



WATER-RIGHT DOCKET

Shenandoah National Park

Docket No: 1

HEADQUARTERS WATER SYSTEM

State Water Rights Documentation

00-00-0000: water well completion report for headquarters area no. 1

COMMONWEALTH OF VIRGINIA	
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT	
DIVISION OF MINERAL RESOURCES	
Sta. 3807, University Station, Charlottesville, Virginia	YEAR 851 WELL 72
WATER WELL COMPLETION REPORT	
OWNER: <u>Shenandoah National Park</u>	Using Address: <u>Luray, Virginia</u>
TENANT: <u>Headquarters Area #1</u>	Mailing Address:
DRILLER: <u>Snyder Pump and Well Co. Inc.</u>	Office Address: <u>Richmond 12, Virginia</u>
WELL LOCATION: County <u>PAGE</u>	Acres <u> </u> ft. <u> </u>
(direction) of <u> </u> and <u> </u> of <u> </u>	
(Show location and distance in feet or tenths of mile from two reference points: roads, towns, rivers, etc. on county highway or other map)	
WATER CONDITIONS	
DEPTH	
STATIC WATER LEVEL <u>50</u>	
WATER ZONES (fissures or formations supplying water)	
(from) <u> </u> (to) <u> </u> (from) <u> </u> (to) <u> </u>	
QUANTITY OF WATER	
WELL PUMPED (or bailed) at <u>15</u> Gal. per Min. with <u>180</u> feet DRAWDOWN after <u>24</u> HOURS PUMPING.	
FLOW (natural) <u> </u> GPM HEAD <u> </u> ft. above ground	
REMARKS: <u>See pumping log for details</u>	
QUALITY OF WATER	
COLOR <u>OK</u> TASTE <u>OK</u>	
ODOR <u>OK</u> OTHER <u> </u>	
ANALYSIS AVAILABLE - Yes ☐ No ☐ ATYCHOUS Yes ☐ No ☐	
TEMPERATURE <u> </u>	
WATER (from) <u> </u> ft. (to) <u> </u> ft.	
(see, brackish, iron, sulfur, acid, other)	
USE OF WATER: Domestic ☐ Ties ☐ Irrigation ☐ Fire ☐ Power ☐	
CONSTRUCTION	
RIG TYPE (or method) <u>Air Rotary</u>	
DATE: Started <u>5-23-63</u> ; Completed <u>6-3-63</u>	
TOTAL DEPTH <u>280</u> ft.	
BEDROCK at <u>11</u> ft.	
GROUTING INFORMATION	
METHOD USED <u>Pump</u>	
GROUTING MATERIAL <u>Cement & water</u>	
DEPTH OF GROUTING <u>50</u>	
MOLE SIZE	
(diam) (from) (to)	
<u>10</u> <u>0</u> <u>30</u>	
<u>OK</u> <u>30</u> <u>280</u>	
CASING SIZE	
(diam) (from) (to)	
<u>6 7/16</u> <u>0</u> <u>52</u>	
SCREEN (or perforations)	
(diam) (from) (to) (opening size)	
<u> </u> <u> </u> <u> </u> <u> </u>	
PUMP (location)	
TYPE <u> </u> Cap. (gpm) <u> </u>	
H.P. <u> </u> Depth of intake <u> </u> ft.	
REMARKS: <u>Log and samples to Div. of Min. Resources</u>	
<u>Samples of water taken by park employees</u>	
<u>Test pump set at 303</u>	
<u>Air line set at 204</u>	
<u>6-10-63 Static level 52' measured</u>	
<u>By Mr. Folsy of Park Service</u>	

Log of well (over)

Headquarters
Well No.1

LOG

FURNISHED BY Sydney Pump and Well Co. Inc.DATE 6-12-63

Data from drillers notes by Jesse Snyder, Jr.

