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POTENTIOMETRIC SURFACE MAPS AND WATER-LEVEL-CHANGE MAP, 1960-76, FOR THE LOWER AQUIFER OF THE CRETACEOUS POTOMAC GROUP IN FAIRFAX COUNTY, VIRGINIA

By R. H. Johnston and J. D. Larson

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INTRODUCTION

The Cretaceous Potomac Group in the Coastal Plain of Fairfax County consists of interbedded sands, silts, and clays that underlie the southeastern quarter of the county. These deposits thicken from a feather edge at the Fall line on the northwest to about 600 feet on the southeast near the Potomac River. The sands are fluvial (channel-fill) deposits that occur as relatively narrow, elongate lenses. The greatest number of sand lenses and thickest sand sections occur in the lower 100 feet. Collectively these sand lenses form an important water-bearing zone which is referred to here as the lower aquifer of the Potomac Group. Most high-yielding wells in the Coastal Plain of Fairfax County tap the lower aquifer.

The three maps presented here relate to water levels in the lower aquifer and are part of a series of hydrogeologic maps on the Potomac Group of Fairfax County. This series includes a preliminary geologic map of the Coastal Plain of Fairfax County (Force, 1975), a map depicting the altitude of base and thickness of the Potomac Group (Larson and Froelich, 1977) and maps showing lithofacies and sub-

surface distribution of sand aquifers (Johnston and Froelich, 1977). Future maps in this series will show transmissivity of the lower aquifer, chemical quality of ground-water, and areas of high ground-water potential.

WATER LEVELS IN THE LOWER AQUIFER

In recent years water levels in the lower aquifer have fluctuated considerably due to changes in the location and withdrawal rates of pumping wells. The three maps document these water-level changes. Plate 1 shows water-level elevations and approximate potentiometric contours in the late 1950's and early 1960's. The map is based on water-level measurements made over a period of several years during the course of ground-water studies by Johnston (1964) and Mack (1966). Plate 1 is intended to show the generalized configuration of the potentiometric surface as it existed in 1960 and is not intended to give precise water-level data at specific sites.

Plate 2 is a map showing the potentiometric surface in the lower aquifer in 1976. All water-level measurements were made between March and June 1976 and the map presents a more accurate representation of the potentiometric surface at a specific time than Plate 1. Both Plates 1 and 2 show a regional hydraulic gradient to the southeast which

is distorted locally by cones of depression around pumping wells. The southeastward gradient reflects the initial direction of ground-water flow from the topographic highs on the northwest to the Potomac River on the southeast. The southeast gradient has been steepened by heavy pumpage at Indian Head, Maryland (located southeast of the area shown on plates 1-3).

In 1960, a major cone of depression existed in and to the south of the city of Alexandria (plate 1). Reflecting a marked decline in pumping in the Alexandria area, the cone is reduced in size in 1976 (plate 2).

Plate 3 shows the net water-level changes between 1960 and 1976 and the locations of centers of pumpage. Average pumping rates during the years 1960 and 1975 are shown for each pumping center. Note that one or two wells within a pumping center may account for most of the pumping. Thus, the area of a pumping center does not necessarily coincide with the center of a cone of depression (plates 1 and 2) or with an area of water-level change (plate 3).

The general rise of water levels can be attributed to a sharp decline in pumpage during the 15-year period. Average pumpage declined from 4 M gal/d in 1960 to about 1 M gal/d in 1975. The decline in ground-water withdrawals has resulted from abandonment of wells and conversion to surface-water sources by major water users in the area.

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