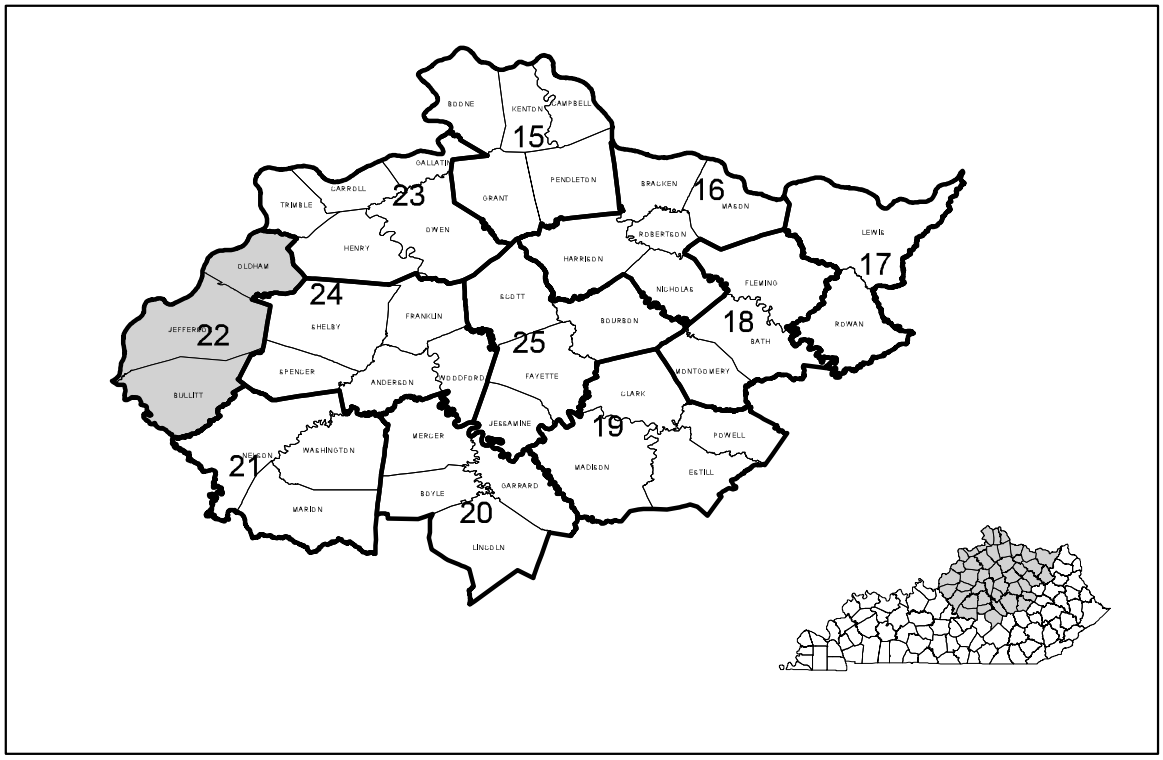
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

