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GEOLOGY
OF THE VIRGINIA PORTION OF THE
APPALACHIA AND BENHAM QUADRANGLES

GEOLOGY OF THE VIRGINIA PORTION OF THE APPALACHIA AND BENHAM QUADRANGLES

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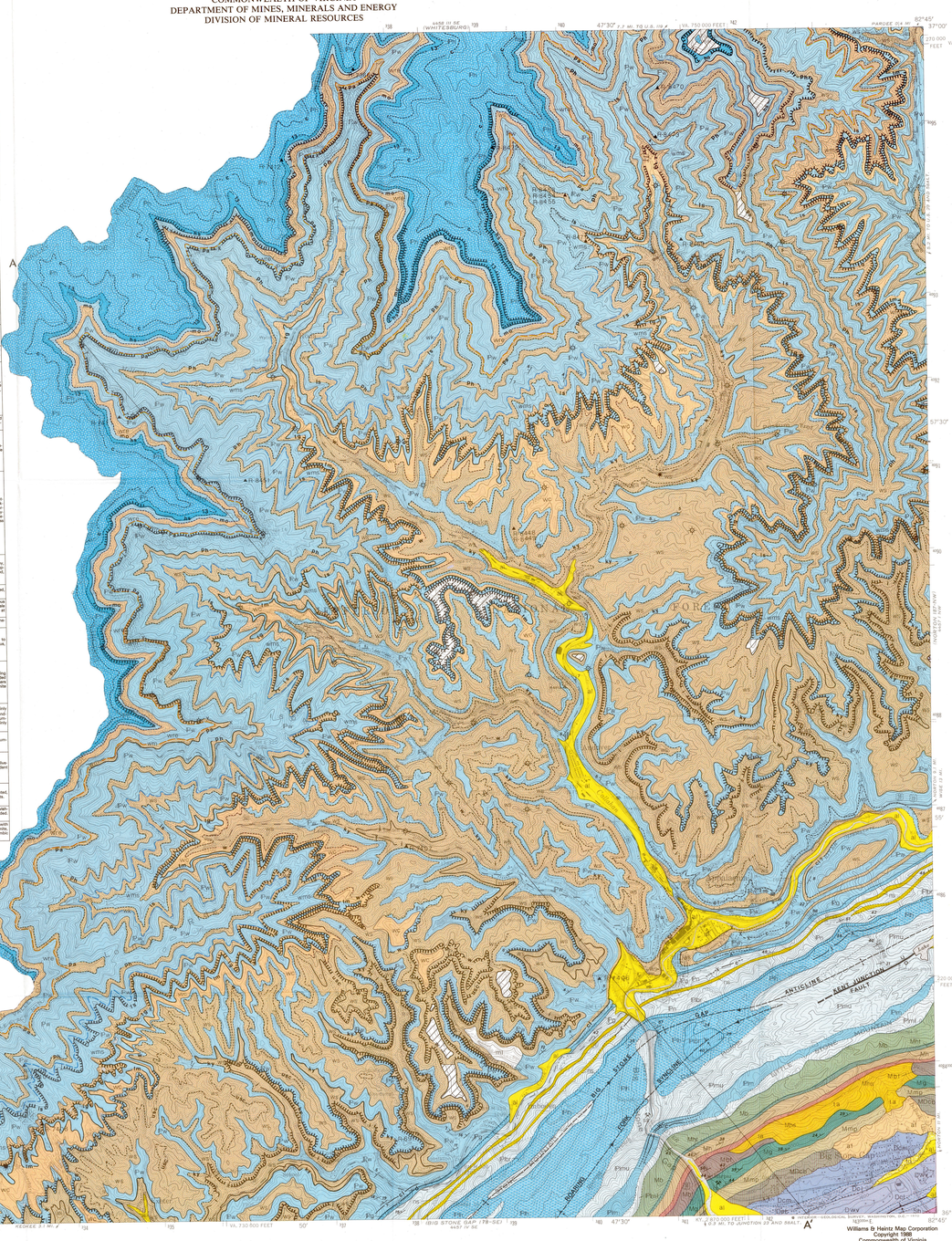
SERIES	FORMATION, MEMBER, OR BED	LITHOLOGY	COAL BED THICKNESS IN INCHES	ROCK UNIT THICKNESS IN FEET	LITHOLOGIC DESCRIPTION
QUATERNARY	Alluvium			0-20	Silt, sand, and gravel with clay at base.
	Terrace deposits			0-20	Stratified rounded pebbles and cobbles in a sandy clay matrix.
	Alluvial Fans			0-10	Slope deposits of angular boulders of sandstone or limestone.
	Talus			0-50	Poorly stratified silt, sand, and well-rounded to angular cobbles and boulders.
PENNSYLVANIAN	Harlan Formation		No. 13 coal 25-40	490+	Siltstone, coal, and sandstone. Siltstone, carbonaceous, medium-gray to pale-brown, thickly laminated, contains plant fossils. Sandstone, moderately quartzose to feldspathic, light-gray, medium-grained, cross- to massive-bedded, reactant.
			High Splint coal 25-50	340-460	Sandstone, siltstone, shale, coal, and limestone. Sandstone, moderately quartzose to feldspathic, light-gray, medium-grained, massive- to cross-bedded. Siltstone and shale, medium-gray to black, massive- to thin-bedded. Coal, bituminous, Hazard No. 4 (Blue Gem) seam. Limestone, fossiliferous micrite 6- to 20-inch-thick bed and shale, fossiliferous, dark-gray. Reynolds Sandstone Member named by Ashby and Glenn (1966).
	Reynolds Sandstone Member				
	Magoffin Member				
	Pardee coal 35-55			290	Siltstone, sandstone, and coal. Siltstone, noncalcareous, medium-gray, thin- to medium-laminated with ironstone nodules. Sandstone, light- to medium-gray, thin- to thick-bedded and cross bedded.
	Phillips coal 35-42			320-440	Siltstone, shale, sandstone, and coal. Siltstone, medium-gray, thin-bedded with ironstone nodules. Sandstone, light-gray, medium-grained, cross-bedded. Kendrick Shale Member shale, calcareous, grayish-black, fossiliferous with some in-core ironstone nodules, up to 20 feet thick.
	Kendrick Shale Member				
	Low Splint coal 25-50				
	Upper Elk Valley coal 22-30			510-600	Sandstone, siltstone, and coal. Sandstone, moderately quartzose, feldspathic, light-gray, medium-grained, massive- to cross-bedded, cliff forming. Fromtown reddish sandstone units (members) are mapped. Marcum Hollow and Clover Fork Sandstone Members described by Miller (1980); Taggart Marker and Taggart Coal described by Miller (1982). Siltstone, medium-gray, thin-bedded, cliff forming, may contain ironstone nodules.
