



WATER-RIGHT DOCKET

Virgin Islands National Park

Docket No: 10

WELL #10, LAMESHUR

Supporting Hydro Data

00-00-0000: records of drilled test wells

National Park, St. John, V. I.									
DESIGNATION					CONSTRUCTION DATA				
Well number	Location	Date completed (year)	Type	Depth (feet)	Casing record		Finish (feet)	Depth (feet)	Type of lift
					Diameter (inches)	From To			
NPS-2	Cruz Bay	1964	Drilled	99	4	0	20	0	99
NPS-3	Cruz Bay	1964	do	54	6	0	25	0	54
NPS-4	Lind Point	1964	do	200	6	-	0	0	200
NPS-5	Trunk Bay	1964	do	60	6	0	12	0	60
NPS-6	Cinnamon Bay	1964	do	70	6	0	50.7	0	70
NPS-7	Hawksnest Bay	1964	do	36	6	0	27	0	36
NPS-8	Cinnamon Bay	1964	do	50	6	-	0	0	50
NPS-9	Cinnamon Bay	1964	do	60	6	0	39	0	Submersible
NPS-10	Lameshur	1964	do	66	4	0	67	0	67

National Park, St. John, V. I.									
HYDROLOGIC DATA					SUPPLEMENTARY DATA				
Surface altitude (feet)	Water-bearing material (yr.)	Depth below surface (feet)	Date tested (yr.)	Yield (gpm)	Temp. °C	Remarks	Water-bearing material (yr.)		
							Use	Yield (gpm)	Temp. °C
60	Vt	40.0	6-64	1	82		T, 0		
40	Vt	28.5	6-64	5	83		T, 0		
176	-	Dry	6-64	-	-	Casing pulled, hole destroyed.	-		
60	Vb	32.1	7-64	6	80		T, 0		
60	Vt	56.9	11-64	8	80		T, 0		
40	Vb	17.1	8-64	12	80		T, 0		
20	-	Dry	9-64	-	-	Casing pulled, hole destroyed.	-		
50	Vt, Vb	42.9	10-64	8	80		P		
40	V	28.5	10-64	2	84		0		

Finish: 0 - open hole, S - slotted.

Water-bearing material: Vb, volcanic breccia; Vt, volcanic tuff; V, volcanic undifferentiated.

Use: T, test; O, observation; P, public supply.

Table 2.--Chemical quality of water from drilled test wells, Virgin Islands National Park, St. John, V. I.

Well Number	Location	Date of collection	PARTS PER MILLION														Specific conductance (micro-mhos at 25° C)	pH	Dis-charge (gpm)
			Silica (SiO ₂)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Dissolved solids	Hardness as CaCO ₃ (mg./l.)				
NPS-2	Cruz Bay	5-18-64	31	0.00	66	67	320	-	644	46	470	0.6	4.9	1,400	440	0	2,490	7.9	1
NPS-3	Cruz Bay	6-3-64	34	.00	94	77	377	-	632	45	480	.5	4.4	1,420	551	33	2,270	7.8	5
NPS-4	Cruz Bay housing	Dry hole																	
NPS-5	Trunk Bay	7-17-64	38	.05	80	61	188	-	482	39	300	.0	.0	988	450	55	1,670	7.9	6
NPS-6	Cinnamon Bay	8-2-64	34	.00	46	81	224	-	390	47	400	.3	.4	1,060	448	128	1,900	8.2	8
NPS-7	Hawkeest Bay	8-8-64 ^{1/}	35	.00	68	88	214	-	272	57	505	.1	2.2	1,260	534	308	2,090	7.9	12
NPS-7	Hawkeest Bay	8-8-64 ^{2/}	38	.05	106	577	628	-	380	276	2,425	.0	.4	5,640	2,637	2,342	7,440	7.5	12
NPS-8	Cinnamon Bay	Dry hole																	
NPS-9	Cinnamon Bay		36	.00	58	71	183	-	504	30	275	.5	.0	964	436	23	1,610	8.4	8
NPS-10	Iaweshur Bay		23	.04	70	111	-	-	544	-	1,003	.3	.9	2,380	631	185	4,090	7.8	2

^{1/} Sample taken at beginning of test, 5 minutes pumping.^{2/} Sample taken at end of test, 12 hours pumping.

Other Supporting Information

14 Arroyo Street
Hato Rey, Puerto Rico 00918

January 12, 1965

Mr. Frank R. Givens, Superintendent
National Park Service
Virgin Islands National Park
P. O. Box 1707 Charlotte Amalie
St. Thomas, V. I. 00802

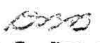
Dear Mr. Givens:

A tabulation is enclosed of funds spent on test-well drilling for the National Park Service in St. John, Virgin Islands. The funds were assigned in FY-1964, but the drilling contract carried over into FY-1965.

