



WATER-RIGHT DOCKET

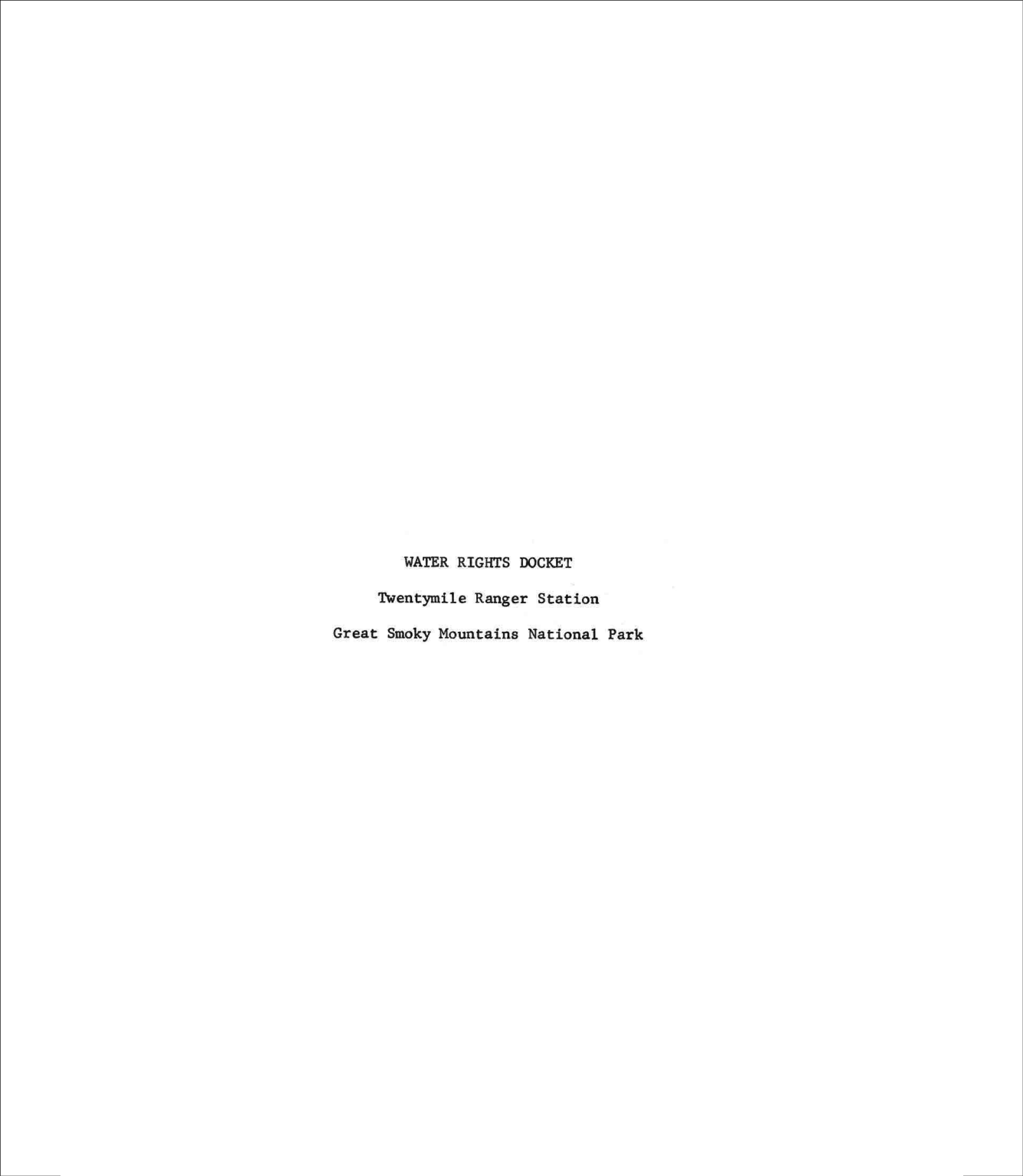
Great Smoky Mountains National Park

Docket No: 31

TWENTYMILE CREEK TWENTYMILE RANGER STATION

Preliminary Docket Information

00-00-0000: water right/source docket information: title page, twenty mile ranger station



Supporting Hydro Data

30.

