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GEOLOGIC MAP OF THE KENTUCKY PORTION OF THE PIKEVILLE 30 x 60 MINUTE QUADRANGLE, SOUTHEASTERN KENTUCKY

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LITHOLOGY NORTH OF THE PINE MOUNTAIN OVERTHRUST FAULT

SYSTEM	SERIES	GROUP	FORMATION, MEMBER, ZONE, AND BED	LITHOLOGY	THICKNESS IN METERS (FEET)
QUATERNARY			Alluvial deposits, landslide deposits	Qal Qls	0–12 (0–40)
PENNSYLVANIAN	Middle Pennsylvanian	Breathitt Group	Four Corners Formation	Pfc	311+ (1020+)
			Magoffin Member	Pm	61–98 (195–195)
			Parsley Formation	Pp	151–174 (496–570)
			Kendrick Shale Member	Pk	37–223 (120–730)
			Tygart Creek Formation	Ptc	55–98 (180–320)
			Hensley Member of Kay Creek Formation	Phk	55–122 (180–400)
			Tunnel Ridge Formation	Ptr	137–183 (450–600)
			Bee Rock Sandstone	Pbr	24–37 (80–120)
			Dark Ridge Member of Bottom Creek Formation	Pdr	24–37 (80–120)
			Sewanee and Warren Point Formations, undivided	Pse	61–152 (200–500)
			Lower Part of Breathitt Group (Undivided)	Mbu	107–152 (350–500)
	Lower Pennsylvanian	Pennington Group	Lee Formation	Ml	113–329 (370–1080)
MISSISSIPPIAN	Upper Mississippian		Stony Gap Sandstone Member of Hinton Formation	Mhs	37–104 (120–340)
			Upper Member	Mbu	24–99 (80–325)
			Lower Member	Mbl	88–158 (290–520)
			Grainger Formation	Mg	61–195 (200–640)
			Sunbury Sh. / Bena Sh.	Msb	0–12 (0–40)
			Sunbury Shale, and Bedford Shale	Msu Mbf	0–12 (0–40)
DEVONIAN	Upper	Cleveland Shale, Chattanooga Shale, and Ohio Shale	Ohio Shale	Do	305+ (1000+)

