



WATER-RIGHT DOCKET

Great Smoky Mountains National Park

Docket No: 3

BUNCHES CREEK. BALSOM-HEINTOOGA

Preliminary Docket Information

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

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

WATER RIGHTS DOCKET
Balsam-Heintooga
Great Smoky Mountains National Park

Supporting Hydro Data

B. Consumption:

During the 1969 season, this area served 5,039 picnickers and 25,343 campers.

1. Breakdown according to usages (1969)

Month (Consumption in 1,000 gal.)	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>TOTALS</u>
Campers (25,343).....	--	--	--	--	--	70	84	111	29	13	--	--	307
Picnickers (5,039).....	--	--	--	--	--	6	4	5	2	3	--	--	20
Residences.....	--	--	--	--	--	11	11	11	--	--	--	--	33
Unaccounted.....	--	--	--	--	--	188	301	351	377	223	--	--	1,440
TOTALS.....						275	400	478	408	239			1,800

During the 1970 season, this area served 5,561 picnickers and 18,587 campers.

2. Breakdown according to usages (1970)

Month (Consumption in 1,000 gal.)	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>TOTALS</u>
Campers (18,587).....	--	--	--	--	9	83	106	103	65	6	--	--	372
Picnickers (5,561).....	--	--	--	--	1	3	4	5	5	3	--	--	21
Residences.....	--	--	--	--	--	--	11	11	11	--	--	--	33
Unaccounted.....	--	--	--	--	228	218	221	333	315	201	--	--	1,516
TOTALS.....					238	304	342	452	396	210			1,942

E. Additional Information:

In the summer of 1969, a vacuum operated gas chlorinator (Porter-Fischer) was installed in the chlorinator house adjacent to the reservoir. This chlorinator house was constructed about four years ago and formerly housed the old Wallace-Tiernan hypochlorinator.

(Balsam-Heintooga - Addendum No. 2)

(2/8/71)

NAME OF SYSTEM: Balsam-Heintooga

LOCATION: Park Route 6

LOCATION: STATE: North Carolina COUNTY: Swain

<u>A. Source of Supply</u>	<u>Location - Reference to Permanent Landmark</u>	<u>Coordinates</u>
1. Small Head Water Stream of Bunches Creek.	1,400 feet upstream from culvert crossing across Route 6, located 1,000 feet east of campground entrance.	Lat. N 35°34'38" Long. W 83°10'31.5"

This is a gravity flow system which supplies the Balsam Mountain Campground Area, the Heintooga Picnic Area and the residence at Balsam Mountain Campground. The quantity of water available at the source is estimated at 20 gallons per minute. The intake structure consists of a small reinforced concrete dam, elevation 5,486', and a 2' x 4' collection box which has three sets of screens, progressively smaller. Storage is a 15,000 gallon reinforced concrete reservoir, elevation 5,425', located on a hillside approximately 300' northwest and uphill from a drain valve at the north edge of the Heintooga Ridge Road approximately 300' north of Balsam Mountain Campground road junction. Treatment consists of a water-flow operated chlorinator and is located 277' north of the reservoir, along the supply main, in a chlorinator box. (Wallace-Tiernan)

B. Consumption:

During the 1968 season, this area served 20,797 campers and 14,334 picnickers.

1. Breakdown according to usages (1968)

Month (Consumption in 1,000 gal.)	<u>Jan.</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Totals</u>
Campers (20,797)	--	--	--	--	7	92	134	145	38	--	--	--	416
Picnickers (14,334).	--	--	--	--	--	5	21	25	6	--	--	--	57
Residences	--	--	--	--	--	--	11	11	--	--	--	--	22
Unaccounted	--	--	--	--	251	187	255	327	76	--	--	--	1,096
TOTALS					258	284	421	508	120				1,591

C. Distribution Mains and Laterals:

<u>Size</u>	<u>Type</u>	<u>Length</u>
3"	Galvanized Iron	5,052 Lineal Feet
2"	Galvanized Iron	2,723 Lineal Feet
1"	Galvanized Iron	32 Lineal Feet
3/4"	Galvanized Iron	685 Lineal Feet
6"	Cast Iron	80 Lineal Feet
2"	Cast Iron	<u>750 Lineal Feet</u>
	TOTAL	9,322 Lineal Feet

(Balsam-Heintooga - Addendum No. 1)

D. Problems:

The present system, which serves a 47-site campground and a 35-site picnic area is a substandard system that needs improvement. Present stream-fed system is highly affected by long dry spells and the open stream is subject to heavy contamination at times.