If you have any questions about the data shown, Mr. Donald G. Jordan, our resident engineer in St. Thomas, is in the best position to provide answers. Sufficient copies of the tabulation have been provided for your possible transmittal to appropriate other NPS offices.

Exploring for and finding water for some of your needs was an interesting technical problem. The second phase of observing how the well supplies stand up under regular use also will be interesting. Pivotal in this phase is knowing how much water is pumped. I believe Mr. Jordan has made recommendations on what information is needed.

Cordially yours,


Dean B. Bogart
Chief, Caribbean District, WRD

In triplicate

cc: D. G. Jordan, St. Thomas, V. I.

Area Hydrologist, Arlington, Va.

DBB/gmp

Water-Supply Project for National Park Service
in Virgin Islands National Park, St. John

Summary of costs of test-well drilling, FY-1964 funds

Funds assigned to drilling	\$15,000
Less: 12 3/4% Washington Office	
Technical Service Charge	<u>1,912</u>
Net funds available for drilling	<u>\$13,088</u>

Well number	Depth drilled, ft 14.75/ft	Casing installed, ft 5.00/ft	Casing pulled, ft 1.25/ft	Experimental time, hr \$11.00/hr	Pumping and bailing tests, hr \$11.00/hr	Cost
NPS-2	98	-	13	-	2 1/2	\$ 1,495.50
3	54	25	-	-	13 1/2	1,070.00
4	200	-	13	-	0	2,966.25
5	60	13	-	-	17	1,137.00
6	70	54	-	-	10 1/2	1,419.00
7	36	28	-	-	15 1/2	841.50
8	50	-	21	-	0	763.75
9	60	45 1/	-	1	9	1,220.00
10	<u>66</u>	<u>53 1/</u>	<u>-</u>	<u>-</u>	<u>8</u>	<u>1,326.50</u>
Total	694	218	52	1	73	\$12,239.50
Bulldozing 2/						<u>810.00</u>
						<u>\$13,049.50</u>

1/ 4-inch diameter plastic liner was installed, in addition to steel casing.

2/ Bulldozing drilling sites.

December 31, 1964

U. S. Geological Survey
San Juan, Puerto Rico

Provisional, subject to revision

Virgin Islands Cooperative Water-Resources Investigation

Water Resources Division
U. S. Geological Survey

INFORMATION RELEASE VI-15
ST. JOHN, V. I.

Well Completions for National Park Service, St. John, V. I.

Two test wells, NPS-9 at Cinnamon Bay and NPS-10 at Lameshur Bay, were drilled in the Virgin Islands National Park on St. John during October 1964. In addition, dug wells at Cinnamon Bay and at Mary Creek, St. John, were tested.

Well NPS-9

National Park Service well No. 9 at Cinnamon Bay, St. John, is capable of producing about 5,000 gpd (gallons per day). The water is potable and is of fair chemical quality. Pertinent well data follow:

Depth	60 ft
Static water level	42.9 ft
Yield	8 gpm for 6 hr
Drawdown	7.2 ft
Finish	6" casing to 42 ft; 4" plastic casing from surface to bottom, perforated from 50 to 60 ft
Recommended depth of pump intake	55 ft
Approximate surface altitude	50 ft
Date completed	10-5-64
Quality of water	
Chloride	290 ppm
Hardness	360 ppm

The data in figure 1 are from short-term pumping tests of NPS-9 and the projections of these data are based on past experience in similar wells. Only a limited amount of drawdown would occur if the well were pumped continuously at 2 gpm for 100 days. If pumping rates were increased the drawdown also would increase; at 10 gpm the water level would reach the intake of the pump in less than 24 hours. However, the well could be pumped at 10 gpm for short periods such as 1 hour by allowing rest periods between pumping periods. A preliminary estimate of safe yield for this well is 5,000 gpd. After the well has been operated for a period of a few months a better estimate of the safe yield can be made.

For the present a maximum pumping rate of 5 gpm should be used and a daily production of 3,000 gpd should not be exceeded. This amount of water is far in excess of the estimated maximum use for the present facilities at

Cinnamon Bay Camp. The water from the well should be sampled and analyzed daily so that any deterioration of chemical quality will be quickly noticed. The Geological Survey will furnish bottles for this purpose and the samples will be processed locally. The Geological Survey will make periodic water-level measurements and keep records of total discharge.

A desirable pump and metering installation is described in Monthly Report No. 18 for July and August 1964.

