



WATER-RIGHT DOCKET

Cumberland Gap National Historical Park

Docket No: 5

WILDERNESS ROAD CAMPGROUND

Supporting Hydro Data

08-15-1963: letter to mr. william w. lukeett, transmitted herewith is the analysis sheet for the water samples collected from the well

Post Office Box 2857
Raleigh, North Carolina

SPH
VICK

August 13, 1963

Mr. William W. Luckett, Superintendent
Cumberland Gap National Historical Park
Post Office Box 340
Middlesboro, Kentucky

Dear Mr. Luckett:

Transmitted herewith is the analysis sheet for the water sample collected from the new well at Cumberland Gap National Historical Park.

The water is slightly hard, otherwise it seems to be of excellent quality for your uses. The quantity (50 gpm) obtained during the test was also good. If we can be of further assistance, please contact us.

Sincerely,

Granville G. Wyrick
Acting District Geologist

Attachment

cc: Mr. Alfred Vick, III
Regional Water Resources Engineer
Richmond 40, Virginia

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
WATER ANALYSIS

W.R. Lab. No. NC 59160

Location <u>Wilderness Road Camp Ground, Virginia - Lee County</u>			
Source <u>Well.</u> Depth: <u>120 ft.</u> Diameter: <u>6 in.</u> Cased to: <u>19 ft.</u> Owner: <u>Dept.</u>			
of Interior. Use: <u>Public supply.</u> Water level: <u>8.8 below LSD.</u> Yield: <u>50 gpm</u>			
Date of collection <u>July 11, 1963</u>			
Gage height(ft.) _____		Discharge(sec.ft.) _____ Temp. (°F) <u>55 est.</u>	
(Parts per million)			
Silica (SiO ₂).....	5.7	Carbonate (CO ₃).....	0
Aluminum (Al).....	.1	Bicarbonate (HCO ₃).....	162
Iron (Fe).....	.15	Sulfate (SO ₄).....	8.8
Manganese (Mn).....	.01	Chloride (Cl).....	4.5
Calcium (Ca).....	50	Fluoride (F).....	.0
Magnesium (Mg).....	3.4	Nitrate (NO ₃).....	.2
Sodium (Na).....	2.8	Phosphate (PO ₄).....	.0
Potassium (K).....	1.0		
Lithium (Li).....	.8		
(Parts per million)			
Dissolved solids:		Alk.....	
Sum.....	157	Color.....	10
Residue upon evapo- ration @ 180°C.....	153		
Hardness as CaCO ₃	156 1/2		
Noncarbonate.....	6		
pH.....	7.7	Specific conductance (microhm-cm at 25°C).....	240

1/ Includes hardness of all polyvalent cations reported.

Regional Chief of Lands

January 8, 1963

Engineer Vick

Investigation of Well Yield - Cumberland Gap National Historical Park

On December 6, 1962, I met Geologist Summison of the U. S. Geological Survey, Morgantown North Carolina Office, to investigate the yield of the new water well at Wilderness Road Campground and Picnic Area, Cumberland Gap National Historical Park. Final results of the recent pump test indicated that the well yielded fifteen or more gallons per minute. According to reports from Park personnel, the yield of the well declined to four gallons per minute during the extremely dry period of this past August and September.

Enclosed is Geologist Summison's report of December 26, 1962 outlining the results of the water resources investigation. Mr. Summison points out in his report that the present well was drilled in siltstone and shale with some intercalated limestone. The original ground water investigation report prepared by Geologist Joel Kimrey of the North Carolina Ground Water District in February 1961 stated that a well drilled in the Reedsville shale would not be as productive as some wells drilled in the Chickamauga limestone. During Mr. Kimrey's field investigation, it was found that some wells even in the limestone formation have a declining yield during the summer months and it was suggested that a stand-by well be drilled if the amount of water obtained from one well barely meets the water demands for the new development.

It was decided to drill a test well at the present site in order to determine the quantity of water available from a well at this particular location. One factor that influenced this decision was a water well at this point greatly reduced the length of power and water lines required. This would result in a considerable saving of construction funds.

I have reviewed Engineer Everhardt's memorandum of December 27, a copy enclosed, for the water supply and demand for the Wilderness Road Development. I agree that extensive pump tests of the existing well during the next several months would be most helpful in determining off season water availability. If an adequate supply is available during the off season period then we probably should consider adding an additional storage reservoir. If the well fails to provide the necessary quantity of water to fill the reservoir during this period, we should then take the necessary steps to drill one or more test wells in the Chickamauga limestone area approximately .3 of a mile from the present well site.

Alfred Vick, III

Enclosures 2

Mr. Vick

Regional Chief of Maintenance

December 27, 1962

Engineer Everhardt

Water Supply and Demand for Wilderness Road Developed Area,
Cumberland Gap

The following statistical study of the Wilderness Road Campground and Picnic Area water supply situation was deemed necessary due to the acute reduction of potable water availability.

Background Data:

The drilling of the well, Project B-3, was completed on March 11, 1962 to a depth of 200 feet under the supervision of U. S. Geological Survey Geologist. This well was bottomed-out in shale material. It was pointed out in the Ground-Water Investigation report that production wells in this type geologic structure were not dependable. A 5 hour pumping test produced a supply at end of the pump test of 10 gpm. During the drought period of September - October 1962 the productive capacity of the well reduced to a low of 4 gpm flow. This condition has been assumed as recurring in the presentation and use computations.

Presentation:

The total water requirements or demand flows for a year are shown monthly on Exhibit A and equals 1,766,008 gallons.

Computations:

Assuming an operating season of 184 days (15 April - 15 October) and utilizing projection of Blue Ridge Parkway camper use data the required water demand for the Cumberland Gap Wilderness Campground is predicted as follows:

Blue Ridge Parkway Data*:

77,412 Camper/year ÷ 184 days/year = 420 Camper/day
420 Camper/day ÷ 202 Campsites = 2.0 Campers/campsites/day

*Data from Use Reports of Price Park and Crabtree Meadows Campground.

