

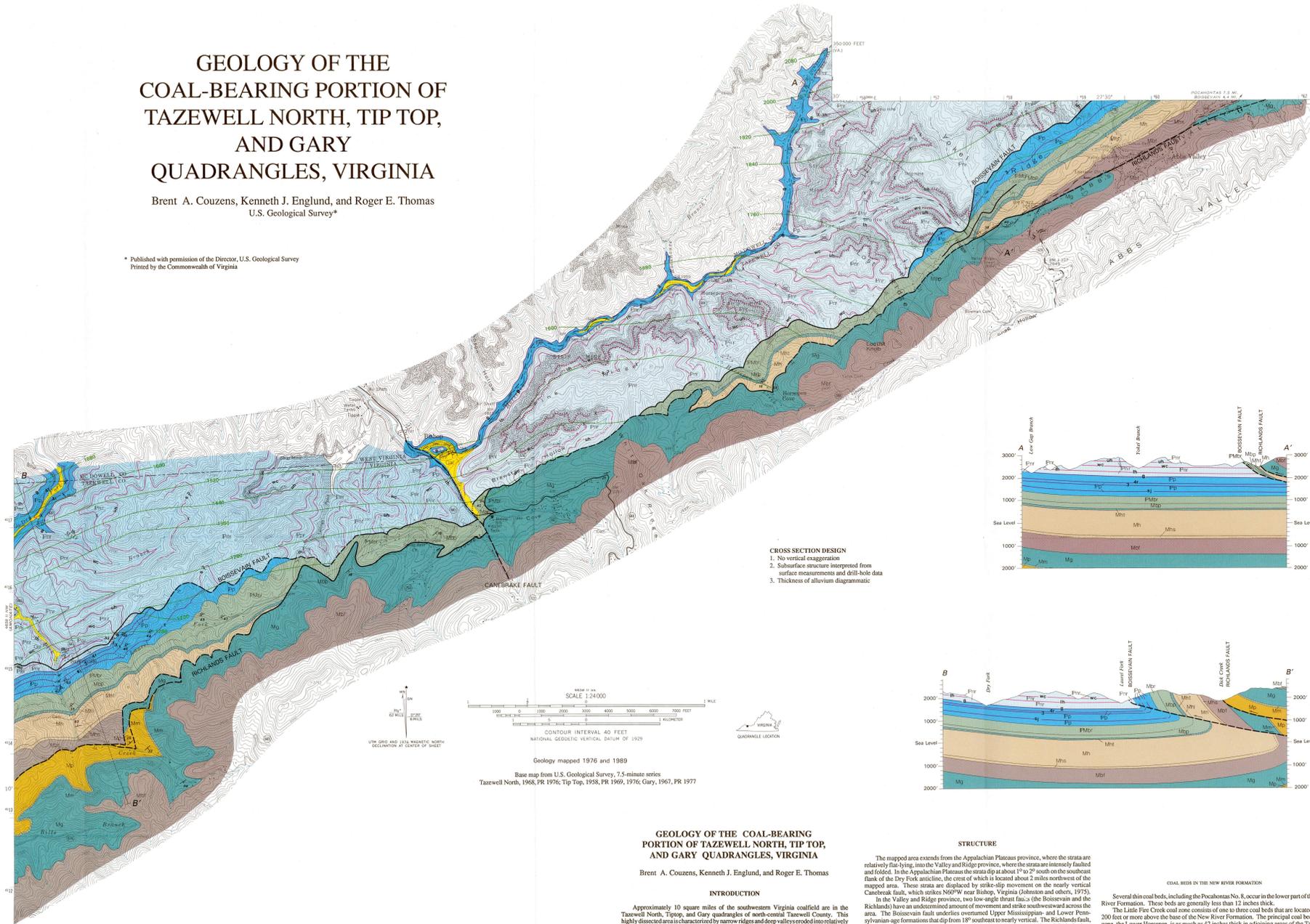


GEOLOGY OF THE COAL-BEARING PORTION OF TAZEWELL NORTH, TIP TOP, AND GARY QUADRANGLES, VIRGINIA

Brent A. Couzens, Kenneth J. Englund, and Roger E. Thomas
U.S. Geological Survey*

