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Additional Water Development on St. Thomas, V. I. with an Addendum on St. Croix

By

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A new public water-supply system has been developed for Charlotte Amalie, St. Thomas, under the direction of a unit of the Federal Works Agency (later General Services Administration), now a part of the Office of Territories, Department of the Interior. The system as it is to be operated is based on the use of existing publicly owned rainfall catchments and storage reservoirs in Charlotte Amalie, on catchment areas and storage reservoirs at Bourne Field and the former submarine base, and on an infiltration gallery, storage tank, and treatment plant at Bourne Field.

The writer has data on only the latter project (the gallery, tanks, and water plant at Bourne Field), which was developed with the assistance of the Geological Survey and the consulting firm of R. L. Kenan and Associates, Montgomery, Ala. However, the total storage capacity of the public system is estimated conservatively at about 16 million gallons, including 5 million for the estimated minimum ground storage at Bourne Field as utilized by means of the infiltration gallery. This is the amount which, starting with all storage facilities full at the end of a wet season, would be available for use in the following dry season. It does not, of course, represent the annual total, for each storage facility will receive more than one complete

charge of water per year. Some of the tanks may be filled several times during an average year, and even those having the greatest storage capacity per square foot of catchment area will receive a total quantity amounting to more than a full charge even in the driest years.

The maximum storage capacity of the ground at Bourne Field, and the number of times a year that it may be possible to fill it, are not known and can be determined only by experience under careful and intelligent operation.

The system as a whole, if operated properly and assuming the avoidance of waste and of improper use of potable water, will provide a modest supply adequate to meet the minimum needs of the present population. However, the anticipated growth of the tourist industry, together with the improved standards of living and greater industrial activity that will accompany that growth, will inevitably result in demands for water far beyond the capacity of the present system. The demand was in excess of supply during the latter part of the present tourist season; however, the shortage was due in part to the fact that the system was not yet being utilized fully.

It is therefore apparent that development of additional water supplies on St. Thomas is needed. There are several possibilities, each of which should be studied carefully. These include the following:

1. Additional storage at Bourne Field.--One possibility for developing an additional supply immediately is the construction of additional storage at Bourne Field. The airport catchment surface has an area of about 1 million square feet. During the driest year it should yield at least 2 feet of water, or at least 15 million gallons in all. During an average year it should yield

at least 3 feet of water, or at least 22.5 million gallons. The ground-storage capacity is estimated by the writer at not less than, but perhaps not much more than, 5 million gallons.

The storage-capacity figure recommended in the November 1936 (Johnson) report of the Bureau of Reclamation is 10 gallons for each square foot of catchment where a supply is used mainly in the dry season. On that basis the storage capacity at Bourne Field should be at least 10 million gallons. The raw-water tank has a capacity of 1½ million and the treated-water tank, 1 million gallons. However, the full capacity should not be counted as a part of the total storage figure because a part of the tanks' capacity must be reserved for receiving and mixing water from various sources in the proper operation of the system, as discussed in the writer's letter of April 3 to Governor de Castro. Therefore, it appears that additional storage capacity could be used, and the feasibility of constructing it should be weighed in relation to other means of developing additional water. A study should be made by a competent consultant who should have, or should be given opportunity to obtain, an adequate background of knowledge of the complex water-supply conditions on St. Thomas.

It should be pointed out that the present storage facilities at the airport are not underdesigned; they were the maximum that could be provided with available funds. The gallery project, in particular, constitutes by far the cheapest storage that could be obtained for the small sum expended.

2. Wells in basin of Turpentine Run (Tutu Valley).—As pointed out in the writer's memorandum of April 26, 1951, entitled "Memorandum concerning

hydrologic studies needed in the Virgin Islands," there is a possibility of obtaining some water from drilled wells in the basin of Turpentine Run. Though the prospects are not highly promising, they are sufficiently good to justify systematic test drilling and pumping. Test wells should be drilled and pumped at selected sites. Also, records of runoff should be collected systematically and continuously to help in determining the perennial yield of the basin. The conditions for impounding surface water are poor, as pointed out in the Pirnie (1945) and Johnson (1936) reports; the problem of siltation is one of the most important unfavorable features, though it is not discussed at length in the two reports mentioned. Development of ground water, if feasible, would be a low-cost substitute for surface-water development.

The hydrologic studies should be made by the Geological Survey. After the facts are in, competent consultants should consider the practicability of a ground-water development.

3. Ground water in Sugar Estate valley.--As pointed out as early as in 1915 by Dr. Viggo Christensen, in a Danish report translated and included as an exhibit in the Johnson report of 1936, there is considerable ground water in wet periods in the alluvium of the so-called Sugar Estate or Long Bay valley southeast of Charlotte Amalie. Infiltration galleries and wells owned by the West India Co. supplement that company's rainfall-catchment area. The ground-water supply is diminished greatly in dry periods, especially in long ones. Nevertheless, it is possible that a useful supply could be developed in wet periods and drawn on well into the dry season, to supplement other sources. Careful investigation involving test drilling and pumping, and other studies,

should be made by the Geological Survey to outline the possibilities, after which a consultant should compare this potential source with others.

4. Rural areas.--A reconnaissance should be made by the Geological Survey to locate areas where construction of wells or development of springs may provide useful low-cost sources of water in rural areas.

Addendum: St. Croix

New public water supplies for Christiansted and Frederiksted have been developed from wells located during recent studies by the Geological Survey in cooperation with the Federal Works Agency (General Services Administration) and R. L. Kenan and Associates. The supplies at present are adequate for the rather small initial demands, but their adequacy under heavy draft remains to be determined by analysis of carefully gathered operational data. Also, the valley north of the airport has been shown, by the studies of Cederstrom in 1939 and by subsequent drilling, to have a substantial water supply which appears to be only partially developed at present, and studies to determine its safe yield are needed.

St. Croix, with its larger drainage areas and more extensive and productive water-bearing formations, has a larger natural water supply than either St. Thomas or St. John. It is the writer's opinion that the supply will never prove to be large enough for large-scale irrigation or industrial use. Nevertheless, the prospects of developing useful supplies for smaller-scale uses in addition to public water supply, including supplementary irrigation, are such as to warrant careful study. The studies should include detailed ground-water investigations,

test drilling, and pumping tests to evaluate favorable areas other than those now developed for public use for Christiansted, Frederiksted, and the airport and Bethlehem sugar factory. Additional studies of those areas are needed also, of course, as stated previously.

In addition, systematic records of surface runoff from the largest drainage areas should be gathered, in order to permit evaluating the feasibility of surface-storage projects. The siltation problem should be studied carefully, both (1) as a limiting factor in reservoir development and (2) with an eye toward reduction of erosion by methods of watershed treatment that will result in the smallest possible reduction in surface runoff.

The ground-water and surface-runoff studies should be made by the Geological Survey. The studies related to sedimentation and watershed treatment should be made cooperatively by the Agriculture Department and the Geological Survey.

The writer knows of no substantial new water projects that could or should be undertaken on St. Croix on the basis of existing data; that is, adequate studies should precede any such new developments.