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

AVAILABILITY OF GROUND WATER IN BULLITT, JEFFERSON, AND OLDHAM COUNTIES, KENTUCKY

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

HYDROLOGIC INVESTIGATIONS
ATLAS HA-22



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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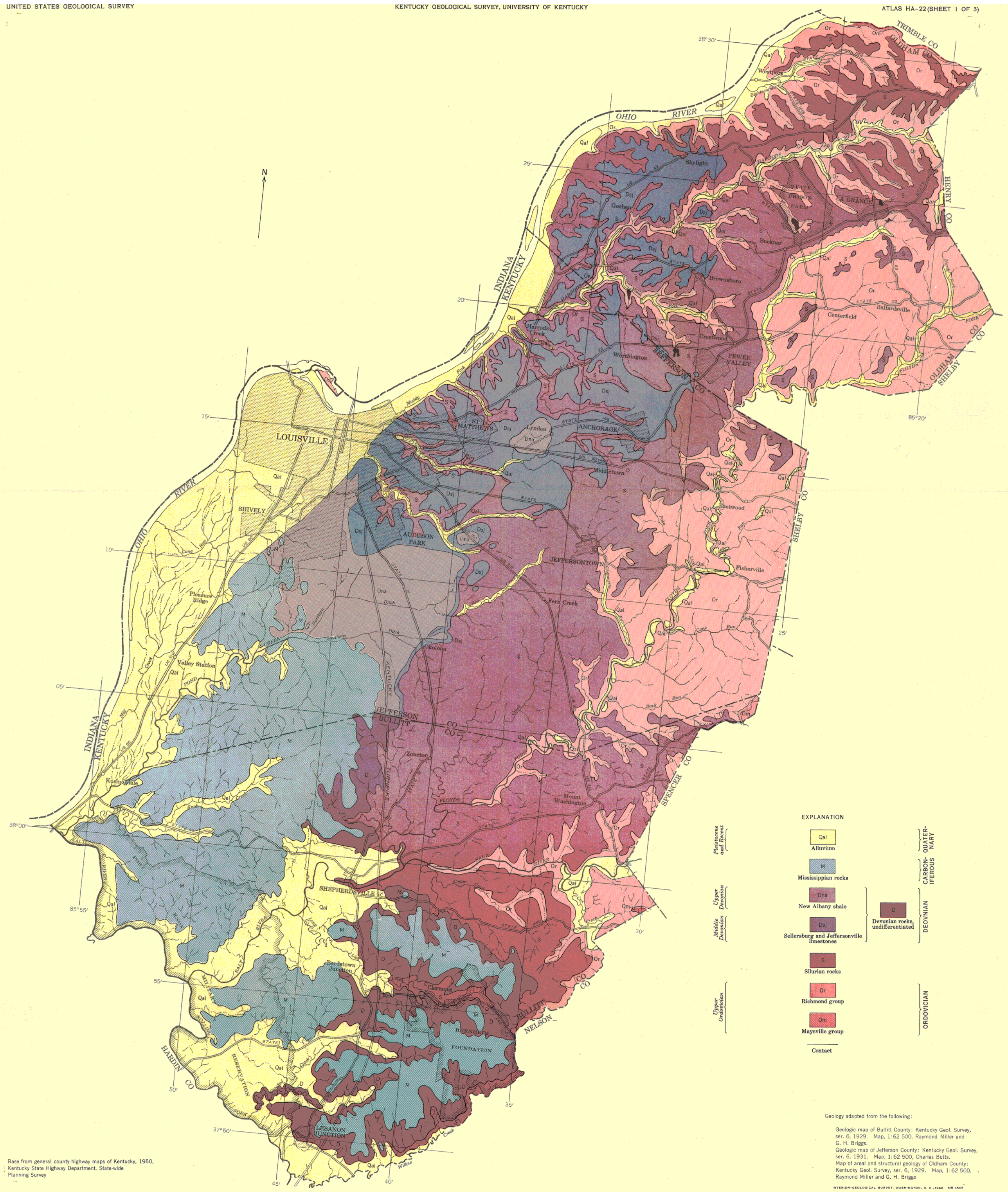

Base from general county highway maps of Kentucky, 1950, Kentucky State Highway Department, State-wide Planning Survey

EXPLANATION

Pleistocene and Recent	Qal — Alluvium	QUATERNARY
	M — Mississippian rocks	CARBONIFEROUS
Upper Devonian	Dna — New Albany shale	DEVONIAN
Middle Devonian	Dsj — Sellersburg and Jeffersonville limestones	DEVONIAN
	D — Devonian rocks, undifferentiated	DEVONIAN
	S — Silurian rocks	
Upper Ordovician	Or — Richmond group	ORDOVICIAN
	Om — Maysville group	ORDOVICIAN

Contact

Geology adapted from the following:

Geologic map of Bullitt County: Kentucky Geol. Survey, ser. 6, 1929. Map, 1:62 500, Raymond Miller and G. H. Briggs.
Geologic map of Jefferson County: Kentucky Geol. Survey, ser. 6, 1931. Map, 1:62 500, Charles Butts.
Map of areal and structural geology of Oldham County: Kentucky Geol. Survey, ser. 6, 1929. Map, 1:62 500, Raymond Miller and G. H. Briggs

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GEOLOGIC MAP OF BULLITT, JEFFERSON, AND OLDHAM COUNTIES, KENTUCKY (COUNTY GROUP 22)

Scale 1:125 000

1 0 1 2 3 4 5 6 7 8 9 10 Miles

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HYDROLOGIC INVESTIGATIONS
ATLAS HA-22 (SHEET 1 OF 3)

EXPLANATION

Area 1

Many properly constructed drilled wells in this area will produce several hundred gallons per minute from alluvial material unless bedrock is encountered at shallow depths. Maximum reported yield is 1,400 gpm. Most drilled wells will produce enough water for a domestic supply with a power pump and pressure system (more than 500 gallons a day) at depths of less than 100 feet. Water is hard or very hard but otherwise of good quality

Area 2

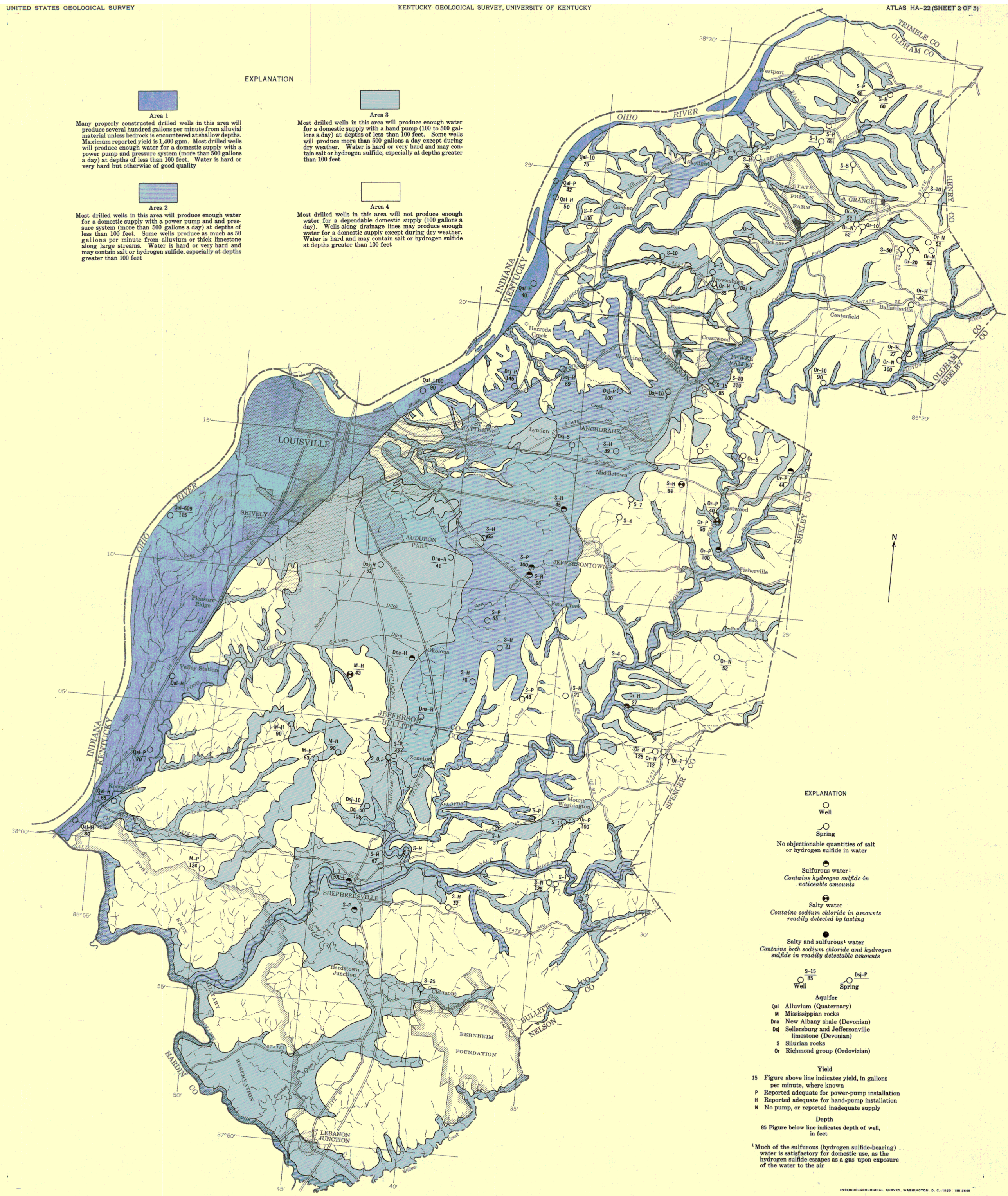
Most drilled wells in this area will produce enough water for a domestic supply with a power pump and and pressure system (more than 500 gallons a day) at depths of less than 100 feet. Some wells produce as much as 50 gallons per minute from alluvium or thick limestone along large streams. Water is hard or very hard and may contain salt or hydrogen sulfide, especially at depths greater than 100 feet