LITHOLOGY SOUTH OF THE PINE MOUNTAIN OVERTHRUST FAULT

SYSTEM	SERIES	GROUP	FORMATION, MEMBER, ZONE, AND BED	LITHOLOGY	THICKNESS IN METERS (FEET)
QUATERNARY			Alluvial deposits, landslide deposits	Qal Qls	0–12 (0–40)
PENNSYLVANIAN	Middle Pennsylvanian	Breathitt Group	Four Corners Formation	Pfc	311+ (1020+)
			Magoffin Member	Pm	61–98 (195–195)
			Parsley Formation	Pp	151–174 (496–570)
			Kendrick Shale Member	Pk	37–223 (120–730)
			Tygart Creek / Darby Creek	Ptc	55–98 (180–320)
			Taggart Member / Kolinsky Creek	Pkc	55–122 (180–400)
			Harlan Coal	Phc	137–183 (450–600)
			Hillsboro Coal	Pbr	24–37 (80–120)
			Belcher Shale Member (not mapped)	Pdr	24–37 (80–120)
			Hance Coal	Phc	61–152 (200–500)
	Lower Pennsylvanian	Pennington Group	HENSLEY MEMBER, ALVY CREEK FORMATION—Shale, sandstone, siltstone, and coal. Shale, silty to sandy, even- to ripple-laminated, carbonaceous fossil plant debris abundant locally. Sandstone, largely fine- to medium-grained, in places very fine-grained, light- to medium-gray, thin- to thick-bedded, planar to cross-bedded and ripple-bedded, micaceous, locally very micaceous, micaceous in part, commonly cross-stratified. Siltstone, light- to medium-gray, even- to ripple-laminated, weakly cemented, moderately indurated; locally grades to quartzose sandstone with fine pebbles; occurs within shale as lenticular beds as much as 61 ft (20 m) thick. Coal, in discontinuous lenses and beds as much as 4 ft (1.2 m) thick, crossbeds and cross laminae. Coals include the Tunnel and its equivalent, the Hance. Previously mapped as Hensley Member of the Lee Formation. In this quadrangle mapped as Alvy Creek Formation and Hensley Member, undivided. Given formation status by Chesnut (1992). Formation. Given member status by Chesnut (1992).	Pahc
			SEWANEE SANDSTONE—Sandstone, shale, and coal. Predominantly quartzose sandstone, light-gray, fine- to coarse-grained to medium-grained conglomeratic, strongly consolidated, conspicuously cross-stratified and lenticular; locally eroded to a honeycomb appearance. Shale, dark-gray, carbonaceous, micaceous, interbedded with sandstone; contact with underlying shale. Thin lenticular bodies of fossiliferous coal, in places associated with underlying shale. Thin lenticular bodies of fossiliferous coal, in places associated with underlying shale. Sandstone and shale are differentiated locally. Contains at least one thin coal bed. Previously mapped as part of Lee Formation. Given formation status by Chesnut (1992). Outcrop of this sandstone are of limited areal extent, occuring in the Elkhorn City and Heller 7.5-minute quadrangles. Given formation status by Chesnut (1992).	Pse
			DARK RIDGE MEMBER, BOTTOM CREEK FORMATION—Shale, sandstone, siltstone, and coal. Shale, dark-gray, dense to fissile, carbonaceous, micaceous, interbedded with very fine-grained sandstone and siltstone. Sandstone, light-gray, very fine- to fine-grained, micaceous, underlying quartzose sandstone varies locally from almost to gradational. Contains at least one thin coal seam. Previously mapped as shale-dominant facies between lower and middle coal members of Breathitt Group. Given member status by Chesnut (1992).	Pdr
			WARREN POINT SANDSTONE—Sandstone and shale. Practically all quartzose sandstone, light-gray, fine- to coarse-grained to conglomeratic, cross-stratified, lenticular. Shale, dark-gray, carbonaceous, micaceous, interbedded with sandstone. Sandstone throughout most of unit where quartz pebbles also mostly less than 1 in. in diameter, at some localities basal parts fluidly conglomeratic; locally eroded to honeycomb pattern of erosion. Lenticular beds of fossiliferous coal, in places associated with underlying shale. Sandstone from lenses of medium-gray sandy shale and clayey and silty mudstone; consolidated sandstone composed of well-rounded quartz grains, cemented by siliceous material. Sandstone and shale are differentiated locally. Contains at least one thin coal seam. Sandstone and shale are of limited lateral extent, occuring in the Elkhorn City and Heller-Dorwood 7.5-minute quadrangles. Given formation status by Chesnut (1992).	Pwa
			SEWANEE AND WARREN POINT FORMATIONS, UNDIVIDED—Sandstone, siltstone, shale, and coal. Sandstone, very light-gray, fine- to coarse-grained, commonly conglomeratic, cross-stratified, lenticular. Siltstone, dark-gray, micaceous, carbonaceous, in places crossbedded in high-angle, large-scale trough sets, generally well indurated, but locally weathers readily to micaceous, clayey and silty soil. Shale, dark-gray, carbonaceous, micaceous, in places interbedded with siltstone and shale; fossiliferous in part. Coal, in discontinuous lenses and beds as much as 4 ft (1.2 m) thick. Forms prominent bluffs and distinct benches with north-facing scarp slopes and south-facing dip slopes. Sandstone and shale are differentiated locally. Contains at least one thin coal seam. Previously mapped as part of Lee Formation, undivided and not mapped in the area by the Jenkins West 7.5-minute quadrangle. Both units given formation status by Chesnut (1992).	Pse
			LOWER PART OF BREATHITT GROUP—Previously mapped as the Lee Formation on the Heller-Dorwood, Jenkins East, Jenkins West, Roxana, and Whitesburg SQ's.	Mbl
			PENNINGTON GROUP (exclusive of Stony Gap Sandstone Member of Hinton Formation)—Shale, siltstone, sandstone, limestone, and coal. Shale, dark-gray, fissile, in places carbonaceous, micaceous, interbedded with siltstone and sandstone. Siltstone, light- to medium-gray, even- to ripple-laminated, micaceous, locally very micaceous, micaceous in part, commonly thin-bedded, locally ripple-bedded, locally argillaceous and micaceous, commonly thin-bedded, locally ripple-bedded; locally grades to very fine grained sandstone. Sandstone, light-gray, very fine- to fine-grained, micaceous, locally very micaceous, micaceous in part, commonly thin-bedded, locally ripple-bedded; locally grades to siltstone. Limestone, dark-gray, fossiliferous, commonly nodular, in part cherty; contains abundant crinoid stems, locally contains brachiopods and bryozoans. Coal, in discontinuous lenses and beds as much as 4 ft (1.2 m) thick, generally only a few feet thick. Limestone, sandstone, and carbonaceous shale, locally dolomitic, micrograined to coarse-grained, commonly fossiliferous; occurs as discontinuous lenticular bodies 1 to 5 ft thick, rarely as much as 30 ft thick.	Pl
			NEWMAN LIMESTONE, LOWER MEMBER—Limestone and shale. Limestone, micrograined to coarse-grained, commonly fossiliferous, in part cherty, in part shaly, in part argillaceous, locally nodular, fossiliferous limestone pebble conglomerate at base. Shale, dark-gray, in beds of grayish-black chert. Shale, silty to sandy, generally in thin partings; calcareous.	Mnl
			GRAINGER FORMATION—Shale, siltstone, sandstone, and shale. Unit located along the north face of Pine Mountain and along Russell Fork on Elkhorn City–Harman and Hellier–Cinkwood GQ's. See description in adjacent strip.	Mg
			DUMP—Mine dump; mine tailings and displaced overburden.	