E. Additional Information:

A 6" well was drilled, in June 1968, to 150 feet with main aquifer at 20'-25' (possible water table from nearby creek). Because the yield of this well was lower than the anticipated future requirements, a second well was drilled near the seasonal ranger quarters. This well was drilled to a depth of 200 feet without finding any significant amount of water bearing strata. On August 9, 1968, well no. 1 was test pumped. The results confirm the estimate that this well has a rather low yield, namely 8 gallons per minute. The water, however, is of good quality although it does have a pH value of 6.0, requiring some treatment. It may be desirable that this well be put into service as an auxiliary supply during extended dry periods when the existing supply is at a low ebb and subject to visitor contamination.

(Balsam-Heintooga - Addendum No. 1)



15,000 Gallon Concrete Reservoir and Chlorinator House
Serving Balsam Mountain Campground

(Balsam-Heintooga - Addendum No. 1)
(5/1969)

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)

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 6-11, 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 analysis 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.

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L54 SER(OLW)

SEP 14 1965

Handwritten:
R...
EWC 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, RQDC (2), w/c of inc.



IN REPLY REFER TO:

L54

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

Great Smoky Mountains National Park
Gatlinburg, Tennessee 37738

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. (DI)	
Resource Studies Ag.	

X *Land & Water*
Point

Memorandum

To: Regional Director, Southeast Region

From: Superintendent, Great Smoky Mountains *lost 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

Area 1. Balsam Mountain Campground

Illustrations

	Page
Figure 1.1. Location of wells at Balsam Mountain Campground.....	6
1.2. Balsam Mountain pumping test, August 9, 1968.....	10

Tables

Table 1.1. Chemical analysis of water sampled at beginning of test.	13
1.2. Chemical analysis of water sampled at end of test.....	14

(Balsam-Heintooga - Addendum No. 1)

Balsam Mountain Campground

As a part of the cooperative program between the U. S. National Park Service and the U. S. Geological Survey, two proposed well sites were selected in June 1968 near the Balsam Mountain Campground in Swain County, N. C.

The campground offers tent and trailer camp sites with drinking water and toilet facilities for about 40 - 50 families. The source of the existing water supply for the campground is Bunches Creek, but it is inadequate to meet the needs of the present facilities. The National Park Service has estimated that 15 to 20 gpm (gallons per minute) are required to meet these needs.

In an effort to obtain additional water for the campground, one well was drilled at each site in June 1968 (fig. 1.1). Site number 1 is about 2,200 feet north-northeast of the campground, about 100 feet north of the Blue Ridge Parkway extension, on the east bank of the upper reach of Bunches Creek on an old railroad bed about 15 feet above creek level. Site number 2 is in a cut on a steep hillside about 100 feet southeast of the Blue Ridge Parkway extension and about 100 feet north of the ranger's residence at the campground.

The Balsam Mountain Campground is situated on a topographic nose at an altitude of about 5,300 feet above mean sea level. The area is highly dissected by streams, the slopes are steep, and stream gradients are as much as several hundred feet per mile.

