



WATER-RIGHT DOCKET

Shenandoah National Park

Docket No: 12

COMER'S DEADENING WATER SYSTEM

Preliminary Docket Information

00-00-0000: docket #12: comer's deadening water system index

SHENANDOAH NATIONAL PARK

DOCKET #12

Comer's Deadening Water System

I N D E X

PART I - INVESTIGATION

1. Sketch - Comer's Deadening - White Oak Canyon Area.
2. Preliminary Report, Comer's Deadening - White Oak Canyon Area, prepared by Virginia Division of Mineral Resources, Charlottesville, Virginia, June 15, 1961.
3. Geologic Log (Well No. 2).
4. Water Well Completion Report (Well No. 2).
5. Pump Test Data Sheet (Well No. 1).
6. Chart Giving Pump Test Information and Drawdown Curve, (Well No. 1).
7. Geologic Log (Well No. 1).
8. Water Well Completion Report (Well No. 1).
9. Final Report, Comer's Deadening Area, prepared by Virginia Division of Mineral Resources, Charlottesville, Virginia, November 1, 1963.

PART II - WATER RIGHT

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

Box 3667, University Station, Charlottesville, Virginia

VDMR # 869
WWCR # 15

WATER WELL COMPLETION REPORT

OWNER: Shenandoah National Park Mailing Address: Lurey, Virginia
TENANT: Comers Deadenig (No. 1) Mailing Address: _____
DRILLER: Sydnor Pump and Well Co., Inc. Mailing Address: Richmond 12, Virginia
WELL LOCATION: County Madison Approx. _____ ft. _____ miles
Direction of _____ and _____ of _____

WATER CONDITIONS

DEPTH

STATIC WATER LEVEL 18'

WATER ZONES (fissures or formations supplying water)

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

QUANTITY OF WATER

WELL PUMPED (or bailed) at 17 1/2 Gal. per Min. with
160 feet DRAWDOWN after 24 HOURS PUMPING

FLOW (natural) _____ GPM HEAD _____ ft. (above ground)

REMARKS: See test pump log for details.

QUALITY OF WATER

COLOR OK TASTE OK

ODOR OK 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 ☒

CONSTRUCTION

RIG TYPE or method: Air rotary
(rotary, cable, bored, driven, etc.)

DATE Started 7-18-63, Completed 8-2-63

TOTAL DEPTH 250 ft.

BEDROCK at 22 ft.

GROUTING INFORMATION

METHOD USED Gravity

GROUTING MATERIAL Cement & water

DEPTH OF GROUTING 50'

HOLE SIZE

(diam) _____ (from) _____ ft. (to) _____ ft.
10 in. 50 ft. 52 ft.
5 1/2 in. 50 ft. 52 ft.

CASING SIZE

(diam) _____ (from) _____ ft. (to) _____ ft.
6 11/32 in. 0 ft. 52 ft.

SCREEN (or perforations)

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

PUMP (installed)

TYPE _____ Cap. (gpm) _____

H.P. _____ Depth of intake _____ ft.

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

Log of well (over)

LOG

Comers Deadening

No. 1

Rig 65

FURNISHED BY Snyder Pump & Well Co., Inc.

DATE 8-2-63

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, struts, screen, sample, etc)
FROM	TO		
0	1	Top soil	
1	22	Boulders, gravel, sand, clay	water on top of bed rock - about 1 to 2 G.P.M.
22	30	Hard greenstone some weathering	
30	50	Greenstone with weathered fractures	5 to 6 G.P.M. water
50	53	Hard greenstone	
53	54	Broken greenstone	water - 3 to 4 GPM
54	58	Hard greenstone	
58	59	Broken weathered greenstone	7 to 8 G.P.M.
59	79	Hard greenstone	
79	82	Broken greenstone weathered	12 to 14 G.P.M.
82	101	Greenstone	
101	104	Fractured greenstone	18 to 20 G.P.M.
104	119	Hard greenstone some quartz	
119	139	Greenstone	
139	163	Greenstone with quartz	
163	170	Hard greenstone	
170	199	Greenstone	softer with depth
199	204	Blue, green and gray rock with quartz	med. hard
204	250	Blue gray soft thin bedded shale	softer with depth
(Air lift indicates about 18 G.P.M.)			

Comers Deadening No. 2

LOG

FURNISHED BY Sydney Pump and Well Co., Inc.DATE 8-30-63

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., screen, sample, etc.)
FROM	TO		
0	1	Top soil	
1	25	Weathered greenstone boulders - gravel sands clay	Water 2 - GPM
25	40	Broken weathered greenstone	
40	50	Hard greenstone	
50	144	Hard greenstone	
144	150	Green and gray rock	
150	175	Greenstone	
175	184	Green and gray shale	
184	190	Greenstone	
190	195	Pink rock	
195	210	Greenstone with slight weathering	
210	250	Greenstone - (hard)	
		55' - trace water	
		84' - $\frac{1}{2}$ GPM	
		114' - 1 GPM	
		193' - 2 GPM	
		210' - $2\frac{1}{2}$ to 3 GPM	
		250' - 3 GPM (short air lift test; made after drilling several hours.)	

