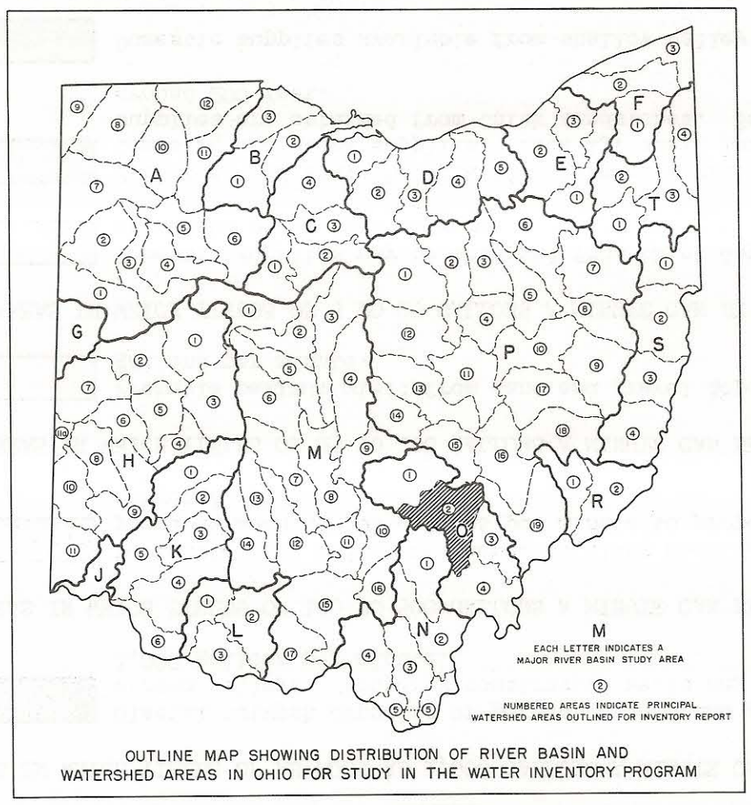
OHIO DEPARTMENT OF NATURAL RESOURCES, DIVISION OF WATER
1562 W. First Ave., Columbus 12, Ohio

OHIO WATER PLAN INVENTORY PROJECT
1958

HOCKING RIVER BASIN
(Middle portion)

UNDERGROUND WATER RESOURCES

Prepared by ALFRED C. WALKER, Geologist,
Ohio Division of Water



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

The occurrence of water beneath the earth's surface is controlled by the size, shape and number of openings in the rocks of the region, for it is in these spaces that water is contained. The characteristics of the water-bearing openings in various formations differ greatly. Thus, wide variations in ground-water conditions are found as the geology differs from place to place. Shale and clay are very dense and are poor sources of underground water. Sandstone varies from dense to rather porous, depending on the degree of cementation. Sand and gravel deposits are the least dense and the most important source of underground water.

The rocks of the middle portion of the Hocking River basin can be divided into 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 with respect to the availability of underground-water supplies.

GENERALIZED STRATIGRAPHIC TABLE OF THE ROCKS
IN THE MIDDLE 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.	
Quaternary	Pleistocene		Glacial outwash deposits of stratified clay, silt, sand and gravel.	Large yields where well-sorted sands and gravel occur.
Pennsylvanian		Allegheny	Variable sequence of shale, clay, limestone, sandstone and coal.	Sandstone will supply only small amounts.
Pennsylvanian		Pottsville		Locally, good supplies obtained from thick sandstones.
Mississippian		Cuyahoga	Massive sandstone and shale layers.	Good supplies locally.
Mississippian		Cuyahoga	Interbedded sandstone and shale.	Very poor for water.

Records of approximately 450 water wells in the middle portion of the Hocking River basin are on file at the Ohio Division of Water. Locations of 60 typical wells are indicated on the availability of underground water map.

FILE INDEX
O-2

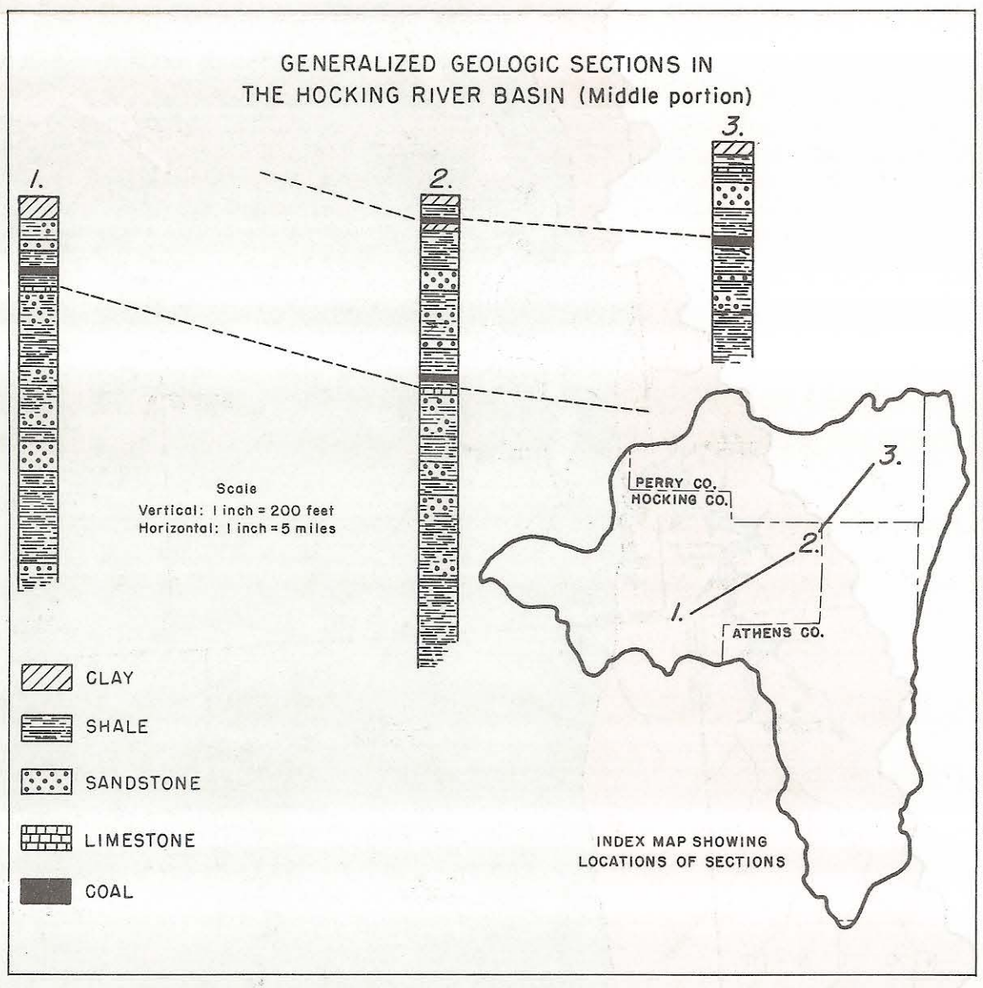
Permeable sand and gravel deposits in the Hocking River valley, although they are relatively shallow (40 to 60 feet in thickness), may supply as much as 1,000 gallons per minute to individual wells. If such supplies are to be obtained from several wells, however, wide spacing is needed between them. Otherwise, heavy pumping will cause a series of wells to interfere with each other.