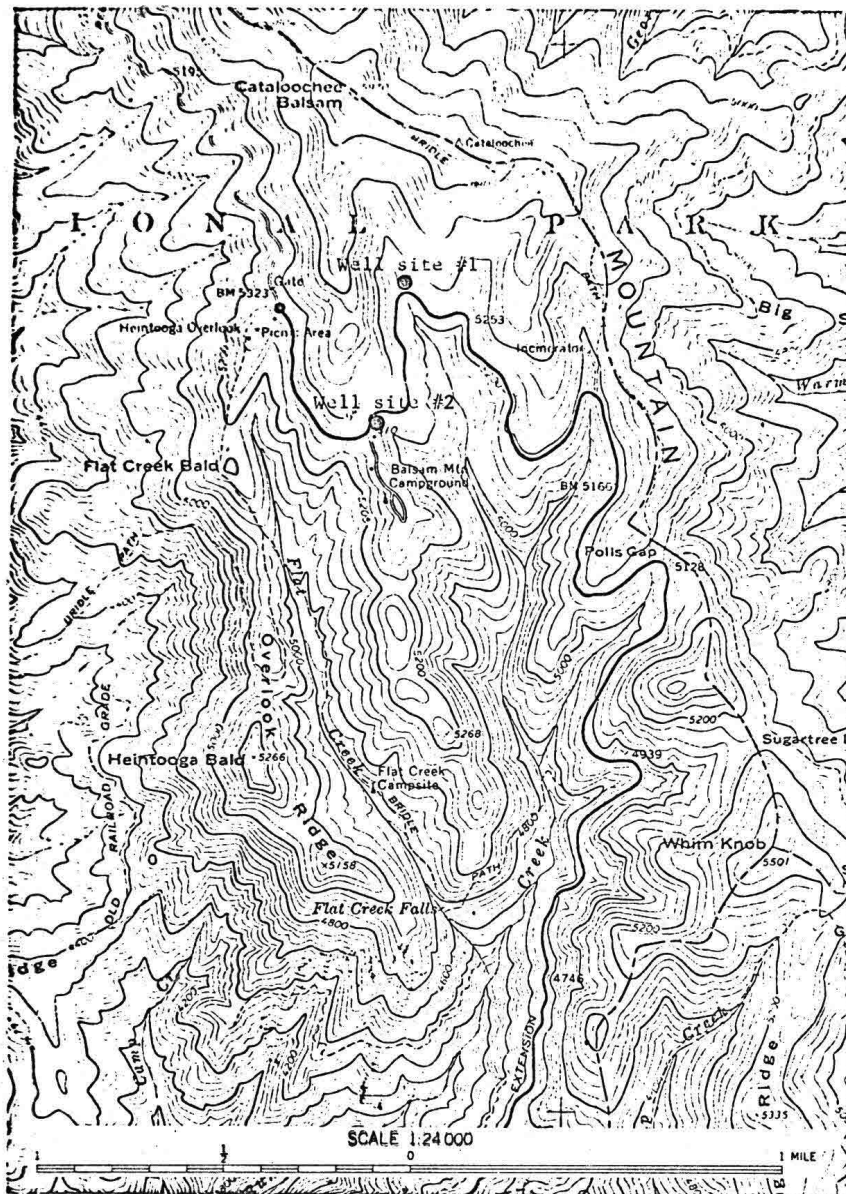


Figure 1.1.--Location of wells at Balsam Mountain Campground.

The campground is underlain by 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, sub-graywacke, and dark-gray or black slate or phyllite. 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. Below depths of about 150 feet the fractures decrease in size and number, and are less capable of transmitting significant quantities of water.

A six-inch well was drilled to a depth of 150 feet at the first site on June 24-25, 1968. A log of the well follows:

<u>Depth</u>	<u>Description</u>
0 - 1 feet	Soil.
1 - 50	Feldspathic sandstone, surface casing set at 13 feet, yield about 5 gpm at 17 feet.
50 - 60	Dark gray dense sandstone.
60 - 90	Light gray, hard sandstone, yield 9 gpm at 80 feet.
90 - 150	Dark gray, hard sandstone, no increase in yield below 80 feet.

After completion, on August 9, 1968, the static water level was 5.3 feet below the top of the casing, or 3.3 feet below the land surface.

At the second site, a six-inch diameter well was drilled to a depth of 200 feet on June 25-27, 1968. A log of the well follows:

<u>Depth</u>	<u>Description</u>
0 - 25 feet	Soft mica schist.
25 - 60	Mica schist, harder.
60 - 80	Granite gneiss.
80 - 120	Hornblende gneiss
120 - 130	Hornblende gneiss, 1/3 gpm of water at this interval.
130 - 180	Hornblende gneiss, no increase in water.
180 - 200	Sandstone, yield of well about 1/3 gpm upon completion.

Because of the low yield, this well was filled and abandoned.

On August 9 a three horsepower test pump was installed in the well at the first site at a depth of 130 feet. The well was pumped for one hour while the discharge valve was being calibrated. After allowing the water level to partially recover for one-half hour, the well was pumped at several different rates ranging from 6 gpm to 10 gpm for a total of eight hours. Figure 1.2 is a graph showing the drawdown in the well related to time of pumping.

