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

OHIO WATER PLAN INVENTORY
1962

SCIOTO RIVER BASIN
(Lower portion)

UNDERGROUND WATER RESOURCES

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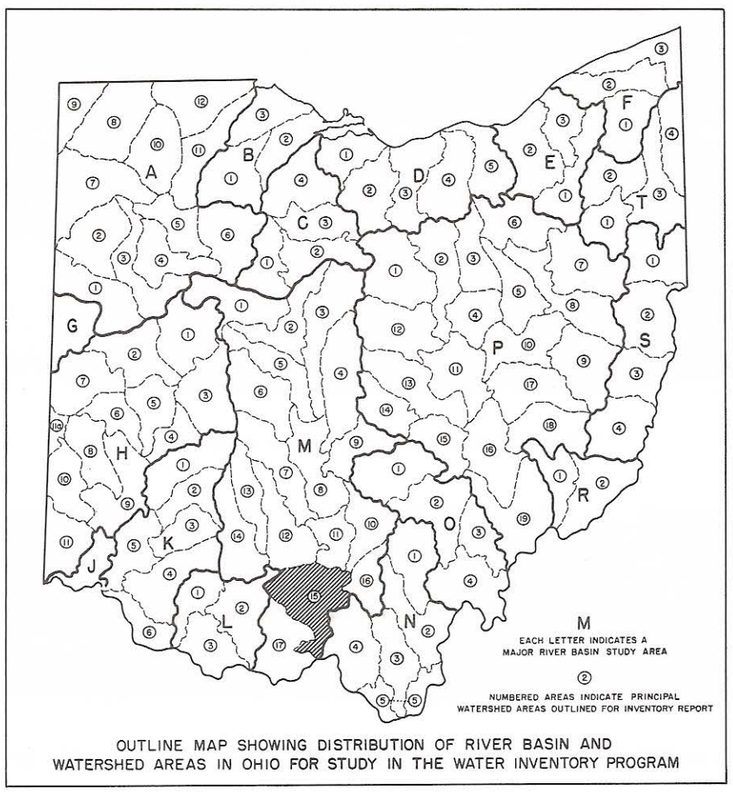
Ohio Division of Water



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

The source of ground water is the moisture that falls as rain, snow, and ice and slowly seeps into the earth's crust. Only a small part of the precipitation actually enters the underground water reservoir. Most of it falls on oceans and lakes, flows off in streams, or is returned to the atmosphere by evaporation and transpiration.

Water in usable quantities is not available everywhere. It can only be developed where the strata that will transmit water freely is present. The ability of the various earth materials to accept, store and yield water depends on the number, kind, and size of the cracks, crevices, solution channels, or pore spaces in the rocks and the regional distribution of the rocks.

The geologic formations, which occur near the surface in this part of the Lower Scioto River Basin comprise two general classes: The consolidated layers of limestone, shale, and sandstone, and the unconsolidated deposits of sand, gravel, clay and silt. Water occurs in the cracks, crevices and solution channels in limestone. Although the yield of sandstone formations depend on the size and sorting of the grains, and the degree of cementation, some sandstones are so thoroughly cemented that any water present moves through the joints and fractures, rather than between the grains. Sand and gravel aquifers store sizable quantities of water and transmit it readily. Materials, such as clay, silt, fine sand, and shale may contain as much or more water per cubic foot as

