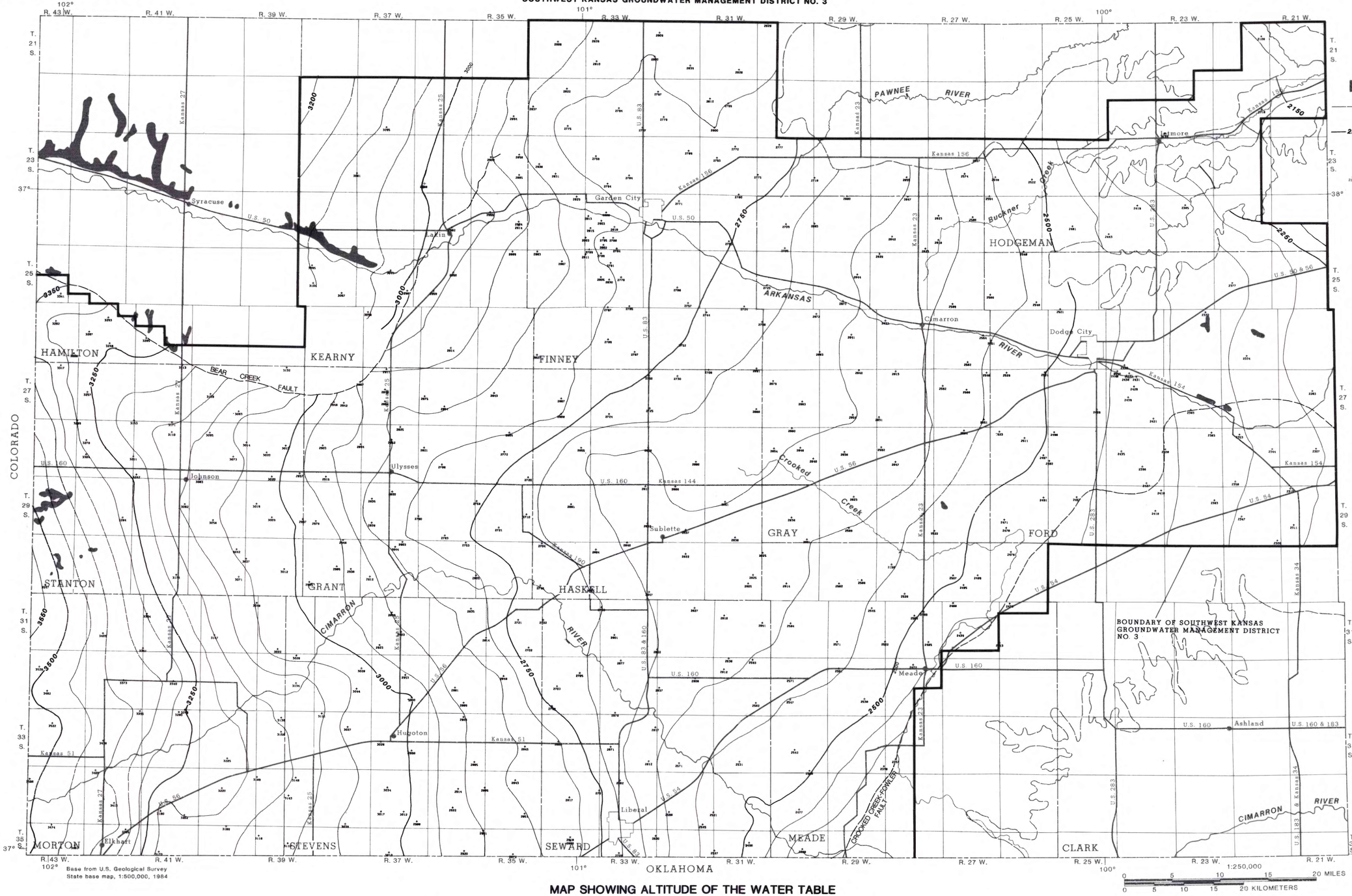
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
SOUTHWEST KANSAS GROUNDWATER MANAGEMENT DISTRICT NO. 3



