



WATER-RIGHT DOCKET

Great Smoky Mountains National Park

Docket No: 24

MINGUS CREEK

Preliminary Docket Information

00-00-0000: explanation/summary for docket 1

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

WATER RIGHTS DOCKET

Mingus Creek & Oconaluftee Residence

Great Smoky Mountains National Park



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Post Office Box 2857
Raleigh, North Carolina 27602

EFH

March 27, 1969

Mr. E. W. Reed, Chief
Branch of Water Resources
National Park Service
801-19th Street, N.W.
Washington, D. C. 20006

Dear Mr. Reed:

This is in response to your request concerning the low-flow characteristics of Mingus Creek, which is located in the Great Smoky Mountains National Park. We have a number of base-flow discharge measurements made at the mouth of Mingus Creek (Site: 3-5108.15, Mingus Creek at Ravensford, N. C.). The drainage area of this site is 4.70 sq mi. These measurements provide a basis for estimating the flow characteristics of Mingus Creek from those of long-term gaging stations in the region.

The average discharge, as estimated at the mouth is 2.7 cfs per sq mi. The 7-day, 2-year minimum discharge is 0.7 cfs per sq mi and the 7-day, 10-year minimum discharge is about 0.5 cfs per sq mi. While flow characteristics estimated in this manner are not precise, these values are believed to be good indicators of the flow regime of Mingus Creek.

If we can be of further service do not hesitate to call on us.

For the District Chief, Ralph C. Heath.

Very truly yours,

E. F. Hubbard

E. F. Hubbard
Hydraulic Engineer

EFH/mch



IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

Great Smoky Mountains National Park
Gatlinburg, Tennessee 37738

September 23, 1968

Memorandum

To: Superintendent

From: Chief of Maintenance

Subject: Flow Records - Mingus Creek Watershed

As per your suggestion, I have contacted the U. S. Geological Survey office in Knoxville to determine flow records for the Mingus Creek watershed.

The following data was received from the U.S.G.S. Geologist McMaster, by telephone on this date:

Readings have been taken on Mingus Creek since 1943 at a location right near the road bridge on U. S. 441 (called site no. 1). Additional readings have been taken on Mingus Creek at a point on Mingus Creek approximately 1,200 linear feet above its intersection with Madcap Branch (site no. 2). The readings (in cubic feet a second) are as follows:

<u>Date</u>	<u>Site No. 1</u>	<u>Site No. 2</u>
12/4/43	5.47	--
11/13/52	2.50	--
10/24/53	2.16	--
12/18/54	2.30	--
10/31/61	3.19	--
5/10/62	12.00	--
9/16/63	4.68	--
9/20/67	7.45	5.99 c.f.s.
11/15/67	6.85	5.63 c.f.s.
8/27/68	4.72	3.31 c.f.s.

According to McMaster, the drainage area covered by site no. 2 is 2.56 square miles; and the drainage area for site no. 1 is 4.70 square miles. He said that the watershed for Madcap Branch was real limited and would probably never approach $\frac{1}{2}$ cubic foot a second max. at any time.

With this data, we see that Mingus Creek apparently has never been measured at less than 2.16 c.f.s. (1,296,000 gallons/day). In a meeting with the Bureau of Indian Affairs people on April 13, 1966, a Mr. Willet who was Superintendent of Utilities for the Indian Service said that the hydraulic gradient on their present water line would allow only 208 g.p.m. (300,000 gallons per day) through their system. Thus, it appears that elimination of the minimal amount of flow available from Madcap Branch would have little effect on the overall needs of the Indian Service water supply.

Gerald A. Rowe

cc:
Chief of Maint.
File
Yellow

NAME OF SYSTEM: Mingus Creek

LOCATION: Park Route OCO 144
about 1 1/4 miles from
1B or U.S. 441

LOCATION: STATE: North Carolina COUNTY: Swain

A. Source of Supply

Location - Reference to Permanent Landmark

Coordinates

1. Mingus Creek

Intake located 6,000 feet upstream
Mingus Creek from U.S. 441.

Lat. N 35°19'46"
Long. W 83°19'21"

This gravity flow system is owned, operated, and maintained by the Indian Service.