	Marcum Hollow Sandstone Member				
	Taggart Marker 12-30				
	Clover Fork Sandstone Member				
	Wilson coal 12-70				
	Upper St. Charles coal 6-28				
	Kelly coal 11-60				
	Imboden coal 35-70			380-440	Siltstone, sandstone, and coal. Siltstone, light- to medium-gray, thin-bedded with ironstone nodules. Sandstone, light-gray, fine-grained, 20 feet above the Clintwood coal. Sandstone, coal, and carbonaceous, light-gray, fine-grained, planar- to trough-cross bedded.
	Clintwood coal 6-30			110-190	Siltstone, coal, and sandstone. Siltstone, carbonaceous, medium- to dark-gray, thickly laminated to thin-bedded. Sandstone, medium-gray, calcareous, medium-gray, fine- to medium-grained, medium- to cross-bedded.
	Dorchester coal 11-36				
	Gladeville Sandstone			35-60	Sandstone, quartzose to feldspathic, white to light-gray, fine- to medium-grained, locally contains mica, and shale pebble conglomerate, thin- to very thick-bedded and cross bedded.
MISSISSIPPIAN	Bee Rock Sandstone Member			70-120	Sandstone, quartzose, light-gray, fine- to very-fine-grained, very-thick-bedded with tabular and planar, high-angle cross stratification, lower 20 feet con-glomeratic.
	Hinton Formation			450-550	Siltstone, coal, and sandstone. Sandstone, medium-gray, fine- to very-fine-grained. Siltstone, medium- to dark-gray, thin-bedded with hard shale partings, carbonaceous medium-bedding surfaces.
	Jawbone coal				
	Greenbrier Limestone		90-125	400	Sandstone, siltstone, shale, and coal. Lower sandstone, quartzose, very-light-gray, fine-grained, massive- to cross-bedded, cliff forming, upper part, thick-bedded, tabular to planar cross beds. Middle siltstone and shale, olive-buff, calcareous, dark-gray with interbedded nonresistant, medium-gray, very-fine-grained sandstone. Upper sandstone, quartzose, light-gray, fine-grained, conglomeratic in lower part, thick-bedded, tabular to planar cross beds.
	War Creek coal 15-48			150	
				400	
	Bluestone Formation			300-500	Sandstone, siltstone, and shale. Shale and siltstone, gray to greenish-gray, thin-bedded, fossiliferous, calcareous, sandstone, light-gray, fine-grained, tabular per part. Sandstone, greenish-gray to medium-gray, medium-grained, thin- to thick-bedded, trough cross bedded.
	Tallery Sandstone Member			20-80	Tallery Sandstone Member, light-olive-gray to white, fine- to medium-grained, cross bedded, coarse-grained and conglomeratic in lower part.