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT

DIVISION OF MINERAL RESOURCES
JAMES L. CALVER, COMMISSIONER

WATER WELL COMPLETION REPORT

MAILING ADDRESS:
Box 3667, University Sta.
Charlottesville, Virginia

OFFICE ADDRESS:
McCormick Road
Charlottesville, Virginia

OWNER: NATIONAL PARK SERVICE Mailing Address: LURAY, VIRGINIA
TENANT: COMERS DEADENING #3 Mailing Address: 619 BRANDON AVENUE, S.W.
DRILLER: FRANK W. MARTIN DRILLING COMPANY Mailing Address: ROANOKE, VIRGINIA
WELL LOCATION: County _____ Approx. _____ feet _____ miles _____ (direction) of _____
and _____ feet _____ miles _____ (direction) of _____

(GIVE DIRECTION AND DISTANCE IN FEET OR MILES FROM TWO REFERENCE POINTS - ROADS, TOWNS, RIVERS, ETC. - ON COUNTY HIGHWAY OR OTHER MAP.)

DATE STARTED: 7/23/64 DATE COMPLETED: 8/26/64

TYPE OF DRILL RIG USED: AIR ROTARY TOTAL DEPTH 365 feet

WATER LEVEL: Stands 6 feet below surface OR
has NATURAL flow of _____ gallons per minute

YIELD TEST: Method PUMP
Drawdown 306 feet
Rate 29 gal. per min.
Duration 29 hrs., _____ min.

WATER ZONES: from 133' to _____ feet
from 295' to _____ feet
from _____ to _____ feet

WATER: Color CLEAR Taste _____
Odor _____ Temp. 56 °F

WELL TO SUPPLY: (check one) Home _____
Farm _____ Town _____ School _____
Industry _____ Other X

WATER ANALYSIS AVAILABLE: Yes _____ No _____

DRILL CUTTINGS SAVED: Yes X No _____

(DRILL CUTTINGS SHOULD BE COLLECTED AT 10 FOOT INTERVALS. THESE SAMPLES MAY BE SHIPPED TO THIS OFFICE EXPRESS COLLECT. SAMPLE BAGS ARE FURNISHED FREE OF CHARGE UPON REQUEST)

REMARKS: _____

HOLE SIZE: 10 inches from 0 to 30⁶ feet
6-1/4 inches from 30⁶ to 365 feet
_____ inches from _____ to _____ feet

SCREEN SIZE: _____ inches from _____ to _____ feet
_____ inches from _____ to _____ feet
_____ inches from _____ to _____ feet

CASE SIZE: 6-1/4 inches from 0 to 30⁶ feet
_____ inches from _____ to _____ feet
_____ inches from _____ to _____ feet

GROUTING: Method POURED
Material CEMENT Depth 30 feet

PUMP: Type SUBMERSIBLE
Capacity _____ gal per min

Depth of intake _____ feet

FURNISHED BY: COMERS DEADENING #3DATE: 8/28/64

DEPTH (feet)		TYPE OF ROCK OR SOIL PENETRATED (gravel, clay, etc., hardness, color, etc.)	REMARKS (water, caving, shot, screen, sample, etc.)
FROM	TO		
0	25	GREEN BROKER	
25	40	GREEN AND BROWN	
40	105	GREENSTONE HARD	
105	145	GREEN AND PINK WATER	
145	290	GREEN HARD	
290	300	GRAY SOFT 3'	
300	350	GREEN HARD	
350-	365	GREEN HARD	

LOG

FURNISHED BY: Frank Martin Drilling Company DA August 28, 1964

DEPTH (feet)		TYPE OF ROCK OR SOIL PENETRATED (gravel, clay, etc., hardness, color, etc.)	REMARKS (water, caving, shot, screen, sample, etc.)
FROM	TO		
0	25	Green broken rocks	
25	40	Green and brown rocks	
40	105	Greenstone, hard	
105	145	Green and pink rocks	Water @ 133 feet
145	290	Hard green rock	" @ 285 feet
290	300	Hard green rock	three feet of soft gray rock
300	350	Hard green rock	
350	365	Hard green rock	

(Use additional forms if necessary)

Land History

REF ID: A58
 (Nov. 1958)

F.I.S. PROPERTY RECORD

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

Location: White Oak Ranger Station - Central District
 One Spring
 One 300 Gallon Spring Box
 2,300 Linear Feet of Pipe
 Gravity System
 Constructed by CCC in 1939

Line	DATE	REFERENCE		QUANTITY			COST		
		Journal Voucher	Other	Unit	No. of Units	Accumulated Total	Direct Costs	Indirect Costs	Accumulated Costs
1	8/27/59	37-10		System	1				2,000.00
2									
3									
4									
5									

G.L. Acct.	General Classification	Sub-Classification	Region	State	Park or Office
100.8	Utility	Water System	One	Va.	SNP

Supporting Hydro Data

[illegible]



NATIONAL CENTER FOR
URBAN AND INDUSTRIAL HEALTH

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
National Capital Region
1100 Ohio Drive, S.W.
Washington, D. C. 20242

SEP 20 1967

REF ID: A5031

SEP 22 1967

Regional Director	
Operations	
Administration	
Education	
Research	
Public Health	
Medical	
Nursing	
Dental	
Pharmacy	
Food Service	
Recreation	
Transportation	
Utilities	
Other	

2.2

[Signature]

Mr. Jackson E. Price
Regional Director
Southeast Regional Office
National Park Service
Federal Building, Box 10008
400 North Eighth Street
Richmond, Virginia 23240

Dear Mr. Price:

Mr. Dyksterhouse in our Charlottesville Regional Office has forwarded to us for our comments well log reports for several wells in Shenandoah National Park.

