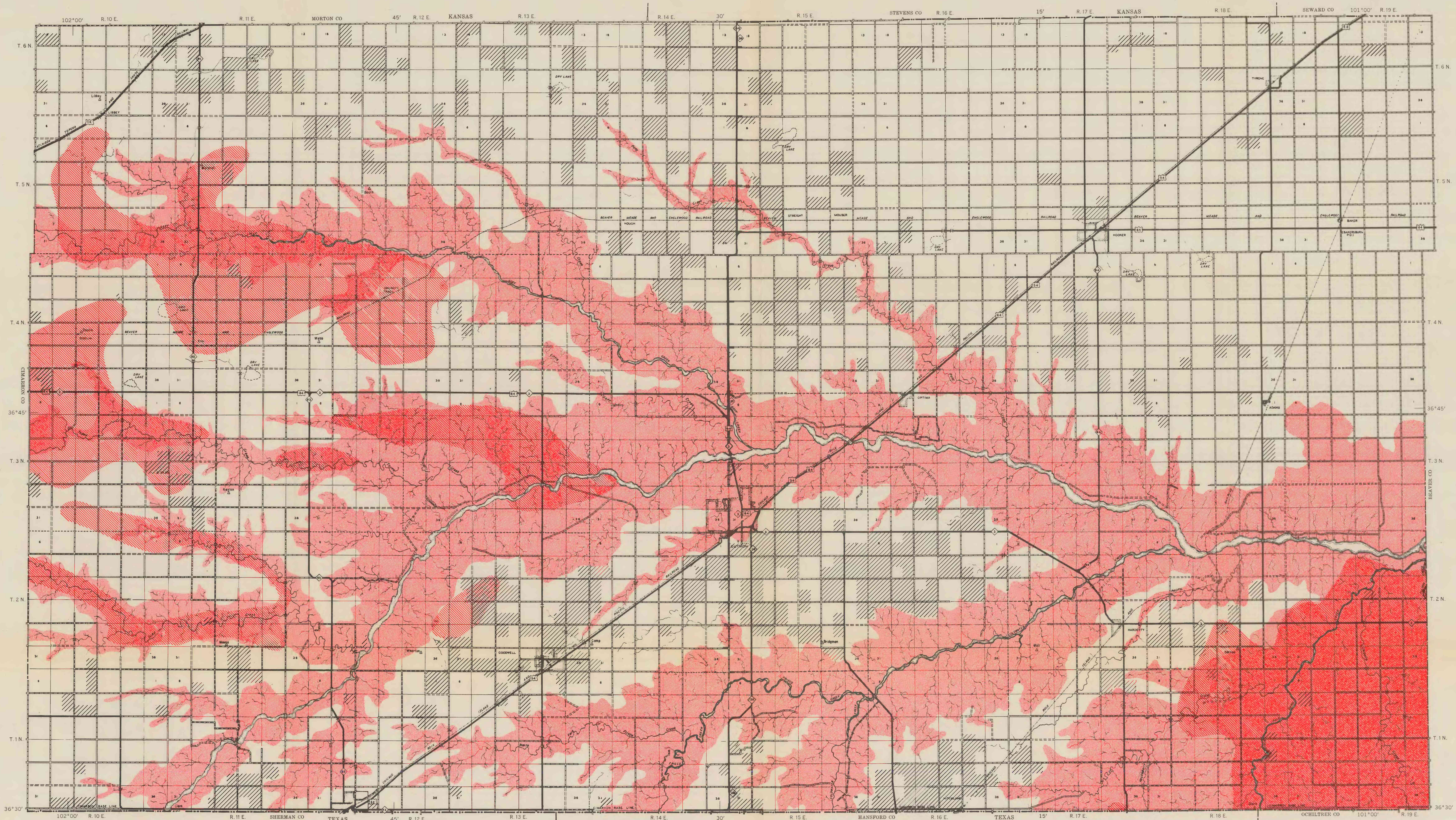
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
OKLAHOMA WATER RESOURCES BOARD

