



WATER-RIGHT DOCKET

Fredericksburg and Spotsylvania NMP

Docket No: 3

WELL, SPOTSYLVANIA EXHIBIT SHELTER

Supporting Hydro Data

05-31-1974: analysis of 7 samples of water

MAIN OFFICE AND LABORATORIES
814 WEST CARY STREET
RICHMOND, VIRGINIA
PHONE 844-3023

SINCE



FROEHLING & ROBERTSON, INC.
INSPECTION ENGINEERS • CHEMISTS • BACTERIOLOGISTS
CABLE ADDRESS—"FROEHLING"

BRANCH LABORATORIES
NORFOLK, CHARLOTTE, BALTIMORE
WASHINGTON, BALTIMORE
GREENVILLE, ROANOKE, WILMINGTON

L.C. 115
RICHMOND, VA. 23261
MAY 31, 1974

NO. B-660-5-A

ANALYSES OF 7 SAMPLES OF WATER

MADE FOR: FREDERICKSBURG NATIONAL MILITARY PARK, P. O. BOX 679, FREDERICKSBURG, VA. 22401
ATTENTION: MR. JOSEPH E. VAUGHN

MARKED: (1) QUARTERS 7 (5) QUARTERS 9
(2) QUARTERS 8 (6) QUARTERS 10
(3) SPOTSYLVANIA SHELTER (7) QUARTERS 11
(4) JACKSON SHRINE

P. NO. PX 4370-4-0259

0-0-0

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
pH VALUE (ELECTROMETRIC)	6.88	6.90	6.92	7.52	6.68	6.72	6.98
	PARTS PER MILLION						
TOTAL SOLIDS @ 103°C.	80.0	78.0	80.0	194.0	44.0	34.0	148.0
LOSS ON IGNITION (ORGANIC & VOLATILE MATTER)	38.0	36.0	30.0	48.0	30.0	24.0	60.0
MINERAL RESIDUE (NON-VOLATILE MATTER)	42.0	42.0	50.0	146.0	14.0	10.0	88.0
FREE CARBON DIOXIDE (CO ₂)	20.0	10.0	8.0	2.0	16.0	10.0	12.0
PHENOLPHTHALEIN (CARBONATE) ALKALINITY as CaCO ₃	0.0	0.0	0.0	0.0	0.0	0.0	0.0
METHYL ORANGE (BICARBONATE) ALKALINITY as CaCO ₃	50.0	62.0	64.0	126.0	28.0	16.0	110.0
TOTAL HARDNESS (BY CALCULATION) as CaCO ₃	58.9	46.9	44.6	56.1	15.1	11.3	86.1
ANALYSIS OF MINERAL RESIDUE:							
SILICA (SiO ₂) AND INSOLUBLE MATTER	15.89	9.09	9.45	37.11	3.79	3.79	27.25
IRON (Fe)	0.13	0.01	0.09	0.88	0.29	0.14	0.03
MANGANESE (Mn)	NIL	NIL	NIL	0.07	0.04	NIL	NIL
CALCIUM (Ca)	11.97	14.17	15.22	13.86	4.87	3.25	25.02
MAGNESIUM (Mg)	7.04	2.79	1.60	5.24	0.73	0.77	5.75
SODIUM & POTASSIUM as SODIUM (Na)	0.3	9.3	11.2	38.1	8.0	4.4	17.4
BICARBONATE (HCO ₃) (BY CALC. FROM ALKALINITY)	61.0	75.6	78.1	153.7	34.2	19.5	134.2
CARBONATE (CO ₃) (BY CALC. FROM ALKALINITY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHLORIDE (Cl)	6.0	3.0	3.0	4.0	3.0	3.0	5.0
SULFATE (SO ₄)	1.2	0.8	0.8	8.6	0.8	0.8	6.6
NITRATE (NO ₃)	5.05	NIL	NIL	NIL	0.71	1.42	1.33
FLUORIDE (F)	NIL	NIL	NIL	NIL	NIL	NIL	NIL

