

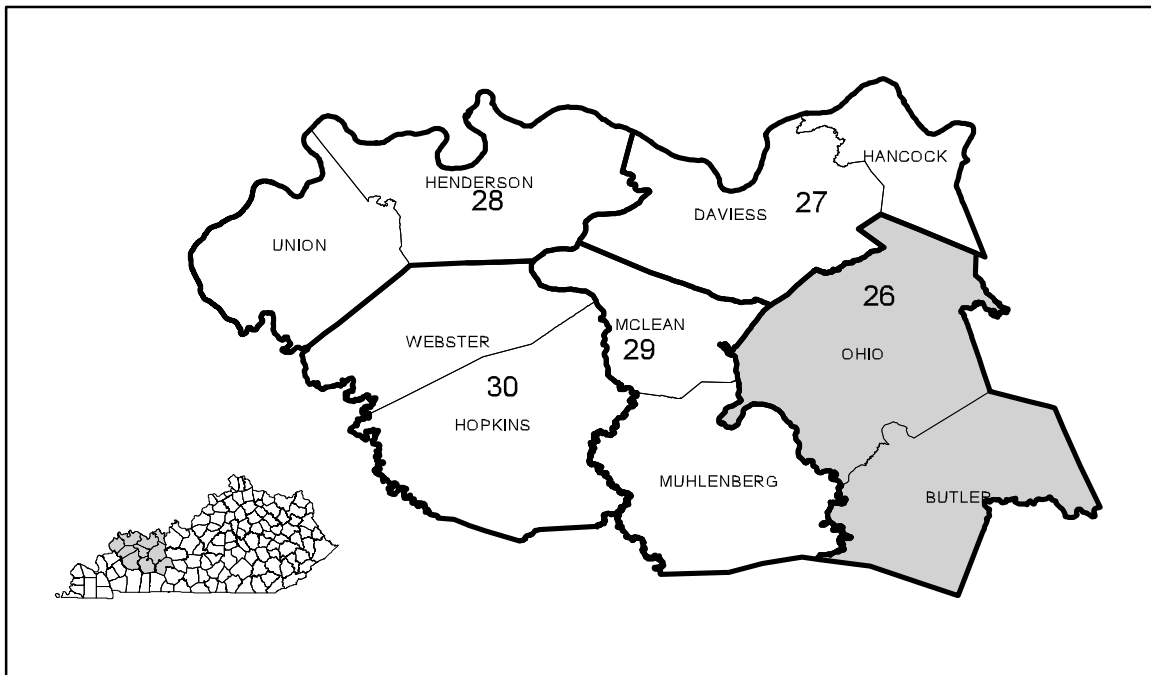
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