HYDROLOGIC INVESTIGATIONS
ATLAS HA-250 SHEET 3 OF 3



Base modified from map of the Oklahoma Dept. of Highways

Hydrology by P. R. Wood, 1966

FAVORABILITY FOR IRRIGATION DEVELOPMENT, JANUARY 1966

SCALE 1:125 000

EXPLANATION

This map shows favorability for irrigation development based on the relation of topography and the thickness of saturated material in the unconsolidated deposits. Irrigated areas, as of January 1966, are shown by black pattern on the map

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Areas with sufficient thickness of saturated materials and with topography generally favorable for irrigation development

At most places the land surface is a flat to gentle undulating upland plain containing many shallow undrained depressions. The ground-water underlying the plain generally has a sufficient thickness of saturated materials for the development of moderate-to-large quantities of ground water. However, the permeability of the water-bearing deposits may change vertically and horizontally or local bedrock highs may restrict the thickness of the saturated zone and limit the amount of ground water available for development. Hence, persons interested in developing large ground-water supplies should drill one or more test holes to obtain detailed information on the thickness of the saturated zone, and on the relative percentages of clay, silt, sand, and coarser materials in the area selected for development. (Irrigable areas on the flood plains of principal streams are not shown)

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Areas with sufficient thickness of saturated materials but with topography less favorable for irrigation development

Considered less favorable for irrigation primarily because of surface relief. At most places, the area has been deeply eroded by ephemeral streams and the resulting slopes are too steep for irrigation. The ground-water reservoir appears to have sufficient thickness of saturated materials for the development of moderate- to- large quantities of ground water. However, the cost of pumps, pipe, and other equipment required to lift and transport water from a well or well field to areas of use on the upland plain may be prohibitive for most agriculture·

When development is contemplated, consideration should be given to the saturated thickness, permeability of the water-bearing deposits, and the additional cost involved in lifting and transporting water to place of use

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Areas with limited thickness of saturated materials but with topography favorable for irrigation development
(Boundaries of areas are not certain)

At most places the land surface is a flat to gently undulating upland plain and saturated thickness is less than 50 feet