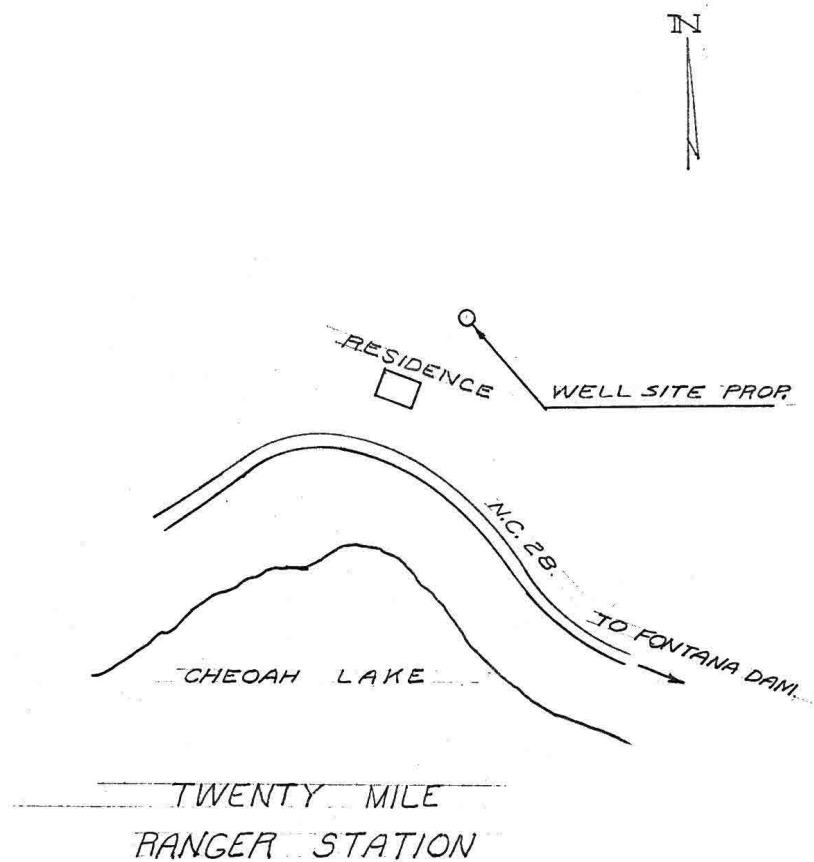
TWENTYMILE RANGER STATION

Situation: This is an isolated area located on North Carolina State Highway 28 approximately 6.0 miles west of Fontana Village. Existing water supply consists of a small open stream. The quantity of water at present is adequate; however, a more potable water supply is desirable.

Proposed: Drill a test well in the vicinity, a 10 g.p.m. capacity being required.

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

(09/28/67)





IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
P. O. Box 2857
Raleigh, N. C. - 27602

June 16, 1969

Mr. Richard L. Stanton, Chief
Office of Land and Water Rights, WSC
National Park Service
4228 Wisconsin Avenue, N. W.
Washington, D. C. - 20242

Dear Mr. Stanton:

As you requested in your letter of March 3, 1969, to this office, we have collected a water sample from the test well at Twenty-Mile Ranger Station, and a copy of the chemical analysis of the sample is enclosed.

As we mentioned in our letter of March 7, 1969, the test hole at Big Creek did not yield enough water to develop it as a well.

If we can be of further service, please let us know.

For the District Chief, Ralph C. Heath.

Very truly yours,

Enclosure

Archie T. Long, Jr.
Geologist

Copy to: ✓ Mr. Gerald A. Rowe, GSMNP
Gatlinburg, Tenn. 37738

ATL/ceh

(Twentymile Ranger Station - Addendum No. 1)

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

W.R. Lab. No. 51112

Location 50 mi west of Bryson City, N. C.			
County: Swain.			
Source Drilled well. Depth: 184 ft. Diameter: 6 in. Cased to: 27 ft.			
Drilled: 1968. Collected at 150 ft. Owner: National Park Service, Gatlinburg, Tennessee. Use: Test. Water-bearing formation: Pre-Cambrian Metamorphic Rocks.			
Static water level: 19.9 ft below top of casing. Yield: 4 gpm. Appearance when collected: Clear. Producing intervals: 29 to 184 ft.			
Date of collection 4-24-69			
Gage height(ft.)		Discharge(sec.ft.)	
		Temp.(°F)	
(Parts per million)			
Silica (SiO ₂).....	16	Carbonate (CO ₃).....	
Aluminum (Al).....	2.1	Bicarbonate (HCO ₃).....	52
Iron (Fe).....	1.9	Sulfate (SO ₄).....	8.0
Manganese (Mn).....	.06	Chloride (Cl).....	1.8
Calcium (Ca).....	13	Fluoride (F).....	.1
Magnesium (Mg).....	1.1	Nitrate (NO ₃).....	.4
Sodium (Na).....	3.2	Phosphate (PO ₄).....	.01
Potassium (K).....	2.8		
Lithium (Li).....			
(Parts per million)			
Dissolved solids:	72	ABS.....	
Sum.....		Color.....	5
Residue upon evapo- ration @ 180°C.....	76		
Hardness as CaCO ₃	39		
Noncarbonate.....	0		
pH.....	7.7	Specific conductance (micromhos at 25°C).....	97

Unpublished records subject to revision

Twentymile Ranger Station

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 Twentymile Ranger Station.

