DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
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PREPARED IN COOPERATION WITH
THE COMMONWEALTH OF KENTUCKY, UNIVERSITY OF KENTUCKY
KENTUCKY GEOLOGICAL SURVEY
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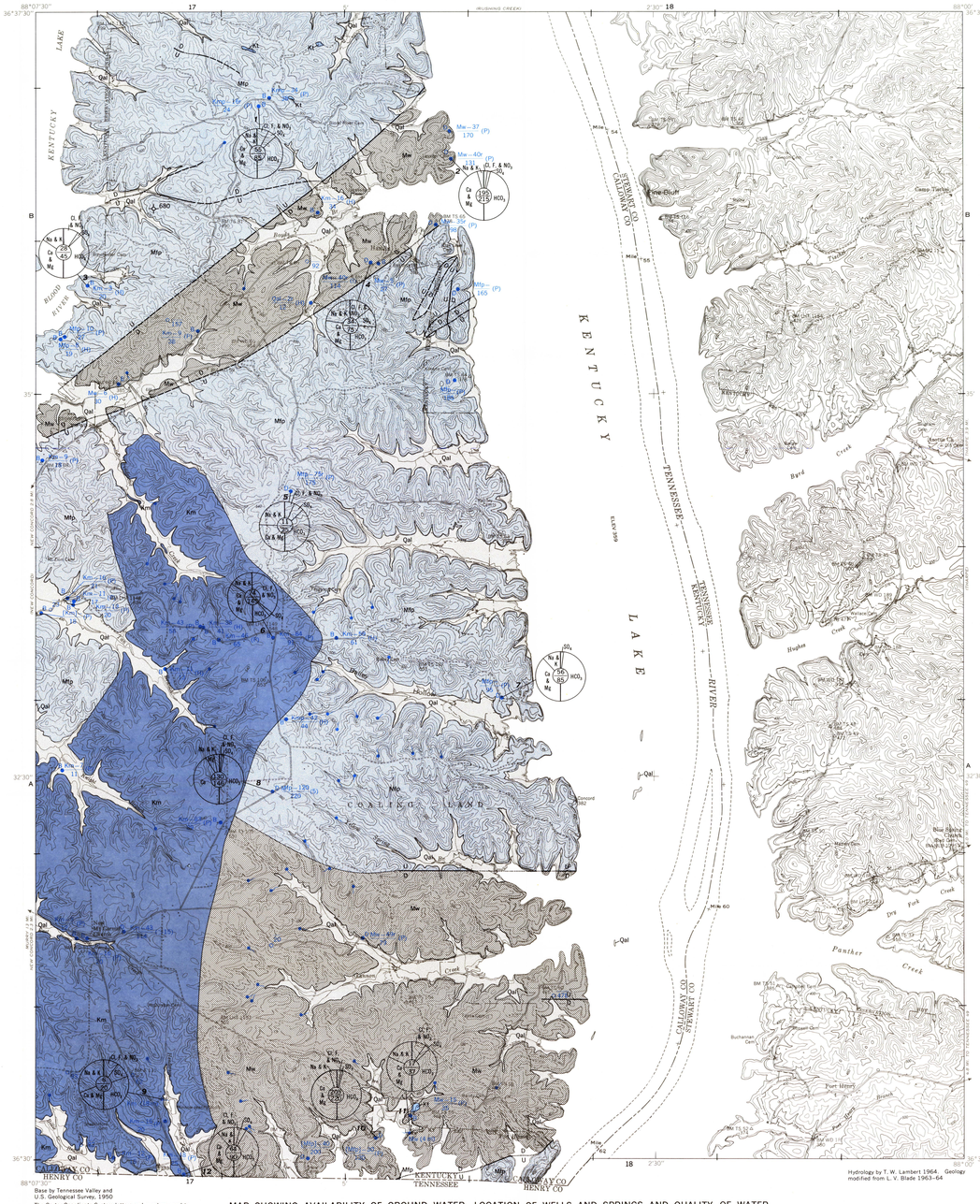
HYDROLOGIC INVESTIGATIONS
ATLAS HA-165