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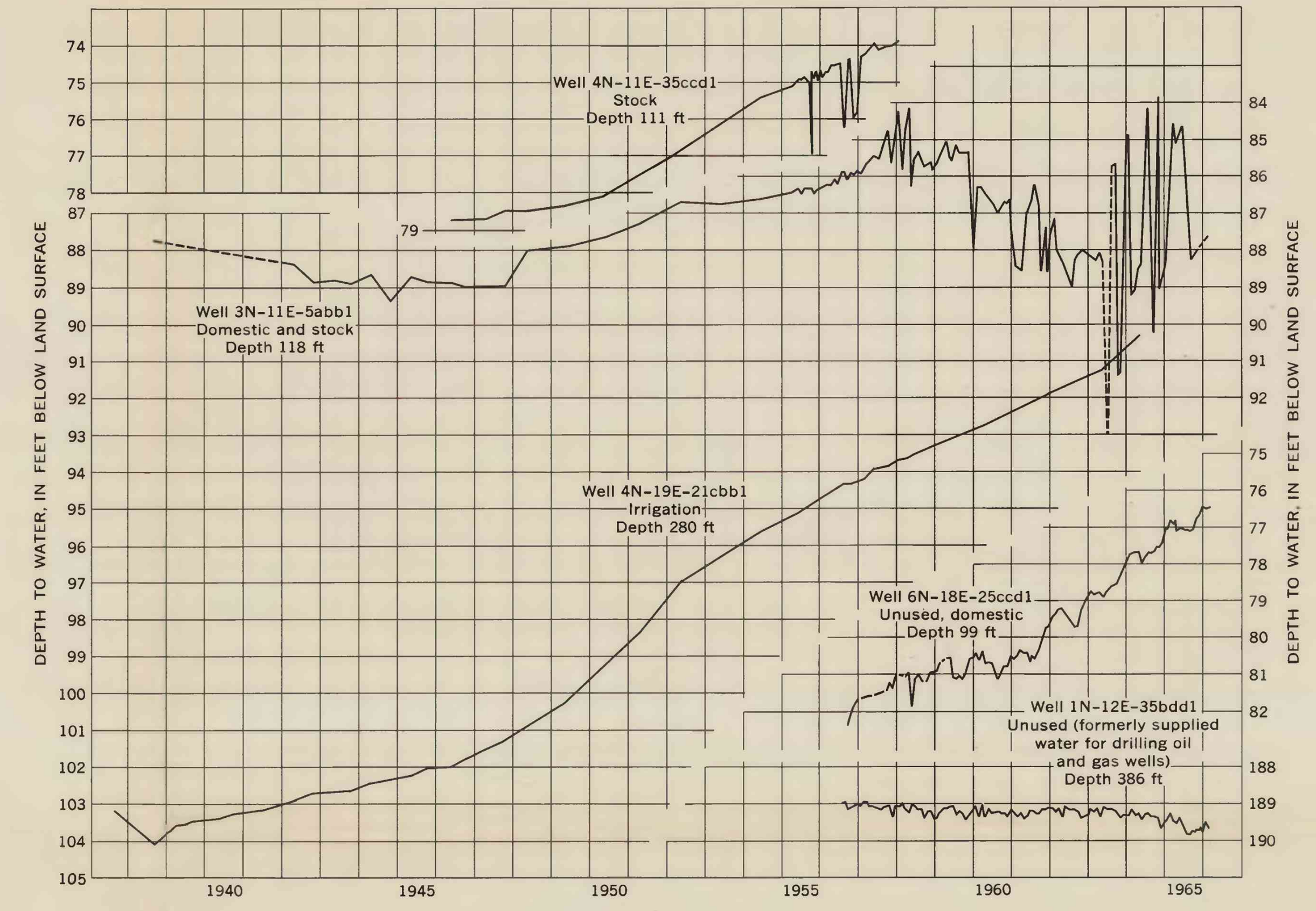
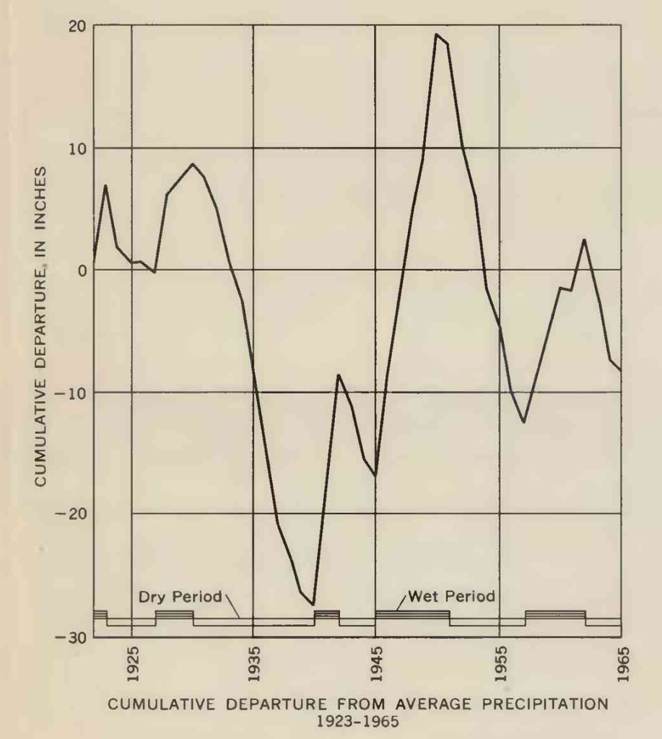
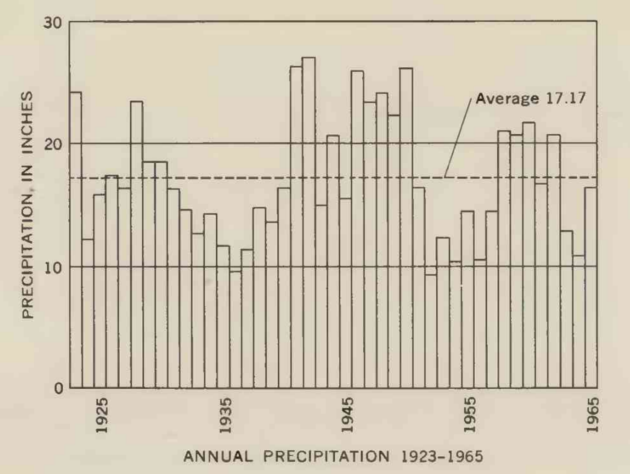
Areas with limited thickness of saturated materials and with topography less favorable for irrigation development

