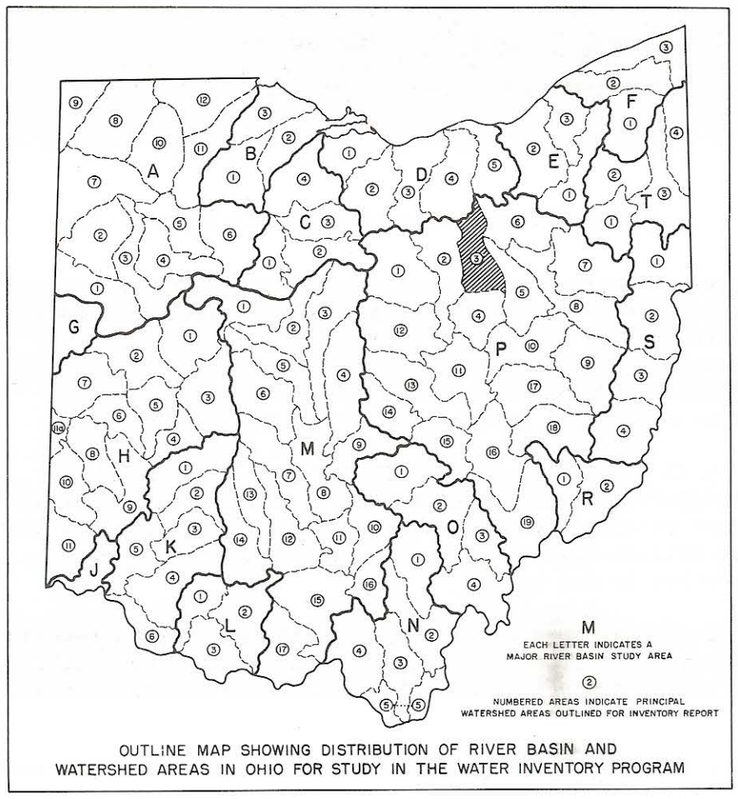
OHIO DEPARTMENT OF NATURAL RESOURCES, DIVISION OF WATER
1562 W. First Ave., Columbus 12, Ohio

OHIO WATER PLAN INVENTORY
1962

UPPER KILLBUCK CREEK BASIN

UNDERGROUND WATER RESOURCES

Prepared by HENRY L. PRÉE, JR. Geologist,
Ohio Division of Water



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

GENERALIZED STRATIGRAPHIC SEQUENCE OF THE ROCKS IN THE UPPER KILLBUCK CREEK BASIN

System or Series		Group or Formation	Character of Material	Water-bearing Characteristics
Quaternary	Recent		Alluvium, composed primarily of clay and silt, with few thin lenses of sand and gravel, deposited on flood plains of principal rivers.	Yields generally small.
Quaternary	Pleistocene		Thick deposits of sand and gravel interbedded with thin layers of till in buried valleys.	Yields range from 100 to 1000 gpm or more.
			Thin to thick morainal deposits of till containing thin lenses of sand and gravel.	Yields generally less than 15 gpm; most wells are finished in underlying sandstone and yield less than 20 gpm.
			Till, consisting predominantly of clay with few thin lenses or beds of sand and gravel of limited areal extent.	Yields generally less than 5 gpm; most wells are finished in underlying sandstone and yield less than 15 gpm.
			Thin lenses or beds of sand and gravel interbedded with thick layers of till in buried valleys.	Yields generally less than 20 gpm.
Pennsylvanian		Allegheny	Variable sequence of shale, sandstone, flint, iron ore.	Limited areal extent and thickness preclude use as source of water supply.
Pennsylvanian		Pottsville	Thin sandstone and shale, with some coal, clay, and small amounts of coarse sand.	Limited areal extent and thickness preclude use as source of water supply, except for occasional wells of small yield in southeast part of basin.
Mississippian		Cuyahoga	Fine-grained sandstones with interbedded shales. Alternating sandstone and shale.	Yields range from 5 to 25 gpm. Sandstones generally yield up to 25 gpm; thicker sandstones may yield up to 250 gpm in favorable locations; shales yield little or no water.