These reports and water use needs were discussed with Superintendent Hoskins. Our comments are listed below:

Corners Deadening Area - A new well was drilled in this area. A pump test indicated a yield of 28 gallons per minute. Examination of the chemical analysis indicates a satisfactory water.

Since this area is in a proposed wilderness area, there are no plans for developing facilities in this area at this time.

Dickey Ridge Area - This area contains a large visitor center, 30 site picnic area, and five houses. These facilities will require a considerable amount of water.

Test hole no. 3 - was drilled near the Fox Hollow weir. A pump test showed a final discharge of only two gallons per minute. This volume would not be adequate.

Test hole no. 4 - was drilled 600 feet north-northeast of test hole no. 3. This was a dry hole.

Test hole no. 5 - was drilled 10 feet from test hold no. 1 to a depth of 650 feet. The pump test indicated a flow of 35 gallons per minute for 28 hours, however, the recovery rate was only 2.5 gallons per minute. A study of the draw down curve indicates that this well

should not be pumped at a rate higher than .10 gallons per minute. The chemical analysis indicates that this is not a hard water and has a low iron content. The use of a large storage tank (100,000 gallons) with long pumping periods at a low rate should provide a adequate amount of high quality water.

Rockfish Gap - The area contains an entrance station with four employees. A small rest room and drinking fountain are located in this area.

Rockfish Gap well no. 1 was drilled about 200 yards north of the entrance station to a depth of 535 feet. The 6 inch diameter casing was grouted to 30.4 feet. A pump test for 19 hours produced 2 to 4 gallons per minute. Three gallons per minute was stabilized for five hours.

A chemical analysis of the water indicates a soft water with a nearly natural pH. The iron content is high enough to stain white fixtures and produce a metallic taste but should be palatable enough for drinking purposes.

With a suitable storage tank this well should produce a sufficient quantity of palatable water for this area.

Simmons Gap - This area will contain a submaintenance station with about 30 men, a trailer and one resident home.

A well was drilled to 205 foot depth. A 6 inch casing was grouted to a depth of 43 feet. After test pumping 25 gallons per minute for 21-2/3 hours, the water level remained at 113 feet.

A chemical analysis of this water indicates a soft water, with about 50 ppm alkalinity. Iron is very low. This water is suitably balanced and should be non-corrosive, good for laundry and general use and have a pleasing taste. This well should provide a satisfactory quantity of good tasting water.

Elkwallow Area - This area has a 50 site picnic area, a gift shop, and two comfort stations.

A well was drilled to a depth of 363 feet. The well was cased with 6 inch diameter pipe and grouted to depth of 41 feet. A pump test at

10 gallons per minute was run for 11 hours. with the water level remaining at 298 feet. This well should produce 10 gallons per minute for an extended period of time.

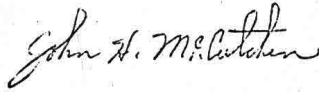
A chemical test indicated that this is a soft water, non-corrosive well, but does contain enough iron to stain fixtures and produce some metallic taste.

With a suitable storage tank, this well should produce a sufficient quantity of water but will not be as high quality as the Simmons Gap well.

If the presence of iron in some of the well water causes a problem at some later date, iron removal filters, or high chlorine dosages may be necessary to eliminate this problem.

If you have any further questions regarding these well supplies, feel free to call on us.

Sincerely yours,

A handwritten signature in cursive script, reading "John H. McCutchen".

John H. McCutchen
Sanitary Engineer Consultant

3-67

FINAL REPORT NO. 2
Comers Deadening Area
Shenandoah National Park

National Park Service
Contract No. 14-10-1-134-2

HISTORY

Following the submission of a Preliminary Report on June 15, 1961, it was decided to delay drilling at Comers Deadening until test drilling was completed at Skyland. After evaluation of data from the three Skyland test holes it was determined (see Skyland Area Report dated December 28, 1962) that test-hole drilling should be considered east of the Skyline Drive. Accordingly, two test holes were completed in the Comers Deadening Area in August 1963 by the Sydnor Pump & Well Company. Although the tested yield from Comers Deadening Test Hole No. 1 was 16 1/2 gallons per minute (see Final Report, November 1, 1963), National Park Service authorities decided the well should be permanently capped and a new test hole drilled in another portion of the Area. Recommendations for Test Hole sites No. 3 and No. 4 were submitted to Shenandoah National Park officials on July 14, 1964.

TEST-HOLE DRILLING AND EVALUATION

The Frank W. Martin Drilling Company began drilling Comers Deadening Test Hole No. 3 on July 23, 1964 at the location designated as Test Hole Site No. 4. Drilling was terminated at 365 feet and construction was completed on August 26, 1964. A 25 3/4-hour pump test was finished on August 28, 1964, and water samples were collected for analyses.

