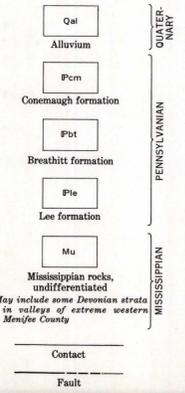


EXPLANATION



**THE KNOBS**  
The Knobs is a belt of conical hills and isolated ridges underlain in this area chiefly by Lower Mississippian shale and lying between the Blue Grass region on the west and the Cumberland Plateau section on the east. Rocks in this area generally yield small supplies of water for domestic use.

**Water in alluvium**  
Dug wells.—Nearly all wells in the alluvium in this area are dug. Most dug wells are adequate for a minimum supply with bucket or hand pump (more than 100 gpd). A few are adequate for a modern domestic supply with power pump (more than 500 gpd).

**Water in the Lee formation**  
Because the Lee formation in these areas caps small conical hills and narrow ridges and is of very small areal extent, it yields little or no water to wells.

**Water in Mississippian rocks**  
Dug wells.—Fewer than half the wells drilled in valley bottoms are adequate for a modern domestic supply. More than three-quarters of the wells drilled in valley bottoms are adequate for a minimum domestic supply. Wells on hills generally will yield smaller quantities of water than wells in valley bottoms.  
Salty water may be found locally in wells drilled to depths of less than 100 feet below the level of the principal valley bottoms. At greater depths probably no fresh water will be found.  
Dug wells.—Most wells dug in valley bottoms are adequate for a minimum domestic supply. Most wells dug on hills are inadequate even for a minimum domestic supply.  
Springs.—Springs yielding as much as 100 gpm occur near stream level. Most springs, however, yield less than 5 gpm.

**CUMBERLAND PLATEAU SECTION**  
The Cumberland Plateau section is a broad upland, in most places of low relief, but highly dissected along its western and northern margins. The plateau is supported by the resistant sandstone and conglomerate beds of the Lee formation. Because the majority of houses are on upland surfaces, most wells are on broad ridges or hillsides. Rocks in this area generally yield from small to ample supplies of water for domestic use.

**Water in alluvium**  
Dug wells.—Nearly all wells in the alluvium in this area are dug. Most dug wells are adequate for a minimum domestic supply. A few are adequate for a modern domestic supply.  
Dug wells.—Screened drilled wells probably can be developed in the alluvium where it is predominantly sand and the saturated thickness is at least several feet. Some of these wells may yield enough water for a modern domestic supply, but most wells probably would be adequate only for a minimum domestic supply. Few screened wells have been developed in the alluvium because they are expensive and probably would yield only small quantities of water.

**Water in the Breathitt formation**  
Dug wells.—Nearly all wells drilled in valley bottoms are adequate for a minimum domestic supply. Some wells in valleys are adequate for a modern domestic supply.  
More than half the wells drilled on hillsides are adequate for a minimum domestic supply. A few wells on hillsides yield enough water for a modern domestic supply.  
About half the wells drilled on hillsides and ridges are adequate for a minimum domestic supply. A few wells on ridges or hillsides yield enough for a modern domestic supply. A few are adequate for a modern domestic supply.  
Water obtained from most drilled wells in this area is moderately hard and contains noticeable amounts of iron. Salty water is found in wells, if any, drilled wells.  
Dug wells.—Most wells dug in valley bottoms are adequate for a minimum domestic supply. A few wells dug in valleys are adequate for a modern domestic supply.  
About half the wells dug on hills are adequate for a minimum domestic supply. A few wells dug on hills are adequate for a modern domestic supply.  
Springs.—A few springs supply sufficient quantities of water for domestic use. Almost all springs yield less than 5 gpm.

**Water in the Lee formation (subarea 1)**  
Dug wells.—About three-quarters of the wells drilled on hillsides and ridges are adequate for a minimum domestic supply. Some wells yield enough water for a modern domestic supply.  
Wells on hillsides and in valleys yield larger quantities of water, but very few produce more than 15 gpm. In this area, salty water is found in a few wells.  
Dug wells.—Most wells dug in valley bottoms are adequate for a minimum domestic supply. A few wells dug in valleys are adequate for a modern domestic supply. About half the wells dug on hills are adequate for a minimum domestic supply. A few wells dug on hills are adequate for a modern domestic supply.  
Springs.—A few springs supply sufficient quantities of water for domestic use. Almost all springs yield less than 5 gpm.

