

SYSTEM	SERIES	FORMATION, MEMBER, AND BED	LITHOLOGY	THICKNESS OF BED, IN FEET	THICKNESS, IN FEET	DESCRIPTION
QUATERNARY	Phlebotomus and Phlebotomus	Alluvium		0-50		Silt, sand, gravel, and clay. Yellowish-brown clayey silt, light brown to gray very fine to fine quartzose sand, and medium to dark gray carbonaceous clay dominant in floodplain deposits along North and Middle Forks of Kentucky River; boulders to pebble-size gravel is abundant as channel fill in shoal areas. Alluvium in tributary floodplain deposits is chiefly light brown to light gray sand. Subangular to rounded boulders to pebble-size gravel occurs in tributary channel deposits. Gravel consists of tabular and blocks of sandstone and ironstone with less abundant coal and shale fragments. Terrace deposits along valley walls and in abandoned meanders as much as 120 feet above Kentucky River are lithologically similar to floodplain deposits and are mapped as alluvium. Contacts are approximate, gradational laterally with unmapped colluvium.
QUATERNARY	Phlebotomus	High-level fluvial deposits		0-80		
PENNSYLVANIAN	Lower and Middle Pennsylvanian	Magoffin Member		20-50		Sand, silt, and gravel. Deposits bordering North Fork in northeastern part of quadrangle consist chiefly of silty clay and silt that are deeply weathered to shades of red and brownish red; local patches of gray green in recent cuts. Sparse gravel at and near base consists of scattered fragments of dark-gray porphyroclastic chert, most as tabular with rounded edges and a weathered, chiefly brownish-yellow, 1/4 inch or more thick. Deposits occur between about 800 and 900 feet elevation. Other deposits in northern part of quadrangle consist chiefly of light-yellowish-brown to light-gray, fine to medium quartz sand commonly with pebbles to large-cobble-size gravel at and near base. Gravel fragments include chert as described above; concretionary tabular whose edges are commonly partly rounded; pebbles to large cobbles of pink to reddish-brown, iron-cemented, medium to coarse-grained quartzite sandstone; and cobbles or blocks of iron-cemented conglomeratic sandstone. This conglomerate is made up of rounded pebbles of pink and red sandstone, pebbles of gray chert, and granules and well-rounded pebbles of light gray ball quartz. Bedrock underlying these sediments is locally deeply weathered. In excavations in valley 1/4 mile east of Fillmore, the weathered zone, in which original bedding can be discerned, extends as much as 50 feet below base of fluvial deposits. Basal contact of unit rarely exposed.
		Copland coal bed		7-6		Shale, siltstone, and sandstone. Shale weathering medium gray, intermineralized and closely interbedded with siltstone, weathering light brownish gray, silty chert common as float; forms moderately steep slopes, poorly exposed on some hillsides in southern part of quadrangle. Sandstone, light gray, weathers reddish brown; fine to medium grained quartz with trace to minor amounts of mica throughout; crossbedded in planar and festoon sets, forms cliffs. Basal contact everywhere covered; generally described as sharp and unconformable in adjacent quadrangles. Coal beds of Hazards and possibly Hazard coal zones that occur in adjoining quadrangles may be present but were not seen in this quadrangle.
		Fire Clay rider coal bed		0-30		Magoffin Member of Breathitt Formation is shale, medium-dark gray, grading upward to silty and sandy shale. Locally, as at fossil locality about 1/2 mile west of southeast corner of quadrangle, Magoffin includes bedded limestone at base. Fossils, mostly small brachiopod fragments and locally middle of gastropods, are fairly abundant at a few localities in southern part of quadrangle but are sparse elsewhere and are absent in east-central part. Data from this quadrangle indicate that projected position of base of Magoffin in western part of adjacent Jackson quadrangle (Richard and Johnston, 1963) is generally too low, particularly in northwestern part; there the Magoffin appears to be as much as 120 feet too low. Copland coal bed at base of unit is very thin but seems to be persistent. It directly underlies Magoffin where that member was recognized.
		Fire Clay coal bed		07-6		
		Whitesburg coal zone		0-6		
		Amburgy coal zone		0-18		
		Upper Elkhorn No. 3 (Little Caney) coal bed		07-40		
		Grassy (Leifco) coal bed		0-40		
		Vires coal bed		0-40		
		Manchester (Zachariah) coal bed		0-36		
Vandevor coal bed		3-307				
Corbin Sandstone Member of Lee Formation						
Gray Hawk coal bed						



EXPLANATION

Qal Alluvium

QTI High-level fluvial deposits

Pb Breathitt Formation

cp Copland coal bed

fc Fire Clay rider coal bed

fc Fire Clay coal bed

w coal bed in Whitesburg coal zone

am coal bed in Amburgy coal zone

3 Upper Elkhorn No. 3 coal bed

vc Vires coal bed

vc Vires coal bed

ss sandstone

mm Manchester coal bed

vc Vandevor coal bed

pic Corbin Sandstone Member of Lee Formation

sh shale

gh Gray Hawk coal bed

*Shown by outcrop symbol only

Artificial fill

Shows locality

Contact

Dotted where concealed. Triangle indicates selected locality where contact was well exposed at time of mapping