The Twentymile Ranger Station consists of a ranger's residence and a small picnic area. The source of the existing water supply is a spring at the head of a small stream that is tributary to Twentymile Creek. The National Park Service estimated that 10 gpm are required to meet their needs.

In an effort to obtain additional water for the Ranger Station, a well was drilled at site No. 1, as described in our letter of October 17, 1968, and shown in this report in figure 2.1. The site is on an old road bed cut in the side of the hill, about 90 feet south of the gate, and about 500 feet northeast of the ranger's residence. The well is about 30 feet above the stream bed.

The Twentymile Ranger Station area is underlain by rocks of the Great Smoky Group, undivided (Dodson and Laney, 1968, p. 13). The rocks of the Great Smoky Group consist mainly of quartzite, metaconglomerate, and metagrawacke. These coarse-grained rocks are characteristic of the Great Smoky Group, which also contains finer-grained phyllite, slate, schist, and gneiss. Ground water generally moves through fractures, and openings along bedding planes in this rock unit.

A six-inch well was drilled, using an air-percussion type rotary drill, to a depth of 186 feet on November 20-21, 1968. A log of the well follows:

(Twentymile Ranger - Addendum No. 1)

(From Fontana, N. C. Quadrangle)

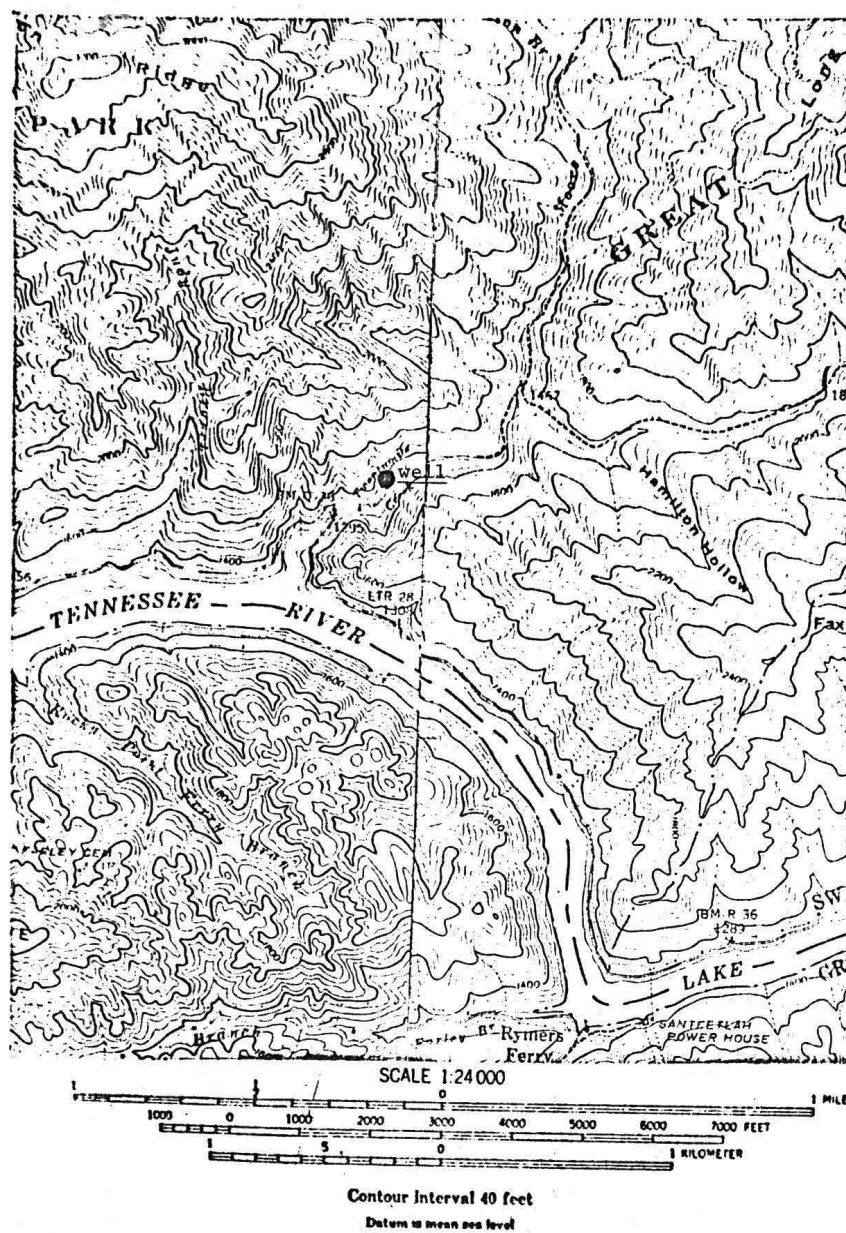


Figure 2.1.--Location of well at Twentymile Ranger Station.

