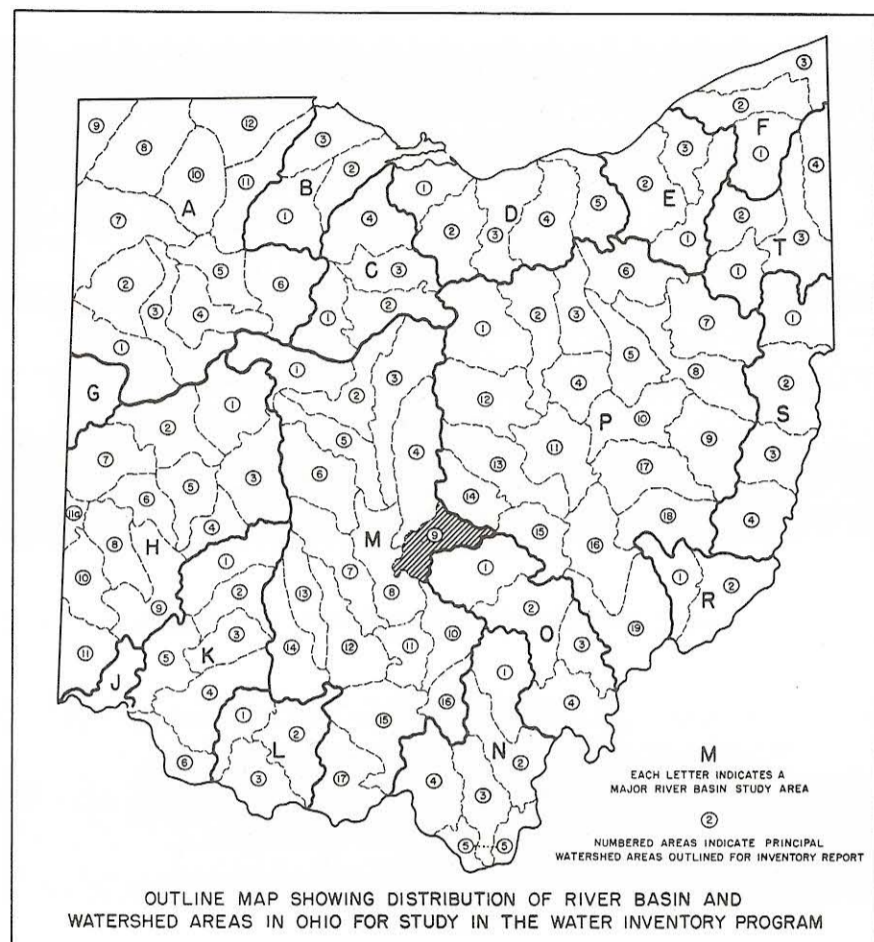


OHIO WATER PLAN INVENTORY  
1961

WALNUT CREEK BASIN

UNDERGROUND WATER RESOURCES

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The occurrence of water beneath the surface of the earth in humid regions is not unusual. Tremendous quantities of water are used each day by vegetation. However, the quantity of water available to drilled wells in sufficient quantities for man's specific requirements depends on the geology or physical characteristics of the underlying formations. Water occurs in the cracks and crevices in the rocks and in the pore spaces or openings between the individual grains or particles of rock. The size, shape, number, and arrangement of these openings govern the quantity of ground water available. Since these characteristics change from one locality to another, so also does the quantity of underground water available.

The geologic formations which occur near the surface in the Walnut Creek Basin are of sedimentary origin. They comprise two general classes (1) consolidated layers of sandstone and shale, and (2) unconsolidated deposits of clay, sand, and gravel. Sandstone formations may yield sizable quantities of water; however, the degree of cementation of the individual grains and the composition of the formation often deter the flow of water through the formation. Sandstone formations often grade from a permeable relatively pure sandstone to a non-water-bearing sandy shale or shaly sandstone from one locality to another. Shale may temporarily store sizable quantities of water; however, owing to the composition of shale, water does not readily pass through it. The glacial sand and gravel deposits may be likened to an unconsolidated sandstone. Water occurs in the pore spaces between the individual sand and gravel particles. Therefore, the permeability, thickness, and regional extent of the water-bearing formation determine the quantity of water available. The generalized stratigraphic table briefly describes the physical and water-bearing characteristics of the water-bearing formations in the Walnut Creek Basin.

