



WATER-RIGHT DOCKET

Great Smoky Mountains National Park

Docket No: 22

WELL. LOOK ROCK DEVELOPED AREA

Preliminary Docket Information

00-00-0000: see great smokey mountain docket no. 1 for map and preliminary map showing locations of water sources within the

SEE GREAT SMOKY MOUNTAIN DOCKET NO. 1 FOR MAP
AND PRELIMINARY MAP SHOWING LOCATIONS OF
WATER SOURCES WITHIN THE PARK.

WATER RIGHTS DOCKET

Look Rock Developed Area, Foothills Parkway

Great Smoky Mountains National Park

FOOTHILLS PARKWAY

Docket # 1

Look Rock Campground and Picnic Area Water System

I N D E X

PART I - INVESTIGATION

1. Letter to Mr. Alfred Vick, Water Resources Engineer, National Park Service, from Mr. J. L. Poole, District Geologist, U. S. Geological Survey, Nashville, Tennessee, dated April 24, 1962.
2. Electric Log - Well No. 1.
3. Electric Log - Well No. 2.
4. Lithologic Log - Well No. 1
5. Lithologic Log - Well No. 2.
6. Water Analysis - Well No. 1.
7. Water Analysis - Well No. 2.
8. Plot of Water-Level Drawdown Versus Pumping Rate for Well No. 2.
9. Geologic Map and Section Through Well No. 1.
10. Report of Water Resources Study at Look Rock Campground, Tennessee,
by Gerald K. Moore and Roy H. Bingham, U. S. Geological Survey.
11. Letter to Mr. Alfred Vick, National Park Service, from Mr. J. H. Criner, U. S. Geological Survey, Nashville, Tennessee, dated February 6, 1963.
12. Letter to Mr. Elbert Cox, Regional Director, Southeast Region, National Park Service, from J. H. Criner, U. S. Geological Survey, Nashville, Tennessee, dated October 18, 1963.
13. Memorandum to Regional Director, Southeast Region, from Acting Superintendent, Great Smoky Mountains National Park, dated October 23, 1963.
14. Completion Report for Water System.

PART II - WATER RIGHT

Supporting Hydro Data

B. Consumption:METER READING - 1969 OPERATING SEASON

Breakdown according to usages:

Month (Consumption in 1,000 gal.)	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>TOTALS</u>
Campers.....	--	--	--	--	--	--	--	72	34	8	--	--	114
Picnickers.....	--	--	--	--	--	4	5	8	3	8	--	--	28
Miscellaneous & Unaccounted.....	--	--	--	--	<u>130</u>	<u>81</u>	<u>36</u>	<u>20</u>	<u>(13)</u>	--	--	--	<u>254*</u>
TOTALS.....	--	--	--	--	130	85	41	100	24	16	--	--	396

*80,000 gallons wasted at end of season; 50,000 used by local seeding contractor in late June. Area had limited season during 1969. Campground not opened until August 1.

METER READING - 1970 OPERATING SEASON

Breakdown according to usages:

Month (Consumption in 1,000 gal.)	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>TOTALS</u>
Campers.....	--	--	--	--	10	61	92	92	22	--	--	--	277
Picnickers.....	--	--	--	--	7	17	24	15	10	--	--	--	73
Miscellaneous & Unaccounted.....	--	--	--	--	<u>130</u>	<u>(5)</u>	<u>(11)</u>	<u>(34)</u>	<u>(19)</u>	--	--	--	<u>61</u>
TOTALS.....	--	--	--	--	147	73	105	73	13	--	--	--	411

Tank and system filled in May and pumping was done on intermittent basis by manual control, through the season. The campground was closed on September 26. Approximately 50,000 gallons wasted at end of season.

NAME OF SYSTEM: Look Rock

LOCATION: Route 8G - Foothills Parkway

LOCATION: STATE: Tennessee COUNTY: Blount

A. <u>Source of Supply</u>	<u>Location - Reference to Permanent Landmark</u>	<u>Coordinates</u>
1. Deep Well	Well is located at the south end of campground at a point 1,740 feet north of the underpass on the Foothills Parkway and 600 feet east of the Parkway.	Lat. N 35°38'22" Long. W 83°55'53"

This system consists of a deep well (8" diameter) drilled to a depth of 88 feet. The pumping equipment includes a "Package Turbine" pump manufactured by Jacuzzi (Pump Model 5M4-6-5). The actual pumping unit is a Universal, 14 stage, Hyper Turbine water lubricated pump. Water is pumped through a Stover (Model No. IANF-36) neutralizing water filter capable of raising the pH of the well water (6.0) to a new pH of 7.2 at a flow rate of 25 gallons per minute. The pumphouse also includes a Wallace & Tiernan Hypochlorinator - Model A-747-F which is not utilized,as supply is considered satisfactory without chlorination treatment at this time. Water is pumped through 2,600 lineal feet of 4" and 6" C.I. pipe line to a 100,000 gallon prestressed concrete (above ground) water reservoir. The reservoir is located with a mean elevation of 2,668 feet (bottom is 2,661 feet) and provides the area with a pressure differential of 15-80 psi, depending on location of facility utilizing the water.

(Look Rock Developed Area, Foothills Parkway - Addendum No. 1)

B. Consumption:

Maximum daily - 12,500 gallons Maximum monthly - 283,000 gallons Maximum annual - 963,400 gallons

Breakdown according to usages

METER READINGS - 1966 OPERATING SEASON

Month (Consumption in 1,000 gallons)	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Totals</u>
Campers (24,318)	--	--	--	--	19	78	183	169	32	5	--	--	486
Picnickers (32,337)	--	--	--	--	18	21	40	29	13	8	--	--	129
Wasted & Unaccounted	--	--	--	--	<u>42</u>	<u>32</u>	<u>60</u>	<u>82</u>	<u>16</u>	<u>115</u>	--	--	<u>347</u>
Totals	--	--	--	--	79	131	283	280	61	128	--	--	962

Breakdown according to usages

METER READINGS - 1967 OPERATING SEASON

Month (Consumption in 1,000 gallons)	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Totals</u>
Campers (21,430)	--	--	--	--	5	75	139	155	41	14	--	--	429
Picnickers (15,245)	--	--	--	--	5	10	15	12	13	4	--	--	59
Wasted & Unaccounted	--	--	--	--	<u>130*</u>	<u>29</u>	<u>-29</u>	<u>-14</u>	<u>-28</u>	<u>-17</u>	--	--	<u>71</u>
Totals	--	--	--	--	140*	114	125	153	26	1	--	--	559

*Wasted approximately 100,000 gallons blowing off lines and washing down.

(Look Rock Developed Area, Foothills Parkway - Addendum No. 1)

B. Consumption: (Continued)

Breakdown according to usages

METER READINGS - 1968 OPERATING SEASON

Month (Consumption in 1,000 gallons)	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Totals</u>
Campers (13,498)	--	--	--	--	--	12	89	135	34	--	--	--	270
Picnickers (5,835)	--	--	--	--	2	7	6	6	4	--	--	--	25
Wasted & Unaccounted	--	--	--	--	2	7	47	72	20	--	--	--	148
Totals	--	--	--	--	4	26	142	213	58	--	--	--	443

C. Distribution Mains & Laterals:

<u>Size</u>	<u>Type</u>	<u>Length</u>
6"	Cast Iron	1,936 Lineal Feet
4"	Cast Iron	3,970 Lineal Feet
2"	Galvanized	908 Lineal Feet
1"	Galvanized	294 Lineal Feet
TOTAL		7,108 Lineal Feet

(Look Rock Developed Area, Foothills Parkway - Addendum No. 1)



Left:
100,000 Gallon Prestressed
Concrete Reservoir at
Look Rock Campground



Right:
Pumphouse at Look Rock
Campground

(5/1969)

(Look Rock Developed Area, Foothills Parkway - Addendum No. 1)

D. General Operational Information:

During the period from 4/14/66 through 10/15/66, we pumped a total of 963,400 gallons of water, using 2168 KWH at a cost of \$26.03 for power. Pump appears to be operating at approximately 36% efficiency, according to a well test conducted in October, 1966. Readjustments to the pump should improve this efficiency to approximately 50%-55%.

E. Proposed Improvements:

Presently this development contains 92 campground sites and 80 picnic sites. Ultimately, this area is to be expanded to have a total of 250 campsites and 150 picnic sites. The existing water system will be extended to handle the entire development.

F. Ultimate Annual Consumption:

The ultimate development will result in a daily demand of 25,000 gallons and an annual consumption of 3,500,000 gallons.

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER ANALYSIS

26W

Bt:J-2

Location Near Maryville, Tennessee, (8 mi. SSE), 4012001251, 300 County Blount
Source drilled well Depth (ft) 12 Diam (in.) 8
Cased to (ft) 44 Date drilled Jan. 1953 Point of coll. pump discharge 90' from well
Owner National Park Service Gatlinburg, Tenn.
Treatment _____ Use Test well
WBF None WL 12.58(?) below L.S. Yield 11 gpm pump, meas.
Temp (°F) _____ Appear. when coll. Cloudy
Collected January 21, 1953 By G. K. Moore
Remarks _____

	ppm	epm		ppm	epm
Silica (SiO ₂)	3.9		Bicarbonate (HCO ₃)	6	0.10
Aluminum (Al)			Carbonate (CO ₃)	0	.00
Iron (Fe)	.12				
Manganese (Mn)	.02		Sulfate (SO ₄)	0.0	0.00
			Chloride (Cl)	0.5	.01
			Fluoride (F)	0.1	0.03
Calcium (Ca)	0.5	0.02			
Magnesium (Mg)	0.5	0.04	Nitrate (NO ₃)	0.3	0.00
Sodium (Na)	0.4	.02			
Potassium (K)	1.1	0.03			
Total		0.11	Total		0.11

	ppm		
Dissolved solids:		Specific conductance (micromhos at 25° C)	15
Calculated	10	pH	6.0
Residue on evaporation at 180° C	10	Color	8
Hardness as CaCO ₃	3		
Noncarbonate	0		

Lab. No. 31473

Field No. Bt:J-2

Project Tenn. OH

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER ANALYSIS

2GW

Bt:J-1

Location Near Maryville, Tennessee, (8 mi. SSE) 453900N:2600300E County Blount
 Source Drilled well Depth (ft) 32 Diam (in.) 3
 Cased to (ft) 56 Date drilled Nov-Dec. 1962 Point of coll. Pump discharge 20' from well
 Owner National Park Service, Gatlinburg, Tenn. Use Test well
 Treatment None WLF Flowing 1 gpm (est); Yield 12 gpm pump near.
 WBF Nebo Quartzite 72 & 115' Temp (°F) 57 Appear. when coll. Clear
 Collected January 18, 1963 By G. K. Moore
 Remarks

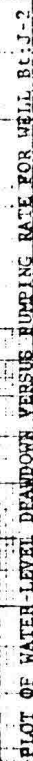
	ppm	epm		ppm	epm
Silica (SiO ₂)	3.9		Bicarbonate (HCO ₃)	6	0.70
Aluminum (Al)			Carbonate (CO ₃)		.00
Iron (Fe)	.38				
Manganese (Mn)	.01		Sulfate (SO ₄)	0.0	0.00
			Chloride (Cl)	0.5	.01
			Fluoride (F)	0.2	.01
Calcium (Ca)	0.2	0.01			
Magnesium (Mg)	0.5	0.04	Nitrate (NO ₃)	0.0	0.00
Sodium (Na)	0.4	.02			
Potassium (K)	1.0	0.03			
Total		0.10	Total		0.12

	ppm		
Dissolved solids:		Specific conductance (micromhos at 25° C)	15
Calculated	10	pH	5.7
Residue on evaporation at 180° C	10	Color	2
Hardness as CaCO ₃	2		
Noncarbonate	0		

Lab. No. 31472

Field No. Bt:J-1

Project 2 m. GW



LOG No. one
 Instrument no. PRG-101
 Run no. one
 Date 1-21-63 Time: 1530
 Logged by G. K. Moore & R. H. Bingham
 Fluid in hole: Water
 Fluid level, below datum: 4.18
 Fluid resistivity --- at --- °F
 Fluid density --- pounds/gal
 Fluid viscosity --- sec --- °F

ELECTRIC LOG

UNITED STATES GEOLOGICAL SURVEY
 in co-operation with
 TENNESSEE DIVISION OF GEOLOGY
 and

TENNESSEE DIVISION OF WATER RESOURCES

OWNER National Park Service
 ADDRESS Gatlinburg, Tennessee
 DRILLER Jack Terry
 ADDRESS Sevierville, Tennessee

WELL No. BtiJ-2
 County Blount State Tenn
 Location no. 4612N: 26143E
 Location: 9.4 mi. SW of Park entrance.

