

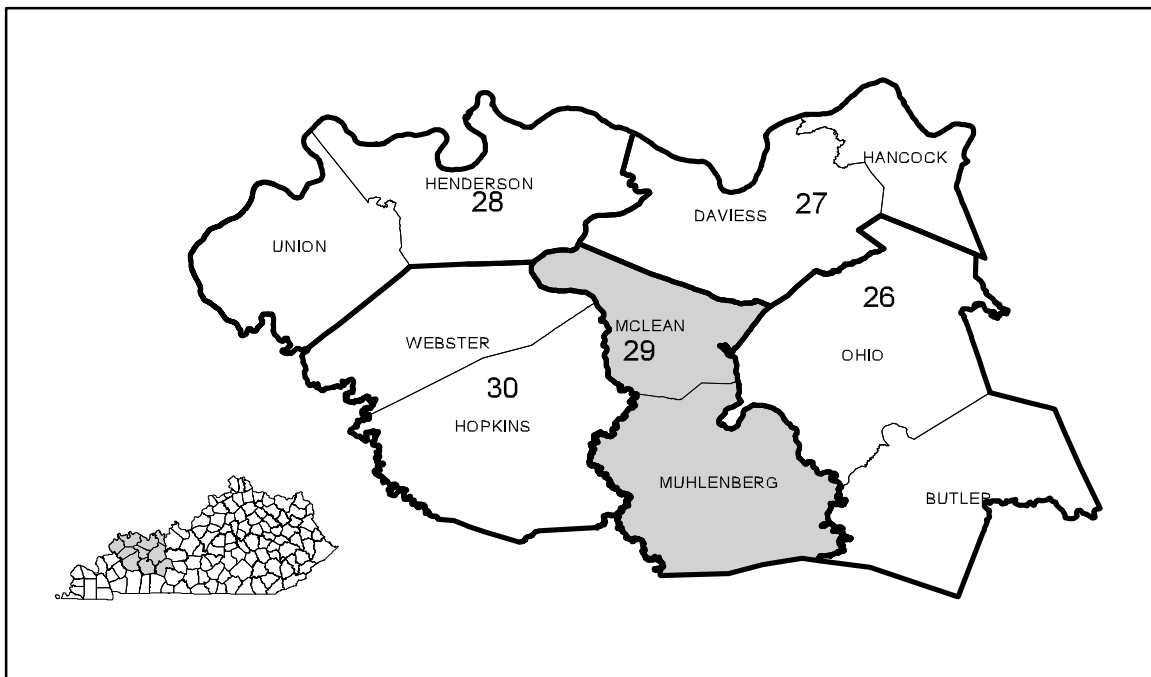
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