* Published with permission of the Director, U.S. Geological Survey
Printed by the Commonwealth of Virginia

QUATERNARY	
Qal	Alluvium
PENNSYLVANIAN	
New River Formation	
7	Sewell (?) coal bed
uh	Upper Split of Upper Horsepen coal bed
wc	War Creek coal bed
lh	Lower Horsepen coal bed
8	Pocahontas No. 8 coal bed
MISSISSIPPIAN	
Pocahontas Formation	
4i	Upper Split Pocahontas No. 4 coal bed
3	Pocahontas No. 3 coal bed
sj	Squire Jim coal bed
Bluestone Formation	
PMbr	Bramwell and Red Members
Mbr	Pride Shale Member
Unconformity	
Mh	Hinton
Mh	Little Stone
Mhs	Stony Gap Sandstone Member
Hinton Formation	
Mht	Tatery Sandstone Member
Mhl	Little Stone Gap Member
Mhs	Stony Gap Sandstone Member
Bluefield Formation	
Mg	Greenbrier Limestone
Greenbrier Limestone	
Mm	Maccrady Shale
Maccrady Shale	
Price Formation	
Mp	Price



CROSS SECTION DESIGN
1. No vertical exaggeration
2. Subsurface structures interpreted from surface measurements and drill-hole data
3. Thickness of alluvium diagrammatic

GEOLOGY OF THE COAL-BEARING PORTION OF TAZEWELL NORTH, TIP TOP, AND GARY QUADRANGLES, VIRGINIA

Brent A. Couzens, Kenneth J. Englund, and Roger E. Thomas

INTRODUCTION

Approximately 10 square miles of the southwestern Virginia coalfield are in the Tazewell North, Tip Top, and Gary quadrangles of north-central Tazewell County. This highly dissected area is characterized by narrow ridges and deep valleys eroded into relatively flat-lying Lower Pennsylvanian coal-bearing rocks of the Appalachian Plateau physiographic province. The mapped area also includes the northwest fringe of the Valley and Ridge physiographic province, which is underlain by older faulted and folded Paleozoic strata that are mostly of marine origin and contain few terrestrial coal-bearing rocks. The geology of the coal-bearing parts of the area was mapped by the U.S. Geological Survey in 1976 as part of a program established to assess the low-sulfur coal resource in Tazewell County. Faulted and folded strata in the area adjacent to the coalfield were mapped in 1989.

STRATIGRAPHY

The principal coal-bearing strata of the mapped area are assigned to the Early Pennsylvanian-age Pocahontas and New River Formations and consist of about 1900 feet of interbedded sandstone, siltstone, and shale. These strata are part of a terrestrial sequence that prograded northward across the central Appalachian basin in the late Paleozoic. On previous geologic maps, these strata were assigned to the Lee Formation (Harmsberger, 1919; Calver and Hobbs, 1963). The name Lee is no longer used because conglomeratic sandstone, typical of the Lee, wedges out in this area. The strata, dominated by subgraywacke, are assigned to the Pocahontas and New River Formations. The Pocahontas Formation, which is the lower part of the coal-bearing sequence, crops out on lower valley slopes and locally in overturned beds of the fault zone on the southeastern edge of the coalfield. The Pocahontas consists of light-gray, fine- to coarse-grained subgraywacke sandstone, medium- to dark-gray shale and siltstone, and coal and associated underclay. The overlying New River Formation is a lithologically similar coal-bearing sequence of sandstone, siltstone, shale, and underclay but also includes beds of conglomeratic, subgraywacke sandstone. The New River Formation is exposed at the surface in most of the mapped area. Extensive areas of coal beds in the New River are strip mined.