GENERALIZED COLUMNAR SECTION AND WATER-BEARING CHARACTER OF THE GEOLOGIC FORMATIONS

System	Series	Group	Formation	Section	Thickness, in feet	Lithology	Topography and geologic setting	Hydrology
QUATERNARY	Pleistocene and Recent		Alluvium		0-125'	Silt, clay, sand, and gravel.	Floodplain and terrace deposits occur in valleys of Tennessee and Blood Rivers and their tributaries. Thickness of alluvium beneath Kentucky Lake is about 125 feet; up to 15 feet in the tributaries of Tennessee and Blood Rivers.	Yields sufficient water for domestic use to large-diameter bored or dug wells in main tributaries. In small tributaries, perched water generally is inadequate for domestic use.
QUATERNARY	Pleistocene		Loess		0-10'	Silt and clay, unstratified.	Windblown deposits form very thin cap on upland and slopes.	Not an aquifer. When saturated, transmits water to the underlying units.
QUATERNARY / TERTIARY	Pleistocene / Pliocene(?)		Gravel and sand[1]		0-65'	Brown pebbles, cobbles, and boulders in a matrix of very fine to very coarse red to brown sand.	Terrace deposits of an old drainage system occur as a thin cover on the upland and in depressions on the eroded Paleozoic rock surface at lower elevations.	Generally not an aquifer, but small supplies for domestic use may be obtained locally from perched water. No wells are known to be finished in the Pliocene(?) gravel.
CRETACEOUS	Upper Cretaceous		McNairy Formation		0-200'+	Very fine to fine clayey micaceous sand with scattered clay lenses. Subrounded white chert pebbles and cobbles in sand matrix are commonly present near base of formation. Locally a coarse sand is present where base of formation occurs above the Mississippian formations.	Present beneath the Pliocene(?) gravel; crops out along hillsides and creeks in the upland. May be present in concealed channels in the eroded surface of the Paleozoic rocks.	Generally contains sufficient water for domestic use, although many dug wells in the upland are inadequate because of the inability to penetrate a sufficient thickness of the saturated zone. The water is perched above the Paleozoic bedrock in most of the area. Numerous small springs, which occur throughout the quadrangle generally flow more than 5 gpm (gallons per minute).
CRETACEOUS	Upper Cretaceous		Tuscaloosa Formation		0-45'+	White rounded pebbles and cobbles in tripolitic matrix. Lenses of tripolitic clay.	Crops out as remnants between the McNairy Formation and the Paleozoic bedrock. May be present in concealed channels and depressions in the Paleozoic bedrock. Commonly fills sinkholes in limestone.	Although large-diameter bored wells may obtain sufficient amounts of water for domestic use at moderate depths, it is generally a poor aquifer because of limited areal extent. Perched water above lenses of tripolitic clay forms a minor spring horizon and locally may yield sufficient water to drilled wells.
CARBONIFEROUS	Mississippian	Meramec	St. Louis Limestone[2]		50'	Leached porous limestone commonly reduced to a brown fossiliferous residual chert rubble.	All rocks below the Cretaceous are of Paleozoic age and are the bedrock of drillers. The upper surface of the Mississippian limestones is deeply weathered into a chert rubble which consists chiefly of angular chert blocks in a matrix of tripolitic sandy clay.	Yields sufficient water for domestic use throughout the area. Probably will yield large quantities of ground water for industrial and public supplies from residual chert rubble and a lesser amount from solution openings in limestone. Yields in excess of 100 gpm may be obtained from the chert rubble. Water in the rubble moves from areas of pinnacles of limestone toward collapse structures (areas of thick deposits of chert rubble formed by solutional collapse along former drainage channels and zones of faulting). Thus, areas of collapse are important sources of large supplies of ground water. For example, a well at the Four Rivers Scout Reservation in the Fairdealing quadrangle penetrated 291 feet of chert rubble about 1,000 feet south of a fault and has a reported yield of 65 gpm.
