



WATER-RIGHT DOCKET

Great Smoky Mountains National Park

Docket No: 17

JAKES CREEK, ELKMONT CAMPGROUND

Preliminary Docket Information

00-00-0000: intro: see grsm docket 1 for map and preliminary map of water sources within the park

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

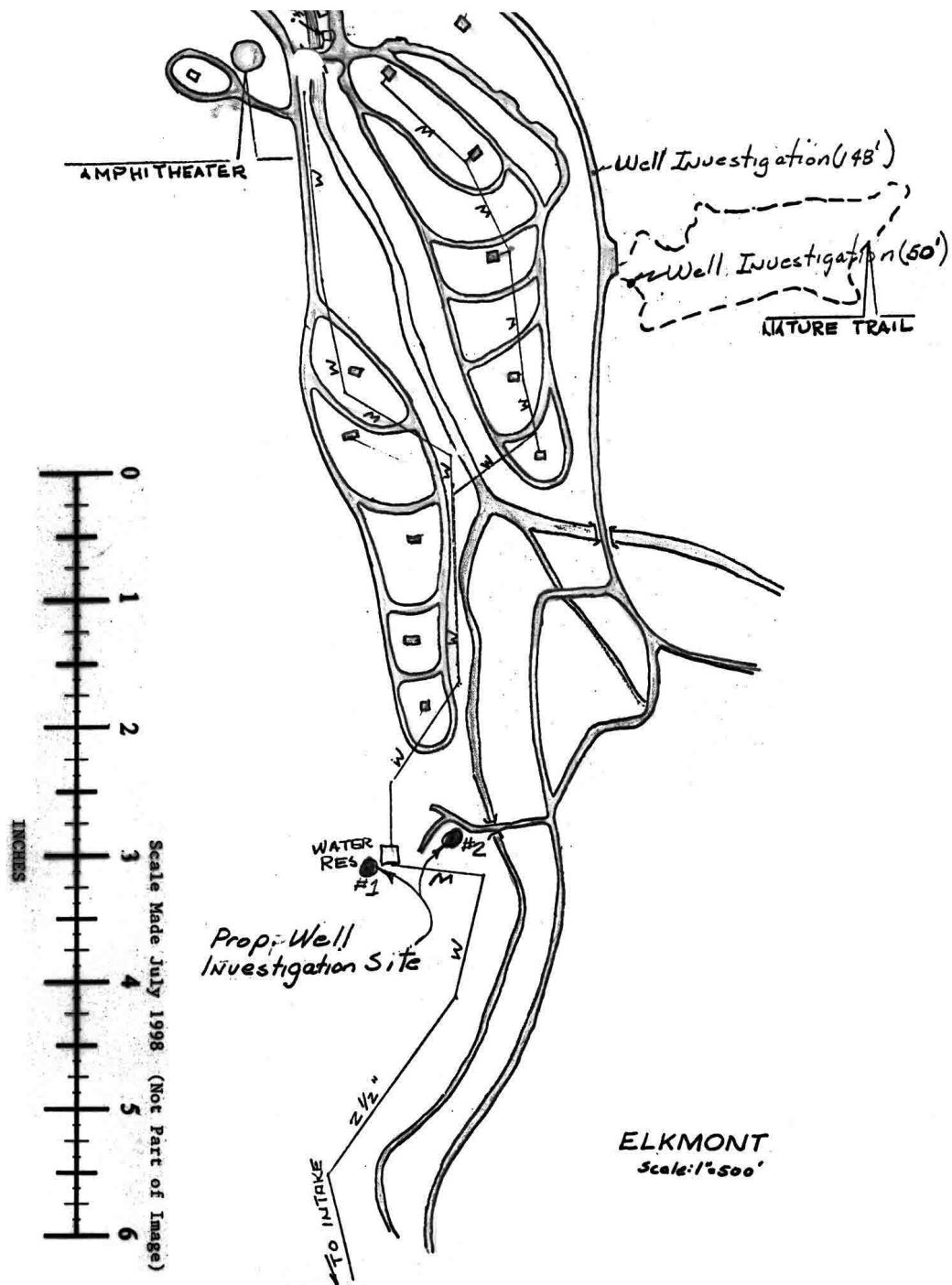
WATER RIGHTS DOCKET
Elkmont Campground
Great Smoky Mountains National Park