	Little Stone Gap and Middle red siltstone members		200-300	200-300	Little Stone Gap Member: Mudstone, calcareous, medium-gray, fossiliferous with interbedded sandstone, light-olive-gray, fine-grained, tabular to planar, and siltstone, olive-gray, grayish-red, medium-gray, thin-bedded, fissile or blocky.
	Stony Gap Sandstone Member		70-200	70-200	Stony Gap Sandstone Member, greenish-gray to dark-yellowish-orange, fine- to very-fine-grained, trough cross bedded.
	Bluefield Formation			360-500	Shale, siltstone, and limestone. Shale and siltstone, calcareous, gray to olive-gray, thin-bedded, fossiliferous. Limestone, medium-gray, massive, oolitic, medium- to dark-gray, thick-bedded, fossiliferous.
	Greenbrier Limestone			260-460	Limestone, light- to olive-gray, thick- to very-thick-bedded, biomicrite grading laterally to biosparite, scattered light-gray to white, cross-bedded calcarenite beds, abundant crinoidal debris, bryozoans, corals, and echinoids, of black, gray, and pale-red chert in lower 40 feet, pale-brown dolomite near top of chert-bearing beds.
DEVONIAN	Macrorafe and Price Formations, undivided			230-320	Macrorafe Formation: Shale and siltstone, grayish-red to grayish-green, thickly laminated, hard, brittle, platy parted. Price Formation (upper part): Sandstone, slightly micaceous, medium-gray, very-fine-grained, medium-bedded, cross laminated, tabular to planar cross beds, medium-gray, thickly laminated, hard, hackly, fissile to platy parting.
	Big Stone Gap Member			200-300	Shale, grayish-black to black, hard, brittle, fissile to platy, thin- to medium-laminated, sparse fossils.
	Middle gray siltstone member		140-215	140-215	Siltstone, medium-gray, hard, platy, thin-bedded with interbedded shale, olive- to dark-gray, fissile to platy, hackly to splintery, than-bed-bed, fossiliferous, concretions.
	Lower black shale member			90	Shale, grayish-black to black, hard, brittle, fissile to platy, thin- to medium-laminated, sparse fossils.
	Wildcat Valley Sandstone			340	Sandstone and chert. Sandstone, quartzose, pale-orange to dark-yellowish-orange, medium- to coarse-grained, moderately sorted, medium-bedded, cross laminated, tabular to planar cross beds. Chert, light-gray to olive-gray.
	Hancock Formation			200	Limestone and dolomite. Limestone, medium-gray, thick-bedded with interbedded shale, fossiliferous, petroliferous odor when broken. Dolomite, light-gray, finely laminated lalgal, aryotitic, medium-bedded with rhombic crystal vug fillings.



