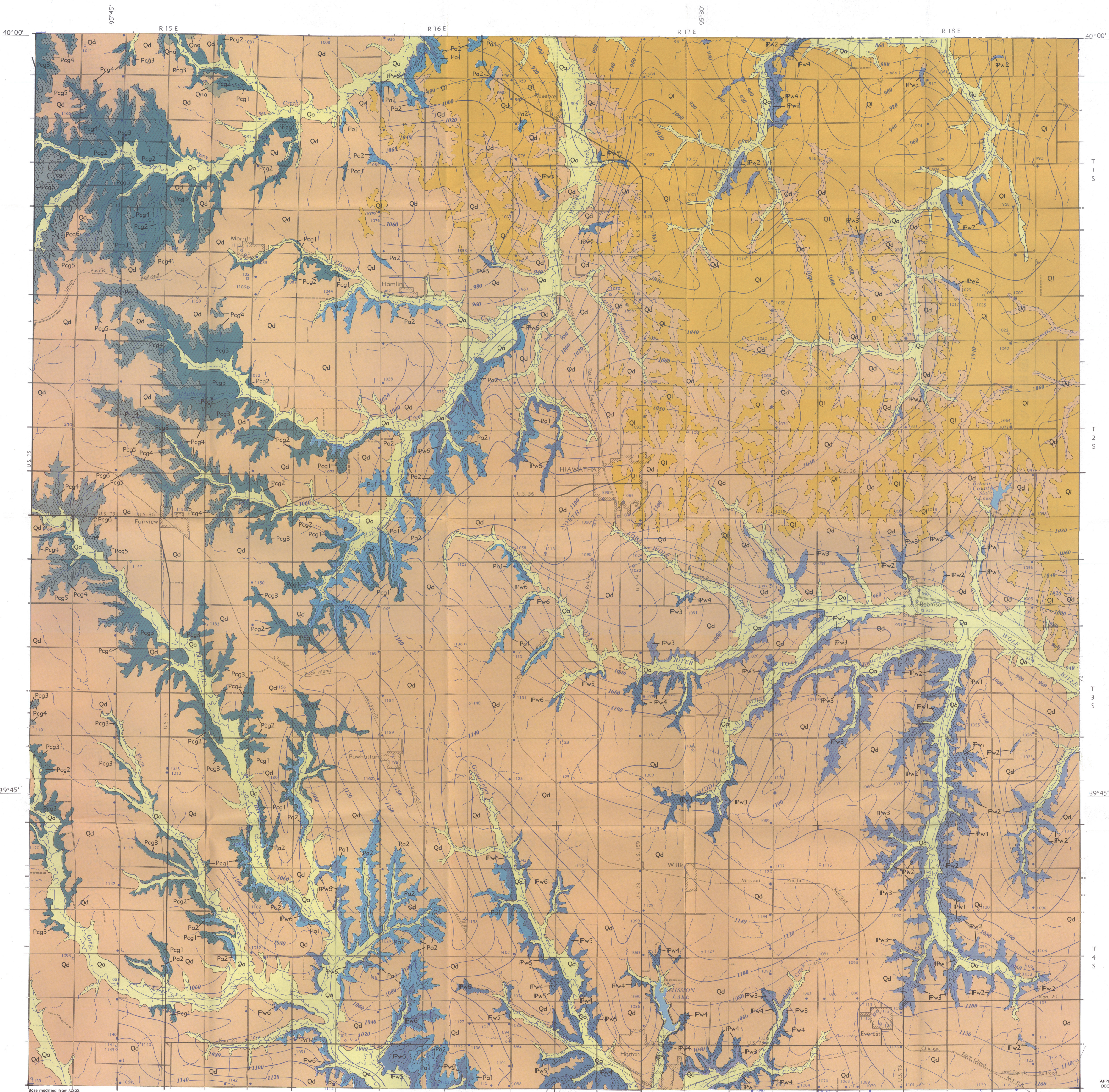


GEOLOGIC MAP OF BROWN COUNTY, KANSAS



EXPLANATION

- Qa**
Alluvium and terrace deposits (Wisconsin and Recent)
Alluvial deposits consisting of silt, clay, sand, and gravel in and adjacent to active channels of present streams and older alluvial deposits in a terrace position in relationship to younger deposits in principal stream valleys. Yields small quantities of water.
- Ql**
Loess (Illinoian and Wisconsin)
Wind-deposited silt, generally in an upland position. Principally silts of early and late Wisconsin age but locally may contain silts of Illinoian age in lower part. Yields little or no water. (Thin loess deposits in area south of Wolf River and west of Walnut Creek are not shown.)
- Qd**
Glacial drift (Kansas)
Glacial till and outwash deposits. Glacial till is heterogeneous mixture of silt, clay, sand and gravel, and boulders. Clay is most common grain size. Outwash consists of poorly graded silt, clay, sand and gravel, and scattered boulders. Generally contains less silt and clay than alluvium and terrace deposits. Yields small to moderate quantities of water locally from glacial till. Moderate to large yields obtained from outwash deposits.
- Qna**
Alluvium (Nebraskan and Aftonian)
Pre-Kansan alluvial deposits in highest upland position. Consists of chert and minor amounts of limestone gravel. Yields little or no water.
- COUNCIL GROVE GROUP**
Pcg5
Crouse Limestone
Two limestones and an intervening tanish-gray, calcareous, blocky shale. Upper limestone is tan, hard, and platy. Lower limestone is hard, gray, massive, and fossiliferous. Yields little or no water.
- Pcg5**
Bader Limestone and Easy Creek Shale
Bader consists of two limestone members and an intervening silty, calcareous, tanish-gray shale member. Upper limestone member is porous and tanish-gray to light gray. Lower limestone member consists of two limestone beds separated by a tanish-gray shale. Easy Creek is silty, calcareous, grayish-green and porous shale. Yields little or no water.
- Pcg4**
Beattie Limestone and Stearns Shale
Beattie is composed of two limestone members separated by an intervening silty, very calcareous, tanish-gray shale member. The upper limestone member is porous and tanish-gray to light gray. The lower limestone member is massive, light gray, and contains some chert. Stearns is composed of silty, calcareous, tanish-gray shale grading downward to grayish-green shale. Yields small quantities of water locally.
- Pcg3**
Grenola Limestone and Eskridge Shale
Grenola Limestone is composed of three limestone members separated by shale members. The shale members are tanish-gray and calcareous. The upper limestone member is more massive and porous than the two lower limestone members, which are hard, gray, thin-bedded limestone separated by shale partings. Eskridge is clayey, calcareous, tanish-gray shale containing some maroon shale in lower part. Moderate to large supplies of water are available locally from the Grenola.
- Pcg2**
Red Eagle Limestone and Roca Shale
The Red Eagle is composed of two limestone members separated by a clay shale, which is gray in upper part and black in lower part. The upper member is soft, porous limestone. The lower member is hard dark-gray limestone. Roca is clayey, calcareous, gray and tanish-gray shale in upper part and commonly dark-gray in lower part. Locally contains a porous, calcareous limestone in lower part. Small quantities of water are locally available from the upper part of the Red Eagle Limestone. Moderate to large quantities of water are available locally from the Roca Shale.
- Pcg**
Foraker Limestone and Johnson Shale
Foraker Limestone consists of two limestone members separated by a silty, calcareous, gray shale containing several persistent limestone beds. The upper member is soft, massive, impure gray to tanish-gray limestone. The lower member is composed of two thin limestone beds separated by a thin shale. Johnson Shale is platy, gray to tanish-gray and dark gray. Small to moderate quantities of water are locally available from the upper limestone member of the Foraker.
