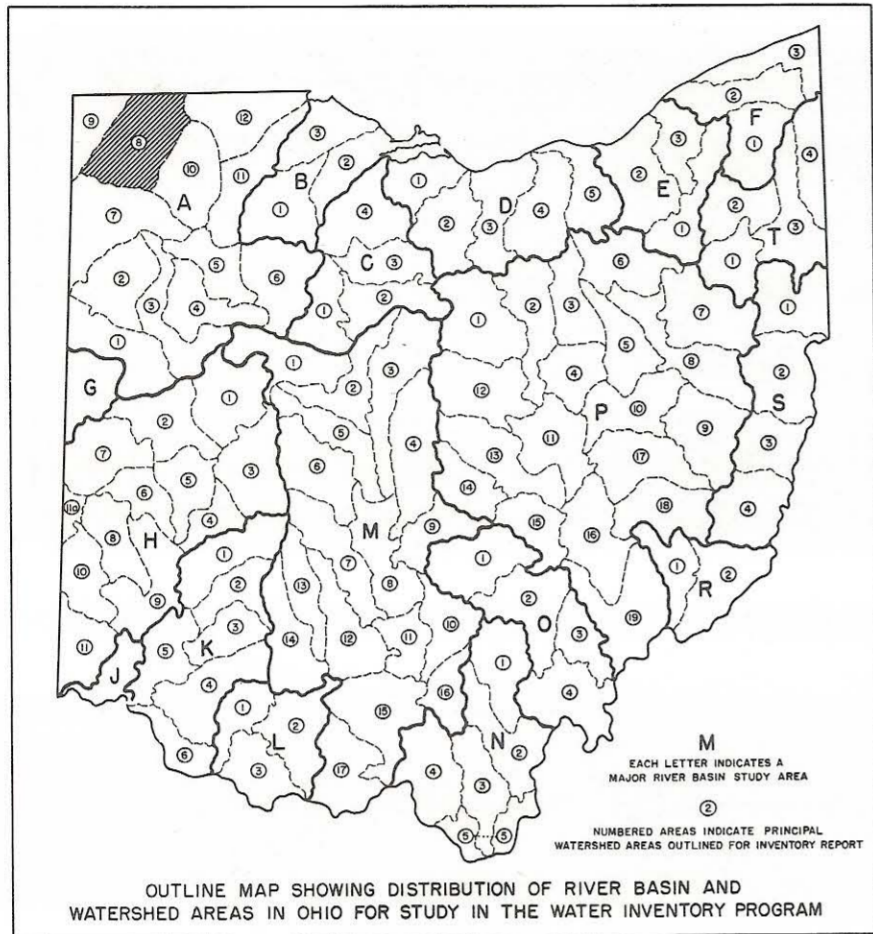


OHIO WATER PLAN INVENTORY
1959

TIFFIN RIVER BASIN

UNDERGROUND WATER RESOURCES

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from data compiled by Lawrence R. Brunstetter.



The occurrence of underground water in any region is controlled by the size, shape and number of openings in the rocks of that region for it is in these spaces that water is contained. The openings are usually interconnected and therefore permit the movement of water from one opening to another. The number, size and interconnection of the water-bearing openings in various formations differ greatly. For this reason, wide variations in underground-water conditions are found as the geology differs from place to place.

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GENERALIZED STRATIGRAPHIC SEQUENCE OF THE ROCKS
IN THE TIFFIN RIVER BASIN

System or Series	Group or Formation	Character of Material	Water-bearing Characteristics
Quaternary	Recent	Clay, silt and alluvium deposited on flood plains of the major streams.	Generally a poor source of water due to fineness of the material.
	Pleistocene	Sands and gravels interbedded with less permeable glacial material.	Quantity of ground water available depends upon the extent of sand and gravel and source of recharge.
		Till, a heterogeneous mixture of clay, sand and gravel with a predominance of clay.	Generally not a source of ground water, although in places gravel lenses within the till will yield small domestic supplies.
		Clay, silt and fine sand in glacial lakes.	Not generally a water source. Due to fineness of material, water that may be contained in sands can not be recovered.
Mississippian		Undifferentiated dark, dense shales.	Little or no water.
Devonian	Ohio	Dark, dense shale.	Small supplies in upper portion where the rock is somewhat jointed and broken.