Examinations of drilling data indicate bedrock was encountered

- 2 -

beneath 25 feet of boulders, gravel, and weathered rock that were cased off to prevent collapse of the hole and entrance of surface waters. Approximately 245 feet of altered basalt of the Catoctin Formation was then penetrated before metamorphosed sediments of the Swift Run Formation were encountered at a depth of 270 feet. Although drilling continued to a total depth of 365 feet, the full thickness of the Swift Run Formation was not penetrated and the underlying Pedlar Formation was not reached. Because the Swift Run Formation is considered to include the most favorable water-bearing strata in this area, and that the contact zone and uppermost portion of the Pedlar Formation is often water-bearing, it had been recommended that the well terminate in Pedlar granite. Cessation of drilling before this hydrogeologic horizon was reached at about 400 feet may have been ill-advised.

A fracture in the Catoctin Formation was penetrated at 133 feet and a small amount of water was obtained; most of the water was obtained from the upper portion of the Swift Run Formation at a depth of approximately 285 feet. Following completion of drilling and construction of the test hole, a pump test of 25 3/4-hours duration was started on August 26, 1964. At the conclusion of this test on August 28, 1964 the pumping level had stabilized for two hours at 302.6 feet at a discharge rate of 28 gallons per minute. Recharge to the aquifer system is confirmed by observation of the static water level; before the pump test the water level in the test hole was nine feet below ground level, and when geophysical logs were made eight days after the test the water level had risen in the casing to an elevation of ten inches above ground level, indicating a flowing artesian-well condition.

- 3 -

A partial chemical analysis of a water sample taken near the end of the pump test was conducted by the Virginia Division of Mineral Resources. The results of this analysis are as follows (in Parts Per Million, except for pH):

pH	8.0	Manganese	0.25
Total Hardness	21.0	Nitrate	0.01
Calcium Hardness	20.0	Phosphate	0.01
Sulfate	4.0	Turbidity	0.00
Silica	3.0	Iron	0.1

The chemical quality of this water is good, and should be acceptable for domestic purposes without treatment.

RECOMMENDATIONS

Should it be necessary to increase the water requirements beyond the supply now available at Comers Deadening, additional wells may be drilled. It is suggested, however, that any new wells be located at least 1000 feet from any of the producing wells in the Area. In addition, it would be preferable if they were located east of the present wells in one of the other local drainage areas. The attached copies of the Water Well Completion Report form, Geologic Log, Pump Test Data sheets and Drawdown Curve for Test Hole No. 3 contain information that will be helpful in any future drilling operations within 1/2 mile east of Skyline Drive at Comers Deadening. These data are also on file at the Virginia Division of Mineral Resources, and the sample drill cuttings have been assigned No. W-1136 in the permanent well-sample repository.

Virginia Division of Mineral Resources
Charlottesville, Virginia
March 8, 1967

267

FINAL REPORT
Rockfish Gap Area
Shenandoah National Park

National Park Service
Contract No. 14-10-1-134-2

History

Plans for expansion of facilities at the Rockfish Gap Entrance Station required the availability of a small water supply. Normally it is not difficult to obtain two to five gallons per minute from a drilled well but, as stated in the Preliminary Report of July 28, 1964, local complications reduced the favorability for a successful well near the entrance station. The limited area in which a well site could be selected, the location of the area relative to drainage and recharge, the steep slope, and the lithology and structure of the bedrock were all a combination of negative factors in the selection of a water-well site.

As there is little change of hydrogeologic conditions within the area investigated, and because of the problem of accessibility to drilling sites, it was recommended that a test hole could be located wherever the drilling rig could get more than 20 feet away from the Skyline Drive.

Because of the poor conditions, it was unlikely any water would be encountered in the first 250 feet of drilling. Even though it seemed possible to develop a ground-water supply from great depth, it was not considered reasonable to recommend a 700 to 800-foot test hole for such a small water requirement.

- 2 -

Test-Hole Drilling & Evaluation

The Frank W. Martin Drilling Company, with the aid of a bulldozer, managed to get a drilling rig approximately 50 feet away from the Skyline Drive about 200 yards north of the entrance station. Drilling of the test hole was begun August 20, 1964. After drilling through 30 feet of dirt, weathered rock, and boulders, the Catoclin Formation was encountered and penetrated to the bottom of the test hole at 535 feet. Construction was completed with the grouting of 30.4 feet of 6-inch diameter casing on September 3, 1964.

The principal bedrock penetrated was altered basalt with interbedded arkosic, quartzitic and phyllitic strata. These rocks, as mentioned in the Preliminary Report, were found to be overturned, steeply inclined, and relatively non-water bearing. It had been anticipated that any water obtained would be from deep fractures, and until one was penetrated at 510 feet, the test hole was dry.

On September 7 and 8, 1964 a pump test was conducted with a 1.5-horsepower deep-well pump installed 501 feet below ground level. After 19 hours of pumping at discharge rates from 2 to 4 gallons per minute, a final yield of three gallons per minute was maintained for a stabilization period of five hours. Although the measured recovery period was only 30 minutes, the recovery rate of approximately 1.5 feet per minute (or 2.3 gallons per minute) and depth of the aquifer are favorable signs of a permanent yield.

