



Docket No: 1

State Water Rights Documentation

00-00-0000: water well completion report

COMMONWEALTH OF VIRGINIA

DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT

DIVISION OF MINERAL RESOURCES

Box 3667, University Station, Charlottesville, Virginia

WATER WELL COMPLETION REPORT

OWNER: National Park Service

TENANT: Port Harrison - Battlefield Park

DRILLER: Snyder Pump & Well Co., Inc.

WELL LOCATION: County _____

(direction) of _____ and _____

(Give direction and distance in feet or tenths of mile from two reference points: roads, towns, rivers, etc. - on county highway or other map)

Mailing Address: Richmond, Virginia

Mailing Address: _____

Mailing Address: Richmond, Virginia

Approx. _____ ft. miles

WATER CONDITIONS

DEPTH

STATIC WATER LEVEL _____

WATER ZONES (fissures or formations supplying water)

(from) _____ (to) _____

_____ ft. _____ ft.

QUANTITY OF WATER

WELL PUMPED (or bailed) at 2 Gal. per Min. with _____ feet **DRAWDOWN** after 24 HOURS PUMPING.

FLOW (natural) _____ G.P.M. HEAD _____ ft. (above ground)

REMARKS: _____

QUALITY OF WATER

COLOR _____ TASTE _____

ODOR _____ OTHER _____

ANALYSIS: AVAILABLE- Yes ☐ No ☒ ATTACHED Yes ☐ No ☐

TEMPERATURE _____

_____ WATER (from) _____ ft. (to) _____ ft.

(salt, brackish, iron, sulfur, acid, other)

USE OF WATER: Domestic ☐ Town ☐ Industry ☐ Farm ☐ Public ☒

N

W

S

CONSTRUCTION

RIG TYPE (or method) Rotary

(rotary, cable, bored, driven, etc.)

DATE: Started 11/7/62; Completed 11/14/62

TOTAL DEPTH 67 ft.

BEDROCK at None ft.

GROUTING INFORMATION

METHOD USED _____

GROUTING MATERIAL _____

DEPTH OF GROUTING _____

REMARKS: _____

HOLE SIZE

(diam) _____ in. (from) _____ ft. (to) _____ ft.

9 7/8 0 67

SCREEN (or perforations)

(diam) _____ in. (from) _____ ft. (to) _____ ft. (opening size)

PUMP (installed)

TYPE _____ Cap. (gpm) _____

H.P. _____ Depth of intake _____ ft.

Could not clear water - casing and screen pulled and hole filled in

LOG

FURNISHED BY **SYDNOR PUMP & WELL COMPANY, INC.**DATE: **January 9, 1963**

DEPTH (feet)		TYPE OF SOIL OR ROCK PENETRATED (gravel, clay, etc., hardness, color, etc)	REMARKS (water, caving, shot, screen, sample, etc)
FROM	TO		
0	2	Red clay	
2	20	Yellow and red sand and gravel and red clay	
20	37	Red and white clay	
37	41	White clay	
41	46	Sand and gravel	
46	48	White clay	
48	70	Yellow sand and gravel	
70	71	Hard streak - clay	
71	87	Gray sand	

OWNER: Richmond Natl. Battlefield Park
 DRILLER: Snyder Pump and Well Co., Inc.
 COUNTY: Henrico

VDNR # 764
 WPCR # 138
 TOTAL DEPTH : 87'

**SAMPLE EXAMINATION
 (Unwashed Samples)**

COLUMBIA GROUP (0-80)

0-2 Silt - slightly argillaceous, tan, small amounts of fine to coarse grained sand
 2-10 Gravel - quartzose, tan, angular, 1/8 to 1/2 inch diameter
 10-20 Gravel - quartzose, tan, small amounts of quartzite and chert, angular, 1/4 to 1 inch diameter
 20-30 Gravel - quartzite, tan, angular, 1/16 to 1/2 inch diameter
 30-40 As above
 40-50 Gravel - quartzose, gray, angular, 1/16 to 1/2 inch diameter, small amounts of coarse sand
 50-60 Gravel - quartzose, gray, angular, 1/16 to 1/2 inch diameter, small amounts of quartzite and coarse sand
 60-70 Gravel - quartzose, gray, angular, 1/16 to 1/2 inch diameter
 70-80 Gravel - quartzose, gray, angular, 1/16 to 1/2 inch diameter, small amounts of quartzite

