

SYSTEM	SERIES	FORMATION	SYMBOL	SECTION	THICKNESS (IN FEET)	MINOR DIVISIONS	CHARACTER OF MINOR DIVISIONS	GENERAL CHARACTER OF FORMATIONS	TOPOGRAPHY	HYDROLOGY
QUATERNARY	Pleistocene and Recent	Alluvium	Qal		0-102	Flint Ridge flint	Flint Ridge flint Flint, unfossiliferous; in bed 10 feet thick.	Alluvium Clay, silt, fine sand, and minor amounts of medium to coarse sand and gravel.	Alluvium Forms narrow flood plains and underlies terraces. At least one well-developed terrace is present along the principal streams of the region.	Alluvium Yields more than 100 gpd to most dug wells. Screened wells yielding as much as 20 or 25 gpm may be developed along the lower sections of the Levisa and Tug Forks. Water is soft or moderately hard; may contain large amounts of iron at depth.
PENNSYLVANIAN	Breathitt formation, post-Lee Pennsylvanian rocks	Breathitt formation, post-Lee Pennsylvanian rocks	IPbt IPle		0-3500±	Magoffin beds	Magoffin beds Limestone, crinoidal, ranging in thickness from about 2 to 30 inches overlain by a bed of shale as much as 70 feet thick. The shale is partly calcareous, sparsely fossiliferous, and contains ellipsoidal limestone concretions that are locally extensive enough to form a continuous ledge.	Breathitt formation or undifferentiated post-Lee Pennsylvanian rocks Sandstone, siltstone, and claystone in alternating beds. Interbedded with lesser amounts of coal, clay, limestone, and chert. Sandstones are gray and are characterized by an abundance of minerals of the clay-mica type and rock fragments. In the upper part of the formation, the sandstones are feldspathic. Sandstones, siltstones, and claystones contain plant fragments. Siltstones are gray and micaceous; claystones are dark and light gray and contain ironstone at many places. Clays commonly underlie coal beds. Calcareous rocks make up a very small part of the formation, but several zones contain large siltstone or sandstone concretions cemented with calcareous material, and at least one limestone, the magoffin member, is widespread.	Breathitt formation or undifferentiated post-Lee Pennsylvanian rocks The Breathitt formation underlies the valleys and forms the hills of almost all the area northwest of Pine Mountain. Undifferentiated post-Lee Pennsylvanian rocks underlie the narrow valleys and form high, rugged hills southeast of Pine Mountain in Letcher and Harlan Counties. Black Mountain, 4,139 feet, the highest point in the State, is carved from undifferentiated post-Lee Pennsylvanian rock, in Harlan County.	Breathitt formation or undifferentiated post-Lee Pennsylvanian rocks In western Perry, most of Breathitt, northern Magoffin and northern Martin Counties yields more than 500 gpd to most wells drilled in valley bottoms. Yields more than 500 gpd to almost half the wells drilled on hillsides and smaller quantities of water to wells on hilltops. In remainder of area yields more than 500 gpd to more than three-quarters of the wells drilled in valley bottoms. Yields more than 500 gpd to about three-quarters of the wells drilled on hillsides. Yields more than 100 gpd to nearly all wells on ridges. Sandstone yields water to most wells. Shale also yields water to many wells, and coal yields water to a few. Near-vertical joints and openings along bedding planes yield most of the water to wells. Chemical character of ground water ranges widely. Shallow ground waters in the northern part of the area may be salty.
						Fire Clay coal	Fire Clay coal Coal containing a dark brown or olive gray flint clay parting, with conchoidal fracture. The parting generally occurs in the lower part of the coal, and is from 1 to 8 inches thick.			
						Kendrick shale	Kendrick shale Shale, dark gray, calcareous; contains ironstone bands or nodules and large ellipsoidal concretions of silty limestone. Marine fossils occur in the base of the shale and in the limestone nodules. Averages about 25 feet in thickness.			
		Lee formation	IPle		270-1800±		Lee formation Sandstone, conglomeratic near top and bottom of formation, separated by claystones, siltstones, and a few thin coals. The sandstones are quartzose, massive, and crossbedded.	Lee formation Resistant sandstones form the high ridges of Pine and Cumberland Mountains in Harlan, Letcher, and Pike Counties. Underlies valleys in northwestern Breathitt County. Forms steep-walled valleys in a small area in northeastern Magoffin County.	Lee formation In Breathitt and Magoffin Counties yields more than 500 gpd to most wells in valley bottoms. Yields more than 500 gpd to almost half the wells drilled on hillsides, and more than 100 gpd to almost three-quarters of the wells on hilltops. In the Cumberland Mountain section yields more than 500 gpd to about three-quarters of the wells drilled in valley bottoms. Yields more than 500 gpd to about half the wells drilled on hillsides, and smaller quantities of water to wells on hilltops. Some wells flow. Yields water almost exclusively from sandstones, but shales supply water to a few wells. The highest yielding wells obtain water from near-vertical joints and openings along bedding planes. Intergranular pore spaces yield water slowly to joints and to wells intersecting poorly cemented zones. Yields soft or moderately hard water containing noticeable amounts of iron to most wells and salty water to very few wells.	
MISSISSIPPIAN	Upper Mississippian	Pennington shale			168-1000±		Pennington shale Shale, gray, reddish and greenish, and greenish, fine-grained, thin-bedded sandstone. Includes a persistent bed of hard siliceous sandstone as much as 100 feet thick.	Pennington shale Forms moderate slopes along the face of Pine Mountain. Hard bed of sandstone within formation forms small cliff or ledge.	Pennington shale Yields little or no water to wells.	
		Glen Dean limestone	Mdu		288-900±		Upper Mississippian limestones Limestone, light gray to tan, oolitic, especially in lower half; cherty near base; thick-bedded in lower half, thin-bedded in upper.	Upper Mississippian limestones Forms cliffs and steep slopes at and just below the crest of Pine Mountain.	Upper Mississippian limestones Yields as much as 50 or 100 gpm (gallons per minute) to springs in limestone.	
	Limestone of early Chester age									
	Ste. Genevieve limestone									
Lower Mississippian	Price and Maccrady formations			151-500±			Price and Maccrady formations Shale, gray and greenish; in lower portion, predominantly reddish in upper part. May include brownish sandstone, or reddish sandstone within the uppermost 50 feet.	Price and Maccrady formations Forms moderate slopes along front of Pine Mountain.	Price and Maccrady formations May yield more than 500 gpd (gallons per day) to wells near the foot of Pine Mountain, but wells drilled into the formation throughout most of its outcrop area will yield little or no water.	
	Chattanooga shale			300-700±			Chattanooga shale Shale, black, fissile.	Chattanooga shale Forms moderate slopes along base of Pine Mountain.	Chattanooga shale Yields essentially no water to wells.	
DEVONIAN										

¹ Of Morse (1931)
² Of Jilison (1919)
³ As used by Stockdale (1939)

GENERALIZED COLUMNAR SECTION IN BREATHITT, FLOYD, HARLAN, KNOTT, LETCHER, MARTIN, MAGOFFIN, PERRY, AND PIKE COUNTIES, KENTUCKY