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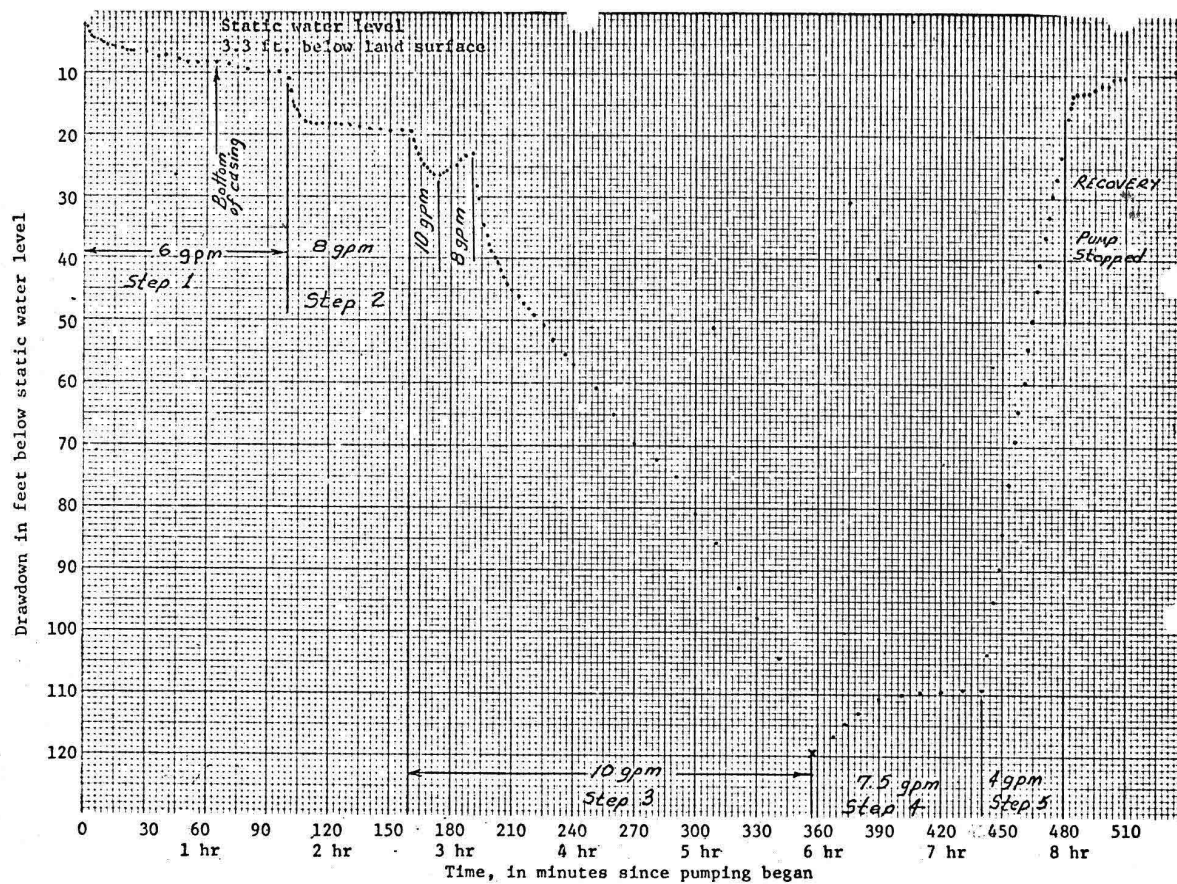


Figure 1.2.--Balsam Mountain pumping test, August 9, 1968.

In the first two steps, the well was pumped at 6 gpm and 8 gpm. During the first step of pumping the water level declined below the bottom of the casing. In the second step the pumping rate was increased to 8 gpm; the increase was accompanied by a rapid decline of the water level at first, followed by a gradual decline as shown in figure 1.2. The total decline in water level during the first two steps was about 20 feet. In the two steps just described the water level in each case declined very slowly after a brief period of pumping, indicating that the water level had not declined below the bottom of the fractures at that level.

In the third step the pumping rate was increased to about 10 gpm, and the water level declined continuously throughout the step to about the level of the pump. There was an interruption of the downward trend of the water level after about 190 minutes caused by an unintentional variation in pumping rate. During this period of interruption the water level rose more than 3 feet as the pumping rate declined to 8 gpm. The continued decline of the water level indicates that the fractures in the vicinity of the well were being drained, and that the pumping rate during this continued decline was greater than the rate at which the water was yielded to the well by the fracture.

