

SYSTEM	SERIES	GROUP	FORMATION	THICKNESS, IN FEET	SECTION	LITHOLOGY	TOPOGRAPHY	HYDROLOGY		
QUATERNARY	PLEISTOCENE AND RECENT		ALLUVIUM	100		Silt, clay, and some sand in upper part and lenses and layers of silt, sand, and gravel in lower part of Ohio River valley; some deposits more than 100 feet thick. Sandy silt and clay and some fine gravel in Licking River valley. Thin and fine grained in tributary valleys.	Valley flats, terraces, and flood plains. Long, narrow, discontinuous terraces in the narrow Ohio River valley; broad terraces along the relatively wide Licking River valley. Too thin in tributary valleys to have distinctive topography.	Yields moderate to large quantities of water to drilled wells in the Ohio River valley, according to its thickness and texture; commonly yields 200 gpm (gallons per minute), and as much as 800 gpm from gravel-packed wells; yields more than 500 gpd (gallons per day) in valleys of the Licking and South Fork Licking Rivers, and as much as 150 gpm in places. Too thin and fine grained in small streams to yield large amounts of water. Water is hard and may contain salt or hydrogen sulfide.		
			IRVINE(?) FORMATION	35		Fluvial deposits of clay, sand, and small amounts of gravel in old stream channels at an intermediate level along Licking and North Fork Licking River valleys.	Tops of low hills near the Licking and North Fork Licking Rivers.	Yields small amounts of water to wells and springs.		
TERTIARY OR QUATERNARY	PLEISTOCENE OR PLEISTOCENE	RICHMOND	BRASSFIELD LIMESTONE	10		Gray to pink medium-crystalline to coarsely crystalline dolomitic limestone.	Discontinuous ledges near hilltops.	Yields water to small springs.		
			ELKHORN AND WHITEWATER FORMATIONS UNDIFFERENTIATED	50		Shale and interlayered thin beds of limestone; alternating limestone and shale in some places.	Gently to moderately rolling upland except along large streams where there is much dissection; consequent steep slopes littered with thin limestone slabs. In places thick limestone beds crop out as ledges on slopes and steep bluffs along larger streams, and also may underlie broad, flat valleys in upland.	Yields more than 500 gpd to drilled wells in valley bottoms of large streams; yields almost no water to drilled wells on hillsides and narrow ridgetops; yields small amounts to dug wells on ridgetops; yields 100 to 500 gpd to wells in thick limestone beds along streams in upland; yields water to small springs. Water is hard and in valley bottoms may contain salt or hydrogen sulfide. In alternating limestone and shale, such as in most of the Richmond and Maysville groups, amount of water available to wells and springs depends upon amount of shale. Shale beds have small, poorly connected openings, and flow of ground water is very slow; result is very little solution of underlying limestone beds. Only along streams, where ground water has ready access to thick limestone beds, are wells likely to be successful.		
			LIBERTY FORMATION	30		Dolomitic limestone and many interlayered thin beds of calcareous shale.				
			WAYNESVILLE LIMESTONE	40		Alternating argillaceous limestone and calcareous shale.				
			ARNHEIM FORMATION	75		Fossiliferous rubby limestone, dolomitic claystone, and interbedded argillaceous				
			UPPER ORDOVICIAN	MAYSVILLE	MC MILLAN FORMATION	100		Thin- to medium-bedded, locally rubby, argillaceous limestone interbedded with lumpy blue-gray calcareous shale. Shale predominates in some places, but generally there is more limestone than shale. The lower part (Bellevue limestone member) consists of thin crystalline limestone, locally crossbedded or rubby, and a little interbedded shale.	Gently to moderately rolling upland except along major streams, where there is much dissection; consequent steep slopes. Thick limestone beds crop out as ledges on slopes and steep bluffs along larger streams; sinkholes may be present locally where thicker limestone beds underlie broad, flat valleys in upland. The Maysville group forms broad ridges between steep-sided valleys cut into shale of the underlying Eden group.	Yields 100 to 500 gpd to drilled wells in valley bottoms of large streams, but almost no water to drilled wells on hillsides and narrow ridgetops; yields some water to dug wells on ridgetops; yields 100 to 500 gpd to wells in thick limestone beds along streams in upland. These thick limestone beds yield water to several springs; the rest of the Maysville group yields water to small springs. Water is hard and in valley bottoms may contain salt or hydrogen sulfide. Small amounts of water may be obtained from the semiperched water body in rocks of the Maysville group where they cap ridges between valleys cut into shale of the Eden group. Dug wells on ridges produce more water than drilled wells; however, many dry in late summer or fall.
