



WATER-RIGHT DOCKET

Great Smoky Mountains National Park

Docket No: 14

COSBY CREEK. COSBY CAMPGROUND

Preliminary Docket Information

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

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

WATER RIGHTS DOCKET
Cosby Campground
Great Smoky Mountains National Park

Supporting Hydro Data

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER ANALYSIS

26W

Location Cosby Creek Campground, Tenn. County Cocke
 Source Well Depth (ft) _____ Diam (in.) 6 1/4
 Cased to (ft) _____ Date drilled July 1971 Point of coll. Pump discharge
 Owner National Park Service
 Treatment _____ Use _____
 WBF _____ WL _____ Yield 50 gpm
 Temp (°) _____ Appear. when coll. Clear
 Collected July 20, 1971 By _____
 Remarks _____

	mg/l	me/l		mg/l	me/l
Silica (SiO₂)	13		Bicarbonate (HCO₃)	28	0.46
Aluminum (Al)			Carbonate (CO₃)	0	.00
Total					
Iron (Fe)	.00				
Total Manganese (Mn)	.01		Sulfate (SO₄)	2.6	.05
Zinc (Zn)	.10		Chloride (Cl)	1.0	.03
			Fluoride (F)	.0	.00
Calcium (Ca)	5.5	0.27			
Magnesium (Mg)	1.2	.10	Nitrate (NO₃)	.2	.00
Sodium (Na)	3.6	.16			
Potassium (K)	.5	.01			
Total		.54	Total		.54

	mg/l		
		Specific conductance (micromhos at 25° C)	50
Dissolved solids:		pH	6.8
Calculated	42	Color	2
Residue on evaporation at 180° C	43		
Hardness as CaCO₃	18		
Noncarbonate	0		
Total alkalinity (as CaCO ₃)	23		

Lab. No. 41282

Field No.

Project

Preliminary Report on Drilling and Pumping of Test Well at Cosby Creek Campground

Introduction

The National Park Service desires to replace the existing surface water supply at the Cosby Creek Campground, which is obtained from Cosby Creek, with a ground water supply. Present problems are with siltation of the intake and horse and pedestrian travel in the watershed. The Cosby Creek Campground consists of a 230-site campground, a 100-site picnic area, and 8 comfort stations. Estimated water use is 30,000 gallons per day. A well with a yield of 35 gpm (gallons per minute) or more is desired. Figure 1 is a map of the campground area.

Geology

The Cosby Creek Campground is located in the northeastern part of the Park, in an outcrop belt of the pre-Cambrian Pigeon Siltstone. Dip of the bedrock is to the southeast. Surficial material consists of an extensive, rather shallow fan of alluvium and colluvium.

The well penetrates 28 ft of colluvium consisting of sand and boulders; between 28 and 40 ft it penetrates a layer of sandstone. Below 40 ft the lithology is alternating layers of very weathered phyllite, siltstone, and sandstone (see figure 2). A zone of flowing sand and gravel is present between 44 and 47 ft. Because of the weathered nature of the rock, it was believed that the well would yield the desired 35 gpm.

However, subsequent pumping tests indicate that the well may be located in an anomalous area of higher permeability than the surrounding rocks and insufficient storage and transmissibility of these surrounding rocks limits the yield to 15 gpm.

Drilling and Pumping

Drilling began on April 6, 1967, by Caldwell Well Drilling Co. of Hot Springs, N. C. Drilling was started with a cable-tool rig which took the hole to 22 ft through cobbles and boulders. On April 10, an air-rotary rig was started on the hole. At 36 ft, 8-inch casing was set and drilling continued to 70 ft. Because of falling rock and flowing sand and gravel from the walls of the hole, 70 ft of 6-inch casing had to be set inside the 8-inch casing. Drilling of a 6 1/4-inch hole continued to a depth of 125 ft, at which time the driller was hesitant to continue with the air rotary because of unstable walls.

On May 1, a 3-hour pump test was run to learn if the yield of the well was adequate. Most of this test was run at a discharge of only 8 gpm. The water level continually declined for the duration of the test and the well had a specific capacity of less than 0.1 gpm per foot of drawdown. The pump was stopped and an effort made to set it deeper but at 98 ft a rock had evidently slipped into the hole and the pump could not be set deeper.

The well was deepened to 190 ft on May 8-9 and a bail test run at an average withdrawal rate of 35 gpm, causing a drawdown of 20 ft after a total of 375 gallons had been removed. Results of this test were encouraging, but as later pumping showed, an increase in drawdown rate occurs about 45 minutes after pumping begins. Because of the unstable conditions of the well it was decided that a gravel pack, consisting of 1/2- to 1 1/2-inch river gravel placed in the hole to within 90 ft of land surface would stabilize the well and allow the well to be pumped. The driller obtained and delivered at the site the specified gravel.

It was decided that since the water pumped during the first pumping test was so turbid with sediment that air surging before placing the gravel pack might improve the yield by development to remove sediment from the water-bearing zones. On May 22, the driller set the necessary pipe in the well for use with a surge head and air compressor provided by the Park Service. The well was surged on the afternoon of the 22nd and on the 23rd and a large quantity of sediment was removed.

The surge pipe was removed and it was found, on lowering the cable-tool bit in the hole, that no wall collapse had occurred as a result of the violent surging action, indicating that the hole was probably more stable than originally thought.

