



WATER-RIGHT DOCKET

Cape Cod National Seashore

Docket No: 4

HEMENWAY LANDING WELL.

Supporting Hydro Data

02-29-1968: letter to mr. stanton on final report of supervisory work ; february 29, 1968



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
2300 John Fitzgerald Kennedy Federal Building
Boston, Massachusetts 02203

February 29, 1968

Mr. Richard L. Stanton, Chief
Office of Land and Water Rights
National Park Service
Washington Planning and Service Center
1730 North Lynn Street
Arlington, Virginia 22209

Attention: Mr. Richard W. Ketchum

Dear Mr. Stanton:

Enclosed is the final report of supervisory work by John Cotton of the Boston office of the Water Resources Division for the National Park Service under Contract No. 14-10-5-609-204 for Test Well Drilling at Hemenway Landing, Nauset Light, Eastham Visitor Center, and Griffin Island. All work was completed by The Able Drillers and Pump Company on September 2, 1967, in accordance with the plans and specifications of the contract.

Enclosed also is Standard Form 1081 prepared in accordance with the instructions in your letter of February 26, 1968.

A summary for each area is tabulated below.

	Well Depth	Well Development	Test Pumping	Test Drilling Hole / Depth
Hemenway Landing	99.2 ft.	24 hrs.	8 hrs.	1 106 ft.
Nauset Light	137.8 ft.	25.5 hrs.	9 hrs.	1 112 ft. 2 150 ft.
Eastham Visitor Center	115.7 ft.	24 hrs.	8 hrs.	1 120 ft. 2 111 ft.
Griffin Island	95.9 ft.	24 hrs.	10 hrs.	1 105 ft.

Mr. Richard Stanton

- 2 -

February 29, 1968

The design sustained yield for each well was 20 gallons per minute (gpm); all four wells may be pumped safely at 20 gpm. In fact, all four wells will yield much more than 20 gpm. However, pumping from shallow coastal aquifers involves the danger of inducing salt-water movement into the fresh ground-water reservoir. One good principle to follow in establishing pumping schedules is not to allow the water level to fall below mean sea level (msl). The 'maximum' yield (following the above principle) for each of the four wells is given in the geohydrologic descriptions of the wells. Unfortunately, even with this precaution, salt-water encroachment may still occur with prolonged pumping. Therefore, the highest pumping rates should not exceed 50 percent of the 'maximum' yield reported for each well.

Very truly yours,


C. E. Knox
District Chief

JEC:g

Encls. Report, 4 copies
SF1081, 6 "

TEST WELL DRILLING AT HEMENWAY LANDING

Location of well. This well is about 70 feet southeast of Hemenway Road and about 15 feet northeast of the walkway to Fort Hill (see figure 1).

Physical description of well. This 8-inch diameter well is 99.2 feet deep with a 10 foot #15 Johnson stainless steel screen from 89.2 to 99.2 feet. The well casing extends 2.0 feet above the land surface; the top of the first coupling is 4.0 feet below land surface. For details see figure 2.

Geohydrologic description of well. The well is screened in unconsolidated sands (lower aquifer of table 1). See table 1 for the log of subsurface materials. The land surface is estimated at 20 feet above mean sea level (msl). On September 1, 1967, the static water level was 13.14 feet below land surface or about 7 feet above msl. Ocean tides affect the water level.

The well was pumped for 8 hours at 51 gallons per minute (gpm) with a drawdown of about 2.2 feet. Specific capacity is about 23 gpm; that is, the well will yield about 23 gpm for every foot the water level in the well is lowered during pumping. With a drawdown of 7 feet this well will yield about 160 gpm. The design yield of 20 gpm is possible with no danger of salt-water encroachment.

Chemical quality of water. After 8 hours of pumping the chloride content--23 parts per million (ppm)--had not changed and was a little lower than much of the fresh ground water on Cape Cod. The iron content (6.6 ppm) was very high and treatment will be required. The complete chemical analysis is in table 2.

During test drilling the quality of ground water in the sands overlying the clayey silts (upper aquifer, see table 1) was tested. The iron content was also very high and there was a large amount of H₂S gas. The presence of this gas demonstrates the hydrologic connection between the upper aquifer and Red Maple Swamp just to the west.