The steady decline of the water level stopped at 357 minutes when the pumping rate was decreased to 7.5 gpm. During step 4, the water level rose nearly 10 feet during the first 50 minutes and much more slowly to the end of the step. At the end of step 4, at 440 minutes after pumping began, the pumping rate was decreased to 4 gpm, and the decrease was accompanied by a rapid rise in water level. The water level rose more than 80 feet in 40 minutes to a level of 23 feet below static level. At this point the pump was cut off; the water level continued its rapid rise to a level about 12 feet below static water level. At this level the rate of recovery showed a marked decrease.

The graph of drawdown in figure 1.2 shows several interesting features with respect to the yield of the well. First, it may be noted that after the first few minutes of step 2 the rate of decline of the water level slowed to about 2 feet per hour. If this decline is compared with the slow rate of recovery that was occurring during the latter part of step 4 it may be concluded that the sustained yield of the well is between 7.5 and 8.0 gpm. The well may be pumped at rates up to 10 gpm for a few hours provided the water level is not permitted to reach the pump intake, but figure 1.2 clearly shows that this rate exceeds the long-term yield of the well.

The abrupt decrease in recovery rate at a level about 12 feet below the static water level (13.3 feet below land surface) probably indicates the bottom of a highly fractured zone in the upper part of the bedrock. As the water level continued to slowly recover, the water that drained from these fractures during the test was replaced. The rapid and uniform rate of recovery at first indicates that significant fractures do not occur below the shallow zone just referred to and most, if not all, of the water produced by the well is derived from the upper part of the well.

Water samples collected at the beginning and near the end of the test were analyzed by the U. S. Geological Survey laboratory in Raleigh, North Carolina. The results are shown in tables 1.1 and 1.2. They indicate that the water is of excellent quality, but is acidic, therefore somewhat corrosive to metal. The first sample collected, near the beginning of the test, showed an excessive amount of iron in solution. The sample collected after pumping five hours contained only a small amount of iron, thus indicating that the iron in the first sample probably was dissolved from the casing.

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

W.R. Lab. No. NC 50154

Location Balsam Mountain Campground, about 10 miles north-northwest Maggie, N. C.			
County: Swain.			
Source 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: 5.3 ft. static below top casing.			
Yield: 6 gpm. Appearance when collected: Cloudy. Producing intervals: 13 to 23 ft. Sampled after pumping 5 minutes.			
Date of collection		August 9, 1968	
Gage height(ft.)		Discharge(sec.ft.)	
		Temp.(°C) 9	
(in milligrams per liter)			
Silica (SiO ₂).....	6.9	Carbonate (CO ₃).....	0
Aluminum (Al).....	2.8	Bicarbonate (HCO ₃).....	17
Iron (Fe).....	6.4	Sulfate (SO ₄).....	.4
Manganese (Mn).....	.13	Chloride (Cl).....	.6
Calcium (Ca).....	4.8	Fluoride (F).....	.1
Magnesium (Mg).....	.1	Nitrate (NO ₃).....	.8
Sodium (Na).....	1.2	Phosphate (PO ₄).....	.06
Potassium (K).....	.7	.....	
Lithium (Li).....		.....	
(in milligrams per liter)			
Dissolved solids:		ABS.	
Sum.....	24	Color	5
Residue upon évapô- ration @ 180°C.....	33	.....	
Hardness as CaCO₃	12	.....	
Noncarbonate	0	.....	
pH	6.0	Specific conductance (micromhos at 25°C).....	33

Table 1.1.--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 50156

Location Balsam Mountain Campground, about 10 miles north-northwest Maggie, N.C.			
County: Swain			
Source 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: 92 ft. (pumping) below top casing.			
Yield: 10 gpm. Appearance when collected: Clear. Producing intervals: 13 to 23 ft. Sampled after pumping 5 hours.			
Date of collection August 9, 1968			
Gage height(ft.)		Discharge(sec.ft.)	
		Temp.(°C) 9	
(in milligrams per liter)			
Silica (SiO ₂).....	6.5	Carbonate (CO ₃).....	0
Aluminum (Al).....	1.3	Bicarbonate (HCO ₃).....	10
Iron (Fe).....	.09	Sulfate (SO ₄).....	.2
Manganese (Mn).....	.01	Chloride (Cl).....	.6
Calcium (Ca).....	2.4	Fluoride (F).....	.1
Magnesium (Mg).....	.3	Nitrate (NO ₃).....	.2
Sodium (Na).....	1.0	Phosphate (PO ₄).....	.10
Potassium (K).....	.4	.....	
Lithium (Li).....		.....	
(in milligrams per liter)			
Dissolved solids:		ABS.....	
Sum.....	17	Color.....	5
Residue upon evaporation @ 180°C.....	28	.....	
Hardness as CaCO ₃	7	.....	
Noncarbonate.....	0	.....	
pH.....	5.5	Specific conductance (micromhos at 25°C).....	21

Table 1.2.--Chemical analysis of water sampled at end of test.