Cumberland Gap Wilderness Road Campground:

184 Campsite X 184 day X 2.0 Campers/campsite/day =
 61,088 Campers
 61,088 Campers X 25 gallons/camper* = 1,527,000 gallons

*From USFWS Manual of Individual Water Supply Systems,
 Revised 1962 Edition.

Cumberland Gap Wilderness Road Picnic Area:

Design Data - Comfort Station (1)

4 WC @ 36 Gal/Mr/Fixture = 144 Gal/Hr
 2 Urinals @ 15 Gal/Mr/Fixture = 30 Gal/Hr
 4 Lav. @ 15 Gal/Mr/Fixture = 60 Gal/Hr

Total 234 Gal/Hr

Use Distribution

2 Hrs. @ 100% Load = 2 X 234 = 468 Gals
 2 Hrs. @ 80% Load = 2 X 117 = 234 Gals
 5 Hrs. @ 25% Load = 5 X 57 = 285 Gals

Total 987 Gals/day

Assuming an operating season of 184 days

20% @ 100% Capacity = 184 X 20% = 36 Days
 30% @ 80% Capacity = 184 X 30% = 54 Days
 50% @ 25% Capacity = 184 X 25% = 92 Days

Total 184 Days

987 Gal/day X 36 Days = 37,506 Gals
 468 Gal/day X 54 Days = 25,202 Gals
 240 Gal/day X 92 Days = 22,008 Gals

Total 87,506 Gals.*

*Equal to approximately 8,750 Picnicker/year

Cumberland Gap Wilderness Road Campground Residence:

5 persons X 75 gal/person/day X 365 day = 136,875 gallons

Cumberland Gap Wilderness Road Campground Maintenance Use:

80 gal/day X 184 day = 14,720 gal/year

Exhibit B presents a composite tabulation of monthly water requirements for all facilities in the Cumberland Gap Wilderness Road Campground and Picnic Area.

The hydrograph is the most easily understood method of indicating the flow or availability of some particular water supply. Daily flows result in a more accurate hydrograph but due to the lack of any recorded flows it was necessary to use projected mean monthly flows computed from two pumping tests. (See Exhibit C) The computations are based on a daily pumping time of 9 hrs/day and rates 10 gpm, 4 gpm and 12 gpm as indicated by USGS pumping test and Park observed flows.

Comparing Exhibit A, Total Demand, and Exhibit C, Total Availability, if all available water was utilized and transferred to storage there would be a yearly deficiency of approximately 180,000 gallons. This is based on the assumption of a 9 hr/day pumping time. This pumping time may be exceeded but it is doubtful if the assumed pumping rates could be maintained especially during the critical use periods when available flow is measurably reduced.

The hydrograph validates the above statement and compared with the Mass Curve indicates that a storage facility of approximately 1,000,000 gallons would be required to meet the demand during the critical period May - October.

Recommendations:

Begin extensive well capacity tests and throughout the winter and spring seasons to determine off season availability. A dependable supply of the magnitude 15-20 gpm during January - April and October - December would provide sufficient quantity to recharge a 1,000,000 gallon storage facility. If the required production cannot be assured after completion of the pump tests then immediate steps should be taken to locate a substantial water supply of approximately 20 gpm. At this rate and a daily pumping period of 9 hours required storage could be reduced to 25,000 gallons. Drawdown and recharge should be observed and correlated with pumping rates due to the behavior of the well in the past and that the well was bottomed in shale formation. The ideal arrangement would be the installation of an automatic recording flow meter and drawdown device.

Gary E. Everhardt

Enclosures

Cumberland Gap Wilderness Road Campground

Tabulation of Water Requirements for the Year 1963-1964

<u>Month</u>	<u>Gals. Monthly</u>	<u>Gals. Monthly Accumulative</u>	<u>Month</u>	<u>Gals. Monthly</u>	<u>Gals. Monthly Accumulative</u>
January	11,406	11,406	July	442,954	1,110,184
February	11,406	22,812	August	336,397	1,446,581
March	11,406	34,218	September	336,336	1,674,807
April	66,389	100,607	October	66,389	1,741,196
May	226,226	330,833	November	11,406	1,752,602
June	336,397	667,230	December	11,406	1,764,008

EXHIBIT A

Cumberland Gap Wilderness Road Campground
Monthly Distribution of Water Requirements

<u>Month</u>	<u>Campground</u>	<u>Picnic Area</u>	<u>Residence</u>	<u>Maintenance</u>
January	0	0	11,406	0
February	0	0	11,406	0
March	0	0	11,406	0
April	51,925	2,968	11,406	2,090
May	203,118	11,612	11,406	2,090
June	305,440	17,461	11,406	2,090
July	406,334	23,234	11,406	2,090
August	305,440	17,461	11,406	2,090
September	203,118	11,612	11,406	2,090
October	51,925	2,968	11,406	2,090
November	0	0	11,406	0
December	0	0	11,406	0