Test drilling. The only test well (about 6 feet south of the final well) was drilled to a depth of 106 feet. The log of this well is in table 1. Test pumping to determine chemical quality of ground water in the upper and lower aquifers established that the lower aquifer would be the better one for the proposed supply, even though the iron content is extremely high. The possibility of locating ground water of higher quality in the immediate vicinity is very small.

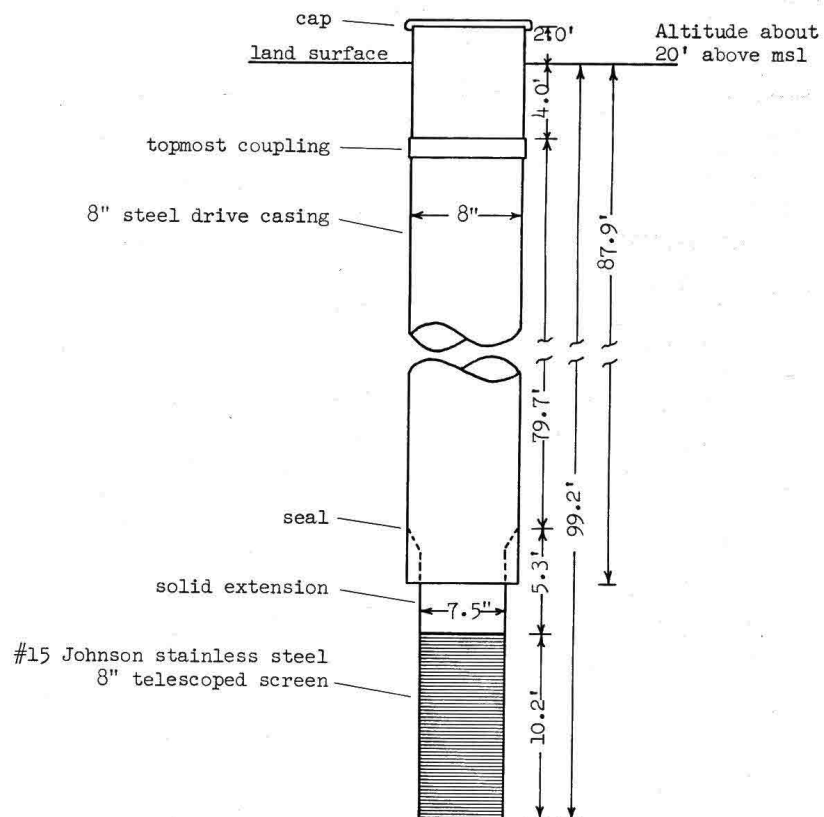


Figure 2.--Design of well at Hemenway Landing

Table 1.--Generalized log of test well at Hemenway Landing

	Sample interval (ft. below surface)	Material description
	0 - 10	Sandy silt, buff
	10 - 15	Sandy silt, buff
	15 - 19	Sandy silt, buff
UPPER	19 - 28	Sand, very fine to coarse, buff
AQUIFER	28 - 35	Sand, medium and coarse, light gray
(High iron & H ₂ S)	35 - 40	Sand, coarse, light gray
	40 - 43	Sand, medium, light gray; some clay layers
	43 - 48	Clayey silt, gray
	48 - 57	Clayey silt, gray
	57 - 71	Clayey silt, gray
	71 - 82	Clayey silt, gray
LOWER	82 - 87	Sand, medium and coarse, light gray at 82'; wood chips; grading to fine and medium at 87'
AQUIFER	87 - 91	Sand, medium and coarse, light gray
(High iron, no H ₂ S)	91 - 97	Sand, medium and coarse, light gray
	97 - 100	Sand, medium and coarse, light gray
	100 - 106	Sand, fine, light gray

Table 2.--Complete chemical analysis, in parts per million, of water from well at Hemenway Landing