Datum Land surface
 Altitude of datum: 2350
 Depth, hole: 82 dia 8"
 Depth, casing 44 d.c. '
 Log begins 32 ft., ends 82

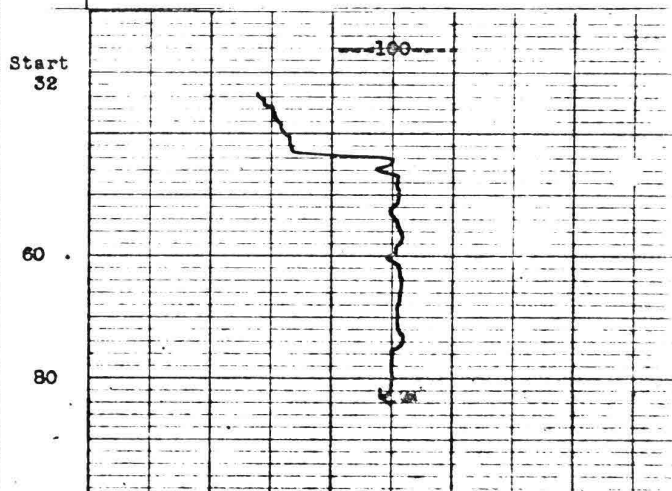
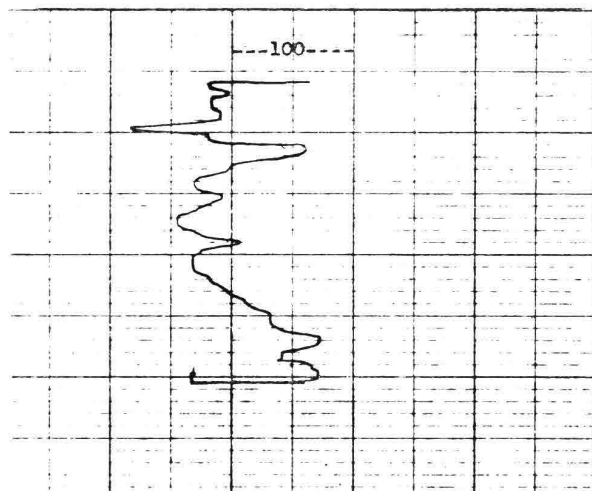
SPONTANEOUS POTENTIAL

Millivolts

DEPTH
(feet)

RESISTANCE

Ohms m²/m





LSK

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
90 White Bridge Road
Nashville 5, Tennessee

IN REPLY REFER TO:	
REGION ONE	2/11 1963
Asst. Director	
Asst. Reg. Dir. (CIB)	
Asst. Reg. Dir. (Adm.)	
Asst. Reg. Dir. (Tech.)	
Asst. to Reg. Dir.	

February 6, 1963

Boundary Surveys	
Land	
Planning Service	
Proposed Areas	

Mr. Alfred Vick
National Park Service
P. O. Box 10008
Richmond 40, Va.

Dear Al:

Results of our pumping tests, current-meter surveys, and geophysical and lithologic logging of the two wells at Look Rock Campground in the Great Smokies are encouraging, even after considering the last minute revision of the drilling specifications which doubled the desired amount of water to be obtained. However, there is yet one unknown which cannot be determined until experienced and that is yield of wells during the dry season of the year. The following statements will help you to decide your future course of action at Look Rock.

Well No. 1 (Bt:J-1), 139 feet deep, water enters well at about 88 feet depth. Well flows 4 gpm continuously, may be pumped at 15 gpm continuously or greater amounts for short periods.

Well No. 2 (Bt:J-2), 88 feet deep, water enters well at 70 to 75 feet depth, static water level about 5 feet below land surface. Well will supply slightly more than 50 gpm for 2 hours and probably 35 gpm continuously.

Both wells are developed in Nebo quartzite and water is probably obtained from crevices, fractures, and solution channels but may come from porous sandstone voids; tests would not definitely determine which.

It is probable that the wells together will supply the desired 50 gpm continuously under weather conditions similar to those at the time of our tests. It is possible but not probable that more than 50 gpm could be obtained continuously during normal summer and fall seasons. The fact that the ground was frozen during and for sometime before our tests may have prevented development of the wells to produce a greater amount of water. On the other hand, it is probable that the well yields will be less in the summer and fall - very rough estimate; 35 gpm.

est J

It is suggested that you do nothing more than to make temporary pump installations in the wells until we can conduct further tests this summer or during a long dry period. This should require no more than one day.

We regret that at present we cannot be more definite about the water supply at Look Rock. Our pumping tests were not entirely satisfactory and they are not typical of any we are familiar with but most nearly resemble tests in limestone aquifers.

We will send you the quality of water analysis statements as soon as they are received from our QW lab in Little Rock, Arkansas. Our field check of the water from both wells indicated soft, acid, and relatively high iron water.

Please contact this office if you wish to discuss the work at Look Rock in greater detail or for additional information and to inform us of your plans for further work at Look Rock.

Yours sincerely,

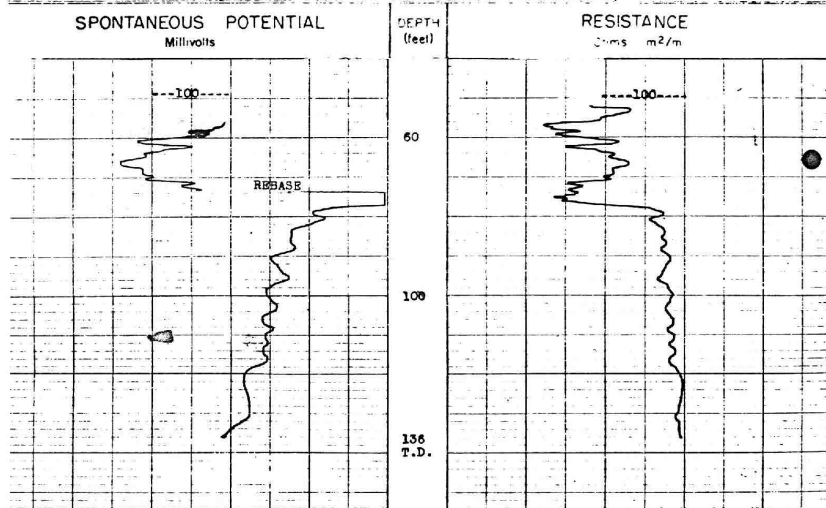
James H. Criner
for Chief, Tennessee District, WRD

cc: NPS Headquarters, Gatlinburg, Tenn.
Chief, GW Br. Code: 4053 0001
Washington, D. C.

*All - call me if we can be of further help. Also, let
us know whether we should plan for a dry-weather test.
This letter may be somewhat on the pessimistic side -*

Jim C.

OG No. <u>one</u>	ELECTRIC LOG UNITED STATES GEOLOGICAL SURVEY in co-operation with TENNESSEE DIVISION OF GEOLOGY and TENNESSEE DIVISION OF WATER RESOURCES	WELL No. <u>Bt:J-1</u>
Instrument no. <u>ERG-161</u>		County <u>Blount</u> State <u>Tenn</u>
Run no. <u>one</u>		Location no. <u>4639H-1 260632</u>
Date <u>1-17-63</u> Time <u>1530</u>		Location <u>7.7 mi SW of Park entrance</u>
Logged by <u>G. K. Moore & R. H. Bingham</u>		Datum <u>land surface</u>
Fluid in hole <u>Water</u>		Altitude of datum <u>2270</u>
Fluid level, below datum <u>flowing</u>		Depth, hole <u>139</u> dia <u>.8"</u>
Fluid resistivity <u>---</u> at <u>---</u> °F		Depth, casing <u>95'</u> dia <u>.8"</u>
Fluid density <u>---</u> pounds/gal		Log begins <u>56</u> ft ends <u>136</u> ft
Fluid viscosity <u>---</u> sec <u>---</u> °F		
OWNER <u>National Park Service</u>	ADDRESS <u>Gatlinburg, Tennessee</u>	
DRILLER <u>Jack Terry</u>	ADDRESS <u>Savoyville, Tennessee</u>	



LOOK ROCK**On Flat Creek Near Exit From Parkway**Weir No. 1 (Lower)

Weir Opening - 24" wide

<u>Date</u>	<u>Gal./Min.</u>
5/22/61	101
6/26/61	101
7/6/61	73
8/24/61	48
9/8/61	48
9/20/61	48
10/18/61	48

On Flat Creek About $\frac{1}{2}$ Mile Below the Production Well SiteWeir No. 2 (Upper)

90° Notch Weir

<u>Date</u>	<u>Gal./Min.</u>
8/31/61	14.2
9/8/61	14
9/20/61	14
10/18/61	10.6

Other Supporting Information

PROPOSED SITES FOR WATER RESOURCES INVESTIGATION

1. Park Headquarters
2. Green Mountain (Foothills Parkway)
3. Newfound Gap
4. Cades Cove
5. Deep Creek
6. Smokemont
7. Abrams Creek
8. Twin Creeks
9. Collins Creek
10. Metcalf Bottoms
11. Cataloochee
12. Elkmont
13. Cosby
14. Chimneys
15. Rocky Mountain (Foothills Parkway)
16. Webb Mountain (Foothills Parkway)
17. Little Greenbrier
18. Greenbrier
19. Sinks
20. Towstring
21. Indian Camp Creek
22. Tremont Ranger Station
23. Round Bottom Campground
24. Balsam Mountain Campground
25. Main Oconaluftee Residential Area
26. Old Oconaluftee Residence Area (Ravensford)
27. Big Creek Ranger Station
28. Cataloochee Ranger Station
29. Cataloochee Maintenance Area
30. Twentymile Ranger Station
31. Cherokee Orchard
32. Sugarlands

(09/28/67)

5010-108 (Rev. 12-1-64)
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

TO : Gerald Rowe, Chief of Maintenance
Great Smoky Mountains National Park
Catlinburg, Tennessee 37738

DATE: September 7, 1967

FROM : W. M. McMaster, USGS, WRD
Knoxville, Tennessee

SUBJECT: Summary of work plans for study of water resources of Great Smoky Mountains
National Park, North Carolina and Tennessee Districts

As I promised you on August 11, I am sending you our plans for the study of water resources of Great Smoky Mountains National Park that have been modified as a result of a meeting between North Carolina and Tennessee U. S. Geological Survey personnel July 6-7, 1967.

W. M. McMaster

W. M. McMaster
Hydrologist

cc: Edward J. Kennedy, Chief, Tenn. District
Ralph C. Heath, Chief, N. C. District



5010-108

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

Summary of work plans for study of water resources of Great Smoky Mountains
National Park, North Carolina and Tennessee Districts

Sept. 7, 1967

At a meeting in Knoxville during July 6-8, 1967, North Carolina and Tennessee personnel discussed modification of plans in the study of water resources of the Great Smoky Mountains National Park. Those who attended the meeting were: Ralph C. Heath, North Carolina District Chief; Edward J. Kennedy, Tennessee District Chief; D. R. Rims, Assistant District Chief for Tennessee; Nat Thomas, G. C. Goddard, and E. F. Hubbard of North Carolina; and W. M. McMaster of Tennessee.