Figure 5. Major watersheds within the Pikeville 30 x 60 minute quadrangle.

Figure 1. Locations of the 23 7.5-minute quadrangles used in the digital compilation of the Pikeville 30 x 60 minute map. Names of the individual 7.5-minute quadrangle maps and their USGS geologic quadrangle map (GQ) numbers are shown.

Figure 2. Locations of the structure contours in the Pikeville 30 x 60 minute quadrangle. Names of each mapped horizon shown. Horizon boundaries are shown on the geologic map as thin red dashed lines. Contour interval is 40 feet with index contours at 200 feet.

Figure 4. Basement structures in the vicinity of the Pikeville 30 x 60 minute quadrangle. Contour intervals in thousands of feet. Adapted from Drahovzal and Noger (1995).

Figure 3. Location of near-surface structural features from the structure contours. Contour interval 40 feet. Index 1:500,000.

Figure 6. Locations of the 30 x 60 minute quadrangles covering Kentucky. The Pikeville quadrangle is highlighted in blue.

EXPLANATION

- U.S. highway
- State highway
- State boundary
- County boundary
- Quadrangle boundary
- Railroad
- Normal fault (U, upthrown side; D, downthrown side)
- Thrust fault (sawteeth on upper plate)
- Concealed thrust fault (sawteeth on upper plate)
- Secondary thrust fault (sawteeth on upper plate)
- Reverse fault (R, upthrown side)
- Right-lateral strike-slip fault
- Concealed fault
- Scarp
- Concealed contact
- Inferred or stratigraphic contact
- 1600 Structure contour, feet
- Anticlinal axis
- Synclinal axis
- Structure datum boundary
- Coal bed (see note)
- Concealed coal bed
- Inferred coal bed
- Active quarry or mine
- Abandoned quarry or mine
- Abandoned sand pit
- Active mine shaft

NOTE: Not all coals digitized under the STATEMAP Program are included on this map. Coals that are included are identified by name in the following list: Alvy Creek, Amburgy, Bottom Creek (Elkhorn), Lower Elkhorn–Pond Creek, Hillsboro, Upper Elkhorn No. 3 Lower Cedar Grove, Kellioka, Taggart Member, Amburgy (Williamson, Creech), Fire Clay, Peridee, Taylor, Hazard (Leatherwood, Myers, Whitesides), Hazard No. 7 (Lower Peach Orchard), and Hindman.