<u>Depth</u>	<u>Description</u>
0 - 15 feet	Soil and boulders.
15 - 30	Hard and soft schist. Casing set at 27 feet.
30 - 40	Hard schist. Red water produced from fractures at 35-40 feet.
40 - 60	Hard schist and black shale, soft at 45-50. Water turned muddy-red.
60 - 70	Fine-grained sandstone.
70 - 80	Sandstone and some black shale.
80 - 120	Sandstone. A little water at 105 feet.
120 - 130	Dark-colored, fine-grained schist. Fracture at 125 feet. No increase in water.
130 - 140	Gray, medium-grained sandstone. Yield 3 gpm.
140 - 150	Dark sandstone and black shale. Fracture at 148 feet; yield about 4 gpm.
150 - 160	Gray, fine-grained sandstone.
160 - 170	Gray, medium-grained sandstone.
170 - 186	Phyllite, no increase in yield.

Although a number of fractures were penetrated in this well, the yield of water from them was estimated to be only 4 gpm. Even though the yield was low it probably is sufficient for one residence if adequate storage for water is provided. The casing was cemented and the well may be used if needed. Because of the low yield a pumping test was not made. The water was relatively clear and tasted good upon completion of the well.

NAME OF SYSTEM: Twentymile Ranger StationLOCATION: On North Carolina 28,
six miles from
Fontana VillageLOCATION: STATE: North Carolina COUNTY: SwainA. Source of SupplyLocation - Reference to Permanent LandmarkCoordinates

1. Small stream tributary of
-
- Twentymile Creek

The intake dam is located about 200 feet
upstream from bridge on TWE-165 crossing
Dalton Creek.Lat. N 35°28'20"
Long. W 83°52'16.7"

This is a gravity flow system utilizing a masonry dam with an overflow section across a small stream to provide the necessary water impoundment. The intake consists of a 2½" perforated cast iron pipe with screens and is connected to the 1 inch copper supply main. The elevation of the intake is about 1,480 feet. The storage tank consists of a 5,000 gallon reinforced concrete tank at an elevation of 1,410 feet. For water purification a flow through type chlorinator is provided above the reservoir.

B. Consumption:

This system is not metered but is estimated at 95,000 gallons per year.

C. Distribution Mains and Laterals:

<u>Size</u>	<u>Type</u>	<u>Length</u>
1"	Copper	3,038 Lineal Feet
1"	Galvanized Iron	101 Lineal Feet
4"	Cast Iron	476 Lineal Feet
	TOTAL	3,615 Lineal Feet

D. Problems:

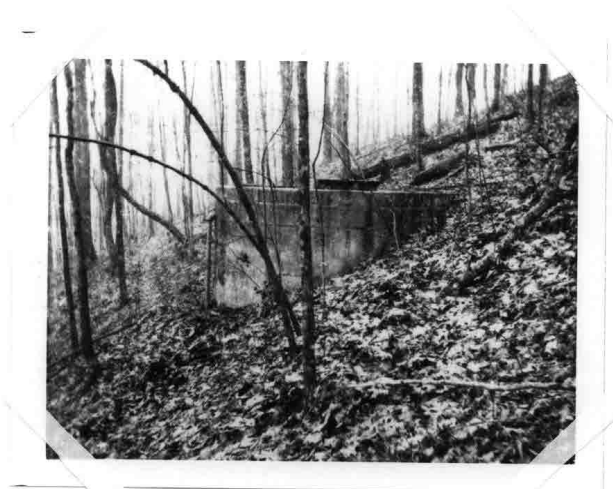
This is an isolated area approximately 6.0 miles west of Fontana Village. The existing supply is adequate; however, a more potable water supply is desirable.

E. Proposed:

Drill a test well in the vicinity, a 10 gallon per minute capacity being required. This is programmed for 1969 F.Y.



Left: Intake Structure Serving
the Water System at
Twentymile Ranger Station



Right: 5,000 Gallon Poured
Concrete Reservoir at
Twentymile Ranger Station

(5/1969)

(Twentymile Ranger Station - Addendum No. 1)

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)

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
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 6-7, 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.