Area 3

Most drilled wells in this area will produce enough water for a domestic supply with a hand pump (100 to 500 gallons a day) at depths of less than 100 feet. Some wells will produce more than 500 gallons a day except during dry weather. Water is hard or very hard and may contain salt or hydrogen sulfide, especially at depths greater than 100 feet

Area 4

Most drilled wells in this area will not produce enough water for a dependable domestic supply (100 gallons a day). Wells along drainage lines may produce enough water for a domestic supply except during dry weather. Water is hard and may contain salt or hydrogen sulfide at depths greater than 100 feet



EXPLANATION

Well

Spring

No objectionable quantities of salt or hydrogen sulfide in water

Sulfurous water[1]
Contains hydrogen sulfide in noticeable amounts

Salty water
Contains sodium chloride in amounts readily detected by tasting

Salty and sulfurous[1] water
Contains both sodium chloride and hydrogen sulfide in readily detectable amounts

S–15 / 85 Well — Dsj–P Spring

Aquifer

- Qal Alluvium (Quaternary)
- M Mississippian rocks
- Dna New Albany shale (Devonian)
- Dsj Sellersburg and Jeffersonville limestone (Devonian)
- S Silurian rocks
- Or Richmond group (Ordovician)

Yield

- 15 Figure above line indicates yield, in gallons per minute, where known
- P Reported adequate for power-pump installation
- H Reported adequate for hand-pump installation
- N No pump, or reported inadequate supply

Depth

85 Figure below line indicates depth of well, in feet

[1] Much of the sulfurous (hydrogen sulfide-bearing) water is satisfactory for domestic use, as the hydrogen sulfide escapes as a gas upon exposure of the water to the air

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Scale 1:125 000

1 0 1 2 3 4 5 6 7 8 9 10 Miles

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HYDROLOGIC INVESTIGATIONS
ATLAS HA-22 (SHEET 2 OF 3)

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HYDROLOGIC INVESTIGATIONS
ATLAS HA-22 (SHEET 3 OF 3)