Geologic formations in the Tiffin basin range from shale, which is a very poor source of underground water, to coarse gravel deposits, which are excellent water sources. The entire basin area is underlain by non-water bearing Mississippian and Devonian shales. The shale bedrock is covered with from 50 to over 250 feet of glacial drift, with the greatest thickness in the northwestern part of the basin. (See section AA').

Extensive layers of sand and gravel are present in the drift in the western part of the area. Because of continual recharge from the northwest, these sand and gravel deposits are good sources of underground water. Although the area is largely untested, properly constructed wells may be expected to yield 200 to 1000 gallons per minute for irrigation, industries or municipalities. Most of the present wells are domestic wells for which the maximum capacities are not known. The maximum yield obtainable from sand and gravel depends to a large extent upon the methods used in constructing and developing the wells.

Where surface elevations are lower than the area of recharge (along a belt from three to five miles wide and extending NNE-SSW across parts of Gorham and Franklin townships, Fulton County, Brady and Pulaski townships, Williams County and Farmer Township in Defiance County) many of the wells have sufficient artesian pressure to flow when they are drilled. Heavy pumping for irrigation or other large uses of water will lower water levels in the immediate vicinity. This may reduce the artesian head on nearby flowing wells and cause them to stop flowing.

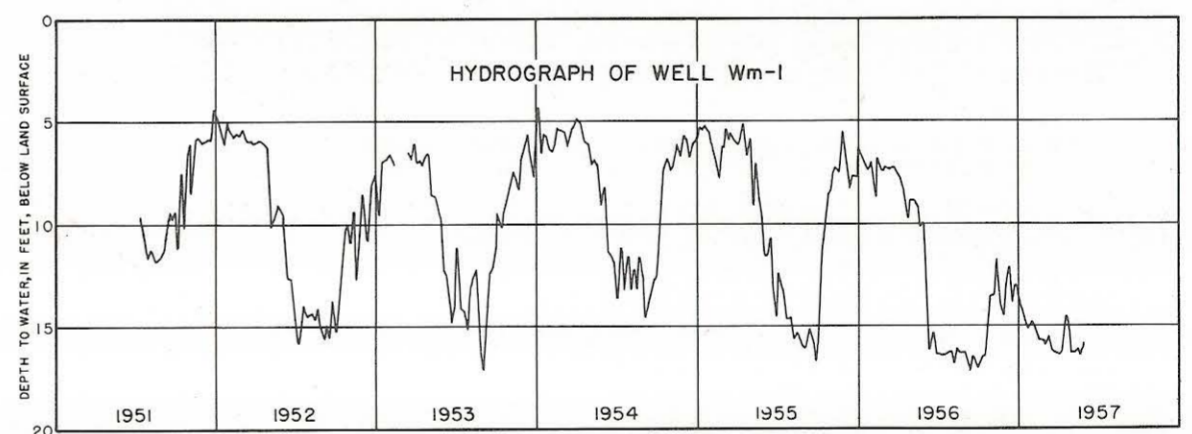
The southeastern one-third of the basin is covered with an average thickness of 100 feet of drift. Sand and gravel lenses occur locally and, in places, yield up to 50 gallons per minute. Many wells, however, do not obtain adequate supplies from the drift and are drilled into the upper weathered portion of the shale where supplies of less than 10 gallons per minute are obtained.

The following logs of two wells show the typical sequence of formations in the western (Williams County) and eastern (Henry County) parts of the Tiffin basin area.

	Williams County		Henry County	
	Thickness (ft.)	Depth (ft.)	Thickness (ft.)	Depth (ft.)
Clay	78	78	Soil & sand	4
Gravel	2	80	Clay	107
Clay	42	122	Black shale	14
Sand & Gravel	27	150		125

Records of approximately 700 water wells in the Tiffin basin are on file at the Ohio Division of Water. Locations of typical wells are indicated on the map.

Water levels in a well of the Bryan Water Department have been observed since October, 1950. Short term fluctuations shown on the hydrograph of this well are in response to local industrial and municipal pumping. The larger fluctuations are in response to normal annual recharge and discharge modified to a considerable extent by pumping in the vicinity.