DEPTH (feet)		TYPE OF SOIL OR ROCK PENETRATED (gravel, clay, etc., hardness, color, etc)	REMARKS (water, casing, etc., splices, casing, etc)
FROM	TO		
0	1	Red clay	
1	11	Broken weathered rock, red clay	
11	15	Hard rock	
15	19	Clay	
19	25	Rock	
25	33	Weathered rock and clay	
33	42	broken rock	
42	56	Hard rock	
56	57	Broken rock, slight weathering	1 G.P.M.
57	87	Gray rock	
88	89	Broken rock	
89	107	Gray rock, slight weathering	4 G.P.M.
107	117	Green & red rock	
117	118	Broken slight weathering	7-8 G.P.M.
118	120	Hard blue rock	
120	149	Hard gray, green & red rock, slight weathering streaks	
149	150	Broken rock, weathering	10-15 G.P.M.
150	280	Hard rock, varying in color from red-green gray brown- no noticeable water increase	

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
DIVISION OF MINERAL RESOURCES

Box 3667, University Station, Charlottesville, Virginia

VDNR 855
WNCR 73

WATER WELL COMPLETION REPORT

OWNER: Shenandoah National Park Making Address: Luxey, Virginia
TENANT: Headquarters #2 Making Address: _____
DRILLER: Sydner Pump and Well Co. Inc. Making Address: Richmond 12, Virginia
WELL LOCATION: County Page Approx. _____ ft. miles
(direction) of _____ and _____ of _____

Give location and distance in feet or tenths of mile from nearest public roads, towns, rivers, etc. to county highway or other road.

WATER CONDITIONS

DEPTH

STATIC WATER LEVEL 41
WATER ZONES (fissures or formations supplying water)
(from) (to) (from) (to)
_____ ft _____ ft
_____ ft _____ ft

QUANTITY OF WATER

WELL PUMPED (or bailed) at 23 Gal. per Min. with
200 feet DRAWDOWN after 24 HOURS PUMPING.
FLOW (natural) _____ G.P.M. HEAD _____ ft. above ground
REMARKS: _____

QUALITY OF WATER

COLOR OK TASTE OK
ODOR OK OTHER _____
ANALYSIS AVAILABLE—Yes ☐ No ☐ ATTACHED Yes ☐ No ☐
TEMPERATURE _____
_____ WATER (from) _____ ft (to) _____ ft
(lead, brackish, iron, sulfur, acid, other)

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

at park headquarters 70' from north
east corner of maintenance area

from observation at time of test

CONSTRUCTION

RIG TYPE (or method) Rotary cable, bored, driven, etc.
DATE Started 6-6-63, Completed 6-14-63
TOTAL DEPTH 220 ft
BEDROCK at 13 ft

GROUTING INFORMATION

METHOD USED Gravity
GROUTING MATERIAL Cement and water
DEPTH OF GROUTING 50'

HOLE SIZE

(diam) (from) (to)
10" _____ ft _____ ft
6" 50 220

CASING SIZE

(diam) (from) (to)
6 7/16" _____ ft _____ ft
0 52

SCREEN (or perforations)

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

PUMP (installed)

TYPE _____ Cap (gpm) _____
H.P. _____ Depth of intake _____ ft

REMARKS: Log and samples to Div. of Min. Resources

Water sample saved by Shenandoah National Park

Pump set at 197'

Air line at 197'

Log of well (over)

Shenandoah Nat. Park
Headquarters
Well No.2

LOG

FURNISHED BY Snyder Pump and Well Co. Inc.DATE 6-15-63

Data from driller's notes by Jesse Snyder, Jr.

DEPTH (feet)		TYPE OF SOIL OR ROCK PENETRATED (gravel, clay, etc., hardness, color, etc.)	REMARKS (water, casing, shot, screen, sample, etc.)
FROM	TO		
0	13	Red clay	
13	20	Weathered rock	
20	30	Greenstone	
30	45	Greenstone hard	
45	60	Dark green rock	2 to 3 G.P.M.
60	70	Broken greenstone	
70	95	Green and gray rock	
95	129	Greenstone	
129	140	Dark green	
140	154	Dark green hard rock	
154	189	Dark green rock	
189	190	Soft weathered area	water about 15 G.P.M.
190	220	Hard dark green rock	
60 - 2 to 3 G.P.M.			
190 - 15 to 20 G.P.M.			