GENERALIZED STRATIGRAPHIC SEQUENCE OF THE ROCKS
IN THE LOWER SCIOTO RIVER BASIN

System or Series		Group or Formation	Character of Material	Water-bearing Characteristics
Quaternary	Recent		Clay, silt and sand deposited on the floodplains of the principal valleys.	Generally a poor source of groundwater, owing to limited thickness and absence of coarse materials.
Quaternary	Pleistocene		Interbedded and interlensing layers of sand, gravel, and clay deposited as valley train in the principal valley.	Quantity of underground water depends on character of material and source of recharge. Properly constructed wells drilled near the Scioto River yield as much as 1000, or more, gpm.
Quaternary	Pleistocene		Clay, silt and fine to medium coarse sand deposited in the quiet waters ponded in the ancient Teays valley.	Potential yields range from 5 to more than 50 gpm to properly constructed drilled wells.
Pennsylvanian		Pottsville	Thin layers of sandstone.	Not a source of water.
Mississippian		Undifferentiated	Alternating layers of shale and sandstone.	Locally wells may yield small supplies. However wells are frequently dry. Salt water reported in Berea sandstone.
Mississippian		Berea	Alternating layers of fine sandstone and siltstone.	
Devonian		Undifferentiated	Shale.	Not water-bearing.
Silurian		Bass Island	Dolomite (limestone-like rock rich in magnesium).	Potential yields of as much as 10 gpm may be developed in the western part of the basin. However, quality may deter its use.
Silurian		Niagara		

sand and gravel. However, the water is held in pores so small that it cannot be transmitted in usable quantities to wells. Therefore, the availability, quantity, and quality of ground water is controlled by the geologic conditions beneath the earth's surface. The generalized stratigraphic table briefly describes the physical and water-bearing characteristics of the principal water-yielding rocks in the Lower Scioto River Basin.

With the exception of the limestone formation in the extreme western portion of the basin, the consolidated rocks yield only meager quantities of ground water to drilled wells. With this exception, the bedrock beneath the entire basin is principally shale and siltstone, overlain and interbedded with thin layers of fine sandstone. The potential yield of wells developed in these formations is less than 2 gallons per minute, and many wells are reported to be dry. Domestic water supplies usually consist of dug or drilled wells, supplemented with larger storage facilities or cisterns.

The water-yielding limestone or dolomite formations are limited to Mifflin Township of Pike County. These carbonate formations are relatively close to the surface beneath Sunfish, Dry Bone, and Kincaid Creeks. Yields from wells drilled less than 130 feet range from less than 5 gallons per minute to as much as 10 gallons per minute. Although these wells are confined to the rather narrow floodplain adjacent to these Creeks, their potential yield is greater than wells developed in the surrounding sandstone and shale.

The shallow layers of clay, silt, sand, and some gravel deposited on the floodplains of the minor tributaries to the Scioto River have a potential yield of as much as four gallons per minute. These deposits average about 30 feet thick and in some instances, fine sand or gravel is noted above the shale bedrock. Large diameter, shallow dug wells may yield sufficient quantities for farm or domestic use.

The buried channel beneath the floodplain of the Scioto River was the principal course for drainage of meltwaters that discharged from glaciers near Chillicothe. Meltwater overloaded with debris from various glaciers deposited successive layers of sand and gravel to partially fill this valley as far south as Portsmouth. The logs of wells drilled into these deposits indicate that as much as 100 feet of unconsolidated deposits fill this valley and the principal water-yielding formation is as much as 35 feet thick. Industrial wells developed in these highly permeable deposits have proven yields in excess of 1000 gallons per minute. These large underground-water supplies are developed from wells which are freely recharged from the Scioto River by induced infiltration. The potential yield of wells developed beyond the recharge influence of the river have a potential yield of 100 to 500 gallons per minute. Greater yields are anticipated during shorter periods of pumping. The generalized cross-section in the vicinity of Piketon reveals the nature of the materials deposited in the discharge channel.

