SUBSURFACE GEOLOGY OF THE ST. CROIX CARBONATE SYSTEM
PHASE II

Ivan P. Gill
Dennis K. Hubbard

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Caribbean Research Institute
University of the Virgin Islands
St. Thomas, U.S.V.I. 00802

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ABSTRACT

Seven new test holes were drilled into St. Croix's central carbonate plain with a rotary drill rig. Cumulative drilling for this phase of the project exceeded 750 feet, and brought the total number of test holes for the project to fourteen. These test holes allow lithologic and biostratigraphic correlation in a north to south transect from Krausses Lagoon to Estate St. John and in a west to east transect from Estate Hesselberg to Estate Pearl.

The drilling establishes the existence of a probable Pliocene reef and shallow-water facies trend that rims the western and southern coastlines of the central plain. The greatest thickness of Pliocene sediments occurs in a subsidiary graben block in the south coast industrial area. The northern and western boundaries of the Pliocene graben can be inferred from core data. The Pliocene post-Kingshill carbonates are less extensive than the Miocene Kingshill Limestone, but are generally more permeable.

Dolomitization in the Pliocene carbonates rims what was the coastline of Krausses Lagoon before industrial development modified the shoreline in the 1960s. The geographical distribution of the dolomite suggests a hydrologic correlation between Krausses Lagoon and the formation of dolomite. The stable isotopic composition of the dolomite suggests the possibility of a dolomitizing fluid with elevated salinity.

Structural mapping on the upper surface of the Miocene Jealousy Formation indicates marked upwarping under the carbonate highlands. This structural upwarping coincides with the greatest isopach thickness of the Kingshill Limestone. The patterns suggest a basin opening to the south, but with a depocenter located under the present position of the carbonate highlands. There is a greater degree of structural complexity in the central plains region than was previously supposed.

Micropaleontological evidence suggests that the Jealousy Formation / Kingshill Limestone contact is time-transgressive within the Miocene. Both units were deposited in deep water, perhaps at depths greater than 1000 m. Despite the marked color change, there are surprisingly few mineralogic or paleontological differences between the Jealousy Formation and the Kingshill Limestone, and the contact between the two formations does not imply significant paleobathymetric change.

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