After the pump test had progressed for 16 1/4 hours, a sample of water was collected for study of its quality. A partial chemical analysis

of the sample was conducted by the Virginia Division of Mineral Resources,
with the following results (in parts per million, except for pH):

pH	6.8	Phosphate	1.3
Turbidity	60.0	Nitrate	1.0
Total Hardness	35.0	Manganese	0.4
Calcium Hardness	20.0	Iron	0.3
Sulfate	2.5	Nitrite	0.0

Like the final yield, which may be slightly less after several months of pumping, it is probable that the amount of many mineral constituents noted in the analysis will be reduced after the well has been in operation for some time. This is anticipated for turbidity, iron, and manganese in particular, as these are commonly more abundant in water from newly-completed wells in sedimentary and metamorphic rocks.

Recommendations

Unless the size of the Rockfish Gap Area is enlarged, any drilling in this area must penetrate hydrogeologic conditions similar to those in Test Hole No. 1. If future developments require additional ground-water supplies, moderate quantities of water should be available from depths greater than 700 feet. Even so, it is possible the quality may be poor as the water will be obtained from a different rock type.

Enclosed are copies of the Water Well Completion Report form, driller's log, geologic log, drawdown and recovery curves, and Pump Test Data sheets. The records of Rockfish Gap Test Hole No. 1 have been entered in the Virginia Division of Mineral Resources water-well files as Augusta County well No. 317, and the drill samples have been assigned number W-1137 in the permanent well-sample repository.

Virginia Division of Mineral Resources
Charlottesville, Virginia
February 9, 1967

ADVIS: BUREAU
7/14

B. BACHAL, JR.
Executive Assistant

DIVISIONS

ADVIS:

MINERAL RESOURCES

LAND

RELATIONS AND ADVERTISING

AND RESOURCES

COMMONWEALTH OF VIRGINIA



DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT

DIVISION OF MINERAL RESOURCES

NATURAL RESOURCES BUILDING

BOX 3667, CHARLOTTESVILLE, VA.

JAMES L. CALVER, State Geologist

July 14, 1964

BOARD

G. ALVIN MACHENRY, Hampton
Chairman

STONY F. SMALL, Roanoke
Vice-Chairman

ANDREW A. FARLEY, Danville

WESTINGTON FAULKNER, Glasgow

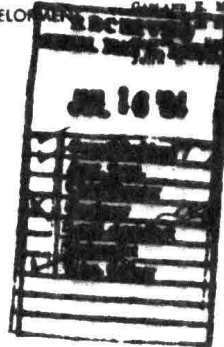
CARLES E. HUMPHREY, Williamsburg

CHARLES E. HESS, Chase City

JOHN E. HARRIS, Grundy

JOHN E. HARRIS, Petersburg

JOHN E. HARRIS, Culpeper



Mr. Jerry Eubanks
Shenandoah National Park Headquarters
Luray, Virginia

Dear Mr. Eubanks:

Enclosed is a copy of your map of the Corners Deadening area in Shenandoah National Park. In accordance with your request, further recommendations for test hole drilling in this area are as follows:

- 1) Test hole site #3 to be drilled to 300 feet. A test hole at this site will begin in the Catoclin formation, encounter the Swift Run formation at approximately 200 feet and terminate in the Pedlar formation at 300 feet.
- 2) If a test hole at site #3 is not acceptable, then a test hole at site #4 should be drilled to 400 feet. A test hole at this site will begin in the Catoclin formation, encounter the Swift Run formation at approximately 300 feet and terminate in the Pedlar formation at 400 feet.
- 3) If neither test hole sites #3 or #4 are acceptable, then the existing test hole #2 should be deepened to 500 feet.

We plan to begin field investigations in the Rockfish Gap area this week and will provide you with our drilling recommendations as soon as a preliminary report can be prepared. Regarding drilling at Dickey Ridge and succeeding Areas, please remind Mr. Martin to collect water samples at the conclusion of all pump tests.

Very truly yours,


James L. Calver
State Geologist

JLC/D/jh
Enc.

764

Shenandoah National Park
Contract No. 14-10-0137-0169

Preliminary Report
Rockfish Gap Area
Shenandoah National Park

RECEIVED	
SHENANDOAH NATIONAL PARK	
JUL 20 1964	
Mr. Tolson	
Mr. DeLoach	
Mr. Mohr	
Mr. Bishop	
Mr. Casper	
Mr. Callahan	
Mr. Conrad	
Mr. Felt	
Mr. Gale	
Mr. Rosen	
Mr. Sullivan	
Mr. Tavel	
Mr. Trotter	
Tele. Room	
Miss Holmes	
Miss Gandy	

General Description

The portion of the Rockfish Gap Area investigated is from the entrance station at milepost 104.4 north along the Skyline Drive to milepost 103. From approximately milepost 104 north to milepost 103 the Park boundaries are 100 feet from and parallel to the Skyline Drive; from milepost 104 to the entrance station the right-of-way is slightly wider.

Topographically, the Skyline Drive is 500 feet below the crest of the Blue Ridge on an extremely steep slope. Land to the east of the Drive rises abruptly from the roadside, and drops off steeply from the west side. In places the east bank is comprised of nearly vertical exposures of rock exceeding 20 feet in height; in other places slight depressions are filled with boulder rubble of considerable size. Access to any portion of the Area to an air rotary drilling rig presents a problem of some magnitude.