**Water in the Lee formation (subarea 2)**  
Dug wells.—More than three-quarters of the wells drilled in valleys are adequate for a modern domestic supply. Nearly all wells in valleys are adequate for a minimum domestic supply.  
Most of the wells drilled on hillsides are adequate for a modern domestic supply. Nearly all wells on hillsides are adequate for a minimum domestic supply.  
About half the wells drilled on hillsides and ridges are adequate for a modern domestic supply. More than three-quarters of the wells on ridges and hillsides yield enough for a minimum domestic supply.  
Deep wells penetrating the entire thickness of the Lee formation where it exceeds 500 feet in thickness may yield enough water for small municipal or industrial supplies.  
Water obtained from most wells in this area is soft or moderately hard and contains noticeable amounts of iron. Salty water may be found in wells drilled into the basal part of the Lee formation along the eastern margin of the Cumberland Plateau section; elsewhere water in the Lee formation generally is fresh.

**Water in Mississippian rocks**  
Dug wells.—Most wells dug in valley bottoms are adequate for a minimum domestic supply. Nearly all wells in valleys are adequate for a modern domestic supply.  
About half the wells drilled on hillsides are adequate for a modern domestic supply. Most wells on hillsides yield enough for a minimum domestic supply.  
Wells on ridges and hills yield smaller quantities of water.  
Water from most wells drilled in this area is hard and contains noticeable amounts of iron. Salty waters are tapped in some wells drilled less than 100 feet below the level of the principal valley bottoms. At depths greater than 100 feet, probably no fresh water is found.  
Dug wells.—Most wells dug in valley bottoms are adequate for a minimum domestic supply. Most wells dug on hills are inadequate even for a minimum domestic supply.  
Springs.—Springs yielding as much as 100 gpm occur near stream level. Most springs, however, yield less than 5 gpm.

**Water in the Lee formation (subarea 1)**  
Dug wells.—Fewer than half the wells drilled in valley bottoms are adequate for a modern domestic supply. Nearly all wells in valleys are adequate for a minimum domestic supply.  
Wells on hillsides and on hillsides and ridges yield smaller quantities of water.  
Salty water may be found in wells in the eastern part of the subarea less than 100 feet below the level of the principal valley bottoms; elsewhere, the water is fresh.  
Dug wells.—Most wells dug in valley bottoms are adequate for a minimum domestic supply. A few wells dug in valley bottoms are adequate for a modern domestic supply.  
About half the wells dug on hills are adequate for a minimum domestic supply. A few wells dug on hills are adequate for a modern domestic supply.  
Springs.—A few springs supply sufficient quantities of water for domestic use. Almost all springs yield less than 5 gpm.

**Water in the Lee formation (subarea 2)**  
Dug wells.—Most wells drilled in valley bottoms are adequate for a modern domestic supply. Nearly all wells in valleys are adequate for a minimum domestic supply.  
Fewer than half the wells drilled on hillsides are adequate for a modern domestic supply. Nearly all wells on hillsides are adequate for a minimum domestic supply.  
About half the wells drilled on hillsides and ridges are adequate for a modern domestic supply. About a third of the wells on hillsides or ridges are adequate for a modern domestic supply.  
Deep wells penetrating the entire thickness of the Lee formation where it exceeds 500 feet in thickness may yield enough water for small municipal or industrial supplies.  
Most water in this area is moderately hard and contains noticeable amounts of iron. Salty water may be found in wells drilled less than 100 feet below the level of the principal valley bottoms. Probably no fresh water will be found at greater depths.  
Dug wells.—Most wells dug in valley bottoms are adequate for a minimum domestic supply. Most wells dug on hills are inadequate even for a minimum domestic supply.  
Water obtained from most dug wells in this area is moderately hard.  
Springs.—Springs in limestone may supply enough water for domestic use.

