



WATER-RIGHT DOCKET

Great Smoky Mountains National Park

Docket No: 10

SPRING, CATALOOCHEE RESIDENTIAL AREA

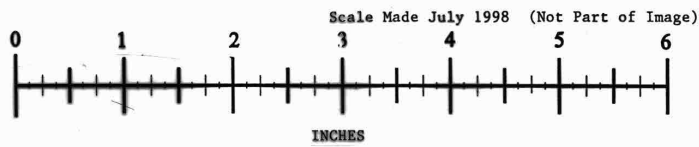
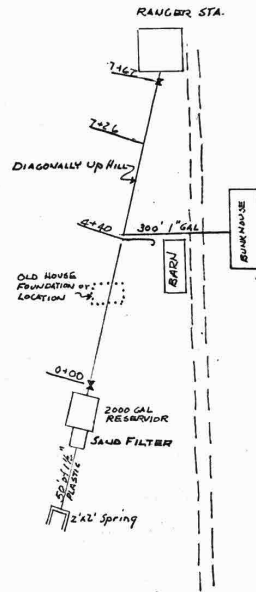
Preliminary Docket Information

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

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

WATER RIGHTS DOCKET
Cataloochee Ranger Station
Great Smoky Mountains National Park

CATALOGUE RANGER STATION OFFS #30
10/27/60
SHULTZ - SMITH



NAME OF SYSTEM: Cataloochee Ranger Station - Quarters No. 30LOCATION: Park Route 14 about 1½
miles from N. C. 284LOCATION: STATE: North Carolina COUNTY: HaywoodA. Source of SupplyLocation - Reference to Permanent LandmarkCoordinates

1. Spring

Located 750 feet west of Ranger Station and
north of Route 14.Lat. N 35°38'24"
Long. W 83°04'58"

This is a gravity flow system having a spring housed in a 2' x 2' concrete box. From the spring a line runs through a six foot sand filter to a 2,000 gallon reinforced concrete storage reservoir. The elevation of the reservoir is about 2,800 feet.

B. Consumption:

The system is not metered. The consumption is estimated at 229,000 gallons per year.

This system serves a single family residence and an 8-man bunkhouse.

C. Distribution Mains and Laterals:

<u>Size</u>	<u>Type</u>	<u>Length</u>
1½"	Plastic	50 Lineal Feet
2"	Galvanized Iron	220 Lineal Feet
1½"	Galvanized Iron	540 Lineal Feet
1"	Galvanized Iron	<u>350 Lineal Feet</u>
TOTAL		1,160 Lineal Feet

D. Problems:

The present spring supply that now serves this residence is marginal during certain periods of the year.

E. Additional Information:

In November of 1968 a six-inch well was drilled to a depth of 152 feet. A six-inch casing was set to a depth of 23 feet and sealed with cement. On test pumping this well, it was found that a sustained yield of 40 gallons per minute would be available. Additional information on the chemical analysis can be found in the U.S.G.S. report accompanying this docket. Eventually, this well should be developed as the ultimate area supply.

(Cataloochee Ranger Station - Addendum No. 1)

Other Supporting Information

Cataloochee Residential Area

As a part of the cooperative program between the U. S. National Park Service and the U. S. Geological Survey, a well site was selected in October 1968 at the Cataloochee Residential Area in Haywood County, N. C.

The Cataloochee Residential Area includes two houses occupied by personnel of the National Park Service, one of which is the ranger's residence. The source of the existing water supply is a small spring that is inadequate for their estimated future needs of 10 gpm.

In an effort to obtain additional water for the Residential Area, a well was drilled at the ranger's residence (site No. 3 in our letter of October 17, 1968), which is on Park Route No. 14 about 1.5 miles from North Carolina Highway No. 284 (fig. 3.1). The well site is about 100 feet south of the ranger's residence.

The Residential Area is on the flood plain of the Cataloochee Creek, near the valley wall. The flood plain at the site is about 2,600 feet above mean sea level and about 10 feet above the bed of Cataloochee Creek.