The geology of this Area is an overturned fold of the Catoctin formation that includes metamorphosed basaltic lava flows interbedded by thin beds of altered sediments. These rocks dip 35 to 45 degrees to the southeast and strike approximately north-south.

- 2 -

The surface hydrology is one of intermittent runoff; no springs occur within the Area and no creeks cross it. During times of rainfall runoff must be rapid down the steep mountain slope, crossing the formation strike and moving opposite dip too swiftly to allow much recharge to the few fracture openings in the insoluble rocks. As a result, the sub-surface hydrology is undoubtedly limited to meager isolated veinlets of water for several hundred feet in depth.

Drilling Recommendations

The rock formations to be penetrated are resistant, relatively impermeable strata with virtually no water-bearing properties other than fracture openings. These openings certainly do occur, but will probably be above the water table until a depth of 200 feet. Because of poor recharge and the steepness of the dip of the strata, it would not be reasonable to expect an adequate yield (3 gallons per minute) from a test hole less than 250 feet deep.

As there is no observable change in the hydrology or the formation lithology and structure within the specified area, a test hole could be located anywhere a drilling rig can gain access to the steep, narrow right-of-way.

Virginia Division of Mineral Resources
Charlottesville, Virginia

Preliminary Report

6-61

Comer's Deadening - White Oak Canyon Area

The area around Comer's Deadening includes the same rock units as those discussed in the Skyland Area Report. The lowest rock unit exposed in the area is a compact, relatively impermeable granodiorite. The granodiorite is overlain by the Swift Run formation, the most favorable aquifer in the area. The Catoclin Greenstone is the highest rock unit and generally contains little water except locally in fractures.

Two alternatives for a source of water for the Comer's Deadening development area are: a well drilled into the Swift Run formation, and a series of receptacles and galleries built around the springs in the area and a gravity-flow system established. Which springs can be used will depend on the elevation of the reservoir to be installed.

The ground water conditions on the west side of White Oak Canyon are almost identical to those at Furnace Spring. The Swift Run formation is a good aquifer from which numerous springs and seeps issue, the most prominent of which are in the vicinity of Park's Springs (No. 4 and 5 of map), White Oak Canyon-New Weir (No. 8) and - South Spring (No. 13), and around the old sump for Camp No. 1.

The most favorable drill sites are near White Oak Canyon-New Weir and South Springs and near the collecting area for the old Camp No. 1 Water Supply. Each area is accessible by old roads that may have to be cleared or widened. The location and estimate of depth on any wells contemplated for these areas should wait until the wells at Skyland have been completed and all of the data from them have been collected and analyzed.

-2-

The present water supply from White Oak Ranger Station Weir (No. 6) is not measured, but is reported to be inadequate during periods of heavy use. This weir should be read regularly to determine the rate of flow. However, before the weir can be read, the concrete cover should be replaced and the inflow checked, as there was no flow over the weir on May 1, but there was some flow from the weir box into the reservoir.

White Oak Canyon - North Weir (No. 7) needs repairing of the wall before it can be read. The adequacy of this water supply is questionable. The recorded flows for 1935 through July of 1936 indicate 2 separate recordings of 0.0 flow (See Table 1).

Table 1. White Oak Canyon - North Weir (7)
Average Flow in gallons per minute

	<u>1935</u>		<u>1936</u>
March	48.0	January	63.2
April	86.8	February	84.3
May	26.1	March	98.0
June	7.9*	April	35.7
July	24.3	May	3.0
August	29.3	June	0.0
September	92.2+	July	8.6
October	6.4		
November	40.0		
December	62.4		

*indicates at least 1 recorded flow of 0.0 gpm

However, development in the spring area may reveal that some water bypasses the weir. This weir should be read after the necessary repairs are made. If the weir reading is 0.0, the approximate distance below the weir should be noted.

Parks springs weirs (No. 4 and 5) are possible sources of water for Comer's Deadenings. The repairs and reconditioning indicated in the report on the Survey of Existing Water Facilities should be carried out so that the maximum water available flows over the weir. Flow readings for 1959 and 1960 indicate that unless more water can be obtained by improving the present facilities these weirs cannot be used as the only water source for Comer's Deadenings (See Tables 2 and 3).

-3-

Table 2. Parks Spring - South Weir (4)
Flow in gallons per minute

<u>1959</u>		<u>1960</u>	
Feb. 27	4.3	Feb. 8	10.9
Mar. 20	6.8	May 2	6.8
May 11	10.0	May 19	23.0
Aug. 27	0.44	Aug. 12	1.5
		Sept. 13	0.97
		Sept. 30	0.21

Table 3. Parks Spring - East Weir (5)
Flow in gallons per minute

<u>1959</u>		<u>1960</u>	
Feb. 2	18.8	Feb. 8	34.8
Mar. 3	38.6	May 2	29.3
May 11	51.8	May 19	106.0
Aug. 14	8.4	Aug. 12	6.2
Aug. 27	4.3	Sept. 13	2.9
		Sept. 30	3.3

White Oak Canyon - Middle Springs (No. 12) should be developed by light trenching so that a 4-inch V-notch wooden weir can be installed below the springs to measure the total water available. This spring has not been measured but may be adequate, especially if the Park's Springs are tied in with it.

