



Hydrology by L.E. Dunlap, 1979.
Geology modified from Pearl and
others (1972) and from Watts and
Stulken (1981)

EXPLANATION

- Qal **AQUIFER IN QUATERNARY ALLUVIUM**
- To **AQUIFER IN OGALLALA FORMATION**
- AREA WHERE WATER TABLE IS NEAR OR BELOW BASE OF AQUIFER-- Contours not shown**
- WATER-TABLE CONTOUR--Shows altitude of water table, in feet. Dashed where approximately located. Contour interval 20 feet. National Geodetic Vertical Datum of 1929**
- BOUNDARY OF PRINCIPAL AQUIFER-- Dashed where approximately located**
- BOUNDARY OF REPUBLICAN RIVER BASIN**
- 2904 **WELL OR TEST HOLE-- Number shows altitude of water table, in feet. National Geodetic Vertical Datum of 1929**



Base from U.S. Geological Survey
1:250,000 quadrangles; Beloit, 1955-70;
Goodland, 1954

MAP SHOWING ALTITUDE AND CONFIGURATION OF WATER TABLE IN PRINCIPAL AQUIFERS, WESTERN PART OF REPUBLICAN RIVER BASIN, SPRING 1977

GEOHYDROLOGY OF PRINCIPAL AQUIFERS IN THE REPUBLICAN RIVER BASIN, KANSAS

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Hydrology

The principal aquifer in the western part of the Republican River basin occurs in the Ogallala Formation. The water table in the aquifer during the spring of 1977, as shown on sheet 3, sloped generally northeastward at about 15 feet per mile. Because the gradient of the water table was steeper than that of the bedrock surface, the aquifer thinned toward the northeast. Thicknesses of saturated material (differences between altitudes at the water table and altitudes at the base of aquifer) generally were greatest in the areas of buried valleys. In Sherman County on the west, yields of about 2,000 gallons per minute are obtained by irrigation wells from as much as 270 feet of saturated materials (Pearl and others, 1972). In Norton and Phillips Counties toward the east, yields of 500 gallons per minute are obtained by irrigation wells from about 50 feet of saturated materials (Stulken, 1980). Hydraulic conductivities (rate at which water is transmitted through 1 square foot of the aquifer under a unit water-table gradient) for the two areas range from 10 to 160 feet per day. Annual recharge to the aquifer from precipitation in the western part of the basin is estimated to be from 0.25 to 0.50 inch (Pearl and others, 1972).

A principal aquifer in Jewell and Republic Counties in the eastern part of the basin occurs in the Grand Island Formation. Contours on the water table in the aquifer during the spring of 1977 is shown on sheet 4. The slope of the water table from both sides of the valley indicates that the river was draining the aquifer. Saturated thicknesses were

reported to be as much as 100 feet. Maximum well yields are unknown, but test results for a municipal well in an area about 10 miles north of Belleville indicated a potential yield of almost 2,000 gallons per minute (Fisher, 1948).

A principal aquifer in the eastern part of the basin, and locally in the western part, occurs in the Quaternary alluvium. In the alluvium of the Republican River, the water table during the spring of 1977, as shown on sheet 4, sloped generally down the valley at about 5 feet per mile. Yields of as much as 1,500 gallons per minute are obtained by irrigation wells from about 80 feet of saturated materials (Bayne and Walters, 1959). Hydraulic conductivities of the aquifer in this area range from 110 to 840 feet per day (Fader, 1968, p. 8). Annual recharge to the aquifer from precipitation is estimated to be 0.60 inch (Fader, 1968, p. 13).

In some areas of the western part of the basin, the aquifer in the Quaternary alluvium is adjacent to, and in hydraulic connection with, the aquifer in the Ogallala formation. In other areas where the water table is at or below the surface of intervening bedrock, as shown on sheet 3, hydraulic connection between the two aquifers is restricted. The alluvial aquifer in the western part of the basin has saturated thicknesses of as much as 65 feet. Maximum yields to irrigation wells are of 1,500 gallons per minute. Hydraulic conductivities of the aquifer range from 30 to 270 feet per day. Annual recharge to the aquifer from precipitation is estimated to range from 0.25 to 0.50 inch (Pearl and others, 1972).