(Cataloochee Ranger Station - Addendum No. 1)

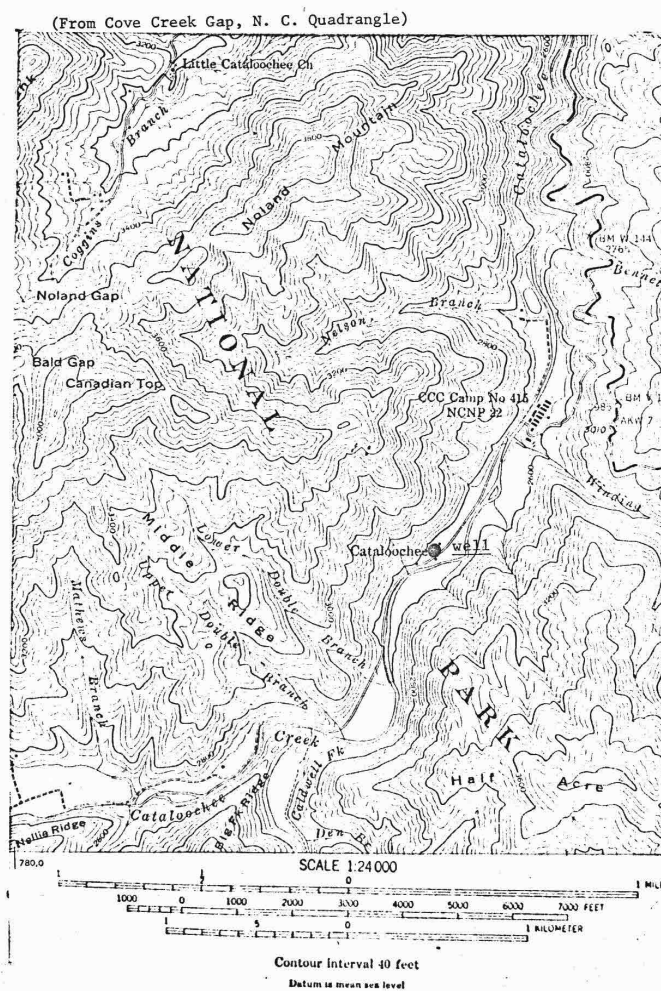
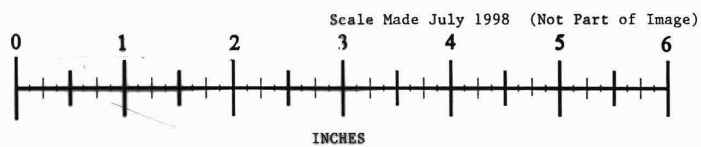


Figure 3.1.--Location of well at Cataloochee Residential Area.

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The Cataloochee Creek valley is cut by several large faults and rocks of different ages crop out within short distances. The rocks underlying the alluvium at the residential area are a part of the Longarm Quartzite of the Snowbird Group in the Ocoee Series. The Longarm Quartzite consists mainly of light-colored medium- to coarse-grained feldspathic quartzite and arkose. In the upper part, the quartzite is interbedded with sandstone similar to the overlying Roaring Fork Sandstone (King and others, 1968, p. 4). Fractures in these rocks are more or less well developed and provide the openings through which groundwater may flow. In this area, the fractures that transmit water occur at greater depth than at most places in the Great Smoky Mountains.

A six-inch well was drilled, using an air-percussion type of rotary drill, to a depth of 152 feet at this site on November 14, 1968. A log of the well follows:

<u>Depth</u>	<u>Description</u>
0 - 17 feet	Alluvium and boulders.
17 - 30	Sandstone. Casing set at 23 feet.
30 - 40	Hard, dark-gray quartzite.
40 - 70	Hard, dark phyllite. Yield of water 2 or 3 gpm at 60 feet.
70 - 83	Hard sandstone and some shale.
83 - 85	Coarse-grained quartz sand. Water turned red.
85 - 90	Hard, dark sandstone,
90 - 120	Several fractures at 115-120 feet. Yield 25 gpm.
120 - 130	Hard, gray-green feldspathic sandstone and some pink chert.
130 - 152	Hard, gray-green feldspathic sandstone. No increase in yield below 120 feet.

At the time of completion, the static water level was 6.3 feet below the land surface.