At the meeting it was agreed that the effort in both districts should be combined under leadership of one individual; McMaster was delegated project leadership. McMaster will be responsible for ground water interpretive aspects of the study and Hubbard will be responsible for surface water interpretive aspects.

The final product will be a hydrologic atlas of the Smokies area, published by the Geological Survey, that will consist of the 1:125,000 base map upon which will be delineated ground water and surface water information. Ground water occurrence and availability will be shown as a series of patterns, each defining a range between a minimum, a maximum, and an average of expected well yields within the area covered by the pattern. These areas are expected to be established by topographic criteria, geologic location, estimated soil thickness, and background information provided by test wells drilled during the course of the study. If a test well appears capable of yielding the desired quantity of water for water supply at the drilling site, a pumping test will be run.

Surface water information will be indicated by isopleths of minimum flow in cubic feet per second per square mile at the 2-year 7-day recurrence interval, based on a series of low-flow measurements made during the course of the study, at a total of about 100 sites throughout the Park distributed so as to define variations in flow with location and altitude. It is hoped that these sites can be measured a total of 6-8 times following periods of about 7 days of no rainfall.

Ground water and surface water chemical quality will be described, based on results of analyses of water from test wells and samples collected from streams. A series of coliform analyses of stream water is planned to define possible areas of contamination.

An explanatory text and supplementary illustrations will be included. The atlas is expected to provide the NPS engineer a basis for planning future developments of any kind in the Park for which knowledge of water resources is required.

Consideration will be given to popular-type brochure for distribution to Park visitors, describing and illustrating the occurrence of water in the area and its role in shaping the mountains.

Test drilling and reporting will continue to be handled by the District in which the site is located.

Plans are to complete the text of the final report by May 1969 for transmission through final review prior to publication. However, if insufficient opportunities to collect low-flow measurements occurs during the remaining time through November 1968, it is hoped that supplementary funds will be available from NPS to make additional measurements during the following year.

725-9-17-65-

L54 SER(OLW)

SEP 14 1965

Reed
EWC 9/17
WTR

Memorandum

To: Superintendent, Great Smoky Mountains

From: Acting Assistant Regional Director, Operations,
Southeast Region

Subject: Water Resources Investigations, Great Smoky Mountains
National Park

We will be glad to assist you in developing a detailed water resources study at Great Smoky Mountains National Park during the 1966 fiscal year as requested in your memorandum of August 23. The results produced from such a study should provide us with the basis for a full and most effective development of all water resources located within the Park boundaries. It is evident that new sources of water are needed to meet the demands of future and existing Park facilities.

We believe the investigative work should include the following:

(1) The first and most pressing problem involves the need to expand several water supply systems in order to provide more water to take care of a greater number of Park visitors and increased Park uses. This requires an evaluation of the probable capacity of the present sources of supply and the locating of possible new sources of water supply of acceptable quality for increased demands of the future and (2) The second phase of the project (extending over a period of several years) would be to conduct surface and ground water studies throughout the Park in order to obtain a general knowledge of all water resources. With such information at hand, the Park staff will be able to plan efficiently for new or expanded developments.

An over-ceiling item was included in the 1966 F.Y. Regional Water Resources Program in the amount of \$26,000 to initiate a study of domestic water supply needs and test well drilling work at the Park. Mr. E. W. Reed, Chief, Water Resources, has recently advised that at present the Washington Office reserve contains sufficient funds to finance this study.

We agree a meeting and field reconnaissance should be held at the Park between representatives of the U. S. Geological Survey, the Regional Office and the Park staff to properly formulate a logical approach to this water resources project. In early October, we will take the necessary action to firm up a satisfactory date for the meeting with all those concerned.

(SIGNED)

W. Mikell

cc:

~~Director~~, w/c of inc.

Chief, EODC (2), w/c of inc.



UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

Great Smoky Mountains National Park
Gatlinburg, Tennessee 37738

Y REFER TO:

L54

August 23, 1965

EAST REGION	
AUG 26 1965	
Regional Director	
Asst. Reg. Dir. (A)	26
Asst. Reg. Dir. (CA)	
Asst. to Reg. Dir. (PA)	
Asst. to Reg. Dir. (DI)	
Resource Studies Asst.	

X *Land & Water*
Maine

Memorandum

To: Regional Director, Southeast Region

From: Superintendent, Great Smoky Mountains *lost Lake*

Subject: Water Resources Investigations, Great Smoky Mountains National Park

Over the past couple of years, continued increases in demands on the numerous surface water supplies have gradually developed into a problem that needs immediate attention. While it is recognized that in the past we have shown little or no interest in water resources investigations, it now appears that well supplies may not only be a desirability but a necessity. During periods of prolonged drouth such as we are now experiencing in the Park, the surface supplies diminish to the point of nearly drying up, and supplemental supplies of low quality water are heavily treated and pumped into the supply lines.

During USPHS Engineer Henderson's recent trip to the Park, we had occasion to closely observe several of our major supplies. For example, we found that the Ash Hopper Branch gravity supply that ordinarily supplies headquarters was providing 19 gallons per minute (actual meter readings) over a period of a week. The consumption at this time was metered at 35,000 to 37,000 gallons per day and so, needless to say, we had to pump a supplemental supply out of a branch of Fighting Creek which runs through the residential area. We actually were only able to obtain a maximum of 15 gallons per minute from this supply. Incidentally, this creek pumping station is only a couple of hundred feet from the first domestic user and less than 1,000 feet from our major development area which definitely does not allow the desired chlorine retention time for safe water treatment. Also, when you realize that our actual usage exceeded an average of 25 gallons per minute and all available water in the system amounted to 34 gallons per minute, it is easy to see there is little margin for any emergency whether it be a leak in the line, any type of fire drawdown or allowance for any consideration of lawn sprinkling. If either of these supplies decrease further, we do have several alternatives in order to retain a minimum supply on hand.

By metering, we have determined that we are wasting 13,000 gallons per day through our Visitor Center dehumidifier system. This is quite a luxury and one that needs some study as to the possibility of re-circulation of this water. If our present supply should decrease any further, we would of course have to shut down the dehumidifier system which would have rather detrimental effects on artifacts storage as well as causing the Visitor Center to be rather uncomfortable.

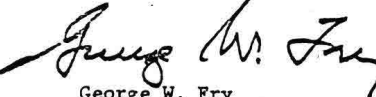
Further checks on other major supplies in the Park showed similar conditions but none as critical as that that exists in the Headquarters area. If at all possible, and if it can be worked into your Water Resources Investigation program as an emergency measure, we would like to suggest the programming of an exploratory well for this fall. While we have little information on the characteristics of wells in this area, Mr. Henderson felt that a well programmed for 100-foot depth with rotary drill method (possible heavy river boulder sub-surface) should provide a plentiful supply for the area. On this basis, it appears that funds in the construction amount of \$2,500 would be needed to drill, case and test the well.

In an August 19 telephone conversation between Hydraulic Engineer Vick of your office and Chief of Maintenance Rowe, Mr. Vick had mentioned that he had put an over-ceiling item in his 1966 F.Y. Water Resources budget in the amount of \$24,000 to initiate a study of Park domestic water supply needs. We support this program whole-heartedly and hope that a necessary field inspection involving personnel from the USGS, the Regional Office, and the Park can be set up for the month of November. | |

As suggested to Mr. Vick in the abovementioned telephone call, the following listing is a tentative priority list of well investigations which we would like to see programmed:

1. Headquarters -- As soon as possible.
2. Green Mountain Picnic Area, Foothills Parkway -- 1967 F.Y.
3. Cades Cove -- 1967 F.Y.
4. Cataloochee -- 1967 F.Y.
5. Rocky Mountain -- 1967 F.Y.
6. Chilhowee, Foothills Parkway -- 1968 F.Y.

7. Cades Cove -- 1968 F.Y.
8. Deep Creek -- 1968 F.Y.
9. Smokemont -- 1968 F.Y.
10. Chimneys -- 1969 F.Y.
11. Elkmont -- 1969 F.Y.
12. Cosby -- 1969 F.Y.
13. Webb Mountain, Foothills Parkway -- 1969 F.Y.


George W. Fry



IN REPLY REFER TO:

L54

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

Great Smoky Mountains National Park
Gatlinburg, Tennessee 37738

October 23, 1963

Boundary Studies	
Planning Service	
Proposed Areas	

SOUTHEAST REGION	
OCT 25 '63	
Reg. Director	
Asst. Reg. Dir. (CUI)	
Asst. Reg. Dir. (Adm.)	
Asst. Reg. Dir. (Res.)	
Asst. to Reg. Dir.	

Memorandum

To: Regional Director, Southeast Region

From: Acting Superintendent, Great Smoky Mountains

Subject: Water Resource Study, Look Rock Campground

As requested by Mr. Butterfield's memorandum of March 22, 1963, and Mr. O'Neil's memorandum of October 1, 1963, we have recently conducted a pumping test on the second site, upper valley, of the Look Rock test wells.

The second test well, in the upper valley, was selected for the pumping test as the results from the drilling and test pumping contract of December, 1962, indicated that pumping would produce 35 to 50 g.p.m. The well at the lower site produced about 15 g.p.m. on contract test pumping.

On contacting the Nashville office of the Geological Survey in regards to the well test, Mr. Criner advised us their pumping equipment would only produce about 15 gallons per minute. Thus, it was necessary for this office to rent pumping equipment that would produce 50 to 100 gallons per minute.

Our approximate expenses for this requested well test consists of Personal Services at \$145, Supplies and Rental of 3-phase generator and a submersible pump at \$132, and Equipment Operation and Depreciation at \$73, for a total cost of approximately \$350.

We request an allotment of funds in the amount of \$350 from the Water Resources funds to cover this expenditure, which is not a maintenance item.

We have received a copy of Mr. Criner's report, dated October 18, 1963, on the pumping test of this well. The quality and quantity of water exceeds the pre-drilling expectations, and the well appears to be adequate for the proposed campground and picnic ground developments. Therefore, we recommend that EODC proceed with plans and specifications for the Look Rock Development.

David deL. Condon
David deL. Condon



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
401 U S Court House
Nashville 3, Tennessee

IN REPLY REFER TO:

SOUTHEAST REGION	
OCT 23 '63	
Reg. Director	
Asst. Reg. Dir. (G.U.)	
Asst. Reg. Dir. (Admin.)	
Asst. to Reg. Dir.	
Asst. to Reg. Dir.	

October 18, 1963

Mr. Elbert Cox
Regional Director
National Park Service
Richmond 40, Virginia

Boundary Studies	
Lands	
Planning Service	
Proposed Areas	

Dear Mr. Cox:

We have concluded testing the wells at Look Rock Campsite this week and the results are indeed favorable.

You may recall that a pumping test of well Bt:J-2 last winter, during extremely cold weather when the ground was frozen, was not entirely satisfactory. It is believed that the frozen ground tended to make the water-bearing formation a "tight artesian aquifer" and a hot and dry weather test was recommended. This week, after 6 weeks without rain, a pumping test was conducted which indicated that well Bt:J-2 will supply more water than earlier tests indicated. The well was pumped at an average rate of 66 gpm (gallons per minute) for 3 hours and the water level recovered to essentially static level in about 5 hours. Transmissibility was computed to be about 5,000 gallons per day per foot for the best value and about 1,000 gpd per ft, the poorest. When the water level had declined to 32 feet below land surface the well, under "drouth conditions", yielded 56 gpm rather constantly with no further decline in water level.

It is believed that the well (Bt:J-2) will supply 50 gpm continuously, even during the severest drouth conditions such as we have experienced during the past 10 years. It will probably supply 75 gpm during normal seasons and more than 100 gpm for short periods of time; for instance for an emergency such as a fire. It is recommended that a pump (submersible or other type) capable of pumping 35 to 50 gpm at a 50-foot water level be installed in the well with the water intake at 60 feet below land surface. The construction should be such that water level can be measured readily by Park Personnel or Geological Survey when desired.