Sec
ed

RESPECTFULLY,
FROEHLING & ROBERTSON, INC.
MEMBER: American Society for Testing Materials • American Concrete Institute • American Council of Independent Laboratories • Virginia Academy of Science • American Road Builders Association • Southern
Association of Science & Industry • Society for Nondestructive Testing • Virginia State Chamber of Commerce
REPRESENTED IN: American Wood Preservers Association • Association of Asphalt Paving Technologists • American Water Works Association • American Chemical Society • American Public Health Association • Technical
Association Pulp & Paper Industry • Virginia Public Health Association

with Directors copy of memo to Supt. from Reg.
6/9/64

TABLE I
PUMP TEST DATA COLLECTED
FROM 30" SHALLOW WELL AT
SPOTSYLVANIA COURT HOUSE

Static Water Level - 24.4'

Depth of Well - 39' (Top of well curbing)

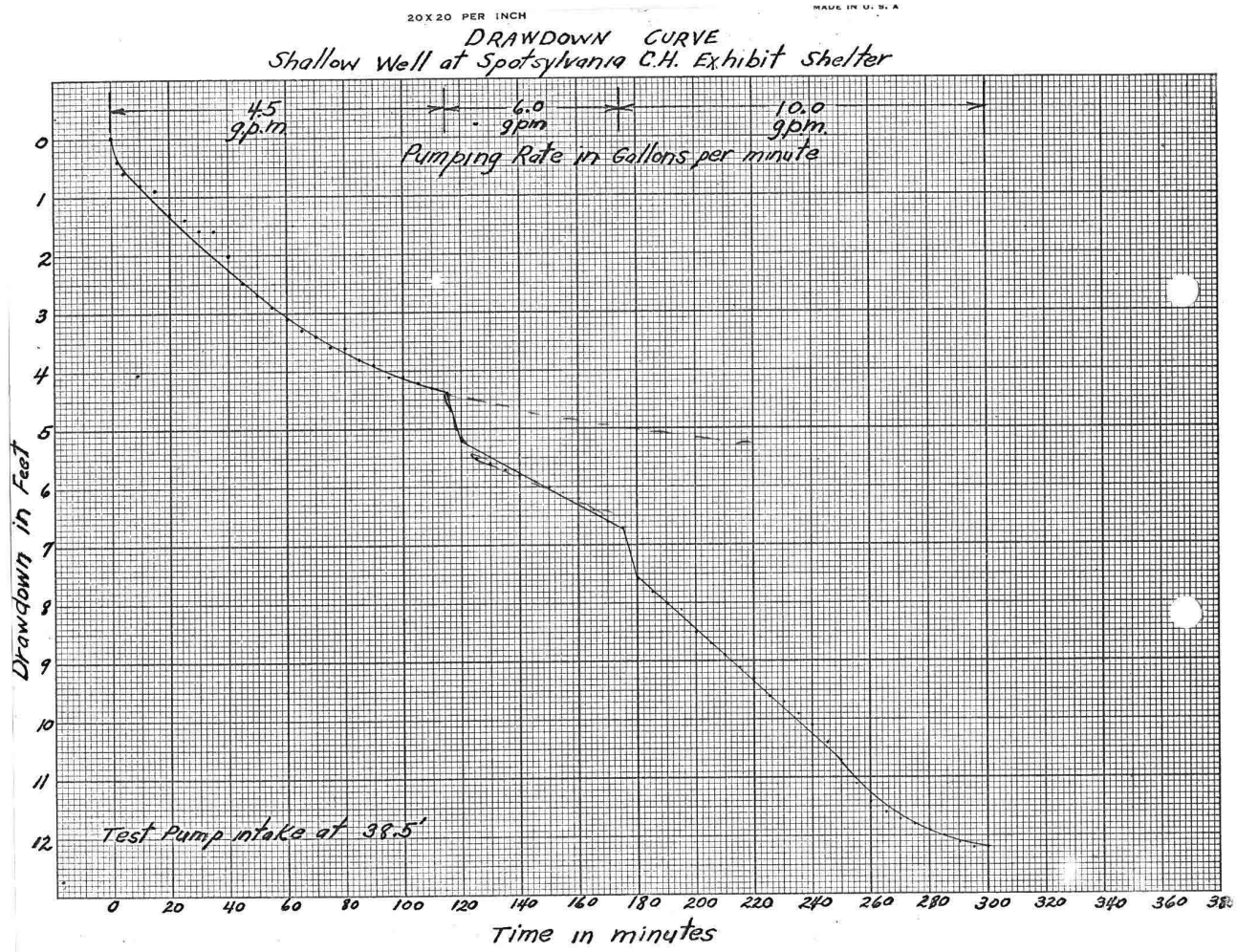
Drawdown vs G.P.M. Data

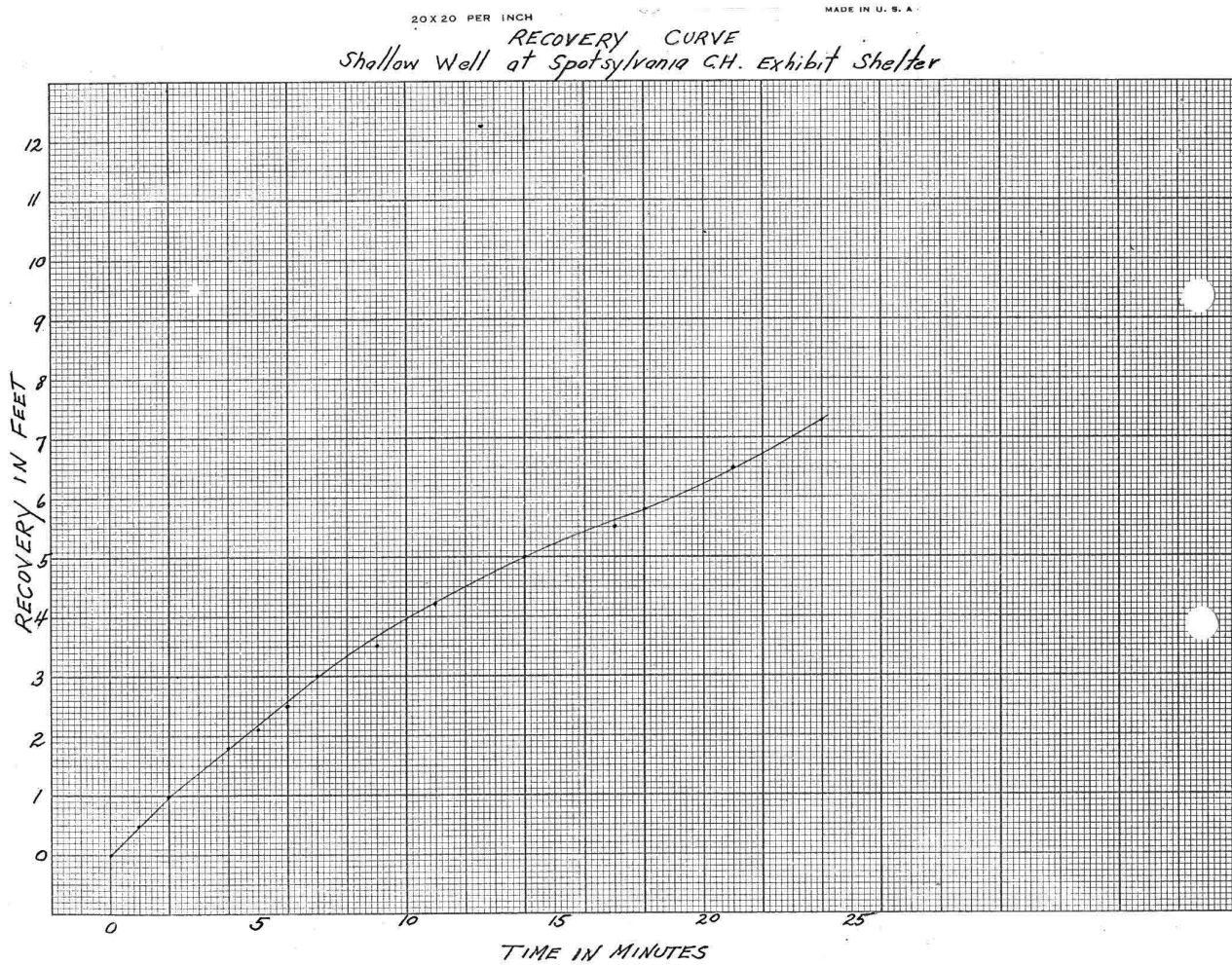
Flow Rate (G.P.M.)	Time		Distance to Water Level (Top of curbing to water level)	t _{min}	Drawdown (Feet)
	Starting	Ending			
Corrected 3.2 ↓	8:30 a.m.	8:32 a.m.	24.8'	2	.4
	8:32 a.m.	8:34 a.m.	25.0'	4	.6
	8:34 a.m.	8:40 a.m.	25.2'	10	.8
	8:40 a.m.	8:45 a.m.	25.3'	15	.9
	8:45 a.m.	8:50 a.m.	25.7'	20	1.3
	8:50 a.m.	8:55 a.m.	25.8'	25	1.4
	8:55 a.m.	9:00 a.m.	26.0'	30	1.6
	9:00 a.m.	9:05 a.m.	26.0'	35	1.6
	9:05 a.m.	9:10 a.m.	26.4'	40	2.0
	9:15 a.m.	9:20 a.m.	26.9'	50	2.5
	9:20 a.m.	9:25 a.m.	27.1'	55	2.7
	9:25 a.m.	9:30 a.m.	27.3'	60	2.9
	9:30 a.m.	9:35 a.m.	27.5'	65	3.1
	9:35 a.m.	9:40 a.m.	27.7'	70	3.3