On December 17, 1968, a three-horsepower test pump was installed in the well at a depth of 150 feet. The well was pumped at several different rates ranging from 10 gpm to 40 gpm, for a total of eight hours. Figure 3.2 is a graph showing the drawdown in the well related to time of pumping.

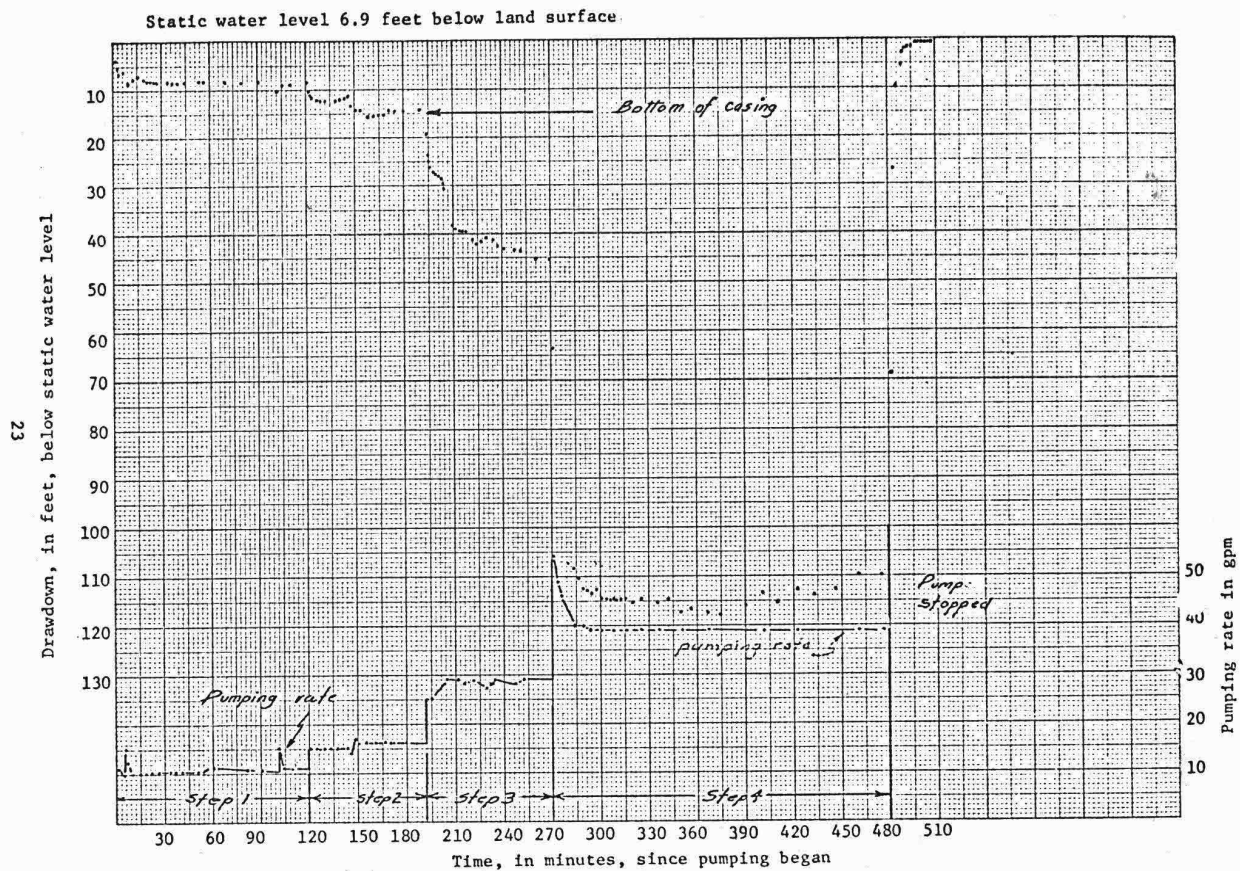


Figure 3.2.--Cataloochee Residential Area pumping test, December 17, 1968.