At most places, the land surface is deeply eroded and saturated thickness is less than 50 feet

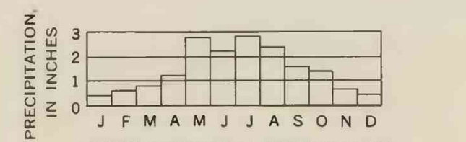




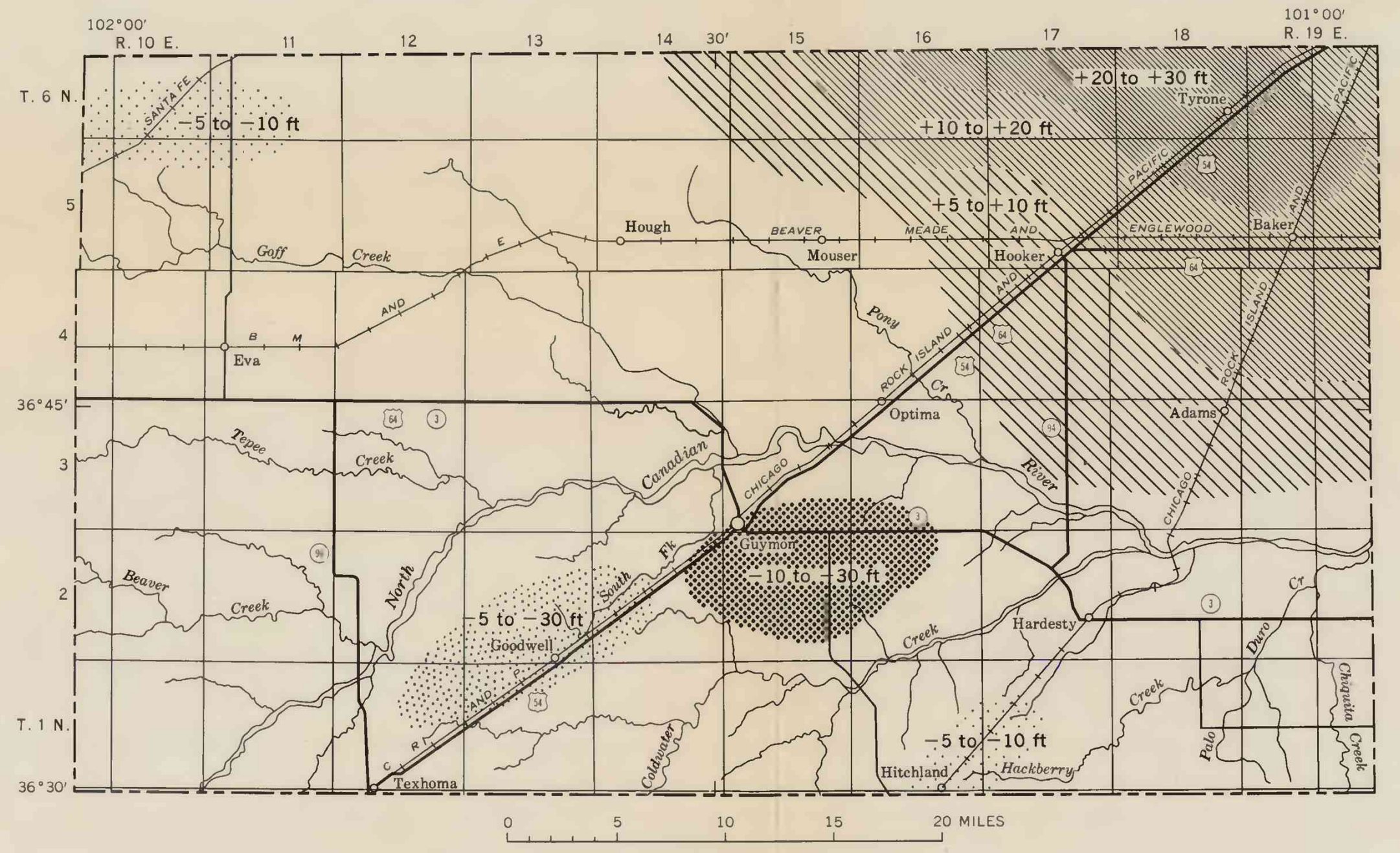
CUMULATIVE DEPARTURE FROM AVERAGE PRECIPITATION
1923–1965



ANNUAL PRECIPITATION 1923–1965



AVERAGE MONTHLY PRECIPITATION
1923–1965



Generalized Water-Level Changes, 1938–66

The areas where ground-water levels measured in February and March 1966 have changed significantly from water levels recorded by Schoff (1939, pl. 1, and p. 185–222) are indicated on the above map.

The ruled pattern outlines areas where ground-water levels have risen, and the stippled pattern outlines areas where water levels have declined. The approximate rise or decline of water levels, in feet, is indicated by numbers in the designated areas. Water levels may have changed in other parts of the county but more information is needed before these areas can be outlined and the net change determined.

PRECIPITATION AND WATER-LEVEL FLUCTUATIONS

Water-level fluctuations in five representative wells and precipitation for the period of record at Goodwell are shown in the graphs.

The average monthly distribution of precipitation at Goodwell illustrates how the annual precipitation deviates from the long-term average. The cumulative departure from average annual precipitation illustrates trends during the period 1923–65; upward trends on the graph represent periods of greater than average precipitation.