The intake for the system is located within the boundaries of the Great Smoky
Mountains National Park. In exchange for permission to operate this intake on

Mingus Creek the Park Service receives free water, the quantity not to exceed

50,000 gallons per day. The intake of the system consists of a concrete dam across

Mingus Creek and a small concrete intake basin above and adjacent to the dam. From

the intake basin runs a twelve-inch corrugated metal, asphalt coated pipe to a Permutit

Valveless Filter and then to a 100,000 gallon reservoir. From the reservoir through

a Wallace Tiernan gas flow electrically operated chlorinator runs a six-inch Cast Iron

distribution main to the town of Cherokee. For park use, this main is tapped near

the bridge at the entrance to the Oconaluftee Maintenance Area by a six-inch lateral.

The water then runs through a six-inch pressure reducing valve and out through a

six-inch A.C. distribution lateral to points of use.

*Copy of SUP GRSM 2-58 in water right
files w memo of Feb 2, 1968 from
Supt on wellhead
one 3/2/68*

B. Consumption:

This system is not metered but the capacity of the six-inch main has been calculated at 208 gallons per minute basis on the hydraulic gradient of the pipe. The park consumption at present is estimated at 40,000 gallons per day. This estimate includes the 180-enrollee Job Corps Civilian Conservation Center; the Oconaluftee Maintenance and Residence Areas, and the Visitor Center.

C. Distribution Mains and Laterals:

<u>Oconaluftee Maintenance and Residence Area</u>			<u>Oconaluftee JCCCC Area</u>		
<u>Size</u>	<u>Type</u>	<u>Length</u>	<u>Size</u>	<u>Type</u>	<u>Length</u>
6"	Cast Iron	276 Lineal Feet	4"	Asbestos Concrete	2,400 Lineal Feet
6"	Asbestos Concrete	463 Lineal Feet			
4"	Asbestos Concrete	2,754 Lineal Feet			
1"	Plastic	<u>731 Lineal Feet</u>			
	TOTAL	4,224 Lineal Feet			

D. Problems:

By agreement, a 50,000 gallon per day demand was set as an arbitrary limit to the water tapped from the Indian Service supply main. With the 180-enrollee Job Corps Civilian Conservation Center and a new visitor center proposed, the Indian Service is voicing concern that too great a demand is being placed on their available supply.

(Mingus Creek & Oconaluftee Residence - Addendum No. 1)

E. Additional Information:

A 6" test well was drilled in June 1968 to a depth of 150 feet. Forty-six feet of 6" casing was set and the well developed for one hour. The yield was 40 gallons per minute.

(Mingus Creek & Oconaluftee Residence - Addendum No. 1)

Other Supporting Information

GREAT SMOKY MTS. NTL. PARK
GATLINBURG, TENN.
RECEIVED

5. 19. '69

Superintendent _____
Asst. Supt. _____
Adm. Officer _____
Chief Ranger _____
Park Naturalist _____
Chief of Maint. _____
Mgmt. Assistant _____
EOC _____

Peam
L54 WSC-OLW

May 14, 1969

Memorandum

To: Chief, Branch of Water Resources, WASO

From: Chief, Office of Land and Water Rights, WSC

Subject: Water Rights Docket #24, Mingus Creek, Great Smoky Mountains

Enclosed are a draft of Special Use Permit, Water Cost Calculations, and a letter of May 2 from the Indian Tribe to Superintendent Fry concerning the Mingus Creek Water System. This data should be filed in Docket No. 24, Great Smoky Mountains. It is also suggested that this docket be labeled "Alien Water Right" because the system will be owned and operated by the Tribe and is partly within the boundary of the National Park.

We appreciate the concern of the IDA, particularly if they are going to make a construction loan to the Indian Tribe, but the fiscal soundness of the project should be determined before the fact, and presented to all before the project is undertaken. The letter from the Tribe indicates the IDA may provide both a grant and a loan for the extension of water and sewer facilities into a new area. This is common practice and as we understand, sound projects that have true merit may receive grants that amount to as much as 50% of the total cost. It would seem that the new construction loan should stand on its own merits. The letter from the Indian Tribe gives the impression that since the new expansion has been proposed, the National Park Service must provide support in a monetary way; thereby, subsidizing in effect the expanded facilities. The other request seems reasonable but may not be possible under the regulations imposed on the National Park Service for the protection of parks.

The soundness of paying \$1,380.72 per year or any other sum is questionable without a detailed analysis of the Indian Tribe's present and proposed revenues and expenses which are not detailed.

Richard L. Stanton

Richard L. Stanton

Enclosures

cc:

Regional Director, Southeast

Chief, D&C, PSC w/c enc

Superintendent, Great Smoky Mountains

(Mingus Creek & Oconaluftee Residence - Addendum No. 1)

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 6-7, 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.