STRUCTURE

The mapped area extends from the Appalachian Plateau province, where the strata are relatively flat-lying, into the Valley and Ridge province, where the strata are intensely faulted and folded. In the Appalachian Plateau the strata dip at about 1° to 2° south on the southeast flank of the Dry Fork anticline, the crest of which is located about 2 miles northwest of the mapped area. These strata are displaced by strike-slip movement on the nearby vertical Canebrake fault, which strikes N60°W near Bishop, Virginia (Johnson and others, 1975). In the Valley and Ridge province, two low-angle thrust faults (the Boisvain and the Richards) have an undetermined amount of movement and strike southwesterly across the area. The Boisvain fault underlies overturned Upper Mississippian- and Lower Pennsylvanian-age formations that dip from 18° southeast to nearly vertical. The Richards fault, which overrides the Boisvain fault locally, is overlain by Lower and Upper Mississippian-age formations that dip from 18° to 26° southeast.

ECONOMIC GEOLOGY

The mapped area contains several coal beds, including the Pocahontas No. 8, which occurs in the lower part of the New River Formation. These beds are generally less than 12 inches thick. The Little Fire Creek coal zone consists of one to three coal beds that are located about 200 feet or more above the base of the New River Formation. The principal coal bed in the zone, the Lower Horsepen, is as much as 42 inches thick in an adjoining area of the Tazewell North and Tip Top quadrangles. The Fire Creek and the Fire Creek Rider coal beds, which are also in the lower part of the New River, are moderately persistent in the mapped area and have an average thickness of 24 inches. A coal bed, tentatively identified as the Sewell, lies about 100 feet above the Upper Split of the Upper Horsepen coal bed. In the western part of the mapped area, the coal bed has an average thickness of 28 inches. The Middle and Upper Horsepen coal beds and associated splits or rider coals occur in a 100-foot-thick sequence of sandstone, coal, and shale located near the middle of the New River Formation. This sequence contains as many as four coal beds, of which the Middle Horsepen and the Lower Split of the Upper Horsepen are the thickest and more persistent. Both beds have been underground and strip mined. The War Creek coal bed is widely distributed but is variable in thickness, ranging from 5 to 60 inches. The Squire Jim coal bed, which is about 140 feet above the base of the Pocahontas Formation, is stratigraphically the lowest coal bed containing appreciable resources in the mapped area. It is mostly at depth in the subsurface and therefore has not been mined. Sparse core drilling indicates that the bed may be as much as 34 inches thick locally. Strata from 100 to 150 feet above the Squire Jim coal bed include two thin coal beds of little economic value. They are identified as the Pocahontas No. 1 and 2. The Pocahontas No. 1 coal bed occurs about 350 feet above the base of the Pocahontas Formation, at depths that range from more than 1000 feet in the subsurface to outcrop. The Pocahontas No. 3 is as much as 90 inches thick in the Tip Top quadrangle; however, it is essentially mined out northeast of Bishop, Virginia. The remaining coal, southwest of Bishop, Virginia, is about 3 feet or less thick. The Pocahontas No. 4 coal bed underlies the Appalachian Plateau of the mapped area and is also present in the overturned beds at the southeast fringe of the coalfield. It ranges from 0 to as much as 100 inches thick, eastward and southward, and includes mined areas in the Tip Top quadrangle and adjacent parts of the Tazewell North quadrangles. The Upper Split of the Pocahontas No. 4 is a thick, extensively mined bed, located as much as 140 feet above the Pocahontas No. 3. It is 38 to 56 inches thick in mined areas. The remaining coal, located along the southeastern edge of the coalfield, is somewhat thinner. Other coal beds in the upper part of the Pocahontas, including the Pocahontas No. 4, 5, 6, and 7 and the Goodwill, are, in most places, less than 12 inches thick and are of little economic value.

REFERENCES CITED

- Calver, J.L., and Hobbs, C.R.B., Jr., 1963, Geologic map of Virginia. Virginia Division of Mineral Resources, scale 1:500,000.
Harmsberger, T.K., 1919, The geology and coal resources of the coal-bearing portion of Tazewell County, Virginia. Virginia Geological Survey Bulletin 19, 195 p.
Johnson, J.E., Miller, R.L., and Englund, K.J., 1975, Applications of remote sensing to structural interpretations in the southern Appalachians. U.S. Geological Survey Journal of Research, v. 3, no. 3, p. 285-293.

