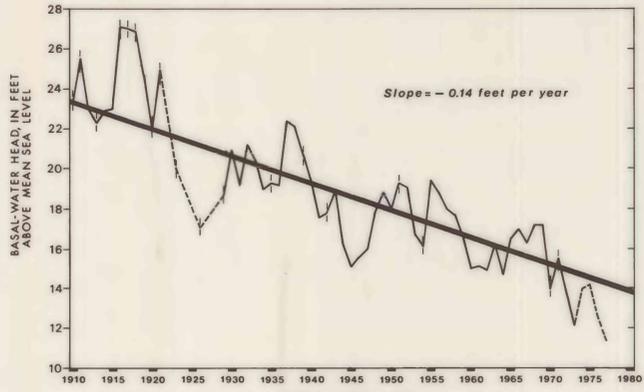
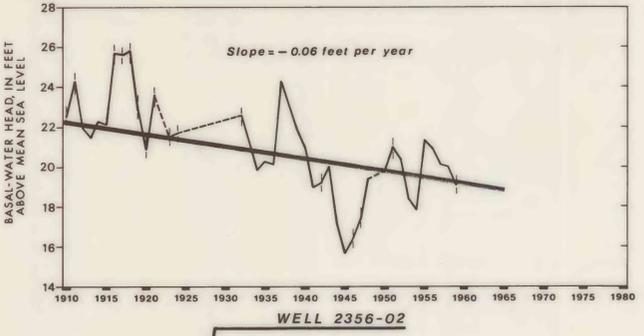


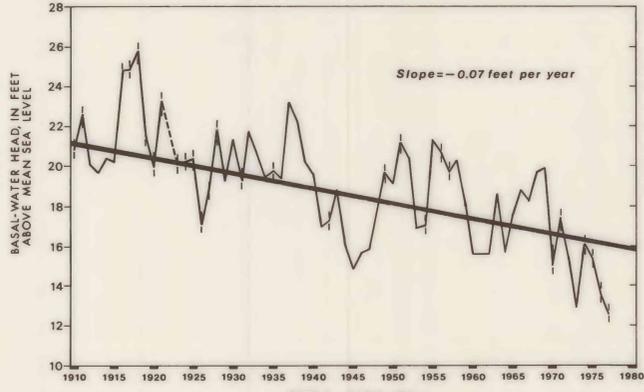