Well MPS-10

Preliminary tests indicate that National Park Service well No. 10 at Lanesbur Bay, St. John, is capable of producing about 2,000 gpd. The water is of poor quality, but is suitable for most domestic purposes. Pertinent well data follow:

Depth	66 ft	
Static water level	28.5 ft	2
Yield	2 gpm for 5 hrs	
Drawdown	12.5 ft	
Finish	6" casing to 53 ft; 4" plastic casing to bottom, perforated from 36 to 66 ft	
Approximate surface altitude	40 ft	
Date completed	10-28-64	
Quality of water		
Chloride	950 ppm	
Hardness	570 ppm	

Well MPS-10 was pumped for 5 hours at 2.2 gpm. The water level stabilised after 2 hours 40 minutes with 12.3 feet of drawdown. No additional drawdown was detected during the remaining 2 hours 20 minutes of pumping. However, at higher rates the drawdown is excessive. After only 26 minutes at 6.4 gpm the water level had reached the level of the pump intake, amounting to about 30 ft of drawdown.

The water is rather highly mineralised. It has a mineral taste but water of similar quality is considered potable in some parts of the United States. The water is of marginal quality for drinking, but it could be used for most other campgrounds and domestic purposes.

If the well is placed in production it should be pumped at a low rate such as 2 gpm, and total daily production should not exceed 2,000 gpd.

Well NPS-12

National Park Service well No. 12, the trench well at Cinnamon Bay, was test pumped on October 5, 6, 7, and 8, 1964. In one 12-hour test period 2,500 gallons of water was removed with a total drawdown in water level of 1.17 ft. The well has a large storage capacity, estimated to be in excess of 7,500 gallons. However, the recovery rate is rather slow. In 10.5 hours the water level rose only 0.24 ft which means only about 500 gallons of water entered the well during this time. Rainfall should influence productivity, causing the safe yield to be high after rainy periods and to drop off gradually during periods of drought. Based on information available, the safe yield should be between 500 and 1,000 gpd during dry weather and perhaps as much as 3,000 gpd during wet weather.

The chemical quality of the water deteriorated during the period of inactivity since the well was constructed in July 1963. At that time the chloride, from field determination, was 350 ppm; at the beginning of testing on October 5, 1964, the chloride was 5,350 ppm. The increase in chloride content is attributed to a slug or slugs of sea water moving inland during periods of high surf, either on the surface or as a subsurface wave. As pumping progressed the chloride gradually dropped--the last sample taken on October 8, contained 2,830 ppm. It appears that with additional pumping the chloride content might approach the original value of 350 ppm.

Well NPS-13

The dug well at Mary Creek, about 100 ft south of the road leading to the warehouse at Mary Point, is designated National Park Service well No. 13. About 1,400 gallons of water was pumped from NPS-13 during an 11-hour test on October 14, 1964. The water is of fair chemical quality, and is suitable for domestic use. The water level had declined to the bottom of the well at the end of the pumping period, but about 12 hours after pumping stopped, the water level had recovered fully. The well would be suitable for the planned installations at Mary Point. It should be cleaned and a sanitary cover placed over it before it is used.

Summary of Water Supply

Based on short-term tests, the existing wells and spring at Cinnamon Bay shown on figure 2 can supply as much as 10,000 gpd of potable water during periods of normal rainfall. During periods of drought such as we are experiencing now, the spring is supplying no water and the wells will produce about 5,500 gpd. In addition, a supply of variable quality water suitable for sanitary purposes is available and could be expanded to meet the foreseeable needs.

Table 1 shows the estimated yields, chemical quality, proposed uses, and suggested types of pumps for each existing and proposed source of supply.

It must be emphasized that the estimates of safe yield are based on short-term testing and thus are conditional until further testing and operating experience are obtained.

Suggested Plan for Development of Water Supply

The rest rooms serving the cottages probably account for more than 90% of the total water use at Cinnamon Bay. Each guest will use about 30 gpd and with the cottages full about 40 guests will be using the facilities, creating a demand of 1,200 gpd. For beach showers the estimated use is 5 gallons each time the shower is used - and 10 gallons per bather per day. In maximum-use days this would add 400 gpd for the cottages and about the same for the tent area. The peak demand for sanitary purposes is about 2,000 gpd.

The only method of finding the safe yield of wells in fractured rock such as NPS-6 and NPS-9 is to put them into production and observe the behavior of the water level and changes in chemical quality of the water over a long period of time.

It is possible that the installation of a pump in NPS-9 will satisfy the demands for some time to come. However, the following suggestions are offered for development of the sources of supply at Cinnamon Bay after the planning of installation at NPS-9.

- Step 1. Install pump in NPS-6 and connect to the cistern.
- Step 2. Install a pump and pressure tank in NPS-12 and connect directly to the rest rooms serving the cottages. During prolonged periods of high use the cistern could be used to augment this supply. This system could also be used for beach showers.
- Step 3. If NPS-12 fails to supply sufficient water for normal use well points should be installed along the east-west service road to augment the supply.

Docket Information

Number of Documents in Docket 8

Documents Dated from 1/12/1965 to 1/12/1965

Docket Compiled: 7/28/2011