

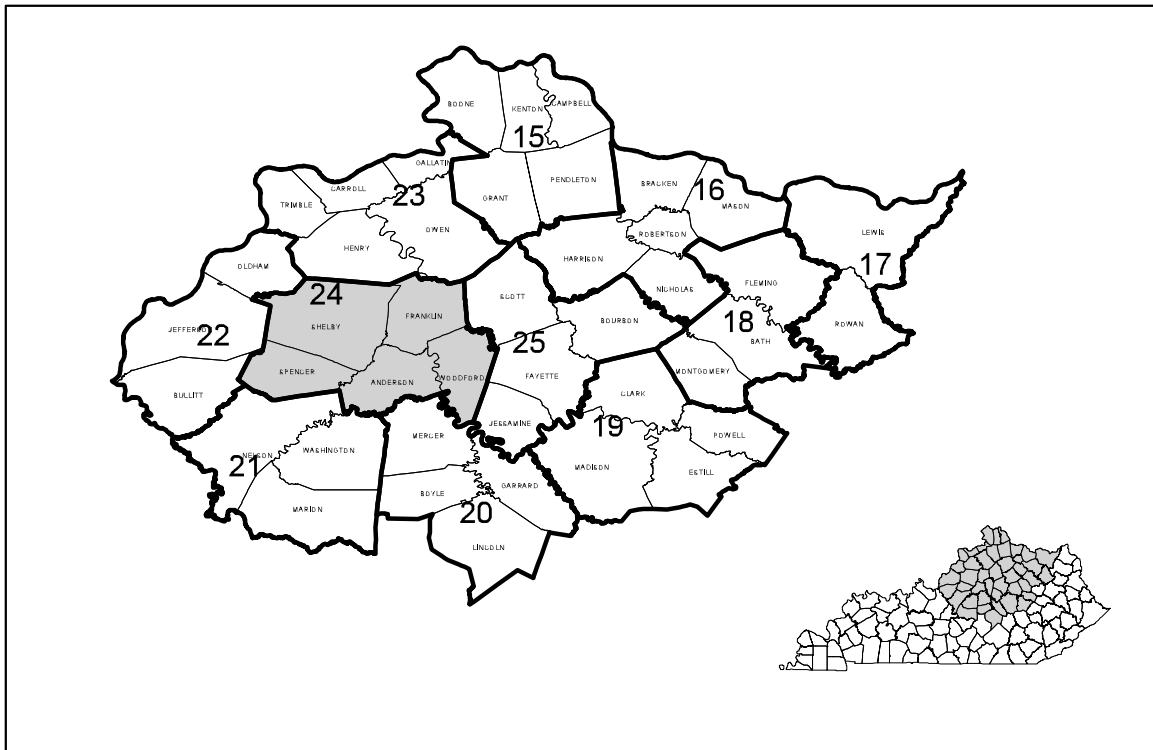
DEPARTMENT OF THE INTERIOR
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UNIVERSITY OF KENTUCKY

