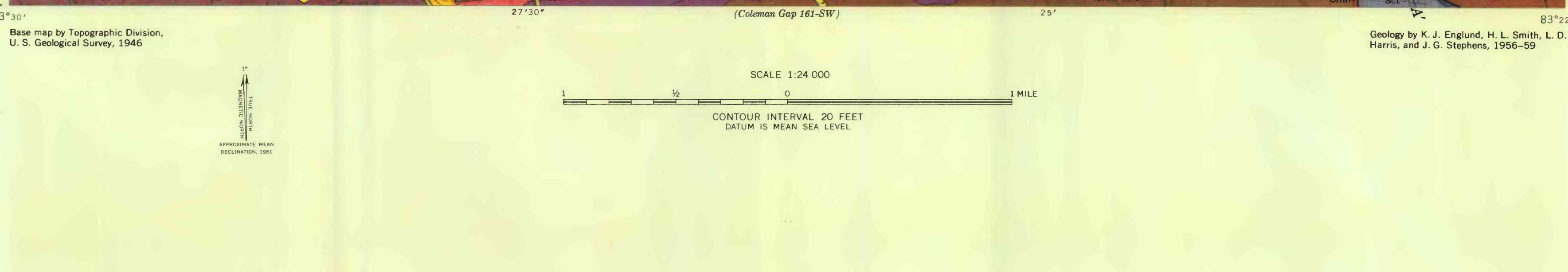


SYSTEM	SERIES	GROUP, FORMATION, AND MEMBER	LITHOLOGY	THICKNESS IN FEET	DESCRIPTION			
QUATERNARY	Alluvium, terrace deposits and colluvium	Reynolds sandstone member	Shale, medium-gray, with few thin beds of fine-grained light-gray sandstone.	10-20	Unconsolidated stream deposits, sand, silt, and gravel (alluvium and terrace deposits) and slope deposits of boulders in clay to sand matrix (colluvium).			
		Hignite formation	Shale, medium-gray, and sandstone, very fine to medium-grained, thin-bedded to massive. Calcareous shale, about 8 ft thick, with marine fossils at 80 ft above base.	60-80	Shale, medium-gray, and sandstone, very fine to medium-grained, thin-bedded to massive. Calcareous shale, about 8 ft thick, with marine fossils at 80 ft above base.			
		Jesse sandstone member	Sandstone, fine- to coarse-grained, light-gray, massive, micaceous. Conglomeratic with well-rounded quartz pebbles from 1/4 to 1/2 in. in diameter.	250	Sandstone, fine- to coarse-grained, light-gray, massive, micaceous. Conglomeratic with well-rounded quartz pebbles from 1/4 to 1/2 in. in diameter.			
		Cañon formation	Sandstone, very fine to fine-grained, light-gray, micaceous, massive with interbedded medium-gray shale, siltstone, coal, and underclay.	340	Sandstone, very fine to fine-grained, light-gray, micaceous, massive with interbedded medium-gray shale, siltstone, coal, and underclay.			
		Wallins Ck. coal bed	Shale, medium-gray, interbedded with very fine to fine-grained sandstone, siltstone, coal, and underclay.	200	Shale, medium-gray, interbedded with very fine to fine-grained sandstone, siltstone, coal, and underclay.			
		Puckett sandstone member	Sandstone, fine-grained, light-gray, micaceous, massive.	40	Sandstone, fine-grained, light-gray, micaceous, massive.			
		Mingo formation	Sandstone, very fine to fine-grained, light-gray, thin-bedded to massive, with interbedded medium-gray shale, siltstone, coal, and underclay. Marine fossils abundant in calcareous shale and siltstone beds, from 2 to 3 ft thick, at 45, 130, and 330 ft below top. Few ellipsoidal limestone concretions.	710	Sandstone, very fine to fine-grained, light-gray, thin-bedded to massive, with interbedded medium-gray shale, siltstone, coal, and underclay. Marine fossils abundant in calcareous shale and siltstone beds, from 2 to 3 ft thick, at 45, 130, and 330 ft below top. Few ellipsoidal limestone concretions.			
		Kellioka coal bed	Sandstone, very fine to fine-grained, light-gray, thick-bedded, micaceous.	40-90	Sandstone, very fine to fine-grained, light-gray, thick-bedded, micaceous.			
		Harlan coal bed	Sandstone, very fine to fine-grained, light-gray, thick-bedded, micaceous.	40-90	Sandstone, very fine to fine-grained, light-gray, thick-bedded, micaceous.			
		Path Fork coal bed	Sandstone, very fine to fine-grained, light-gray, thick-bedded, micaceous.	40-90	Sandstone, very fine to fine-grained, light-gray, thick-bedded, micaceous.			
PENNSYLVANIAN	Breathitt group	Puckett Ck. coal bed	Shale, medium-gray, with interbedded very fine to medium-grained sandstone, siltstone, coal, and underclay. Abundant ellipsoidal limestone concretions in upper 125 ft.	1400-1450	Shale, medium-gray, with interbedded very fine to medium-grained sandstone, siltstone, coal, and underclay. Abundant ellipsoidal limestone concretions in upper 125 ft.			
		Hance formation	Sandstone, fine- to coarse-grained, very light gray, quartzose, cross-bedded. Conglomeratic with lenses, as much as 5 ft thick, of well-rounded quartz pebbles commonly 1/2 to 1 in. in diameter and as much as 2 in. long. Four conglomeratic sandstone beds can be differentiated locally where they are separated by thin lenses of platy sandstone, shale, coal, and underclay.	250-300	Sandstone, fine- to coarse-grained, very light gray, quartzose, cross-bedded. Conglomeratic with lenses, as much as 5 ft thick, of well-rounded quartz pebbles commonly 1/2 to 1 in. in diameter and as much as 2 in. long. Four conglomeratic sandstone beds can be differentiated locally where they are separated by thin lenses of platy sandstone, shale, coal, and underclay.			
		Bee Rock sandstone member	Shale, medium-gray to black, and sandstone, wavy to platy-bedded, very fine to fine-grained, light-gray, in upper part. Middle part is thick-bedded to massive very fine to fine-grained light-gray sandstone. Medium-gray shale with very fine to fine-grained wavy to platy-bedded sandstone in lower part.	400	Shale, medium-gray to black, and sandstone, wavy to platy-bedded, very fine to fine-grained, light-gray, in upper part. Middle part is thick-bedded to massive very fine to fine-grained light-gray sandstone. Medium-gray shale with very fine to fine-grained wavy to platy-bedded sandstone in lower part.			