Large industrial and municipal yields are available by induced infiltration from the river. Wells located along the valley margins and in portions of the Hocking River valley obtain smaller supplies. As is indicated on the map, the probable maximum yield from these sand and gravel deposits is around 50 gallons per minute, with an average yield of 15 gallons per minute. Farm and domestic supplies are obtained from shallow valley fill deposits along the lower reaches of Sunday, Monday, Oldtown and Margaret creeks. The area west of the Hocking Valley and two miles north of Athens, known as The Plains, lies in an old buried valley which has been filled with as much as 100 feet of sand and fine gravel. Underground-water supplies from the sand and gravel are limited because the area lies well above drainage and deposits which otherwise would be water bearing are drained by streams flowing into the Hocking River valley. Where thick fill is present, domestic supplies may be obtained at depths of greater than 30 feet.

Water levels in the outwash gravels of the Hocking River valley in the vicinity of Athens have been observed since 1947. It is apparent that the underground water in the gravels is directly connected with the stream. Fluctuation of underground-water levels coincides with changes in stream level. The highest underground-water levels occur in the period of January through April, at which time the water level is from 10 to 13 feet below land surface. Lowest underground-water levels occur in the period, September through December, when the water level is from 20 to 21.5 feet below land surface. The relation between stream and underground-water levels indicates that pumping sufficient to lower water levels in the gravel to a point lower than the stream would induce recharge infiltration from the stream.

Because the bedrock formations dip to the east, formations which occur near the surface in the western part of the area are well beneath the surface in the east.

Coal mining operations in the eastern third of the area have drained many of the sandstones that would otherwise be good underground-water producers. Elsewhere, adequate farm and domestic supplies are generally available from sandstones. Locally, where thick, porous sandstones are present, small industrial supplies may be obtained. The sandstones vary in thickness and character so that large yields from thick sandstones at one location do not indicate extensive water-bearing sandstones. Where shales predominate, water supplies are meager. Water wells are limited in depth by salt water which is usually reached at around 200 feet below the surface.



QUALITY

Partial analyses of the water from four wells are shown in the following table. Three of the wells obtain water from sand and gravel, and one from sandstone.

Analysis number	C/1	C/2	C/3	C/4
Depth (feet)	59	188	44	47
Water-bearing formation	Sand and Gravel	Sandstone	Sand and Gravel	Sand and Gravel
	Parts per million			
Iron (Fe)	*2.2	*1.0	*2.35	.35
Chloride (Cl)	20.0	18.0	19.0	34.0
Dissolved solids	460.0	839.0	563.0	494.0
Total hardness	*365.0	*516.0	*412.0	*317.0
pH	7.2	7.0	7.5	7.5

*Would require treatment for most uses.

AREA CONTINUED IN INSET ABOVE

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 stream valleys. Properly constructed wells may yield up to 1,000 gallons per minute.

AREAS IN WHICH YIELDS OF 100 TO 500 GALLONS A MINUTE CAN BE DEVELOPED

Permeable sand and gravel deposits along Hocking River may yield as much as 500 gallons per minute to properly constructed wells.

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

Probable maximum yield from sand and gravel deposits is 50 gallons per minute.

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

Domestic supplies may be obtained from thick deposits of sand at depths of 30 feet or more.

Sandstone and shale bedrock will generally yield adequate domestic and stock supplies. Locally, small industrial supplies are obtained from thick sandstones. Salt water at around 200 feet.

Domestic supplies available from shallow valley fill deposits.

AREAS IN WHICH LESS THAN 5 GALLONS A MINUTE CAN GENERALLY BE DEVELOPED

Small domestic supplies obtained from sandstone and shale bedrock. Wells drilled 100 to 150 feet likely to obtain salt water.

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.)

MAP OF THE MIDDLE 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

BASIN INDEX MAP — HOCKING RIVER INVENTORY AREA