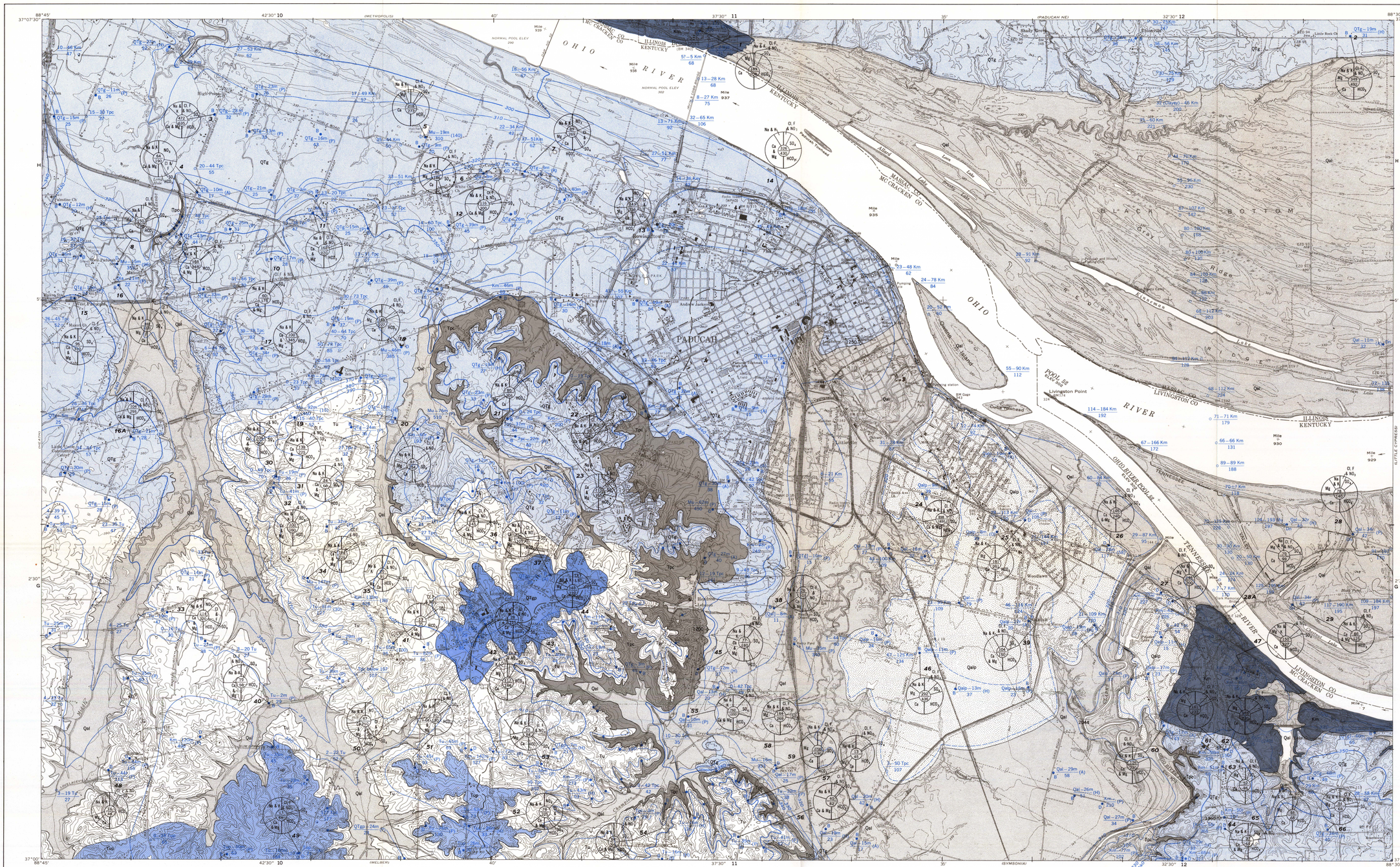
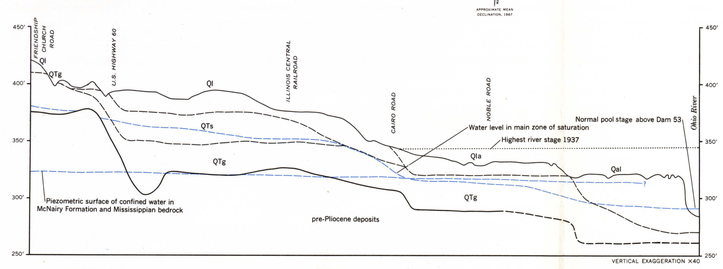
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
WILLIAM T. PECORA, DIRECTOR