Base map from U.S. Geological Survey, 1955
(69-PR) Appalachia Quadrangle, 7½ minute series.
Base map from U.S. Geological Survey, 1954
(79-PR) Benham Quadrangle, 7½ minute series.

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

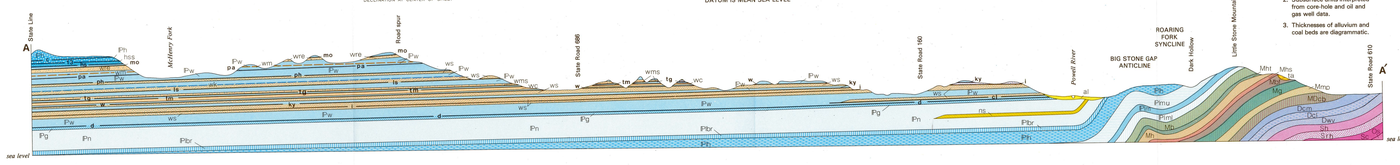
SCALE 1:24000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

CROSS SECTION DESIGN

1. No vertical exaggeration.
2. Subsurface units interpreted from core-hole and oil and gas well data.
3. Thicknesses of alluvium and coal beds are diagrammatic.



EXPLANATION

QUATERNARY
- al — Alluvium
- tg — Terrace deposits
- af — Alluvial fans
- tl — Talus

PENNSYLVANIAN
- Pn — Harlan Formation: Pfc, *Interbedded siltstones and sandstones*; hss, *Unnamed sandstone*; c, *Unnamed coal bed*; 13, *No. 13 coal bed*
- Pw — Wise Formation: Fw, *Interbedded siltstones and sandstones*; wre, *Reynolds Sandstone Member*; wm, *Magoffin Member*; ws, *Unnamed sandstone*; wk, *Kendrick Shale Member*; mg, *Marcum Hollow Sandstone Member*; wc, *Clover Fork Sandstone Member*; hs, *High Splint coal bed*; mo, *Morris coal bed*; pa, *Pardee coal bed*; ph, *Phillips coal bed*; ls, *Low Splint coal bed*; tg, *Taggart coal bed*; tm, *Taggart Marker coal bed*; w, *Wilson coal bed*; usc, *Upper St. Charles coal bed*; ky, *Kelly coal bed*; i, *Imboden coal bed*; ct, *Clintwood coal bed*; d, *Dorchester coal bed*
- Pg — Gladeville Sandstone

MISSISSIPPIAN
- Pn — Norton Formation: Pn, *Interbedded siltstone, coal and sandstone*; ns, *Unnamed sandstone*; c, *Unnamed coal bed*
- Pbr — Lee Formation: Pbr, *Bee Rock Sandstone Member*; Ph, *Hensley Member*; Pmu, *Middleboro Member, upper unit*; Pm, *Middleboro Member, middle unit*; Pml, *Middleboro Member, lower unit*; j, *Jawbone coal bed*; wc, *War Creek coal bed*; c, *Unnamed coal bed*
- Mb — Bluestone Formation
- Mht — Hinton Formation: Mht, *Tallery Sandstone Member*; Mh, *Little Stone Gap Member and middle red member, undivided*; Mhs, *Stony Gap Sandstone Member*
- Mbf — Bluefield Formation
- Mg — Greenbrier Limestone
- Mmp — Maccrady and Price Formations, undivided

DEVONIAN
- Mbdb — Chattanooga Shale: MDdb, *Big Stone Gap Member*; Ddm, *Middle gray siltstone member*; Ddl, *Lower black shale member*
- Dwv — Wildcat Valley Sandstone