**KANAWHA SECTION**  
The Kanawha section is a highly dissected area characterized by narrow valleys and irregular ridges. Although shale is the predominant rock type, beds of sandstone form resistant ledges in the sides and on the tops of hills, and underlie some of the broad valleys. Because most of the people live along the streams, nearly all wells are drilled in the valley bottoms. Rocks in this area generally yield ample supplies of water for domestic use.

**Water in alluvium**  
Dug wells.—Nearly all drilled wells are adequate for a modern domestic supply. The median yield of large-capacity wells is 150 gpm. The maximum reported yield is 300 gpm. Compound horizontal wells could be constructed that would yield more than this amount. Ground water in this area is very hard.

**Water in alluvium of the Big Sandy River and lower reaches of its forks**  
Dug wells.—Nearly all wells in the alluvium of the Big Sandy River and lower reaches of its forks are dug. Most dug wells are adequate for a modern domestic supply. Ground water obtained from most dug wells in this area is soft.  
Dug wells.—Because this alluvium in many places contains much sandy material and has a saturated thickness of about 30 feet, screened wells yielding as much as 20 to 25 gpm probably could be developed in it. Most screened wells would be adequate for a modern domestic supply.  
Water from wells drilled in the alluvium is moderately hard and contains large amounts of iron.

**Water in alluvium of streams tributary to the Ohio River, with the exception of the Big Sandy River and the lower reaches of its forks**  
Dug wells.—Nearly all wells in this area are dug. Most dug wells are adequate for a modern domestic supply. Water from most dug wells in this area is moderately hard and contains noticeable amounts of iron.  
Dug wells.—Screened drilled wells probably can be developed in the alluvium where it is sandy and the saturated thickness is at least several feet. Some of these wells may yield enough water for a modern domestic supply, but most probably would be adequate only for a minimum domestic supply. Few screened wells have been developed in the alluvium because they are expensive and probably would yield only small quantities of water.

**Water in the Breathitt formation (subarea 1)**  
Dug wells.—Most wells in valley bottoms are adequate for a minimum domestic supply. Nearly all wells in valleys are adequate for a modern domestic supply.  
Fewer than half the wells drilled on hillsides are adequate for a modern domestic supply. More than three-quarters of the wells on hillsides and ridges yield smaller quantities of water.  
Most of the water from drilled wells in the area is very hard and contains noticeable amounts of iron. Salty water may be found in wells drilled less than 100 feet below the level of the principal valley bottoms. Probably no fresh water will be found at greater depths.  
Dug wells.—Most wells dug in valley bottoms are adequate for a minimum domestic supply. Most wells dug on hills are inadequate even for a minimum domestic supply.  
Water obtained from most dug wells in this area is moderately hard.  
Springs.—Springs in limestone may supply enough water for domestic use.

**Water in the Breathitt formation (subarea 2)**  
Dug wells.—More than three-quarters of the wells drilled in valley bottoms are adequate for a modern domestic supply. Nearly all wells in valleys are adequate for a minimum domestic supply.  
About three-quarters of the wells drilled on hillsides are adequate for a modern domestic supply. Nearly all wells on hillsides are adequate for a minimum domestic supply.  
Nearly all wells drilled on hillsides are adequate for a minimum domestic supply. Some wells on hillsides or ridges are adequate for a modern domestic supply.  
Dug wells more than 200 feet deep in valleys yield enough water for small municipal or industrial supplies.  
Ground water from most drilled wells in this area is moderately hard and contains noticeable amounts of iron. In the southeastern part of the area, salty water may be found in wells tapping the Breathitt formation less than 100 feet below the level of the principal valley bottoms. Elsewhere, salty water in drilled wells probably will not be found at depths less than 200 feet below the level of the principal valley bottoms.

**Water in the Lee formation (subarea 1)**  
Dug wells.—Fewer than half the wells drilled in valley bottoms are adequate for a modern domestic supply. Nearly all wells in valleys are adequate for a minimum domestic supply.  
Wells on hillsides and on hillsides and ridges yield smaller quantities of water.  
Salty water may be found in wells in the eastern part of the subarea less than 100 feet below the level of the principal valley bottoms; elsewhere, the water is fresh.  
Dug wells.—Most wells dug in valley bottoms are adequate for a minimum domestic supply. A few wells dug in valley bottoms are adequate for a modern domestic supply.  
About half the wells dug on hills are adequate for a minimum domestic supply. A few wells dug on hills are adequate for a modern domestic supply.  
Springs.—A few springs supply sufficient quantities of water for domestic use. Almost all springs yield less than 5 gpm.