PATUXENT FORMATION (80-87)

80-87 Gravel - quartzose, gray, subangular, 1/16 to 1/8 inch diameter, 20% feldspar and 20% coarse sand

GEOLOGIC SUMMARY

	<u>AGE</u>	<u>ROCK UNIT</u>
0-80	Pleistocene	Columbia group
80-87	Lower Cretaceous	Patuxent formation

Note: This section of Pleistocene gravel is unusually thick, and apparently represents channel-fill material from an ancestral river that cut down through Tertiary sediments into the Lower Cretaceous Patuxent formation.

Virginia Division of Mineral Resources
 James L. Ruhl - Geologist
 January 8, 1963

State Virginia LAND OWNERSHIP RECORD Tract No. _____
County Warren Deed No. 1-6
Civil Subdivision Various Metasterial Plots; 465.73 acres Richmond National Battlefield Park
Name of Park or Area
Area based on survey of H. W. LePrade & Sons Date 1939 Section of Park or Area
Legal Description: Long Description - see deed: first tract 315.18 acres
(Malvern Hill Battlefield) second tract 180.00 acres
(Malvern Hill Battlefield) third tract 30.50 acres *see pg 23*
Method of Acquisition: Donation Appropriation or Source of funds: _____
Cost (if purchased) or estimated value: \$31,586.20
Acquired from: Virginia Conservation Commission by deed of 12/6/43 recorded DE 328 page 1
Also deed of correction dated May 18, 1944 recorded DE 327 page 426 and plat BK 18 P 24
Accepted by Secretary (W.) Opinion of Atty. Gen., title in U. S. () date: 7-14-44
Physical Characteristics: First Tract - Fort Harrison area including nearby Forts Gilmer, Gregg,
Johnson, Hoke, Hairy, Brady, and connecting fortifications - Union and Confederate works.
Area contains splendid examples of the permanent type of fortifications employed to defend
Richmond. Fort Harrison was captured by Federal attacks September 29, 1864, following which
this strong point and adjacent lines were held by Federal forces until Richmond fell the
following April. Present culture is about 90% woodland, with a very fine stand of pine
and oak timber. Park roads parallel interesting fortifications throughout the area.
Second Tract - Malvern Hill or Crow House area; 65 acres pine woodland; 15 acres open land.
Third Tract - Malvern Hill or West House area; about 17 acres open farm land, remainder
in pine and oak woodland. Tracts two and three, and adjacent area, were the scene of the
improvements on land at time of Acquisition. Battle of Malvern Hill, July 1, 1862 - the last of the
Seven Days' Battles.
Improvements on land at the time of Acquisition: No buildings on Second and Third Tracts.
The following buildings on Tract One: 1 - 4 room log cabin (Museum & Bq.); 1 - 3 room log
cabin (Pump house and rest rooms); 1 - Utility Garage (6 large & 6 small stalls); 1 - Shed
(4 stalls and 1 room for shop); 1 - Tool House; 1 - Power House; 1 - Oil House; and the
following units of a GOC camp: 1 - Mess Hall; 1 - Headquarters Bldg.; 1 - Officers' Qrs.;
1 - Wash House; 1 - Latrine; 1 - Barracks; 1 - Water Tank and Tower; 1 - Recreation Hall.
Existing or outstanding special use permits, reservations, rights, or rights of way: Numerous reservations in deed.
Mr. J. O. Blankenship holds Special Use Permit No. 1-32-52, dated Oct. 1, 1944, for the
right to farm the open land and pasture the woodland, of the Second Tract; and, to farm
the open land of the Third Tract.
Report Based on: _____
Prepared by: G. K. Simmers (in part) date: 7/18/44
Map References: H. W. LePrade and Brothers survey and map
Remarks: *Data supplied by Flora E. Taylor 4/1/45/ The estimated value is taken from
the 1938 appraisal and the maximum liability of the Lawyers Title Insurance Corporation.
The figure is the same in both cases.

