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RECONNAISSANCE OF GROUNDWATER QUALITY IN THE U.S. VIRGIN ISLANDS

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INTRODUCTION

The demand for groundwater in the U.S. Virgin Islands, especially for domestic use, has increased markedly in recent years. In 1982, groundwater withdrawals for public and domestic use in the U.S. Virgin Islands were about 1.1 million gallons per day. Recent investigations have shown that additional withdrawals might be possible.

In spite of increasing demands for groundwater, data on its quality is very scarce. The lack of data constitutes a major gap in the knowledge of the U.S. Virgin Islands' hydrologic environment. There are no active water-quality monitoring networks, and the most recent reconnaissance was conducted nearly two decades ago.

In July 1984, the U.S. Geological Survey, Water Resources Division and the Water Resources Research Institute of the College of the Virgin Islands conducted a reconnaissance of the groundwater quality at selected wells throughout the U.S. Virgin Islands. Wells representing the principal aquifers were sampled for physical, chemical and bacteriological characteristics. Selected wells were also sampled to determine potential contamination with priority pollutants as designated by the U.S. Environmental Protection Agency (EPA). The data collected is summarized in this report and will provide a base line for future investigations and an assessment of water use versus quality.

METHODS AND PROCEDURES

Nineteen wells on St. Croix, St. Thomas and St. John, representing the most important pumping centers, were sampled. The samples were collected as closely as possible to the well casings, and standard methods were used in the collection process. The physical characteristics of temperature, specific conductance, pH and total alkalinity of the samples were measured at each site immediately upon collection of the samples. The depth of the water level below the land surface was also determined. Samples for chemical analysis of trace elements, common ions and nutrients were collected, filtered and preserved in accordance with standard procedures. Samples for the determination of priority pollutants were collected at five wells and preserved. The samples were then shipped to the U.S. Geological Survey National Water Quality Laboratory in Doraville, Georgia, for chemical analysis. Determinations of fecal coliform and fecal streptococci bacteria were completed from raw water samples using the membrane filter method. Processing and incubation of the samples were begun in the field shortly after collection.

RESULTS

The principal findings were as follows:

1. Specific conductance values normally ranged from 1,400 to 3,000 micromhos per centimeter. Two wells had values which surpassed 4,500 micromhos per centimeter.
2. Fecal coliform and fecal streptococci bacteria were detected in samples from 18 of the wells sampled. Colony counts of fecal streptococci bacteria were as high as 5,800 colonies per 100 milliliters of raw water sampled.
3. Nitrate concentrations exceeded 1.0 milligrams per liter at ten of the wells sampled.
4. Chloride concentrations generally ranged from 180 to 600 milligrams per liter. At 13 wells, chloride concentrations exceeded the EPA drinking water standard of 250 milligrams per liter.
5. Sulfate concentrations for most wells were less than the drinking water standard of 250 milligrams per liter. All wells sampled had total dissolved solids exceeding the EPA secondary drinking water standard of 500 milligrams per liter.
6. Concentrations of organic compounds and most trace elements at selected sites were less than detection limits.

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