The development of supplies of underground water which are adequate from the standpoint of both quantity and quality depends upon the kinds of rocks in which the water occurs and the size, shape, and arrangement of the openings in the rocks. Openings occur in practically all rocks in the form of fractures and solution channels, and between individual grains or fragments of the rocks. The openings may be small and closely spaced like those in shale and clay, or relatively large like those which may exist between individual grains in sand and pebbles in gravel. The rate of flow of water through gravel and sand is generally greater than through silt and clay, or through most consolidated rocks. For this reason, the sand and gravel deposits usually yield water to wells more readily than do silt, clay, or consolidated rocks.

The consolidated rocks which occur at or near the surface in the Upper Killbuck Creek Basin include deposits of sandstones and shales and, in limited areas in the southern part of the basin, thin layers of coal interbedded with shale, sandstone, limestone, and clay, as shown in the generalized stratigraphic sequence of the rocks in the basin. The group of rocks with which the coal beds are associated occurs only in small areas, and yields only small amounts of water to wells. Beneath those rocks are interbedded shales and sandstones, with a maximum total thickness of about 500 feet, which are the chief source of underground water in the upland areas of the basin. The upper part of this group of rocks consists primarily of fine-grained sandstones with some conglomerate. Beneath these are a series of rocks including shale and a considerable amount of sandstone. The lower rocks in this group consist of alternating sandstone and shale, and show great variation vertically. The upper member changes laterally from a coarse sandstone in the eastern part of the basin to a shale in the western part of the basin. West of the valley of Killbuck Creek this member consists almost entirely of shale, with a total thickness of about 80 feet. The only break in this thick shale occurs near the base, where there is about 10 feet of fine sandstone. Although the rocks show great variation both vertically and laterally, they are generally similar in water-bearing characteristics. These rocks yield five to 25 gpm (gallons per minute) to domestic wells. Wells drilled at Apple Creek State Hospital range in depth from 145 to 295 feet. During a 10-hour test, the pumping rate on one of these 295-foot wells was 260 gpm. Although the data collected are incomplete, this test indicates that the water-bearing sandstones yield 100 to 200 gpm to properly constructed wells. The lack of data on wells with high rates of discharge makes it difficult to predict the success with which such wells could be developed in different parts of this basin.

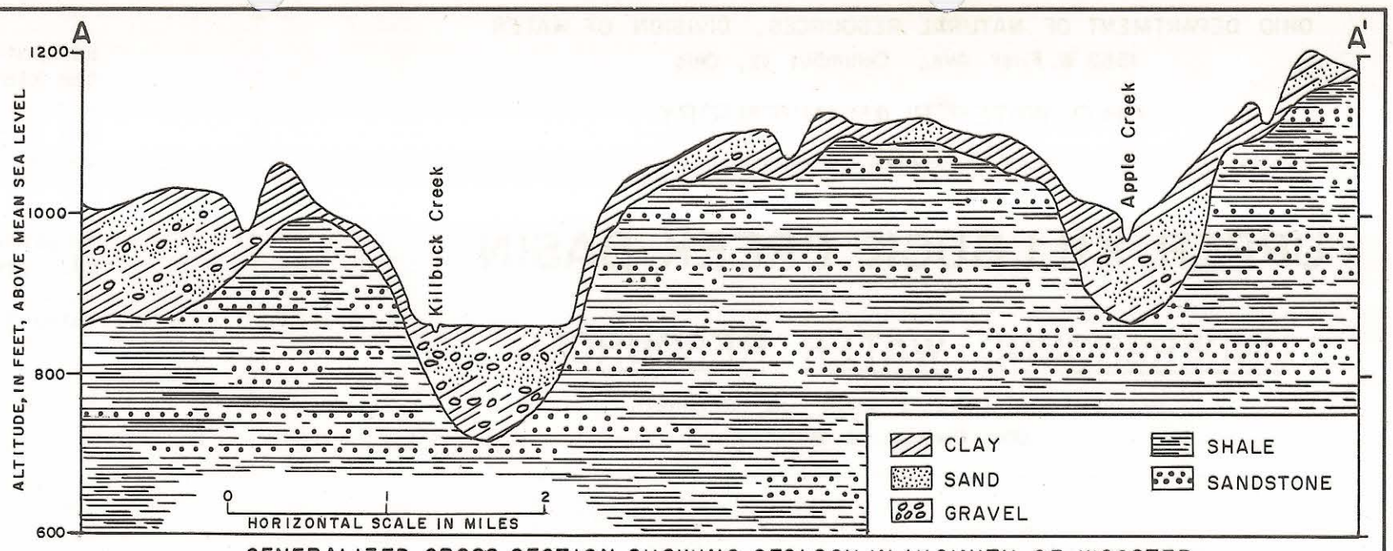
The amount of water which can be pumped through wells finished in unconsolidated deposits is variable and depends upon the location of the well and the kinds of materials through which it is drilled. The unconsolidated deposits which overlie the bedrock in the upland areas generally yield only small quantities of water to wells. The smooth-surfaced deposits of till, or ground moraine which cover the bedrock in much of the upland area are composed of an unsorted, unstratified mixture of clay, silt, sand, and coarser fragments. These deposits only occasionally contain sorted coarser materials in which wells may be developed successfully. Thin to thick glacial moraine deposits consisting of thin lenses of sand and gravel interbedded with thick layers of clayey till occur in limited areas, as shown on the map. Since neither of these types of deposits yields appreciable amounts of water to wells, most of the wells in the upland areas are drilled into the sandstone bedrock beneath.