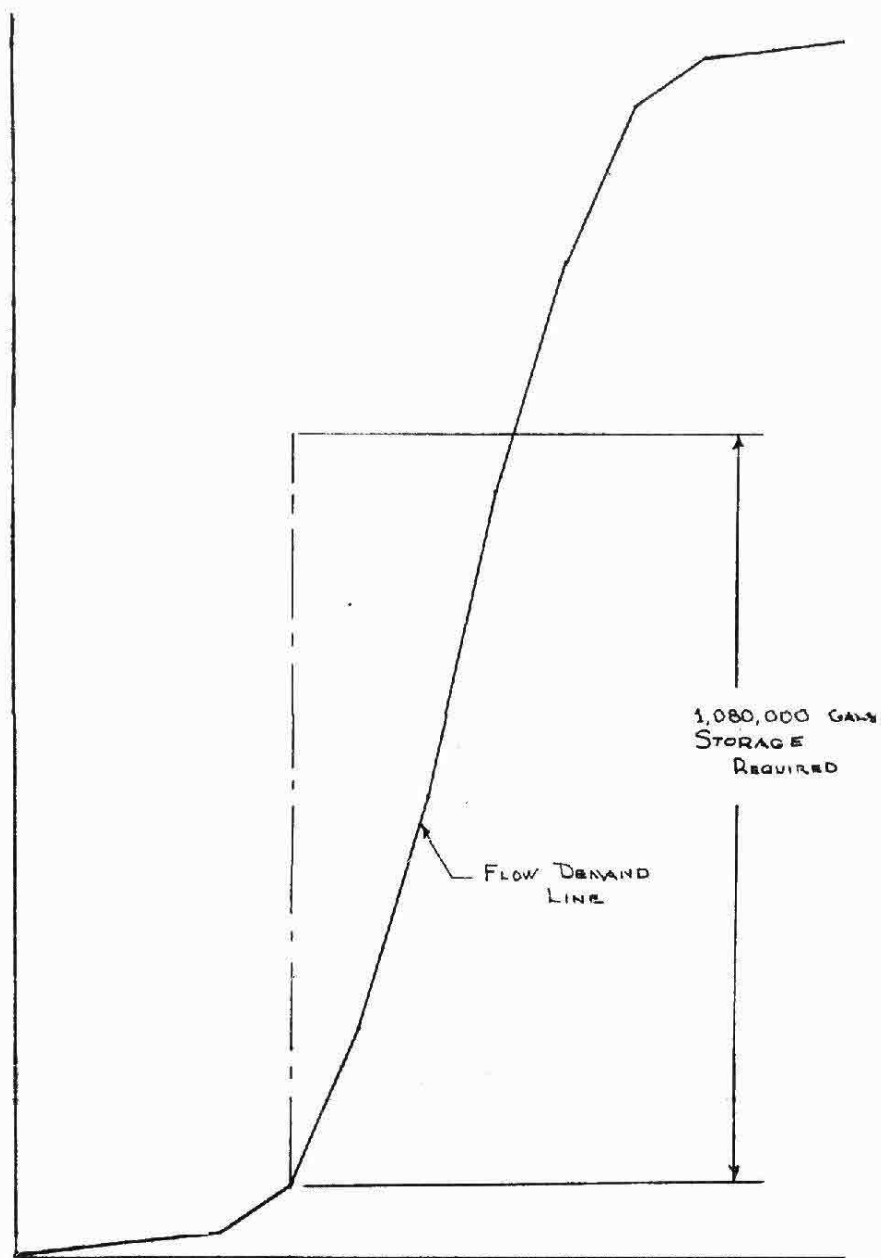
EXHIBIT B

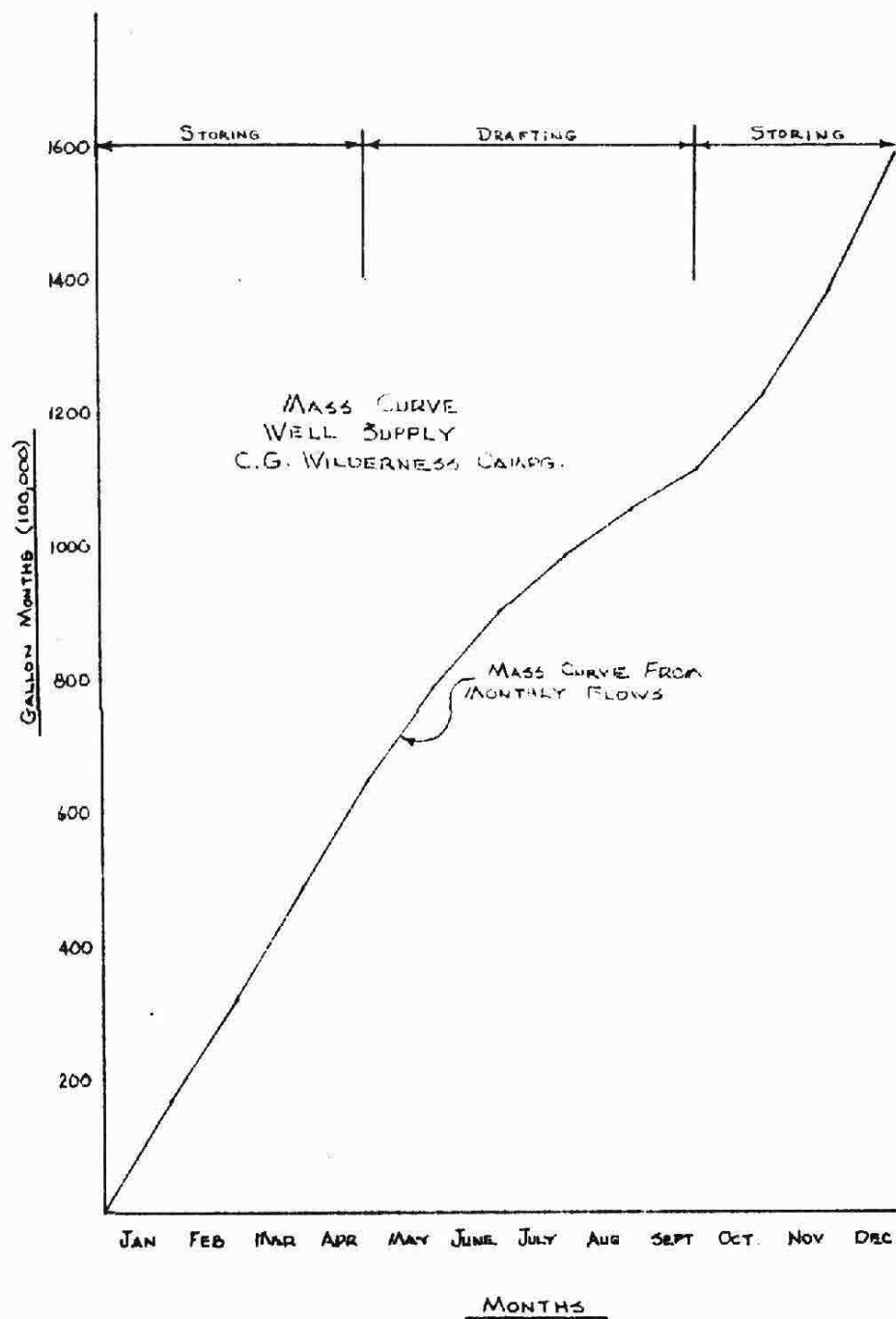
Cumberland Gap Wilderness Road Campground

