

INTRODUCTION

This report is one in a series of reports that depict altitudes of water levels since 1977, the most recent of which (Barbie and others, 1989) presented maps of the altitudes of water levels for 1989. This report was prepared in cooperation with the City of Houston and the Harris-Galveston Coastal Subsidence District, and presents approximate altitudes of water levels in wells in the Chicot and Evangeline aquifers in the Houston area, Texas, January-February 1990.

GEOHYDROLOGY

The Chicot aquifer (in Pleistocene deposits) and the underlying Evangeline aquifer (in Pliocene and Miocene deposits) are composed of discontinuous sedimentary strata of sand, silt, and clay, which thicken to the southeast (Williams and Ranzau, 1987). In the western and northern parts of the area, the aquifers are exposed at land surface and are under water-table conditions. In the southern and eastern parts of the area, the aquifers are under artesian conditions. Because there is a slight hydraulic connection between the Chicot and Evangeline aquifers and between the Chicot aquifer and streams on the land surface, the system is termed "leaky" (Carr and others, 1985). Beneath Galveston Bay and Lake Houston, the Chicot and Evangeline aquifers are confined by clays in the overlying Beaumont Formation and, therefore, are not as leaky in that part of the area.

The water in the aquifers is fresh (less than 1,000 milligrams per liter dissolved-solids concentration) in most of the area. The primary basis for separating the Chicot aquifer from the underlying Evangeline aquifer is a difference in hydraulic conductivity. The hydraulic conductivity of the Chicot is greater than the Evangeline and, in part, causes the difference in the altitude of the water levels in wells completed in the two aquifers (Meyer and Carr, 1979). Water levels in wells in the Chicot aquifer (fig. 1) are generally higher than those in wells in the Evangeline aquifer (fig. 2). The water levels in the Houston area, in effect, can be considered a system of intersecting cones of depression caused by the withdrawal of water from numerous wells throughout the area.

WATER-LEVEL MEASUREMENTS

Water levels used in preparation of this report were obtained by steel tape and airline measurements, by electronic sensors, or from reports by well operators. Sixty percent of the observation wells are pumped frequently, and some are pumped daily. Multiple measurements were made when wells were not being pumped. However, antecedent pumping conditions commonly were not known. Measurements in wells having comparable depths and screened intervals were selected for construction of the maps. Additional wells in the southern and southwestern parts of the Houston area were added to the monitoring network in 1990 to improve definition of water levels in those parts of the area. The maps were prepared using measurements from 342 wells.