SYSTEM	SERIES	FORMATION	MEMBER AND BED	LITHOLOGY	THICKNESS OF COAL BED IN INCHES	THICKNESS IN FEET	DESCRIPTION
QUATERNARY	PENNSYLVANIAN	NEW RIVER	Alluvium		0-30	0-30	Gravel, sand, silt, and clay.
			Sewell (?) coal bed		0.12	500+	
			Upper split of Upper Horsepen coal bed		0.12		
			War Creek coal bed		0.12	140-180	
			Lower Horsepen coal bed		0.12	110-125	
			Middle Horsepen coal bed		0.12	110-125	
			Fire Creek Rider coal bed		0.12	80-120	
			Little Fire Creek coal bed		0.12	65-75	
			Fire Creek coal bed		0.12	115-165	
			Lower Horsepen coal bed		0.12	110-125	
PENNSYLVANIAN	POCAHONTAS	POCAHONTAS	Pocahontas No. 8 coal bed		10-80		
			Quartz coal bed		4		
			Pocahontas No. 7 coal bed		1.5	235	
			Pocahontas No. 6 coal bed		1.5	235	
			Pocahontas No. 5 coal bed		1.5	235	
			Pocahontas No. 4 coal bed		1.5	235	
			Pocahontas No. 3 coal bed		1.5	235	
			Pocahontas No. 2 coal bed		1.5	235	
			Pocahontas No. 1 coal bed		1.5	235	
			Squire Jim (summit) coal bed		1.5	130-140	
MISSISSIPPIAN	BLUESTONE	BLUESTONE	Bramwell Member		50-75		
			Red Member		300-400	550-700	Shale, sandstone, siltstone, and limestone. Bramwell Member, calcareous shale with marine fossils; limestone, medium-gray, argillaceous, in thin discontinuous beds. Red member, mostly grayish-red, partly calcareous shale, interbedded with greenish-gray shale, greenish-gray or grayish-red siltstone, and very fine-grained sandstone; Pride Shale Member, dark-gray, evenly bedded shale and siltstone.
			Pride Shale Member		150-250		
			Falls Mills Sandstone Member		100-150		
			Falls Mills Sandstone Member		100-150		
			Little Stone Member		50-100		
			Little Stone Member		50-100	1075-1200	Sandstone, siltstone, shale, coal, and limestone. Sandstone, white to light-gray, very fine- to medium-grained, thin to thick-bedded, locally ripple-bedded. Siltstone and shale, mostly grayish-red, partly greenish-gray or medium-gray, thin to irregularly bedded, locally calcareous. Coal, mostly discontinuous, in beds as much as 30 inches thick. Little Stone Gap Member, medium-gray, partly argillaceous limestone with abundant marine invertebrate fossils.
			Stony Gap Sandstone Member		150-250		
			Stony Gap Sandstone Member		150-250		
			Stony Gap Sandstone Member		150-250		
MISSISSIPPIAN	GREENBRIER	BLUEFIELD			850-950		Limestone, light-olive-gray, medium-gray, and brownish-gray, very finely to coarsely crystalline, partly oolitic and cherty, generally thick-bedded, abundantly fossiliferous; few interbeds of yellowish-gray weathering argillaceous limestone and greenish-gray or grayish-red shale.
					50		Shale, bright red, thin or poorly bedded.
					500-650		Sandstone, siltstone, shale, and silty shale. Sandstone, medium-light-gray to light-gray, olive-gray to greenish-gray weathering, few grayish-red beds, very fine- to medium-grained, thin to thick-bedded, well-sorted quartz grains and pebbles in some beds; interbedded with greenish-gray to medium-dark-gray, partly calcareous siltstone and silty shale; few thin beds of black carbonaceous shale; contains marine fossils.

