OHIO DEPARTMENT OF NATURAL RESOURCES, DIVISION OF WATER
1562 W. First Ave., Columbus 12, Ohio

OHIO WATER PLAN INVENTORY PROJECT
1958

HOCKING RIVER BASIN
(Upper portion)

UNDERGROUND WATER RESOURCES

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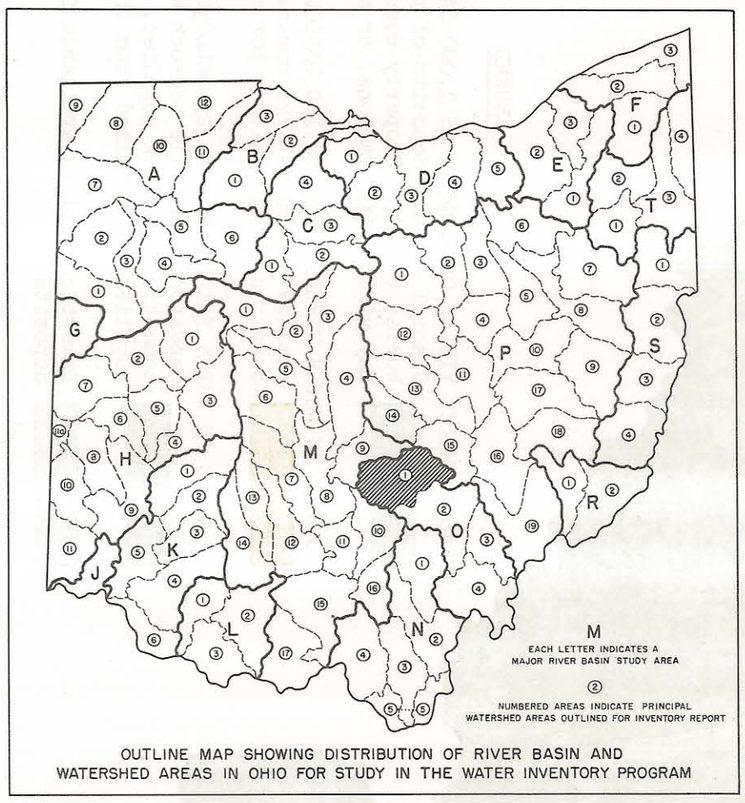
Ohio Division of Water



OUTLINE MAP SHOWING DISTRIBUTION OF RIVER BASIN AND WATERSHED AREAS IN OHIO FOR STUDY IN THE WATER INVENTORY PROGRAM

The quantity of water available to wells depends upon the types of geologic formations present in the area. Underground water is contained in the small open spaces that are present in the rocks. The number, kind and size of these openings in a formation determine its water-bearing characteristics. Therefore, wide variations in underground-water conditions are found as the geology differs from place to place.

Records of approximately 700 water wells in the upper portion of the Hocking River basin are on file at the Ohio Division of Water. Locations of 113 typical wells are indicated on the availability of underground water map.

The rocks of the upper portion of the Hocking River basin comprise two major units:

(1) sandstone, shale, limestone and coal layers which form the bedrock, and (2) unconsolidated deposits of clay, silt, sand and gravel. These unconsolidated deposits, though limited in extent, are the more important of the two major rock divisions with respect to the availability of underground-water supplies.

GENERALIZED STRATIGRAPHIC TABLE OF THE ROCKS
IN THE UPPER HOCKING BASIN

System or Series	Group or Formation	Character of Material	Water-bearing Characteristics
Quaternary — Recent		Clay, silt, sand and gravel.	Not favorable. May supply dug wells.
Quaternary — Pleistocene		Drift, thin and patchy, clay with sand and gravel lenses.	
		Glacial outwash deposits of stratified clay, silt, sand and gravel.	Large yields where well-sorted sands and gravel occur.
Pennsylvanian	Pottsville	Variable sequence of shale, clay, limestone, sandstone and coal.	Locally, good supplies obtained from thick sandstones.
Mississippian	Cuyahoga	Massive sandstone and shale layers.	Good supplies locally.
		Interbedded sandstone and shale.	Very poor for water.