24.

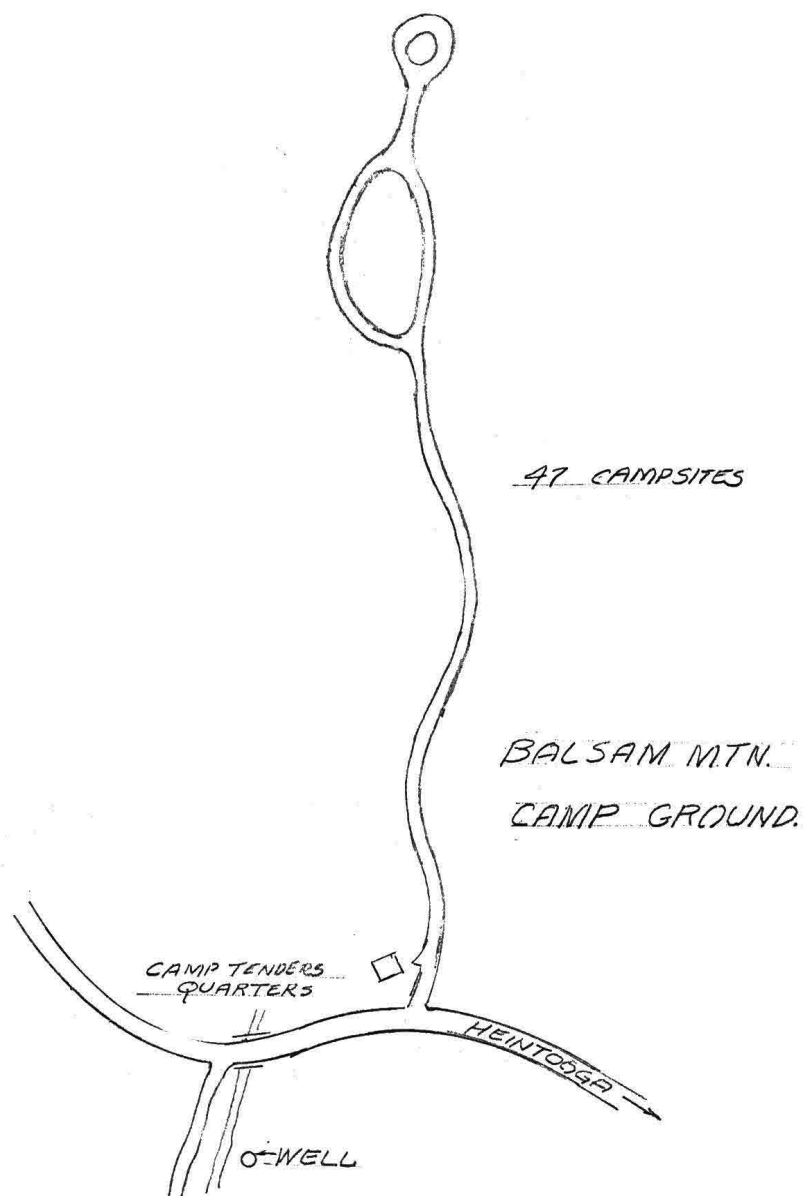
BALSAM MOUNTAIN CAMPGROUND

Situation: The present system, which serves a 30-site campground and a 50-site picnic area (a total of 4 comfort stations and a seasonal residence in this complex) is substandard and needs improvement. Present stream-fed system is highly affected by long dry spells and the open stream is subject to heavy contamination at times.

Proposed: A deep well pump of 15-20 g.p.m. capacity would serve this area and greatly improve the water system.

Progress to Date: Water Investigation project advanced to 1968 F.Y. by park's program based on current needs and per Acting Superintendent Davis' memorandum of February 3, 1967.

(09/28/67)



Number of Documents in Docket	31		
Documents Dated from	8/23/1965	to	8/9/1968
Docket Compiled:	3/29/2011		