ELKMONT

Situation: The Elkmont area, as served by the National Park Service water system, consists of 340 campground sites (plus 30 group sites) and a Park Service residential area. Actual water consumption in the area totals 45,000 gallons per day and is supplied from a surface creek to a gravity line. The supply seems sufficient but the present creek source is highly vulnerable to contamination because of proximity of visitor use and permanent residents to the supply source. Several test wells were drilled in the area in the early 1960's but proved of little value. If a good well could be developed, it is possible that it might entirely replace the existing source or be utilized as a supplement.

Proposed: That we drill an 8" well or combination of wells with a capacity of 50 g.p.m. minimum.

Progress to date: This Water Investigation Study is included in the proposed 1967 F.Y. program, as submitted by the park.



NAME OF SYSTEM: Elkmont CampgroundLOCATION: ElkmontLOCATION: STATE: Tennessee COUNTY: Sevier

<u>A. Source of Supply</u>	<u>Location - Reference to permanent Landmark</u>	<u>Coordinates</u>
1. Jakes Creek	Intake structure is located 5,000' upstream from junction of Jakes Creek and East Prong Little River.	Lat. N $35^{\circ}38'38''$ Long. W $83^{\circ}35'08''$
Gravity system complete with infiltration collection dam which is located on edge of creek at elevation of 2,400. In 1960, a $1\frac{1}{2}$" galvanized line was constructed between the intake and the reservoir. In 1964 a duplicate (or parallel) $2\frac{1}{2}$" plastic line was constructed and the $1\frac{1}{2}$" line is still in place and available for supplemental or for stand-by use. Water treatment consists of chlorination with unit located at the end of the intake line just before water enters reservoir. The reservoir is a two compartment, 50,000 gallon capacity unit, which is located at an elevation of 2,253, some 3,700' distance from the intake structure.		
2. Deep Well	This well is located 120 feet S 20° W of existing water intake	Lat. N $35^{\circ}38'37''$ Long. W $83^{\circ}35'08''$
A deep well of 50 gallons per minute capacity was drilled in September 1967. This well should be developed as a stand-by supply. If it is possible to obtain additional capacity (through well recovery work or an additional well), it may be desirable to utilize it as an ultimate supply for this area.		

B. Consumption (Meter readings - 1966 season)

Maximum daily - 45,000 gallons Maximum Monthly - 1,010,900 gallons Maximum Annual - 3,808,000 gallons

1. Breakdown according to usages (in 1,000 gallons)

Month	<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>Total</u>
Residents	25	32	30	33	35	57	60	62	51	49	27	24	485
Campers	<u>29</u>	<u>30</u>	<u>93</u>	<u>118</u>	<u>147</u>	<u>699</u>	<u>951</u>	<u>821</u>	<u>262</u>	<u>146</u>	<u>18</u>	<u>9</u>	<u>3,323</u>
TOTALS	54	62	123	151	182	756	1,011	883	313	195	45	33	3,808

C. Distribution Mains and Laterals:

<u>Size</u>	<u>Type</u>	<u>Length</u>
6"	Cast Iron	1,648 Lineal Feet
4"	Cast Iron	4,967 Lineal Feet
2½"	Plastic	3,700 Lineal Feet
2"	Copper	1,504 Lineal Feet
2"	Galvanized	2,441 Lineal Feet
1½"	Galvanized	3,721 Lineal Feet
1"	Copper	724 Lineal Feet
1"	Plastic	125 Lineal Feet
¾"	Copper	<u>100</u> Lineal Feet
TOTAL		18,930 Lineal Feet

D. Present System Problems:

The Elkmont Area, as served by the National Park Service water system, consists of 340 campground sites (plus 30 group sites) and a number of scattered residences used for permanent and seasonal employees. The source of supply seems sufficient with the 2½" supply line to the reservoir but the present creek supply is highly vulnerable to contamination because of heavy visitor use and also existence of permanent residences in proximity of intake. During high water, considerable difficulty can be anticipated due to excess debris piling up in intake area and reducing efficiency and capacity. Several wells were drilled in the area in 1960 but proved of little value. In 1967, the U.S.G.S. was able to develop a good 50 gallon per minute (24,000 gallons per day) well in the vicinity of the intake.