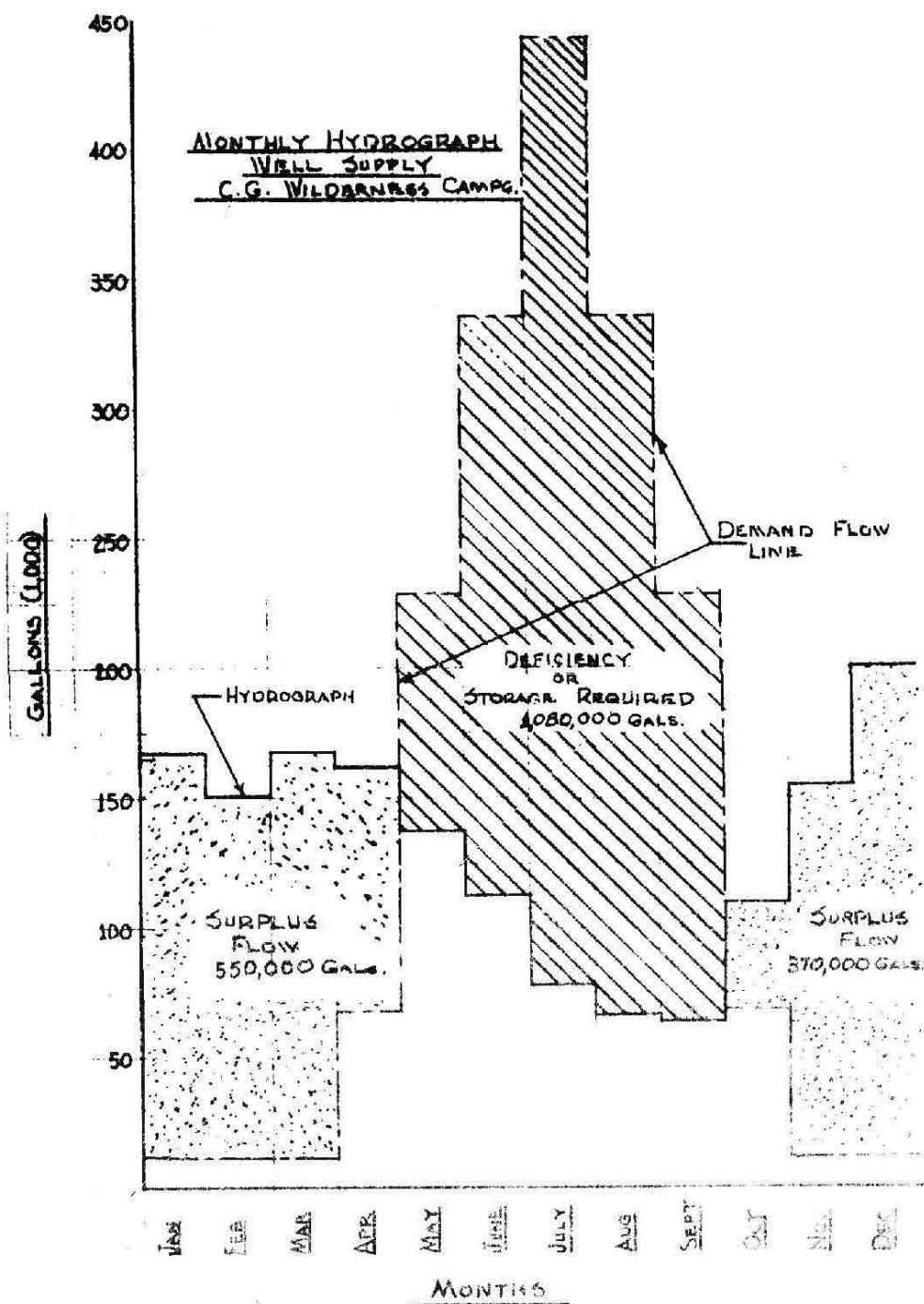
Computations of Well Water Supply for the Year 1963-1964

Month	Gals. Mean Monthly Flow	Gals. Monthly Accumulative	Month	Gals. Mean Monthly Flow	Gals. Monthly Accumulative
January	167,400	167,400	July	88,000	988,000
February	181,200	318,600	August	66,840	1,052,940
March	167,400	486,000	September	64,800	1,117,740
April	182,000	648,000	October	110,000	1,227,740
May	137,000	785,000	November	155,000	1,382,740
June	112,000	898,000	December	200,280	1,582,640

EXHIBIT C









UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

P. O. Box 2857
Raleigh, North Carolina

IN REPLY REFER TO:

SOUTHEAST REGION	
DEC 27 '62	
Reg. Director	
Asst. Reg. Dir. (GEU)	
Asst. Reg. Dir. (Adm.)	
Asst. Reg. Dir. (Res. Pl.)	
Asst. to Reg. Dir.	
Harrison	
Dish	

December 26, 1962

Mr. Alfred Vick, III
Regional Water Resources Engineer
U. S. Department of the Interior
National Park Service
Region I
P. O. Box 10008
Richmond 40, Virginia

Dear Mr. Vick:

As requested by your office, an investigation of well yield and the location of a new well site at Cumberland Gap National Historical Park, Virginia Section to supply camp ground requirements was conducted on December 6, 1962.