775-9-17-65-

L54 SER(OLW)

SEP 14 1965

Reed
ARC 9/17
WRR

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, EGDC (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:
LS4

August 23, 1965

EAST REGION	
AUG 26 1965	
Regional Director	
Asst. Dir., (A)	26
Asst. 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 *last file*

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. | |

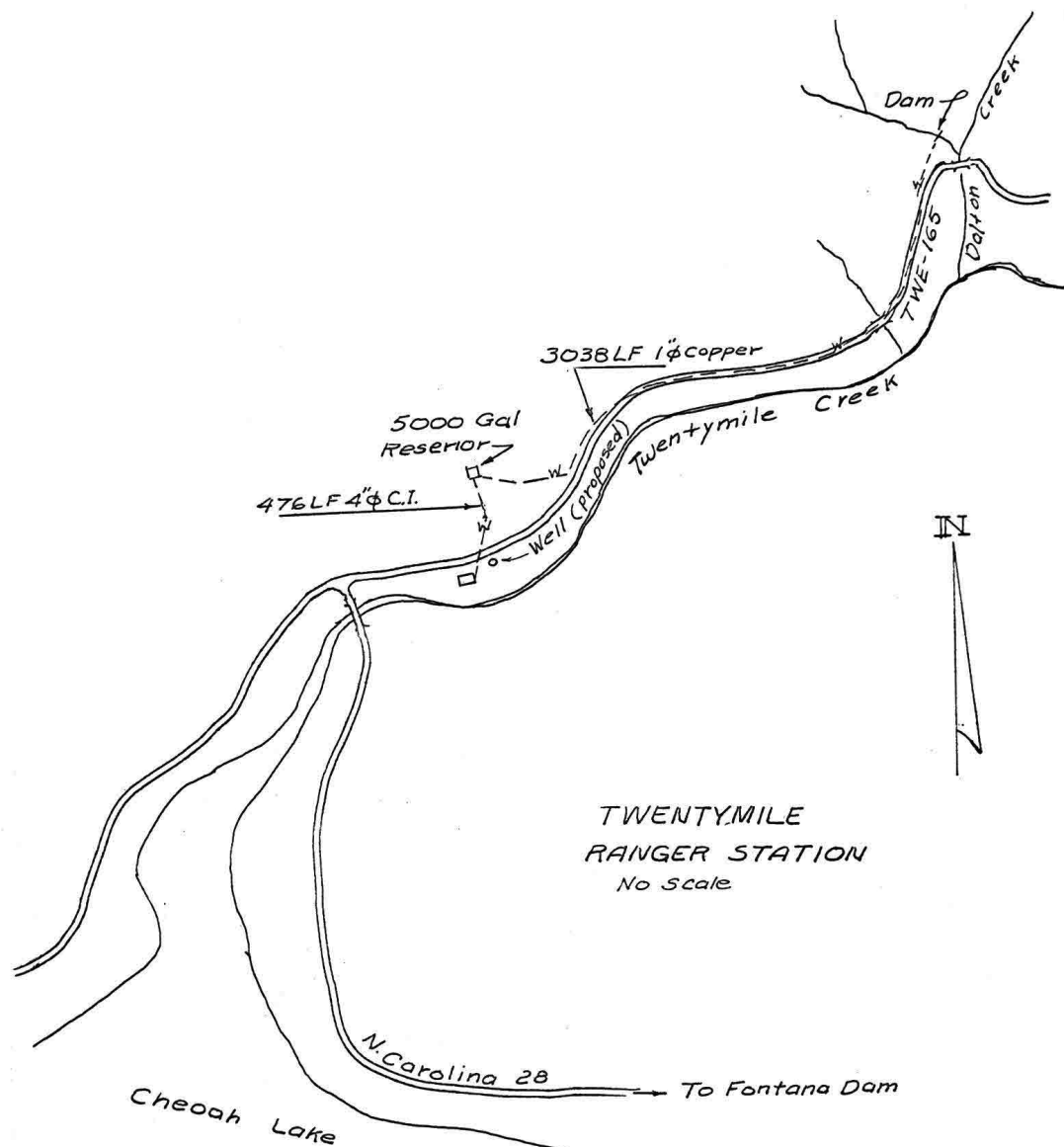
As suggested to Mr. Vick in the abovementioned telephone call, the following listing is a tentative priority list of well investigations which we would like to see programmed:

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

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



Docket Information

Number of Documents in Docket 21

Documents Dated from 8/23/1965 to 6/16/1969

Docket Compiled: 3/30/2011