		Sandstone and shale member D	Sandstone, fine- to coarse-grained, very light gray, massive, quartzose, cross-bedded. Conglomeratic with lenses, as much as 5 ft thick, of well-rounded quartz pebbles commonly 1/2 to 1 in. in diameter and as much as 2 in. long. Four conglomeratic sandstone beds can be differentiated locally where they are separated by thin lenses of platy sandstone, shale, coal, and underclay.	400	Sandstone, fine- to coarse-grained, very light gray, massive, quartzose, cross-bedded. Conglomeratic with lenses, as much as 5 ft thick, of well-rounded quartz pebbles commonly 1/2 to 1 in. in diameter and as much as 2 in. long. Four conglomeratic sandstone beds can be differentiated locally where they are separated by thin lenses of platy sandstone, shale, coal, and underclay.			
		Sandstone member C	Shale, medium-gray, in lower part, and very fine to fine-grained, wavy-bedded light-gray and light-olive-gray sandstone in upper part.	100-240	Shale, medium-gray, in lower part, and very fine to fine-grained, wavy-bedded light-gray and light-olive-gray sandstone in upper part.			
		Sandstone and shale member B	Sandstone, fine- to coarse-grained, very light gray, quartzose, massive, cross-bedded. Very conglomeratic with well-rounded quartz pebbles ranging mostly from 1/2 to 1 in. in diameter. Includes at center lens of very fine grained wavy-bedded light-olive-gray sandstone. Named from exposure at White Rocks on Cumberland Mountain.	125-340	Sandstone, fine- to coarse-grained, very light gray, quartzose, massive, cross-bedded. Very conglomeratic with well-rounded quartz pebbles ranging mostly from 1/2 to 1 in. in diameter. Includes at center lens of very fine grained wavy-bedded light-olive-gray sandstone. Named from exposure at White Rocks on Cumberland Mountain.			
		White Rocks sandstone member	Sandstone, fine- to medium-grained, very light gray, quartzose, massive. Lens of conglomeratic sandstone at base locally. Lower part grades laterally and intertongues with Pennington formation. Upper part is too thin to be shown on the map east of White Rocks.	50-180	Sandstone, fine- to medium-grained, very light gray, quartzose, massive. Lens of conglomeratic sandstone at base locally. Lower part grades laterally and intertongues with Pennington formation. Upper part is too thin to be shown on the map east of White Rocks.			
		Sandstone member A	Shale, light-olive-gray to grayish-green with interbedded very fine to fine-grained, platy- and wavy-bedded sandstone. Locally sandstone is fine to medium grained and conglomeratic.	450-500	Shale, light-olive-gray to grayish-green with interbedded very fine to fine-grained, platy- and wavy-bedded sandstone. Locally sandstone is fine to medium grained and conglomeratic.			
		MISSISSIPPIAN	Pennington formation	Upper member	Sandstone, very fine to fine-grained, platy- and wavy-bedded, with few thin beds of light-olive-gray shale and siltstone.	195-245	Sandstone, very fine to fine-grained, platy- and wavy-bedded, with few thin beds of light-olive-gray shale and siltstone.	
				Lower member	Shale and limestone, olive-gray, calcareous shale predominates; some thick beds of lutite-textured or oolitic olive-gray limestone.	350±	Shale and limestone, olive-gray, calcareous shale predominates; some thick beds of lutite-textured or oolitic olive-gray limestone.	
Upper member	Limestone, basal few feet olive-gray, lutite-textured argillaceous limestone with abundant dark-gray chert; remainder is mainly oolitic, light-olive-gray limestone with some interbeds of lutite-textured light-olive-gray limestone.			250±	Limestone, basal few feet olive-gray, lutite-textured argillaceous limestone with abundant dark-gray chert; remainder is mainly oolitic, light-olive-gray limestone with some interbeds of lutite-textured light-olive-gray limestone.			
Lower member	Shale, greenish-gray or pale-olive, locally grayish-red beds occur in lower half and at top; some interbedded pale-olive siltstone.			325	Shale, greenish-gray or pale-olive, locally grayish-red beds occur in lower half and at top; some interbedded pale-olive siltstone.			
Grainger formation	Upper member			Shale, carbonaceous, grayish-black with some thin zones of greenish-gray shale.	375±	Shale, carbonaceous, grayish-black with some thin zones of greenish-gray shale.		
	Lower member			Dolomite, dark-gray, very finely crystalline, base marked by 5 ft of conglomeratic sandstone.	90-185	Dolomite, dark-gray, very finely crystalline, base marked by 5 ft of conglomeratic sandstone.		
DEVONIAN	Clinton shale			Upper member	Shale, light-olive-gray, some thin beds of light-olive-gray, very fine grained sandstone; oolitic hematite near base.	350-400	Shale, light-olive-gray, some thin beds of light-olive-gray, very fine grained sandstone; oolitic hematite near base.	