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.

5010-108 (Rev. 1-67)
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

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Great Smoky Mountains National Park
Gatlinburg, Tennessee 37738

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WMM
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5010-108

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725-7-17-65-

L54 SER(OLW)

SEP 14 1965

Handwritten:
R...
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. Mikkell

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

August 23, 1965

Y REFER TO:
L54

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. (D)	
Resource Studies	

X *Land & Water*
Main

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 USFHS 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

Area 2. Main Oconaluftee Residence Area

Illustrations

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(Mingus Creek & Oconaluftee Residence - Addendum No. 1)

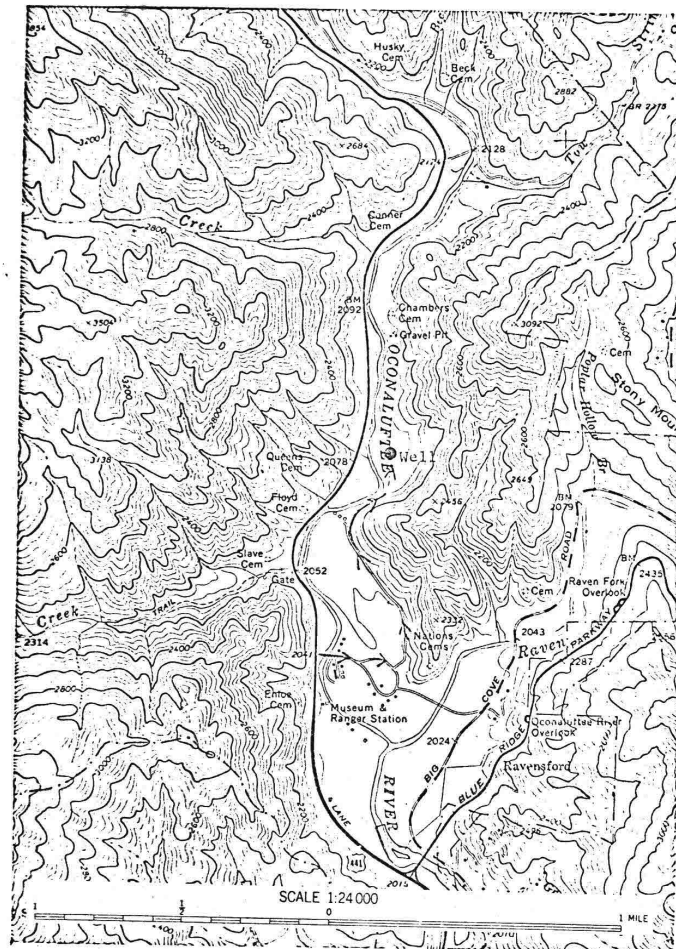
Main Oconaluftee Residence Area

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 June 1968 near the Main Oconaluftee residence area in Swain County, N. C.

The residence area includes about a dozen houses occupied by Park Service employees, a group of trailer houses occupied by Job Corps personnel, a Job Corps Center for training students, a maintenance area, and a museum and ranger station. Water for this area is obtained from the municipal supply for the town of Cherokee, N. C. The source of the Cherokee municipal supply is Mingus Creek where it is impounded about 6 miles northeast of the town of Cherokee. The National Park Service wishes to obtain their own supply and estimated that 50 gpm (gallons per minute) are required to meet these needs.

In order to obtain a supply of water for the residence area a well was drilled in June 1968 (fig. 2.1). The site is about 4,000 feet north of the residence area, east of the Oconaluftee River, and at a high point on a relatively broad alluvial plain.

The Main Oconaluftee residence area is situated on a broad alluvial plain that lies at the foot of steeply sloping uplands. The altitude of the alluvial plain here is about 2050 feet above mean sea level.



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The Oconaluftee River valley in the vicinity of the residence area is cut by the Greenbrier fault, together with its related faults. The Greenbrier fault is a low-angle thrust along which younger rocks overlie older rocks. The bedrock to the west of the Greenbrier fault is composed of the Thunderhead Sandstone of the Great Smoky Group in the Ocoee Series. The Thunderhead Sandstone consists mainly of coarse-grained feldspathic quartz sandstone or arkose, interbedded with thinner layers of pebble conglomerate, subgrawacke, and dark-gray or black slate or phyllite. On the east side of the fault the bedrock is composed chiefly of gneiss, schist, and granitic rocks of earlier Precambrian age. Joint or fracture systems are more or less well developed, but the development varies considerably from one place to another. The water-yielding characteristics of these rocks depend on the degree to which fractures are open to the movement of ground water. The fractures generally yield water at shallow depths, but below depths of about 150 feet the fractures are smaller and less capable of transmitting significant quantities of water.