CARBONIFEROUS	Mississippian	Meramec	Warsaw Limestone		170'+	Gray coarsely crystalline limestone that contains nodules of gray chert.	The Paleozoic rocks are consolidated marine deposits. The surface of the Paleozoic rock has been reduced to a residual chert rubble by pre-Cretaceous weathering. Pinnacles of limestone project up through the rubble. The rocks underlie the entire quadrangle and crop out locally in stream valleys. Large areas of limestone occur in this quadrangle as compared to the adjacent quadrangles to the north.	Yields in excess of 100 gpm may be obtained from the chert rubble. Water in the rubble moves from areas of pinnacles of limestone toward collapse structures (areas of thick deposits of chert rubble formed by solutional collapse along former drainage channels and zones of faulting). Thus, areas of collapse are important sources of large supplies of ground water. For example, a well at the Four Rivers Scout Reservation in the Fairdealing quadrangle penetrated 291 feet of chert rubble about 1,000 feet south of a fault and has a reported yield of 65 gpm. Yields from limestone formations of Mississippian age are sufficient for small industrial and public-supply uses, especially in areas where openings along joints and bedding planes are enlarged by solution. In general, the solution openings are better developed in the Warsaw Limestone than in the limestone of the Fort Payne Formation. At depth, openings along joints and bedding planes are less likely to be developed and may not yield sufficient water for domestic supplies. However, some deep wells tapping reeflike deposits in the Fort Payne Formation in adjacent quadrangles yield more than 30 gpm. Water from the chert rubble is soft and low in dissolved solids, while that from the limestone is hard and high in dissolved solids. In general, water from the limestone below the local stream base may be quite hard and contain hydrogen sulfide.
CARBONIFEROUS	Mississippian	Osage	Fort Payne Formation[3]		235-330'	Dark-gray fine-grained argillaceous limestone interbedded with dark-gray to black dense chert. Black, brown, or grayish-green shale, locally glauconitic, in lower part.		
DEVONIAN	Upper Devonian		Chattanooga Shale		110'	Black micaceous carbonaceous fissile shale.	Present at depth throughout the quadrangle. Overlain by the Fort Payne Formation.	Yields little or no water. Formation confines water in the underlying rocks and retards the movement of water between the Mississippian and Devonian limestones.
DEVONIAN	Lower and Middle Devonian		Devonian rocks undifferentiated		500'+	White to brown cherty limestone and chert. Limestone may be finely to coarsely crystalline, and may contain silty or siliceous zones. Thin to thick beds of chert are common. Locally, a thin, chert rubble zone occurs at the top.	Present at depth throughout the quadrangle. Top of the Devonian limestone is 430 feet below land surface in an oil test near Blood River and is estimated to be 390 feet below land surface near Fort Heiman.	Wells in other quadrangles tapping the rocks below the Chattanooga Shale furnish sufficient water for domestic use. The Garrison's oil-test hole in the northwestern part of the quadrangle was reported to flow from a depth of 680 feet until plugged. Water may be hard and contains an objectionable amount of iron. Hydrogen sulfide may be present in minor amounts.

[1] Age undetermined. Estimates of age range from Pliocene or older to Pleistocene
[2] Lower part of the formation includes the Salem Limestone
[3] Basal part of the Fort Payne Formation includes the New Providence Shale

Gravel | Sand | Clay or shale | Loess | Mica | Glauconite | Carbonaceous material | Chert rubble | Limestone | Cherty limestone | Oolitic limestone | Crossbedded limestone


KENTUCKY LAKE
KENTUCKY
TENNESSEE
TENNESSEE RIVER
CALLOWAY CO
HENRY CO
STEWART CO TENNESSEE
Camp Tiarko
Panther Creek
Buchanan Cem
Fort Henry
Dry Fork Creek
Big Sandy Creek
Byrd Creek
Hughes Creek
Bear Creek
Big Bear Creek
Cypress Creek
Blood River
Yellow Spring Branch
Bailey Hollow
Coulter Land
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Mw-40r
Km-65 91
Km-86 (P)
Km-15.65
Mw-35r
Mw-165
Mfp-60
Mfp-29
Mfp-139
Km-156
Km-56
Km-18
Km-65
Km-91
Km-86