PREPARED IN COOPERATION WITH
THE COMMONWEALTH OF KENTUCKY, UNIVERSITY OF KENTUCKY
KENTUCKY GEOLOGICAL SURVEY
WALLACE W. HAGEN, DIRECTOR AND STATE GEOLOGIST

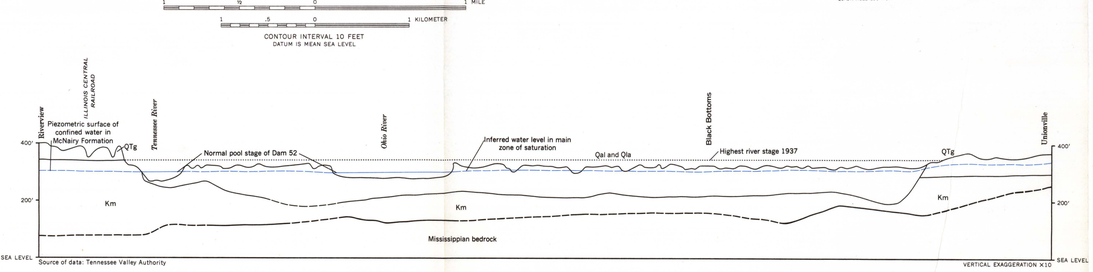
HYDROLOGIC INVESTIGATIONS
ATLAS HA-177 (SHEET 1 OF 2)



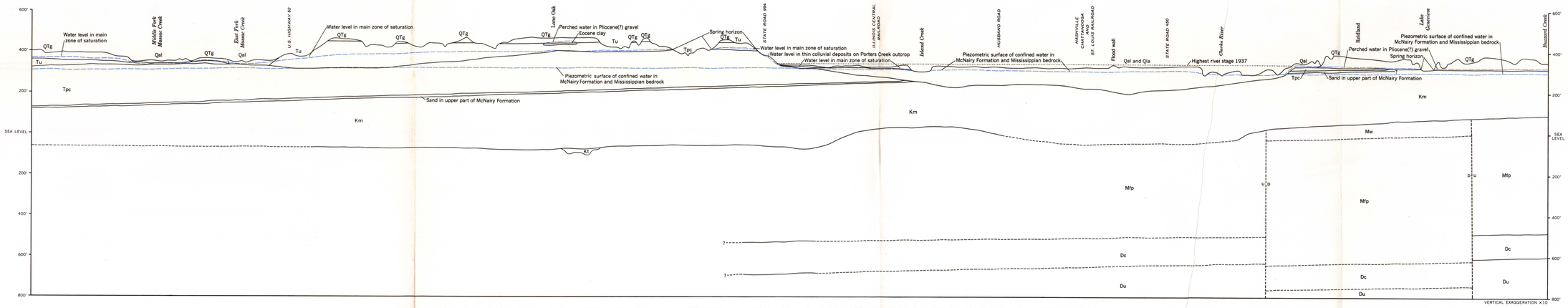
MAP SHOWING AVAILABILITY OF GROUND WATER, LOCATION OF WELLS AND SPRINGS, AND QUALITY OF WATER



GENERALIZED GEOLOGIC SECTION FROM FRIENDSHIP CHURCH ROAD ALONG OLIVET CHURCH ROAD TO THE OHIO RIVER



GENERALIZED GEOLOGIC SECTION FROM RIVERVIEW, KY., NORTHWARD TO THE TENNESSEE RIVER AND NORTH-NORTHWEST TO UNIONVILLE, ILL.



GENERALIZED GEOLOGIC SECTION ALONG EAST–SOUTHEAST–TRENDING LINE FROM ABOUT 2 MILES NORTH OF MASSAC, THROUGH LONE OAK, TO A POINT EAST OF REIDLAND

EXPLANATION

The water-availability areas on this map show the occurrence and availability of ground water in the shallowest aquifer that may yield adequate amounts of water for domestic use in each area. As considered in this report, an adequate domestic supply will deliver approximately 500 gallons per day from a well equipped with a power pump and pressure-distribution system. The shallowest aquifer is underlain by deeper aquifers whose geologic and water-bearing properties are described in the generalized columnar section