A six-inch well was drilled to a depth of 150 feet at this site on June 12-13, 1968. A log of the well follows:

<u>Depth</u>	<u>Description</u>
0 - 40 feet	Alluvium.
40 - 70	Phyllite, surface casing set at 46 feet, yield 20 gpm.
70 - 80	Dark, dense sandstone.
80 - 100	Phyllite, mica grains in water.
100 - 130	Granite gneiss, yield 30 gpm.
130 - 140	Sandstone containing quartz.
140 - 150	Gray sandstone, yield 40 gpm.

Prior to the test, on August 8, 1968, the static water level was 6.2 feet below the top of the casing or 4.2 feet below the land surface.

On August 7 a three horsepower test pump was installed in the well at a depth of 140 feet. The well was pumped for about one hour while the discharge valve was being calibrated. On August 8, the well was pumped at several different rates ranging from 3 gpm to 51 gpm, for a total of eight hours. Figure 2.2 is a graph showing the drawdown in the well related to time of pumping.

In the first five steps the well was pumped at 3 gpm, 12 gpm, 15.7 gpm, 27 gpm, and 38 gpm. In each step the increase in pumping rate was accompanied by a rapid decline of water level followed by a much slower decline.

20

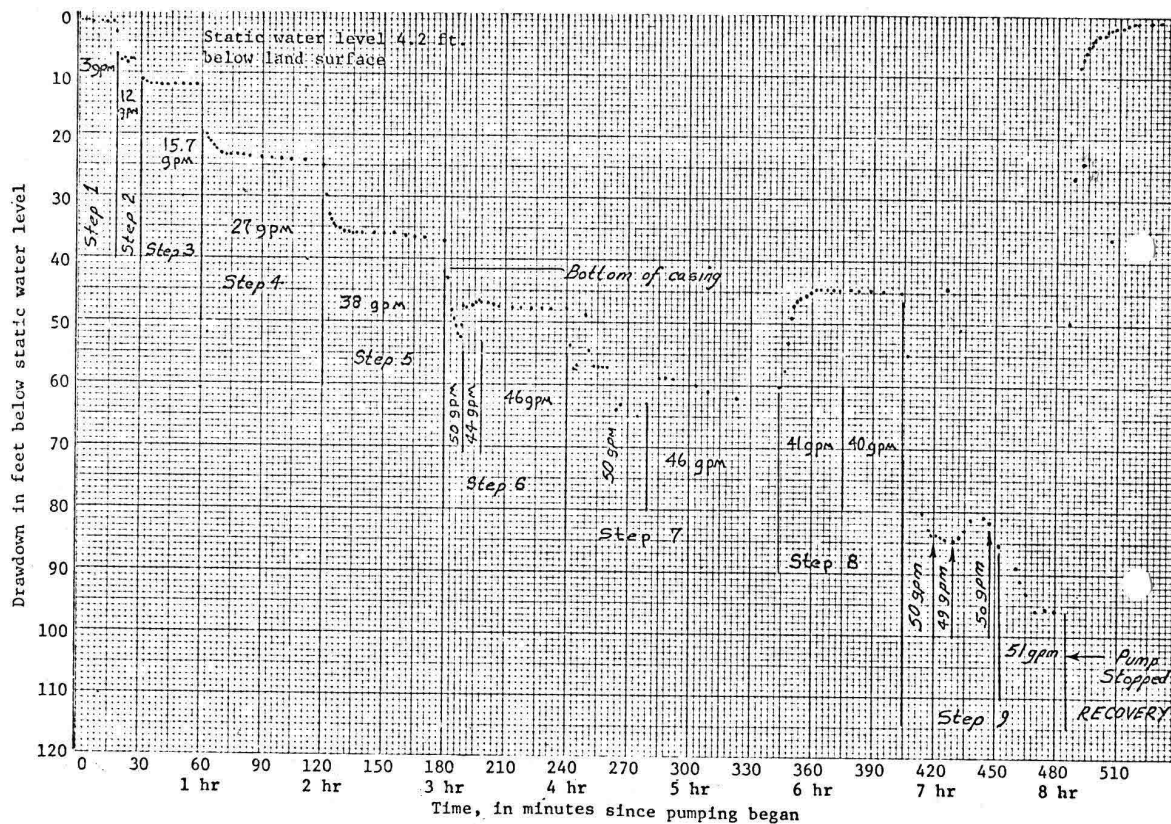


Figure 2.2.--Main Oconaluftee pumping test, August 8, 1968.