Nov. 1958)

FIXED PROPERTY RECORD

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

Location: Headquarters Area - North District

Three Springs

Three Collection Boxes and Trenches

One 50,000 Gallon Concrete Reservoir

One 6' x 10' Concrete Weir House

18,505 Linear Feet of Pipe

Four fire hydrants

Gravity System (Chlorinated)

Constructed by GOC in 1939, Paces Act.

8	DATE	REFERENCE		QUANTITY			COST		
		Journal Vn.	Other	Unit	No. of Units	Accumulated Total	Direct Costs	Indirect Costs	Accumulated Costs
1	8/27/59	37-30		System	1				834,700.00
2	11/26/60	37-50			1		4,912.15	860.12	40,472.27
3	1/25/65	37-67				1	1,998.26	315.72	42,790.25
4	3/18/65	37-91					681.00		43,471.25
5									
G.L. Acct. No. 100.6		General Classification Utility			Sub-Classification Water System		Region One	State Va.	Park or Office SNP

Other Supporting Information

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

FACE SHEET FOR COMPLETION REPORT

Park Shenandoah National Park	Region Southeast	Work Order No. B-57 (SNP)
Location in Park Headquarters Area	State(s) Virginia	Fund Symbol 14X1035
☒ Contract and/or ☒ Day Labor	County or Counties	Year Programmed 1965
Work Order Title Auxiliary Water Supply System, Headquarters	Page	PCP No. U-159
		Master Plan No. None
		Master Plan Corrected By None
		As Built Drawings By None
		Date Started October 1964
		Date Completed November 1964
DESCRIPTION OF FIXED ASSETS (For completion by employee in charge of project)		TOTAL COSTS (For completion by FFO)
100.8 (1)		
Contract work: Drill, Case, Seal and Pump Test 220' Well		\$1,858.00
Force Account Work: Install 3,000 feet of control cable PS&S Costs for Contract & Force Account Work		140.26 319.72
Other Assets: Value of control cable (obtained from excess property listing) 3,000 at 0.30 per foot - \$900.00		
TOTAL		\$ 2,317.98

DISTRIBUTION		THE FIXED ASSET DESCRIBED ABOVE HAS BEEN COMPLETED IN ACCORDANCE WITH APPROVED DRAWINGS, SPECIFICATIONS, AND AUTHORIZED CHANGES	
No.	To		
1	WASO	Submitted	Date:
1	EODC	By: <u>Jerry A. Eubanks</u>	Title: <u>Project Supervisor</u> Date: <u>12/31/64</u>
1	SERO	Approved: <u>Jerry A. Eubanks</u>	Title: <u>Acting Superintendent</u> Date: <u>12/31/64</u>
1	FFO (SNP)	By: <u>Jerry B. House</u>	
1	SNP Files	By: <u>Jerry B. House</u>	
1	Engineer	COSTS VERIFIED	Date:
		By: <u>Harley W. Blivins</u>	Title: <u>Accounting Officer</u> Date: <u>12/31/64</u>

11360

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

COMPOSITION OF COST FOR COMPLETION REPORT

Work Order Number

B-57 (SNP)

Fund Symbol

14X1035

Year Programmed

1965

Park

Shenandoah National Park

Region

SE

Location in Park

Headquarters Area

Work Order Title

Auxiliary Water Supply System, Headquarters

COMPOSITION OF COST

COSTS CHARGED TO FUNDS ALLOTTED TO FIELD FINANCE OFFICE

(1) Personal Services.....	\$ 140.26	
(2) Travel.....		
(3) Contract Work	1,858.00	
(4) Supplies and Materials.....		
(5) Other Direct Expenses.....		
(6) Operation of Equipment.....		
(7) Depreciation of Equipment.....		
(8) Purchase of Construction Equipment.....		
(9) Purchase of Other Accountable Equipment		
(10) Other Costs:		
(11) TOTAL COST CHARGED TO FFO FUNDS	xxxxxxxxxx	\$ 1,998.26