Two samples of the water from well Bt:J-2 were collected and field analysed this week, one at the beginning of the pumping test and one near the end. Both samples gave identical results, indicating no change in chemical quality within the 3 hour period of pumping. The water was clear, 58°F., pH of 6, contained less than 17 ppm hardness, and less than 0.1 ppm of iron.

gt 8.

Page 2

In conclusion it may be well to point out a few things that may be of use to you in planning for future use. During the winter or when the ground is frozen there is limited recharge to the formation and well Bt:J-2 may not yield more than 35 gpm continuously. It is now evident that the water-bearing formation is "artesian" during cold weather and water table during the periods of normal use, which means that you have a better well in summer than winter. Should a larger pump than the one recommended above be installed, it should have controlled discharge in order to throttle the discharge to 35 to 50 gpm except during periods of emergency use; although a larger pump might be used in the well to lift the water directly to an elevated storage tank.

We hope the above information is satisfactory and if not please call on this office again.

Very truly yours,



J. H. Criner

For: District Hydrologist
Water Resources Division

cc: Superintendent
Great Smoky Mountains National Park
J. L. Poole



LS4

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
90 White Bridge Road
Nashville 5, Tennessee

IN REPLY REFER TO:	
REGION ONE	2/11 1963
Reg. Director	
Asst. Reg. Dir. (CIU)	
Asst. Reg. Dir. (Adm.)	
Asst. Reg. Dir. (Tech.)	
Asst. to Reg. Dir.	

February 6, 1963

Boundary Studies	
Lands	
Planning Service	
Proposed Areas	

Mr. Alfred Vick
National Park Service
P. O. Box 10008
Richmond 40, Va.

Dear Al:

Results of our pumping tests, current-meter surveys, and geophysical and lithologic logging of the two wells at Look Rock Campground in the Great Smokies are encouraging, even after considering the last minute revision of the drilling specifications which doubled the desired amount of water to be obtained. However, there is yet one unknown which cannot be determined until experienced and that is yield of wells during the dry season of the year. The following statements will help you to decide your future course of action at Look Rock.

- Well No. 1 (Bt:J-1), 139 feet deep, water enters well at about 88 feet depth. Well flows 4 gpm continuously, may be pumped at 15 gpm continuously or greater ^{amounts} for short periods.
- Well No. 2 (Bt:J-2), 88 feet deep, water enters well at 70 to 75 feet depth, static water level about 5 feet below land surface. Well will supply slightly more than 50 gpm for 2 hours and probably 35 gpm continuously.

Both wells are developed in Nebo quartzite and water is probably obtained from crevices, fractures, and solution channels but may come from porous sandstone voids; tests would not definitely determine which.

It is probable that the wells together will supply the desired 50 gpm continuously under weather conditions similar to those at the time of our tests. It is possible but not probable that more than 50 gpm could be obtained continuously during normal summer and fall seasons. The fact that the ground was frozen during and for sometime before our tests may have prevented development of the wells to produce a greater amount of water. On the other hand, it is probable that the well yields will be less in the summer and fall - very rough estimate; 35 gpm.

ef

It is suggested that you do nothing more than to make temporary pump installations in the wells until we can conduct further tests this summer or during a long dry period. This should require no more than one day.

We regret that at present we cannot be more definite about the water supply at Look Rock. Our pumping tests were not entirely satisfactory and they are not typical of any we are familiar with but most nearly resemble tests in limestone aquifers.

We will send you the quality of water analysis statements as soon as they are received from our QW lab in Little Rock, Arkansas. Our field check of the water from both wells indicated soft, acid^{ic}, and relatively high iron water.

Please contact this office if you wish to discuss the work at Look Rock in greater detail or for additional information and to inform us of your plans for further work at Look Rock.

Yours sincerely,

James H. Griner
for Chief, Tennessee District, WRD

cc: NPS Headquarters, Gatlinburg, Tenn.
Chief, GW Br. Code: 4053 0001
Washington, D. C.

*All - call me if we can be of further help. Also, let us know whether we should plan for a dry-weather test.
This letter may be somewhat on the pessimistic side -*

Jim C.

REPORT OF WATER RESOURCES STUDY
AT LOOK ROCK CAMP GROUNDS, TENNESSEE

--

By Gerald K. Moore and Roy H. Bingham

--

INTRODUCTION

The U. S. Geological Survey, in cooperation with the National Park Service, investigated the ground-water resources near the proposed Look Rock Camp Site, southeast of Maryville, Tennessee from November 1962 through February, 1963. This report summarizes the results of this study. The drilling of two test wells and one pumping test were paid for by the Park Service. The U. S. Geological Survey collected and described the drill cuttings, ran electrical logs, ran vertical-flow current meter surveys, supervised the pumping test and made additional pumping tests, analyzed the test data, and analyzed two water samples for chemical content.

The two wells drilled by the Park Service are termed Bt:J-1 and Bt:J-2 in this report. The first two letters are an abbreviation of Blount County. The Blockhouse Quadrangle upon which the wells are located is indicated by the letter J. The last item is a number indicating the order in which the wells are drilled.

The locations of Bt:J-1 and 2 are shown on the enclosed topographic map.

Geology

The Look Rock area is underlain by the Hesse Quartzite, the Murray Shale, the Webb Quartzite, and the Nichols Shale, all of Cambrian age. These rocks are for the most part composed of tight shale and silica-cemented sandstone of extremely low permeability. Little opportunity exists for water to move through them except along joint and fault surfaces.

A tracing of part of the "Geology of the Blockhouse Quadrangle, Tennessee" by R. B. Neuman and R. L. Wilson (Map GQ-131, 1960) is enclosed, and the limits of the tracing are shown on the topographic map (enclosed). A geologic section across this area and passing through Bt:J-1 is also enclosed. The rock strata dip about 30° to the southeast in the outcrop area along the crest of Chilhowee Mountain but this dip decreases rapidly to the southeast.

Both wells are in the Murray Shale at land surface (just below the soil mantle) but penetrate the Nebo Quartzite at a shallow depth. All of the water zones are in the Nebo. Descriptions of the drill cuttings and electric logs of the wells are enclosed. No evidence of permeable water-bearing zones were detected either in the drill cuttings or on the electric logs, which indicates that water flows to the wells through crevices, fractures or solution channels.

Occurrence and Depth to Water Zones

Analysis of the pumping test data on Bt:J-1 and Bt:J-2 further indicates that the water in these wells comes from joints or crevices in the Nebo Quartzite. This water is under artesian pressure and rose above the point at which it was found by drilling. Well Bt:J-1 was flowing at the time of testing.

The driller reported finding a small amount of water in well Bt:J-1 at a depth of 65 feet and an additional stream of water at 135 feet. In an effort to check these depths, the Geological Survey ran a current meter survey on the well on Jan. 17, 1963 under conditions of natural flow and ran another survey on Jan. 18, while pumping the well at about 11 gpm (gallons per minute). The results of both surveys were poor as the amount of water moving up the well was insufficient to counteract the variation in readings caused by small variations in well diameter. The current-meter surveys suggest a possible water zone between 71 and 79 feet but show that most of the water is coming from below 88 feet. At the time of the surveys, there appeared to be no water coming from a depth of 65 feet. Consistent readings could not be obtained below 88 feet and the 135-foot zone reported by the driller could not be checked.

In well Bt:J-2, the driller reported finding water at a depth of between 70 and 75 feet. A current-meter survey was made on this well on Jan. 21, 1963 while pumping the well at about 11 gpm. The current meter quickly became clogged with mud and drill cuttings, however, and no indicative readings were obtained. The depth of the water zone reported by the driller is probably fairly accurate, however.

Pumping Tests

On Jan. 8, 1963 a bailing test was made by the driller on well Bt:J-1. While bailing at a rate of about 15 gpm, the water level was drawn down to about 130 feet.

On Jan. 18, 1963, the Geological Survey submersible pump was installed in well Bt:J-1. The well was flowing about 4 gpm at this time. While pumping at 11.3 gpm, the water level dropped to 6.14 feet after 10 minutes, to 14.09 feet after 30 minutes, and to 19.14 feet after 1 hour and 15 minutes. At this time the portable generator started operating erratically, the discharge dropped off to about 9 gallons per minute and the water level began rising. In 29 minutes under these conditions the water level recovered to 12.72 feet. The pump was then turned off and the well began flowing again in 6 minutes.

The specific capacity of well Bt:J-1 after 1.33 hours of pumping is about 1.7 gpm/foot drawdown.

Semi-log plots of drawdown and recovery of water level in well Bt:J-1 versus time, in the manner normally used to determine the transmissibility and storage characteristics of an aquifer, gave no consistent or logical values for these characteristics.

On Jan. 21, 1963, the Geological Survey submersible pump was installed in well Bt:J-2. The static water level was 4.18 feet below the top of the casing at this time. While pumping at 10.7 gpm, the water level dropped to 10.16 feet after 75 minutes of pumping. The water then became very muddy and the water level began rising. This was probably a result of well development. Mud was pulled from the water-bearing crevice and the well yield improved. After 2 hours of pumping, the water level recovered to 5.52 feet and after 3 hours and 35 minutes of pumping was at 5.62 feet. The pump was then turned off and the water level recovered to 4.61 feet after 1 hour and 15 minutes.

On Feb. 1, 1963 the driller's submersible pump was used to test well Bt:J-2. After two hours of pumping at about 50 gpm the water level was at 61.97 feet below the top of the casing. As the pump was set at this depth and began to break suction, discharge was reduced to 37 gpm. After pumping 37 gpm for 23 minutes and 33 gpm for 1 hour and 37 minutes, the water level recovered to 48.56 feet, a recovery of 13.41 feet. The amount of this recovery is roughly the amount of drawdown which would occur if the well were pumped at 34 gpm for 2 hours. After pumping for a total of 5.5 hours, the water level was at 49.67 feet and the pump was turned off. In 30 minutes, the water level recovered to 25.73 feet, in one hour to 21.15 feet, and in 2 hours and 45 minutes to 13.09 feet.

The specific capacity of well Bt:J-2 is about 8 gpm/foot of drawdown for a pumping rate of 10.7 gpm, about 3.5 gpm/foot of drawdown for 34 gpm, and about 0.9 gpm/foot of drawdown for 50 gpm after two hours of pumping.

Semi-log plots of drawdown and recovery of water levels in well Bt:J-2 versus time gave neither logical nor consistent values of the aquifer transmissibility and storage characteristics. A part of the cause of the unusual results may be attributed to the frozen ground which could have prevented the free movement of water.

Well Yields

Based on the bail and pumping tests, well Bt:J-1 will not yield more than 15 gpm continuously even during the wettest part of each year. Larger amounts of water could be pumped for a short time but the water level would soon be drawn below the pump intake. Fifteen gpm, therefore, should be considered as the upper limit of well yield, and pumping at a slightly lower rate (10-12 gpm) would probably be desirable.

A plot of water-level drawdown versus pumping was constructed for well Bt:J-2 and is enclosed. This plot shows the amount of drawdown which can be expected at any pumping rate after two hours of pumping (assuming an initial static water level of 4.18 feet below the top of the casing). There is about 65 feet of water-level drawdown available in this well. As shown on the enclosed graph (dashed line), the well therefore would yield about 51 gpm for two hours. If longer periods of pumping are required, a lower pumping rate would be necessary. The well will probably yield 35 gpm continuously.