A detailed report on this area prior to drilling the present supply well was submitted by Mr. J. O. Kimrey of the North Carolina Ground Water District.

The present supply-well, drilled in March 1961, penetrated 200 feet of siltstone and shale with minor intercalated limestone. Initially the well yielded 15 gpm. Recently the yield was reported to have declined to 3 gpm. This investigation was proposed to determine the possible cause of decline in yield.

On December 6, 1962, water level in the camp-ground well was 10.9 feet below land-surface datum. Pumping began at 9:15 A.M. at full capacity, 25 gpm from 180 feet. After one hour the yield decreased to 20 gpm and remained constant until water level dropped to the level of the automatic shut-off switch in the pump at 11:00 A.M. The water level recovered in 15 minutes sufficiently to continue pumping. Efforts were then made to regulate the pumping rate to 10 gpm by adjusting the outlet valve. This resulted in a highly erratic, but constantly decreasing yield, possibly due to the valve. After the valve was replaced, pumping was resumed at 11.1 gpm long enough to confirm the well yield at that rate. A subsequent test by Park

Mr. Alfred Vick - Page 2.

maintenance personnel on December 10 established well yield at 15 gpm. It was suggested that a monthly efficiency log be kept of the well, consisting of water-level measurements and yield. This will provide a better picture of well efficiency with relation to monthly precipitation.

As the demand for water justifies consideration of a second well, reexamination was made of the area described by Mr. Kimrey. A proposed second well site about 0.3 mile southeast of the first location is near the top of a northwest-dipping Silurian dolomitic-limestone formation. Sink holes, springs, and solution depressions attest to permeability of the formation underlying this area. In concurrence with Mr. Kimrey's earlier evaluation, a well at this site should yield sufficient water for all intended purposes from less than 200 feet of depth.

Sincerely,

C. T. Samsion

C. T. Samsion
Geologist

For: P. M. Brown
District Geologist



August 16, 1962

L54-AL

Memorandum

To: Regional Director, Southeast Region
From: Superintendent, Cumberland Gap National Historical Park
Subject: Completion Report, Contract No. 14-10-0131-760, November 27, 1961, Wilderness Road Developed Area

We are enclosing the following data for inclusion in the completion report of this contract, as requested by Mr. Dunn in his memorandum to you dated June 5, 1962.

1. Well Log
2. Pump Test Data
3. Data on Pump and Motor
4. Segregated Water System Costs

We did not prepare the sketch map of the water system since it was completed as specified in EODC's as-built-drawing, No. 3048A, dated June 28, 1961. They are therefore, provided with an excellent map of the project.

SIGNED

William W. Lockett
Superintendent

Enclosures:

Well log
Pump test data
Pump data
Pump motor data
Segregated water system costs

Completion Report: Contract No. 14-10-0131-760, November 27, 1961,
Wilderness Road Developed Area, Cumberland Gap National Historical
Park.

Well Log

3'	Soft rock and dirt
5'	Limestone rock and dirt
10'	Limestone rock
15'	Limestone rock
20'	Limestone rock
25'	Red slate rock and a small stream of water
30'	Red slate rock
35'	Another small stream of water
40'	Red and blue slate rock
45'-70'	Blue slate rock
75'	Blue slate rock and a little more water
80'-95'	Blue slate rock and more water at 95'
100'-115'	Blue slate rock and more water at 115'
120'-160'	Seamy Blue slate rock
165'-200'	Blue slate rock mixed with chert

Pump Test Data

A pumping test was conducted on March 11, 1961.

Duration of pumping test	5 hours
Water produced at beginning of test	12 gallons per minute
Water produced at end of test	10 gallons per minute

Pump Data

Manufacturer's name - "Commander". Four inch deep well submersible
pump with a capacity of 10 gallons per minute.

Pump Motor Data

Electric, 2 HP, single phase, oil filled and sealed. Designed
especially for the pump it powers.

Completion Report: Contract No. 14-10-0131-760, November 27, 1961,
Wilderness Road Developed Area, Cumberland Gap National Historical
Park.

Segregated Water System Costs

Pump and installation of pump	\$600.00
Pump house (building only)	1,113.00
566 L/Ft 2" water line	1,556.50
2,607 L/Ft 4" water line	10,036.95
Drinking fountains, 2 each	434.00
Concrete reservoir, 25,000 gallon capacity	<u>5,637.00</u>
TOTAL Costs	\$19,377.45



L54

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Ground Water Branch
Box 2857
Raleigh, North Carolina

IN REPLY REFER TO:

REGION ONE	
MAR 15 1961	
Reg. Director	
Asst. Reg. Dir.	
Ch. Geologist	<i>3/15</i>
Ch. Ranger Act.	
Ch. Interpretation	
Ch. Adm.	
Ch. Rec-Mgmt.	

3/16

March 14, 1961

Mr. Alfred Vick, III
Regional Water Resources Engineer
Region I, National Park Service
Richmond 20, Virginia

Dear Mr. Vick:

Attached are two copies, with illustrations, of the administrative report for the ground-water investigation at Cumberland Gap, Virginia. The manuscript has been approved for administrative release to the National Park Service by the Director, U. S. Geological Survey.

We are pleased to forward the report to you and we will continue to closely observe the test-well drilling as outlined in the report until such time as a satisfactory water supply has been obtained in the area of investigation.

