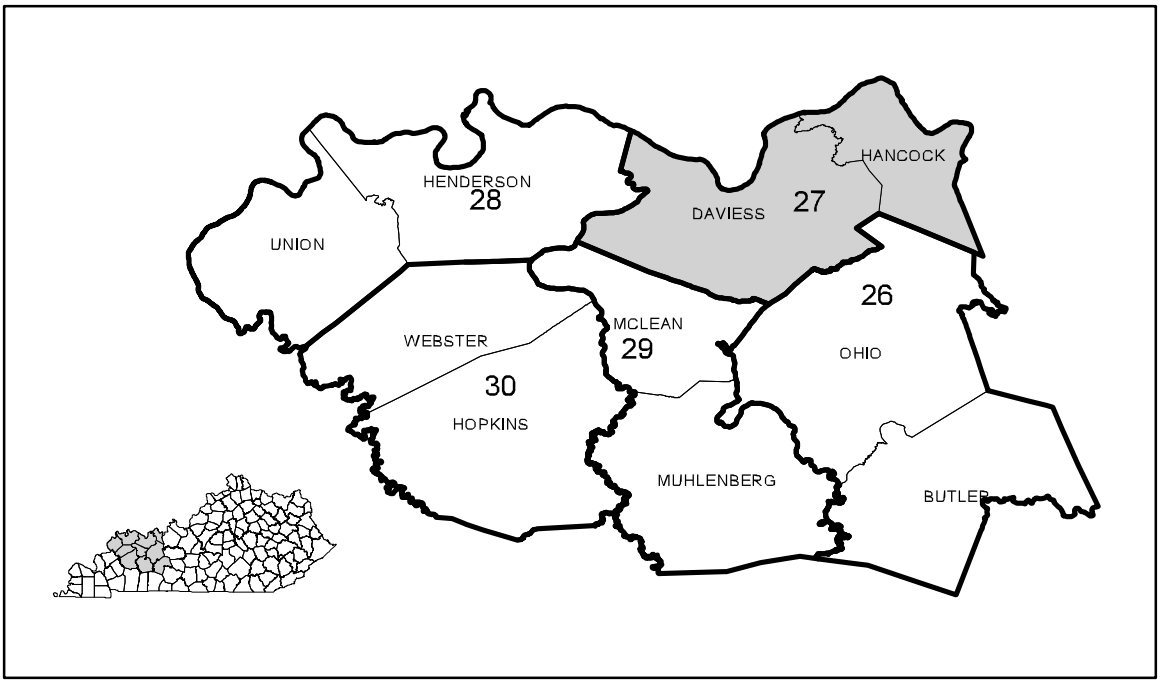
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE COMMONWEALTH OF KENTUCKY
AND THE KENTUCKY GEOLOGICAL SURVEY
UNIVERSITY OF KENTUCKY

AVAILABILITY OF GROUND WATER IN DAVIESS AND HANCOCK COUNTIES, KENTUCKY

By
R.W. Duvaul and B.W. Maxwell

HYDROLOGIC INVESTIGATIONS
ATLAS HA-27



INDEX MAP OF THE WESTERN COAL FIELD REGION, KENTUCKY, SHOWING COUNTY GROUPS AND AREA OF THIS ATLAS

This is 1 of 5 atlases (HA-26 to HA-30) showing geology and availability of ground water in the Western Coal Field region, Kentucky U.S. Geological Survey Water-Supply Paper 1599 contains a text description and illustrations providing further information on the occurrence and quality of ground water in the Western Coal Field region.