AVAILABILITY OF GROUND WATER IN ANDERSON, FRANKLIN,
SHELBY, SPENCER AND WOODFORD COUNTIES, KENTUCKY

By
F.R. Hall and W.N. Palmquist, Jr.,

HYDROLOGIC INVESTIGATIONS
ATLAS HA-24



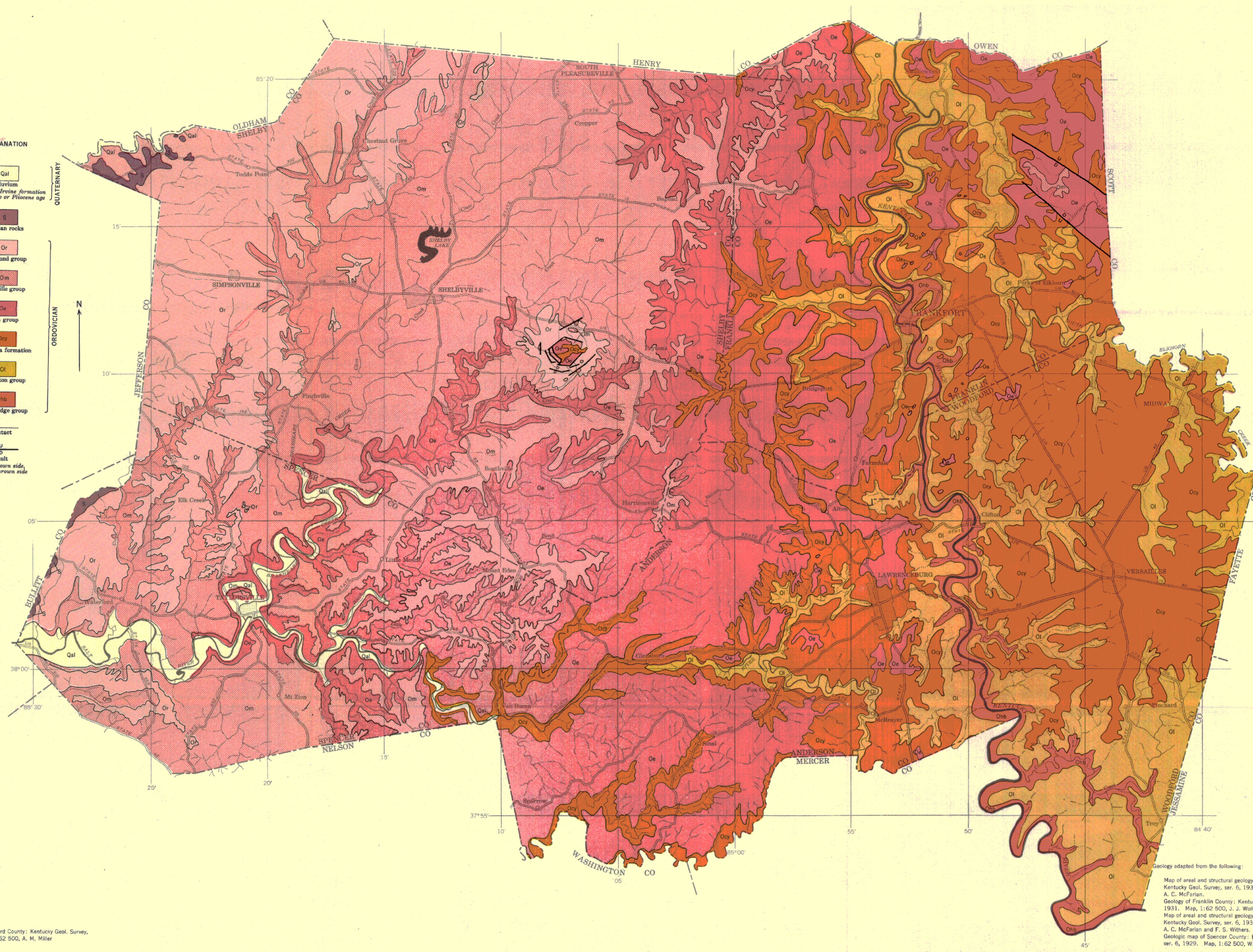
INDEX MAP OF THE BLUE GRASS REGION, KENTUCKY, SHOWING COUNTY
GROUPS AND AREA OF THIS ATLAS

This is 1 of 11 atlases (HA-15 to HA-25) showing geology and availability of ground water in the Blue Grass region, Kentucky U.S. Geological Survey Water-Supply Paper 1533 contains a text description and illustrations providing further information on the occurrence and quality of ground water in the Blue Grass region.

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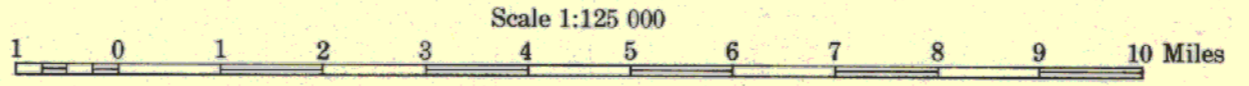
Geologic map of Woodford County: Kentucky Geol. Survey, ser. 6, 1924. Map, 1:62 500, A. M. Miller

Geology adapted from the following:

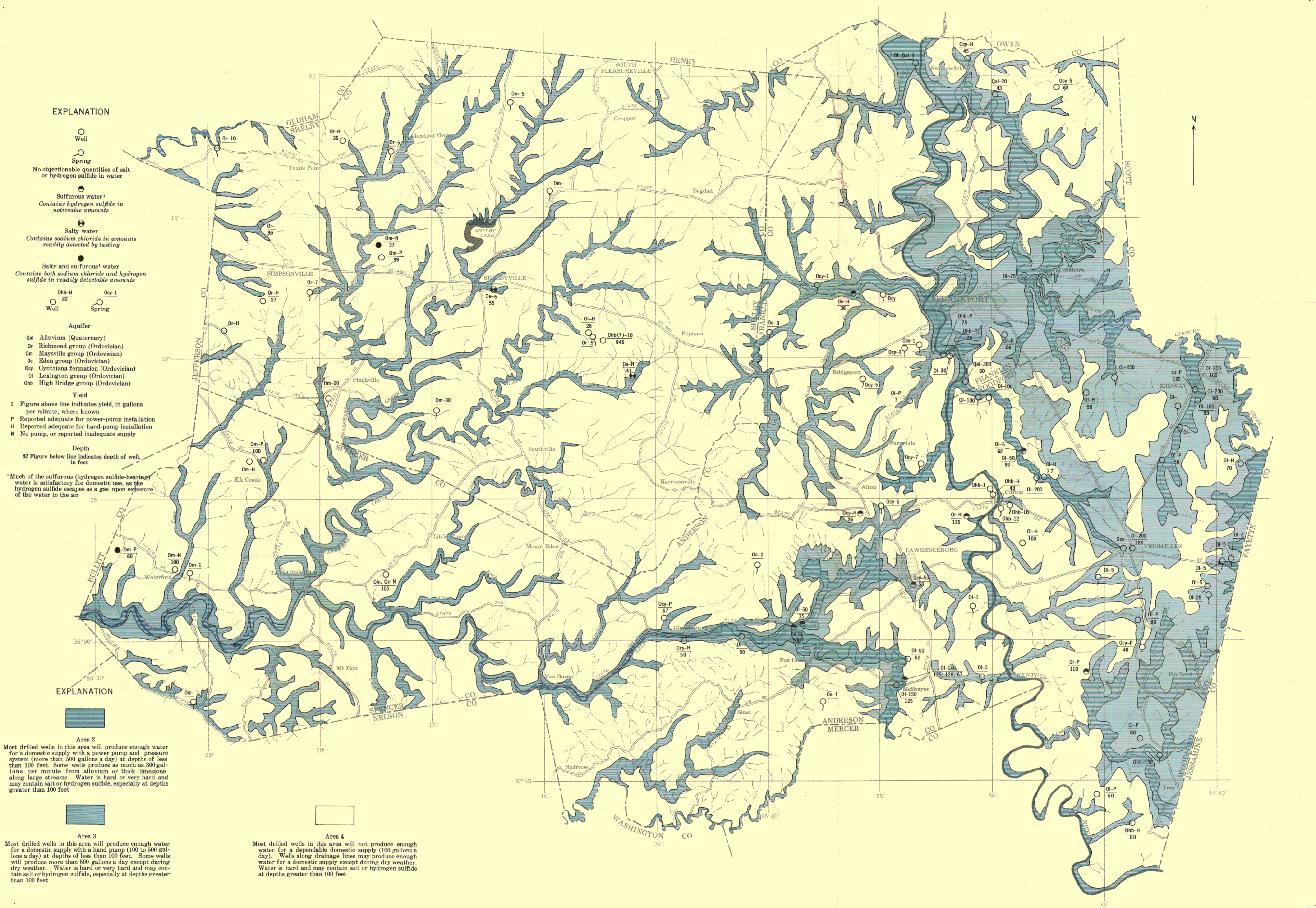
- Map of areal and structural geology of Anderson County: Kentucky Geol. Survey, ser. 6, 1930. Map, 1:62 500, A. C. McFarlan.
- Geology of Franklin County: Kentucky Geol. Survey, ser. 6, 1931. Map, 1:62 500, J. J. Wolford and A. M. Miller.
- Map of areal and structural geology of Shelby County: Kentucky Geol. Survey, ser. 6, 1931. Map, 1:62 500, A. C. McFarlan and F. S. Withers.
- Geologic map of Spencer County: Kentucky Geol. Survey, ser. 6, 1929. Map, 1:62 500, W. H. Shideier.

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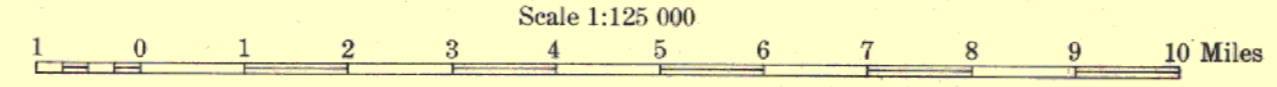
GEOLOGIC MAP OF ANDERSON, FRANKLIN, SHELBY, SPENCER, AND WOODFORD COUNTIES, KENTUCKY (COUNTY GROUP 24)