The buried outwash plain in the western portion of the Walnut Creek Basin is the principal water-bearing formation for the area. Industrial wells are reported to yield as much as 450 gallons per minute from these regionally extensive, thick, permeable sand and gravel, glacial deposits. Wells developed in the permeable deposits beneath the area adjacent to Walnut Creek have a potential yield of 500 to 1000, or more, gallons per minute. Where these permeable deposits are hydraulically connected with this surface stream, pumping wells may induce recharge from Walnut Creek to the wells, providing the large industrial ground-water supplies.

Unconsolidated deposits which fill the buried valleys in the northwestern portion of Fairfield County are as much as 292 feet thick. These deposits are essentially clay interbedded with thin lenses of fine sand, and sand and gravel. Reported yields of wells developed in these deposits are as much as 10 gallons per minute, although a potential of as much as 20 gallons per minute may be expected. The east-west buried valley extending from Millersport to Canal Winchester is filled with glacial materials as much as 278 feet thick. These deposits have reported yields of as much as 100 gallons per minute. Where extensive, thick, permeable layers of sand and gravel have been located, such as wells developed at Baltimore, yields of as much as 350 gallons or more per minute are developed. Extensive test drilling and pumping tests are necessary to locate and fully define the more permeable horizons within this buried valley.

The glacial drift above the shale and sandstone bedrock in the upland areas ranges from less than 10 feet to more than 150 feet. The thicker deposits are essentially moraines, located north and south of Baltimore and Lithopolis. These deposits are basically clay interbedded with relatively thick lenses of sand and gravel. The average yield reported of wells developed in these deposits is about 12 gallons per minute. The bedrock beneath these thin to thick glacial deposits consists of alternating layers of sandstone and shale. Yields range from 5 to 30 gallons per minute from the sandstone formations and the depth of the wells range from 35 to 270 feet, depending on the location.

The bedrock which caps the hills in the northeast portion of Pickaway County is shale. Meager quantities of ground water are obtained from wells developed in these impermeable formations. Dug wells and cisterns are necessary to provide ample domestic water supplies.

The generalized cross section A-A' shows the geology beneath the Walnut Creek Basin. The buried outwash plain in the western portion of the basin is separated from the glacial drift filled valley to the east by the north-south bedrock ridge.

The map and the text for this publication were prepared from the logs of more than 2000 wells drilled in the Walnut Creek Basin. These logs are on file with the Ohio Division of Water.

QUALITY OF WATER

Partial analyses of the water from sand and gravel, and sandstone are shown in the following table. All three wells contain iron in excess of 0.3 parts per million (ppm). The water from the Pickerington well has an exceptionally high hardness. These analyses were made by the Ohio Department of Health in 1960.

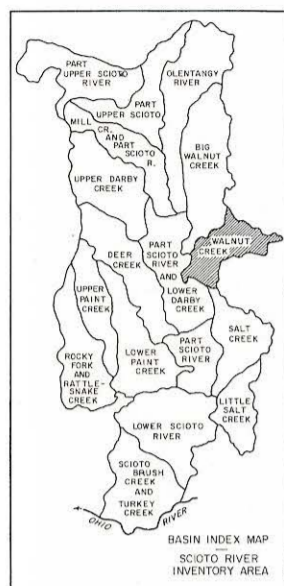
Well Number	C-1	C-2	C-3
Depth (ft.)	175	50	164
Water-bearing formation	Sand and Gravel	Sand and Gravel, Sandstone	Sandstone
	Parts per million		
Iron	0.7	0.5	1.2
Dissolved solids	366.	645.	575.
Total hardness	260.	520.	450.
pH	7.95	7.6	7.0

GENERALIZED STRATIGRAPHIC SEQUENCE OF THE ROCKS IN THE WALNUT CREEK BASIN

System or Series	Group or Formation	Character of Material	Water-bearing Characteristics
Quaternary	Recent	Clay, silt and alluvium deposited on floodplains of the principal valleys.	Extremely variable, small yields may be developed from shallow wells.
	Pleistocene	Generally clayey till interbedded with thin lenses of sand and gravel. These materials were deposited at edge of glacier as moraines.	Farm and domestic water supplies are often developed in the lenses of sand and gravel.
		Thick layers of sand and gravel deposited by glacier meltwaters as valley trains or deeply buried outwash.	Potential groundwater yields depend on thickness, permeability, and source of recharge. Where favorable conditions exist yields may exceed 1000 gallons, or more, per minute.
		Lenses of sand and gravel buried beneath thick clayey till and deposited in buried valleys.	Quantity of water available depends on thickness and regional extent of aquifer. Potential yields of as much as 100 gallons per minute may be expected.
Mississippian	Cuyahoga	Series of alternating thin-layered, sandy shale and thin-layered sandstone.	Yields are limited to presence of sandstone layers. Average yields are less than 10 gallons per minute.
	Berea	Thin-bedded sandstone with some layers of sandy shale.	Yields of less than five gallons per minute are anticipated.