SYSTEM	SERIES	GROUP	FORMATION	THICKNESS, IN FEET	SECTION	LITHOLOGY	TOPOGRAPHY	HYDROLOGY
QUATERNARY	PLEISTOCENE AND RECENT		ALLUVIUM	0–130		Soil, clay, silt, and fine sand, 5 to 40 feet thick, overlying sand and gravel with clay lenses in the Ohio River valley. Thin deposits of clay, silt, and fine sand with scattered deposits of gravel in tributary-stream valleys.	Flood plains and terraces, as much as 6 miles wide, in the Ohio River valley; broad flat areas in the valleys of the Salt River and large tributaries.	Yields 200 to 500 gpm (gallons per minute) to most wells that penetrate the full thickness of alluvium in the Ohio Valley; yields more than 1,000 gpm to large-diameter wells; yields 100 to 500 gpd to wells in tributary-stream valleys, and may yield more than 500 gpd where gravel is present. Water is hard.
CARBONIFEROUS	UPPER MISSISSIPPIAN		SALEM LIMESTONE	50±		Fine-grained siliceous and argillaceous limestone and shale with geodes and chert.	Tops of some of the high ridges and knobs in western Bullitt and southwestern Jefferson Counties, and broad, flat valleys in some places.	Yield 100 to 500 gpd to drilled wells on broad uplands, but almost no water on narrow ridges; yield water to small springs in edges of escarpment. Water is hard but otherwise of good quality.
			WARSAW LIMESTONE	40±				
	LOWER MISSISSIPPIAN	BORDEN[1]	MULDRAUGH FORMATION[2]	75–95		Hard bedded fine-grained siliceous limestone; argillaceous and crinoidal limestone; and calcareous and argillaceous siltstone with drab to black shale, small geodes, and bands and lenses of chert.		
			FLOYDS KNOB FORMATION[1]	1–9		Brown siliceous, oolitic, or crinoidal limestone capped by streak or layer of greenish-black glauconitic silt or clay.		
			BRODHEAD FORMATION[2]	200–220		Argillaceous silty shale with calcium carbonate concretions, grading upward to massive argillaceous shaly siltstone and occasional beds of limestone. Siliceous to crinoidal limestone at top in southern Bullitt County.	Main part of the Mississippian escarpment and many outlying knobs. Resistant rocks of the Muldraugh formation cap the escarpment and larger knobs. The Brodhead formation caps and forms cliffs in the upper part of many knobs in Bullitt County. The New Providence formation underlies the lower dissected slopes of the knobs and escarpment.	Yields 100 to 500 gpd to wells in valley bottoms; may yield more than 300 gpd where thick siltstone beds occur at and below stream level; yields almost no water to wells on hills; yields water to small springs in the limestone and siltstone beds. Water from the shale is soft; from the siltstone, hard; and from the limestone, very hard. At shallow depths below stream level, water may contain salt, sulfate, or iron. The silty shale and siltstone are favorable for dug wells, common in this area. Most dug wells yield less than 500 gpd and many yield very little or go dry in late summer and early fall.
			NEW PROVIDENCE FORMATION[1]	175–205		Argillaceous shale or claystone with ferruginous calcareous concretions and lenses and ferruginous limestone patches and lenses. Fine-grained sandstone layers with interbedded shale at the top.		
DEVONIAN	UPPER DEVONIAN		NEW ALBANY SHALE	100±		Black fissile slightly calcareous carbonaceous shale, pyrite scattered throughout and in a layer at the base, and several thin sandstone and shale layers.	Broad, flat areas in southwest-central Jefferson and central Bullitt Counties; gentle lower slopes of much of the Mississippian escarpment and the knobs.	Yields 100 to 500 gpd to shallow drilled wells in broad, flat areas, but almost no water to drilled wells on hillsides; yields water to small springs and dug wells. Water is hard and from depths greater than about 50 feet may contain hydrogen sulfide and iron.