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

AVAILABILITY OF GROUND WATER IN MCLEAN
AND MUHLENBERG COUNTIES, KENTUCKY

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

HYDROLOGIC INVESTIGATIONS
ATLAS HA-29



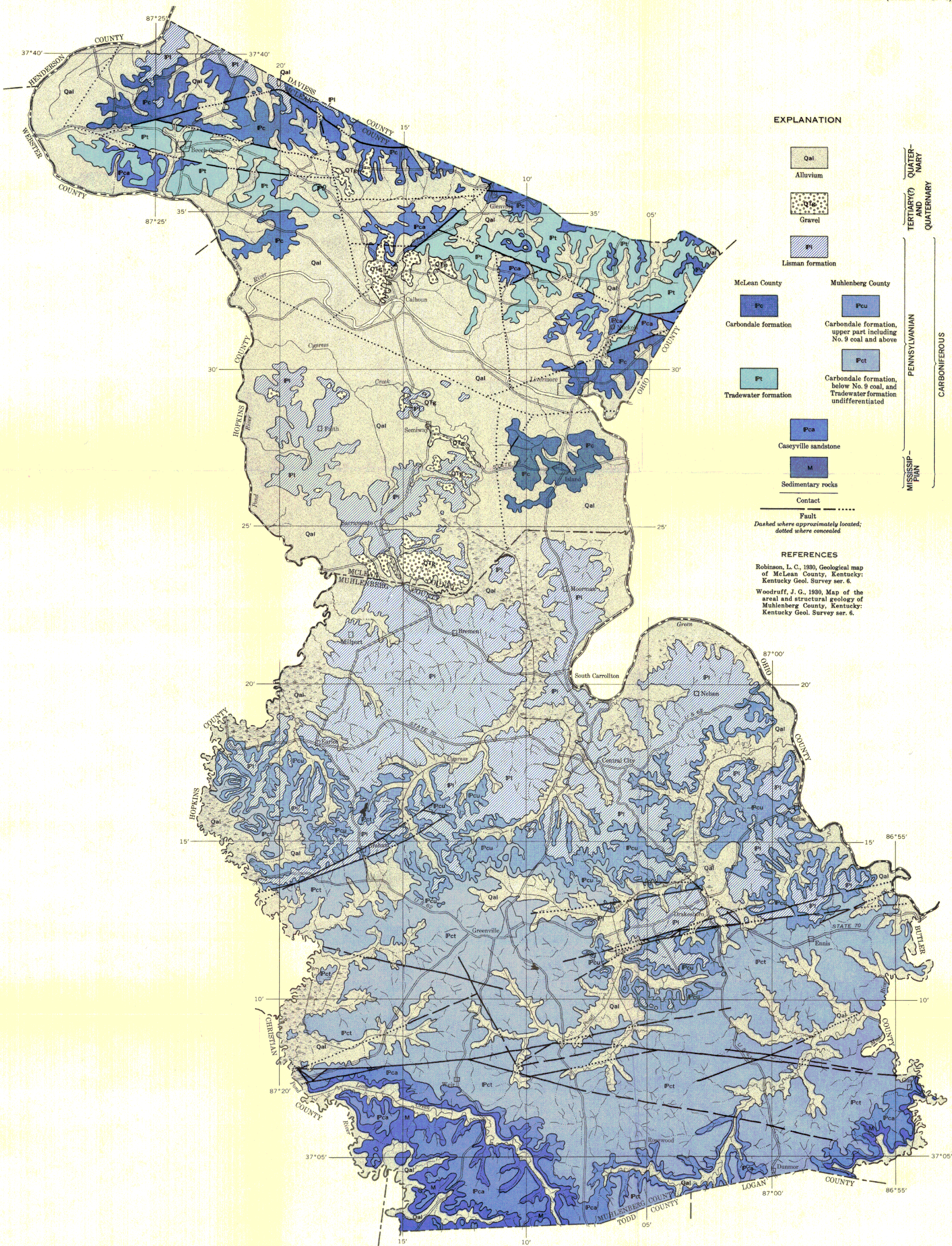
INDEX MAP OF THE WESTERN COAL FIELD REGION, KENTUCKY, SHOWING COUNTY
GROUPS AND AREA OF THIS ATLAS

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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WASHINGTON, D.C.

1962



EXPLANATION

- | | |
|--|----------------------------------|
| Qal
Alluvium | QUATERNARY |
| Qte
Gravel | |
| Pl
Lisman formation | TERTIARY(?)
AND
QUATERNARY |
| Pc
Carbondale formation | PENNSYLVANIAN |
| Pcu
Carbondale formation, upper part including No. 9 coal and above | |
| Pct
Carbondale formation, below No. 9 coal, and Tradewater formation undifferentiated | |
| Pt
Tradewater formation | CARBONIFEROUS |
| Pca
Caseyville sandstone | |
| M
Sedimentary rocks | |
| Contact | |
| Fault | |
| Dashed where approximately located;
dotted where concealed | |

REFERENCES

Robinson, L. C., 1930, Geological map of McLean County, Kentucky: Kentucky Geol. Survey ser. 6.