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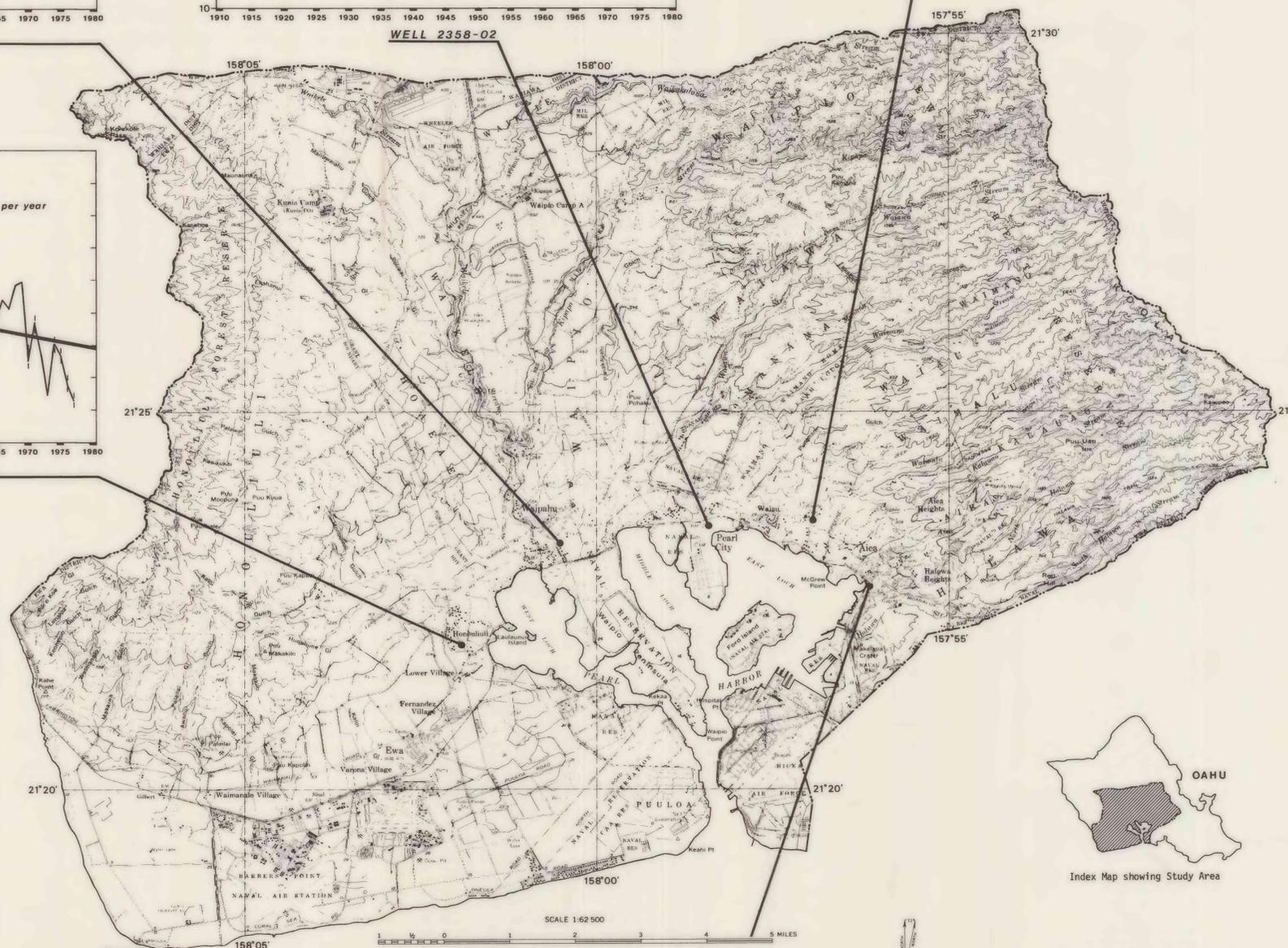
WELL 2358-02