	9:40 a.m.	9:45 a.m.	27.8'	75	3.4
	9:45 a.m.	9:50 a.m.	28.0'	80	3.6
	9:50 a.m.	9:55 a.m.	28.0'	85	3.6
	9:55 a.m.	10:00 a.m.	28.2'	90	3.8
	10:00 a.m.	10:05 a.m.	28.3'	95	3.9
	10:05 a.m.	10:10 a.m.	28.5'	100	4.1
4.6	10:10 a.m.	10:15 a.m.	28.5'	105	4.1
	10:15 a.m.	10:20 a.m.	28.6'	110	4.2
	10:20 a.m.	10:25 a.m.	28.7'	115	4.3
	10:25 a.m.	10:30 a.m.	28.8'	120	4.4
	10:30 a.m.	10:35 a.m.	29.6'	125	5.2
	10:35 a.m.	10:40 a.m.	29.9'	130	5.5
	10:40 a.m.	10:45 a.m.	30.0'	135	5.6
	10:45 a.m.	10:50 a.m.	30.1'	140	5.7
	10:50 a.m.	10:55 a.m.	30.2'	145	5.8
	10:55 a.m.	11:00 a.m.	30.3'	150	5.9
	11:00 a.m.	11:05 a.m.	30.4'	155	6.0
	11:05 a.m.	11:10 a.m.	30.5'	160	6.1
	11:10 a.m.	11:15 a.m.	30.6'	165	6.2
	11:15 a.m.	11:20 a.m.	30.8'	170	6.4
	11:20 a.m.	11:25 a.m.	31.0	175	6.6
	11:25 a.m.	11:30 a.m.	31.1'	180	6.7