Unconsolidated materials comprising gravel, sand, silt, and clay in different proportions have been deposited in the valleys of streams which are remnants of earlier stages of drainage development. These materials, which range in thickness up to 165 feet, are coarsest in the Killbuck Creek valley, from the southeastern corner of Chester Township to Holmesville at the southern edge of the basin. Wells in the vicinity of Wooster, which range in depth from 35 to 86 feet, have capacities ranging from 1000 to 1500 gpm with only 14 feet of drawdown. Farther south in this valley, at Holmesville, 1500 gpm are pumped from 70 feet of sand and gravel with only a 14.5-foot drawdown. Another buried valley in which large yields can be developed is the one between Lodi and Creston. Unconsolidated deposits within this valley, which are more than 100 feet thick, yield 100 to 500 gpm to wells. Several smaller valleys tributary to the larger valley contain unconsolidated deposits containing a greater proportion of fine materials, which yield five to 25 gpm to wells.

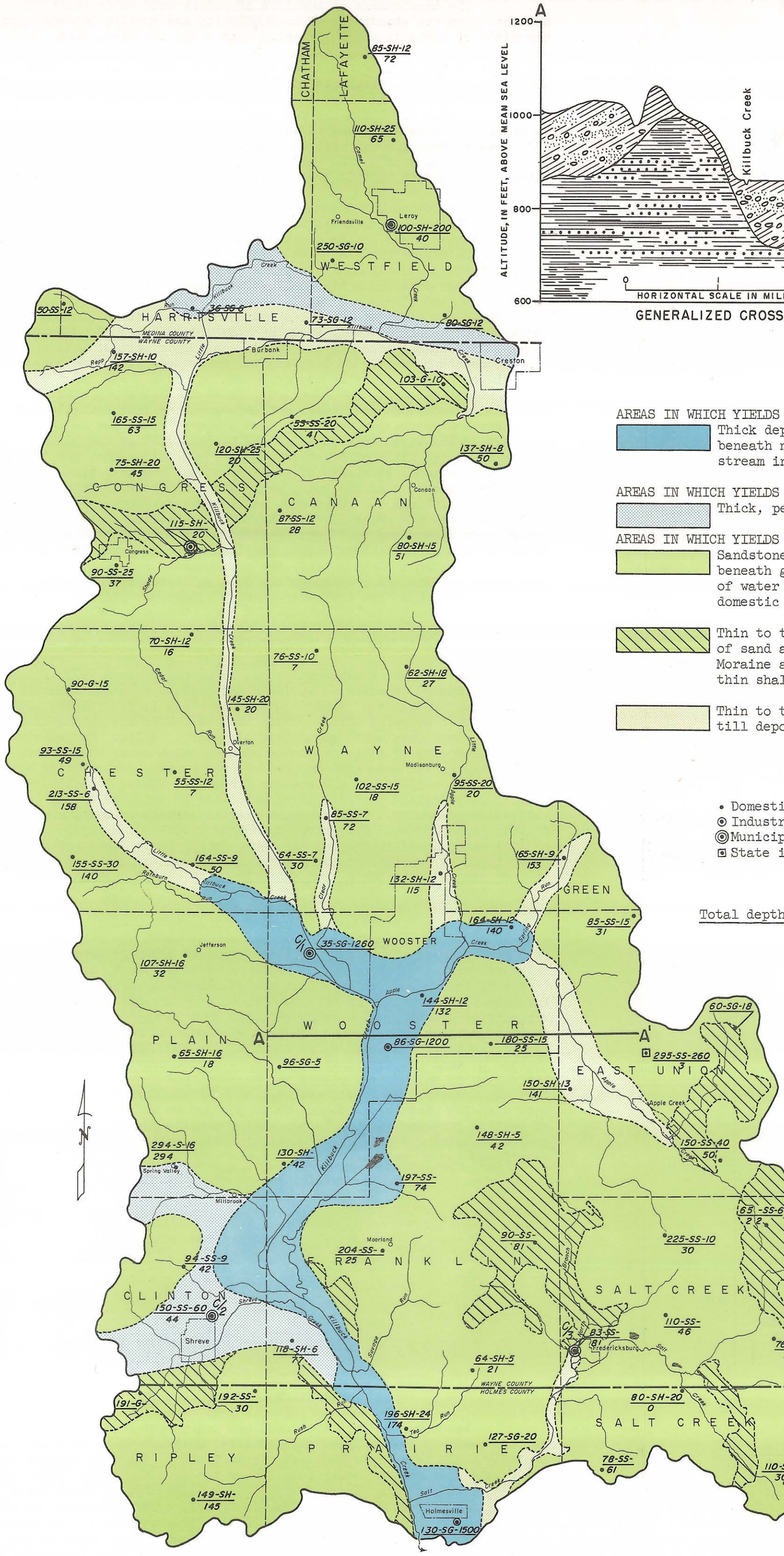
QUALITY OF UNDERGROUND WATER

Water pumped from both sand and gravel and sandstone deposits in this basin is generally of good quality, although it is very hard and probably would have to be softened for most uses. The iron content of the sample of untreated water pumped from the sand and gravel deposits in Wooster is too high for most uses. This objectionable constituent, however, can be removed by aeration, chlorination, or softening, or a combination of these processes. The amounts of dissolved solids present in the samples analyzed are below 500 parts per million, which is the limit generally considered for water for domestic and most industrial uses.