By
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SYSTEM	SERIES	GROUP	FORMATION	THICKNESS, IN FEET	SECTION	LITHOLOGY	TOPOGRAPHY	HYDROLOGY		
QUATERNARY	RECENT		ALLUVIUM	0-60		Silt, clay, and some fine sand in upper part; gravel, sand, and clay in lenses, or mixtures of all three, in lower part. As much as 60 feet thick in the Kentucky River valley; thinner mixture of clay, silt, fine sand, and a small amount of gravel in smaller stream valleys.	Valley flats, flood plains, and, in the Kentucky River and Elkhorn Creek valleys, terraces. Flats are dissected by short, steep-sided gullies near tributaries.	Yields small to large quantities of water to drilled wells, according to texture and thickness of material; yields more than 20 gpm (gallons per minute) from 60 feet of fine-grained material in the Kentucky River valley; yields as much as 20 gpm from 44 feet of similar material in the valley of Elkhorn Creek. Too thin and fine-grained elsewhere to yield large amounts of water. Water is hard.		
			IRVINE FORMATION	0-15		Unconsolidated deposits of brown chert fragments in a red-brown sandy clay matrix.	Uplands near the Kentucky River.	Yields water to small springs and dug wells.		
TERTIARY OR QUATERNARY	PLEISTOCENE AND RECENT		LAUREL DOLOMITE	40		Massive, thick-bedded bluish-gray fine-grained dolomitic limestone. Evenly bedded layers about 1 foot thick in upper part, uneven thinner beds in lower part.	Ledges high on valley sides in northwestern Shelby County.	Yields almost no water to drilled wells; yields water to small perennial springs at basal contact with underlying shale. Water is hard.		
			OSGOOD FORMATION	30±		Mostly lumpy gray coarse, calcareous and magnesian shale and some fine-grained magnesian limestone above, and limestone similar to the Brassfield below. A few feet of soft fissile green-gray shale at the top.	Gentle slopes between ledges of underlying, overlying, and interbedded limestone beds.	Yields almost no water from shale; yields water through small springs in limestone. Shale impedes downward percolation of water to underlying limestone. Water is hard.		
SILURIAN	PLEISTOCENE AND RECENT	RICHMOND	BRASSFIELD LIMESTONE	5		Massive medium-crystalline to coarsely crystalline salmon-colored sandy dolomitic limestone; less massive near top, and some shale.	Ledges beneath ridges and in valley sides.	Yields almost no water to wells; yields water to small springs. Water is hard.		
			SALUDA LIMESTONE	30-36		Massive bluish-gray fine-grained sandy dolomitic limestone.	Ridges and small upland areas; bluffs along large streams.	Yields 100 to 500 gpd (gallons per day) to wells if not overlain by shale of the Osgood formation; yields almost no water to wells on hillsides; yields water to small springs, some perennial. Water is hard.		
			LIBERTY FORMATION	35-50		Coarse bluish-gray shale with thin beds of somewhat dolomitic crystalline limestone; fossiliferous.				
			WAYNESVILLE LIMESTONE	40		Massive green fine-grained argillaceous limestone with thin beds of green shale; coral reef at base with shale zone above; weathers gray.	Dissected upland; moderately steep slopes where shale predominates, and moderately undulating to gently rolling upland where limestone predominates. Slopes steep and cliffy along the valleys; many slopes are dotted with weathered limestone slabs.	Yield 100 to 500 gpd to drilled wells in valley bottoms; yield almost no water to drilled wells on hillsides or ridgetops. Water is hard and may contain salt in valley bottoms.		
			ARNHEIM FORMATION	35-60		Bluish-gray lumpy claystone and thin-bedded shale with much interbedded irregular, knotty, rubbly limestone.				
			MAYSVILLE	MC MILLAN FORMATION	80-100		Thin- to medium-bedded rubbly argillaceous limestone with much shale. Thin, locally crossbedded, crystalline rubbly limestone with no shale in lower part (Bellevue limestone member).	Gently to moderately rolling upland away from major streams; more highly dissected where shale predominates; small sinkholes, minor underground drainage, and broad, flat valleys where limestone predominates. Lower part forms broad, flat ridges between steep-sided valleys cut into underlying shale of the Eden group.	Yields 100 to 500 gpd to drilled wells in valley bottoms, but almost no water to wells on hills; yield some water through springs and seeps. Limestone bed 15 feet thick in lower part of McMillan formation yields as much as 30 gpm to springs. Sandy zone near base yields little water. Water from wells is hard and may contain salt in valley bottoms.	
				FAIRVIEW FORMATION	95-100		Thin to medium-thick beds of gray locally rubbly limestone with much interbedded shale. Some thin sandstone beds in lower part.			