Supporting Hydro Data

Form 10-559
(Nov. 1958)

U. S. DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE

FIXED PROPERTY RECORD

DESCRIPTION OF PROPERTY (Include reference to the location within the Park, how the asset was acquired, name of contractor)

1. One shallow well, located at Fort Harrison, pumped. 1000' of pipe. Maintained by N Water has a high natural carbon dioxide and required treatment as follows: Water is pumped from well to top of a coke-tray aerator, trickles through the aerator into a collecting basin, and is pumped through a neutralizer into a 300 gallon hydro-pneum tank. Donated. Rawls plumbing Co., Mechanicsville, Va. installed pump in Watt House. One shallow well at Garthright House, pumped, with no treatment. Length of pipe maintained by NPS is 45'. Donated.
2. Pump and power house. building # 8. One story building constructed of frame on concrete base. Exterior walls are siding covered with tar paper. Flooring is concrete and roof is tar paper. Building is used as a pump house and distribution point for electricity. Measures 91 square feet. Donated. Constructed by CCC.
3. Water System, Watt House - Hand dug well 30' deep, 2 1/2 ft. in diameter. Lined with concrete tile. Gould two pipe system, 1/3 H.P. pump, s/p, 60 cycle. System includes 40 gallon pressure tank and 140' of flexible plastic pipe.

Line	DATE	REFERENCE		Unit	QUANTITY		COST		
		Journal Voucher	Other		No. of Units	Accumulated Total	Direct Costs	Indirect Costs	Accumulated Cost
1	1/13/60	31-181		Each	2	2	\$ 1,082.00		\$ 1,082.00
2	1/13/60	31-181		Each	1	3	\$ 150.00		\$ 1,232.00
3	12/15/60	31-112	331.1	"	1	4	922.00	111.13	2,295.13
4									
5									

G.L. Acct. No.	General Classification	Sub-Classification	Region	State	Park or Office
100.8	UTILITIES	Water Systems	One	Virginia	Richmond

1001

Allen - to Ver 1

Mr. Wallace T. Stephens, Superintendent
National Park Service, Fort Harrison
Route 14, Box 334
Richmond, Virginia

REGION ONE	
NOV 28 1960	
Exec. Director	
Asst. Dir.:	
Adm. Serv.	
Ch. Ranger Act.	
Ch. Interpretation	
Ch. Admin.	
Ch. Rec. Mgmt.	

Dear Mr. Stephens:

On November 3, 1960, we took a sample of water from the Park's well pump and submitted it to the F. E. Myers & Bros. Co. at Ashland, Ohio, for chemical (mineral) water analysis.

The following report came back to us:

Suspended matter . . . None	Hardness . . . 1.8 gpg.
Color 2	Iron 0.8 ppm.
Odor Earthy	Turbidity . . . 2
PH	6.3

The Myers Co. recommended as follows:

The PH is low and water is very corrosive. We would suggest using a No. CF 10 water guard Feed, feeding a solution of soda ash to raise PH.

Cost of CF 10 water guard Feed	129.50
Soda Ash per 100%	6.25
Total	135.75

(Will use approximately 25% per No.)

This does not include installation

If you are interested further I will be glad to go over this report.

Yours truly,

Ms. J. Helfert

Nov 26, 1960

At. This is the report on chemical analysis of existing water supply at Fort Harrison

1076

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UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
REGION ONE
RICHMOND, VIRGINIA

FILE NO. D5039 RICH

February 7, 1952

Memorandum

To: Director
From: Regional Engineer
Subject: Shallow Well - Richmond National Battlefield Park

In response to Chief A. Van V. Dunn's question of February 4, the water supply in current use at the above area is a 30-to 35-foot dug well cased with 36 inch diameter concrete pipe. A jet pump in the pumphouse pulls approximately 3.4 g.p.m. when operating, but does so intermittently.