ORDOVICIAN
- Oh — Hancock Formation
- Orh — Rose Hill Formation
- Sc — Clinch Sandstone
- Os — Sequatchie Formation

In cross-section only

KEY

CONTACTS

Contact
Dashed where approximate

Coal bed
Dashed where approximate

Marine marker bed

ATTITUDE OF ROCKS

Strike and dip of beds

FOLDS

Anticline axis; arrow indicates direction of plunge

Syncline axis; arrow indicates direction of plunge

FAULTS

Solid line where exposed; dashed line where approximate; U, upthrown side; D, downthrown side

COAL MINES

Adit of active mine

Adit of abandoned mine

Contour surface mine, hachures indicate direction to highwall

Area of extensive surface mining (e.g. mountain-top removal), showing original extent of lowest coal seam removed.

Modified land (e.g. mine dump, valley fill, and areas of extensive reclamation).

Coal outcrop or prospect

OIL AND GAS WELLS

Gas well

Dry hole (gas show)

Oil and gas well

ABANDONED QUARRIES

Sandstone

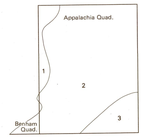
Limestone

REPOSITORY NUMBERS

R-6911
R, collection point repository number of coal sample with analysis on file at Virginia Division of Mineral Resources.

R-8448
R, collection point repository number of coal sample from underground mine with coal analysis on file at Virginia Division of Mineral Resources.

Credit Diagram



1. Previously mapped by Froelich and Stone (1973), U.S.G.S. GQ 1059.
2. Jack E. Nolde and James A. Henderson, Jr.
3. Jack E. Nolde and Ralph L. Miller, and modified in part after Thomas M. Gathright, II, unpublished manuscript.

INTRODUCTION

This geologic map of parts of the Appalachia and Benham quadrangles illustrates an area of approximately 55 square miles in southwestern Wise County, Virginia. The geology of the Kentucky portion of the quadrangles has been described by Froelich and Stone (1973). The Virginia Polytechnic Institute and State University provided partial funding for the present study under contract number 231-81844-3-4125.

STRATIGRAPHY

The stratigraphic sequence exposed on Stone and Little Stone mountains, in the southeastern portion of the area, includes Upper Silurian to Lower Pennsylvanian rocks. The Hancock Formation of Late Silurian age is a sequence of limestones and dolomites about 100 feet thick. The overlying Devonian rocks are composed of three units. The oldest unit, the Wildcat Valley Sandstone, is light gray, fine to medium grained, calcareous, cherty, and fossiliferous. The unit averages 50 feet in thickness and the upper and lower contacts are unconformable. The lower black shale member of the Chattanooga Shale overlies the Wildcat Valley Sandstone. The combined thickness of the lower black shale and the middle gray siltstone ranges between 525 and 575 feet. The middle gray siltstone member is gradational with the overlying Mississippian-age Big Stone Gap Member of the Chattanooga Shale. The Big Stone Gap Member ranges between 200 and 300 feet in thickness and is gradational upward into the Price, and Maccrady formations, a sequence of interbedded sandstones and siltstones about 240 feet thick. Unconformably overlying the grayish-red siltstones of the Maccrady Formation is the Greenbrier Limestone. The Greenbrier averages 450 feet in thickness. Above the Greenbrier Limestone are 1,500 feet of grayish-red to grayish-green siltstones, shales, and sandstones of the Bluefield, Hinton, and Bluestone formations, in ascending order. The Bluestone Formation of Mississippian age is overlain unconformably by the thick, resistant quartz-arenites of the Lee Formation, Early Pennsylvanian in age which form the crests of Stone and Little Stone mountains. The Lee is nearly 1,600 feet thick.

The principal coal-bearing rocks of Middle Pennsylvanian age have an aggregate thickness of nearly 3,500 feet and are northwest of Pigeon Creek and the Powell River. These are, in ascending order, the Norton Formation, Gladeville Sandstone, Wise Formation and Harlan Formation. The Harlan Formation is present only along the crest of Black Mountain.