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

AVAILABILITY OF GROUND WATER IN BUTLER
AND OHIO COUNTIES, KENTUCKY

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

HYDROLOGIC INVESTIGATIONS
ATLAS HA-26



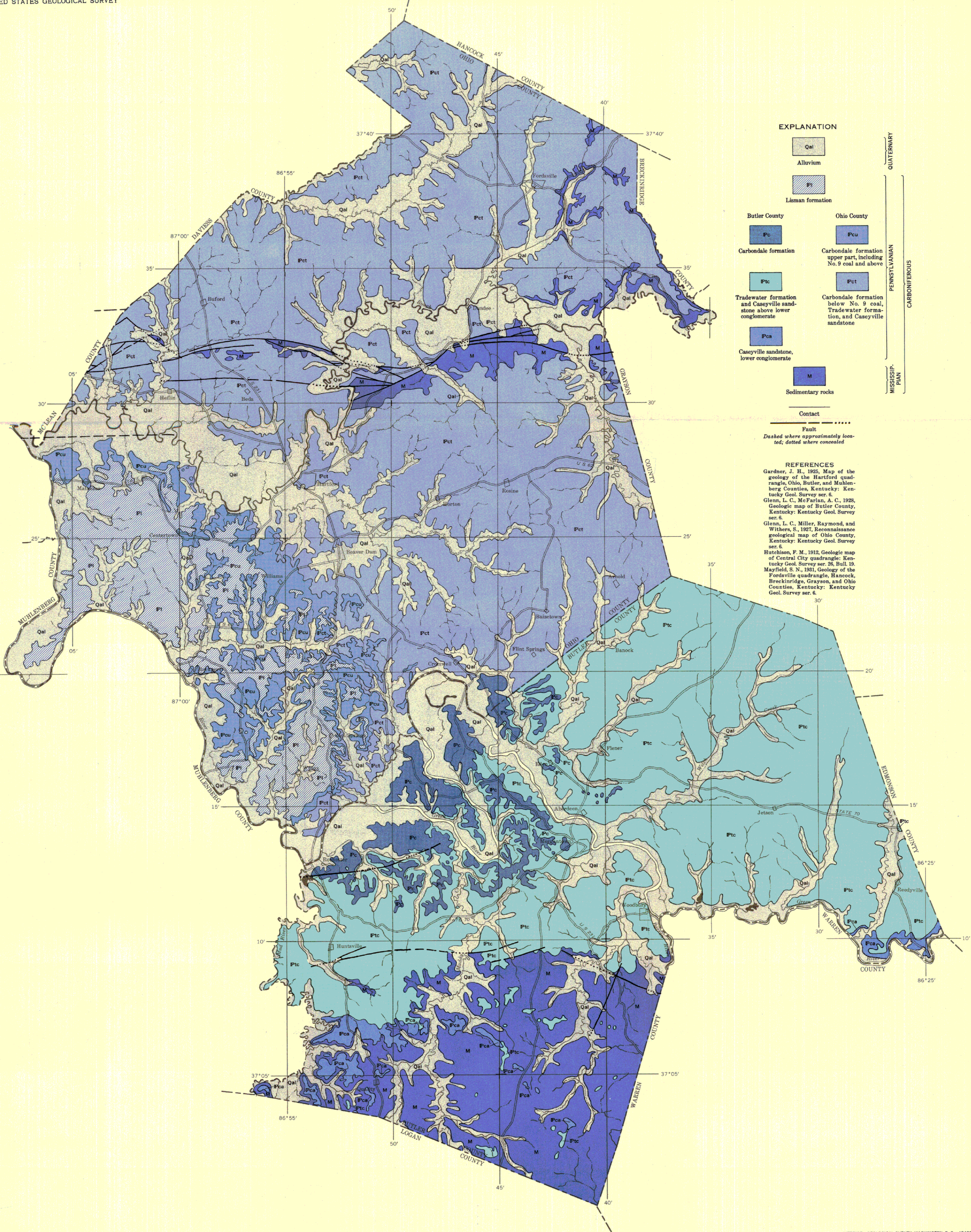
INDEX MAP OF THE WESTERN COAL FIELD REGION, KENTUCKY, SHOWING COUNTY
GROUPS AND AREA OF THIS ATLAS

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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EXPLANATION

	Alluvium	QUATERNARY
	Lisman formation	
	Butler County Carbondale formation	PENNSYLVANIAN
	Ohio County Carbondale formation upper part, including No. 9 coal and above	
	Carbondale formation below No. 9 coal, Tradewater formation, and Caseyville sandstone	
	Caseyville sandstone, lower conglomerate	MISSISSIPPIAN
	Sedimentary rocks	
Contact		
Fault Dashed where approximately located; dotted where concealed		

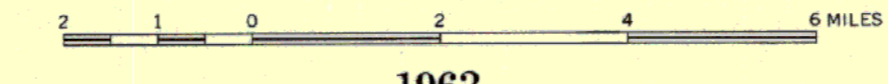
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GEOLOGIC MAP OF BUTLER AND OHIO COUNTIES, KENTUCKY (COUNTY GROUP 26)