In the sixth step the pumping rate was increased to 50 gpm, accompanied by a rapid decline in water level. The rate then declined to 46 gpm. At this rate the water level rose to about 47 feet below static water level and then declined very slowly to about 48 feet at the end of the step. During this step the water level declined below the bottom of the casing and remained below the casing until after the pump was stopped. The fractures at this water level were being drained at a greater rate than they were being replenished.

In the seventh step the pumping rate was again increased, but became erratic because of difficulty with the generator, eventually becoming steady at 46 gpm again. The water level, in this step, declined at a somewhat greater rate than during the previous step because some of the fractures in the immediate vicinity of the well had been dewatered. The greater rate of drawdown in this step probably indicates that the rate of 46 gpm exceeds the rate that water moves toward the well.

In step 8 the pumping rate was decreased to 40 gpm, and the water level rose to about 45 feet below the static level where it remained until the end of the step.

In step 9, the pumping rate was increased, the rate fluctuating for a while from 55 gpm to 49 gpm then to 51 gpm. In response to the fluctuating pumping rate the water level declined to about 85 feet below static level then rose to 81 feet, then declined to 96 feet. This variation in water level may appear too great at first glance to result from the fluctuating pumping rate; but the specific capacity at this pumping rate is only 0.53 gpm per foot of drawdown, whereas when the pumping rate was 40 gpm and the water level was above 47 feet--above the most fractured zone--the specific capacity was about 1 gpm per foot of drawdown. The significance of this fact is that at the former specific capacity (0.53 gpm/foot) a change in pumping rate of 1 gpm results in a change of almost 2 feet of drawdown.

A comparison of the water levels in step 8 and in step 7 (fig. 2.2) indicates that the sustained yield of the well is about 40 gpm. The well may be pumped at rates up to 50 gpm for short periods provided the water level is not permitted to reach the pump intake, but figure 2.2 shows that this rate exceeds the long-term yield of the well.

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 2.1 and 2.2. The water is of excellent quality, except that it is slightly acidic, and, therefore, somewhat corrosive to metal.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

WATER ANALYSIS

W.R. Lab. No. NC 50152

Location Main Oconaluftee about 3 miles north of Cherokee, N. C. County: Swain			
Source Drilled well. Drilled: 1968. Owner: Great Smoky Mountains National Park, Gatlinburg, Tenn. Use: Public supply. Water-bearing formation: Crystalline rock. Water Level: (static) 6.17 ft. below top casing. Yield: 12 gpm. Producing intervals: 46 to 150 ft. Sampled after pumping 20 minutes.			
Date of collection August 8, 1968			
Gage height(ft.)		Discharge(sec.ft.)	
		Temp.(°C) 14	
(in milligrams per liter)			
Silica (SiO ₂).....	22	Carbonate (CO ₃).....	0
Aluminum (Al).....	.0	Bicarbonate (HCO ₃).....	22
Iron (Fe).....	.07	Sulfate (SO ₄).....	1.6
Manganese (Mn).....	.01	Chloride (Cl).....	.6
Calcium (Ca).....	3.7	Fluoride (F).....	.1
Magnesium (Mg).....	.6	Nitrate (NO ₃).....	.1
Sodium (Na).....	4.0	Phosphate (PO ₄).....	.17
Potassium (K).....	1.0	.....	
Lithium (Li).....		.....	
(in milligrams per liter)			
Dissolved solids:		ABS.....	
Sum.....	45	Color.....	0
Residue upon evapo- ration @ 180°C.....	52	.....	
Hardness as CaCO ₃	12	.....	
Noncarbonate.....	0	.....	
			
