



## SUBSURFACE GEOLOGY OF THE ST. CROIX CARBONATE ROCK SYSTEM

By

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### INTRODUCTION

Investigations into St. Croix's geologic history date to before the turn of the century. Subsurface geological information is acquired through drilling records, data from outcrops and public well logs.

The focus of this research was the central plain of the island. This central plain was formed by deposits of alluvium and carbonate rocks (limestone). The limestone is referred to as "Kingshill" limestone and is the major water producing rock body on St. Croix. However, the available information on the subsurface geology of this formation is presently insufficient to permit informed decisions for the maximum exploitation of St. Croix's water resources. From the standpoint of hydrology, geologic information is required in order to mathematically model aquifer behavior. From a strictly geologic standpoint, the information gathered allows the reconstruction of the development of St. Croix as an island and its part in the geologic history of the Caribbean basin.

The carbonate rock system of the central plain was divided by the authors of this report into two layers called Kingshill limestone and Post-Kingshill limestone. The carbonates are thought to range from 0 to 600 feet thick and are underlain by a dark impermeable Jealousy Formation clay that exceeds 1400 feet in thickness. This report differed from other research findings in several ways; one major difference was that in this report the Post-Kingshill limestone was discussed as a separate and distinct unit, another difference was that this research was concerned primarily with the rocks found in the southeastern section of the central plains area.

There has been considerable evolution of thought concerning the formation of the geology of the central part of St. Croix. According to the authors, the Kingshill limestone was formed in the middle Miocene age and the underlying Jealousy Formation in the Oligocene age. The area in which the Kingshill carbonate was deposited has been described as a wedge shaped fault bound basin. The basin was open to the northeast and the south and was bracketed by the northside and eastern ranges of St. Croix.

### METHODS

Six test holes were drilled with a rotary drilling rig capable of sampling to several hundred feet. The total drilling footage exceeded 1000 feet. With the help of the V.I. Department of Public Works personnel, well logs and summaries of previous water well drillings were collected and compiled.

These reports were used to assess the thickness and the lateral extent of geologic units in the central plain of the island, and the nature of the Kingshill/Jealousy contact. Additional information from cores drilled by Martin Marietta Alumina and Tippets, Abbot, McCarty and Stratton Inc. were donated to this project.

### RESULTS

The Kingshill limestone is varied lithologically over the area through which it extends. It is the most important aquifer unit on the island of St. Croix in terms of numbers of wells drilled, although yields vary according to location. The Post-Kingshill limestone was found to be a porous and permeable part of the carbonate section on St. Croix. The Post-Kingshill rocks are extensively utilized as water-bearing strata by private, public and industrial users. The porosity and permeability of these rocks are related both to depositional processes and to later alteration by geochemical effects. Depositionally, the Post-Kingshill carbonates represent a considerable shallowing of the Kingshill basin. The Post-Kingshill carbonates have been extensively modified by dissolution, cementation and mineralogic alteration. Research continues on the post depositional history of this unit.

The Jealousy Formation underlies the entire central plain of the island, and can be considered the hydrologic basement. The transition from yellowish Kingshill to the bluish clays of the Jealousy is marked and abrupt. Well diggers almost invariably stop after reaching the clays, and the boundary is well marked on their drill logs.

The investigation described in this report is part of an ongoing study and as a result the conclusions are not final. Further drilling would certainly aid reconstruction of the aquifer and will be discussed in future reports.

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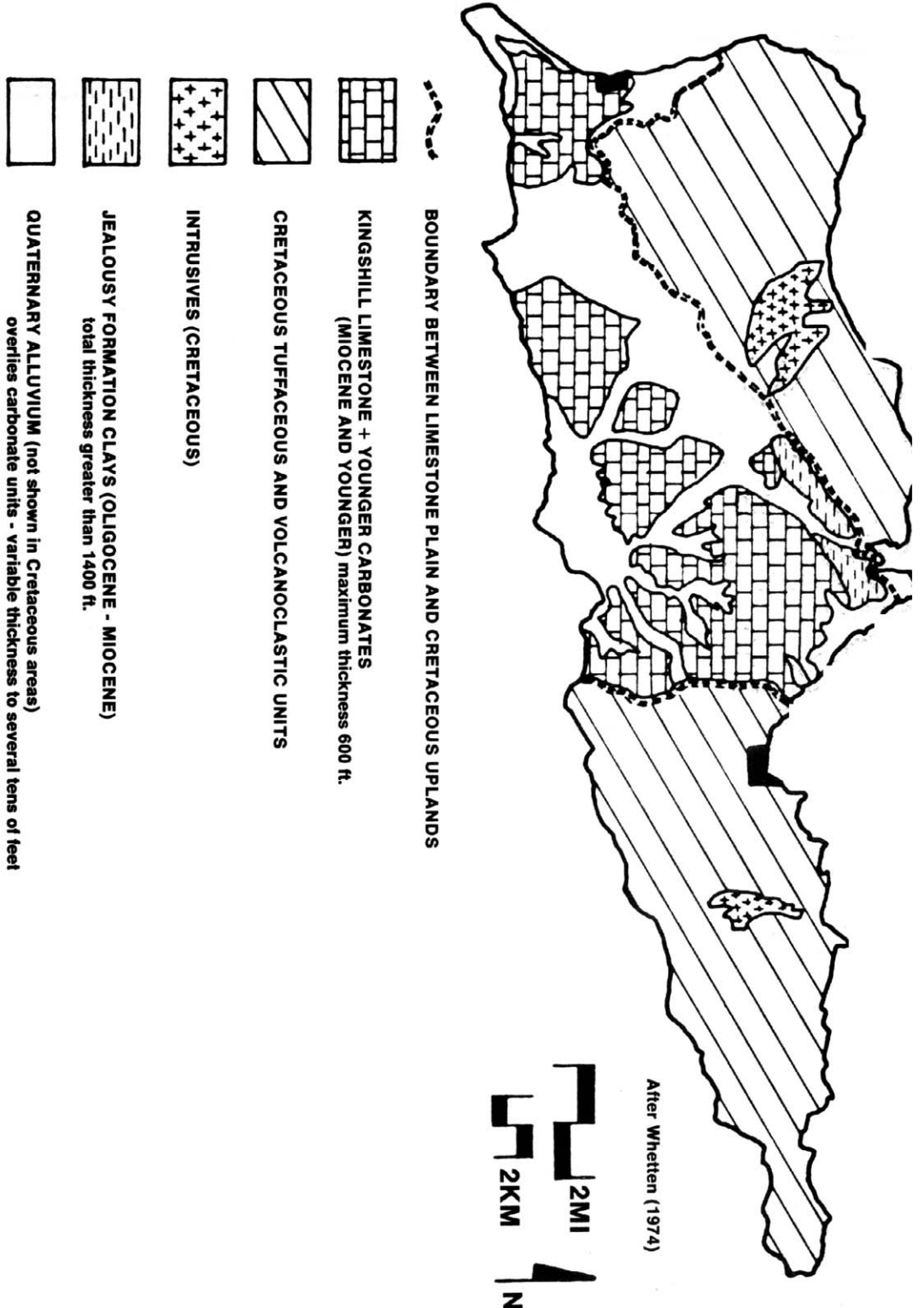


Figure 1. Generalized geologic map of St. Croix.