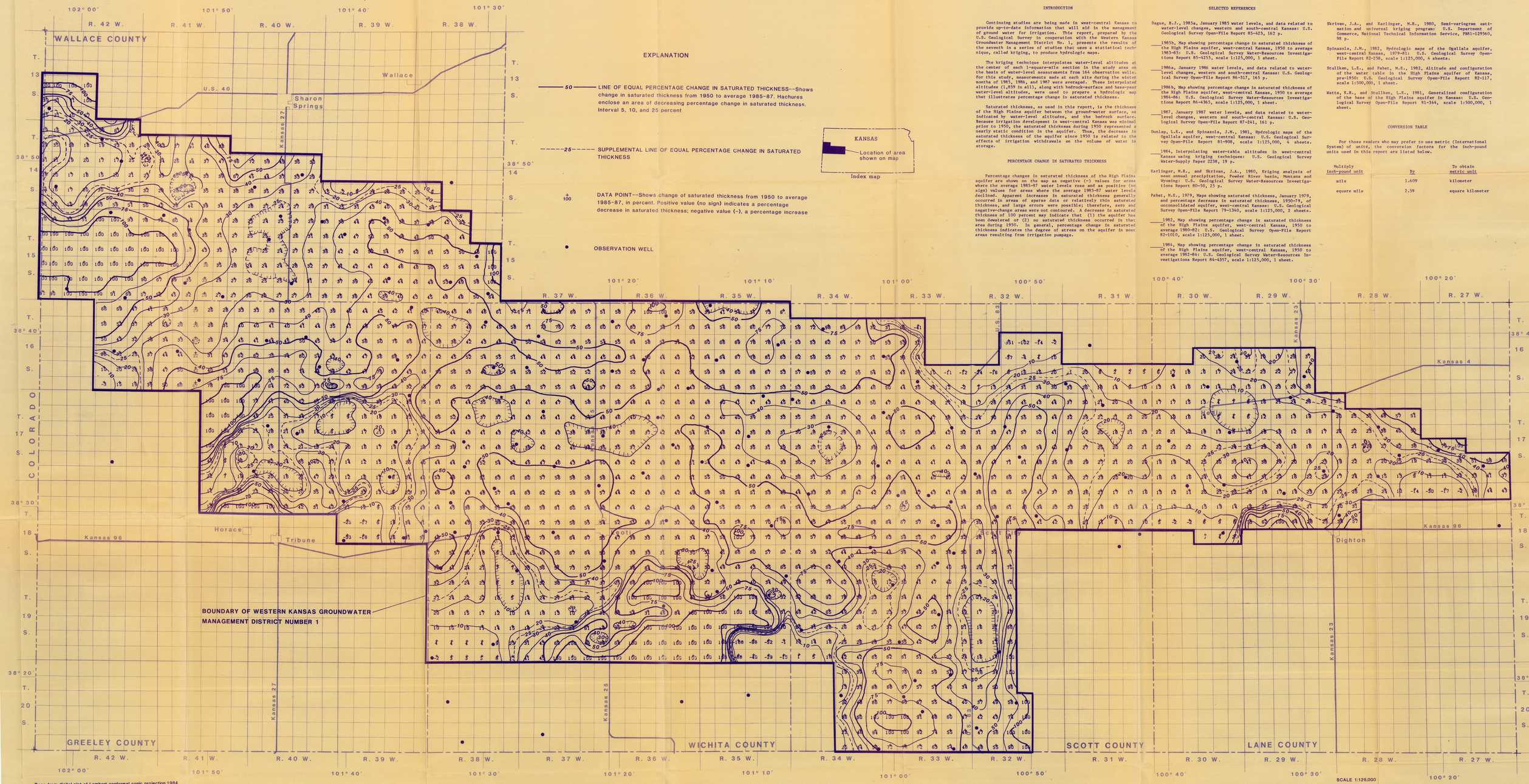
DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

Prepared in cooperation with the
WESTERN KANSAS GROUNDWATER MANAGEMENT DISTRICT NO. 1

WATER-RESOURCES INVESTIGATIONS
REPORT 87-4252




EXPLANATION

50 — LINE OF EQUAL PERCENTAGE CHANGE IN SATURATED THICKNESS--Shows change in saturated thickness from 1950 to average 1985-87. Hachures enclose an area of decreasing percentage change in saturated thickness. Interval 5, 10, and 25 percent

25 — SUPPLEMENTAL LINE OF EQUAL PERCENTAGE CHANGE IN SATURATED THICKNESS

+100 DATA POINT--Shows change of saturated thickness from 1950 to average 1985-87, in percent. Positive value (no sign) indicates a percentage decrease in saturated thickness; negative value (-), a percentage increase

OBSERVATION WELL



Index map

Base from digital plot of Lambert conformal conic projection,1984

SCALE 1:125,000
0 2 4 MILES
0 2 4 KILOMETERS

# PERCENTAGE CHANGE IN SATURATED THICKNESS OF THE HIGH PLAINS AQUIFER, WEST CENTRAL KANSAS, 1950 TO AVERAGE 1985-87

By
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## INTRODUCTION

Continuing studies are being made in west-central Kansas to provide up-to-date information that will aid in the management of ground water for irrigation. This report, prepared by the U.S. Geological Survey in cooperation with the Western Kansas Groundwater Management District No. 1, presents the results of the seventh in a series of studies that uses a statistical technique, called kriging, to produce hydrologic maps.

The kriging technique interpolates water-level altitudes at the center of each 1-square-mile section in the study area on the basis of water-level measurements from 164 observation wells. For this study, measurements made at each site during the winter months of 1985, 1986, and 1987 were averaged. These interpolated altitudes (1,859 in all), along with bedrock-surface and base-year water-level altitudes, were used to prepare a hydrologic map that illustrates percentage change in saturated thickness.

Saturated thickness, as used in this report, is the thickness of the High Plains aquifer between the ground-water surface, as indicated by water-level altitudes, and the bedrock surface. Because irrigation development in west-central Kansas was minimal prior to 1950, the saturated thickness during 1950 represented a nearly static condition in the aquifer. Thus, the decrease in saturated thickness of the aquifer since 1950 is related to the effects of irrigation withdrawals on the volume of water in storage.

## PERCENTAGE CHANGE IN SATURATED THICKNESS

Percentage changes in saturated thickness of the High Plains aquifer are shown on the map as negative (-) values for areas where the average 1985-87 water levels rose and as positive (no sign) values for areas where the average 1985-87 water levels declined. Apparent increases in saturated thickness generally occurred in areas of sparse data or relatively thin saturated thickness, and large errors were possible; therefore, zero and negative-change areas were not contoured. A decrease in saturated thickness of 100 percent may indicate that (1) the aquifer has been dewatered or (2) no saturated thickness occurred in that area during 1950. In general, percentage change in saturated thickness indicates the degree of stress on the aquifer in most areas resulting from irrigation pumpage.

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Watts, K.R., and Stullken, L.E., 1981, Generalized configuration of the base of the High Plains aquifer in Kansas: U.S. Geological Survey Open-File Report 81-344, scale 1:500,000, 1 sheet.

## CONVERSION TABLE

For those readers who may prefer to use metric (International System) of units, the conversion factors for the inch-pound units used in this report are listed below.

| Multiply inch-pound unit | By | To obtain metric unit |
|---|---|---|
| mile | 1.609 | kilometer |
| square mile | 2.59 | square kilometer |