Sincerely yours,

P. M. Brown

P. M. Brown
District Geologist

(by mail)

Attachment

CC: Mr. J. O. Kimmey
Hydraulic Engineer, Ground Water Branch
& Project Chief
Cumberland Gap National Historical Park

GROUND-WATER INVESTIGATION, CUMBERLAND GAP
NATIONAL HISTORICAL PARK, VIRGINIA SECTION

BY

Joel O. Kimrey

Report on an investigation conducted by the
U. S. Geological Survey
at the request of the National Park Service

Administrative report for U.S. Government use only
Subject to revision

Feb. - 1961

Ground-Water Investigation, Cumberland Gap
National Historical Park, Virginia Section

By

Joel O. Kimrey

This report summarizes the findings of the ground-water study conducted at the Cumberland Gap National Historical Park by the Ground Water Branch, U. S. Geological Survey, at the request of the National Park Service. This study was made in the Virginia section of the park to facilitate the location of ground-water supplies for the proposed campground and picnic areas in this section of the park (see figure 1). Test drilling locations are suggested in this report, and under terms of the agreement between the two agencies, the Geological Survey will observe test drilling in the area and advise the Park Service when productive zones have been encountered or when further drilling at a given site seems unlikely to be productive.

The detailed phases of this study were localized in the valley that heads in the northeastern part of the study area. This valley drains the study area and constitutes the major ground-water control in the area.

In the study area two geologic formations of Ordovician age crop out. Generally the hills and ridges are underlain by the Reedsville shale, a formation that consists of interbedded impure limestones, calcareous siltstones, and shales. Ground water in this formation discharges into the perennial streams, such as Station Creek, which heads near the escarpment. Ground water may be observed entering the streams from numerous solution channels developed in the more calcareous interbedded strata of this formation. The Chickamauga limestone, a well bedded, fine-grained limestone, underlies the valleys in the study area. This unit is cut by well developed solution channels as evidenced by the sink holes and disappearing streams in the valleys. This unit acts as a ground-water recharge area; part of the water recharged to the streams by overlying formations reenters the ground in the Chickamauga limestone. It is evident from topographic maps and observation by the writer that a large part of the valley that heads in the study area is drained by such underground drainage.

The northeast-trending Cumberland Mountain escarpment is a major drainage divided and complicates the hydrology of the entire Cumberland Gap area. The study area is just east of this escarpment. The entire Cumberland Gap area is underlain by sedimentary rocks ; sandstones, siltstones, limestones, shales, and rocks gradational in composition between these major rock types. West of the escarpment the rocks are relatively impermeable and flatlying, dipping only very gently to the northwest. Surface and ground water drains to the northwest. East of the escarpment (in the study area), the rocks are relatively permeable and dip under the escarpment at an angle of 30 to 40 degrees. Their strike trends about N 65° E. The permeability of the rocks in the study area is due mainly to the high percentage of limestone and other calcareous rocks that outcrop there. These calcareous rocks contain water in fractures, many of which have been enlarged by solution. Surface and ground-water drainage in the study area is generally along the strike to the southwest. Some ground water moves downdip to the northwest and under the Cumberland escarpment.

The methods of this study, in addition to determining the previously discussed effects of the geologic structure and material upon the hydrology of the area, consisted of evaluating the quality and quantity of ground water available to wells in the study area. This latter objective was accomplished by inventory of existing wells in the area. All wells inventoried withdraw water from the Chickamauga limestone. As previously mentioned, water in this unit occurs in solution channels and cavities. The area receives some 48 inches of precipitation annually, (more than 4 inches monthly in all months except Sept., Oct., and Nov., which receive 3 inches or less). The precipitation which is reported usually comes in short, heavy rainfalls that add little ground-water recharge to many rock types, enters the permeable Chickamauga limestone readily. Thus wells that penetrate solution channels in this unit are usually good producers although the yields of some wells are reported to diminish between periods of rainfall. The depth at which water-bearing solution channels are intersected by wells ranges widely in this unit. Some productive wells are around 90 feet deep; others are 150 feet deep or more. The quality of water obtained above a depth of 150 feet is generally good except for its moderate hardness. Wells deeper than 150 feet often yield water containing offensive amounts of hydrogen sulfide.

One test well location was selected in the area (shown on the attached map). A well at this site would be drilled in the Reedsville shale near its contact with the Chickamauga limestone. Test drilling at this location (which would require minor road work) would be something of a gamble as it would not likely be as productive as some wells drilled in the Chickamauga, but the geologic structure indicates that a well at this location should yield a more dependable year-round supply than a well drilled into the underlying formations. In the event that a well at this location does not supply the necessary amount of water the entire circled area in the valley may be considered as a test drilling site. A well drilled anywhere in this area (no road construction required) will penetrate the Chickamauga limestone, and if such a well penetrates sufficient solution channels it will be a productive well. The declining yield of some wells in the area during summer months suggests the advisability of drilling a standby well in the area if the amount of water obtained from the one or more wells drilled should barely exceed the amount required for the area. As offensive amounts of hydrogen sulfide occur in the water below a depth of about 150 feet, the depths of test wells should be limited to about that depth.

In summation, the writer believes that a well at the test-drilling site in the Reedsville shale may yield the required amount of water. If not, a second well may be drilled into the Chickamauga limestone within the circled area in the valley. Two wells should furnish the required water. However, solution channels in limestone may be missed by a well so there is a possibility that more test holes will be required.