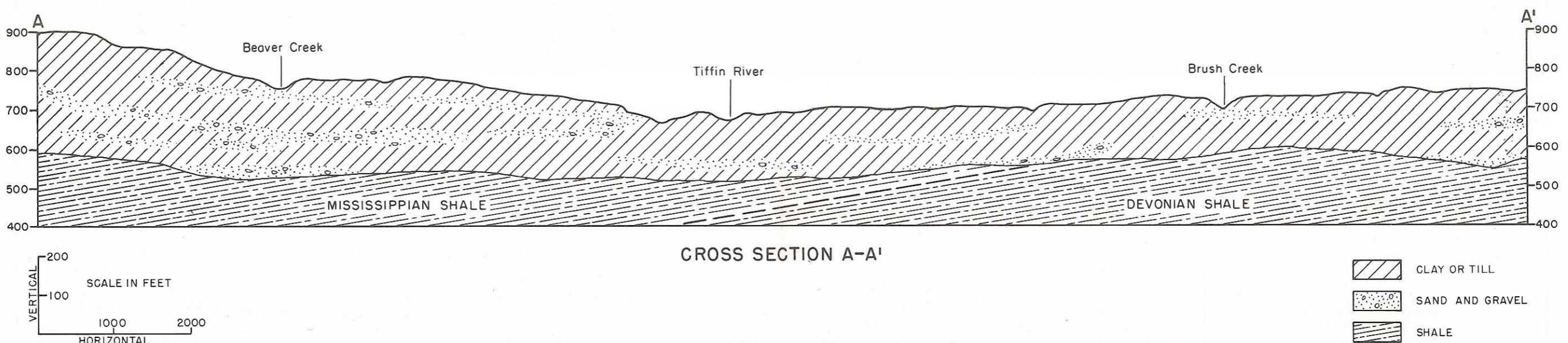


QUALITY OF WATER

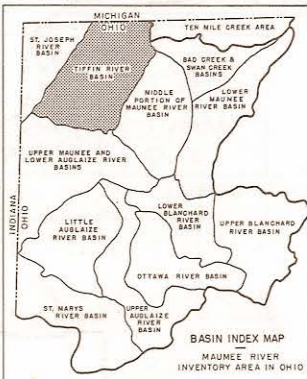
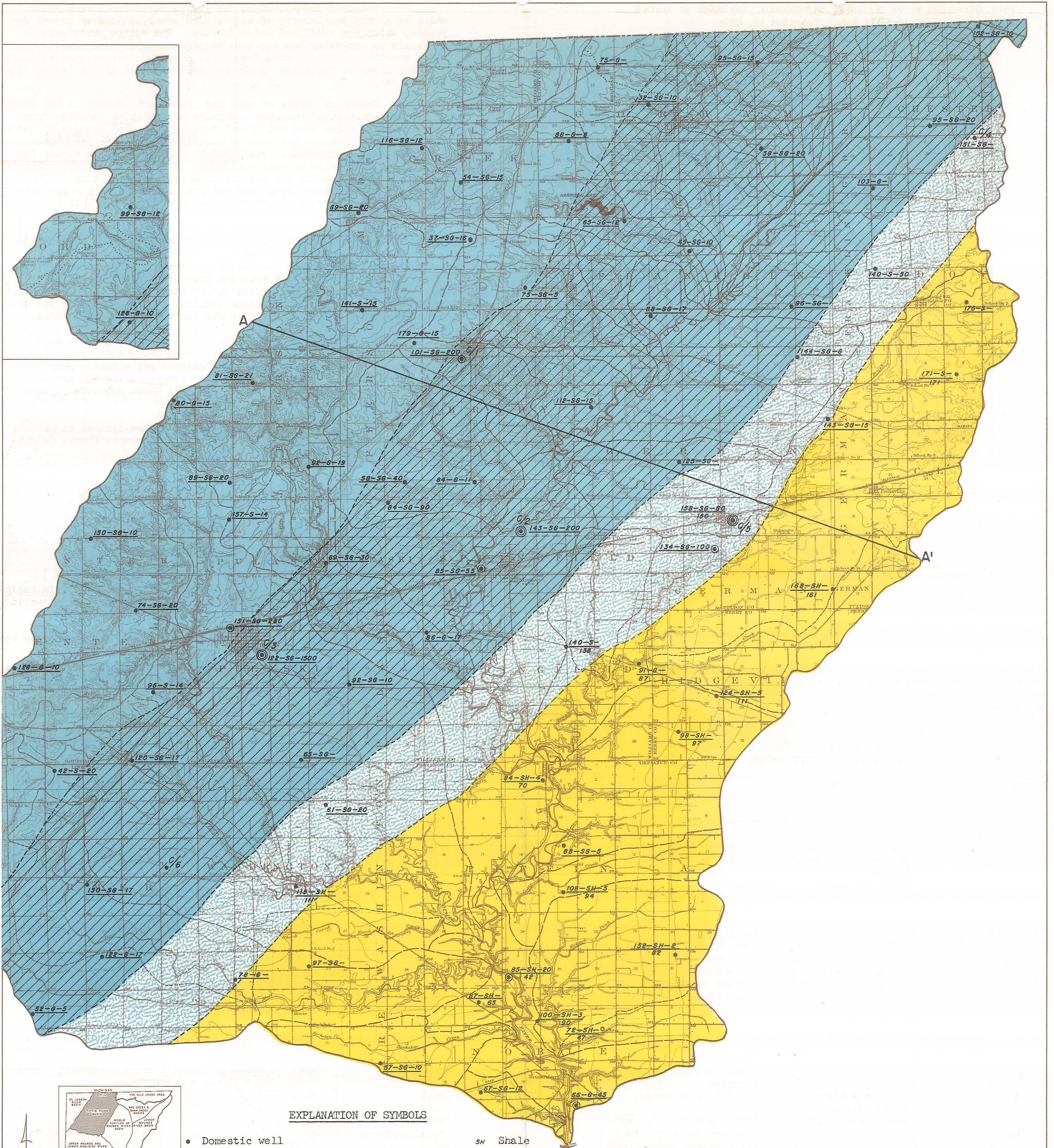
Wells drilled deep into the bedrock will obtain water that has been highly mineralized. Underground water, whether from glacial deposits or from the bedrock, is generally hard and may contain varying amounts of iron. Partial analyses of the water obtained from six wells are shown in the following table.