				EDEN		170-235		Evenly bedded bluish-gray calcareous shale with some thin-bedded limestone. Interbedded fine-grained sandstone in upper part (Garrard sandstone).	Rugged; narrow, steep-sided ridges and narrow, V-shaped valleys of dendritic drainage. Steep slopes erode easily and are covered with thin limestone slabs. The contrast with the less rugged surface of the adjacent areas is marked except near major streams.	Yields 100 to 500 gpd to wells in valley bottoms, but almost no water to wells on hillsides or ridgetops; yields little water from sandy zone near top. Water is hard and may contain salt in valley bottoms.
			ORDOVICIAN	MAYSVILLE	CYNTHIANA FORMATION		45-120		Thin- to thick-bedded fine- to coarse-grained siliceous and argillaceous limestone, locally crossbedded, rubbly or bouldery, with drab or bluish-gray shale.	Gently to moderately rolling upland with small sinkholes and partially developed underground drainage where limestone predominates; broad valleys between hills on fringe of Eden shale belt.
DEVILS HOLLOW FACIES ¹	0-25					Massive coarse-grained to compact and extremely fine-grained, locally siliceous or argillaceous, limestone.	Small outcrop area; no characteristic topographic expression.			
WOODBURN LIMESTONE MEMBER	0-40					Crossbedded light-gray coarse-grained phosphatic limestone.	Gently rolling uplands with many large sinkholes and well-developed underground drainage; exposed on sides of small shallow valleys traversing the uplands.	Water-bearing characteristics are similar to those of the overlying part of the Cynthia formation. Yield as much as 50 gpm to springs in the Woodburn in northern Woodford County. Water is hard.		
BRANNON LIMESTONE MEMBER	0-15					Gray fine-grained argillaceous or siliceous limestone, locally shaly, having a concretionary or bouldery appearance; much shale in lower part.				
BENSON LIMESTONE	75					Thin to medium-thick beds of bluish-gray medium-crystalline to coarsely crystalline limestone, and some shale.	Broad, flat valleys in upland; well-developed subsurface drainage and many sinkholes; gently sloping hillsides adjacent to small streams in upland.	Yields more than 500 gpd to wells in valley bottoms and along streams in upland; yields 100 to 500 gpd to many perennial springs and more than 100 gpm to a few large springs. Water is hard and may contain salt in some places.		
JESSAMINE LIMESTONE	75-95					Bluish-gray fine-grained hard siliceous limestone in thin to medium-thick beds with much shale.	Rolling to dissected upland. Natural outcrops are rare in the rolling upland, but the limestone beneath hillslopes is evident from the benchlike or terracelike appearance of the slopes. Limestone crops out in discontinuous bands in the valley sides in the dissected part near the Kentucky River.	Yield 100 to 500 gpd to wells in most valley bottoms and along streams in upland; yield up to 150 gpm from thick limestone beds in the Curdsville along large streams; yield water to many small springs. Water is hard and may contain salt in valley bottoms.		
LOGANA FORMATION	35-45					Thin-bedded bluish-gray fine-grained argillaceous or siliceous limestone with much shale.				
CURDSVILLE LIMESTONE	20					Gray coarsely crystalline siliceous limestone in medium-thick beds with shale partings; bentonite bed at base; chert zones.				
HIGH BRIDGE	TYRONE LIMESTONE	60-90					Pure limestone in medium-thick beds, lithographic in places, with scattered inclusions of coarsely crystalline calcite; several thin to thick bentonite beds; weathers chalky white with dark calcite crystal faces standing in relief (Birdseye limestone).			
	OREGON LIMESTONE	30					Granular, finely crystalline gray to cream-colored magnesian limestone in medium-thick beds.	Steep slopes and high cliffs along the Kentucky River and lower parts of tributaries; relatively broad, flat valleys extending nearly to the upland surface. The Camp Nelson and Oregon limestones crop out only in the cliffs of the Kentucky River gorge. The Tyrone above forms the relatively flat, broad floor of the major tributary valleys as they approach the upland level.	Yields more than 500 gpd to many wells in the Kentucky River valley; yields more than 500 gpd to some wells in tributary valley bottoms; yields water to springs along the walls of the Kentucky River gorge and tributaries. Wells drilled through the Tyrone into the Oregon and Camp Nelson limestones produce very little water, as impermeable bentonite beds in and at the top of the Tyrone impede recharge of underlying rocks. Water is hard.	
	CAMP NELSON LIMESTONE	130 EXP.		Massive dolomitic limestone composed of irregular patches of gray-buff finely crystalline magnesian limestone in matrix of dense dove-gray limestone with scattered small calcite crystals; weathers to honey-combed surface with less soluble magnesian limestone standing in relief.						

GENERALIZED COLUMNAR SECTION AND WATER-BEARING CHARACTER OF THE ROCKS IN ANDERSON, FRANKLIN, SHELBY, SPENCER, AND WOODFORD COUNTIES KENTUCKY (COUNTY GROUP 24)

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