Surficial deposits of Quaternary age occur as flood-plain alluvium, alluvial fans, alluvial terraces, and talus. The alluvial deposits are composed of fine- to coarse-grained sand and gravel. Talus deposits are made up of boulders of angular sandstone or limestone. Man-made deposits (gob piles, spoil, valley fills, etc.) are present in mining areas and are composed of an unsorted mixture of coal, shale, siltstone, and sandstone.

STRUCTURE

The rocks in the area were deformed during the Late Paleozoic Alleghanian orogeny and above the Pine Mountain decollement as the Pine Mountain thrust sheet was emplaced. The area occupies part of the gently inclined southeast limb of the Middlesboro syncline and part of the steep northwest limb of the Powell Valley anticline. The transition from the Middlesboro syncline to the Powell Valley anticline lies along Powell River and Pigeon Creek.

Minor folds on the northwest limb of Powell Valley anticline include the Big Stone Gap anticline and the Roaring Fork syncline, which are continuous along Stone and Little Stone mountains southwest of Roaring Fork. These folds are separated by the northwest-dipping Kent Junction fault northeast of the Appalachia Reservoir.

Folds in the rocks of the Middlesboro synclinE are rare and of low amplitude and limited extent. Both extensional joints and shear fractures are well developed in the gently dipping strata. Major fracture trends of N65-70°E and N20-25°W are present in both underground and surface mines in the Appalachia area (Miller and others, 1982).

ECONOMIC GEOLOGY

COAL

Coal is the most important mineral resource in the area. In general, it ranges from a high-volatile B to a high-volatile A bituminous coal. The content of twenty-three coal samples analyzed from beds within the area ranges from 53 to 63 percent fixed carbon, 34.3 to 41.4 percent volatile matter, 6.8 to 10.2 percent ash, and 0.6 to 1.0 percent total sulfur. Thev have heating values of 13,200 to 15,300 Btu per pound. The analyses for individual coal beds are on open file at the Division of Mineral Resources.

Almost all of the economically extractable coal is limited to the Wise and Harlan formations. The principal mined coal beds are the Dorchester, Imboden, Kelly, Wilson, Taggart Marker, Taggart, Low Splint, Phillips, Pardee, Morris, High Splint, and No. 13.

Lee and Norton Formation Coals

Coal beds of the Lee and Norton formations crop out in Big Stone Gap gorge along Powell River and along Bens Branch. One coal bed crops out near the south end of the Louisville and Nashville Railroad tunnel in the gorge. This coal occurs in the siltstone beds between the lower and upper sandstone ledges of the Middlesboro Member of the Lee Formation. The coal is 32 inches thick. Another coal bed, which is present 85 feet above, measures 56 inches in thickness. Both coals are faulted and considerably sheared. Stratigraphic and structural relationships indicate that these two coals may be the same bed. Based on the stratigraphic position of the coal, it is tentatively correlated with the War Creek. Another coal of the Lee Formation crops out in Bens Branch and lies about 250 feet stratigraphically below the Bee Rock Sandstone Member. The coal measures 36 inches and tentatively correlates with the Jawbone. Steeply inclined beds along Stone and Little Stone mountains here discourage prospecting and mining.

Wise Formation Coals

The Dorchester coal bed is exposed in only isolated localities above the Gladeville Sandstone between Appalachia and Exeter. It is extracted from the underground Bullitt Mine near the mouth of Looney Creek at the western edge of Appalachia. Drill hole data throughout the area indicate that the coal is of workable thickness.

Data from diamond drill holes show the Lyons and Blair coal beds to be present west of Powell River but too thin to mine. These coal beds could not be accurately traced or identified near the flexure and even though they are useful in subsurface correlation, they are not shown of the map. The Clintwood coal has been traced in the subsurface and on the surface along Powell River and Pigeon Creek.