The pumphouse is shown on the sketch drawing #2011, sent with my memorandum of January 25. The shallow well may be located in the small rectangle shown adjacent to the north side of the pumphouse. It is at the north end of this rectangle, and was dug in 1944.

(SIGNED)
Regional Engineer

MAACK: SHANNHOLTZ, W. D.
COMMISSIONER

COMMONWEALTH OF VIRGINIA



DEPARTMENT OF HEALTH
RICHMOND, 19

RICHARD MESSER
DIRECTOR
DIVISION OF ENGINEERING

PLEASE ADDRESS REPLY TO
DIRECTOR, DIVISION OF
ENGINEERING

66-63 water S.

Mr. T. B. Kinear
National Park Service
900 N. Lombardy Street
Richmond, Virginia

November 5, 1951

Dear Mr. Kinear:

The report on the sample from the well at Richmond National Battlefield Park, Fort Harrison, came in just a few minutes after you left the office. A copy is enclosed.

Other than the rather high CO₂ and low Alkalinity, the only other constituent of any significance is the Chloride content 41.3 p.p.m. However, this is well within the limits and probably should not affect the characteristics of the water after treatment.

Very truly yours

Richard Messer
Richard Messer, Director
Division of Engineering.

Encl. 1

Commonwealth of Virginia

State Department of Health

WATER ANALYSIS

Lab. No. 299Sample: Source and Ownership Raw Water from shallow well (35')Richmond National Battlefield Park - Ft. Harrison area

Collected by: _____

Date Collected 10-19-51 Received 10-19-51 Completed 11-1-51

Turbidity _____ Color _____ Odor _____

DETERMINATIONS MADE: (Parts per Million)

Dissolved Solids at 103°C.	<u>96.0</u>	Calcium: Ca	<u>3.6</u>
Loss on Ignition	<u>47.0</u>	Magnesium: Mg	<u>2.5</u>
Fixed residue	<u>49.0</u>	Sodium and Potas- sium as Na	_____
Fe ₂ O ₃ + Al ₂ O ₃	<u>2.0</u>	Sulphate: SO ₄	<u>0.41</u>
Iron: Filtered, Fe	_____	Nitrate: NO ₃	<u>6.64</u>
Unfiltered, Fe	<u>0.2</u>	Chloride: Cl	<u>41.3</u>
Manganese: Mn	<u>0.03</u>	Fluoride: F	<u>0.0</u>
Insoluble residue + SiO ₂	<u>2.2</u>	Calculated Hardness	<u>19.3</u>
Alkalinity as CaCO ₃	_____	By ~~3666666666~~ Titration	<u>16.0</u>
Methyl Orange	<u>9.0</u>	Nitrate nitrogen	<u>1.5</u>
Phenolphthalein	<u>0.0</u>		
Free Carbon Dioxide: CO ₂	<u>96.0</u>	(In sample as received at lab.)	
Free Carbon Dioxide: CO ₂	_____	(Field test by _____)	
Hydrogen Ion: pH	<u>4.9</u>	(In sample as received at lab.)	
Hydrogen Ion: pH	_____	(Field test by _____)	
Remarks:	_____		

Analysis by: R. T. Hill



C O P Y

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

Richmond National Battlefield Park

R. F. D. 14, Richmond 23, Virginia

IN REPLY REFER TO:

July 13, 1948

MEMORANDUM for the Regional Director, Region One.

Attached please find a copy of the water analysis of the well service the Museum and Utility area, Richmond NBP, as prepared by Calgon, Inc., April 25, 1946.

This information was recently requested by Engineer Kiener. The pump in this particular well delivers 5 gallons of water per minute.

/s/ Floyd B. Taylor

Floyd B. Taylor,
Custodian.

C O P Y

FROM CALGON, INC.
Hagan Building,
Pittsburg, Pa.

April 25, 1946

Richmond National Battlefield Park
R. F. D. 14
Richmond 23, Virginia

Attention: Mr. Floyd B. Taylor
Custodian

Gentlemen:

We are enclosing analysis of water sample from your well.

The water is reasonably soft with respect to calcium salts, but is high in iron.

Micromet should do an excellent job with this iron condition.