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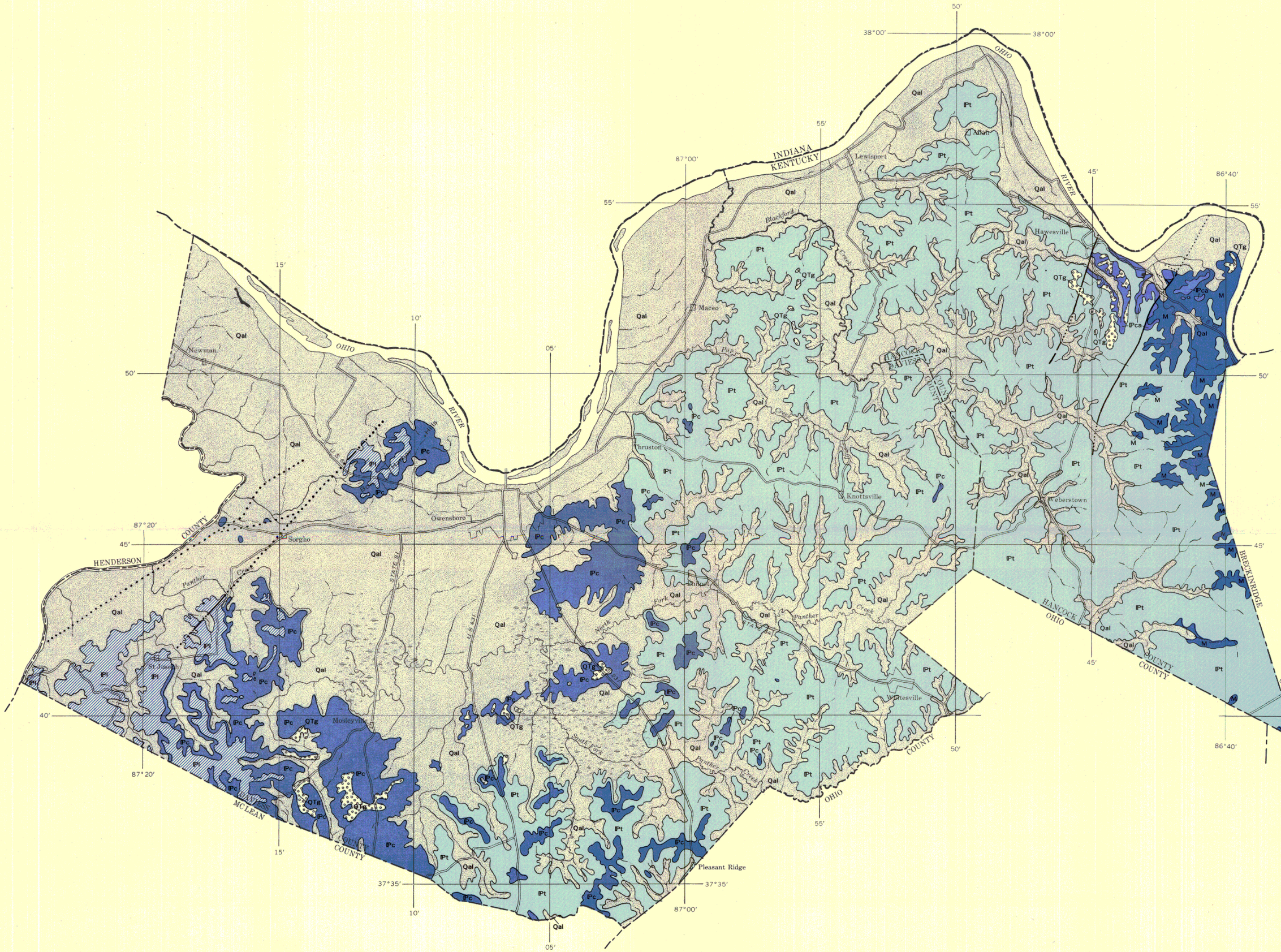
HYDROLOGIC INVESTIGATIONS
ATLAS HA-27 (SHEET 1 OF 3)



EXPLANATION

- Qal — Alluvium — QUATERNARY
- QTg — Gravel — TERTIARY(?) AND QUATERNARY
- IPt — Lisman formation — PENNSYLVANIAN
- IPc — Carbondale formation — PENNSYLVANIAN
- IPt — Tradewater formation — PENNSYLVANIAN
- IPca — Caseyville sandstone — PENNSYLVANIAN
- M — Sedimentary rocks — MISSISSIPPIAN
- CARBONIFEROUS

Contact

Fault

Dashed where approximately located; dotted where concealed

REFERENCES

Cathey, J. B., Jr., 1955, Areal geologic map of the Reed quadrangle: Kentucky Geol. Survey ser. 9, Bull. 15.

Mayfield, S. M., and Chisholm, D. B., 1931, Geologic and structure map of Hancock County, Kentucky: Kentucky Geol. Survey ser. 6.

Woodruff, J. G., 1928, Map of the areal geology of Daviess County, Kentucky: Kentucky Geol. Survey ser. 6.