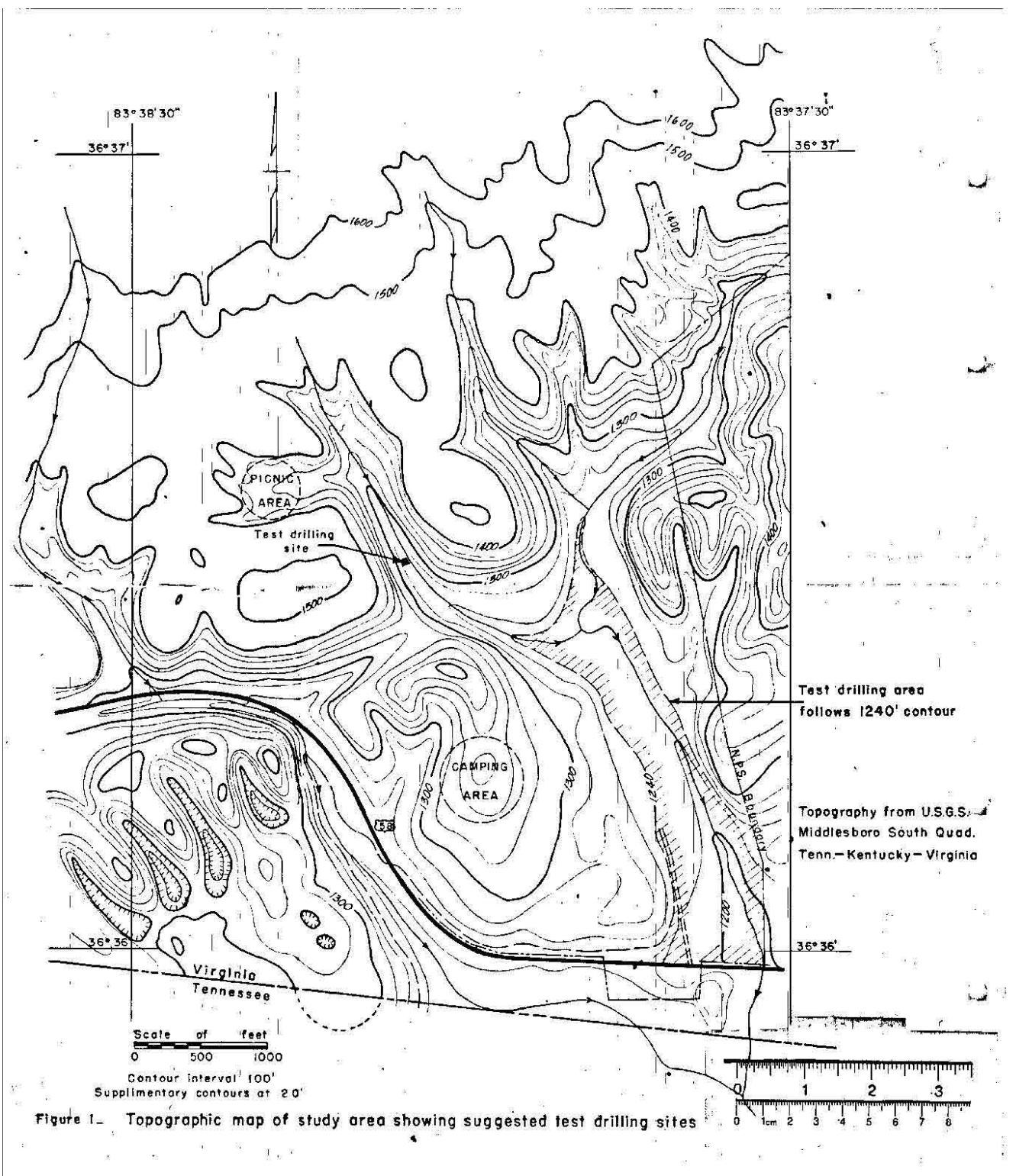


Figure 1. Topographic map of study area showing suggested test drilling sites



IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

March 16, 1961

REGION ONE	
MAR 20 1961	
Asst. Dir.	
Asst. Dir. -	
Ch. Conservation	
Ch. Ranger Act.	
Ch. Interpretation	
Ch. Adm.	
Ch. Rec. Mgmt.	

10/17
7/2/61

D5039

Memorandum

To: Regional Director, Region One
From: Superintendent, Cumberland Gap
Subject: Water Test Well for Wilderness Campground

On March 10 and 11, Mr. Austin P. Whitaker drilled a well near the Campground-Picnic area to a depth of 200 feet, and then ran a 5 hour pumping test under the supervision of Mr. Glenn Wyrick. He installed a 19½' casing, 6 5/8" in diameter.

The log on this drilling was as follows:

3'	soft rock and dirt
5'	limestone rock and dirt
10'	limestone rock
15'	limestone rock
20'	limestone rock
25'	red slate rock and a small stream of water
30'	red slate rock
35'	another small stream of water
40'	red and blue slate rock
45'-70'	blue slate rock
75'	blue slate and a little more water
80'-95'	blue slate and more water at 95'
100'-115'	blue slate and more water at 115'
120'-160'	seamy blue slate rock
165'-200'	blue slate rock mixed with chert rock

At the beginning of the 5 hour pumping test, 12 gallons of water were produced; at the end, 10.

William W. Lockett
William W. Lockett
Superintendent

Copy to: Chief, EODC

DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

WATER ANALYSIS

W.R. Lab. No. NC 31472

63974

Location <u>Cumberland Gap National Historical Park, Va. - Lee County</u>			
Well: Depth: 200 ft. Diameter: 6 in. Cased to: 20 ft. Drilled:			
Source <u>March 1961. Collected at discharge pipe on pump. Owner: National Park</u>			
<u>Service, Middlesboro, Ky. Use: Public Supply. Water level: 10 ft. below LSD.</u>			
Yield: 10 gmp meas.			
Date of collection <u>March 11, 1961</u>			
Gage height(ft.) _____ Discharge(sec. ft.) _____ Temp.(°F) _____			
(Parts per million)			
Silica (SiO ₂).....	8.1	Carbonate (CO ₃).....	0
Iron (Fe).....	.02 <u>y</u>	Bicarbonate (HCO ₃).....	208
Manganese (Mn).....	.00 <u>y</u>	Sulfate (SO ₄).....	5.4
Calcium (Ca).....	35	Chloride (Cl).....	12
Magnesium (Mg).....	14	Fluoride (F).....	.1
Sodium (Na).....	21	Nitrate (NO ₃).....	.6
Potassium (K).....	2.6	Phosphate (PO ₄).....	.0
Aluminum (Al).....	.1		
Lithium (Li).....	.2		
(Parts per million)			
Dissolved solids:			
Sum.....	201	Color.....	3
Residue upon evapo- ration @ 180°C.....	197	Oxygen consumed:	
Hardness as CaCO ₃	146 <u>z</u>	Unfiltered.....	
Noncarbonate.....	0	Filtered.....	
pH.....	7.7	Specific conductance (micromhos at 25 C.).....	357

y In solution when analyzed.z Includes hardness of all polyvalent cations reported.