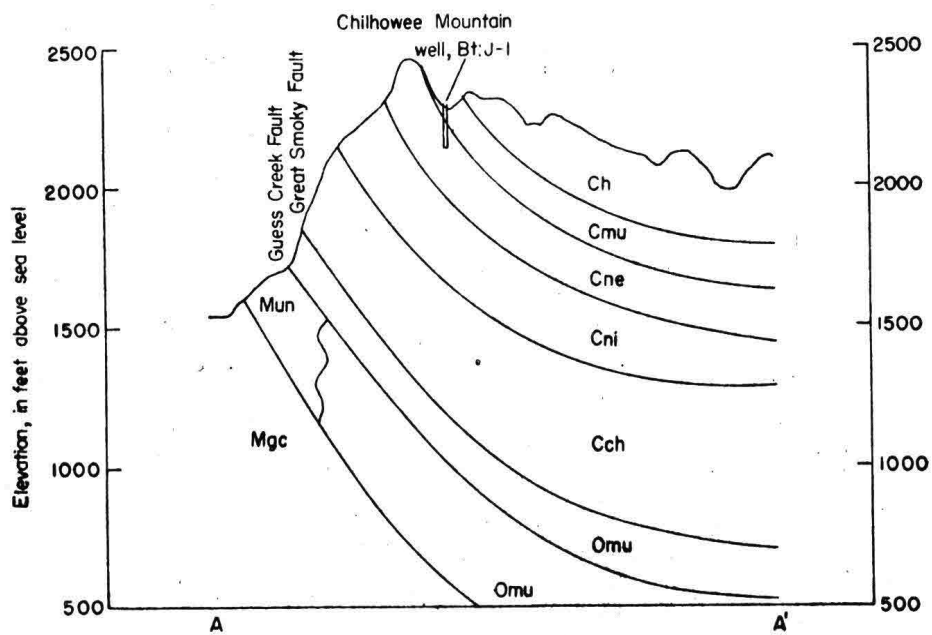
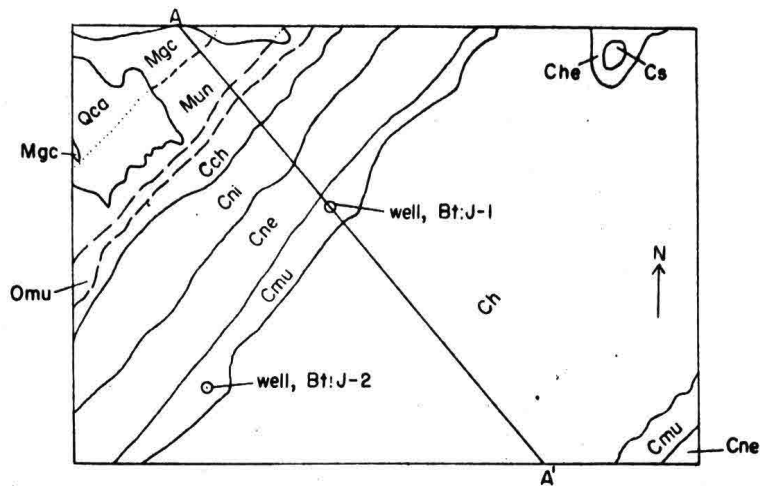
We cannot predict now the effects of dry weather on the yields of wells Bt:J-1 and Bt:J-2. If the water table drops during the summer and fall, there probably will be a decrease in well yields. Spring flows in Blount County have from 15 to 1000 percent variations in discharge between the wet and dry seasons of the year. Yields of average wells are probably somewhat less variable than yields of average springs, but well yields could decrease significantly in dry weather.

Water Quality

Enclosed are copies of the analyses of water on wells Bt:J-1 and Bt:J-2. Water from both wells is soft, slightly acidic (pH = 5 to 6), and has a temperature of about 57°F. The acidity is caused by dissolved carbon dioxide and the water may be somewhat corrosive to iron piping. The only chemical constituent in sufficient amount to be objectionable is the iron content of well Bt:J-1. Water containing in excess of 0.3 ppm (parts per million) iron can cause staining of toilet fixtures, and the water from this well contains 0.38 ppm. Aeration of the water would precipitate this iron as well as release the dissolved carbon dioxide and, thereby, reduce its corrosiveness. Any of various filters and treatment with lime would have the same effects. If both wells are used together, however, the combined iron content of water from both would be less than 0.3 ppm and no problem would exist on this account.

Summary and Recommendations

Wells Bt:J-1 and Bt:J-2 will yield 15 and 50 gpm for two hours. The sustained yield of these wells, however, is probably about 10 and 35 gpm respectively. These yields may decrease somewhat during the dry season of the year. If the Park Service installs pumps on the wells, it may be necessary to decrease their discharge later in the year to prevent their breaking suction. If desired, the U. S. Geological Survey will run additional pumping tests on the wells late this year or during a long dry period. A test in dry weather is recommended, and no additional expenditure by the Park Service would be necessary as the Survey submersible pump could be used.



Geologic map and section through well Bt:J-1

Legend

Geologic Map

Cch - Cochran Formation

Ch - Hesse Quartzite

Che - Helenmode Formation

Cmu - Murry Shale

Cne - Nebo Quartzite

Cni - Nichols Shale

Cs - Shady Dolomite

Mge - Greasy Cove Formation

Mun - Greasy Cove and Grainger Formation

undifferentiated.

Omu - Tellico Formation and Blockhouse Shale

undifferentiated

Qca - Colluvium and Alluvium

Solid lines - geologic contacts

Broken lines - faults

LITHOLOGIC LOG

Owner: National Park Service	WELL No: Bt-J-1
Driller: Jack Terry	Date: Nov. 62
County: Blount	State: Tenn
Logged by: G. K. Moore	Date:
Location: 463.900N-2.606,300E	
Depth, hole: 140 dia: 8"	Location No. On E. side of
Depth, casing: 56 dia: 8"	Chilhowee Mtn. SE of Maryville
Depth, screen: none dia:	Alt. datum
	Alt. LSD 2270
E. log: X	compass: caliper: temp: conductivity flow meter

AGE	FORMATION	LITHOLOGY	Thick- ness (ft)	Depth (feet)
Cambrian	Nebo Quartzite	Quartzite - gray, very fine grained, angular, hard, well cemented, glauconitic, a few grains of pyrite - 70%	15	50-65
		Shale - gray, moderately soft, muscovite and biotite - 10%		
		Sandstone - white to clear, coarse grained, subrounded, poorly cemented - 20%		
		Quartzite - gray, very fine grained, hard, well cemented, glauconitic, small amount of pyrite - 70%		
		Shale - light gray and black, soft, micaceous - 15%	10	65-75
		Sandstone - white to clear, coarse grained, subrounded, poorly cemented - 15%		
		Sandstone - white to clear, coarse grained, subangular, poorly cemented, partly stained with limonite - 50%		
		Siltstone - light gray, well cemented, glauconitic - 40%		
		Shale - black, moderately hard, micaceous - 10%	10	75-85
		Quartzite - light gray, silt to very fine grained, hard, poorly to well cemented, small amounts of pyrite and glauconite, partly stained with limonite - 95%		
		Shale - gray to black, soft, micaceous - 5%	10	85-95
		Sandstone - light tan, very fine grained, subangular to subrounded, poorly cemented, partly stained with limonite, grains are clear to yellow - 98%		
		Shale - gray to black, soft, micaceous - 2%	45	95-140

LITHOLOGIC LOG

Owner: National Park Service	WELL No: BT-J-1
Driller: Jack Terry	Date: Nov. 62
County: Blount	State: Tenn.
Logged by: G. E. Moore	Date:
Location: 463.900N: 2.606.300E	
Datum: Land Surface	Location No. On E. side of
Depth, hole: 140	dis: 8"
Depth, casing: 56	dis: 8"
Depth, screen: none	dis:
Alt. datum	Alt. L&D 2270
E. log: X gamma	caliper: temp: conductivity flow meter

AGE	FORMATION	LITHOLOGY	Thick- ness (ft)	Depth (feet)
Cambrian	Murray Shale	Samples missing	10	0-10
		Sandstone - gray, very fine grained, subangular, fair to well cemented, glauconitic, partly micaceous. A few grains stained with limonite - 50%		
		Siltstone - gray, clayey, micaceous, and partly glauconitic - 40%		
		Sandstone - clear to tan, hard, well cemented, partly glauconitic or limonitic - 10%	5	10-15
		Sandstone - clear to tan, very fine grained, well cemented, partly glauconitic or limonitic - 50%		
		Sandstone - gray, very fine grained, fair to well cemented, glauconitic and partly limonitic and micaceous - 15%		
		Siltstone - gray, clayey, micaceous, and partly glauconitic - 35%	5	15-20
		Shale - gray, soft - 50%		
		Siltstone - gray, clayey, moderately soft, pyritic - 50%		
		Sandstone - light gray, very fine grained, hard, well cemented, glauconitic - 10%	15	20-35
		Shale - as above - 80%		
		Siltstone - as above but no pyrite - 20%	15	35-50

LITHOLOGIC LOG

Owner: National Park Service		WELL No: BT-J-2	
Driller: Jack Terry	Date: Jan/63	County: Blount	State: Tenn
Logged by: G. K. Moore	Date: Feb/63	Location: 461200N:2614300E	
Datum Land surface		Location No. E. side of Chilhowee	
Depth, hole: 85	dia: 8	Mtn. SE of Maryville	
Depth, casing: 44	dia: 8		
Depth, screen: none	dia:	Alt. datum	Alt. LSD 2350
E.log: X	gamma:	caliper:	temp: conductivity flow meter

AGE	FORMATION	LITHOLOGY	Thick- ness (ft)	Depth (feet)
Cambrian	Nebo Quartzite	Samples missing	40	0-40
		Quartzite - light grayish tan, fine grained, subangular to subrounded, partly limonitic. Pitted over 10% of surface - 96%		
		Limonite - red, purple, and black. Contains a few grains of glauconite - 1%		
		Shale - gray and greenish gray, hard, micaeous, siliceous, and glauconite - 1%	10	40-50
		As above but quartzite is less pitted, limonite is non-glauconitic, and shale is softer and less siliceous.	15	50-65

LITHOLOGIC LOG

Owner: National Park Service	WELL No: Bt:J-2
Driller: Jack Terry Date: Jan/63	County: Blount State: Tenn.
Logged by: G. E. Moore Date: Feb/63	Location: 461200N:2614300E
Datum: Land surface	Location No. E. side of Chilhowee
Depth, hole: 85 dia: 8	Mtn. SE of Maryville
Depth, casing: 44 dia: 8	
Depth, screen: none dia:	Alt. datum Alt. LSD 2350
E. log: X gamma: caliper: temp: conductivity flow meter	

AGE	FORMATION	LITHOLOGY	Thick- ness (ft)	Depth (feet)
Cambrian	Nebo Quartzite	Quartzite - light grayish tan, fine grained, partly limonitic, slightly pitted. Contains a few scattered grains of a soft, apple green mineral (pyrophyllite?). - 98% Limonite - red, purple, and black - 2% Shale - gray and greenish gray, hard, micaceous and glauconitic - 2%	10	65-75
		Quartzite - light grayish tan, fine to very fine grained, subangular, fair to well cemented, partly stained with limonite, very slightly calcareous. Contains a few scattered grains of pyrophyllite(?). - 98% Limonite - orange to black - 1% Shale - brown to black, stained with black limonite, calcareous and micaceous - 1%	10	75-85



UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

Great Smoky Mountains National Park
Gatlinburg, Tennessee 37738

October 23, 1963

IN REPLY REFER TO:

L54

Memorandum

To: Regional Director, Southeast Region
From: Acting Superintendent, Great Smoky Mountains
Subject: Water Resource Study, Look Rock Campground

Southeast Region	
OCT 25 '63	
Reg. Director	
Asst. Reg. Dir. (ADM)	
Asst. Reg. Dir. (Tech)	
Asst. Reg. Dir. (Inv.)	
Asst. to Reg. Dir.	
Planning Service	
Proposed Areas	

As requested by Mr. Butterfield's memorandum of March 22, 1963, and Mr. O'Neil's memorandum of October 1, 1963, we have recently conducted a pumping test on the second site, upper valley, of the Look Rock test wells.

