

WATER QUALITY IN THE PUBLIC DISTRIBUTION
SYSTEMS OF THE VIRGIN ISLANDS

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ABSTRACT

The public distribution systems of the Virgin Islands were first installed in 1949 through the mid-1950's. The cast iron pipes which comprise the system are subject to severe corrosion. Though the systems have undergone several major repairs, questions have arisen about the quality of the water being distributed as a direct result of a typhoid epidemic at a public housing complex on St. Croix in which potable water was the suspected carrier. These fears are understandable in as much as the systems can become contaminated by several different pathways. A study of the distribution systems of all three islands was conducted. The principal findings were that with the exception of iron, probably due to residual rust in the lines, all systems easily met the U.S. E.P.A. physical and chemical parameters for drinking water. The real threat to public health however is due to inadequate or improper chlorination. Without proper chlorination, then the outbreak of some other water borne enteric disease is highly likely.

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INTRODUCTION

The public distribution systems of the Virgin Islands were first installed in 1949 through the mid-1950's. The system on St. Croix serves an area of 14 square miles with 3,000 connections; in St. Thomas it serves 2 square miles with 2,150 connections; and, on St. John 0.3 square miles are served through 10 connections. The necessary pressure in the systems on St. Thomas and St. John is maintained by pumping while the St. Croix system is mainly a gravity operation. Maintenance of the distribution lines is difficult. Through the years these systems have undergone several major repairs due to corrosive soils and the presence of most of the lines in areas in close proximity to sea water.

Water in the public distribution systems in the Virgin Islands can most readily become contaminated due to leakage into the lines, cross connections, siphonage during periods of negative pressure, and insufficient disinfection. Several questions have been raised by the public concerning the quality of the water being distributed. In 1985 this was particularly a concern when 66 cases of typhoid were diagnosed and confirmed at a housing complex in St. Croix. Water from the public distribution system was the suspected carrier.

The immediate benefit of the project is obvious. Analysis of water at several points in the distribution systems

will assist in the identification of areas where water contamination is more likely to occur. This has been hindered in the past when analysis with any similarity was performed on an emergency basis and often by groups with particular self-interests.

This investigation is especially timely in that the distribution system in St. Thomas is currently undergoing major renovations. This project provides both before and after looks at contamination in this system. The investigation provides information that can be used in planning similar renovations on the St. John and St. Croix systems. Determination of quality profiles of the St. Thomas distribution system will also develop baseline data for monitoring the integrity of the system. For these reasons there is a need for a comprehensive systematic survey of water quality in the public distribution systems of the Virgin Islands.

MATERIALS AND METHODS

Site Selection

To help identify the sample point locations, a map of the potable water distribution system was obtained, then with the aid of the Department of Conservation and Cultural Affairs personnel responsible for monitoring the quality of water in the distribution systems, field trips were made to locate useable sample points.

In St. Thomas, there are four main lines which constitute the distribution system (Figure 1). From these main lines extend the laterals which serves the homes and businesses. The heart of the water supply system is a 2.5 million gallon per day desalination facility located at Krum Bay, St. Thomas. The desalinated water is pumped first to storage tanks, enters into filter tanks, then passes through a chlorination chamber. From the chamber it enters directly into the distribution system.

The first main line is a ten inch line laid in 1975, which travels from Krum Bay west to the University of the Virgin Islands. The second main line is a six inch line laid in 1950 that runs east from Krum Bay along Harwood Highway and Main Street. This is the line which was being relaid with new eight inch Ductile steel, to replace the original cast