OTHER COSTS:

(12) PS&S, AP, and/or Facilitating Services @ 16 %	\$ 319.72	
(13) Inventory and Other Non-Fund Costs		319.72
(14) GROSS WORK ORDER COSTS	xxxxxxxxxx	\$ 2,317.98
LESS:		
(15) Residual Value of Construction Equipment on Line 8	\$	
(16) Other Credits		
(17) NET COST OF FIXED ASSETS	xxxxxxxxxx	\$ 2,317.98

Identify other costs and other credits by line item entry, on an attached schedule, or explain in narrative.

NARRATIVE TO ACCOMPANY PROJECT COMPLETION REPORT

WORK ORDER NO. B-57

AUXILIARY WATER SUPPLY SYSTEM, HEADQUARTERS

SHENANDOAH NATIONAL PARK

Funds from this account were used primarily to reimburse the Water Resources Branch, Division of Lands, for the drilling, casing and pump testing of a test well which was drilled in the Headquarters Area and later converted to a production well which supplements the surface water supply. A small portion of the funds (\$140.26) was used to cover the installation of an electrical control cable to connect the well to the distribution system.

The well was drilled in 1963 by the Sydnor Pump and Well Company of Richmond, Virginia, under Contract No. 14-10-0137-0140, dated April 24, 1963. A 6-1/4" hole was drilled by the air-rotary method to a depth of 220 feet. This hole was then reamed to 10" in diameter, for a depth of 50 feet. Schedule 40, 6-7/16" diameter black steel casing was installed to a depth of 50 feet and the annular space between the casing and the reamed hole filled cement grout placed by the gravity method.

The well was pump-tested for 24 hours using a 3 H.P. submersible pump set at a depth of 197 feet. This test indicates that the well has a capacity of 23 gallons per minute.

The Virginia Division of Mineral Resources prepared preliminary and final reports on the well under its Contract No. 14-10-0137-0135 for Water Resources Studies. This well was assigned Virginia Division of Mineral Resources Well No. 855.

The well is located approximately 70 feet northeast of the northeast corner of the Headquarters Utility Area on property formerly owned by I. Casper Judd, Tract Number 141.

A 3,000 foot cable was installed by day labor forces during November 1964. The cable was laid in a direct line between the well and the reservoir access road intersection, and from that point, along the west side of the access road to the 50,000-gallon reservoir. The total length of cable installed was 3000 feet. This material was obtained from excess property sources and is valued at \$0.30 per foot.

GENERAL LEDGER DATA

100,8(1)	220' well	\$1,858.00
	Installation of control cable	140.26
	PS&S Costs	<u>319.72</u>
	Total Cost	\$2,317.98

Jerry A. Eubanks
Jerry A. Eubanks
Project Supervisor

November 8, 1963

LS4

Memorandum

To: Regional Director, Southeast Region
From: Superintendent, Shenandoah
Subject: Final Water Resources Reports, Headquarters Area and
Swift Run Maintenance Area, Shenandoah National Park

In response to Mr. E. W. Reed's memorandums of September 6, and September 30; and Mr. R. C. Squiza's memorandums of September 12, and October 24, on the subject water resources reports, the following details and comments are submitted:

Headquarters Area: The preliminary report located three test well sites, and water resources funds were programmed for two wells. Test Well No. 1 was drilled at the location designated in the preliminary report. Test Site No. 2 could not be used because the Virginia Department of Highways plans to construct a four lane highway over the site. After drilling Test Well No. 1 and abandoning Site No. 2, the State Geologist recommended relocation of Site No. 3 because of additional geological data obtained from the first test well. They selected a site in the Loudoun formation approximately 120 feet northwest of the intersection of the entrance road to the Headquarters Area and U. S. Highway 211 (this site is shown as a proposed water well on the final report). Because of the inaccessibility of this site and the damage which would result from the construction of an access road, this site was rejected by the Park staff after consultation with Key Regional personnel. An alternate site was selected back of the maintenance area near the site where a hand dug production well once existed. This test well proved to be a very good producer (23 gallons per minute). A permanent pump has been installed in the well and arrangements are being made to reimburse the water resources account for drilling this production well. Since this well will furnish all water needed in the Headquarters Area for many years, no further drilling is proposed for the area. Bacteriological samples are taken from the production well twice each month, and no contamination has been found.