pH.....	6.4	Specific conductance (micromhos at 25°C).....	39

Table 2.1.--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 50153

Location <u>Main Oconaluftee about 3 miles north of Cherokee, N. C. County: Swain</u>			
Source <u>Drilled well. Drilled: 1968. Collected at discharge pipe. Owner: Great Smoky Mountains National Park, Gatlinburg, Tenn. Use: Public supply. Water-bearing formation: Crystalline rock. Water level: 96 ft. (static) below top casing. Yield: 51 gpm. Producing intervals: 46 to 150 ft. Sampled after pumping 8 hours.</u>			
Date of collection <u>August 8, 1968</u>			
Gage height(ft.) _____		Discharge(sec.ft.) _____ Temp.(°C) <u>13</u>	
(in milligrams per liter)			
Silica (SiO₂)	22	Carbonate (CO₃)	0
Aluminum (Al)	.0	Bicarbonate (HCO₃)	22
Iron (Fe)	.09	Sulfate (SO₄)	2.0
Manganese (Mn)	.01	Chloride (Cl)	.6
Calcium (Ca)	3.7	Fluoride (F)	.1
Magnesium (Mg)	.5	Nitrate (NO₃)	.1
Sodium (Na)	4.0	Phosphate (PO₄)	.31
Potassium (K)	1.0	.....	
Lithium (Li).....		.....	
(in milligrams per liter)			
Dissolved solids:		ABS	
Sum.....	45	Color	5
Residue upon evapo- ration @ 180°C.....	48	.....	
Hardness as CaCO₃	11	.....	
Noncarbonate.....	0	.....	
pH	6.5	Specific conductance (micromhos at 25°C)	40

Table 2.2.—Chemical analysis of water sampled at end of test.

Data pertinent to operation and maintenance of Mingus Creek water system
(now owned and operated by the Bureau of Indian Affairs), along with estimated usage, etc.

The development at the intake involves the following components, which were constructed by the B.I.A. in 1966:

1. Intake in small concrete dam on Mingus Creek.
2. A 100,000 gallon underground concrete reservoir.
3. Chlorination and fluoridation equipment.
4. A Permutit valveless filter.
5. A frame building housing the treatment equipment.

Analysis of operating costs for similar installations involving a valveless filter and associated treatment equipment suggests that actual site maintenance and operations at the intake area should run approximately \$7,000 annually. This includes all supplies and materials, personal services, power bills, equipment amortization, etc.

According to the Bureau of Indian Affairs' figures, this system is supplying approximately 42,760,000 gallons of water to the Town of Cherokee. If we add the NPS estimated consumption (2,655,000 gallons annually) and the JCC consumption (9,990,000 gallons), we find that the B.I.A. processed 55,405,000 gallons of water at a cost of \$6,879, or 12.4¢/1,000 gallons.

4/4/69

(Mingus Creek & Oconaluftee Residence - Addendum No. 1)

Mingus Creek Water System

The annual water consumption figures for the NPS are estimated as follows:

<u>Quarters</u> -----	955,000 gal.
Permanent Employees -----	820,000 gal.
Seasonal Employees -----	135,000 gal.
<u>Oconaluftee Visitor Center</u> -----	1,700,000 gal.
	2,655,000 gal.

Pro-rata share --

2,655,000 gal. x 12.4¢/1,000 (B.I.A. rate) = \$ 329.22

The secondary graded road, which serves the Mingus water intake, is 1.3 miles in length and annual maintenance costs to the NPS during the past fiscal year amounted to \$675.

The NPS invested \$11,900 to extend commercial power to the water intake area in 1967, even though we had no obligation whatsoever to do so. We did this on the premise that it was to our advantage to have improved water treatment, and also to show our appreciation that we were receiving free water.

The annual water consumption for the Job Corps Center is estimated as follows:

<u>Enrollees</u> -----	8,212,500 gal.
180 x 125 g.p.d. x 365 -----	= 8,212,500
<u>Quarters</u> -----	1,777,500 gal.
Permanent - 12 x 3 x 125 x 365 =	1,642,500
Seasonal - 6 x 180 x 125 =	135,000
	9,990,000 gal.

Value - 9,990,000 gal. @ 12.4¢*/1,000 = \$1,238.76

*If the B.I.A. charges at the 25¢/1,000 gal. rate that they say is their commercial rate, then the JCC cost would be \$2,497.50 annually.