**Water in the Lee formation (subarea 2)**  
Dug wells.—Most wells drilled in valley bottoms are adequate for a modern domestic supply. Nearly all wells in valleys are adequate for a minimum domestic supply.  
Fewer than half the wells drilled on hillsides are adequate for a modern domestic supply. Nearly all wells on hillsides are adequate for a minimum domestic supply.  
About half the wells drilled on hillsides and ridges are adequate for a modern domestic supply. About a third of the wells on hillsides or ridges are adequate for a modern domestic supply.  
Deep wells penetrating the entire thickness of the Lee formation where it exceeds 500 feet in thickness may yield enough water for small municipal or industrial supplies.  
Most water in this area is moderately hard and contains noticeable amounts of iron. Salty water may be found in wells drilled less than 100 feet below the level of the principal valley bottoms. Probably no fresh water will be found at greater depths.  
Dug wells.—Most wells dug in valley bottoms are adequate for a minimum domestic supply. Most wells dug on hills are inadequate even for a minimum domestic supply.  
Water obtained from most dug wells in this area is moderately hard.  
Springs.—Springs in limestone may supply enough water for domestic use.

**Water in the Lee formation (subarea 1)**  
Dug wells.—About a third of the wells drilled in valley bottoms are adequate for a modern domestic supply, but more than three-quarters are adequate for a minimum domestic supply.  
Wells drilled on hillsides and hillsides yield smaller quantities of water.  
Most of the water from drilled wells in the area is very hard and contains noticeable amounts of iron. Salty water may be found in wells drilled less than 100 feet below the level of the principal valley bottoms. Probably no fresh water will be found at greater depths.  
Dug wells.—Most wells dug in valley bottoms are adequate for a minimum domestic supply. Most wells dug on hills are inadequate even for a minimum domestic supply.  
Water obtained from most dug wells in this area is moderately hard.  
Springs.—Springs in limestone may supply enough water for domestic use.

**Water in the Lee formation (subarea 2)**  
Dug wells.—More than three-quarters of the wells drilled in valley bottoms are adequate for a modern domestic supply. Nearly all wells in valleys are adequate for a minimum domestic supply.  
About three-quarters of the wells drilled on hillsides are adequate for a modern domestic supply. Nearly all wells on hillsides are adequate for a minimum domestic supply.  
Nearly all wells drilled on hillsides are adequate for a minimum domestic supply. Some wells on hillsides or ridges are adequate for a modern domestic supply.  
Dug wells more than 200 feet deep in valleys yield enough water for small municipal or industrial supplies.  
Ground water from most drilled wells in this area is moderately hard and contains noticeable amounts of iron. In the southeastern part of the area, salty water may be found in wells tapping the Breathitt formation less than 100 feet below the level of the principal valley bottoms. Elsewhere, salty water in drilled wells probably will not be found at depths less than 200 feet below the level of the principal valley bottoms.

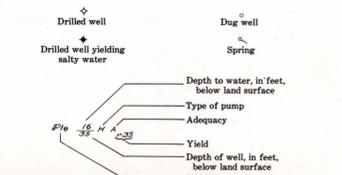
**Water in alluvium of streams tributary to the Ohio River, with the exception of the Big Sandy River and the lower reaches of its forks**  
Dug wells.—Nearly all wells in this area are dug. Most dug wells are adequate for a modern domestic supply. Water from most dug wells in this area is moderately hard and contains noticeable amounts of iron.  
Dug wells.—Screened drilled wells probably can be developed in the alluvium where it is sandy and the saturated thickness is at least several feet. Some of these wells may yield enough water for a modern domestic supply, but most probably would be adequate only for a minimum domestic supply. Few screened wells have been developed in the alluvium because they are expensive and probably would yield only small quantities of water.