Woodruff, J. G., 1930, Map of the areal and structural geology of Muhlenberg County, Kentucky: Kentucky Geol. Survey ser. 6.

GEOLOGIC MAP OF MCLEAN AND MUHLENBERG COUNTIES, KENTUCKY (COUNTY GROUP 29)

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

SCALE 1:125 000

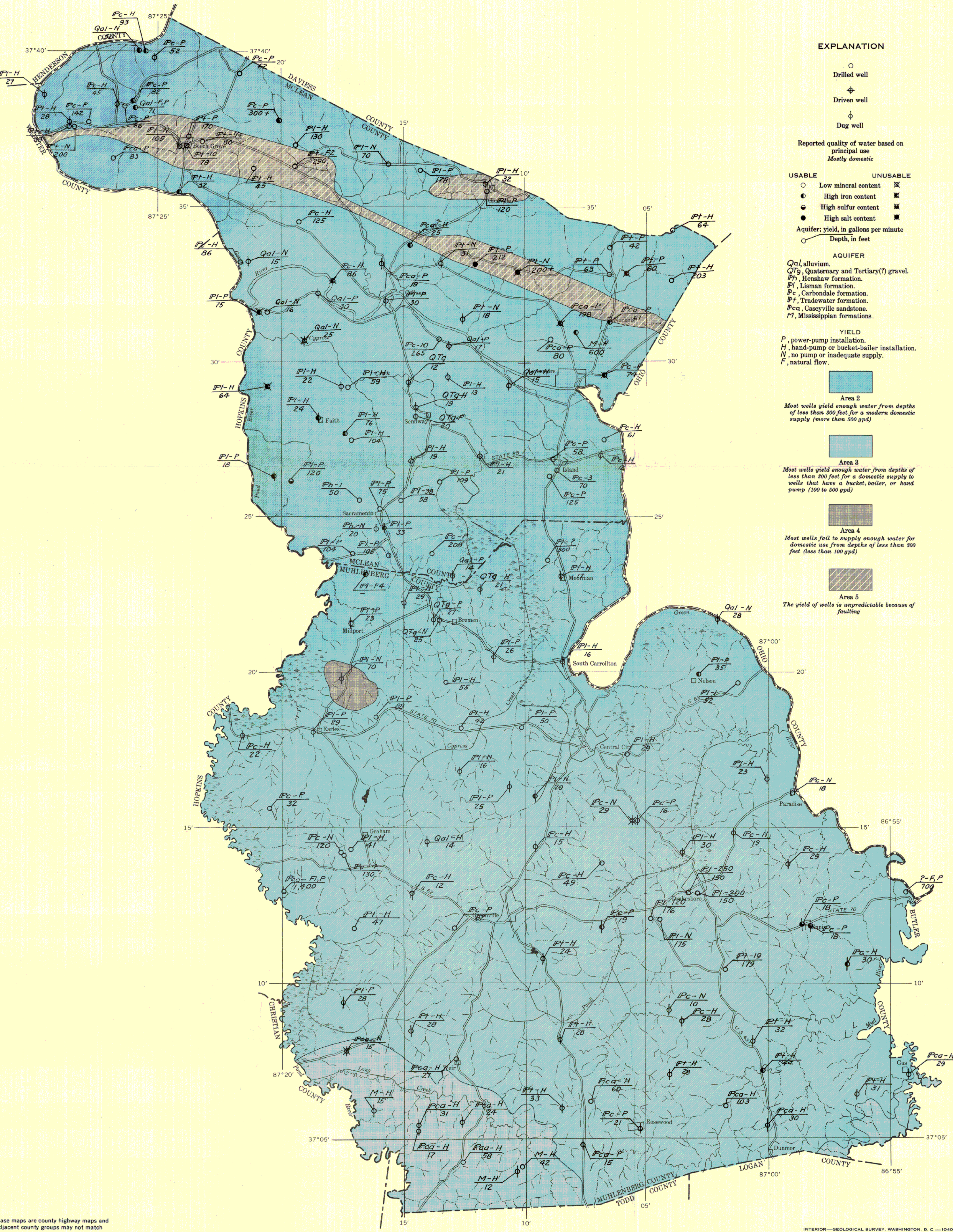
2 1 0 2 4 6 MILES

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

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—10409



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 |
| ● High salt content | |
| Aquifer: yield, in gallons per minute | |
| Depth, in feet | |

