



ALTITUDE AND CONFIGURATION OF THE WATER TABLE
IN THE HIGH PLAINS AQUIFER OF KANSAS, PRE-1950

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GENERAL DESCRIPTION

The High Plains aquifer in Kansas is part of a regional system that extends into Colorado, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming. The aquifer in Kansas underlies 31,000 square miles in the western and south-central part of the State. The aquifer is a hydraulically connected assemblage of unconsolidated water-bearing deposits. In western Kansas, the High Plains aquifer consists principally of the Ogallala formation of late Tertiary age overlain by deposits of Quaternary age. In south-central Kansas, the aquifer consists of unconsolidated deposits principally of Quaternary age. Valley alluvium of Quaternary age also is included in the deposits in both areas. The High Plains aquifer is delimited on the east by outcrops of Permian or Cretaceous rocks and by unsaturated deposits of Quaternary age.

The U.S. Geological Survey began a 5-year study of the High Plains regional aquifer during 1978 to provide: (1) Hydrologic information for evaluating the effects of continued ground-water development and (2) computer models for predicting aquifer response to changes in ground-water development. The plan of study for the High Plains Regional Aquifer-System Analysis is described by Weeks (1978). This report is one of a series that presents hydrologic information on the aquifer in Kansas for a specific time.

The altitude and configuration of the water table prior to 1950 are shown. The purpose of this map is to depict a "predevelopment" surface that can be compared with maps for later time periods to determine water-level changes. Data used in preparing the map include: (1) water levels measured by the U.S. Geological Survey, as part of a continuing cooperative program with the Kansas Geological Survey and the Kansas State Board of Agriculture, Division of Water Resources; (2) water-level measurements in county reports by the Kansas Geological Survey (see "Selected References"); and (3) water levels from drilling contractors. In some localities where historic data were sparse, more recent measurements were considered for surface trends.

The pre-1950 water table sloped generally from west to east at an average rate of 10 feet per mile. The altitude of the water table ranged from about 3,900 feet in the southwest corner of Sherman County, northwestern Kansas, to about 1,350 feet in northern Sedgwick County, south-central Kansas. Ground water moved perpendicular to the water-table contours from higher altitudes in the western part of the High Plains to lower altitudes in the east. Contours that cross stream valleys without flexure may indicate that the water table was below the streambed. Upgradient flexures of water-table contours along stream valleys indicate that ground water flowed toward, and discharged into, streams. This was most evident along the South Fork Republican River in Cheyenne County, northwestern Kansas, and the South Fork Neosho River in Pratt and Kingman Counties, south-central Kansas.

Two levels of contour reliability were recognized on the basis of density of data available for this compilation, as shown on the map. Contours identified as type 1 are considered to be controlled by data and accurately represent water levels within ± 25 feet altitude (one-half contour interval). Type-1 contours generally coincide with areas of known ground-water irrigation potential. Contours identified as type 2 were inferred from various indirect sources, and the accuracy is considered to be speculative. Type-2 contours generally are in predominantly "fringe areas" of the aquifer system that have relatively little saturated thickness. Altitude and configuration of the land surface and bedrock, interpretations from previous reports, and water-level measurements dated other than that of the map were used to control type-2 contours. In areas where the water table was at or near the bedrock surface, contouring was not feasible.

CONVERSION TABLE

The inch-pound units of measurement given in this report are listed with equivalent International System of Units (SI), using the following conversion factors:

Inch-pound unit	Multiply by	SI unit
foot	0.3048	meter
mile	1.609	kilometer
square mile	2.590	square kilometer
foot per mile	0.1694	meter per kilometer

The National Geodetic Vertical Datum of 1929 (NGVD) is a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada. NGVD of 1929 refers to sea level in this report.

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EXPLANATION

- AREA OF BEDROCK OUTCROP WITHIN AQUIFER BOUNDARY
- AREA WHERE WATER TABLE IS AT OR NEAR BEDROCK SURFACE--
Contours not shown
- 1500-- WATER-TABLE CONTOUR-- Shows altitude of water table, pre 1950.
Solid where accurately located (type 1); and short dash where location is speculative (type 2). Contour interval 50 feet. National Geodetic Vertical Datum of 1929
- BOUNDARY OF HIGH PLAINS AQUIFER