As is shown on the map, all the areas of large potential yield are confined to the major stream valleys. Natural recharge in these areas occurs from precipitation on the floodplains, from underground water flowing from the bedrock at the edges of the valley, and from the river. Recharge from precipitation is small because the floodplains are covered by relatively impermeable clay and silt. Recharge from the bedrock is also limited because much of the bedrock is dense and impermeable. Thus, the streams are probably the greatest source of natural recharge.

A buried valley underlying the Hocking River in the vicinity of Lancaster contains from 120 to 200 feet of glacial outwash deposits. These deposits consist of permeable sand and gravel which may supply 1,000 gallons, or more, per minute to properly constructed large diameter wells.

The following log of a well, drilled for the City of Lancaster, shows the typical sequence of formations in this area.

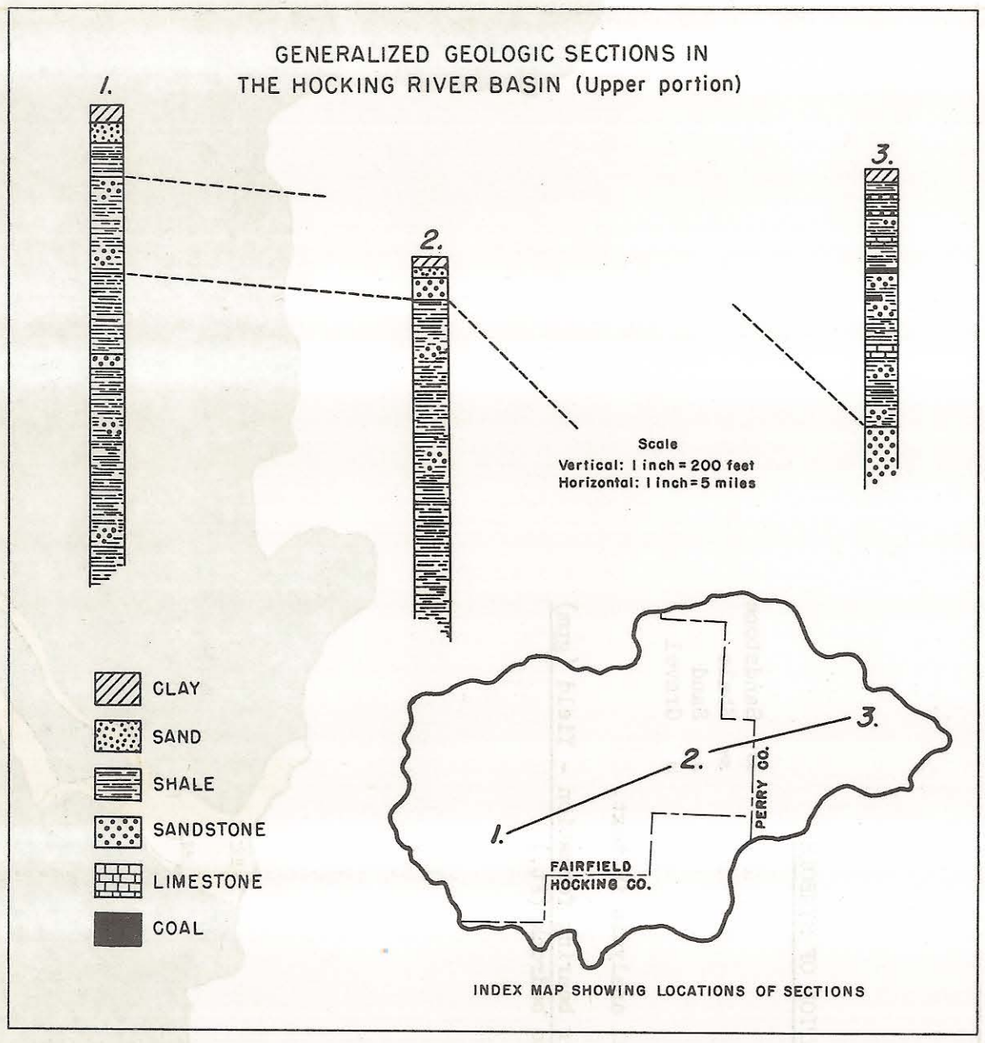
	Thickness (ft.)	Depth (ft.)
Topsoil	6	6
Clay	9	15
Sand and Gravel	5	20
Clay and Gravel	4	24
Sand and Gravel	16	40
Sand	49	89
Clay	5	94
Sand and Gravel	20	114