E. Proposed Additions or Improvements:

Under PCP U-246 the park proposed to improve the intake, develop the deep well, replace some of the plastic lines, etc. On January 1, 1972, the private inholding leases (involving 38 residential sites at Elkmont) are due to expire and the buildings are to be razed. At that time, a 500 site picnic area is scheduled for the area. This development is expected to generate a domestic water supply demand of a maximum of 20,000 gallons per day. Because of the elevation of this area, it is entirely possible that study will show the need of a new system to serve this facility.

F. Ultimate Consumption:

Present annual consumption is 3,808,000 gallons with the ultimate consumption expected to be reached about 1973 and to amount to 5,250,000 gallons.

B. Consumption:METER READINGS - 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>
Residences.....	33	29	33	32	43	42	65	65	42	33	32	34	483
Campers.....	--	--	--	49	332	835	853	885	564	545	56	14	4,133
Unaccounted.....	<u>26</u>	<u>85</u>	<u>77</u>	<u>90</u>	<u>189</u>	<u>(27)</u>	<u>37</u>	<u>111</u>	<u>(87)</u>	<u>(40)</u>	<u>138</u>	<u>3</u>	<u>602</u>
TOTALS.....	59	114	110	171	564	850	955	1,061	519	538	226	51	5,218

During the 1969 season, this system served 206,666 campers, and the residential areas.

METER READINGS - 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>
Residences.....	33	29	43	42	43	53	54	54	53	33	32	33	502
Campers.....	8	4	44	295	266	806	828	855	653	636	91	9	4,495
Unaccounted.....	<u>61</u>	<u>68</u>	<u>22</u>	<u>35</u>	<u>292</u>	<u>144</u>	<u>466</u>	<u>437</u>	<u>(69)</u>	<u>110</u>	<u>69</u>	<u>20</u>	<u>1,655</u>
TOTALS.....	102	101	109	372	601	1,003	1,348	1,346	637	779	192	62	6,652

During the 1970 season, this system served 224,753 campers and the residential areas.

(Elkmont Campground - Addendum No. 2)

(2/8/71)



WATER INTAKE FOR ELKMONT
CAMPGROUND LOCATED ON JAKES CREEK



A 50,000 GALLON, TWO COMPARTMENT
RESERVOIR AT ELKMONT CAMPGROUND



THE CHLORINATOR HOUSE AT THE RESERVOIR
OF THE ELKMONT CAMPGROUND WATER SYSTEM

Other Supporting Information

Preliminary Report
Test Wells at Elkmont Campground,
Great Smoky Mountains National Park

Introduction

The Elkmont Campground area, shown in figure 1, is located about 1 mile south of Tennessee Highway 73, about 3 miles southwest of Great Smoky Mountains National Park Headquarters, and on the flood plain of Little River. It consists of 340 camping sites, 30 group sites, and a Park Service residential area. The water supply, presently obtained from Jakes Creek, a tributary to Little River, is subject to possible contamination by horse and pedestrian travel. A ground-water supply of at least 50 gpm (gallons per minute) was desired to augment or replace the present supply.

Geology

The Elkmont area is underlain by the pre-Cambrian Elkmont Sandstone, which is composed of sandstone interbedded with silty and argillaceous rocks. The beds dip generally to the southeast and east. The trace of the Mids Gap fault passes through the campground area and the trace of the Oconoluftee fault appears about a mile south of the area. A mantle of alluvial material covers the valley floors of Little River and its tributaries.