Flow Rate (G.P.M.)	Time		Distance to Water Level (Top of curbing to water level)	Drawdown (Feet)
	Starting	Ending		
10.0	11:30 a.m.	11:35 a.m.	32.0'	185 7.6
10.0	11:35 a.m.	11:40 a.m.	32.2'	190 7.8
10.0	11:40 a.m.	11:45 a.m.	32.4'	195 8.0
10.0	11:45 a.m.	11:50 a.m.	32.5'	200 8.1
10.0	11:50 a.m.	11:55 a.m.	32.9'	205 8.5
10.0	11:55 a.m.	12:00 Noon	33.1'	210 8.7
10.0	12:00 Noon	12:05 p.m.	33.3'	215 8.9
10.0	12:05 p.m.	12:10 p.m.	33.5'	220 9.1
10.0	12:10 p.m.	12:15 p.m.	33.7'	225 9.3
10.0	12:15 p.m.	12:20 p.m.	34.0'	230 9.6
10.0	12:20 p.m.	12:25 p.m.	34.1'	235 9.7
10.0	12:25 p.m.	12:30 p.m.	34.3'	240 9.9
10.0	12:30 p.m.	12:35 p.m.	34.5'	245 10.1
10.0	12:35 p.m.	12:40 p.m.	34.8'	250 10.4
10.0	12:40 p.m.	12:45 p.m.	35.1'	255 10.7
10.0	12:45 p.m.	12:50 p.m.	35.5'	260 11.1
10.0	12:50 p.m.	12:55 p.m.	35.8'	265 11.4
10.0	12:55 p.m.	1:00 p.m.	36.0'	270 11.6
10.0	1:00 p.m.	1:05 p.m.	36.1'	275 11.7
10.0	1:05 p.m.	1:10 p.m.	36.2'	280 11.8
10.0	1:10 p.m.	1:15 p.m.	36.3'	285 11.9
10.0	1:15 p.m.	1:20 p.m.	36.4'	290 12.0
10.0	1:20 p.m.	1:25 p.m.	36.5'	295 12.1
10.0	1:25 p.m.	1:30 p.m.	36.6'	300 12.2

TABLE II
RECOVERY DATA ON
39' SHALLOW WELL AT SPOTSYLVANIA COURT HOUSE
EXHIBIT SHELTER

<u>Time</u>		<u>Recovery (Ft.)</u>	<u>Ext. dd.</u>		<u>Ext. rec</u>
1:30 p.m.	300	0	12.2	12.2	0
1:31 p.m.	301	0.5	11.7	12.2	0.5
1:32 p.m.	302	1.0	11.2	12.25	1.05
1:34 p.m.	304	1.8	10.4	12.3	1.9
1:35 p.m.	305	2.1	10.1	12.3	2.2
1:36 p.m.	306	2.5	9.7	12.35	2.65
1:37 p.m.	307	3.0	9.2	12.4	3.2
1:39 p.m.	309	3.5	8.7	12.4	3.7
1:41 p.m.	311	4.2	8.0	12.5	4.5
1:44 p.m.	314	5.0	7.2	12.55 ³	5.35
1:47 p.m.	317	5.5	6.7	12.6	5.9
1:48 p.m.	318	5.8	6.4	12.65	6.25
1:51 p.m.	321	6.5	5.7	12.7	7.0
1:54 p.m.	324	7.3	4.9	12.8	7.9
	50		12		12.0





Other Supporting Information

January 7, 1971

Dear Mr. Ketchum:

The area is underlain by granite as shown by outcrops in two small creeks east of the site. The granite is jointed, the joints systems trending N 20°E and N 80°W. The jointing system in the granite is no doubt a key to the movement of ground water in the area.

An old well drilled by the CCC was located south of the McCoull house. It apparently supplied sufficient water for the needs at that time. The well was abandoned and covered with dirt and its exact location is not known.