				Lower member	Sandstone and shale, pale-olive shale concentrated in lower third and as zones in upper two-thirds; sandstone is slightly conglomeratic, fine to medium grained, cross-bedded.	250	Sandstone and shale, pale-olive shale concentrated in lower third and as zones in upper two-thirds; sandstone is slightly conglomeratic, fine to medium grained, cross-bedded.	
				Sequitchee formation	Upper member	Shale and siltstone, grayish-red, calcareous.	260	Shale and siltstone, grayish-red, calcareous.
					Lower member	Shale, pale-olive-gray; some interbedded coquina limestone and siltstone.	335	Shale, pale-olive-gray; some interbedded coquina limestone and siltstone.
		SILURIAN	Trenton limestone	Upper member	Limestone, medium-light-gray; coquina in lower half, upper half medium dark gray, interbedded coquina and lutite textured.	500	Limestone, medium-light-gray; coquina in lower half, upper half medium dark gray, interbedded coquina and lutite textured.	
				Lower member	Limestone, yellowish-gray, lutite-textured. Contains two prominent bentonite beds in upper part.	150	Limestone, yellowish-gray, lutite-textured. Contains two prominent bentonite beds in upper part.	
				Hardy Creek limestone	Upper member	Limestone, light-olive-gray, lutite-textured; zone of argillaceous yellowish-gray limestone near middle. Olive-black chert nodules.	120	Limestone, light-olive-gray, lutite-textured; zone of argillaceous yellowish-gray limestone near middle. Olive-black chert nodules.
					Lower member	Limestone, yellowish-gray, lutite-textured, argillaceous. Few beds composed of fossil detritus near middle.	130-165	Limestone, yellowish-gray, lutite-textured, argillaceous. Few beds composed of fossil detritus near middle.
				Woodway limestone	Upper member	Limestone, olive-gray to brownish-gray, lutite- to arenite-textured; few olive-black chert nodules in lower part.	240	Limestone, olive-gray to brownish-gray, lutite- to arenite-textured; few olive-black chert nodules in lower part.
					Lower member	Limestone, light-olive-gray, lutite-textured; contains two grayish-red argillaceous limestone zones.	310-345	Limestone, light-olive-gray, lutite-textured; contains two grayish-red argillaceous limestone zones.
Hurricane Bridge limestone	Upper member			Limestone, olive-gray, arenite textured in lower part; light-olive gray lutite-textured abundant olive-black chert nodules in upper part.	25-145	Limestone, olive-gray, arenite textured in lower part; light-olive gray lutite-textured abundant olive-black chert nodules in upper part.		
	Lower member			Limestone, light-olive-gray, lutite-textured in massive beds.	45-100	Limestone, light-olive-gray, lutite-textured in massive beds.		
ORDOVICIAN	Potet limestone			Upper member	Limestone, light-olive-gray or medium-gray, lutite- to arenite-textured; abundant olive-black chert nodules.	125-215	Limestone, light-olive-gray or medium-gray, lutite- to arenite-textured; abundant olive-black chert nodules.	
				Lower member	Dolomite and limestone base marked by chert and dolomite pebble conglomerate; dolomite is greenish gray, very fine grained, and argillaceous, and is overlain by argillaceous limestone and light-olive-gray lutite-textured limestone.	350-450	Dolomite and limestone base marked by chert and dolomite pebble conglomerate; dolomite is greenish gray, very fine grained, and argillaceous, and is overlain by argillaceous limestone and light-olive-gray lutite-textured limestone.	
		Newala dolomite	Upper member	Dolomite, very light gray, very finely to finely crystalline.	350-450	Dolomite, very light gray, very finely to finely crystalline.		
			Lower member	Dolomite, light gray, finely to coarsely crystalline, contains abundant white-weathering chert beds and nodules.	320	Dolomite, light gray, finely to coarsely crystalline, contains abundant white-weathering chert beds and nodules.		
		Longview dolomite	Upper member	Dolomite, light-olive-gray, finely crystalline, argillaceous; few banded chert nodules.	350±	Dolomite, light-olive-gray, finely crystalline, argillaceous; few banded chert nodules.		
			Lower member	Dolomite, light-olive-gray, finely crystalline, in part argillaceous; fine-grained dolomitic sandstone abundant.	300±	Dolomite, light-olive-gray, finely crystalline, in part argillaceous; fine-grained dolomitic sandstone abundant.		
		Copper Ridge dolomite	Upper member	Dolomite, olive-brown; lower part medium to coarsely crystalline; upper part very fine to finely crystalline. Olive-black oolitic chert locally abundant.	750	Dolomite, olive-brown; lower part medium to coarsely crystalline; upper part very fine to finely crystalline. Olive-black oolitic chert locally abundant.		
			Lower member	Limestone and dolomite, limestone medium gray and ribbon bedded, with lutite-textured yellow-gray very finely crystalline dolomite.	250-300	Limestone and dolomite, limestone medium gray and ribbon bedded, with lutite-textured yellow-gray very finely crystalline dolomite.		