White Oak Canyon - New Weir (No. 8) and the three nearby springs collectively called White Oak Canyon - South Springs (No. 13) appear to be most favorable. The flow records at the new weir indicate a minimum flow of about 5 gallons per minute since the weir was built in August of 1959. (See Table 4).

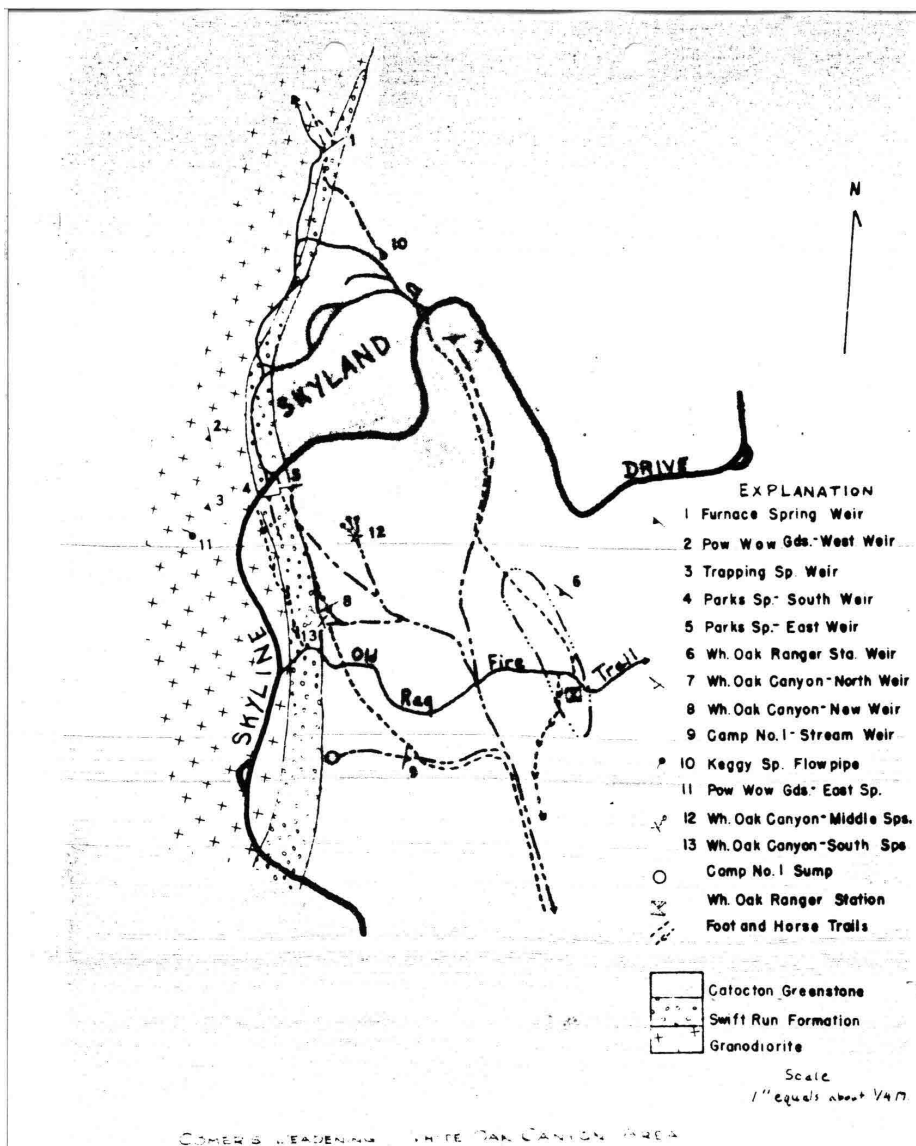
Table 4. White Oak Canyon - New Weir (8)
Flow in gallons per minute

<u>1959</u>		<u>1960</u>	
August 14	9.2	February 8	54.2
August 27	6.8	May 2	42.8
		May 19	85.4
		August 12	7.6
		Sept. 13	4.9
		Sept. 30	5.5

Further development at this site may greatly increase the amount of water impounded by the weir. The South Springs have not been developed or measured in the past. The flow from each of these three springs appears to be equal to or slightly greater than the flow over the New Weir. A 6-inch wooden weir should be built across the stream just below the confluence of the runoff channels of the three springs.

Final recommendations for a water source of Comer's Deadenig should be deferred until the wells at Skyland have been completed and the data analyzed, and until the reliability of the water available from the springs has been determined by weir gauging.

Virginia Division of Mineral Resources
P. O. Box 3667
Charlottesville, Virginia
June 15, 1961
H. Robert Hopkins, Geologist



National Park Service
Contract No. 14-10-0137-0150

FINAL REPORT
Comers Deadening Area
Shenandoah National Park

RECEIVED	
SHEN. NATL. PARK	
NOV 12 '63	
Superintendent	
Asst. Supt.	
Chief Ranger	
Engineer	
Land Architect	
Naturalist	
Admin. Officer	

Test hole drilling and evaluation

Two test holes were drilled in August 1963 at the sites recommended in the Comers Deadening Area Preliminary Report prepared by the Virginia Division of Mineral Resources on December 28, 1962. Each test hole is 250 feet deep and encountered rocks of the Catoclin formation beneath 30 to 40 feet of weathered material.