The years 1931–40 were a period of drought in the county as it was in most of the Great Plains. Near the end of this period the water table was at the lowest level. Beginning in 1941, precipitation increased and for the next 9 years it was generally above average. This period of above-average precipitation is reflected in the hydrographs by a steady upward trend for wells located in areas where water was added to the ground-water reservoir faster than it was withdrawn by natural and artificial means. From 1951 through 1957, precipitation was considerably below average. During the same period, however, ground-water levels continued to rise. This continued rise in water levels probably is a reflection of the time required for changes in the rates of recharge or discharge to affect the ground-water reservoir.

Water levels cannot rise until water is added to the ground-water reservoir at the water table. Rate of recharge at the water table is determined largely by the amount of water that passed through the soil zone at some previous time. Analyses of water-level data (Marine, 1963, p. 4–10) have shown that in the Pliocene and Pleistocene deposits in the Oklahoma Panhandle, water-level changes lag from 1 to 7 years behind rainfall that caused the changes. The time lag is determined by (1) the depth to the water table and (2) the rate at which water moves downward to the zone of saturation. The hydrograph of well 1N-12E-35bdd1, in an undeveloped area about 2 miles east of Texhoma, shows a slight downward trend and probably reflects the effects of ground-water withdrawals for irrigation in the Goodwell and Texhoma areas.

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AVAILABILITY OF GROUND WATER IN TEXAS COUNTY, OKLAHOMA

By
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1967