Well number	C-1	C-2	C-3
Depth (Ft.)	35	150	83
Water-bearing formation	Sand and gravel	Sandstone	Sandstone
	Parts per million		
Iron (Fe)	2.1	0.05	0.1
Chloride (Cl)	13.	12.	3.
Dissolved solids	304.	307.	245.
Total hardness	241.	258.	228.
pH	7.4	6.9	7.4



GENERALIZED CROSS SECTION SHOWING GEOLOGY IN VICINITY OF WOOSTER.



LEGEND

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

Thick deposits of permeable sand and gravel filling buried valleys beneath major perennial streams. Large yields sustained through stream infiltration.

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

Thick, permeable sand and gravel deposits within buried valleys.

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

Sandstone aquifer of variable thickness, with interbedded shale, beneath ground moraine. Ground moraine is not an important source of water for drilled wells, although it may furnish adequate domestic supplies to dug wells.

Thin to thick glacial moraine deposits consisting of thin lenses of sand and gravel interbedded with thick layers of clayey till. Moraine and till overlie thin to thick sandstones interbedded with thin shale strata.

Thin to thick lenses of sand and gravel interbedded in thick clayey till deposited in buried valleys.

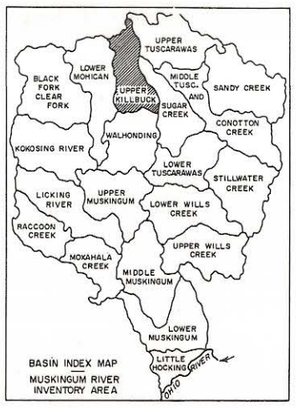
EXPLANATION OF SYMBOLS

- • Domestic well
- ◉ Industrial well
- ◎ Municipal well
- ⊡ State institution well

SH Shale
SS Sandstone
S Sand
G Gravel

C/2 Chemical analysis in text.

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



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

MAP OF THE
UPPER KILLBUCK CREEK 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