It is also very possible that this water is corrosive to the pressure tank and 300' of pipe line. Micromet will also protect the line and tank.

We suggest that you have a feeder made according to the enclosed diagram to hold four pounds of Micromet. Place the feeder between the pump and pressure tank. Put an initial charge of four pounds of Micromet in the feeder and recharge it each month with one pound.

It is advisable to flush the entire system frequently at the beginning of treatment in order to wash out as much of the accumulation of iron as possible. We would also suggest the addition of a cupful of clorox to the feeder every third day for two weeks to aid in cutting the iron deposits from the pipes.

Your condition may appear worse at first, but this will be due to the cleaning process.

If we can be of further assistance, please do not hesitate to write us.

Very truly yours,

(SGD)

W. W. HOPWOOD
W. W. Hopwood
Micromet Department
Calgon, Inc.

WWH:vh

FROM

CALGON, INC.
Results of AnalysesReceived: 4-10-46
Reported: 4-25-46Source: Water sample
Lab. N. J-3562

		pH 6.4	ppm.	pH	ppm.	pH	ppm.
Hydroxide	(OH)		0				
Carbonate	(CO ₃)		0				
Bicarbonate	(HCO ₃)		79				
Sulphate	(SO ₄)		--				
Chloride	(Cl)		32				
Iron	(Fe)		1.0				
Calcium	(Ca)		17				
Magnesium	(Mg)		1				
Soap Hardness	(CaCO ₃)		46				
Suspended Solids (est)			5-10				
Calgon (as NaPO ₃)							
Orthophosphate (PO ₄)							

CALGON, INC.

W. W. Hopwood
Micromet Department

Other Supporting Information

ESTABLISHED 1889
RICHMOND, VA.

April 2, 1951

Mr. Floyd B. Taylor,
Supt., Richmond National Battlefield Park,
R. F. D. 14,
Richmond, Virginia.

Dear Floyd:

In line with our promise I have investigated our files with respect to the Fort Harrison Cemetery well and the Battlefield Park well, which we drilled in 1933.

When we first drilled the Fort Harrison well it was completed at a depth of 126 ft. This was a CWA job. Later we deepened the well to a finished depth of 210 ft. I have not gone back to determine the exact reason for deepening this well, but I imagine it stemmed from two causes - one, an undesirable quality of water and possibly a reduced quantity of water, which in itself was probably caused by the chemical characteristics of the water, which I believe is substantially the same water that we obtained at the Camp well.

You brought us samples of the present Fort Harrison well water and of a dug well water that you are now using. I gather that the dug well water is superior in quality to the drilled well water and for that reason you are using it.

The Fort Harrison Cemetery water produced the following analysis:

Total Iron as Fe	0.2 PPM
pH	8.4
Free CO ₂	Nil PPM
Alkalinity (P) as CaCO ₃	36 PPM
" M as "	210 PPM
Chlorides	110 PPM
Total Hardness as CaCO ₃	17.1 PPM
	1.0 GPG
Free Chlorine as CaCO ₃	ND PPM

The dug well water at the Camp which you are using produced the following analysis:

Total Iron as Fe	0.2 PPM
pH	5.9
Free CO ₂	85 PPM
Alkalinity (P) as CaCO ₃	0 PPM
" M as "	35 PPM
Chlorides	25 PPM
Total Hardness as CaCO ₃	34.2 PPM
	2.0 GPG
Free Chlorine as CaCO ₃	ND PPM

35'
Battlefield
Well?

SYDNOR PUMP & WELL CO.
ESTABLISHED 1889
RICHMOND, VA.

Mr. Floyd B. Taylor

2

April 2, 1951

Notes: 1) To convert Grains per gallon to PPM multiply by 17.1

2) ND means "Not Determined"

Now the real trouble with the Battlefield Park well water is the low pH and the high CO₂ content, which you will notice is absent in the cemetery well water.

The procedure at the cemetery seems to have been to remove the screen and simply deepen the well to a stratum which did not require a screen and which did produce a good volume of water, 15 or 20 GPM, and the quality of the water which is indicated by the above analysis.