A small spring yielding an estimated 3 to 5 gpm is in a draw northeast of the McCoull house in a draw. Park Service personnel noted that they would like the spring to remain in its present free flowing condition. This limits to some extent the area available for location of a prospective well.

Two drilling sites were picked for the test well.

Site one is to the left (westside) of the dirt road leading to the ruins of the McCoull house along the edge of the wooded area.

The site is easily accessible to drilling equipment.

-2-

Site two is nearly north of the ruins of the McCoull house in the draw and at the edge of the woods near the creek.

Both sites will be staked to show the suggested locations. Mr. Allen Brown will visit the sites to stake them on January 11th.

The test wells should be drilled to a depth of 250 to 300 feet and cased with 6-inch casing. An air-hammer rotary drill would be the most rapid type of drilling equipment.

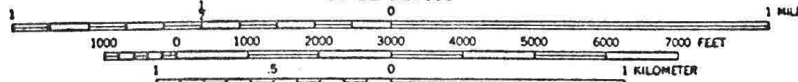
Sincerely yours,

Robert L. Wait
Assistant District Chief

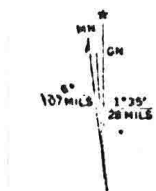
Enclosure
RLW/cyh



SCALE 1:24 000

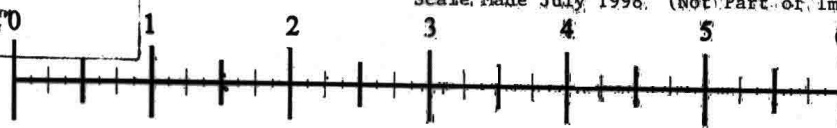


CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL



1964 AND 1966 MAGNETIC NORTH
LOCATIONS AT CENTER OF SHEET

Scale Made July 1998. (Not Part of Image)



INCHES

Form 10-174
(June 1962)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

FACE SHEET FOR COMPLETION REPORT

Park <u>Fredericksburg National Military Park</u> Location in Park <u>Spotsylvania & Wilderness Battlefield Areas</u>		Region <u>SERO</u> State(s) <u>Virginia</u> County or Counties <u>Spotsylvania</u>	Work Order No. <u>B-15</u> Fund Symbol <u>11X1035</u> Year Programmed <u>1963</u> PCF No. <u>B-38-1; 020621; B-33-2;</u> <u>M50452</u> Master Plan No. <u>-</u> Master Plan Corrected By <u>-</u> As Built Drawings By <u>-</u> Date Started <u>6/63</u> Date Completed <u>5/64</u>
☒ Contract and/or ☒ Day Labor		Work Order Title <u>Construct Exhibit Shelter, Spotsylvania; Construct Utilities (Water and Sewer Systems), Spotsylvania; Construct Exhibit Shelter, Wilderness; Grounds Development & Flagpole, Spotsylvania and Wilderness.</u>	
DESCRIPTION OF FIXED ASSETS (For completion by employee in charge of project)		TOTAL COSTS (For completion by FFO)	
<u>100.6 - Buildings</u> 15,188.00 2. Visitor Use <u>100.7 - Structures</u> 740.00 5. Miscellaneous Structures <u>100.8 - Utilities</u> 5,062.54 1. Water Systems 2. Sewer Systems 5. Electric Systems <u>100.9 - Grounds and Other Developments</u> 16,281.21 1. Grounds, General 9. Signs System - Outdoor Interpretive Devices		43,235.23	
TOTAL		\$ 13,235.23	
DISTRIBUTION THE FIXED ASSET DESCRIBED ABOVE HAS BEEN COMPLETED IN ACCORDANCE WITH APPROVED DRAWINGS, SPECIFICATIONS, AND AUTHORIZED CHANGES			
No.	To	Submitted By:	Title
1	WASO	Weldon B. Land	Administrative Assistant
1	EODC		
2	SERO	O. F. Northington, Jr.	Superintendent
1	Area (Fred M. ...)		
COSTS VERIFIED		Regional Accountant	
BY <u>T. J. Baer</u>		Date: <u>6/22/64</u>	