EXPLANATION

- Qal Alluvium
- Qt Terrace deposits
- Oca Colluvium
- Phr Hignite formation
- Phr Reynolds sandstone member
- Pc Cañon formation
- Pc, lower member; w, Wallins Creek coal bed
- Pmp Mingo formation
- Pmp, Puckett sandstone member; k, Kellioka coal bed; h, Harlan coal bed
- Phs Hance formation
- Phs, sandstone member; Phs, lower member; pf, Path Fork coal bed; p, Puckett Creek coal bed
- Pid Sandstone and shale member D
- Pic Sandstone member C
- Pib Sandstone and shale member B
- Piw White Rocks sandstone member
- Mpu Pennington formation
- Mpu, upper member; Mpl, lower member
- Mnu Newman limestone
- Mnu, upper member; Mnl, lower member
- Dc Grainger formation
- Dc Chattanooga shale
- Sh Hancock dolomite
- Sc Clinton shale
- Sc Clinch sandstone
- Or Sequatchie formation
- Or Reedsville shale
- Or Trenton limestone
- Or Hardy Creek limestone
- Or Ben Hur limestone
- Or Woodway limestone
- Or Hurricane Bridge limestone
- Or Martin Creek limestone
- Or Rob Camp limestone
- Or Potet limestone
- Or Dot formation
- Or Nevada dolomite
- Or Longview dolomite
- Or Cheaptapee dolomite
- Or, upper member; Or, lower member
- Or Copper Ridge dolomite
- Or Maynardville limestone

Geological Symbols:

- Contact: Dashed where approximately located, dotted where concealed
- Fault: Dashed where approximately located, U, upthrown side; D, downthrown side; T, upper plate of thrust fault
- Anticline: Dashed where approximately located
- Overturned anticline: Dashed where approximately located
- Syncline: Dashed where approximately located
- Strike and dip of beds: 22°
- Vertical beds
- Strike and dip of overturned beds: 22°
- Structure contour drawn on top of Harlan coal bed
- Dashed where projected from other beds. Contour interval 40 feet. Datum is mean sea level
- Coal bed: Dashed where approximately located, dotted where concealed; letters designate coal bed
- Strip mine
- Mine adit
- Prospect or outcrop of coal bed
- Abandoned oil well
- Dry hole

Geology by K. J. Englund, H. L. Smith, L. D. Harris, and J. G. Stephens, 1956-59

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET

DATUM IS MEAN SEA LEVEL

1 MILE

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—8128

GEOLOGIC MAP AND SECTION OF THE EWING QUADRANGLE, KENTUCKY AND VIRGINIA