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M-9

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.

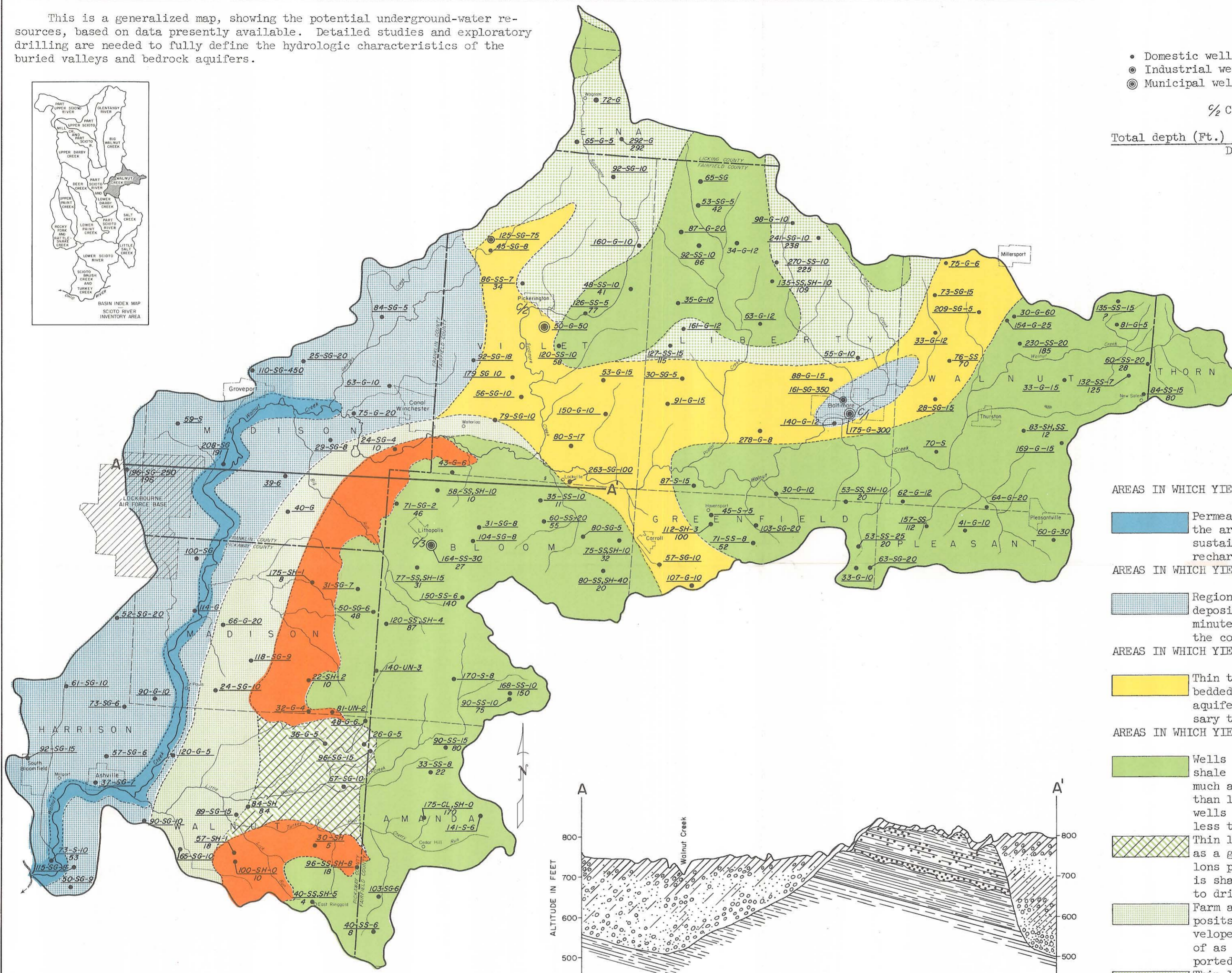


EXPLANATION OF SYMBOLS

- Domestic well
- ⊙ Industrial well
- ⊙ Municipal well
- s Sand
- g Gravel
- UN Clay, sand, gravel
- SS Sandstone
- SH Shale
- Cl Clay

½ 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 GALLONS PER MINUTE CAN BE DEVELOPED

Permeable sand and gravel deposits beneath the area adjacent to Walnut Creek. Large sustained yields are developed if wells are recharged by stream infiltration.