The second test well, in the upper valley, was selected for the pumping test as the results from the drilling and test pumping contract of December, 1962, indicated that pumping would produce 35 to 50 g.p.m. The well at the lower site produced about 15 g.p.m. on contract test pumping.

On contacting the Nashville office of the Geological Survey in regards to the well test, Mr. Criner advised us their pumping equipment would only produce about 15 gallons per minute. Thus, it was necessary for this office to rent pumping equipment that would produce 50 to 100 gallons per minute.

Our approximate expenses for this requested well test consists of Personal Services at \$145, Supplies and Rental of 3-phase generator and a submersible pump at \$132, and Equipment Operation and Depreciation at \$73, for a total cost of approximately \$350.

We request an allotment of funds in the amount of \$350 from the Water Resources funds to cover this expenditure, which is not a maintenance item.

We have received a copy of Mr. Criner's report, dated October 18, 1963, on the pumping test of this well. The quality and quantity of water exceeds the pre-drilling expectations, and the well appears to be adequate for the proposed campground and picnic ground developments. Therefore, we recommend that EODC proceed with plans and specifications for the Look Rock Development.

David deL. Condon
David deL. Condon



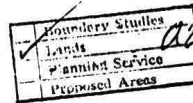
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
401 U S Court House
Nashville 3, Tennessee

IN REPLY REFER TO:

SOUTHEAST REGION	
OCT 23 '63	
Reg. Director	
Asst. Reg. Dir. (G.S.)	
Asst. Reg. Dir. (Land)	
Asst. Reg. Dir. (Planning)	
Asst. to Reg. Dir.	

October 18, 1963

Mr. Elbert Cox
Regional Director
National Park Service
Richmond 40, Virginia



Dear Mr. Cox:

We have concluded testing the wells at Look Rock Campsite this week and the results are indeed favorable.

You may recall that a pumping test of well Bt:J-2 last winter, during extremely cold weather when the ground was frozen, was not entirely satisfactory. It is believed that the frozen ground tended to make the water-bearing formation a "tight artesian aquifer" and a hot and dry weather test was recommended. This week, after 6 weeks without rain, a pumping test was conducted which indicated that well Bt:J-2 will supply more water than earlier tests indicated. The well was pumped at an average rate of 66 gpm (gallons per minute) for 3 hours and the water level recovered to essentially static level in about 5 hours. Transmissibility was computed to be about 5,000 gallons per day per foot for the best value and about 1,000 gpd per ft, the poorest. When the water level had declined to 32 feet below land surface the well, under "drouth conditions", yielded 56 gpm rather constantly with no further decline in water level.

It is believed that the well (Bt:J-2) will supply 50 gpm continuously, even during the severest drouth conditions such as we have experienced during the past 10 years. It will probably supply 75 gpm during normal seasons and more than 100 gpm for short periods of time; for instance for an emergency such as a fire. It is recommended that a pump (submersible or other type) capable of pumping 35 to 50 gpm at a 50-foot water level be installed in the well with the water intake at 60 feet below land surface. The construction should be such that water level can be measured readily by Park Personnel or Geological Survey when desired.

Two samples of the water from well Bt:J-2 were collected and field analysed this week, one at the beginning of the pumping test and one near the end. Both samples gave identical results, indicating no change in chemical quality within the 3 hour period of pumping. The water was clear, 58°F., pH of 6, contained less than 17 ppm hardness, and less than 0.1 ppm of iron.

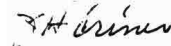
gt 8.

Page 2

In conclusion it may be well to point out a few things that may be of use to you in planning for future use. During the winter or when the ground is frozen there is limited recharge to the formation and well Bt:J-2 may not yield more than 35 gpm continuously. It is now evident that the water-bearing formation is "artesian" during cold weather and water table during the periods of normal use, which means that you have a better well in summer than winter. Should a larger pump than the one recommended above be installed, it should have controlled discharge in order to throttle the discharge to 35 to 50 gpm except during periods of emergency use; although a larger pump might be used in the well to lift the water directly to an elevated storage tank.

We hope the above information is satisfactory and if not please call on this office again.

Very truly yours,



J. H. Criner

For: District Hydrologist
Water Resources Division

cc: Superintendent
Great Smoky Mountains National Park
J. L. Poole

REPORT OF WATER RESOURCES STUDY
AT LOOK ROCK CAMP GROUNDS, TENNESSEE

--
By Gerald K. Moore and Roy H. Bingham
--

INTRODUCTION

The U. S. Geological Survey, in cooperation with the National Park Service, investigated the ground-water resources near the proposed Look Rock Camp Site, southeast of Maryville, Tennessee from November 1962 through February, 1963. This report summarizes the results of this study. The drilling of two test wells and one pumping test were paid for by the Park Service. The U. S. Geological Survey collected and described the drill cuttings, ran electrical logs, ran vertical-flow current meter surveys, supervised the pumping test and made additional pumping tests, analyzed the test data, and analyzed two water samples for chemical content.

The two wells drilled by the Park Service are termed Bt:J-1 and Bt:J-2 in this report. The first two letters are an abbreviation of Blount County. The Blockhouse Quadrangle upon which the wells are located is indicated by the letter J. The last item is a number indicating the order in which the wells are drilled.

The locations of Bt:J-1 and 2 are shown on the enclosed topographic map.

Geology

The Look Rock area is underlain by the Hesse Quartzite, the Murray Shale, the Nabo Quartzite, and the Nichols Shale, all of Cambrian age. These rocks are for the most part composed of tight shale and silica-cemented sandstone of extremely low permeability. Little opportunity exists for water to move through them except along joint and fault surfaces.

A tracing of part of the "Geology of the Blockhouse Quadrangle, Tennessee" by R. B. Neuman and R. L. Wilson (Map GQ-131, 1960) is enclosed, and the limits of the tracing are shown on the topographic map (enclosed). A geologic section across this area and passing through Bt:J-1 is also enclosed. The rock strata dip about 30° to the southeast in the outcrop area along the crest of Chilhowee Mountain but this dip decreases rapidly to the southeast.

Both wells are in the Murray Shale at land surface (just below the soil mantle) but penetrate the Nebo Quartzite at a shallow depth. All of the water zones are in the Nebo. Descriptions of the drill cuttings and electric logs of the wells are enclosed. No evidence of permeable water-bearing zones were detected either in the drill cuttings or on the electric logs, which indicates that water flows to the wells through crevices, fractures or solution channels.

Occurrence and Depth to Water Zones

Analysis of the pumping test data on Bt:J-1 and Bt:J-2 further indicates that the water in these wells comes from joints or crevices in the Nebo Quartzite. This water is under artesian pressure and rose above the point at which it was found by drilling. Well Bt:J-1 was flowing at the time of testing.

The driller reported finding a small amount of water in well Bt:J-1 at a depth of 65 feet and an additional stream of water at 135 feet. In an effort to check these depths, the Geological Survey ran a current meter survey on the well on Jan. 17, 1963 under conditions of natural flow and ran another survey on Jan. 18, while pumping the well at about 11 gpm (gallons per minute). The results of both surveys were poor as the amount of water moving up the well was insufficient to counteract the variation in readings caused by small variations in well diameter. The current-meter surveys suggest a possible water zone between 71 and 79 feet but show that most of the water is coming from below 88 feet. At the time of the surveys, there appeared to be no water coming from a depth of 65 feet. Consistent readings could not be obtained below 88 feet and the 135-foot zone reported by the driller could not be checked.

In well Bt:J-2, the driller reported finding water at a depth of between 70 and 75 feet. A current-meter survey was made on this well on Jan. 21, 1963 while pumping the well at about 11 gpm. The current meter quickly became clogged with mud and drill cuttings, however, and no indicative readings were obtained. The depth of the water zone reported by the driller is probably fairly accurate, however.

Pumping Tests

On Jan. 8, 1963 a bailing test was made by the driller on well Bt:J-1. While bailing at a rate of about 15 gpm, the water level was drawn down to about 130 feet.

On Jan. 18, 1963, the Geological Survey submersible pump was installed in well Bt:J-1. The well was flowing about 4 gpm at this time. While pumping at 11.3 gpm, the water level dropped to 6.14 feet after 10 minutes, to 14.09 feet after 30 minutes, and to 19.14 feet after 1 hour and 15 minutes. At this time the portable generator started operating erratically, the discharge dropped off to about 9 gallons per minute and the water level began rising. In 29 minutes under these conditions the water level recovered to 12.72 feet. The pump was then turned off and the well began flowing again in 6 minutes.

The specific capacity of well Bt:J-1 after 1.33 hours of pumping is about 1.7 gpm/foot drawdown.

Semi-log plots of drawdown and recovery of water level in well Bt:J-1 versus time, in the manner normally used to determine the transmissibility and storage characteristics of an aquifer, gave no consistent or logical values for these characteristics.

On Jan. 21, 1963, the Geological Survey submersible pump was installed in well Bt:J-2. The static water level was 4.18 feet below the top of the casing at this time. While pumping at 10.7 gpm, the water level dropped to 10.16 feet after 75 minutes of pumping. The water then became very muddy and the water level began rising. This was probably a result of well development. Mud was pulled from the water-bearing crevice and the well yield improved. After 2 hours of pumping, the water level recovered to 5.52 feet and after 3 hours and 35 minutes of pumping was at 5.62 feet. The pump was then turned off and the water level recovered to 4.61 feet after 1 hour and 15 minutes.

On Feb. 1, 1963 the driller's submersible pump was used to test well Bt:J-2. After two hours of pumping at about 50 gpm the water level was at 61.97 feet below the top of the casing. As the pump was set at this depth and began to break suction, discharge was reduced to 37 gpm. After pumping 37 gpm for 23 minutes and 33 gpm for 1 hour and 37 minutes, the water level recovered to 48.56 feet, a recovery of 13.41 feet. The amount of this recovery is roughly the amount of drawdown which would occur if the well were pumped at 34 gpm for 2 hours. After pumping for a total of 5.5 hours, the water level was at 49.67 feet and the pump was turned off. In 30 minutes, the water level recovered to 25.73 feet, in one hour to 21.15 feet, and in 2 hours and 45 minutes to 13.09 feet.

The specific capacity of well Bt:J-2 is about 8 gpm/foot of drawdown for a pumping rate of 10.7 gpm, about 3.5 gpm/foot of drawdown for 34 gpm, and about 0.9 gpm/foot of drawdown for 50 gpm after two hours of pumping.

Semi-log plots of drawdown and recovery of water levels in well Bt:J-2 versus time gave neither logical nor consistent values of the aquifer transmissibility and storage characteristics. A part of the cause of the unusual results may be attributed to the frozen ground which could have prevented the free movement of water.

Well Yields

Based on the bail and pumping tests, well Bt:J-1 will not yield more than 15 gpm continuously even during the wettest part of each year. Larger amounts of water could be pumped for a short time but the water level would soon be drawn below the pump intake. Fifteen gpm, therefore, should be considered as the upper limit of well yield, and pumping at a slightly lower rate (10-12 gpm) would probably be desirable.

A plot of water-level drawdown versus pumping was constructed for well Et:J-2 and is enclosed. This plot shows the amount of drawdown which can be expected at any pumping rate after two hours of pumping (assuming an initial static water level of 4.18 feet below the top of the casing). There is about 65 feet of water-level drawdown available in this well. As shown on the enclosed graph (dashed line), the well therefore would yield about 51 gpm for two hours. If longer periods of pumping are required, a lower pumping rate would be necessary. The well will probably yield 35 gpm continuously.