The well was pumped in four steps, the rates being 10 gpm, 15 gpm, 28 gpm, and 40 gpm. In the first step, the drawdown was about 9 feet after pumping at 10 gpm for two hours, and the specific capacity was 1.17 gpm per foot of drawdown. In step 2, the water level declined to the bottom of the casing (23 feet) after 1/2-hour of pumping at 15 gpm. In step 3, after pumping at 28 gpm for 1 hour, the water level declined sharply to 45 feet which is about 30 feet below the bottom of the casing. In step 4, the water level again declined in response to pumping at a rate of 39 gpm. After 5-1/2 hours, the pumping level declined to 126 feet which is about 6 feet below the depth of the major fracture zone at 115 to 120 feet. After reaching this depth the water level began to rise, and continued to rise to a depth of 118 feet at the end of the test. The rise in water level, with no apparent change in pumping rate, may have resulted from development of the well. At a pumping level of 126 feet, the specific capacity was 0.33 gpm per foot of drawdown and it increased to 0.36 gpm per foot of drawdown at the end of the test.

In view of the decrease in specific capacity with each increase in the pumping rate, the sustained yield of the well probably is about 40 gpm.

Water samples collected at the beginning and at the end of the test were analyzed by the U. S. Geological Survey laboratory in Raleigh, North Carolina. The results are shown in tables 3.1 and 3.2. The analyses show that water is of excellent quality, except that it is slightly acidic, and therefore, somewhat corrosive to metal. This condition can be treated with commercially available pH correction systems.

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

W.R. Lab. No. NC 50570

Location <u>Cataloochee Residential Area, 8 miles northwest of Delwood, N. C.</u>			
County: <u>Haywood</u>			
Source <u>Drilled well. Depth: 152 ft. Drilled: Nov. 15, 1968. Collected at discharge pipe. Owner: National Park Service, Gatlinburg, Tennessee. Use: Public supply. Water-bearing formation: Crystalline rocks. Pumping water level: 17 ft. below measuring point. Yield: 10 gpm. Appearance when collected: Cloudy. Producing intervals: 23 to 125 ft. Sampled after pumping 18 minutes.</u>			
Date of collection <u>December 17, 1968</u>			
Gage height(ft.) _____ Discharge(sec.ft.) _____ Temp.(°C) <u>12</u>			
(milligrams per liter)			
Silica (SiO ₂).....	17	Carbonate (CO ₃).....	0
Aluminum (Al).....	.4	Bicarbonate (HCO ₃).....	47
Iron (Fe).....	2.7	Sulfate (SO ₄).....	1.6
Manganese (Mn).....	.23	Chloride (Cl).....	1.2
Calcium (Ca).....	9.6	Fluoride (F).....	.0
Magnesium (Mg).....	.9	Nitrate (NO ₃).....	.5
Sodium (Na).....	5.1	Phosphate (PO ₄).....	.11
Potassium (K).....	.7		
Lithium (Li).....			
(milligrams per liter)			
Dissolved solids:		ABS.....	
Sum.....	63	Color.....	10
Residue upon evapo- ration @ 180°C.....	65		
Hardness as CaCO ₃	28		
Noncarbonate.....	0		
pH.....	6.7	Specific conductance (micromhos at 25°C).....	74

Table 3.1.-- Chemical analysis of water sampled at beginning of test.

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

W.R. Lab. No. NC 50571

Location <u>Cataloochee Residential Area, 8 miles northwest of Delwood, N. C.</u>			
County: <u>Haywood.</u>			
Source <u>Drilled well. Depth: 152 ft. Drilled: November 15, 1968. Collected</u>			
<u>at discharge pipe. Owner: National Park Service, Gatlinburg, Tennessee. Use: Public</u>			
<u>supply. Water-bearing formation: Crystalline rocks. Pumping water level: 124 ft.</u>			
<u>below measuring point. Yield: 24 gpm. Appearance when collected: Clear.</u>			
<u>Producing intervals: 23 to 125 ft. Sampled after pumping 6 hrs., 50 minutes.</u>			
Date of collection <u>December 17, 1968</u>			
Gage height(ft.) _____ Discharge(sec.ft.) _____ Temp.(°C) <u>12</u>			
(milligrams per liter)			
Silica (SiO ₂).....	17	Carbonate (CO ₃).....	0
Aluminum (Al).....	.0	Bicarbonate (HCO ₃).....	38
Iron (Fe).....	.08	Sulfate (SO ₄).....	1.2
Manganese (Mn).....	.01	Chloride (Cl).....	.8
Calcium (Ca).....	7.2	Fluoride (F).....	.1
Magnesium (Mg).....	.8	Nitrate (NO ₃).....	.3
Sodium (Na).....	4.4	Phosphate (PO ₄).....	.10
Potassium (K).....	.6		
Lithium (Li).....			
(milligrams per liter)			
Dissolved solids:			
Sum.....	52	ABS.....	
Residue upon evapo- ration @ 180°C.....	54	Color.....	5
Hardness as CaCO ₃	22		
Noncarbonate.....	0		
pH.....	6.6	Specific conductance (micromhos at 25°C).....	60