11360

Construct Shelter	27'4" x 38'	10,000.00
Concrete Pipe	96'	820.00
Concrete Curbing	352'	2,200.00
Strip and Replace Topsoil		150.00
Site Preparation		250.00
Tree Removal (8)		240.00
Concrete Walks & Terraces	1557 sq.ft.	518.00
Wood Edging (Gravel Beds)	150 ft.	75.00
Gravel (39 cu.yds)		234.00
Flagpole (1)		370.00
Bituminous Paving	7,560 sq.ft.	2,300.00
Seeding	6000 sq.ft.	150.00
Planting	270 periwinkle - 68 Holly	1,500.00
		<u>18,807.00</u>

Spotsylvania Shelter

Construct Shelter	40' x 40'	15,103.00
Construct Water System		525.00
Sewer System	2000 gal. tank 400 ft. drain field	3,300.00
Underground Power Connection	630 ft	1,740.00
Strip and Replace Topsoil		150.00
Site Preparation		550.00
Borrow	200 cu.yd.	300.00
Concrete Walks & Terraces	100 sq.ft.	495.00
Concrete Curbing	100 ft.	2,400.00
Wood Edging	100 ft.	57.50
Gravel	39 cu.yds.	234.00

JUN 10 1 05 PM '64

L54 SER(OLW)

JUN 9 - 1964

390-6-11-64
W.R. Long
Cnd.
d. ch. 11-11-64
R. L. 11-11-64
LWC
6/1

Memorandum

To: Superintendent, Fredericksburg

From: Assistant Regional Director, Operations, Southeast Region

Subject: Pump testing of existing shallow well at Spotsylvania
Exhibit Shelter - Fredericksburg

Chief Engineer Smith recommended in his memorandum of May 16 to Superintendent Northington that a yield and drawdown test should be conducted on the subject well to determine the quantity of water available. This office concurred in the recommendation and arrangements were made to get this work underway immediately. On May 27, the test pumping of the existing shallow well at Spotsylvania Exhibit Shelter was performed by C. H. Helmick Well Drilling Company, Walkerton, Virginia.

The contractor used a weighted steel cable to measure the total depth of the well. It was found that the distance from the top of the casing to the bottom of the well was 39 feet. The well was originally drilled to a depth of 40 feet. The casing placed in the well was standard strength 30' reinforced concrete pipe.

The contractor installed a submersible pump in the well at a point 38.5' below the top of casing. The test pump had a capacity of 30 gallons per minute and was equipped with a proper throttling device.

The next step was to measure the static water level which was recorded at 25.4' below the top edge of casing. The pump test was started after the water level measurement was recorded. All yield and drawdown data are shown on the enclosed Table I. The drawdown curve was plotted from the data listed on Table I. You will note from the table that a flow rate of 4.5 gallons per minute was maintained for two hours and at the end of this period, the drawdown was 4.4 feet. The throttling device was opened up to increase the flow rate to 8 gallons per minute and at the end of one hour the water level had dropped an additional 2.3 feet. The pumping rate was again increased to 10 gallons per minute

and after two hours of pumping at this rate the water level of the well was recorded at 36.7'. From the field information collected during the test, I believe the well capacity is approximately 6 to 7 gallons per minute. It must be remembered that during drought conditions the well yield could possibly be a great deal less than its present recorded yield. Therefore, I recommended that the well be pumped at not over 5 gallons per minute.

Recovery measurements were made by the contractor after the test was completed. Pertinent data on rate of well recovery are shown on Table II. A recovery curve has been plotted on the enclosed graph.

SIGNED

E. M. Lisle

Enclosures 4

cc:

Director, w/encs.

Chief, EODC (2), w/encs.

Docket Information

Number of Documents in Docket 13

Documents Dated from 6/9/1964 to 5/31/1974

Docket Compiled: 3/22/2011