Drilling

Two wells were drilled in 1960 in an effort to obtain a 35 gpm well, near the mouth of Mids Branch. These wells, shown in figure 1 and numbered 1 and 2, were located near the trace of the Mids Gap fault. The first well, 148 ft deep, had a yield of about 10 gpm. The second well yielded only a trace of water by 50 ft and efforts were abandoned.

In February 1967, another attempt was made; location of this test hole is shown as number 3 on figure 1. It is also located near the Mids Gap fault. Drilling was by Caldwell Well Drilling Company of Hot Springs, N. C., using an air rotary rig and an 8-inch bit to a depth of 8 ft and a 6-inch bit to a depth of 220 ft.

Twenty-seven ft of 6-1/4 inch casing was placed in the hole. The yield of the well was only eight gpm. A fourth test hole was drilled in September 1967, located about 3800 ft south of the southern end of the

campground and about 600 ft north of the Oconoluftee fault. This well, also drilled by Caldwell, is 160 ft deep, is cased to 54 ft and has a yield of about 12 gpm.

The fifth test hole, also drilled by Caldwell in September 1967, is located about 1,000 ft west of the fourth hole and within 200 ft of the Oconoluftee fault. This 6-1/4-inch diameter well, 215 ft deep and cased to a depth of 31 ft, has a yield of at least 50 gpm.

Most of the water in this hole comes from weathered zones at depth of between 76 and 165 ft. A columnar section of the well is shown in figure 2.

Pumping Test

On October 16, 1967, an 8-hour pumping test was run, using a generator-powered 5-hp submersible pump set at a depth of 140 ft. Discharge was regulated by a gate valve. Results of the test are shown in figure 3.

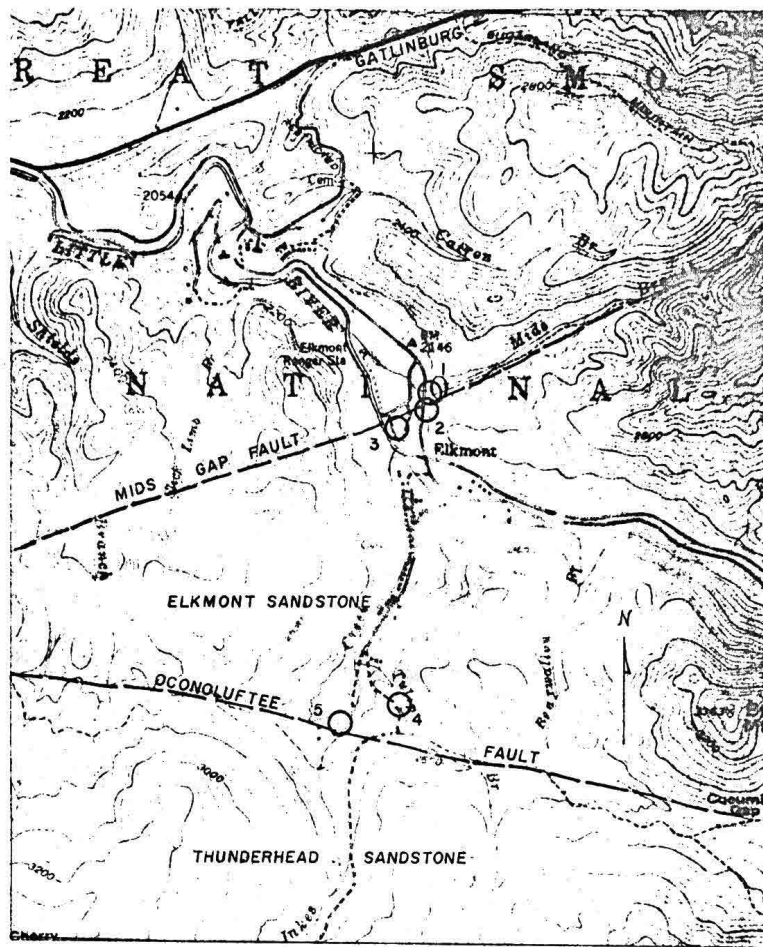
Pumping started at 30 gpm. Discharge was slightly erratic due to difficulty in maintaining gate valve settings, but discharge during the final 50 minutes at this stage was stable and drawdown stabilized at 52 ft below the measuring point (which was 2.0 ft above land surface), or 25 ft below the static water level of 27 ft. Specific capacity at this discharge is 1.2 gpm/ft of drawdown.