By
B. W. Maxwell and R. W. Devaul

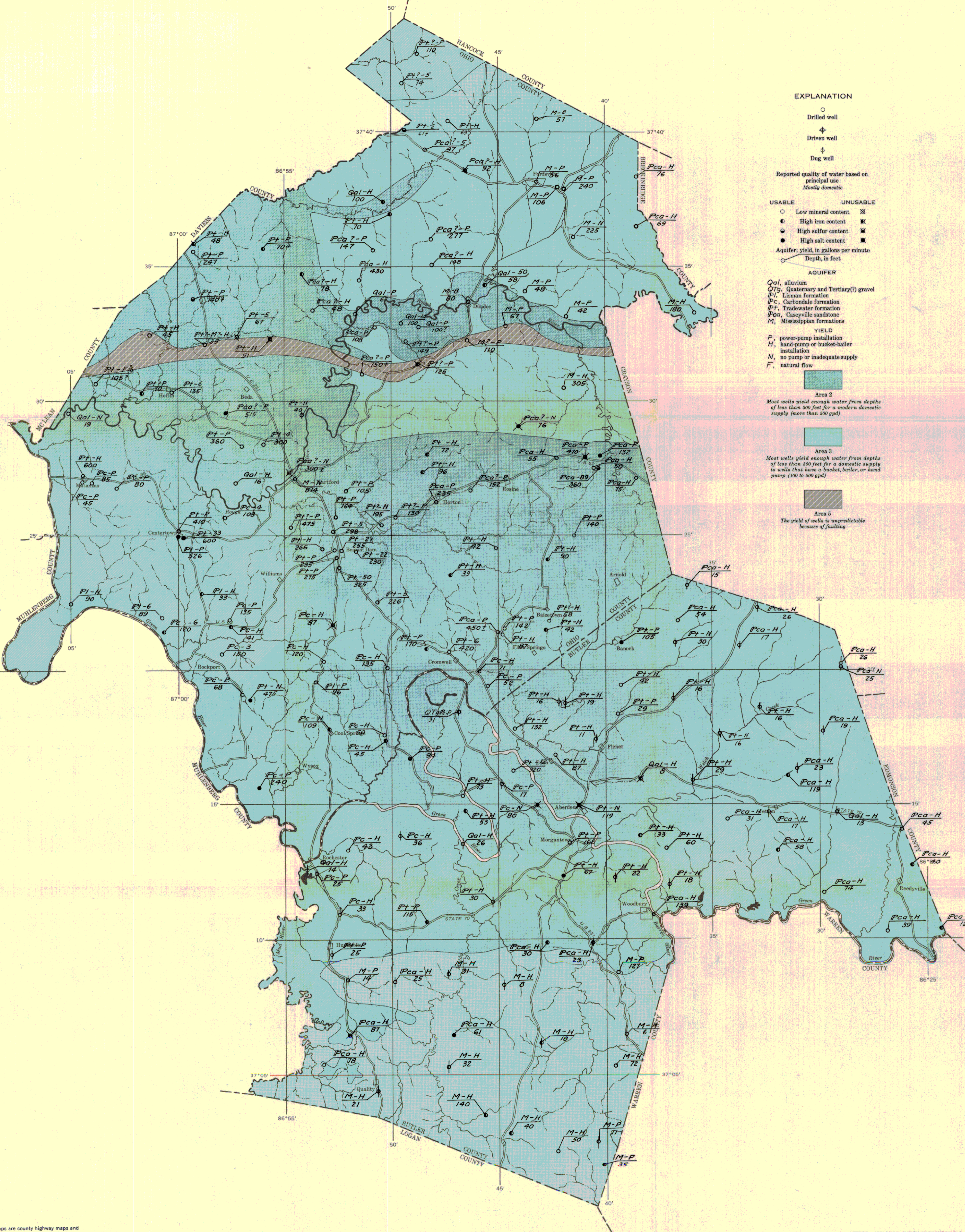
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Base maps are county highway maps and adjacent county groups may not match

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—10408



EXPLANATION

- Drilled well
- ⊕ Driven well
- ⊕ Dug well

Reported quality of water based on principal use
Mostly domestic

- | USABLE | UNUSABLE |
|-----------------------|-----------------------|
| ○ Low mineral content | ⊗ High iron content |
| ● High iron content | ⊗ High sulfur content |
| ● High sulfur content | ⊗ High salt content |
- ⊗ Aquifer yield, in gallons per minute
○ Depth, in feet

AQUIFER

- Gal, alluvium
- QTg, Quaternary and Tertiary(?) gravel
- Pl, Lisman formation
- Pc, Carbondale formation
- Tr, Tradewater formation
- Ca, Caseyville sandstone
- M, Mississippian formations

YIELD

- P, power-pump installation
- H, hand-pump or bucket-bailer installation
- N, no pump or inadequate supply
- F, natural flow

Area 2
Most wells yield enough water from depths of less than 300 feet for a modern domestic supply (more than 500 gpd)

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)

