

WATER QUALITY OF PUBLIC HOUSING PROJECTS
IN THE VIRGIN ISLANDS

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ABSTRACT

The predominant source of water for residents of the United States Virgin Islands is cistern-stored water. In this study of cisterns serving residents of public housing, it was found that only about one-half of the samples collected over time from ten study sites were in compliance with the mandates of the Safe Drinking Water Act of 1974 as amended in 1986. Contamination was correlated with absence of free residual chlorine in cisterns. Chlorination practices were irregularly applied by public housing staff during the study period. The presence of pathogenic Pseudomonas aeruginosa is not well-correlated to the standard total coliform indicator suggesting that standard mandates of the Safe Water Drinking Act do not adequately protect human health when applied to cistern-stored water.

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TABLE OF CONTENTS

	Page
ABSTRACT	i
ACKNOWLEDGEMENTS	ii
TABLE OF CONTENTS	iii
INTRODUCTION	1
MATERIALS AND METHODS	3
Site Selection	3
Sample Collection Procedures	3
Physical-Chemical Analysis	4
Microbiological Analysis	4
Pseudomonas aeruginosa Analysis	5
Salmonella spp. Analysis	5
Salmonella typhi Analysis	6
Verification of Isolates	6
RESULTS	8
DISCUSSION	17
SUMMARY	22
BIBLIOGRAPHY	26

INTRODUCTION

Only about one-third of the residents in the U.S. Virgin Islands are served by a potable water distribution system. Almost 80% of Virgin Island residents rely to some extent on rainfall harvesting techniques with cistern storage (22,40,41). All buildings, including housing projects administered by the Virgin Islands Public Housing Authority, are required under the Virgin Islands Code to have cisterns. Most Public Housing projects are not served by the potable water distribution system. Cisterns in those projects are filled with water from a variety of sources including rain water, water transported in trucks from desalination plants, and water transported in trucks from wells. Typically, water that is transported to public housing is rationed by Public Housing officials with service restricted to early morning and night-time hours. In cisterns supplied by potable water and supplemented by rain water, rationing is less frequent.

Public Housing cisterns are covered by the mandates of the Safe Drinking Water Act of 1974 as amended in 1986 because they serve more than 25 residents on a year round basis and/or have more than 15 service connections. Consequently, they must contain ≤ 1 total coliform per 100mL of sample (2,4,5). Studies of the quality of cistern-stored water show that such water frequently fails to conform to the established standards (22,29,39,41). Since

cisterns are systems which are open to the environment it is not surprising that they are subject to contamination.

In a previous study of cisterns in private residences in the U.S. Virgin Islands (41), we documented the following observations:

1. Most cisterns would not comply with the mandates of the Safe Drinking Water Act.
2. Major sources of contamination include tree leaves, dust, and animal droppings.
3. Tree leaves are major reservoirs for organisms leading to high heterotrophic plate counts, total coliform, fecal coliform fecal streptococci, and Pseudomonas aeruginosa (Ps. aeruginosa).
4. Chlorination is highly effective at reducing microbial contaminants for 3 to 5 days, but must then be replenished.
5. Cistern sediments provided chlorine-resistant reservoirs for recontamination of cisterns.

Both the quality and quantity of water supplied to tenants of public housing is a frequent matter of public concern in the Virgin Islands. While concern peaked following an outbreak of typhoid at a Public Housing project on St. Croix in 1985 in which 66 cases were diagnosed (40), the issue is frequently raised in less dramatic ways. In this study, we attempt to assess the quality of water supplied to Public Housing. Specifically we wish to:

1. Assess the degree to which Public Housing cisterns are in compliance with Safe Drinking Water standards.
2. Assess health risks to Public Housing tenants from other pathogenic contaminants such as Ps. aeruginosa and Salmonella spp.
3. Develop further information upon which to base changes in water quality standards for cistern-stored water.