Well number	C-1	C-2	C-3	C-4	C-5	C-6
Depth (feet)	101	143	122	151	158	
Water-bearing formation	Gravel	Gravel	Gravel	Sand & Gravel	Gravel	Gravel
	Parts per million					
Iron	*4.0	0.6	0.8	0.15	0.12	0.25
Chloride	20.	176.	12.	313.	190.	4.5
Dissolved solids	342.	607.	385.	658.	651.	351.
Total hardness	*494.	*246.	*302.	*168.	*162.	*249.
pH	7.6	7.5	7.5	6.9	7.5	7.5

*Would require treatment for most uses.



CROSS SECTION A-A'



EXPLANATION OF SYMBOLS

- Domestic well
- ⊙ Industrial well
- ⊕ Municipal well
- SH Shale
- S Sand
- G Gravel

⊕ Chemical analysis in text.

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

LEGEND

- AREAS IN WHICH YIELDS OF MORE THAN 500 GALLONS PER MINUTE CAN BE DEVELOPED**
 Glacial drift, ranging from 100 to 250 feet thick, contains extensive sand and gravel deposits. Industrial and municipal supplies of up to 1000 gallons per minute may be obtained from the drift. Shale bedrock is a poor water source.
- Belt of flowing wells. Source and amount of water similar to above. Many wells flow when drilled.
- AREAS IN WHICH YIELDS OF 100, OR MORE GALLONS PER MINUTE CAN BE DEVELOPED**
 Industrial and municipal supplies available from sand and gravel deposits in glacial drift. Underlying shale is a poor water source.
- AREAS IN WHICH YIELDS OF MORE THAN 25 GALLONS PER MINUTE CAN BE DEVELOPED**
 Drift averages 100 feet thick and contains occasional sand and gravel lenses which yield maximum of 50 gallons per minute. Domestic needs available from drift. Small supplies only from upper portion of shale bedrock.

**MAP OF
TIFFIN RIVER BASIN
SHOWING
AVAILABILITY OF
UNDERGROUND WATER**

STATE OF OHIO
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER

Note: 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 glacial and bedrock aquifers.