Base maps are county highway maps and adjacent county groups may not match

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GEOLOGIC MAP OF DAVIESS AND HANCOCK COUNTIES, KENTUCKY (COUNTY GROUP 27)

By

R. W. Devaul and B. W. Maxwell

SCALE 1:125 000

2 1 0 2 4 6 MILES

TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1962

1962

HYDROLOGIC INVESTIGATIONS
ATLAS HA-27 (SHEET 1 OF 3)

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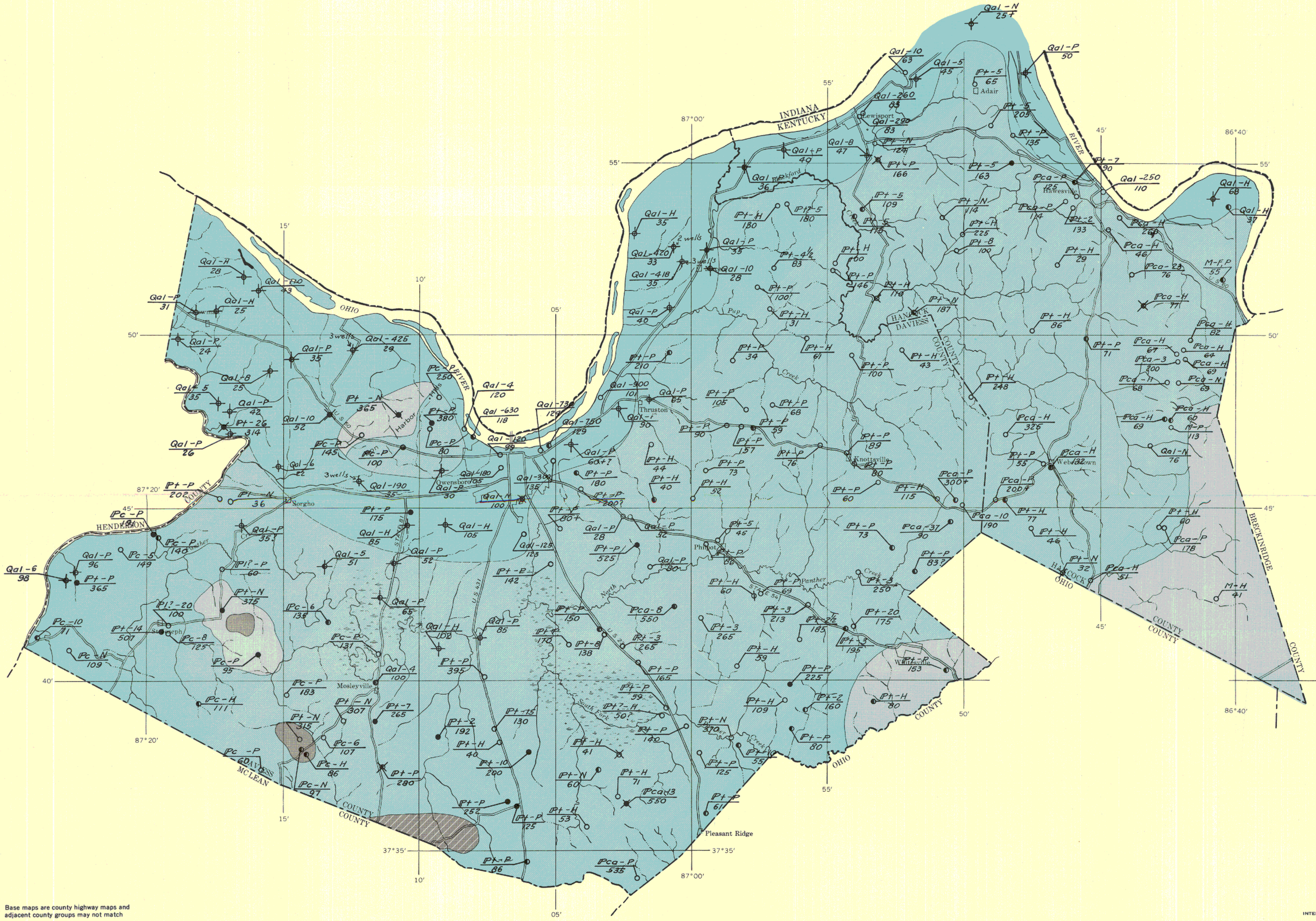
ATLAS HA-27 (SHEET 2 OF 3)