Table 3.2.--Chemical analysis of water sampled at end of test.

28.

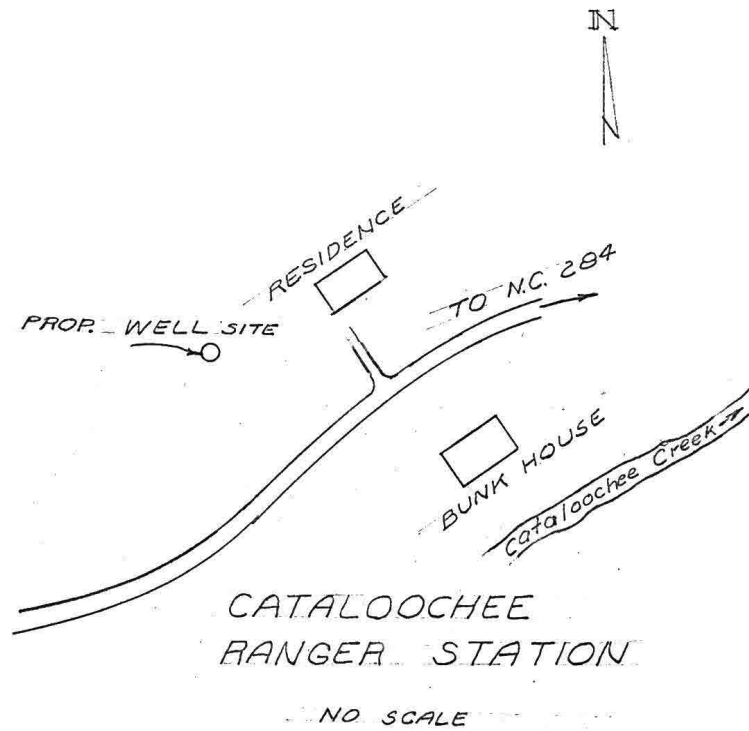
CATALOOCHEE RANGER STATION

Situation: This area is located on the old Cataloochee approach road approximately two miles from North Carolina State Highway 284. The present spring that now supplies the residence, No. 30, and a bunkhouse for seasonal workers is marginal during certain times of the year.

Proposed: Drill an exploratory test well in the vicinity, a minimum capacity of 10 g.p.m. is desired.

Progress to Date: This project is programmed for 1969 F.Y.

(09/28/67)



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)

OPTIONAL FORM NO. 10
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
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. 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 WFS 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.

775-7-17-65-

L54 SER (OLW)

SEP 14 1965

[Handwritten signature]
EVR
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, 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

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

X *Land & Water*
Point

Memorandum

To: Regional Director, Southeast Region

From: Superintendent, Great Smoky Mountains *lost hole*

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.

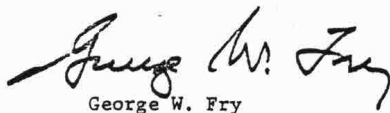
Further checks on other major supplies in the Park showed similar conditions but none as critical as that that exists in the Headquarters area. If at all possible, and if it can be worked into your Water Resources Investigation program as an emergency measure, we would like to suggest the programming 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

Docket Information

Number of Documents in Docket 25

Documents Dated from 10/27/1960 to 12/17/1968

Docket Compiled: 3/29/2011