AQUIFER

- Qal, alluvium.
- QTg, Quaternary and Tertiary(?) gravel.
- IPH, Henshaw formation.
- IPi, Lisman formation.
- IPc, Carbondale formation.
- IPt, Tradewater formation.
- IPca, 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 4

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

Area 5

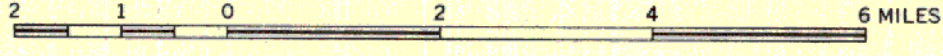
The yield of wells is unpredictable because of faulting

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

AVAILABILITY OF GROUND WATER IN MCLEAN AND MUHLENBERG COUNTIES, KENTUCKY (COUNTY GROUP 29)

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SCALE 1:125 000



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				THICKNESS (IN FEET)	SECTION	LITHOLOGY	LOCATION	HYDROLOGY
CARBONIFEROUS SYSTEMS	QUATERNARY	Pleistocene and Recent	GROUP	Union fm ¹		Loess and loam, leached and oxidized.	Forms a thin mantle over much of the area but thins to the south.	Yields practically no water to wells.
				Alluvium	0-100	Gravel, sand, silt, and clay as much as 100 feet thick along Green and Pond Rivers. Thinner and finer along tributaries. Gravel consists of chert fragments from Pliocene(?) and Pleistocene gravel.	Underlies most of flat areas bordering streams.	May yield as much as 100 gpm (gallons per minute) from gravel and sand along the Green and Pond Rivers. Yields enough water for a modern domestic supply (more than 500 gpd) to wells in valleys of the Green and Pond Rivers and their larger tributaries. Yields practically no water to wells in small valleys where the alluvium is thin and fine grained. Water is hard or very hard and may contain objectionable amounts of iron.
	TERTIARY(?) AND QUATERNARY	Pliocene(?) and Pleistocene	GROUP	Gravel		Chert gravel and sand mixed with silt and clay. Locally gravel has been reworked into alluvium.	Lies on tops and flanks of hills between elevations of 420 and 500 feet around Calhoun, Sacramento, and Bremen.	Yields enough water for a modern domestic supply to dug wells. Water generally is soft and low in dissolved solids but may contain objectionable amounts of iron.
	PENNSYLVANIAN	McLeansboro	Lisman formation	250-370		Shale, sandy shale, sandstone lenses, and thin coal and limestone beds.	Underlies northern McLean County west of Glenville to the Green River, and from the vicinity of Faith and Semiway south to Earles, Central City, and Nelson. Crops out in hills and fault blocks near Graham, Drakesboro, and Ennis.	Yields practically no water except to wells penetrating sandstone. Water is hard but otherwise suitable for domestic use.
			Madisonville limestone member					
			Anvil Rock sandstone member			Coarse- to fine-grained crossbedded friable to well-cemented quartz sandstone; grades laterally into shale. Sandstone facies present around Drakesboro, Paradise, and Nelson, and northward from Graham and South Carrollton.	Crops out in hills from northeast of Ennis to Nelson along the Green River, and westward to the Pond River from Earles and Graham. Crops out in fault blocks at Drakesboro and Graham.	Yields enough water for a modern domestic supply to wells penetrating sandstone. Yields 125 gpm to the city well at Drakesboro. Water at depth generally is soft and contains sodium bicarbonate. In areas where the Kentucky-No. 11 coal has been mined, the sandstone may be dry, or it may yield water containing iron sulfate.
			Providence limestone member			Thin-bedded to massive fossiliferous gray locally shaly limestone.		
			Carbondale formation	No. 11 coal		Fine- to medium-grained quartz sandstone grading laterally into shale.	Underlies all of northern Muhlenberg and southern McLean Counties. Crops out at the base of hills from near Ennis to Nelson along the Green River.	Yields enough water for a modern domestic supply to wells penetrating sandstone. Yields practically no water to wells penetrating only shale. Water is hard.