The Imboden coal crops out 420 to 500 feet above the Dorchester and lies between two cliff-forming sandstones. It has an average thickness of 60 inches and has been mined extensively at the surface and underground. The Imboden Marker coal is locally present 10 to 20 feet below the Imboden coal but has not been mapped separately.

The Kelly coal lies between 70 and 120 feet above the Imboden and is from a few inches to 15 feet above a cliff-forming sandstone at the base of a 40- to 120-foot-thick siltstone sequence. Where the Kelly has been mined and augered at the surface, the coal averages 30 inches thick. In the vicinity of the town of Imboden, the Pinhook coal is present 15 to 20 feet above the Kelly and measures 24 inches but was not mapped separately.

The Upper St. Charles coal bed occurs 220 feet above the Imboden and 20 to 40 feet below the Wilson. The Upper St. Charles averages 18 inches in thickness. This coal was mined between Franks Branch and Looneys Creek.

The Wilson coal bed is from 180 to 280 feet above the Kelly. The coal is present throughout most of the area and was obtained from surface mines in the southwestern portion of the Appalachia quadrangle area. The Wilson ranges from less than 1 foot to 4 feet in thickness.

The Taggart Marker coal crops out 65 to 90 feet above the Wilson and a few feet above a sandstone. The Taggart Marker ranges from less than 1 foot to 5 feet in thickness with an average of 3 feet. The coal has been extensively mined at depth as well as at the surface.

The Taggart coal occurs 20 to 60 feet above the Taggart Marker coal. There are two distinct units in the Taggart coal, which are locally called the Taggart "B" and "A" from bottom to top. The Taggart "B" occurs 8 to 30 feet above the Taggart Marker and the coal ranges from 6 to 24 inches in thickness. The rocks between the Taggart Marker and Taggart "B" are dark gray siltstone. Throughout the area the Taggart "A" is the main coal, which averages 36 inches in thickness. It is separated from the Taggart "B" by a 40-foot-thick sandstone. About 2 miles north of Stonega, the Taggart "A" is split into two benches, the "A1" and "A2". The Marcum Hollow Sandstone Member is present above the Taggart "A" or "A2". The Taggart coal has been extensively mined.

In the southern part of the area, the Low Splint coal, which lies from 180 to 220 feet above the Taggart coal, contains two coal beds with intervening sandstones and shales. These beds are the Low Splint "C" and "D". Respectively, they range from 24 to 36 inches and from 10 to 20 inches in thickness. The thickness of the intervening sandstones and shales ranges from 6 to 30 feet. In the northern part of the area, the Low Splint coal, which lies from 100 to 160 feet above the Taggart coal, becomes a single coal bed that ranges from 18 to 36 inches in thickness. There is a 7-inch sandstone and shale parting above the base of the unit. This coal was mined along Looney Ridge and Road Spur at the surface.

There is one coal bed between the Taggart and the Low Splint "D" and two coal beds between the Low Splint "C" and the Kendrick Shale Member. Locally the company names applied to them are the "Low Splint E" and the "Low Splint B" and "Low Splint A", respectively. The "Low Splint E" is also called the "24-inch coal". The "Low Splint B" ranges up to 24 inches in thickness and may be present in Bluff Spur. The "Low Splint A" ranges from 4 to 31 inches in thickness.

The Phillips (Lower Phillips, No. 7) coal bed is about 300 feet above the Kendrick Shale. The coal overlies a 40- to 80-foot-thick sandstone and is near the base of a 100-foot-thick siltstone sequence. The Phillips coal is less than 24 inches thick in most areas and was mined only along the east slope of Ninemile Spur at the surface.

The Pardee (Parsons) coal bed lies 250 feet above the Phillips and about 70 feet below the Magoffin Beds (limestone and shale) of Morse (1931). The Pardee averages 48 inches of coal with less than 6 inches of shale parting. This coal has been extensively mined underground and at the surface along Iron Rock Ridge and Bluff, Ninemile, and Road spurs.