Figure 7. Major physiographic features in the Pikeville 30 x 60 minute quadrangle and surrounding areas.

INTRODUCTION

The geology of the Pikeville 30 x 60 minute quadrangle was digitally compiled, primarily from U.S. Geological Survey 7.5-minute geologic quadrangle maps published between 1978 and 2004. The new GQ's are products of a cooperative mapping project between the U.S. Geological Survey and the Kentucky Geological Survey (KGS). The KGS has been mapping the geology of Kentucky on orthophoto quadrangle (ortho) and others, 1993a–c; Chenoweth, 1992; Rice and Hall, 1994) have resulted in changes in stratigraphic nomenclature and correlations. These changes have been incorporated into this map, and were necessary for compilation of regional maps and for correlation between the Pikeville 30 x 60 minute quadrangle and the adjacent quadrangles that make up the Pikeville 30 x 60 minute quadrangle are shown in the index map (Fig. 1).

The data base for compiling the GQ's are part of a comprehensive relational and spatial data set being developed by the Kentucky Geological Survey. Information for the data base comes from GQ's, from the results of an intensive map and research effort (Petersen, 1999), and from a review of all their disposal spatial data sets from which to select map themes to create this map. Digital cartographic techniques (Hounshell, 1997) and relational database techniques (Hounshell and Petersen, 1997) were used in a consistent manner on each of the 7.5-minute maps, since they were compiled by various authors between 1978 and 2004. Mapping in the 23 7.5-minute quadrangles was necessary for efficient topological analysis in a GIS environment. In addition, mapping in the 7.5-minute quadrangles was at a 1:24,000 scale, whereas mapping for the rest of this map was at a 1:100,000 scale.

This map is a compilation of existing maps and published information, and no attempt was made to verify the data. When there were problems in stratigraphic correlation within or between quadrangles, they were resolved by the author of the 7.5-minute quadrangle. The author's interpretations for the rest of this map are based on the published and unpublished data.

GEOLOGIC SETTING AND STRUCTURAL GEOLOGY

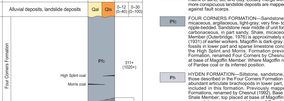
The geology of the Pikeville 30 x 60 minute quadrangle consists of gently to steeply dipping sedimentary rocks of late Devonian through Middle Pennsylvanian age (fig. 8). These rocks are in the Eastern Kentucky Coal Field, in the central part of the Appalachian Basin. These rocks consist of shale, coal, and limestone for strata of Mississippian and Pennsylvanian age, and sandstone, shale, and coal for strata of Pennsylvanian age. In the southeastern part of the quadrangle, in the hanging block of the Devonian shale, Big Sandy, Raccoon, and Upper Cumberland) are included in the Ohio Shale (Do). Rocks of Mississippian age are exposed at the surface of the Middlesboro Syncline, which occupies the southeastern corner of the quadrangle (fig. 1) and that only coal beds with thicknesses greater than 14 in. are mapped and included in these estimates.

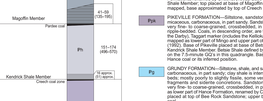
Table 3. Coal resource estimates by county in the Pikeville quadrangle (in million short tons).

County	Original Resource	Mined and Lost	Remaining Resource	Percentage Remaining
Floyd	4,168	882	3,287	79
Knott	4,385	515	3,870	88
Letcher (a)	3,106	880	2,226	
Letcher (b)	587	19	567	
Total (Letcher)	3,693	899	2,793	76
Pike	11,392	2,453	8,938	79

(a) Data for the part of Letcher County within the Hazard District
(b) Data for the part of Letcher County within the Upper Cumberland District

Source: Keystone Coal Industry Manual (2003)





1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 KILOMETERS
1 0 1 2 3 4 5 6 7 8 9 10 MILES
1000 0 5000 10 000 15 000 METERS
5000 0 10 000 20 000 30 000 40 000 50 000 FEET
SCALE 1:100 000
universal transverse Mercator projection, zone 17; 1927 North American datum
TOPOGRAPHIC CONTOUR INTERVAL 50 METERS