Water level: 14 feet below surface
Well diameter: 12 inches
Capacity: 900 gallons per minute

Shallower and less permeable outwash deposits fill the southern portion of this buried valley and tributary valleys in the eastern part of the basin. Fill in the shallow valleys ranges from 50 to 180 feet thick. The probable maximum yield from these sand and gravel deposits is 50 gallons per minute. The presence of valley fill deposits does not necessarily indicate that good water supplies are available. Portions of the present valleys of the Hocking River, Rush Creek and Little Rush Creek contain deposits of silt and sand with scattered gravel lenses. Yields from wells drilled in these areas are generally adequate for farm and domestic uses only. A deep buried valley is present in Amanda, Clear Creek and Madison townships, Fairfield County. However, large underground-water supplies are not available here. Sand and gravel lenses, which yield domestic supplies, are present beneath 30 to 60 feet of fine sand and silt. The extent of this valley has not been definitely determined. In the northern and western parts of the basin there are areas of thick drift which are not indicated by pattern on the map. These areas are made up largely of clay with poorly-sorted gravel layers. Occasionally, domestic supplies are available from the drift, but often wells must be drilled into the underlying bedrock for domestic needs.

The bedrock formations in the basin dip gently to the east, so that rocks which form the bedrock surface in the western part of the area may be more than 200 feet below the surface in the east (see geologic sections). They consist mainly of interbedded sandstone and shale layers with some limestone and coal beds. Adequate farm and domestic supplies are available from sandstones throughout the basin. Where thick, porous sandstones are present small industrial supplies may be obtained generally from depths of less than 200 feet. The sandstones are not consistent in thickness, character or in areal extent. Thus, large yields locally do not indicate extensive water-bearing sandstone deposits. Salt water occurs at depths of around 400 feet.

GENERALIZED GEOLOGIC SECTIONS IN
THE HOCKING RIVER BASIN (Upper portion)



INDEX MAP SHOWING LOCATIONS OF SECTIONS

QUALITY

Partial analyses of the water from four wells are shown in the following table. Three of the samples were taken from wells drilled into sandstone and one from a sand and gravel well.

Analysis number	C/1	C/2	C/3	C/4
Depth (ft.)	402	62	108	81
Water-bearing formation	Sandstone	Sand and Gravel	Sandstone	Sandstone
	Parts per million			
Iron (Fe)	0.1	0.1	*1.9	.04
Chloride (Cl)	2.0	2.0	141.	2.0
Dissolved solids	54.	297.	575.	54.
Total hardness	40.	*255.	*336.	21.
pH	7.3	7.3	7.4	6.9

*Would require treatment for most uses

EXPLANATION OF SYMBOLS

- • Domestic well
- ◉ Industrial well
- ◎ Municipal well
- ○ Observation well

ss Sandstone
SH Shale
s Sand
g Gravel

C/2 Chemical analysis in text.

Total depth (Ft.) - Water bearing formation - Yield (gpm)
Depth to bedrock (Ft.)

LEGEND

AREAS IN WHICH YIELDS OF AS MUCH AS 1,000 GALLONS A MINUTE CAN BE DEVELOPED

Glacial outwash deposits of permeable sand and gravel in buried valley. Properly constructed, large diameter wells may yield 1,000 gallons, or more, per minute.

AREAS IN WHICH YIELDS OF 25 TO 100 GALLONS A MINUTE CAN BE DEVELOPED

Shallow buried valleys containing sand and gravel may supply up to 50 gallons per minute.

AREAS IN WHICH YIELDS OF 5 TO 25 GALLONS A MINUTE CAN BE DEVELOPED

Sandstone and shale bedrock will generally yield ample domestic and stock supplies. Locally, small industrial supplies are obtained from thick sandstones.

Domestic supplies available from shallow valley fill deposits.

AREAS CONTAINING LITTLE OR NO GROUND WATER

Small supplies available from sand and gravel lenses beneath 30 to 60 feet of silt and fine sand.

MAP OF THE UPPER PORTION OF THE HOCKING RIVER BASIN SHOWING

AVAILABILITY OF UNDERGROUND WATER

PUBLISHED BY- STATE OF OHIO, DEPARTMENT OF NATURAL RESOURCES, DIVISION OF WATER

SCALE IN MILES 0 1 2 3 4 5