The Morris coal, which lies 300 to 350 feet above the Pardee coal, has been mined along Bluff Spur and the spur between Lick and Mud Lick creeks in the northern part of the area. The coal was completely removed along Ninemile Spur. The thickness of the Morris ranges from 30 to 72 inches, averaging about 60 inches. There is generally a shale parting about 10 inches above the base of the coal.

The High Splint coal, which marks the top of the Wise Formation, lies 40 to 80 feet above the Morris. The coal ranges between 4 and 7 feet in thickness and averages 5 feet. The High Splint is from a few inches to 8 feet below the basal sandstone of the Harlan Formation.

Harlan Formation Coals

There are several coals within the Harlan Formation; only two of these are of present economic importance. One of these is the No. 13 coal, which is 50 to 70 feet above the High Splint coal and ranges between 12 and 48 inches in thickness. The other, an unnamed coal, which is about 150 feet above the No. 13, ranges from 2 to 3 feet in thickness.

COKE

Coke ovens were operated in the Appalachia quadrangle by the Stonega Coal and Coke Company in the early 1900's. The ovens were located at Imboden, Inman, Osaka, and Stonega (Watson, 1909).

OIL AND GAS

As of December 31, 1985, 74 wells have been drilled for oil and gas in the Stonega gas field. As of this date 69 are producing gas, 3 with gas shows are plugged and oil and gas are produced from two gas wells. Some condensate is also produced from many of the gas wells. All the wells were stimulated by hydraulic fracturing or acidizing or both. The wells range in depth from 4009 to 7081 feet and average 5594 feet. The top of the Greenbrier Limestone, the shallowest producing unit, averages 1712 feet below sea level, and the top of the Chattanooga Shale, the deepest producing unit, averages 2411 feet below sea level. Up to four producing zones are completed in each well. The three principal gas-bearing zones in the Stonega field are the Berea sand and Devonian shales, the Price Formation (Weir sand), and the Greenbrier Limestone (Big Lime). Oil and gas production in the area is primarily from induced fracture porosity although there may be some primary and secondary intergranular porosity in the Greenbrier Limestone.

The total natural gas production for Wise County through December 1985 was 6,336,576 Mcf. Of this total, 4,466,102 Mcf of gas were produced from the wells located in the Appalachia quadrangle area.

LIMESTONE

Limestone occurrences include the Hancock and Greenbrier formations, limestone within the Bluefield Formation, the Little Stone Gap Member of the Hinton Formation, and the Magoffin Member of the Wise Formation. The Greenbrier is the only limestone of economic potential in the area. The Greenbrier was actively quarried in the early 1900's at the Simpson and Crawford (Harper) Quarry, about one-eighth of a mile north of the town of Big Stone Gap. Subsequently, until early 1982, the quarry was operated by Southwest Quarries, Inc. Stone from this quarry was crushed and sized for use as road stone and concrete aggregate. It was also used as building stone. The lower beds were produced for use as flux in iron furnaces (Watson, 1907). From chemical analyses, the limestone contains 82.09 to 89.23 percent calcium carbonate, 4.58 to 6.98 percent magnesium carbonate, 0.64 to 1.34 percent iron and aluminum oxides, and 6.04 to 9.04 percent insoluble residue (Ety, 1923).

SANDSTONE

Sandstone is the most abundant rock type occurring in the Appalachia quadrangle. The lithologies of the various sandstones are described in the stratigraphic column. In general, the sandstones are highly variable in thickness, composition, and texture. The thicker sandstones in some places have a high silica content and therefore may have economic potential. Some of the sandstones contain weathered feldspar, mica, and rock fragments; they are also stained with iron oxide.

The sandstones of the Hinton and the Lee formations are by far the thickest and most quartz rich. An abandoned quarry within Big Stone Gap gorge is located in the upper bed of the Middlesboro Member of the Lee Formation. This rock may have been used as rip-rap or as road stone. Another abandoned quarry just north of Rutherford Hollow is in the sandstone below the Wilson coal. The rock from this quarry was used to build the dam located at the mouth of Rutherford Hollow.

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