- ADMIRE GROUP**
Pa2
Falls City Limestone and Janesville Shale
Falls City Limestone is composed of two limestone beds separated by an intervening tanish-gray, clayey, noncalcareous shale. The upper limestone is a coquina of tabulated shells. The lower limestone is impure and shaly. The Janesville Shale is composed of two shale members and an intervening limestone member. The shale members are clayey, tanish-gray limestone, and locally contain some sandstone. The limestone member is hard and dark grayish-brown. Small quantities of water are available locally from sandstone beds.
- Pa1**
Onaga Shale
Consists of two shale members separated by a thin, hard, light-gray limestone member. The shale members are silty, calcareous and noncalcareous, and tanish-gray. The lower member locally contains sandstone. Yields little or no water.
- WABAUNSEE GROUP**
IPw6
Wood Siding Formation
Comprised of three limestone members and two shale members. Limestone members are gray to dark grayish-brown. Shale members are silty, sandy and gray to grayish-brown. Middle limestone member is locally absent. Yields small quantities of water from sandy zones in shale members.
- IPw5**
Stotler Limestone and Root Shale
Stotler Limestone is comprised of two limestone members separated by a calcareous sandy shale member. The upper limestone member is hard and tanish-gray; upper limestone is locally absent. Root Shale comprised of two shale members separated by a thin, hard, bluish-gray limestone member. Upper shale member is bluish-gray and noncalcareous. Lower shale member is gray, sandy, and calcareous. Yields small quantities of water from sandy shale and sandstone.
- IPw4**
Zeandale Limestone and Pillsbury Shale
Zeandale Limestone is comprised of two limestone members separated by a bluish-gray, noncalcareous, silty shale member. The limestone members are hard, grayish-brown to tanish-gray. Pillsbury Shale is noncalcareous gray to grayish-green sandy shale that locally contains sandstone. Yields small quantities of water from sandy shale and sandstone.
- IPw3**
Emporia Limestone and Willard Shale
Emporia Limestone is comprised of two limestone members separated by a gray to grayish-green calcareous shale member. Lower member is a hard, dense, bluish-gray to grayish-brown limestone. Upper member is hard, bluish-gray to grayish-green limestone. Willard Shale is noncalcareous, gray to bluish-gray sandy shale. Yields little or no water.
- IPw2**
Bern Limestone and Auburn Shale
Bern Limestone is comprised of two limestone members separated by a gray to greenish-gray shale. The upper member is a hard, dense, bluish-gray to brown limestone. The lower member is comprised of several limestone beds separated by thin shale beds. Auburn Shale is lime and gray shale in lower and upper parts, silty in middle part. Yields little or no water.
- IPw1**
Scranton Shale
Consists of three shale members and two limestone members. The shale members are silty, calcareous, and locally shale member. The limestone members are gray and bluish-gray, thin, and may be locally absent. Yields small quantities of water from sandstone in local areas.

Pleistocene Series

Lower Permian Series

Upper Pennsylvanian Series

QUATERNARY SYSTEM

PERMIAN SYSTEM

PENNSYLVANIAN SYSTEM

- Test hole
 - Domestic or stock well
 - Municipal well
 - Industrial well
 - ◆ Domestic observation well
 - ◆ Municipal observation well
 - ▲ Spring
- Contours connecting points of equal altitude of water table (omitted where water table is discontinuous). Contour interval, 20 feet.
- Contact (dashed where approximate or inferred)
- Number refers to altitude of water table
- Scale, miles

Base modified from USGS topographic quadrangles

Prepared by the United States Geological Survey and the State Geological Survey of Kansas, with the cooperation of the Division of Water Resources of the Kansas State Board of Agriculture and the Environmental Health Services of the Kansas State Department of Health.

Aerial Geology mapped in 1962 by Charles K. Bone.

APPROXIMATE MEAN DECLINATION, 1961