been surface mined concurrently on Indian Ridge and Bold Camp Mountain. On Indian Ridge both coals were completely removed. On Bold Camp Mountain the Upper St. Charles was covered by spoil, but the Wilson coal, exposed in the highwall, was 39 inches thick and contained a 10 inch thick shale parting.

The Taggart Marker coal lies approximately 80 feet above the Wilson Coal and 15 feet below the Taggart coal bed. The Taggart Marker and Taggart were visible only in the highwall of the Upper St. Charles/Wilson surface mine on Bold Camp Mountain and could not be measured. These coals are shown on Plate 1 as a single line.

## NATURAL GAS

Natural gas production in the map area has been concentrated primarily in the Caney Ridge quadrangle where 71 wells have been drilled. This compares with only three wells drilled in Pound quadrangle.

Natural gas occurs in Caney Ridge quadrangle in commercial amounts in rocks of Devonian and Mississippian age. Drilling in the quadrangle began in 1951. The first gas well, completed on June 6, 1951 to a total depth of 5332 feet, was the Clinchfield Coal Company Wilson Rose No. 119 (now Philadelphia Oil Company P-168). Initial open flow of gas was 8 Mcf (thousand cubic feet per day). Two hours after hydraulic fracturing, the well produced 442 Mcf of gas. The well is presently producing from the "Berea" sand at a depth of 4428 feet. Of the 71 wells drilled 63 are producing, 4 are shut-in, and 4 are plugged and abandoned. Footage drilled varies between 3518 to 6436 feet, with an average depth of 5180 feet.

Caney Ridge quadrangle includes part of the Nora gas field. Gas producing zones within the field include the Wildcat Valley Sandstone ("Corniferous"), the Big Stone Gap Member of the Chattanooga Shale ("Berea"), Greenbrier Limestone ("Big Lime"), and the Hinton Formation ("Ravencliff"). The top elevation of the Wildcat Valley Sandstone varies between -4285 feet in the southeast to -3735 feet in the northwest. Natural gas is produced mainly from the lower part of the Big Stone Gap Member ("Bedford-Berea" interval) of the Chattanooga Shale. The "Berea" sand averages 90 feet in thickness and lies at an elevation of about -3150 feet in the southeast to -2600 feet in the northwest. Driller's logs indicate that the base of the Greenbrier Limestone ("Big Lime") lies 600 feet above the "Berea." The Hinton Formation ("Ravencliff") averages 170 feet in thickness; its base lies about 550 feet below the Pennsylvanian Pocahontas Formation.

Pound quadrangle is outside of the limits of the Nora gas field. Hydrocarbon exploration within the quadrangle has been limited to three drill holes completed in the early 1950s. Two wells, both west of U. S. Highway 23, were fractured. One well produced 412 Mcf of gas and has been shut-in. Initial flow of the second well was 483 Mcf and it has been plugged and abandoned. A third well is located near the head of Lick Fork in Dickenson County. After acidizing, the well produced only 21 Mcf of gas and was plugged and abandoned.

## CLAY AND SHALE

Reports by Sweet (1982) and Johnson and others (1966) included results of analyses of clay, shale, and related material collected in Wise County. One sampled underclay from the Wise Formation has potential for use in structural clay products (Sweet, 1982). One sample from the Caney Ridge quadrangle had no potential use (Johnson and others, 1966). This report (Johnson and others, 1966) included samples taken from the Norton and Wise formations in other areas that correspond to rocks present in the map area. These samples have potential use in the manufacture of brick, quarry tile, and lightweight aggregate (Johnson and others, 1966).

## SANDSTONE

A sandstone quarry is located along State Road 652 about 1000 feet east of the intersection with State Road 643. This is the sandstone body that overlies the Hagy coal bed. The sandstone is medium gray, fine- to medium-grained, medium- to thick-bedded, and contains mica and feldspar with rare quartz-pebble beds. The use for the sandstone is not known.