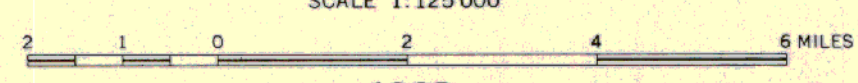
Area 5
The yield of wells is unpredictable because of faulting

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

AVAILABILITY OF GROUND WATER IN BUTLER AND OHIO COUNTIES, KENTUCKY (COUNTY GROUP 26)

By
B. W. Maxwell and R. W. Devaul

SCALE 1:125 000



SYSTEM	SERIES	GROUP	THICKNESS (IN FEET)	SECTION	LITHOLOGY	LOCATION	HYDROLOGY		
CARBONIFEROUS SYSTEMS PENNSYLVANIAN	QUATERNARY	Pleistocene and Recent	Union formation ¹	0-10		Loess and loam, leached and oxidized.	Forms a thin mantle over alluvial deposits and bedrock over much of the area.	Yields practically no water to wells.	
			Alluvium	0-90		Sand, gravel, silt, and clay; thinner and finer in the tributaries than in the Green River valley. Gravel consists of chert fragments from Pliocene(?) and Pleistocene gravel.	Borders streams and underlies most flat land along streams. Gravel occurs locally along the Green and Rough Rivers.	May yield as much as 100 gpm (gallons per minute) from sand and gravel along the Green and Rough Rivers. Wells along the Rough River between Taffy and Dundee yield over 10 gpm. Water is hard.	
	TERTIARY(?) QUATERNARY	Pliocene(?) and Pleistocene	Gravel	0-10		Chert gravel, with some sand and clay. Locally gravel has been reworked into the alluvium.	Occurs on tops and flanks of hills at elevations of 420 to 500 feet. Occurs on ridge northwest of Morgantown.	Yields enough water for a modern domestic supply (more than 500 gpd) to dug wells. Water is generally soft and low in dissolved solids but may contain objectionable amounts of iron.	
	McLeansboro	Lisman formation		180±		Shale, sandy shale, and sandstone lenses, thin coal and limestone beds. The Madisonville limestone member occurs near the top of the section in Ohio County.	Crops out in small area in western Ohio County west of Centertown to the Green River and south of Mantanzas to the Green River. This sequence is absent in Butler County.	Yields practically no water except to wells penetrating sandstone. Water may be hard but is suitable for domestic use.	
			Anvil Rock sandstone member			Coarse- to fine-grained crossbedded friable to well-cemented quartz sandstone; grades into shale laterally. Unconformity at base.	Crops out in western and southwestern Ohio County and near Mantanzas, Centertown, Williams, Cool Springs, and Wysox. In most of the eastern part of the outcrop area, the Anvil Rock caps the hills. Underlies younger rocks west of the outcrop area.	Yields enough water for a modern domestic supply except where the sequence is shaly or well cemented. Water near the outcrop area is hard but is increasingly softer down dip. Sodium bicarbonate content increases down dip. Iron may be present in objectionable amounts.	
			Providence Is member			Fine- to medium-grained locally shaly quartz sandstone. The No. 11 coal marks the top of the formation.	Crops out in the southwestern quarter of Ohio County at base of hills below Lisman formation. Dips westward and wherever it is present underlies the Lisman formation. Absent in Butler County.	Yields enough water for a modern domestic supply to wells penetrating sandstone. Yields practically no water to wells penetrating only shale. Water is hard.	
		Carbondale formation			275±		Shale, sandy shale, and thin coal beds.	Crops out northwest of Morgantown in Butler County. In Ohio County crops out west of Hartford in the valley of the Rough River and midway between Beaver Dam and McHenry southward toward Prentiss and Cromwell. Scattered outcrops occur in northwestern Ohio County north of the Shawneetown-Rough Creek fault zone.	Yields practically no water to wells.
			No 9 coal				Crossbedded coarse- to medium-grained friable to well-cemented locally shaly quartz sandstone.	Crops out from Rochester to Morgantown to Eden in Butler County and on the flanks of the Moorman syncline at the base of the formation near Cromwell, Beaver Dam, and Hartford in Ohio County. Scattered outcrops may occur in northwestern Ohio County north of the Shawneetown-Rough Creek fault zone.	Yields enough water for a modern domestic supply to wells penetrating sandstone. Water is hard or very hard.
			No 11 coal				Shale, sandy shale, thin limestone and coal beds.	Crops out in Butler County from near Rochester, through Morgantown to Eden, and in Ohio County below and to northeast of the Sebree sandstone.	Yields practically no water to wells.