Discharge was increased to 50 gpm 127 minutes after pumping began. After a period of adjustment of the gate valve, the discharge was steady at 50 gpm during the final 320 minutes of pumping. The water level required about 2 hours to adjust to this increase, but was essentially stable at a depth of 82 ft, or a drawdown of 55 ft. Specific capacity at this discharge is 0.9 gpm/ft drawdown. About 21,000 gallons was removed during the pump test. The well will yield at least 24,000 gallons in an 8-hr period.

Recovery was rapid to a depth of about 40 ft below the measuring point, but the rate decreased considerably after this; an hour after the pump was stopped, the water level was 5.5 ft below its static level.

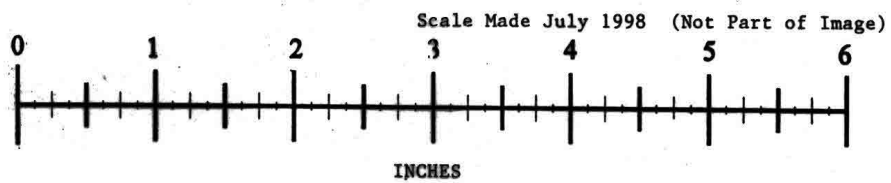
A copy of the results of chemical analyses of a sample taken from the well after 4 hrs pumping is attached. The water is of excellent chemical quality.

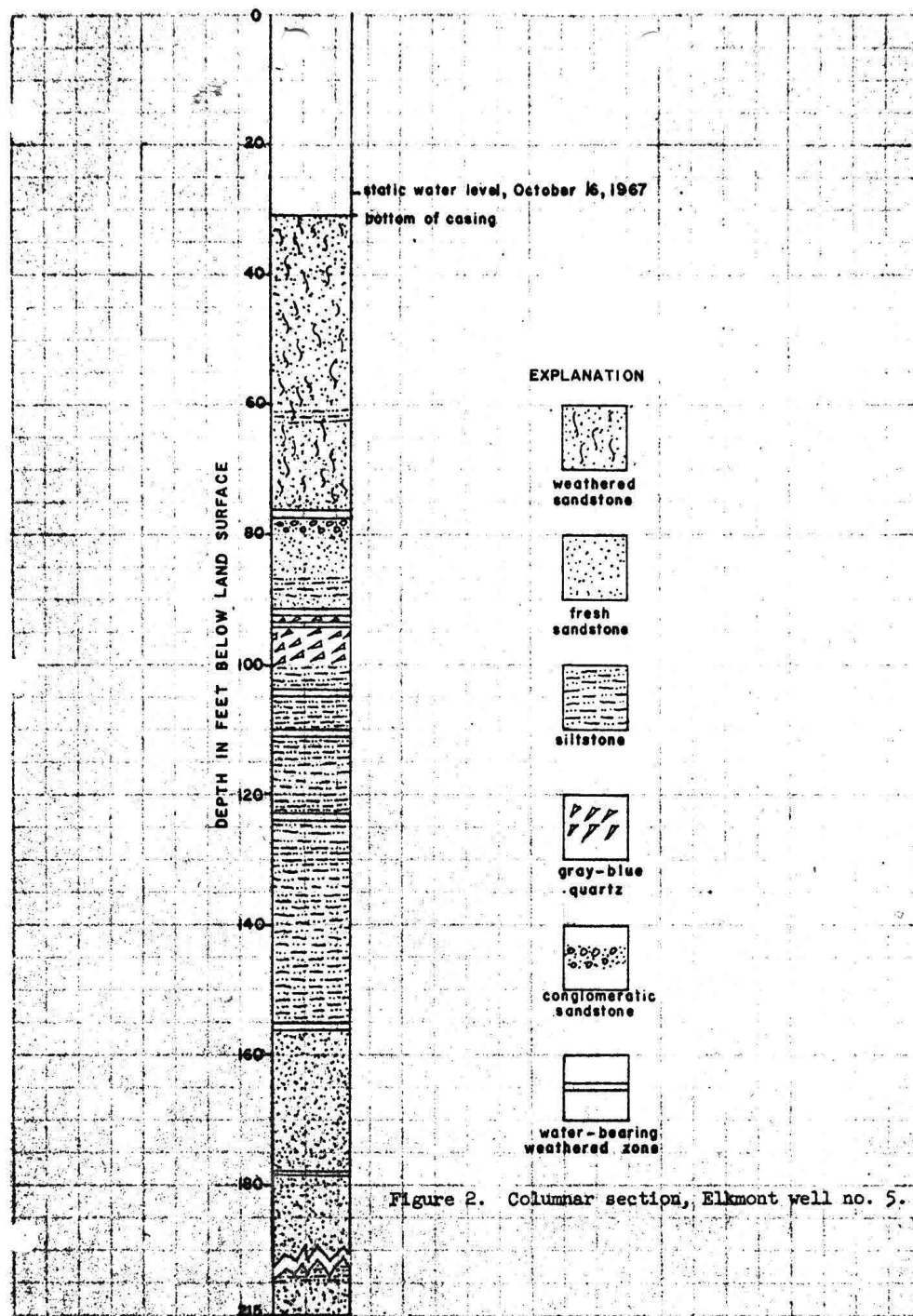
William M. McMaster
Hydrologist, U.S. Geological Survey
Knoxville, Tennessee