## ACKNOWLEDGEMENTS

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Pennsylvanian System.....	1		



**EXPLANATION**

Alluvium  
Terrace deposits

**KEY**

**CONTACTS**  
Contact  
Solid where exposed; dashed where approximately located or covered  
Coal bed  
Solid where exposed; dashed where approximately located or covered

**FOLDS**  
Syncline showing trace of axial surface, direction of plunge shown by arrow  
Anticline showing trace of axial surface, direction of plunge shown by arrow

**FAULTS**  
Solid where exposed; dashed where approximately located or covered  
D, downthrow side; arrows indicate direction of relative movement  
In cross section:  
T, relative movement toward observer  
A, relative movement away from observer

**ATTITUDE OF ROCKS**  
Strike and dip of beds  
Horizontal beds

**COAL MINES**  
Mine adit  
Aft of abandoned mine  
Surface mine; hachures toward highwall  
Area of extensive surface mining (see monitoring report), where the bounding coal bed and all units above have been removed  
Coal outcrop or prospect

**TEST WELLS FOR OIL AND GAS**  
Gas well  
Gas well, shut in  
Abandoned gas well

**REPOSITORY NUMBERS**  
R, repository number of surface coal sample and analysis on file at Virginia Division of Mineral Resources  
R, repository number of underground coal sample and analysis on file at Virginia Division of Mineral Resources

**MODIFIED LAND**  
Mine dump, valley fill, or areas of extensive reclamation  
Land, active  
Land fill, inactive

**GLADEVILLE SANDSTONE**  
Norton Formation  
Pn, interbedded siltstone and sandstone  
ns, unmetamorphosed sandstone  
n, Norton coal bed  
h, Hagy coal bed  
sd, Splash Dam coal bed  
ub, Upper Banner coal bed  
k, Kennedy coal bed

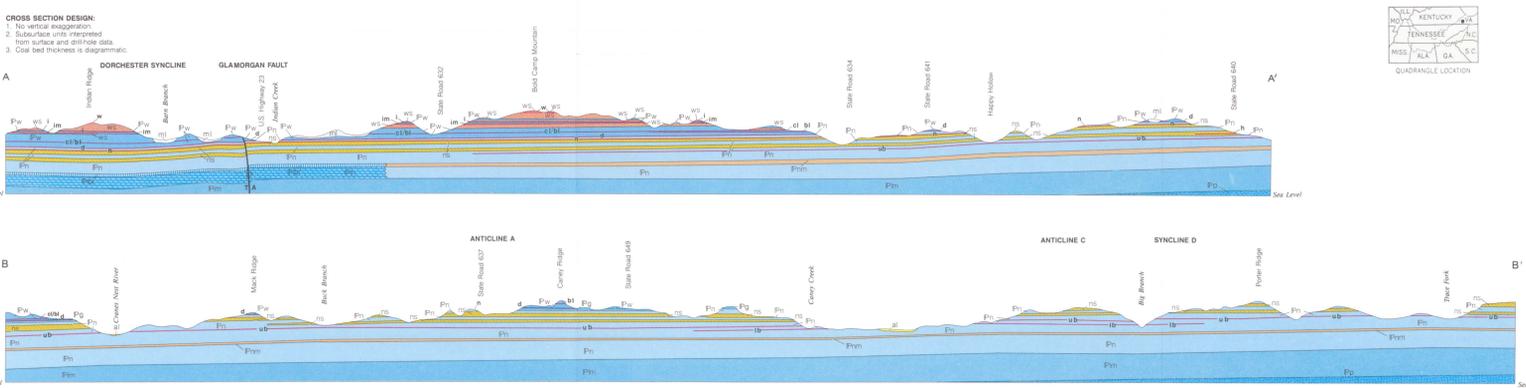
**WISE FORMATION**  
Pw, interbedded siltstone and sandstone  
ws, unmetamorphosed siltstone, Marston Hollow Sandstone  
wg, Taggart coal bed  
w, Wilson coal bed  
kg, Kelly coal bed  
l, Imboden coal bed  
mb, Imboden Marker coal bed  
ad, Addison coal bed  
cl, Clintonwood coal bed  
b, Blair coal bed  
l, Lyons coal bed  
d, Donahoe coal bed

**Lee Formation**  
Plr, Bee Rock Sandstone Member  
Pp, Henley Member

**Norton Formation**  
Pn, interbedded siltstone and sandstone  
ns, unmetamorphosed sandstone  
n, Norton coal bed  
h, Hagy coal bed  
sd, Splash Dam coal bed  
ub, Upper Banner coal bed  
k, Kennedy coal bed

**Middle Member of the Lee Formation**

**Peachotas Formation**



**GEOLOGY OF THE POUND AND CANEY RIDGE QUADRANGLES, VIRGINIA**

William W. Whitlock and James A. Lovett (Pound Quadrangle)  
Jack E. Nolde (Caney Ridge Quadrangle)

1988

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Base map from U.S. Geological Survey, Pound, Va. Quadrangle (1967, PR 1966, 1977) and Caney Ridge Quadrangle (1968, PR 1970) 7 1/2 minute series.