Base from U.S. Geological Survey
State base map, 1:500,000, 1984

MAP SHOWING ALTITUDE OF THE WATER TABLE

HYDROLOGIC MAPS OF THE HIGH PLAINS AQUIFER, SOUTHWESTERN KANSAS, JANUARY 1986

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1988

EXPLANATION

- AREA OF BEDROCK OUTCROP WITHIN AQUIFER BOUNDARY
- BOUNDARY OF HIGH PLAINS AQUIFER
- 2250 — WATER-TABLE CONTOUR–Shows altitude of water table. Dashed where approximately located. Contour interval 50 feet. Datum is sea level
- 2765 OBSERVATION WELL–Number is measured altitude of water table, in feet above sea level

INTRODUCTION

Maps in this report depict the altitude of the water table and the saturated thickness of the High Plains aquifer in southwestern Kansas in January 1986. These maps were prepared by the U.S. Geological Survey in cooperation with the Southwest Kansas Groundwater Management District No. 3. The Management District uses the maps to calculate a planned depletion rate of 40 percent for the saturated thickness of the High Plains aquifer in 25 years for a 13-county area. Because the information contained on these maps is used in management decisions, the Management District is concerned with the accuracy, reliability, and consistency of the hydrologic information that is shown on the maps.

A computerized, mathematical technique, called kriging (Karlinger and Skrivan, 1980), was used to produce the hydrologic maps in this report. The technique has been applied with good results to geohydrologic data in west-central Kansas (Dunlap and Spinazola, 1984) and southwestern Kansas (Spinazola, 1982). A computer program interpolated hydrologic data in southwestern Kansas from a network of 450 measured values. The program calculated values for the center of 8,869 1-square-mile sections and facilitated contouring of selected values.

The principal source of ground water for agricultural, industrial, and municipal use in southwestern Kansas is the High Plains aquifer. The aquifer consists of interbedded deposits of clay, silt, sand, and gravel, and layers of calcium carbonate-cemented sand (mortar beds) of Miocene (Ogallala Formation) and Pleistocene age (undifferentiated deposits). These deposits range in thickness from about zero to about 610 feet. Depths to water in wells completed in the High Plains aquifer range from less than 10 to about 370 feet. Well yields are potentially as large as 3,000 gallons per minute in some areas (Gutentag and others, 1981).

ALTITUDE OF THE WATER TABLE, JANUARY 1986

Maps showing the altitude of the water table in the High Plains aquifer (sheets 1 and 2) were constructed using water-level measurements made in January 1986 at 450 wells in southwestern Kansas and values calculated by the kriging technique. The wells (sheet 1) are part of an established network of observation wells (Dague, 1986). The kriging technique was used to calculate the altitude of the water table at the center of each of the 8,869 1-square-mile sections underlain by the High Plains aquifer in the study area (sheet 2). Kriging results were adjusted in some locations where regional trends do not indicate known local variability, such as in a small stream channel in eastern Hodgeman County, along major stream channels, and at the edge of the aquifer. Where the kriged water-table altitude was below the bedrock surface or above the land surface, the calculated value was adjusted to coincide with the altitude of the appropriate surface. Although kriged values of the water-table altitude were calculated to the nearest 1 foot to aid in contour placement, these values are generally less accurate. Contours were drawn by a computer using the kriged center-of-section values. Center-of-section values have not been plotted on sheet 2 where the calculated saturated thickness was less than 10 feet. Where shown on sheet 1, contours in these areas are dashed to indicate less confidence in location.

In January 1986, the altitude of the water table ranged from 3,600 feet above sea level in northwestern Morton County to about 2,100 feet above sea level in northeastern Hodgeman County. The hydraulic gradient of the water table averaged about 10 feet per mile. Intensive pumping for irrigation has altered the general gradient in northeastern Finney County (Gutentag and others, 1981, p. 22).

CONVERSION FACTORS

For those readers who prefer to use metric units, the inch-pound units used in this report can be converted to the International System of Units (SI) using the following factors:

Multiply inch-pound unit	By	To obtain SI units
foot	0.3048	meter
mile	1.609	kilometer
square mile	2.590	square kilometer
gallon per minute	0.06309	liter per second
acre-feet	1,233	cubic meter
foot per mile	0.1894	meter per kilometer

Sea level: In this report, sea level refers to the National Geodetic Vertical Datum of 1929–a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called "Mean Sea Level."