**Water in the Breathitt formation (subarea 1)**  
Dug wells.—Most wells in valley bottoms are adequate for a minimum domestic supply. Nearly all wells in valleys are adequate for a modern domestic supply.  
Fewer than half the wells drilled on hillsides are adequate for a modern domestic supply. More than three-quarters of the wells on hillsides and ridges yield smaller quantities of water.  
Most of the water from drilled wells in the area is very hard and contains noticeable amounts of iron. Salty water may be found in wells drilled less than 100 feet below the level of the principal valley bottoms. Probably no fresh water will be found at greater depths.  
Dug wells.—Most wells dug in valley bottoms are adequate for a minimum domestic supply. Most wells dug on hills are inadequate even for a minimum domestic supply.  
Water obtained from most dug wells in this area is moderately hard.  
Springs.—Springs in limestone may supply enough water for domestic use.

**Water in the Breathitt formation (subarea 2)**  
Dug wells.—More than three-quarters of the wells drilled in valley bottoms are adequate for a modern domestic supply. Nearly all wells in valleys are adequate for a minimum domestic supply.  
About three-quarters of the wells drilled on hillsides are adequate for a modern domestic supply. Nearly all wells on hillsides are adequate for a minimum domestic supply.  
Nearly all wells drilled on hillsides are adequate for a minimum domestic supply. Some wells on hillsides or ridges are adequate for a modern domestic supply.  
Dug wells more than 200 feet deep in valleys yield enough water for small municipal or industrial supplies.  
Ground water from most drilled wells in this area is moderately hard and contains noticeable amounts of iron. In the southeastern part of the area, salty water may be found in wells tapping the Breathitt formation less than 100 feet below the level of the principal valley bottoms. Elsewhere, salty water in drilled wells probably will not be found at depths less than 200 feet below the level of the principal valley bottoms.

**Water in the Lee formation (subarea 1)**  
Dug wells.—About three-quarters of the wells drilled on hillsides and ridges are adequate for a minimum domestic supply. Some wells yield enough water for a modern domestic supply.  
Wells on hillsides and in valleys yield larger quantities of water, but very few produce more than 15 gpm. In this area, salty water is found in a few wells.  
Dug wells.—Most wells dug in valley bottoms are adequate for a minimum domestic supply. A few wells dug in valleys are adequate for a modern domestic supply.  
About half the wells dug on hills are adequate for a minimum domestic supply. A few wells dug on hills are adequate for a modern domestic supply.  
Springs.—A few springs supply sufficient quantities of water for domestic use. Almost all springs yield less than 5 gpm.

**Water in the Lee formation (subarea 2)**  
Dug wells.—More than three-quarters of the wells drilled in valleys are adequate for a modern domestic supply. Nearly all wells in valleys are adequate for a minimum domestic supply.  
Most of the wells drilled on hillsides are adequate for a modern domestic supply. Nearly all wells on hillsides are adequate for a minimum domestic supply.  
About half the wells drilled on hillsides and ridges are adequate for a modern domestic supply. More than three-quarters of the wells on ridges and hillsides yield enough for a minimum domestic supply.  
Deep wells penetrating the entire thickness of the Lee formation where it exceeds 500 feet in thickness may yield enough water for small municipal or industrial supplies.  
Water obtained from most wells in this area is soft or moderately hard and contains noticeable amounts of iron. Salty water may be found in wells drilled into the basal part of the Lee formation along the eastern margin of the Cumberland Plateau section; elsewhere water in the Lee formation generally is fresh.



TYPE OF PUMP	
Hand-powered pump-bucket, bailer, pitcher, or force	Hand-powered pump-bucket, bailer, pitcher, or force
Power pump	Power pump
No pump	No pump
Flowing	Flowing

ADEQUACY	
Adequate	Adequate
Inadequate	Inadequate

YIELD	
Estimated—from pump capacity if a well	Estimated—from pump capacity if a well
Reported	Reported
Measured	Measured
500 Gallons per minute where known	500 Gallons per minute where known
5000 gpd	Gallons per day where known, when less than 1 gpm

Base maps are county highway maps and adjacent county groups may not match.

AVAILABILITY OF GROUND WATER IN BOYD, CARTER, ELLIOTT, GREENUP, JOHNSON, LAWRENCE, LEE, MENIFEE, MORGAN, AND WOLFE COUNTIES, KENTUCKY

By  
W. E. Price, Jr., Chabot Kilburn, and D. S. Mull  
1962