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

In reply refer to:
D5039

Kiener 9/11

SEP 11 1953

Memorandum

To: Superintendent, Shenandoah National Park
From: Acting Assistant Regional Director, Region One
Subject: Improvement in Headquarters Water Supply

This refers to the water supply for the Headquarters Area in Shenandoah National Park which required replenishing last year by hauling from a separate source, and more recently has shown further inadequacy to meet the needs of this area. As you know, Engineer Kiener was shown a possible additional source which might be brought into the present system. He also discussed with Park Engineer Zenfell more than one method of adding it to the Headquarters supply.

After due consideration, we believe that the scheme for constructing a collecting system at the new spring-head and piping the flow by gravity to the upper spring box will prove the most satisfactory from all points of view.

It is believed that the pipe line might be laid on the surface of the ground, provided that a valve was installed on the upper end of the line inside the collecting box so that in cold weather the entire pipe line could be drained. It will be necessary in such a case to avoid dips in the pipe line which would retain water, otherwise outlets should be provided at low points to insure complete drainage. We are agreeable to this method of construction.

When observed on September 9, the new spring was flowing about 2.3 g.p.m., and was approximately equal to the flow of the sources now being used. Its addition to the system would, therefore, about double the present supply. The proposed pipe line should not be less than 1" in diameter. For an estimated distance of 3,000 feet, the difference in elevation between the new spring and the existing upper collecting box need be only 38 feet to deliver 3 g.p.m. through this size pipe. Mr. Zenfell may figure on a loss of head in 1" pipe for 3 g.p.m. at 12.6 feet for each 1,000 feet of pipe line. After determining the length of line and available head by survey, he can tell whether 1" pipe will be satisfactory. We would like to receive a drawing of the proposal for clearing with the U. S. Public Health Service.

TEKiener:ad
General
Engineering
Daily

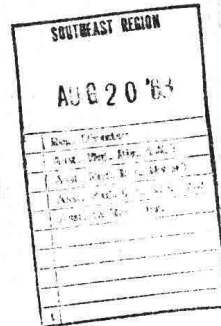
(SIGNED)

W. E. O'Neil, Jr.
Acting Assistant Regional Director

National Park Service

Contract No. 14-10-0137-0135

Final Report
 Headquarters Area
 Shenandoah National Park



Test drilling and evaluation

The first test hole was drilled at recommended site No. 1 and was completed at a depth of 280 feet. The hole penetrated only the Catoctin formation instead of the anticipated Loudoun formation. Test data indicate this hole may be pumped at the rate of 10 gallons per minute. A revised geologic map of the Northern Portion, Headquarters Area is attached, together with copies of the geologic log, Water Well Completion Report form, and pump test data for this test hole, which has been assigned Virginia Division of Mineral Resources Well No. 851. The rock cuttings obtained from this hole have been entered into this Division's repository under the above well number.

Test holes No. 2 and No. 3 as recommended in the Preliminary Report were not drilled because of road improvements to U. S. Highway 211 that may cover the No. 2 site, and because the No. 3 site would scar a portion of the developed sector. An alternate test hole site was selected about 300 feet east of test hole No. 1, and test hole No. 2 was drilled at this site to a depth of 220 feet. The Catoctin formation was penetrated as anticipated, and test data indicate this hole may be pumped at the rate of 23 gallons per minute. Copies of the geologic log, Water Well Completion Report form, and pump test data for this test hole, Virginia Division of Mineral Resources Well No. 855, are attached.