Qal

AREA 1
Water in Quaternary alluvium

Bored or dug and drilled wells in area 1 tap the main zone of saturation and supply sufficient water for domestic use except along the edge of area 1 where the alluvium is a thin gravel. Wells tapping this thin gravel may be inadequate for domestic use and must tap a deeper aquifer for an adequate supply. Water from the alluvium is generally of good quality, but iron is reported to be present in objectionable amounts. Land below 335 feet altitude is subjected to annual flooding and is not inhabited. The maximum recorded flood crest of 317.6 feet altitude (60.6 feet on Paducah gage) occurred in 1937

Qalp

AREA 2
Water in Quaternary alluvium above the main zone of saturation

Shallow bored or dug wells in area 2 tap perched water in the alluvium above alluvial clay and silt at Woodlawn and above the McNairy Formation and Porters Creek Clay near Priester Lake. The southern extent of this area is unknown, but the 320-foot water-level contour of the perched zone is used as a boundary. Most shallow wells are reported to yield sufficient water for domestic use; however, most wells are being abandoned owing to the extension of the Paducah Water Works pipelines into the area. Many shallow wells in the perched zone are reported contaminated. Except for the man-induced contamination, the water is of good quality and lower in iron content than the water from the deeper alluvial gravel. If sufficient water cannot be obtained from large-diameter bored wells, drilled wells may tap a basal gravel in the alluvium or sands of the McNairy Formation. The water level in the basal gravel is about 10 to 15 feet lower than that of the perched zone. The basal alluvial gravel may supply sufficient water for selected industries near Woodlawn. Water from the deeper gravel contains an objectionable amount of iron

QTg

AREA 3
Water in Pliocene(?) gravel

Large-diameter bored wells as deep as 61 feet tap the Pliocene(?) gravel and generally yield sufficient water for domestic and stock uses. Generally, north of U.S. Highway 60 west of Paducah yields of more than 200 gpm may be obtained from properly constructed wells. Small-diameter bored wells north of State Road 358 (Cairo Road) yield sufficient water for domestic use. Along State Road 358, gravel bars of an ancient Pleistocene lake occur between 340 and 350 feet altitude and yield sufficient water for domestic use to large-diameter bored wells. The water level is about 15 feet higher in these bars than that in the main zone of saturation. Owing to the shallowness of water table and a lack of surficial silt on top of the bars, downward percolation of surface water and fluids from domestic sewage-disposal systems may cause pollution of the ground water.

QTgp

AREA 4
Perched water in the Pliocene(?) gravel

Shallow large-diameter dug wells tap perched water in the Pliocene(?) gravel above Eocene clay in the "Lone Oak area but are generally not in use. The wells are reported to have yielded sufficient water for domestic use, but the water is reported to be contaminated from domestic sewage-disposal systems. The perched water table occurs at about 440 feet altitude. The area now is supplied by the Paducah Water Works.

Tup

AREA 5
Perched water in sand of Eocene age

Water is perched above a lignitic clay or clayey silt forming a minor spring horizon. Shallow bored or dug wells near Massac and south of St. Matthews Cemetery tap the perched zone and may yield sufficient water for domestic use. Some dug wells do not penetrate sufficient saturated thickness and are inadequate for peak-domestic demands. Water perched in the Eocene sand is soft and contains a low concentration of dissolved solids.

Tu

AREA 6
Water in sand of Eocene age

Many shallow bored or dug wells yield sufficient water for domestic use and several drilled wells south of Lone Oak yield more than 100 gpm from the basal sand of the lower Eocene formation. The maximum depth of any drilled well tapping the basal sand will be about 210 feet. Thin, irregularly occurring sand beds above the basal sand may be thick enough to supply water to drilled wells; however, large-diameter bored wells generally obtain sufficient water from these thin sands for domestic use. The water from thick basal Eocene sand is soft and contains a low concentration of dissolved solids. Water from bored wells tapping thin basal sand beds contains a high concentration of dissolved solids and is very hard. Water from drilled wells with steel casings has a high iron content. The objectionable amounts of iron may be the result of a chemical reaction between the acidic ground water and the steel well casing and pump equipment. Large concentrations of iron are rarely present in water from wells that have plastic casings and plastic plumbing.

Tpc

AREA 7
Water in Porters Creek Clay

The Porters Creek Clay is generally not water bearing, although sand beds in upper part of the formation may yield a small amount of water to bored wells. The contact of the sand with the underlying clay is marked locally by a spring horizon. The springs are low yielding and are used chiefly for watering stock, although a few may be used for domestic supplies. The water from tapping the upper sand is generally of good quality, but in some places it is very poor and cannot be used.