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

Regionally extensive permeable sand and gravel deposits may yield as much as 500 gallons per minute. Test drilling is necessary to locate the coarser materials.

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

Thin to thick lenses of sand and gravel interbedded in thick layers of clay. Isolated aquifers are noted and test drilling is necessary to locate coarser deposits.

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

Wells developed in Mississippian sandstone and shale formations have reported yields of as much as 40 gallons per minute at depths of less than 100 feet. However, the potential yield of wells developed in these bedrock formations is less than 25 gallons per minute.

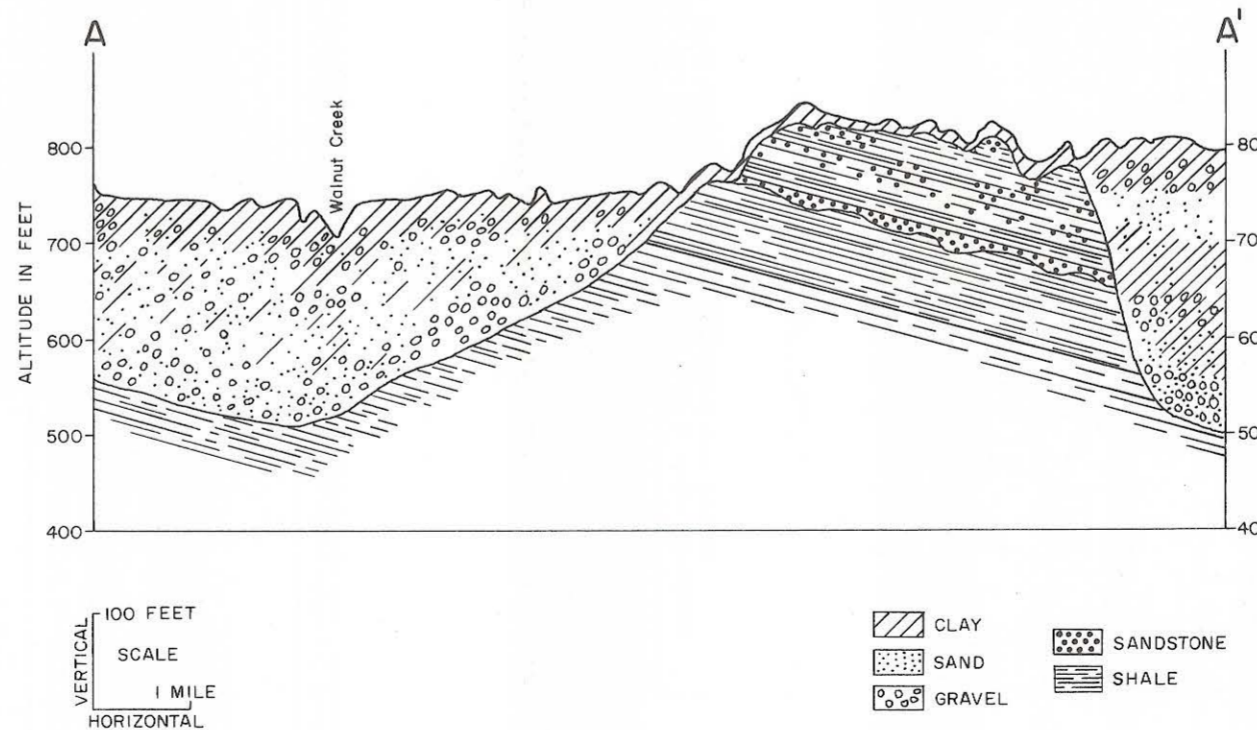
Thin lenses of sand, gravel and clay deposited as a glacial moraine yield as much as 10 gallons per minute. Bedrock beneath these deposits is shale and yields meager quantities of water to drilled wells.

Farm and domestic supplies developed in deposits of sand and gravel. Few wells are developed in sandstone-shale formations. Yields of as much as 25 gallons per minute are reported from wells developed in sand and gravel.

Thin lenses of sand and gravel interbedded in thick clay layers. Wells may be as much as 292 feet deep and yields are generally in excess of 10 gallons per minute.

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

Relatively thin glacial drift, composed essentially of clay, deposited above shale bedrock. Limited quantities of ground water are developed; dug wells and cisterns are often necessary to supplement water needs.



MAP OF THE WALNUT CREEK BASIN SHOWING AVAILABILITY OF UNDERGROUND WATER

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

GENERALIZED CROSS SECTION SHOWING THE GEOLOGY OF THE AREA