(2)

Water Well Recommendation

The Loudoun formation is still considered to be the most favorable aquifer in the Headquarters Area, and a site is located for a proposed water well to penetrate this formation. The site for this well, as indicated on the attached revised geologic map, is located about 120 feet northwest of the intersection of the entrance road to the Headquarters Area and U. S. Highway 211. It is anticipated this well will begin in the Weyerston formation, and should encounter the Loudoun formation at approximately 125 feet and the Catoctin formation at about 350 feet. The well should terminate at approximately 400 feet, 50 feet in the Catoctin formation.

Commonwealth of Virginia
Division of Mineral Resources
Charlottesville, Virginia
August 9, 1963
Laurence H. Gardner II - Geologist

Shenandoah National Park
Contract No. 14-10-0137-0123

Preliminary Report - Headquarters Area

Location

The Headquarters Area of Shenandoah National Park is located 1 mile west of the Park proper and 4 miles east of Luray, in Page County, Virginia. U. S. Highway 211 bisects the Area, the northern portion of which contains the administration, maintenance, and residence buildings; the southern portion is not utilized at present.

Hydrology

The present water supply is obtained from two springs located 2200 feet and 5100 feet east of the weir which is situated on the south side of Shenks Hollow road 300 feet south of Shenks Hollow. The weir supplies all the water to the Headquarters Area and has a range in flow between 5-1/2 and 17 gallons per minute. The pipe line from the weir is approximately 5000 feet long, most of which crosses private property. A minimum flow of 20 gallons per minute throughout the year is desired from wells within the Area.

Geology

The three geologic units present in the Headquarters Area are, from east to west, the Catoctin formation, Loudoun formation and Weverton formation. These formations strike north 15° - 20° east and are overturned with a dip of 60° - 70° to the southeast. The oldest rock unit exposed, the Catoctin formation, is a fine grained lava flow altered to greenstone. The greenstone is very hard and dense, and without fracturing is not a potential aquifer. However, in the Headquarters Area the greenstone is well fractured and exhibits prominent cleavage inclined 55° - 65° to the southeast. The springs that presently supply the Area are located in greenstone.

-2-

The Loudoun formation overlies the Catoclin formation and is composed of purple slate estimated to be about 175 feet thick; the surface exposure is approximately 200 feet wide (see map). The slate exhibits prominent southeast cleavage, and because it is more easily weathered than the adjacent rock units generally occupies the lower topographic areas. The Loudoun formation acted as an incompetent bed between the massive greenstone and quartzite, and is well shattered. It is considered the main aquifer in the area, principally along the greenstone and quartzite contacts.

Overlying the Loudoun formation is the Weverton formation, a massive, coarse to medium grained quartzite interbedded by dark slate or phyllite. The quartzite is often well fractured but many of the openings in surface exposures have been filled with quartz. Unless open subsurface fractures are present, the Weverton is not considered a potential aquifer except along the slaty interbeds.

Test drilling

Although surface exposures of the three rock units are overturned and dip steeply to the southeast, it is expected that at depth these formations dip to the northwest in conformance with younger formations westward in the Luray area. A test hole begun in the Loudoun formation or Weverton formation will penetrate the greenstone at depth. Three drilling sites are indicated on the accompanying map and are designated as Numbers 1, 2, and 3 in order of preference. Upon completion of these test holes the data will be evaluated and a well site located unless one of the test holes can be converted to a water well. The three test holes should be drilled to the total depths given below or 20 feet into Catoclin greenstone, whichever is less:

-3-

Test Well No. 1 (approx. 200' NW of chlorinator house in
the maintenance area)

Loudoun	=	Surface
Catoctin	=	475
Total Depth	=	495'

Test Well No. 2 (approx. 650' south of the entrance to
Park Headquarters)