Km

AREA 8
Water in McNairy Formation

The McNairy Formation yields sufficient water for domestic use to most large-diameter bored wells and to drilled wells. Bored wells may tap perched water bodies within the McNairy and locally the water-bearing Pliocene(?) gravel above McNairy clay. The yields to many dug wells are reported inadequate. Drilled wells that tap the basal McNairy sand may be as deep as 220 feet. Yield of one well of the Reidland Water District is 150 gpm. Water is of good quality, but iron is present in objectionable amounts. Most of area 8 is served by the Reidland Water District, and few private wells are in use.

Area boundary

◇ 1250
Oil-test well
Figure below line is depth of test well

○
Test hole

20 – 44 Tpc / 55
- Saturated thickness of Quaternary gravel in area 1 and of Pliocene(?) gravel in area 3
- Depth to geologic unit. Where saturated thickness is given, depth is the base of the Quaternary or Pliocene(?) gravels
- Geologic unit (see aquifer symbols below)
- Depth of test hole

●D
Water well

D, *Drilled or jetted well, generally steel or plastic casing with well screen on lower end*
B, *Bored or dug well, generally 24-inch, concrete-tile casing or 6-inch vitrified-clay pipe open at the bottom*
Dn, *Driven well, generally 1¼-inch pipe with a sand point on lower end*

Mu – 86m / 535 (240)
- Aquifer (see below)
- Water level, in well, in feet below land surface; *m*, if measured, *r*, if reported
- Yield, in gallons per minute, or adequacy (see below)
- Depth of well, in feet below land surface

●
Spring

▲
Sampling site for quality of surface water

AQUIFER SYMBOLS

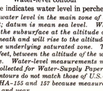
Qal	Alluvium of Quaternary age
Qalp	Perched water in alluvium of Quaternary age
Qla	Lake deposits of Quaternary age
QTg	Gravel of Pliocene(?) age
QTgp	Perched water in gravel of Pliocene(?) age
Tu	Sand of Eocene age
Tup	Perched water in sand of Eocene age
Tpc	Sand in the Porters Creek Clay of Paleocene age
Km	Sand in the McNairy Formation of Cretaceous age
Mu	Mississippian rocks, undifferentiated
[ ]	Brackets indicate probable aquifers where not definitely known

YIELD OR ADEQUACY

(165)	Gallons per minute
(P)	Well reported adequate for power pump for domestic and (or) stock supply
(H)	Well reported adequate for hand pump or bucket
(A)	Abandoned or destroyed
(O)	Observation well

350
Water-level contour
(Dashed line indicates water level in perched zone)
Shows altitude of the water level in the main zone of saturation. Contour interval 10 feet, datum is mean sea level. Where impermeable sediments occur in the subsurface at the altitude of the contour, the water is confined beneath and will rise to the altitude of the contour in wells penetrating the underlying saturated zone. The depth to water is the difference, in feet, between the altitude of the water-level contour and the land surface. Water-level measurements made in early 1964 or taken from data collected for Water-Supply Paper 1577 published in 1962. Water-level contours do not match those of U.S.Geological Survey Hydrologic Atlases HA-155 and 157 because measurements were made at a different season and year.

QUALITY



Chemical composition of dissolved solids
Figure between circular diagram and well symbol refers to analysis number in table at end of text. Figure above line at center of circle is carbonate hardness (calcium magnesium hardness, as $CaCO_3$) in ppm (parts per million); figure below line is dissolved solids in parts per million. Hardness of water is classified by the U.S. Geological Survey as follows: 0–60 ppm, soft; 61–120 ppm, moderately hard; 121–180 ppm, hard; and 181 ppm or more, very hard. Dissolved solids in partial analyses are computed from specific conductances and are only approximate values. Areas of the segments of each circle are proportional to the mineral components in the dissolved solids in the water. Percentages are computed from equivalents per million of the anions and cations. Calcium and magnesium are shown as one segment in partial analyses. Nitrate shown separately if present in amounts greater than 45 ppm.

AVAILABILITY OF GROUND WATER IN THE PADUCAH WEST AND EAST QUADRANGLES, ILLINOIS AND JACKSON PURCHASE REGION, KENTUCKY

By
T. W. Lambert

1967

HYDROLOGIC INVESTIGATIONS
ATLAS HA-177(SHEET 1 OF 2)

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1967—W87034

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