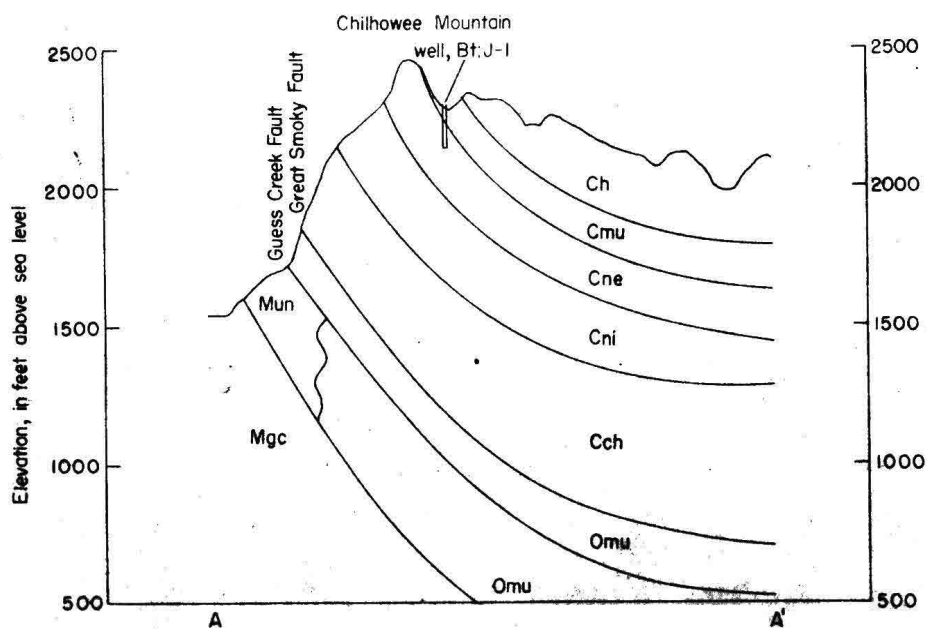
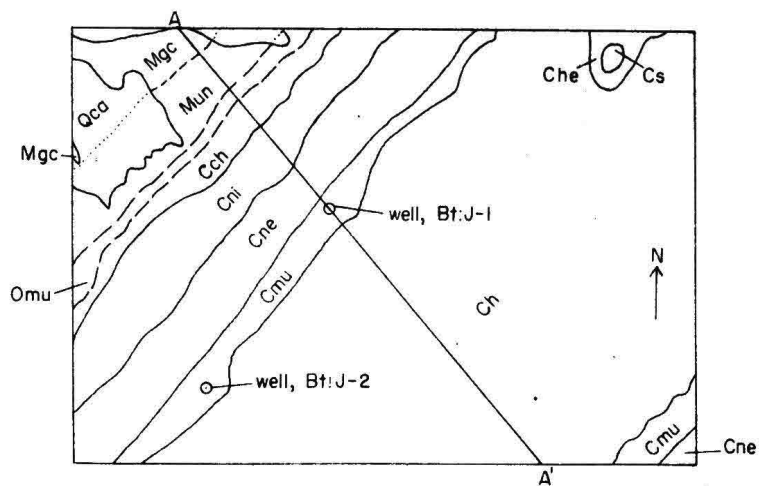
We cannot predict now the effects of dry weather on the yields of wells Et:J-1 and Et:J-2. If the water table drops during the summer and fall, there probably will be a decrease in well yields. Spring flows in Blount County have from 15 to 1000 percent variations in discharge between the wet and dry seasons of the year. Yields of average wells are probably somewhat less variable than yields of average springs, but well yields could decrease significantly in dry weather.

Water Quality

Enclosed are copies of the analyses of water on wells Bt:J-1 and Bt:J-2. Water from both wells is soft, slightly acidic (pH = 5 to 6), and has a temperature of about 57°F. The acidity is caused by dissolved carbon dioxide and the water may be somewhat corrosive to iron piping. The only chemical constituent in sufficient amount to be objectionable is the iron content of well Bt:J-1. Water containing in excess of 0.3 ppm (parts per million) iron can cause staining of toilet fixtures, and the water from this well contains 0.38 ppm. Aeration of the water would precipitate this iron as well as release the dissolved carbon dioxide and, thereby, reduce its corrosiveness. Any of various filters and treatment with lime would have the same effects. If both wells are used together, however, the combined iron content of water from both would be less than 0.3 ppm and no problem would exist on this account.

Summary and Recommendations

Wells Bt:J-1 and Bt:J-2 will yield 15 and 50 gpm for two hours. The sustained yield of these wells, however, is probably about 10 and 35 gpm respectively. These yields may decrease somewhat during the dry season of the year. If the Park Service installs pumps on the wells, it may be necessary to decrease their discharge later in the year to prevent their breaking suction. If desired, the U. S. Geological Survey will run additional pumping tests on the wells late this year or during a long dry period. A test in dry weather is recommended, and no additional expenditure by the Park Service would be necessary as the Survey submersible pump could be used.



Geologic map and section through well Bt:J-1

Legend

Geologic Map

Cch - Cochran Formation

Ch - Hesse Quartzite

Che - Helenmode Formation

Cmu - Murry Shale

Cne - Nebo Quartzite

Cni - Nichols Shale

Cs - Shady Dolomite

Mge - Greasy Cove Formation

Mun - Greasy Cove and Grainger Formation

undifferentiated.

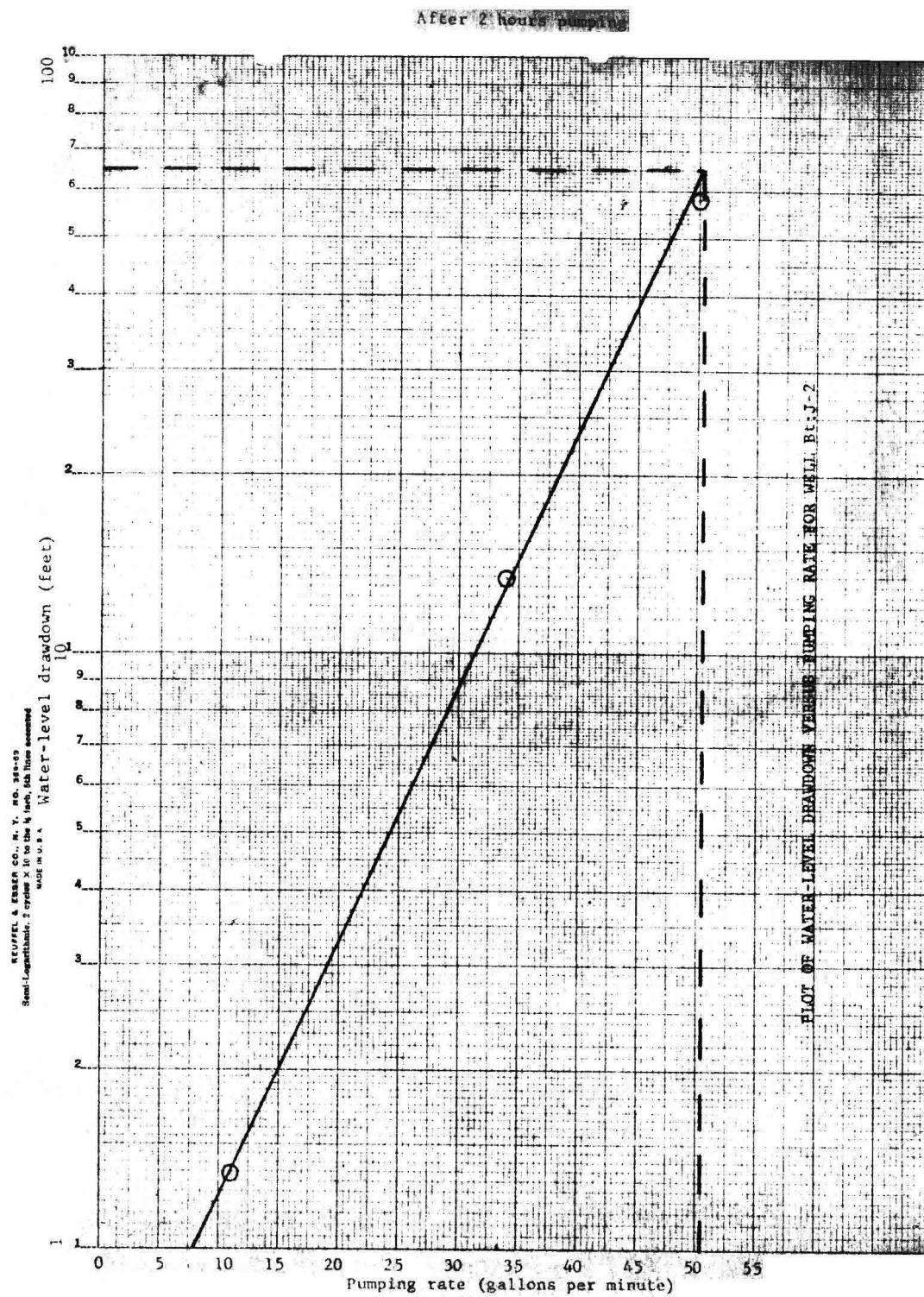
Omu - Tellico Formation and Blockhouse Shale

undifferentiated

Qca - Colluvium and Alluvium

Solid lines - geologic contacts

Broken lines - faults



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER ANALYSIS

BT:J-2

Location Near Maryville, Tennessee, (8 mi. SSE), 461200:2519300 County Blount
Source drilled well Depth (ft) 82 Diam (in.) 8
Cased to (ft) 82 Date drilled Jan. 1963 Point of coll. Pump discharge 90' from well
Owner National Park Service Gatlinburg, Tenn. Use Test well
Treatment None WL 22.88(?) below L.B. Yield 11 gpm
WB Quartzite, G5 Temp (°F) Appear. when coll. Cloudy
Collected January 21, 1963 By G. K. Moore
Remarks

	ppm	epm		ppm	epm
Silica (SiO ₂)	3.9		Bicarbonate (HCO ₃)	6	0.10
Aluminum (Al)			Carbonate (CO ₃)	0	.00
Iron (Fe)	.12				
Manganese (Mn)	.02		Sulfate (SO ₄)	0.8	0.00
			Chloride (Cl)	0.5	.01
			Fluoride (F)	0.4	0.00
Calcium (Ca)	0.5	0.02			
Magnesium (Mg)	0.5	0.04	Nitrate (NO ₃)	0.3	0.00
Sodium (Na)	0.4	.02			
Potassium (K)	1.1	0.03			
Total		0.11	Total		0.11

	ppm		
Dissolved solids:		Specific conductance (micromhos at 25° C)	15
Calculated	10	pH	6.0
Residue on evaporation at 180° C	10	Color	2
Hardness as CaCO ₃	3		
Noncarbonate	0		

Lab. No. 31473

Field No. BT:J-2

Project Tenn. GW

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER ANALYSIS

26W

Bt:J-1

Location Near Maryville, Tennessee, (8 mi. SSE) 463900N:2606300E County Blount
Source Drilled well Depth (ft) 139 Diam (in.) 6
Cased to (ft) 56 Date drilled Nov-Dec. 1962 Point of coll. Pump discharge 20' from well
Owner National Park Service, Gatlinburg, Tenn.
Treatment None Use Test well
WBF Nebo Quarzite 75 & 135' WL Flowing + gpm (est): Yield 12 gpm: pump meas.
Temp (°F) 57 Appear. when coll. Clear
Collected January 18, 1963 By G. K. Moore
Remarks

	ppm	epm		ppm	epm
Silica (SiO ₂)	3.9		Bicarbonate (HCO ₃)	6	0.10
Aluminum (Al)			Carbonate (CO ₃)	~~1.0~~	.00
Iron (Fe)	.38				
Manganese (Mn)	.01		Sulfate (SO ₄)	0.0	0.00
			Chloride (Cl)	0.5	.01
			Fluoride (F)	0.2	.01
Calcium (Ca)	0.2	0.01			
Magnesium (Mg)	0.5	0.04	Nitrate (NO ₃)	0.0	0.00
Sodium (Na)	0.4	.02			
Potassium (K)	1.0	0.03			
Total		0.10	Total		0.12

	ppm		
		Specific conductance (micromhos at 25° C)	15
Dissolved solids:		pH	5.7
Calculated	10	Color	2
Residue on evaporation at 180°C	10		
Hardness as CaCO ₃	2		
Noncarbonate	0		

Lab. No. 31472

Field No. Bt:J-1

Project 20m. GW



254

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
90 White Bridge Road
Nashville 5, Tennessee

IN REPLY REFER TO:

April 24, 1962

Mr. Alfred Vick
Water Resources Engineer
U.S. National Park Service
P. O. Box 10008
Richmond 40, Virginia

REGION ON
APR 26 1962
Dir. Director
Asst. Dir. (CIU) <i>DM</i>
Asst. Dir. (GSA) <i>DM</i>
Asst. Dir. (Rec. M.)