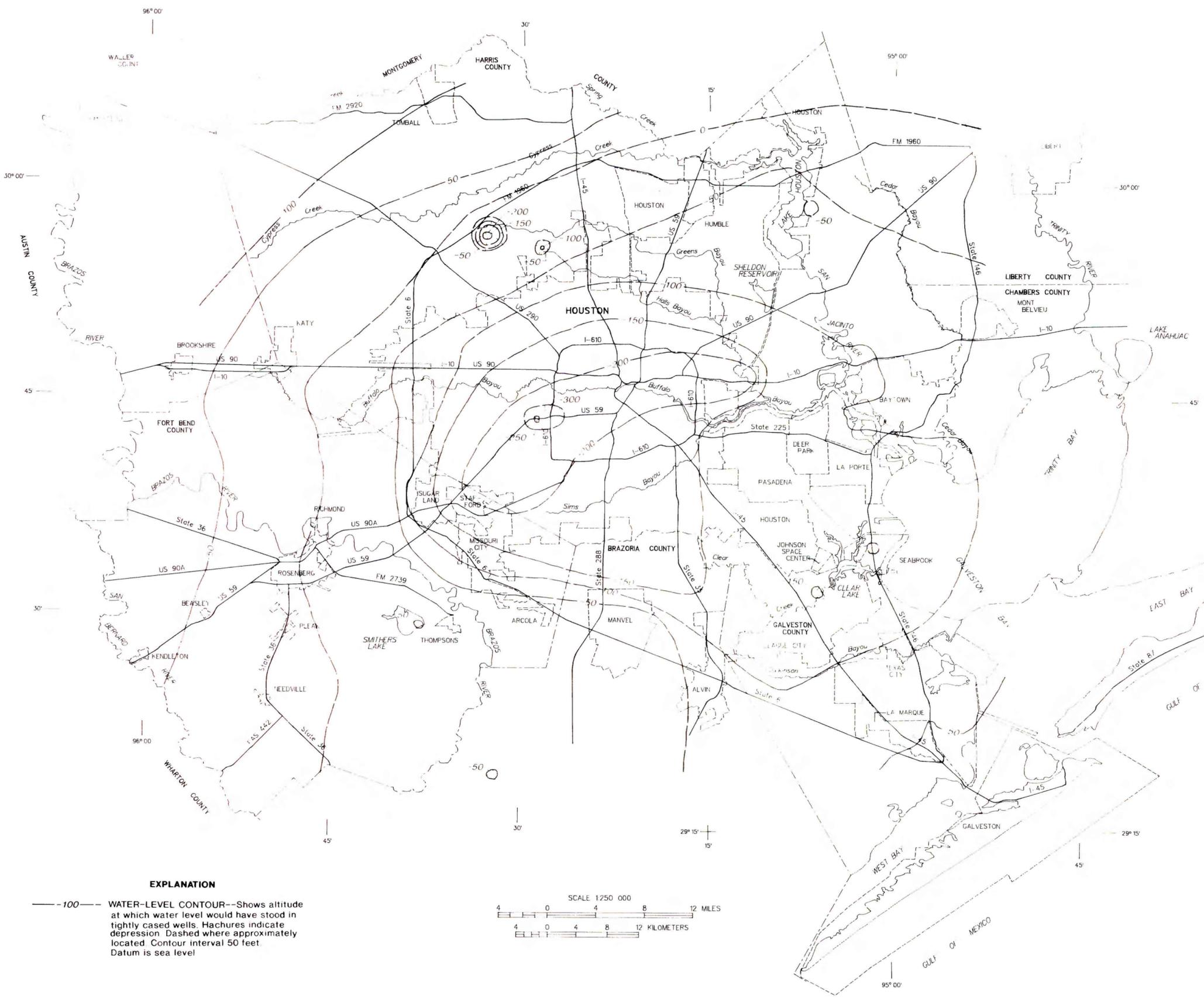
REFERENCES CITED

- Barbie, D.L., Coplin, L.S., Bonnet, C.W., 1989, Approximate altitude of water levels in wells in the Chicot and Evangeline aquifers in the Houston area, Texas, spring 1989. U.S. Geological Survey Open-File Report 89-237, 2 sheets.
- Carr, J.E., Meyer, W.R., Sandeen, W.M., and McLane, I.R., 1985, Digital models for simulation of ground-water hydrology of the Chicot and Evangeline aquifers along the Gulf Coast of Texas. Texas Department of Water Resources Report 289, 101 p.
- Meyer, W.R., and Carr, J.E., 1979, A digital model for simulation of ground-water hydrology in the Houston area, Texas. Texas Department of Water Resources Report LP-103, 27 p.
- Williams, J.F. III, and Ranzau, C.E., Jr., 1987, Ground-water withdrawals and changes in ground-water levels, ground-water quality, and land-surface subsidence in the Houston district, Texas, 1980-84. U.S. Geological Survey Water-Resources Investigations Report 87-4153, 56 p.

CONVERSION FACTORS

Multiply	By	To obtain
foot	0.3048	meter
mile	1.609	kilometer

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



EXPLANATION

—100— WATER-LEVEL CONTOUR—Shows altitude at which water level would have stood in tightly cased wells. Hachures indicate depression. Dashed where approximately located. Contour interval 50 feet. Datum is sea level.

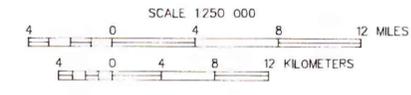


Figure 1.—Map showing approximate altitude of water levels in wells in the Chicot aquifer, January-February 1990.

APPROXIMATE ALTITUDE OF WATER LEVELS IN WELLS IN THE CHICOT AND EVANGELINE AQUIFERS IN THE HOUSTON AREA, TEXAS, JANUARY-FEBRUARY 1990

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