4/4/69



UNITED STATES
DEPARTMENT OF THE INTERIOR

BUREAU OF INDIAN AFFAIRS
Cherokee Indian Agency
Cherokee, North Carolina 28719

IN REPLY REFER TO:
Plant Management
412 - 3

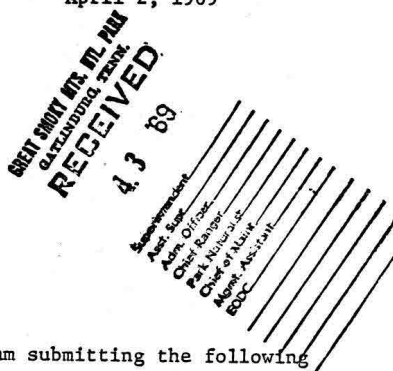
April 2, 1969

Mr. George W. Fry, Superintendent
Great Smoky Mountains National Park
Gatlinburg, Tennessee 37738

Attention: Mr. Gerald Rowe
Chief Engineer

Dear Mr. Fry:

In reply to our recent telephone conversation, I am submitting the following information as requested.



<u>BIA WATER & SEWERAGE</u>		-	<u>CALENDAR YEAR 1968</u>
	<u>OTHERS</u>	<u>PHS</u>	<u>BIA</u>
January	140,634	52,967	
February	147,879	44,557	E
March	166,427	41,395	S
April	282,272	49,781	T
May	322,287	39,060	I
June	444,789	38,202	M
July	640,522	37,509	A
August	689,360	48,048	T
September	356,237	45,317	E
October	379,663	54,669	D
November	227,935	52,248	
December	234,613	52,908	
CUBIC FT.	4,032,618	556,661	907,549
DOLLAR AMT.	\$14,041.51	\$630.00	\$2,823.60
TOTAL CU./FT. USED			5,496,828
CU./FT. OVERAGE AND WASTE (4%)			219,872
GROSS CU./FT. PRODUCED			5,716,700
ANNUAL INCOME (Actual Dollar Amount)			\$14,671.51
VALUE OF WATER & SEWERAGE (BIA)			2,823.60
ANTICIPATED ANNUAL INCOME			\$17,495.11

A. ANNUAL OPERATING COST AT MINGUS CREEK

1. WAGES - \$3.50 per/hr.	
1a. 2 hrs. x 5 week days x 52 weeks (Regular time)	\$1820.00
1b. 2 hrs. x Sat. - Sun. X 52 weeks (Time and 1/2 time)	1092.00
ANNUAL OPERATING WAGES	\$2912.00
2. ELECTRICAL SERVICE CHARGE	
2a. Nantahala Power & Light Co.	180.00
3. WATER TREATMENT CHEMICAL COST	
3a. Fluoride and chlorine* (*Possible Savings by using Gas instead of Powder)	1287.00
4. MISCELLANEOUS OPERATING COST	500.00

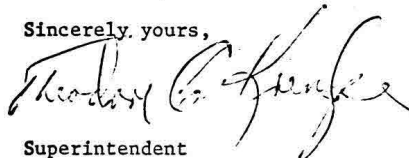
B. ANNUAL MAINTENANCE COST AT MINGUS CREEK

1. Routine Maintenance	
2. Equipment Depreciation	- \$2,000.00
3. Plant Depreciation	

C. TOTAL ANNUAL OPERATING & MAINTENANCE COST

1a. See items A & B	\$6,879.00
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Sincerely yours,



Superintendent

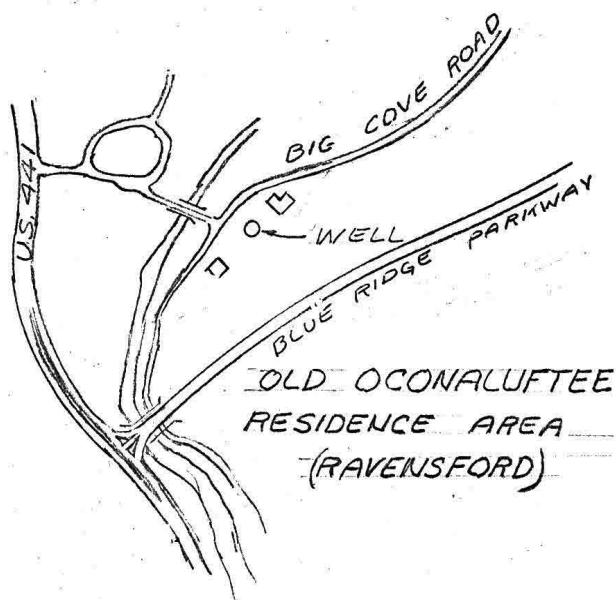
26. OLD OCONALUFTEE RESIDENCE AREA (Ravensford)