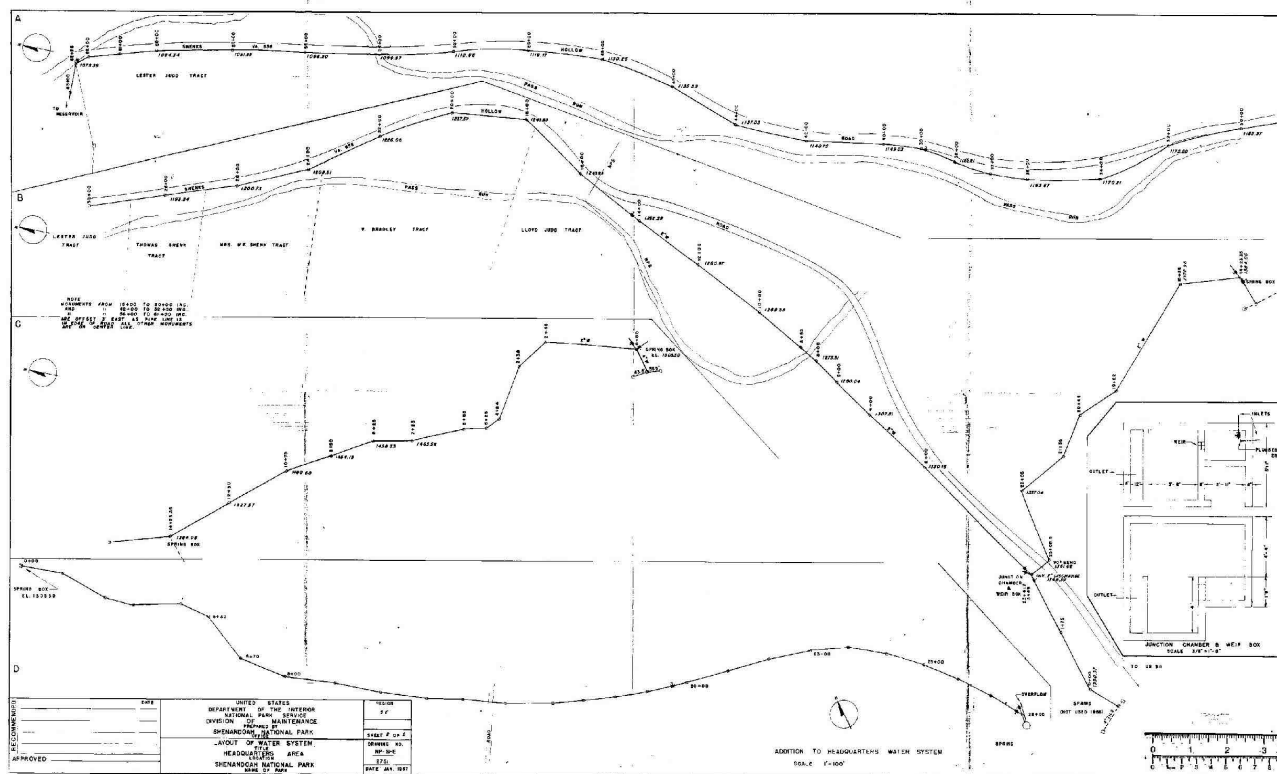
Loudoun	=	Surface
Catoctin	=	475
Total Depth	=	495'

Test Well No. 3 (approx. 150' SW of the entrance to the
residential area)

Weverton	=	Surface
Loudoun	=	175
Catoctin	=	550'
Total Depth	=	570'

Laurence H. Gardner II
Virginia Division of Mineral Resources
Charlottesville, Virginia
April 16, 1962

Headquarters supply ^{Remained} 2/28/67 and
 Originally 2 springs & connecting
 pipeline constructed by CCC in 1939.
 Springs are within park proper but piped
 across private land. No record in district of
 it of way or easements for pipeline.
 Added 3rd spring in 1953. Spring & addi-
 tional pipeline within park proper.
 Drilled well within Hight area in 1962
 & connected to water system in 1964.
 Not known whether well is primary supply &
 springs supplementary or vice versa. One of 2 old springs ^{drilled}



Docket Information

Number of Documents in Docket 19

Documents Dated from 9/11/1953 to 12/28/1967

Docket Compiled: 6/17/2011