Other Supporting Information



UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

December 5, 1961

IN REPLY REFER TO:

D2621

REGION ONE	
DEC 7 1961	
Reg. Director	
Asst. Reg. Dir.	
Ch. Operations	
Ch. Ranger Act.	
Ch. Interpretation	
Ch. Adm.	
Ch. Rec. Mgmt.	

Memorandum

To: Regional Director, Region One
From: Superintendent, Cumberland Gap
Subject: Project Completion Report, B-3 CUM

In response to Mr. Watson's memorandum of November 30 we furnish supplemental information in regard to the utilities portion of subject report as follows:

The installation of the water system consists of a 200' well which produces about 10 to 12 gallon per minute. Well pump is a Commander submersible with a 2 h.p. motor. Water reservoir has a 25,000 gallon capacity and is of concrete construction. Pumphouse houses well pump and controls. 3 drinking fountains are provided. To install this water system the contractor used 2,607 lin. ft. of 4" C.I. water line and 940 lin. ft. of 2" galv. steel pipe.

Sewer system consists of 6,000 gallon concrete septic tank, equalizer box, and siphon. A distribution box, 900 lin. ft. of absorption trench and 11 manholes. 1,570 lin. ft. of 6" sewer line, VC, and 218 lin. ft. 6" sewer line, CI, was used for installation of the system.

We trust the above data will be satisfactory for your purposes.

Mr. John Westerfield of the BODC Office was project supervisor for this and one other project for which Form 10-174s, Completion Report are currently in your office for clearance. He is leaving for another assignment next week. Since he is anxious to make distribution of the final reports prior to leaving the area, any effort to expedite return of the cleared forms on these projects will be appreciated.

William W. Lockett
William W. Lockett
Superintendent

Form 10-174
(Rev. 8-56)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

COMPLETION REPORT OF CONSTRUCTION PROJECT

REGION One	AREA Cumberland Gap National Hist. Park	COUNTY Bell	STATE Kentucky
PROJECT OR JOB TITLE Construction of Campground Sewer and Water Utilities and Comfort Stations		PCF NO B-16, U-11, U-15 & U-17	
LOCATION IN AREA Wilderness Road Developed Area		MASTER PLAN NO —	BUILDING NO —
WORKING DRAWING NO AND TITLE WHP-CG-3048 and 3049 Campground Sewer and Water Utilities Campground Development: 50 Campsites (Tables, Benches, Fireplaces)			
APPROPRIATION TITLE AND SYMBOL 14X1035 Construction & Acquisition of Lands, NPS		WORK ORDER NO. B-3 CUM	
CONTRACT NO. 14-10-0131-760		DATE WORK STARTED May 15, 1961	DATE WORK COMPLETED November 14, 1961
NAME OF CONTRACTOR Pennington & Mackabee		ADDRESS LaFollette, Tennessee	

COST ANALYSIS

CONSTRUCTION ITEMS	QTY	UNIT COST IN PLACE	TOTAL COST IN PLACE
100.6 - Buildings Three (3) Comfort Stations constructed. Each has men and women restrooms, storage rooms, and are equipped with all necessary fixtures.			\$18,900.00
100.8 - Utilities An operable water and sewer system for the Wilderness Campground constructed which consists of a well, well pump, water reservoir, pumphouse, water lines, sewer lines, drinking fountains, manholes, septic tank, absorption trenches and all necessary appurtenances and incidentals to provide complete working systems.			46,178.25 ~~46,378.25~~ 46,184.22
100.9 - Grounds and Other Improvements Purchased for use in the Campground were 25 Refuse Container Units, 50 Picnic Tables and 50 Fire Place Units. PS&S ADDED 18.27% FAO CLEARANCE CERTIFIED CORRECT I. J. Baer			3,180.97 ~~3,195.00~~ 12,470.96
		TOTAL	\$68,373.35

SUMMARY OF EXPENDITURES			\$80,730.18
PERSONAL SERVICES I. J. Baer, Regional Accountant	EQUIPMENT PS&S \$12,470.96	MATERIALS AND SUPPLIES \$3,195.00	
OTHER \$1,792.26			

CHANGE ORDERS			
ORIGINAL CONTRACT AMOUNT \$57,294.58	FIRST Change Order No. 1 \$5,320.75 (+)	SECOND Bid Item No. 16 Overrun - \$169.15	THIRD
FINAL CONTRACT AMOUNT \$68,259.22	FOURTH	FIFTH	SIXTH

THIS PROJECT OR JOB HAS BEEN COMPLETED IN ACCORDANCE WITH
APPROVED DRAWINGS, SPECIFICATIONS, AUTHORIZED CHANGES

SUBMITTED BY (Name and title) John T. Westerfield, Project Supervisor	DATE November 27, 1961
APPROVED BY (Name and title) William V. Lockett, Superintendent	DATE November 27, 1961

(ATTACH NARRATIVE STATEMENT, PHOTOGRAPHS, AND "AS BUILT" DRAWINGS TO THIS FORM)

10109

Maps and Miscellaneous Information

Docket Information