					FAIRVIEW FORMATION	140		Thin alternating beds of gray rubby limestone and lumpy blue-gray calcareous shale. More limestone than shale in most places, but locally may be more than one-half shale.		
					GARRARD SANDSTONE	0-48		Well-cemented calcareous siltstone and fine-grained sandstone interbedded with sandy shale and limestone. Garrard sandstone grades downward into rocks typical of the Eden group, and the unnamed sandstone member grades upward into rocks typical of the Maysville group. Unit thins northward from Nicholas County.	Similar to that of the Maysville group; crops out as prominent ledges in steep slopes and bluffs in many places along large streams.	Yields 100 to 500 gpd to drilled wells in valley bottoms, but almost no water to wells on hillsides or ridgetops; yields little water to springs. The well-cemented siltstone and fine-grained sandstone do not allow free circulation of water. Water is hard.
			ORDOVICIAN	EDEN		215		Evenly bedded lumpy blue calcareous shale and mudstone and interlayered thin limestone beds. Shale predominates and may form entire section, but thicker limestone beds are present in places, especially in lower part.	Rugged, much dissected topography of long, narrow, steep-sided ridges and narrow, winding, V-shaped valleys with dendritic drainage pattern. Steep slopes are littered with thin limestone slabs that remain as shale erodes and washes away. Contrast with less rugged upland surfaces of adjacent areas is marked except near major streams where change is masked by dissection.	Yields 100 to 500 gpd to drilled wells in valley bottoms along large streams, but almost no water to wells on hillsides and ridges; yields water to small springs and seeps. Water is hard and may contain salt or hydrogen sulfide. Shale units of the Eden group have small, poorly connected openings that allow passage of only small quantities of water, restricting yields to wells and springs and preventing recharge to underlying rocks.
					CYNTHIANA FORMATION	120-140?		Thin to thick beds of finely to coarsely crystalline limestone; rubby in some exposures. Much interbedded calcareous shale in upper part, limestone predominant in lower part.	Broad valleys along large streams between steep, narrow ridges of the Eden shale belt; low, rolling hills in a belt bordering the Licking River in Harrison County. Limestone has undergone solution and in some areas is characterized by small sinkholes and subsurface drainage.	Yields more than 300 gpd to drilled wells in valley bottoms along large streams; yields small amounts of water to wells on hillsides and hilltops; yields water to small springs and to a few large ones. Water is hard or very hard and may contain hydrogen sulfide or salt, particularly in wells in valley bottoms; both, especially hydrogen sulfide, may be found in wells on hillsides. Beneath broad interstream areas, much solution enlargement of fractures and bedding-plane openings has taken place in the soluble zones beneath tributary streams, and many drilled wells produce 100 to 500 gpd. Little water is available from the Cynthiana where it is covered by younger rocks.
					Lower part of Cynthiana formation has been mapped as part of Lexington group.					
MIDDLE ORDOVICIAN	LEXINGTON?	BENSON LIMESTONE	10		Thin- to thick-bedded fine- to coarse-grained limestone and some thin interbedded shale.	Valley bottoms along the Licking River in Harrison and Robertson Counties.	Yield more than 500 gpd to wells in stream valleys and as much as 150 gpm in places. Water is hard and may contain salt or hydrogen sulfide.			
		JESSAMINE LIMESTONE	25							

GENERALIZED COLUMNAR SECTION AND WATER-BEARING CHARACTER OF THE ROCK IN BRACKEN, HARRISON, MASON, NICHOLAS, AND ROBERTSON COUNTIES, KENTUCKY (COUNTY GROUP 16)

By
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