Date of collection-----	9/1/67	Chloride (Cl)-----	23
Temperature (°F)-----	52	Fluoride (F)-----	.4
Silica (SiO ₂)-----	16	Nitrate (NO ₃)-----	.0
Iron (Fe) total-----	6.6	Dissolved solids	
Manganese (Mn) dissolved--	.44	Calculated-----	83
Calcium (Ca)-----	4.6	Residue on evaporation at 180°C--	91
Magnesium (Mg)-----	2.6	Hardness as CaCO ₃ -----	22
Sodium (Na)-----	15	Non-carbonate-----	16
Potassium (K)-----	.9	Specific conductance	
Bicarbonate (HCO ₃)-----	8	(micromhos at 25°C)-----	135
Carbonate (CO ₃)-----	0	pH-----	6.6
Sulfate (SO ₄)-----	17	Color-----	2

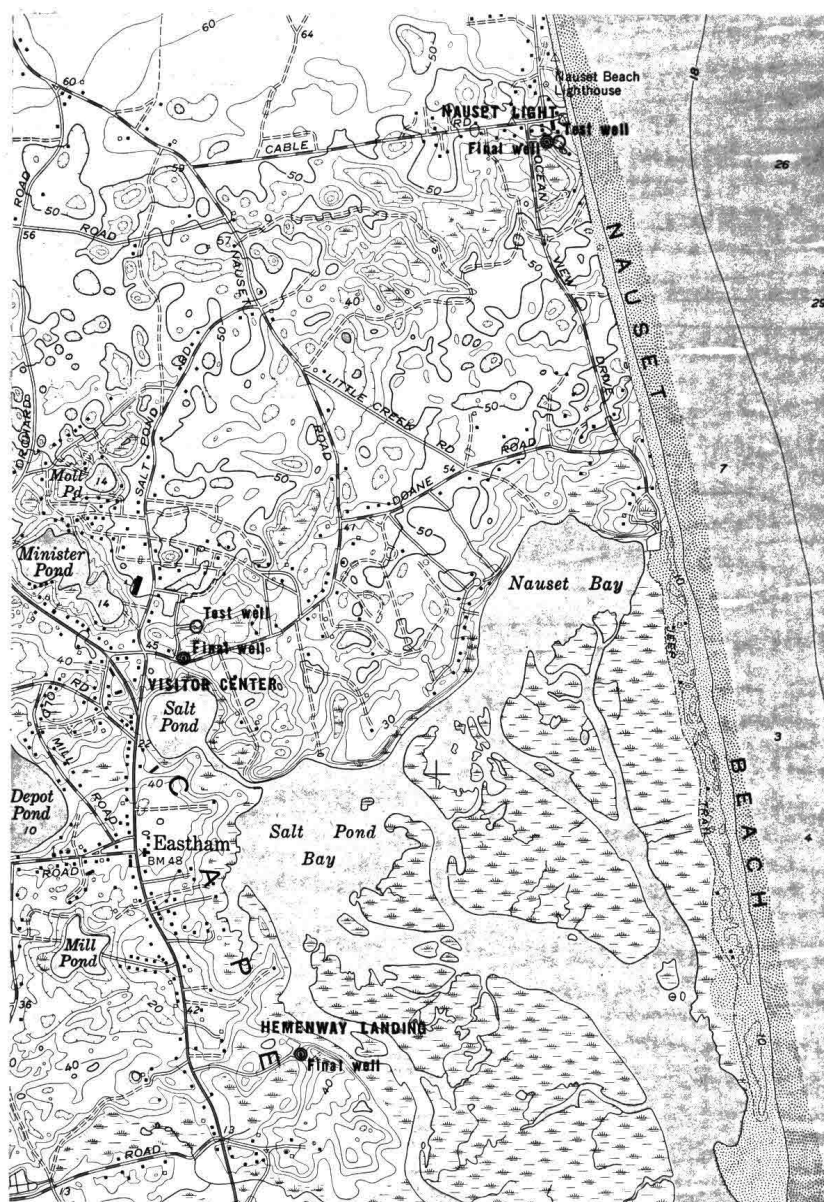


Figure 1.--Location of wells at Hemenway Landing, Nauset Landing, and Eastham Visitor Center

-2-

Docket Information

Number of Documents in Docket 6

Documents Dated from 9/1/1967 to 2/29/1968

Docket Compiled: 2/1/2011