Coal bed

Long dashed where approximately located; dotted where concealed

Structure contours

Drawn on base of Vires coal bed. Projected where contour horizon is missing. Contour interval 20 feet

Caved or abandoned airt

Prospect or outcrop

Letter symbol indicates coal bed

Strip mine

Strip or auger mine

Aves completely stripped

Outcrop of marine fossil-bearing strata

ECONOMIC GEOLOGY

The principal mineral resource of the quadrangle is coal. Coal beds are discussed by Huddle and others (1963) in sections on the Hazard and Southwestern Coal Reserve Districts. Most of the coal is common bedded. Canandaoh coal occurs locally, notably in the Grassy and Vires coal beds and reportedly also in the Manchester bed. There was no active mining in the quadrangle at the time of mapping but extensive prospecting was under way, especially in the southern part. All of the named coals shown have been mined at various localities throughout the quadrangle with the exception of the Copland, Fire Clay rider, and Fire Clay. Over much of the quadrangle the combination of extensive overburden and thin coal has made stripping unprofitable. Many coal beds have been mined underground for both commercial and house coal, but most mines appear to have been abandoned for many years.

The Fire Clay rider coal bed is thickest on the ridge along the Owsley-Lee county boundary in the southwestern part of the quadrangle where 30 inches of coal was observed; the bed thins eastward and was not found in the east-central part. The Fire Clay coal bed is everywhere as thin as 18 inches. Coal beds of the Whitesburg zone are thickest in the southwestern part of the quadrangle. Resistant sandstone commonly overlies the lower bed, locally overlies the upper. The Amburgy zone locally contains at least two coal beds, the lower of which has been mined and prospected extensively in the south half of the quadrangle where it is as much as 36 inches thick. Where mined at the head of Bean Fork in the east-central part of the quadrangle, the lower Amburgy bed is as much as 60 inches thick and the upper bed 18 inches thick. In the southwestern part, recent prospecting has exposed an Amburgy coal bed as much as 41 inches thick. The Upper Elkhorn No. 3 coal bed has been mined at scattered localities throughout the quadrangle; the thickest known occurrence is 40 inches at an adit three-fourths of a mile west of Athol; the bed may persist throughout the quadrangle, but it is not shown where control is sparse.

The Grassy coal bed has been strip mined on a hill west of Lower Twin Creek, where the coal and associated only shale is as much as 60 inches thick; it has also been stripped at many other places throughout the quadrangle. A thick sandstone body commonly occurs close above and locally truncates the Grassy. The Vires coal bed appears to persist throughout the quadrangle. It has been stripped on a small scale near the northeast corner of the quadrangle where it is as much as 36 inches thick. The seam is thickest but includes a shale parting in the upper part of Coal Branch. The Manchester coal bed, reported to be 36 inches thick in the mine southwest of Laurel Branch, thins southward to a trace in Mill Creek in the south-central part of the quadrangle. The Vandevor coal bed was mined at one locality along Rock Lick Creek in the northeastern part of the quadrangle.

Wilson and Sutton (1970) give locations and producing zones of four oil and gas fields in the quadrangle. The Primrose oil pool in the northwestern part, the Widewater oil pool in the northeastern part, and the Coupe Branch gas pool in the southeast are shown as producing pools but no activity was noted at the time of mapping. The Lyman Creek oil pool in the southwestern part is shown as abandoned. Production from the three oil fields was mostly from the Lockport Dolomite equivalent and "Big Six" sandstone of Silurian age at depths of 1,250 to 1,400 feet. Shale suitable for the manufacture of lightweight aggregate and common brick was sampled along Ky. Highway 82 near the west end of Mid Tunnel on the Louisville and Nashville Railroad in the central part of the quadrangle (McGrain and others, 1960, p. 20).

Sols are very thin on ridge crests and noses but thicken on lower parts of slopes above ledge-forming sandstone beds, especially on north- and east-facing slopes. Soils in Lee County are dissected and related to underlying bedrock by Wilson and others (1974). Sol to bedrock relations in Breathitt and Owsley Counties may be similar.

Thick shale sequences of the Breathitt Formation are especially susceptible to slumping, particularly where steepened by excavation or where sandstone ledges are undercut.

Availability of ground water is discussed by Price and others (1962b, 1962b) and by Kilburn and others (1962). Most wells in shale, siltstone, and sandstone of the Breathitt Formation in or near valley bottoms yield enough water for domestic use; the water is commonly hard and may be salty at depths of less than 100 feet below valley bottoms. The Corbin Sandstone Member of the Lee Formation is an important aquifer where it is relatively thick, but water is moderately hard and may contain noticeable amounts of iron.

Base from U.S. Geological Survey, 1961. Revised 1978

The Carter Coordinate System letters and numbers used to designate five-minute divisions of latitude and longitude are shown along the margins; tick marks indicate one-minute divisions

10,000-foot grid based on Kentucky coordinate system, south zone

1000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

SCALE 1:24,000

1000 2000 3000 4000 5000 6000 7000 FEET

1 2 3 4 5 6 7 8 9 10 11 12 MILE

1 2 3 4 5 6 7 8 9 10 11 12 KILOMETER

CONTOUR INTERVAL 20 FEET

DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

KENTUCKY

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