The Piles Peak Lithographing Co. Copyright 1988 Commonwealth of Virginia

Scale: 1:24,000

CONTOUR INTERVAL, 40 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929

SYSTEM AND SERIES	Formation, Member and Bed	Gamma-Ray Log	Lithology	Coal Thickness in Inches	Description
Quaternary	Alluvium		Unconsolidated sand, silt, clay, gravel, pebbles, and coarse cobbles and boulders. Thickness: 0-20 feet.		
	Terrace deposits		Unconsolidated sand, silt, clay, gravel, pebbles, and coarse cobbles and boulders. Thickness: 0-20 feet.		
PENNSYLVANIAN MIDDLE	Wise Formation Taggart Member coal		Sandstone, siltstone, and coal. Sandstone, siltstone, shaly, very fine-grained and poorly sorted. Weathering to yellowish-brown and reddish-brown. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	7	
	Wilson coal		Sandstone, siltstone, and coal. Sandstone, siltstone, shaly, very fine-grained, thin to thick bedded. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	19	
	Upper St. Charles coal		Sandstone, siltstone, and coal. Sandstone, siltstone, shaly, very fine-grained, thin to thick bedded. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	7	
	Kelly coal		Sandstone, siltstone, and coal. Sandstone, siltstone, shaly, very fine-grained, thin to thick bedded. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	7	
	Imboden coal		Sandstone, siltstone, and coal. Sandstone, siltstone, shaly, very fine-grained, thin to thick bedded. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	20-16	
	Imboden Marker coal		Sandstone, siltstone, and coal. Sandstone, siltstone, shaly, very fine-grained, thin to thick bedded. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	19-21	
	Connetquot Shale		Siltstone, shale, sandstone, and clay. Siltstone, shale, medium light gray, weathering light gray to grayish brown. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	20-16	
	Addington coal		Siltstone, shale, sandstone, and clay. Siltstone, shale, medium light gray, weathering light gray to grayish brown. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	0-10	
	Clintonwood coal		Siltstone, shale, sandstone, and clay. Siltstone, shale, medium light gray to yellowish gray, weathering light gray to grayish brown. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	0-10	
	Blair coal		Siltstone, shale, sandstone, and clay. Siltstone, shale, medium light gray, weathering light gray to grayish brown. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	23-23	
Lyons coal		Siltstone, shale, sandstone, and clay. Siltstone, shale, medium light gray, weathering light gray to grayish brown. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	14-14		
Donahoe coal		Siltstone, shale, sandstone, and clay. Siltstone, shale, medium light gray, weathering light gray to grayish brown. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	17-21		
PENNSYLVANIAN LOWER	Gladeville Sandstone		Sandstone, siltstone, and coal. Sandstone, siltstone, shaly, very fine-grained, thin to thick bedded. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	25-21	
	Norton coal		Sandstone, siltstone, and coal. Sandstone, siltstone, shaly, very fine-grained, thin to thick bedded. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	12-14	
	Eagle Shale		Siltstone, shale, sandstone, and coal. Siltstone, shale, medium light gray to grayish brown, weathering light gray to grayish brown. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	0-13	
	Hagy coal		Siltstone, shale, sandstone, and coal. Siltstone, shale, medium light gray, weathering light gray to grayish brown. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	0-25	
	Splash Dam coal		Siltstone, shale, sandstone, and coal. Siltstone, shale, medium light gray to yellowish gray, weathering light gray to grayish brown. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	0-11 18-20	
NORTON	Upper Banner coal		Siltstone, sandstone, and shale. Siltstone, shale, medium light gray to medium gray, weathering light gray to grayish brown. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	10-12	
	Kennedy coal		Siltstone, sandstone, and coal. Siltstone, shale, medium light gray, weathering light gray to grayish brown. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Contains thin, irregularly bedded, fossiliferous sandstone. Lower 50 feet of Marston Hollow Sandstone Member exposed at base of Wise Formation. Siltstone, siltstone, siltstone, clay, shaly sandstone. Thickness: 100 feet.	0-70	