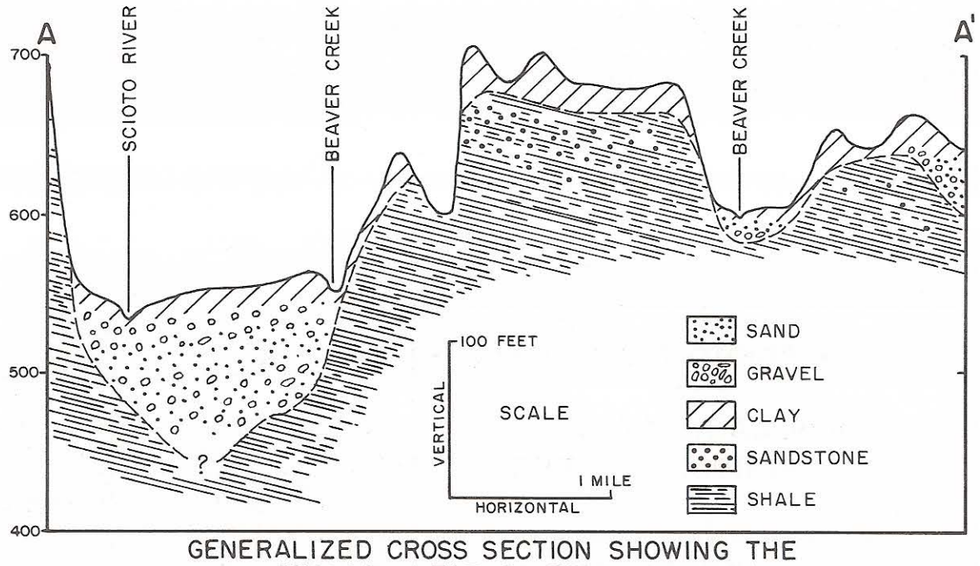
The ancestral Teays River was the principal system of drainage in Ohio prior to the glacial epoch. Remnants of this valley east of Waverly to Beaver are noted in the field and especially observed from a topographic map. This valley was partially filled with clay, silt, and fine to medium coarse sand as the natural discharge for this river to the northwest was blocked by glacial advance. The deposits which fill this valley are as much as 65 feet thick. Thin water-yielding sand and gravel deposited at approximately 20 feet may yield as much as 15 gallons per minute. However, more than 50 gallons per minute is developed from fine to coarse sand deposits in the vicinity of Beaver. Gravel packed wells, properly screened, may yield as much as 50, or more, gallons per minute.

QUALITY OF UNDERGROUND WATER

Partial analyses are shown in the following table. The samples for C-1, C-2, and C-3 were analyzed by the Ohio Department of Health. Samples for C-4, C-5, and C-6 were made by the U. S. Geological Survey, Quality of Water Branch.

Although the two samples for C-1 are located in the same well field, and are drilled to approximately the same depth, the analyses are quite dissimilar. The sample collected for C-2, the Village of Beaver, indicates extremely soft water yet a low pH and high iron content. The water from C-5 should not be used for domestic purposes.

Well Number	C-1		C-2	C-3	C-4	C-5	C-6
Depth (Ft.)	#1-67	#3-64	39	85	58	43	Spring
Water-bearing formation	Sand and gravel		Sand	Sand and gravel	Sand and gravel	Sand and shale	Limestone
	Parts per million						
Iron (Fe)	2.2	0.6	16.	2.5	1.9	2.8	.04
Chloride (Cl)	160.	8.0	15.	8.	3.8	66.	3.0
Dissolved solids	905.	415.	148.	495.	348.	2909.	117.
Total hardness	480.	336.	48.	420.	328.	1290.	119.
pH	7.55	7.7	5.8	7.4	7.2	4.10	6.8



GENERALIZED CROSS SECTION SHOWING THE GEOLOGY NEAR PIKETON, OHIO

MAP OF A PORTION OF THE LOWER SCIOTO 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

AREA CONTINUED IN INSET BELOW

HUNTINGTON · PAXTON · TWIN · FRANKLIN · PERRY · BENTON · PEEPEE · PEBBLE · JACKSON · MIFFLIN · SUNFISH · NEWTON · SEAL · BEAVER · UNION · MARION · SCIOTO · CAMP CREEK · MORGAN · JEFFERSON · RUSH · CLAY · WASHINGTON