EXPLANATION

- Drilled well
- Driven well
- 2 wells — Driven wells, pumped as a unit
- Dug well

Reported quality of water based on principal use
Mostly domestic

USABLE	UNUSABLE
○ Low mineral content	⊠
◐ High iron content	⊠
◒ High sulfur content	⊠
● High salt content	⊠

Aquifer; yield, in gallons per minute
Depth, in feet

AQUIFER
Qal, alluvium
Pl, Lisman formation
Pc, Carbondale formation
Pt, Tradewater formation
Pca, Caseyville sandstone
M, Mississippian formations

YIELD
P, power-pump installation
H, hand-pump or bucket-bailer installation
N, no pump or inadequate supply

Area 1
Most wells yield more than 50 gpm from depths of less than 150 feet. Almost all yield enough for a modern domestic supply (more than 500 gpd)

Area 2
Most wells yield enough water from depths of less than 300 feet for a modern domestic supply +

Area 3
Most wells yield enough water from depths of less than 300 feet for a domestic supply to wells that have a bucket, bailer, or hand pump (100 to 500 gpd)

Area 4
Most wells fail to supply enough water for domestic use from depths of less than 300 feet (less than 100 gpd)

Area 5
The yield of wells is unpredictable because of faulting

Base maps are county highway maps and adjacent county groups may not match

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2 1 0 2 4 6 MILES

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HYDROLOGIC INVESTIGATIONS
ATLAS HA-27 (SHEET 3 OF 3)