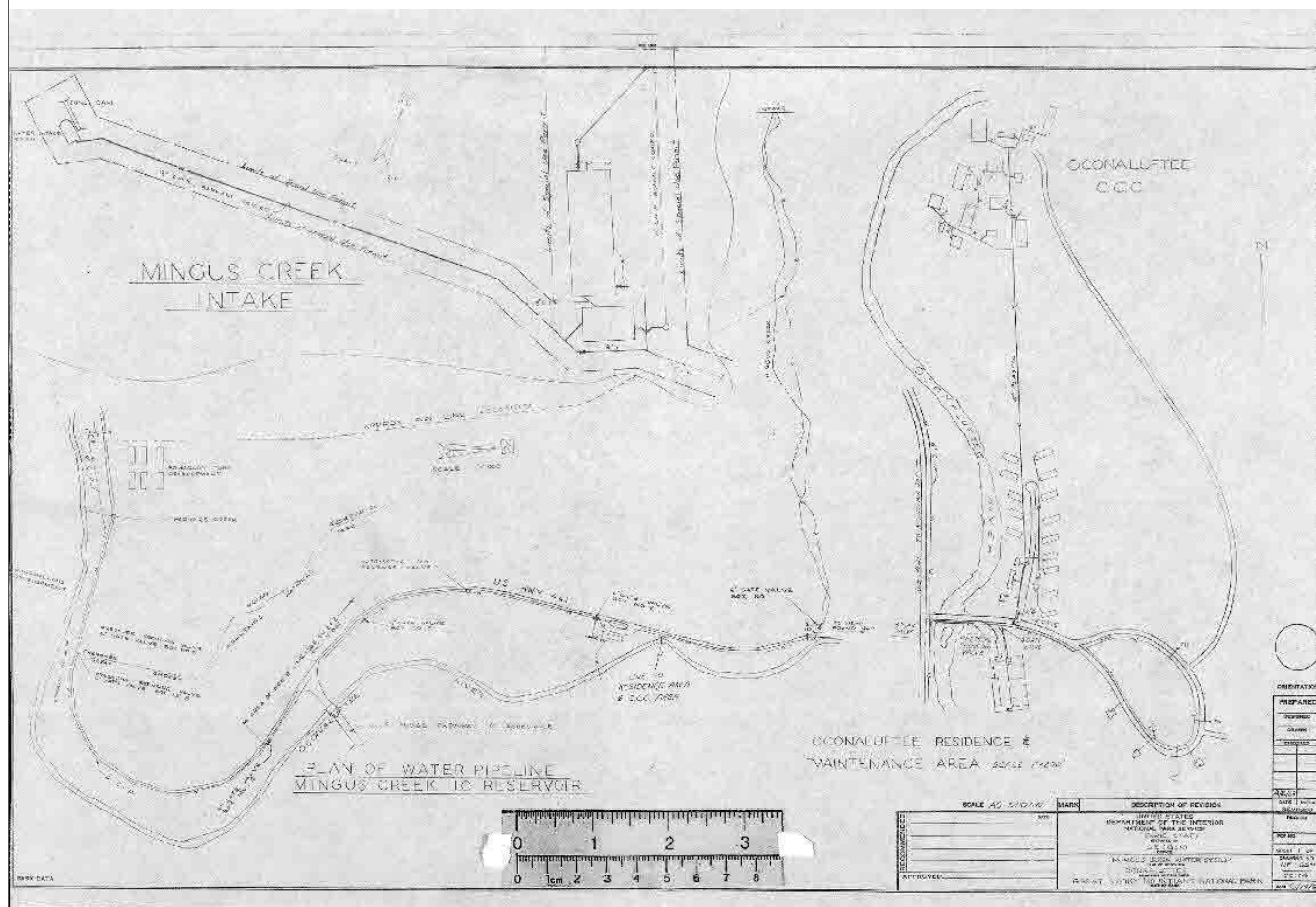
Situation: The present water system for these two residences is a surface stream intake with minimum storage and subject to contamination during the dry seasons of the year.

Proposed: Drill test well trying to locate a 15 g.p.m. supply.

Progress to Date: This project was programmed for 1969 F.Y. by Acting Superintendent Davis' memorandum of February 3, 1967, but now advanced to 1968 F.Y. in lieu of other project accomplished in the 1967 F.Y. program.

(09/28/67)





Docket Information

Number of Documents in Docket 38

Documents Dated from 8/23/1965 to 5/14/1969

Docket Compiled: 3/30/2011