Test hole No. 1 was pump-tested for 24 hours, at the end of which 16½ gallons per minute was being discharged from a pumping level of 153½ feet. Approximately three gallons per minute was being discharged by the air rotary drilling rig at the termination of drilling in test hole No. 2; this quantity of water was not considered sufficient to warrant a pump test.

A copy of the pump-test data for test hole No. 1 is attached, together with copies of the Water Well Completion Report forms and geologic logs for each of the two test holes. The sample drill cuttings from test holes No. 1 and 2 are permanently stored in the Virginia Division of Mineral Resources well repository as well numbers #69 and #76, respectively.

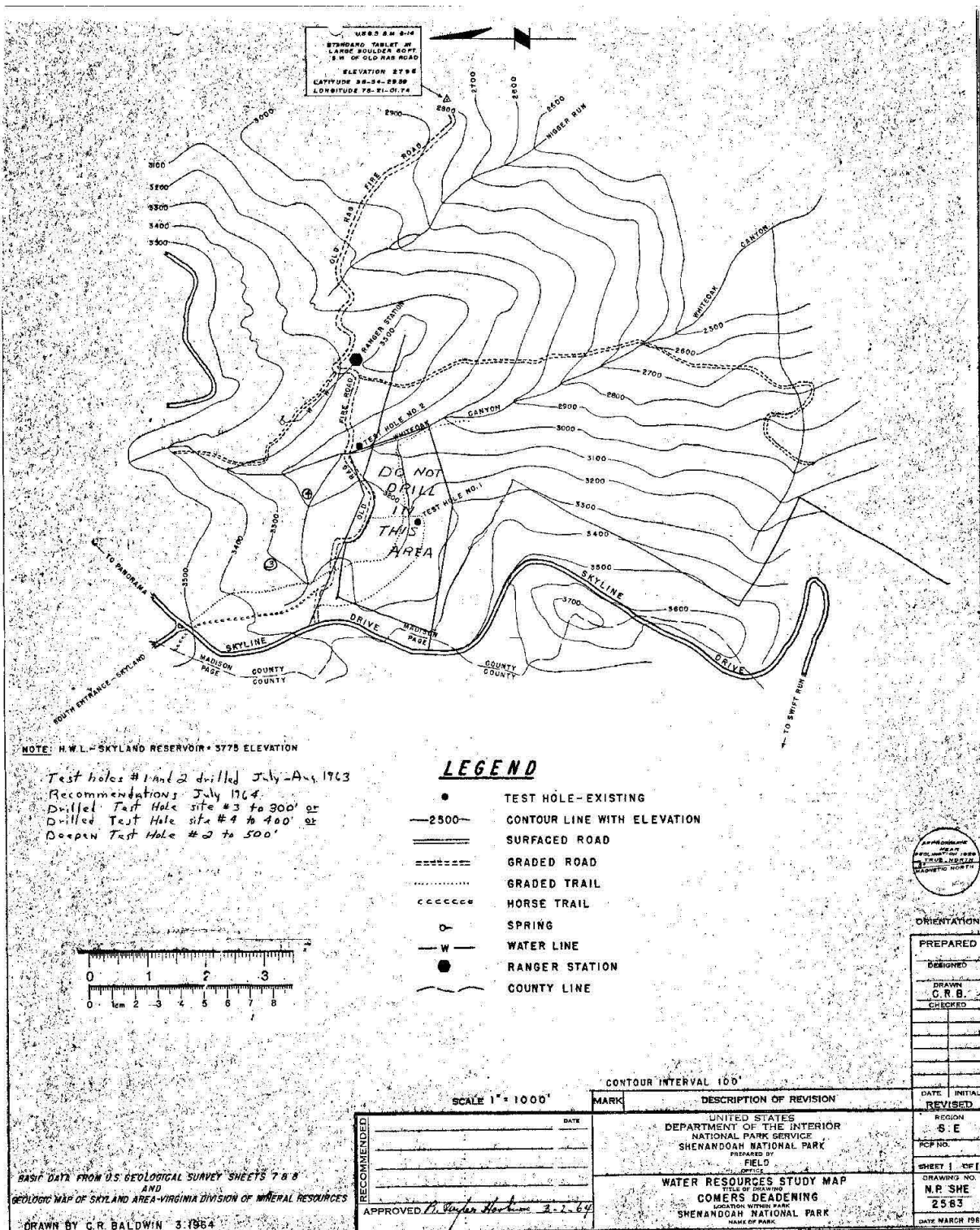
Recommendations

Although water was encountered in fractured rocks of the Catoclin formation, the underlying Swift Run formation is considered to have the most favorable aquifer potential in the Comers Deadening Area. Examinations of the drill cuttings indicate neither test hole reached the Swift Run formation that apparently has a steeper subsurface dip than was postulated from measured surface exposures in the area.

If additional water requirements occur for the Comers Deadening Area, it may be considered to deepen test hole No. 2 or drill a deep test hole near test hole No. 1. A test hole approximately 1000 feet deep to the top of the Pedlar formation would be advantageous for a more complete evaluation of formation aquifer potential in the Skyland-Comers Deadening area.

Virginia Division of Mineral Resources
Charlottesville, Virginia
November 1, 1963

Maps and Miscellaneous Information



Docket Compiled: 6/17/2011