	MIDDLE DEVONIAN		SELLERSBURG LIMESTONE	0–22		Thick-bedded finely to coarsely crystalline argillaceous magnesian limestone, small black phosphatic nodules in upper part.	Rolling upland with sinkholes and underground drainage in northern Jefferson County and broad ridges in western Oldham County. The Jeffersonville thins toward the south and is not present in Bullitt County.	Yield more than 500 gpd to drilled wells in broad, flat valleys or along streams on the upland; yield water to springs. Water is hard.
			JEFFERSONVILLE LIMESTONE	0–30		Medium- to thick-bedded medium-crystalline to coarsely crystalline limestone, siliceous and cherty in part.		
SILURIAN			LOUISVILLE LIMESTONE	45–100		Thick-bedded fine-grained limestone, magnesian or siliceous in part.	Moderately rolling upland with some sinkholes and underground drainage in south-central Jefferson and north-central Bullitt Counties; broad ridges in south-central Oldham and northeastern Bullitt Counties. Cliffs and ledges in valley sides.	Yields more than 500 gpd to wells drilled in valley bottoms or along streams on broad uplands; yields as much as 50 gpm in places; yields water to springs at contact with underlying Waldron shale. Water is hard and may contain salt or hydrogen sulfide below stream level.
			WALDRON SHALE	10±		Green-gray nonfissile calcareous magnesian siliceous shale.	Slopes between limestone ledges on hillsides; erosion undermines overlying Louisville limestone.	Yields almost no water to wells or springs. Holds up water in the overlying Louisville limestone and prevents recharge to the underlying Laurel dolomite.
			LAUREL DOLOMITE	40±		Thin- to medium-bedded fine- to medium-grained dolomitic limestone.	Ledges and cliffs along streams.	Yields 100 to 500 gpd to wells where it occurs along streams, but almost no water to wells on hillsides; yields water to springs. Water is hard.
			OSGOOD FORMATION	30		Coarse lumpy or fissile calcareous and magnesian shale with prominent fine-grained limestone beds at base and about 3 feet below top.	Slopes between limestone ledges.	Yields water to small springs from limestone beds.
			BRASSFIELD LIMESTONE	4±		Medium-bedded pink to brown coarsely crystalline limestone.	Ledges on slopes and tops of small cliffs of underlying Saluda limestone.	Yields water to springs. Water is hard.
ORDOVICIAN	UPPER ORDOVICIAN	RICHMOND	SALUDA LIMESTONE	30–40		Thick-bedded sandy magnesian limestone in upper part, and coarse lumpy mudstone with thin beds of bluish-gray fine-grained limestone at base.	Cliffs along streams and ledges in hillsides; tops of some low, flat ridges.	Yields 100 to 500 gpd to wells in valley bottoms and on broad ridges, but almost no water to wells on hillsides; yields water to small springs. Water is hard.
			LIBERTY FORMATION	35–50		Coarse bluish-gray shale with thin layers of bluish-gray fine-grained limestone.	Moderately dissected upland areas; moderately steep slopes where shale predominates and less steep slopes where limestone predominates. Steep slopes along large streams and cliffs, in places. Solutional features evident where thick limestone beds underlie streams.	Yield 100 to 500 gpd to wells in large stream valleys, and more where thick limestone is present; yield almost no water to wells on hillsides and ridges; yield water to small springs. Water is hard.
			WAYNESVILLE LIMESTONE	40±		Thick-bedded green nongranular argillaceous limestone with shale partings, and 10-foot bed of green shale in lower part.		
			ARNHEIM FORMATION	80–100		Thin alternating layers of blue lumpy or rubbly, locally crossbedded, argillaceous limestone and clay shale.		
		MAYSVILLE	MC MILLAN FORMATION	20 EXP.		Argillaceous limestone and shale.	Stream valleys on east edge of area.	Yields 100 to 500 gpd. Water is hard.

[1] As used by Stockdale (1939). [2] Of Stockdale (1939).

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GENERALIZED COLUMNAR SECTION AND WATER-BEARING CHARACTER OF THE ROCKS IN BULLITT, JEFFERSON, AND OLDHAM COUNTIES, KENTUCKY (COUNTY GROUP 22)

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