				No. 9 coal	280-320	Shale, sandy shale, and thin coal beds.	Crops out in Muhlenberg County from west of Graham to east of Ennis. Dips beneath the surface north of this line.	Yields practically no water to wells.
				Sebree sandstone ¹	0-100	Coarse- to medium-grained friable to well-cemented crossbedded locally shaly quartz sandstone.	Crops out from the Mud River southeast of Ennis to the Pond River southwest of Graham. Dips beneath the surface to the north.	Yields enough water for a modern domestic supply to wells penetrating sandstone. Water is hard or very hard.
				No. 7 coal		Shale, sandy shale, and thin coal and limestone beds. The Kentucky coals, Nos. 6 and 7, are absent locally.	Crops out from the Pond River southwest of Graham to the Mud River southeast of Ennis. Dips beneath the surface to the north. Crops out in fault blocks around Beech Grove, northeast of Calhoun, and near Nuckols.	Yields practically no water to wells.
				Curlew ² sandstone	0-60	Coarse- to fine-grained friable to well-cemented crossbedded locally shaly quartz sandstone. Shaly west and southwest of Greenville.	Crops out in southern Muhlenberg County and dips beneath the surface to the north. It is 200 to 400 feet beneath the surface at Greenville.	Yields enough water for a modern domestic supply to wells penetrating sandstone. Many wells yield more than 10 gpm. Water is fresh east of Greenville and contains common salt along the Muhlenberg-McLean County line.
			Tradewater formation	Curlew ³ limestone	370-550			
				Aberdeen sandstone ⁴	0-50	Shale, sandy shale, sandstone, and thin beds of coal and limestone. The Aberdeen sandstone ⁶ is present around Greenville and east of Central City.	Crops out from the Pond River west of Weir to the Mud River north of Gus, and caps the hills along the southern edge of Muhlenberg County at Dunmore and Rosewood.	Yields practically no water to wells; however, the Aberdeen sandstone will yield enough water for a modern domestic supply. Water is fresh around Greenville but contains common salt east of Central City.
				No. 1a coal				
			Caseyville sandstone	Bee Springs sandstone ⁵	150-500	Medium- to very coarse-grained crossbedded conglomeratic sandstone, intertonguing with shale. The middle part is more shaly than the rest and contains several thin beds of coal and limestone. The lower part consists of sandstone and conglomerate south and east of Drakesboro. The entire unit is shaly east of Central City. The unconformity at the base extends locally through the Menard limestone of late Chester age.	Underlies all of McLean and Muhlenberg Counties except the southern edge of Muhlenberg County. Crops out from Gus on the Mud River to west of Weir on the Pond River, along the southern fringe of Muhlenberg County, and in faulted areas southwest of Beech Grove, north of Calhoun, and around Nuckols.	Yields enough water for a modern domestic supply. Yields more than 100 gpm to wells penetrating thick sections of sandstone. Water is hard to very hard and low in dissolved solids, becoming increasingly mineralized but softer downdip to the northwest.
				Lower conglomerate member				
	MISSISSIPPIAN	Upper Mississippian		Formations of late Chester age		Limestone, shale, sandy shale, and sandstone.	Underlies all of McLean and Muhlenberg Counties and crops out along the southern edge of Muhlenberg County.	Yields small amounts of water to wells and springs in outcrop area. Yields practically no water where covered by younger rocks. Water is hard.