		Tradewater formation	Sebree sandstone ¹		10-50		Crossbedded coarse- to medium-grained friable to well-cemented locally shaly quartz sandstone.	Crops out from Rochester to Morgantown to Eden in Butler County and on the flanks of the Moorman syncline at the base of the formation near Cromwell, Beaver Dam, and Hartford in Ohio County. Scattered outcrops may occur in northwestern Ohio County north of the Shawneetown-Rough Creek fault zone.	Yields enough water for a modern domestic supply to wells penetrating sandstone. Water is hard or very hard.
			No 7 coal				Shale, sandy shale, thin coal and limestone beds.	Crops out in area between the Aberdeen sandstone ⁴ below, and the Curlew sandstone ² above.	Yields practically no water to wells.
			Curlew sandstone ²		20-120		Massive crossbedded coarse- to medium-grained friable to well-cemented quartz sandstone; contains fragments of silicified wood. Shaly in some areas. Unconformity at base.	Crops out at Aberdeen, from Morgantown to Banock in Butler County, north of Baizetown to Horton, Beda, and northwest of Heflin in Ohio County. Unmapped north of Shawneetown-Rough Creek fault zone, but occurs in northwestern part of Ohio County. Underlies all younger rocks to the west.	Yields enough water for a modern domestic supply to wells penetrating sandstone. Some wells produce over 20 gpm. The water is fresh near outcrop areas in both Butler and Ohio Counties but may become highly mineralized in the deeper part of the Moorman syncline in Ohio County.
			Curlew limestone ³		500		Shale, sandy shale, sandstone lenses, and thin coal beds. In the northwest quarter of Ohio County, this sequence consists mostly of shales. To the west, sandstone becomes more prevalent in subsurface.	Crops out from the Mud River near Huntsville to the Green River near Woodbury and Banock. Crops out in northeastern Ohio County north of the Shawneetown-Rough Creek fault zone and from near Arnold and Rosine to north and west of Rosine.	Generally yields only small quantities of water to wells. May yield enough water for a modern domestic supply to wells penetrating a sufficient thickness of sandstone. Water is fresh near outcrop areas but becomes increasingly mineralized with depth.
			Aberdeen sandstone ⁴				Crossbedded conglomeratic medium- to very coarse-grained sandstone intertonguing with shale laterally. The middle part contains several thin coal and limestone beds and more shale than the upper and lower parts. The unconformity at the base locally cuts through 200 feet of the Upper Mississippian. The lower part of the formation is more conglomeratic than the upper part.	Crops out from the Mud River, north of Quality through Woodbury and Reddyville, and into the eastern part of Butler County. Not mapped in Ohio County.	Yields of 60 gpm have been obtained from this sandstone. Will yield enough water for a modern domestic supply to most wells penetrating sandstone. At depth, the water becomes salty or may have a high sodium bicarbonate content. Electric logs indicate that moderately mineralized water may be obtained locally from this formation at depths of 1200 feet.
			Aberdeen coal					Limestone, shale, sandy shale, and sandstone.	Crops out from the Mud River west of Quality to the Barren River and along the fault. Crops out in Ohio County east and southeast of Fordsville, along the Shawneetown-Rough Creek fault zone from south of Buford east to Grayson County. Underlies all younger rocks to the west.
MISSISSIPPIAN	Upper Mississippian	Formations of late Chester age	Lower conglomerate	100-450		Limestone, shale, sandy shale, and sandstone.	Crops out from the Mud River west of Quality to the Barren River and along the fault. Crops out in Ohio County east and southeast of Fordsville, along the Shawneetown-Rough Creek fault zone from south of Buford east to Grayson County. Underlies all younger rocks to the west.	Yields only small quantities of water to most wells. May yield fairly large quantities of water to wells penetrating solution channels in limestone. Water is fresh near the outcrop areas but becomes salty at depth.	

¹ of Glenn (1912) ² of Owen (1856) ³ as used by Wanless (1939) ⁴ of Crider (1915)

GENERALIZED COLUMNAR SECTION IN BUTLER AND OHIO COUNTIES, KENTUCKY (COUNTY GROUP 26)

By

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