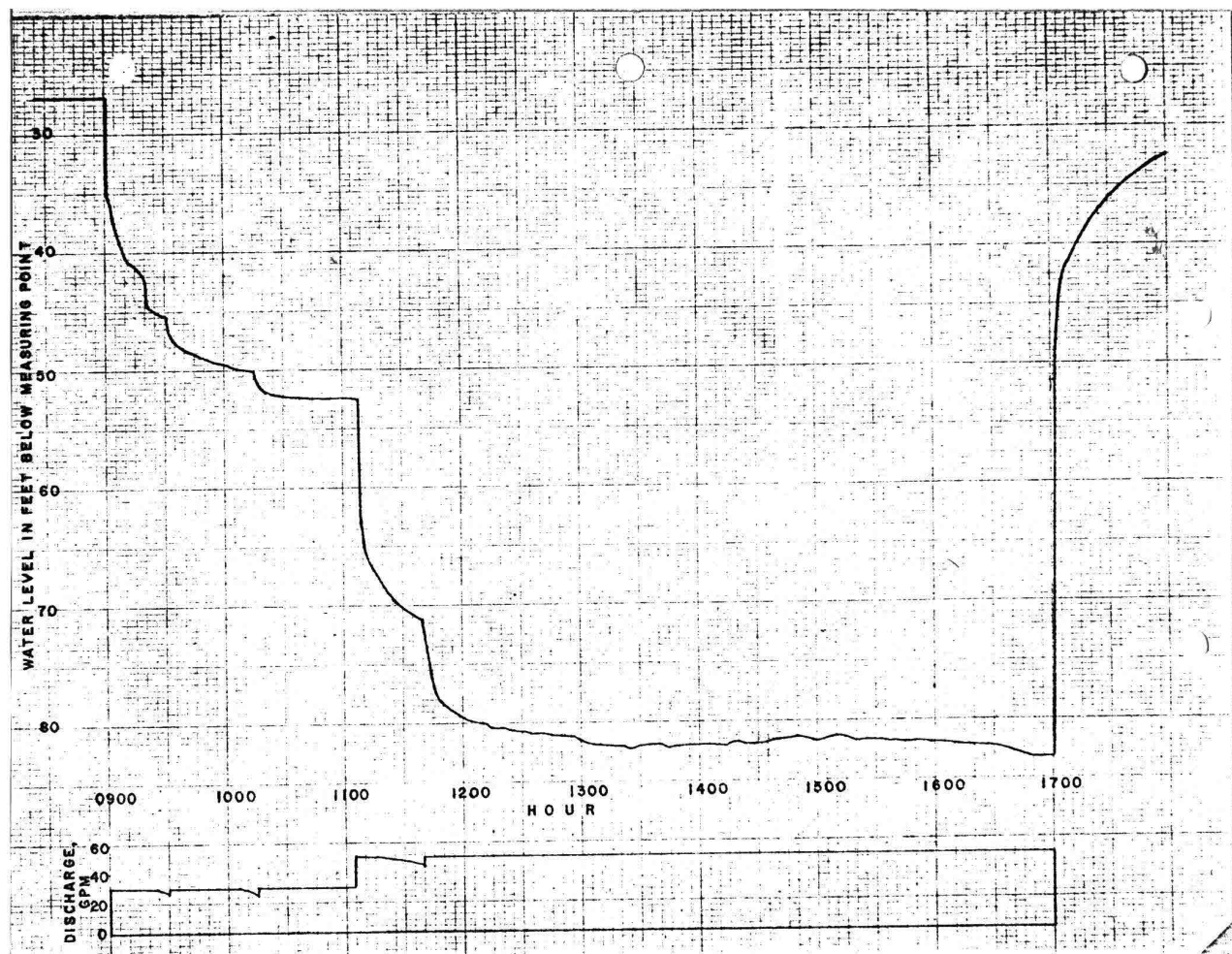


Scale 1:24000

Figure 1. Locations of test wells at Elkmont Campground.







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

DEC 8 Rec'd

W.R. Lab. No. NC 49431

Location <u>Near Elkmont, Tenn.</u>			
Source <u>Drilled well (Elkmont Well) 215' drilled Sept 67</u>			
<u>WL 80' below LSD 50 gpm pump mean</u>			
Date of collection <u>10-16-67</u>			
Gage height (ft.) _____		Discharge (sec. ft.) _____ Temp. (°F) <u>13</u>	
(Parts per million) (in milligrams per liter)			
Silica (SiO ₂).....	15	Carbonate (CO ₃).....	0
Aluminum (Al).....	.1	Bicarbonate (HCO ₃).....	31
Iron (Fe).....	.00	Sulfate (SO ₄).....	2.2
Manganese (Mn).....	.01	Chloride (Cl).....	1.9
Calcium (Ca).....	6.9	Fluoride (F).....	.2
Magnesium (Mg).....	.5	Nitrate (NO ₃).....	.1
Sodium (Na).....	3.9	Phosphate (PO ₄).....	.02
Potassium (K).....	1.0		
Lithium (Li).....			
(Parts per million) (in milligrams per liter)			
Dissolved solids:		ABS.....	
Sum.....	47	Color.....	1
Residue upon evapo- ration @ 180°C.....	44		
Hardness as CaCO ₃	* 20		
Noncarbonate.....	0		
pH.....	6.3	Specific conductance (micromhos at 25°C).....	56

INCLUDES HARDNESS OF ALL
POLYVALENT CATIONS REPORTED.

Unpublished records subject to revision

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)

May 1962 Edition
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

TO : Gerald Rowe, Chief of Maintenance
Great Smoky Mountains National Park
Gatlinburg, 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. Rima, 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.

735-7-17-65-

L54 SER (OLW)

SEP 14 1965

Handwritten:
R...
EVC
WAT 9/17

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, RADC (2), w/c of inc.



Y REFER TO:

LS4

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

Great Smoky Mountains National Park
Gatlinburg, Tennessee 37738

August 23, 1965

Memorandum

To: Regional Director, Southeast Region

From: Superintendent, Great Smoky Mountains

Subject: Water Resources Investigations, Great Smoky Mountains
National Park

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	

East & Water
Point

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

Docket Information

Number of Documents in Docket 26

Documents Dated from 8/23/1965 to 10/16/1967

Docket Compiled: 3/29/2011