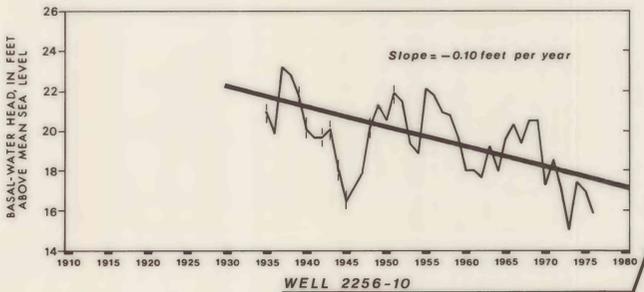
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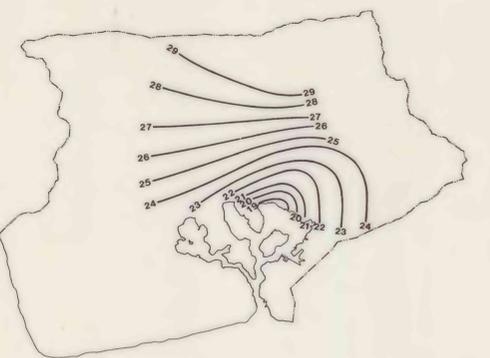
WELL 2101-03



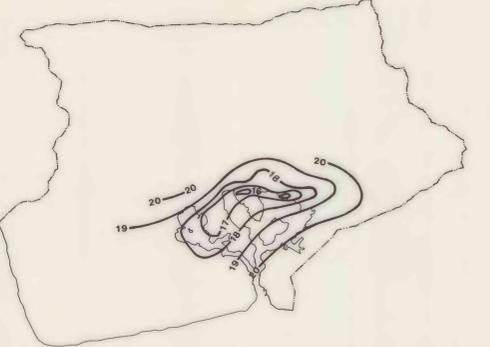
**BASAL-WATER HEAD TRENDS, PEARL HARBOR AREA**



WELL 2256-10



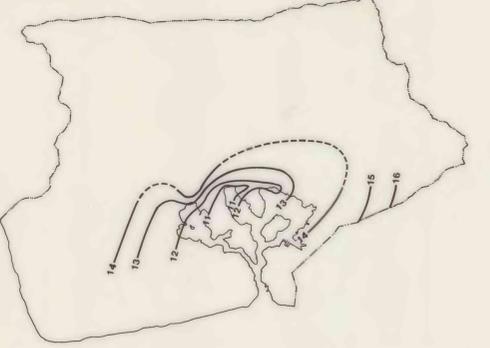
BASAL-WATER HEAD CONTOURS BASED ON MEASUREMENTS ON MAY 31, 1958, FROM VISHER AND MINK, 1964.



BASAL-WATER HEAD CONTOURS BASED ON MEASUREMENTS ON MAY 2, 1967, FROM DALE AND ENART, 1971.



BASAL-WATER HEAD CONTOURS BASED ON MEASUREMENTS ON JANUARY 11, 1978.



BASAL-WATER HEAD CONTOURS BASED ON MEASUREMENTS ON AUGUST 9, 1978.

**EXPLANATION**  
 15 — Ground-water head contour in feet, above mean sea level, dashed where uncertain.

**BASAL-WATER HEAD TRENDS**  
 The basal-water heads in Pearl Harbor wells have been declining since development began in the 1880's. Hydrographs of the heads at five wells in the Pearl Harbor area, which date back to 1910, show a declining trend with short-term fluctuations. The annual water levels used in the hydrographs are the means of monthly measurements. Years during which less than 12 monthly measurements were made are indicated by a vertical line through the point. When no measurements were made during the year, gaps in the record are shown by broken lines on the figures. Long-term trends, shown as straight lines, were determined by the least-squares method, using annual means of only those years during which at least 12 monthly measurements were recorded.

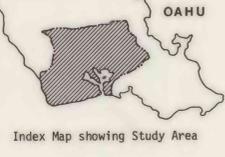
The long-term rates of decline of water levels in the five wells range from 0.06 to 0.14 feet per year and average about 0.09 foot per year. In accordance with the Ghyben-Herzberg principle, the average head decline implies that the freshwater lens has thinned at a rate of 3.7 feet per year, or 41 times the head decline of 0.09 foot. The area underlain by the freshwater lens is estimated to be 120 square miles, and the storage coefficient of the aquifer is assumed to be 0.10. The inferred volume of water withdrawn annually from storage during the period 1910-77 is, therefore, about 9.3 billion gallons or an average of 25 Mgal/d.

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Base from U.S. Geological Survey  
1:62,500, Island of Oahu, 1960

SCALE 1:62,500  
 1 2 3 4 5 MILES  
 1 2 3 4 5 KILOMETERS  
 CONTOUR INTERVAL 80 FEET  
 DATUM IS MEAN SEA LEVEL



Index Map showing Study Area

**BASAL-WATER HEAD CONTOURS**

Contours of the basal-water head represent the surface to which the basal water would rise if tapped by a well or piezometer. The four maps shown were compiled from head measurements taken nearly simultaneously at accessible wells in the area. The May 31, 1958, measurements were taken at the end of a 4-month period when no water was pumped for irrigation. The two measurements in 1978 were intended to be taken at the beginning and end of heavy pumping in the irrigation seasons; however, owing to drought conditions, no significant reduction in pumping occurred at any time during 1977 and 1978.

The basal-water head maps in the Pearl Harbor area clearly reflect the influence of the large spring discharge along the shore near the center of Pearl Harbor. Ground-water flow is roughly perpendicular to the head contours. The general pattern of flow is from the west, north, and east toward the springs.

Between 1958 and 1978, basal-water heads in the area have dropped about 7 feet. The heads apparently dropped evenly throughout the area, so that the pattern and the gradients are generally unchanged.

**GROUND-WATER STATUS REPORT, PEARL HARBOR AREA, HAWAII, 1978**

By  
 Ronald L. Soroos and Charles J. Ewart  
 1979