ROSS COUNTY / PIKE COUNTY

PIKE COUNTY / SCIOTO COUNTY

Summit Hill · Nipgen · Denver · Peck · Buchanan · Morgantown · Lapperell · Latham · Byington · Arkoe · Pennyson · Bethel · Omega · Waverly · Piketon · Givens · Omega · Beaver · Dalesville · LAKE WHITE · U.S. ATOMIC ENERGY COMMISSION · Mt Joy · Sedan · Camp · Wakefield · Stringtown · Clifford · Lucasville · Candy · Sturgeon · Berlin · New Boston · PORTSMOUTH

SCIOTO RIVER · OHIO RIVER

120-SH,SS-0 5
46-SG-0 14
37-SG-10
129-UN-0 100
68-SG,SS- 18
52-SH-2 4
64-SG-1000
90-SG-750
56-SG-340
37-G-50
40-SH,SS-1 15
52-SH-1 23
60-SH-3 13
160-LS-1 18
36-G,SH-5 20
42-G
58-LS 5
85-LS 6
67-SS-1 10
30-SG 30
78-SG
68-SG-900
81-SG-900
58-SG-800
75-SH-0 28
30-SG-5
80-SH 80
50-SG-12
215-SH-1
85-SG-500
74-SG-360
75-SG-15
81-SS-3 26
55-SH-1 15
90-UN,SH-1 75
30-SG-600
70-SG
82-SS-0 10
56-SH-0 ?
35-SS-0 6
100-SS-1 8
68-G
80-SH-2 20
28-SS 2
53-UN
37-G
35-SS-3 18
56-SG
84-SH 21
71-SG
80-SH 16
42-SH 5
60-G
55-G
62-SG-15
55-SG-4
37-SG-15
43-S,SH 15
38-SG-15
28-SG-20 23
28-S,SH-5 21
76-SG,SH 26
75-SH 45
39-S-50
38-SG,SH 33
60-S,SH 54
65-S,SH 64
85-SH-1 4
49-UN
40-SS 14
70-SS-1 10
62-UN

C/1 C/2 C/3 C/4 C/5 C/6

BRUSH CREEK

BASIN INDEX MAP
SCIOTO RIVER INVENTORY AREA

EXPLANATION OF SYMBOLS

- • Domestic well
- ◉ Industrial well
- ◉ Municipal well

s Sand · g Gravel · un Clay, sand, gravel · sh Shale · ss Sandstone · ls Limestone

C/2 Chemical analysis in text.

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

AREAS IN WHICH YIELDS OF AS MUCH AS 1000, OR MORE, GALLONS PER MINUTE CAN BE DEVELOPED

Permeable deposits of sand and gravel beneath the area adjacent to the Scioto River can yield as much as 1000, or more, gallons per minute to properly constructed drilled wells.

AREAS IN WHICH YIELDS OF MORE THAN 100 GALLONS PER MINUTE CAN BE DEVELOPED

Regionally extensive, thick deposits of sand and gravel beyond the recharge influence of the Scioto River. Yields of more than 500 gallons per minute have been reported.

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

Relatively thick layers of sand deposited above the shale bedrock. Yields depend on the regional extent of the water-bearing formation and properly screened well construction.

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

Yields of 5 to 10 gallons per minute can be developed from the limestone and dolomite formations.

Deposits are essentially clay interbedded with sand, and sand and gravel. Yields seldom exceed 15 gallons per minute.

AREAS IN WHICH YIELDS OF LESS THAN 5 GALLONS PER MINUTE CAN BE DEVELOPED

Average yield of wells, developed in alternating layers of shale and sandstone, is less than 2 gallons per minute.

Thin lenses of permeable deposits may yield as much as 4 gallons per minute to large diameter, shallow dug wells.

This is a generalized map, showing the potential underground-water resources, based on data presently available. Detailed studies and exploratory drilling are needed to fully define the hydrologic characteristics of the buried valleys and bedrock aquifers.