Dear Mr. Vick:

After receiving your data relating to the Look Rock Campsite I have studied the available hydrologic information and the topography and geology of the proposed site. Although it is not very conclusive with respect to the availability of a ground-water supply, I can perhaps be more specific than during our telephone conversation April 18.

The area in question is between 2400 and 2500 feet above sea level, just southeast of the crest of Chilhowee Mountain, and extending northeast from the vicinity of Look Rock along a tributary of Flat Creek to a 90-degree bend in the creek -- a distance of 1.4 miles NE of the lookout tower (U.S. Geological Survey Blockhouse 7 1/2-minute topographic quadrangle). As I understand the situation, the Park Service wishes to determine the feasibility of a water supply from a well or wells in the vicinity of Look Rock to avoid possible contamination and the expense of excessive lift of water from a surface reservoir at weir number 1 (approximate altitude 2260 feet).

The area is underlain by rocks of the upper part of the Chilhowee Group, consisting of the Hesse Sandstone, Murray Shale, and Nebo Sandstone. These rocks are for the most part composed of tight shale and silica-cemented sandstone of extremely low permeability. Little opportunity exists for water to move through them except along joint and fault surfaces, and it is not likely that such secondary openings are present below depths of two to three hundred feet. Under these conditions it would be necessary to drill and test a well to determine if an adequate ground-water supply is available. This well could readily be converted to a supply well if a sufficient quantity of water is obtained. There are no known wells completed in these formations in this region. The nearest wells for which information is available are in Miller Cove, SW of Walland. These tap the Shady Dolomite, which overlies the Chilhowee Group and is not

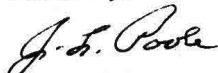
present at the Look Rock site. They provide small domestic supplies in Miller Cove, at an altitude of 1000 to 1200 feet, which is 1300 to 1400 feet lower than the proposed campsite. The regional water table conforms generally with the topography, ranging from about 40 to 170 feet below land surface in Miller Cove. In the vicinity of Look Rock it would perhaps be considerably deeper, except for shallow perched water infiltrating through fault and joint zones near the surface and eventually flowing into the stream.

On the basis of these rather discouraging conditions it appears that the best and most economical means of obtaining a ground-water supply would be by means of a large diameter collector with perforated pipes radiating horizontally from the bottom of the collector (similar to Ranney Collector). This would need to be constructed near the stream bed where the maximum thickness of alluvium or jointed bedrock is present, to induce infiltration from the stream bed by pumping. It is possible, however, that the cost of such an installation would equal or exceed that of the earth dam and surface reservoir you have mentioned.

The other alternative, which you have considered first, is the dam and reservoir at or near weir #1. The adequacy of such a supply would depend on the amount of reservoir storage and the permanence of the stream, or lowest flow during the dry season. The discharge measurements you have provided will be helpful in evaluating this source of supply. I am sending these data to Mr. J. S. Cragwall, District Engineer, Surface Water Branch, 823 Edney Building, Chattanooga, in the hope that he may have additional information regarding low-flow characteristics of this or similar streams in the area. By copy of this letter I will ask Mr. Cragwall to provide whatever information is available and to offer suggestions as to the most efficient and economical development of the stream for the campsite water supply.

In the event that you wish Mr. Cragwall and me to visit the campsite personally in the near future, I feel relatively sure that it can be arranged, pending, of course, Mr. Cragwall's initial appraisal of the water-supply possibilities and his other commitments.

Sincerely,



J. L. Poole
District Geologist

cc: District Engineer, SW, Chattanooga, Tenn.

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

FACE SHEET FOR COMPLETION REPORT

Park Great Smoky Mountains National Park	Region Southeast	Work Order No. P-11 GSM
Location in Park Look Rock Development, Foothills Parkway	State(s) Tennessee	Fund Symbol 14X1037
☒ Contract and/or ☐ Day Labor	County or Counties Blount	Year Programmed 1961
Work Order Title Water System		PCP No. U-4
		Master Plan No. ----
		Master Plan Corrected By ----
		As Built Drawings By ----
		Date Started November 1962
		Date Completed February 1963
DESCRIPTION OF FIXED ASSETS (For completion by employee in charge of project)		TOTAL COSTS (For completion by FFO)

Water Systems**(Production Well, 88,1.f.)****100.8-1****1,548.60**

TOTAL

\$ **1,548.60**

DISTRIBUTION		THE FIXED ASSET DESCRIBED ABOVE HAS BEEN COMPLETED IN ACCORDANCE WITH APPROVED DRAWINGS, SPECIFICATIONS, AND AUTHORIZED CHANGES		
No.	To	Submitted	Title:	Date:
Orig.	Director	By: /s/ Lawrence J. Fitzpatrick	Civil Engineer	6/26/64
1	SERO	Approved	Title:	Date:
1	EQDS	By: /s/ George W. Fry	Superintendent	6/29/64
		COSTS VERIFIED	Title:	Date:
		BY /s/ Joseph E. Van Patten	Accounting Officer	6/26/64

11360

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

Order Number

P-11 GCM

Fund Symbol

14X1037

COMPOSITION OF COST FOR COMPLETION REPORT

Park	Region	Year Programmed
Great Smoky Mountains National Park	S.E.	1961
Location in Park		
Look Rock Development, Foothills Parkway		
Work Order Title		
Water System		

COMPOSITION OF COST

COSTS CHARGED TO FUNDS ALLOTTED TO FIELD FINANCE OFFICE

(1) Personal Services.....	\$ ---	
(2) Travel.....	---	
(3) Contract Work	1,335.00	
(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	\$ 1,335.00
OTHER COSTS:		
(12) PS&S, AP, and/or Facilitating Services @ 16 %.....	\$ 213.60	
(13) Inventory and Other Non-Fund Costs	---	213.60
(14) GROSS WORK ORDER COSTS	XXXXXXXXXX	\$ 1,548.60
LESS:		
(15) Residual Value of Construction Equipment on Line 8	\$ ---	
(16) Other Credits	---	---
(17) NET COST OF FIXED ASSETS	XXXXXXXXXX	\$ 1,548.60

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

WATER SYSTEM
Look Rock Development, Foothills Parkway

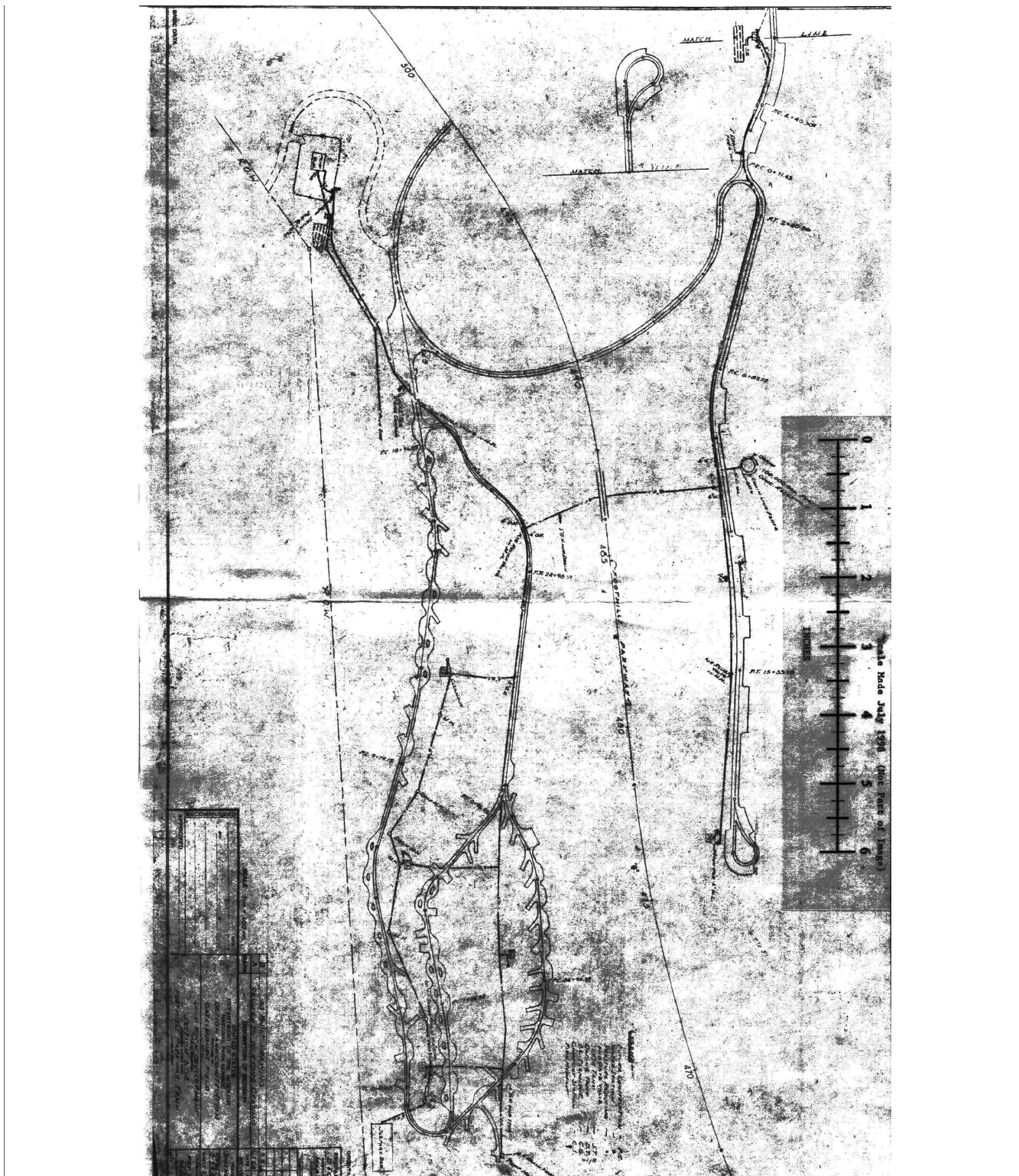
Work Order No. P-11 GSM

This project includes only the construction of the "production" well (Number 2) which will provide water to the developed areas at Look Rock. The narrative, however, covers the water study problem from its inception.

Early in 1961, the problem of Look Rock water supply came into prominence. The Park decided to determine the volume of available ground water by weir measurement of the available streams. Park engineers located only one stream which was within the realm of practicability for water supply. Maintenance personnel installed two weirs, and flow measurements were taken periodically from May 1961. The lower weir produced an adequate quantity of water, but pumping and treatment would be expensive. The stream carried the runoff from the proposed development area. It was then decided to drill test wells in the vicinity, recognizing the pessimism of geologists concerning availability of water in the substratum.

The Park let a contract to drill wells at two test locations. Jack Terry Well Drilling Company drilled the first well to 140 feet, and it yielded a continuous 15 g.p.m. under testing. The contractor drilled the second test well to a depth of 83 feet. Subsequent U.S.G.S. tests determined minimum drouth flow at 50 g.p.m.

The Park subsequently recommended that well Number 2 be used to provide the water supply for the Look Rock developed area.



Docket Information

Number of Documents in Docket 66

Documents Dated from 4/24/1962 to 2/8/1971

Docket Compiled: 3/30/2011