SYSTEM	SERIES	GROUP		THICKNESS (IN FEET)	LITHOLOGY	LOCATION	HYDROLOGY
QUATERNARY	Pleistocene and Recent		Union[1] formation	0–25	Leached and oxidized loess and loam consisting of silt and fine sand. Calcium carbonate content increases with depth. Locally contains iron oxide and calcium carbonate concretions.	Forms a mantle covering alluvial deposits and bedrock over most of the area; is thickest along the Ohio River and thins southward.	Yields practically no water to wells.
			Alluvium	0–150	Gravel, sand, silt, and clay. Alluvium in the Ohio Valley contains gravel at the base composed of glacial outwash derived from igneous, metamorphic, and sedimentary rocks, and fragments of sandstone, limestone, chert, shale, and coal bedrock material locally cemented with iron. Alluvium in tributaries generally is fine grained although gravel is present locally along the Green River.	Borders streams and underlies flatland in valleys. Underlies the large flat areas south and west of Owensboro and west of Bon Harbor Hills. Maximum thickness occurs in the Ohio River valley and is 100 feet thick as far south as Mosleyville.	Yields as much as 750 gpm (gallons per minute) to wells in the Ohio Valley. Yields enough water for a modern domestic supply (more than 500 gpd) to wells in larger tributary valleys. Yields practically no water to wells in small valleys, where it is thin and fine grained. Water is hard to very hard and may contain objectionable amounts of iron.
TERTIARY(?) AND QUATERNARY	Pliocene (?) and Pleistocene		Gravel	0–25	Chert and quartz gravel with some sand, silt, and clay.	Occurs on hilltops and hillsides between elevations of about 420 and 600 feet. Covered by loess in many places.	Yields practically no water to wells.
		McLeansboro	Lisman formation: Anvil Rock sandstone member; No. 12 coal; Providence limestone member	0–110	Brown to red crossbedded medium- to coarse-grained friable to well-cemented quartz sandstone grading into shale laterally. Unconformity at base locally extends to the sandstone beneath the Kentucky No. 11 coal.	Underlies hills in western Daviess County and Bon Harbor Hills west of Owensboro. Thickens westward.	Yields enough water for a modern domestic supply to wells drilled into Anvil Rock sandstone member. Water is hard to very hard.
			Carbondale formation: No. 11 coal		Gray thin to massive locally shaly fossiliferous limestone.		
			Upper sandstone member; No. 9 coal	0–365	Shale and fine- to medium-grained quartz sandstone grading into shale laterally. The No. 11 coal marks the top of the formation.	Crops out below the Lisman formation in western Daviess County and Bon Harbor Hills.	Yields enough water for a modern domestic supply to wells drilled into sandstone. Yields practically no water from shale. Water is hard.
					Shale, sandy shale, and thin coal beds.	Crops out west of a line from Thruston to Pleasant Ridge with a few scattered outliers to the east and on the eastern edge of Bon Harbor Hills.	Yields practically no water to wells.
			Pleasantview[3] sandstone	10–15	White to light-gray fine- to medium-grained locally shaly sandstone.		
			Schultztown coal				Yields enough water for a modern domestic supply to wells drilled into sandstone. Water is hard to very hard in outcrop area and is increasingly mineralized downdip.
			Sebree[1] sandstone	20–30	Crossbedded coarse- to medium-grained friable to well-cemented locally shaly quartz sandstone; contains iron carbonate nodules. Unconformity at base.		
PENNSYLVANIAN			No. 7 coal; No. 6 coal; No. 5 coal				
			Curlew[2] sandstone				
			Curlew[4] limestone; Lead Creek[7] limestone	350–500	Shale, sandy shale, carbonaceous shale, sandstone, limestone, and coal. Sandstone units are medium-to coarse-grained, locally shaly, generally range in thickness from 0 to 100 feet, and generally contain iron. Formation thickens to the west.	Crops out in eastern half of Daviess County and most of Hancock County. The Tradewater formation below the Curlew limestone[4] crops out in the southeastern half of Hancock County and in the extreme eastern part of Daviess County. Locally, the Tradewater formation either lies unconformably on rocks of Mississippian age or has been mapped to include shale of the Caseyville sandstone.	Yields enough water for a modern domestic supply to drilled wells that penetrate sandstone. Yields practically no water from limestone and shale. Water is hard to very hard and low in dissolved solids near outcrop area and becomes increasingly mineralized but softer downdip to the west. It is highly mineralized in western Daviess County. Water from the lower part of the formation generally contains objectionable amounts of iron.
			Aberdeen[5] sandstone				
			Finnie[1] sandstone				
			Grindstaff sandstone member; No. 1A or Hawesville coal				
			Bee Springs[6] sandstone	100–500	Massive cliff-forming crossbedded medium-grained sandstone; contains pebbles of quartz; friable to well cemented with silica or limonite; grades into shale laterally.	Only the massive sandstone and conglomeratic phases have been identified at the outcrops. Rocks mapped as Tradewater formation along eastern edge of Hancock County may in some places be shale and sandstone of the Caseyville sandstone. Dips westward and underlies the rest of Hancock County and all of Daviess County.	Yields enough water for a modern domestic supply to wells drilled into sandstone. Yields practically no water from shale. Water generally contains objectionable amounts of iron. Water is hard to very hard and low in dissolved solids near outcrop area and becomes increasingly mineralized but softer downdip, to the west. At depth, water becomes too mineralized for use.
			Battery Rock coal		Shale, sandy shale, sandstone, and thin limestone and coal beds.		
			Lower conglomerate member		Massive cliff-forming crossbedded conglomeratic medium-grained sandstone with pebbles of vein quartz; friable to well cemented with silica or limonite; grades into shale laterally. Contains more and larger pebbles than the Bee Springs sandstone. Unconformity at base extends to the Menard limestone in places. Formation thickens to the west.		
MISSISSIPPIAN	Upper Mississippian	Formations of late Chester Age	Kinkaid limestone	25	Shale, sandy shale, limestone, and sandstone.	Crops out along the eastern edge of Hancock County. Underlies the rest of Hancock County and all of Daviess County. Locally, the upper units have been removed.	Yields enough water for a modern domestic supply to wells drilled into sandstone and solution openings in limestone near the outcrop area. Shale yields practically no water. Water is hard to very hard. Water from rocks of Mississippian age underlying younger rocks west of the outcrop area is highly mineralized.
			Degonia sandstone	70			
			Clore limestone	15			
			Palestine sandstone	40			
			Menard limestone	60			
			Waltersburg sandstone	60			
			Vienna limestone	7			
			Tar Springs sandstone	50			
			Formations of middle Chester age				

[1] of Glenn (1912) [2] of Owen (1856) [3] of Wanless (1929) [4] as used by Wanless (1939) [5] of Crider (1915) [6] of Norwood (1876) [7] of Crider (1913)

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GENERALIZED COLUMNAR SECTION IN DAVIESS AND HANCOCK COUNTIES, KENTUCKY (COUNTY GROUP 27)

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