Now assuming that we did come up with substantially the same performance for your drilled well as was used in the case of the cemetery job, we find that you will need about \$850 to cover the work of moving down and setting up and subsequently knocking down and moving out, of pulling the present screen and drilling your well from approximately 128 ft. to approximately 228 ft. and testing the well for a period of approximately 16 hours. Of course, if a strainer is required, and the one that is removed from your well is usable, no strainer cost would be involved; otherwise, you might be confronted with purchasing a screen worth approximately \$200 and the cost of installing it amounting to slightly less than \$100.

Basically this is one of those jobs that should be done on a time and material basis with an appropriation that is great enough to see the job through.

I trust with this information that you will be able to take the necessary steps toward accomplishing the work.

With kindest regards, we beg to remain

Yours very truly,
Sydnor Pump & Well Co., Inc.

Garland S. Sydnor, President

GSS/H



C O P Y

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

IN REPLY REFER TO:

Richmond National Battlefield Park
R. F. D. 14, Richmond 23, Virginia

January 12, 1950

Memorandum

For: The Regional Director, Region One
From: Superintendent, Richmond National Battlefield Park
Subject: Sanitation and Water

This is in reference to your memorandum of January 6 requesting a report on this subject prior to January 24.

From the standpoint of visitor use the Headquarters area (Fort Harrison) may be considered the only developed area in the Park at this time. The water supply at the Headquarters and Utility area and the Superintendent's Residence is produced by a thirty-five foot dug well located in the abandoned camp-site at Fort Harrison. The supply has proved adequate and is provided at a potential rate of 5 GPM. Water samples usually analysed once a month by the Virginia State Department of Health indicate the water to be satisfactory bacteriologically, and therefore no chlorine or other treatment for this purpose has ever been installed. An OCN 15 Permutit Neutralizer was installed November 4, 1949, to reduce the turbidity and render the water more suitable for Park and Household purposes.

A spring provides water for public use in two of the picnic areas located near Park Headquarters. This spring was developed during CCC days and reasonable protection has been made against the possibility of contamination. Water samples from this source occasionally show contamination and when this occurs the spring is posted and samples are submitted at frequent intervals for analysis until a report that the spring is free of contamination is obtained.

Sanitary facilities in the form of flush toilets are available at Park Headquarters. The septic-tank-type of disposal has proved satisfactory. Two pit-type latrines are located in the picnic area near headquarters and these facilities are considered adequate for current travel conditions and Park use and no further expansion is planned for the Headquarters area at this time.

There is no apparent opportunity for stream pollution to result from the operation of the sanitary facilities in this Park.

/s/ Floyd B. Taylor

Floyd B. Taylor
Superintendent

In duplicate

cc: Coord. Superintendent



C O P

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

IN REPLY REFER TO:

Richmond National Battlefield Park
R.F.D. 14, Box 140, Richmond 23, Virginia

April 20, 1945

MEMORANDUM for the Coordinating Superintendent:

When I was in the Regional Office, Tuesday, I brought up the subject of the old well and the comfort stations at the Museum, with Regional Engineer O'Neil, and discussed the feasibility of putting these units in use, and the probability of securing funds for that purpose within the current fiscal year.

Mr. O'Neil is heartily in favor of providing comfort facilities, usually found at places of public interest, and understands our difficulty with respect to a water supply. He suggests that we go ahead and prepare specifications for the installation of a new pump, together with a 42 gallon pressure tank, etc., and have everything ready to secure bids just as soon as it is known definitely that the money will be available. In view of the condition of the old pipe line and the cost of replacing it, etc., it is his opinion that the above proposal is fully justified under the present emergency. The previous pump carried 3" pipe (120'), and when removed water stood on the bottom 40' of the pipe. A deep well pump providing 6 gallons per minute, or even less, will probably provide adequate water for current proposed use. Any other data which you may need I will gladly endeavor to secure.

/s/ Floyd B. Taylor
Floyd B. Taylor, Custodian.

cc: Region One.

Maps and Miscellaneous Information

Number of Documents in Docket	19
Documents Dated from	7/18/1944 to 1/9/1963
Docket Compiled:	6/14/2011