Another short pump test was run on May 25 to determine if surging had improved the yield of the well. During 4.5 hours of pumping at various discharges ranging between 10 and 30 gpm, the water level did not stabilize. A brief stabilizing tendency occurred after 45 minutes of pumping during this and the following test, at a drawdown of about 17 ft, followed by an increasing rate of drawdown. This appears to indicate that the well is in a very localized condition and as the cone of depression develops and expands it encounters rocks of lower permeability than those in which the well is drilled. Water removed during this test was extremely turbid with clay and sand, indicating that it was still incompletely developed.

The final pumping test was of 8 hours duration, beginning at a discharge of 11.5 gpm. The specific capacity was in the neighborhood of 0.3 gpm/ft. After 3 hours, discharge was increased to 15 gpm, resulting in a drawdown of 93 ft and causing an increase in turbidity. After four hours of pumpage at 15 gpm, discharge was raised to 20 gpm. Within one hour the water level was at 155 ft, where the pump was stopped.

Conclusions

The Cosby Creek test well will not yield more than 15 gpm on a continuous basis in its present undeveloped condition. It is possible that continuous pumpage for several weeks, beginning at a discharge of 15 gpm and gradually increasing, could cause sufficient development to raise the yield to 20-25 gpm, but it is doubtful that the desired 35 gpm can be obtained.

It is recommended that a second test well be drilled in the area at a location near the entrance to the campground, which is in the Gatlinburg Fault zone. A well drilled in a similar location at the Indian Camp Creek ranger's residence 3.5 miles to the west has a yield of at least 150 gpm.

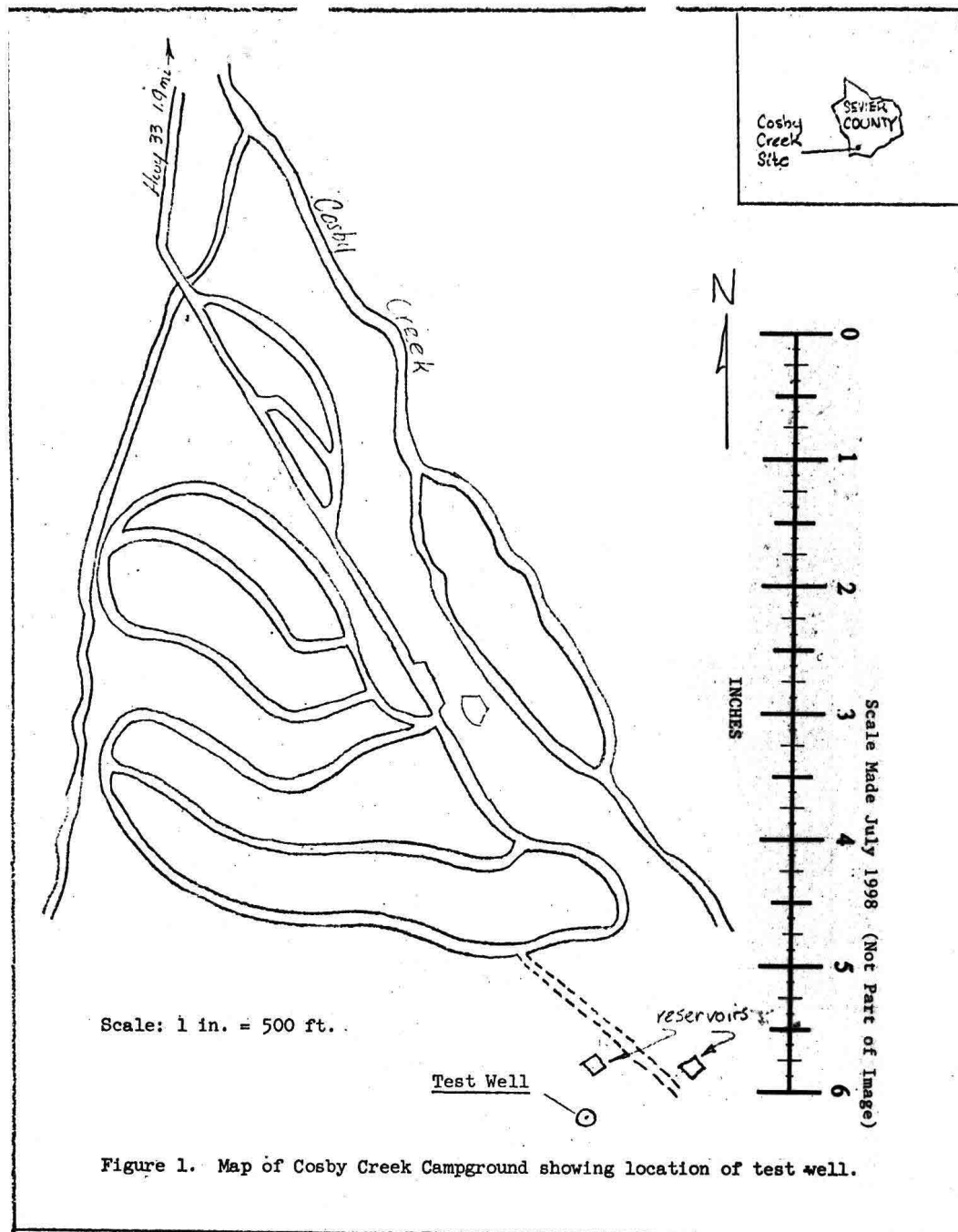
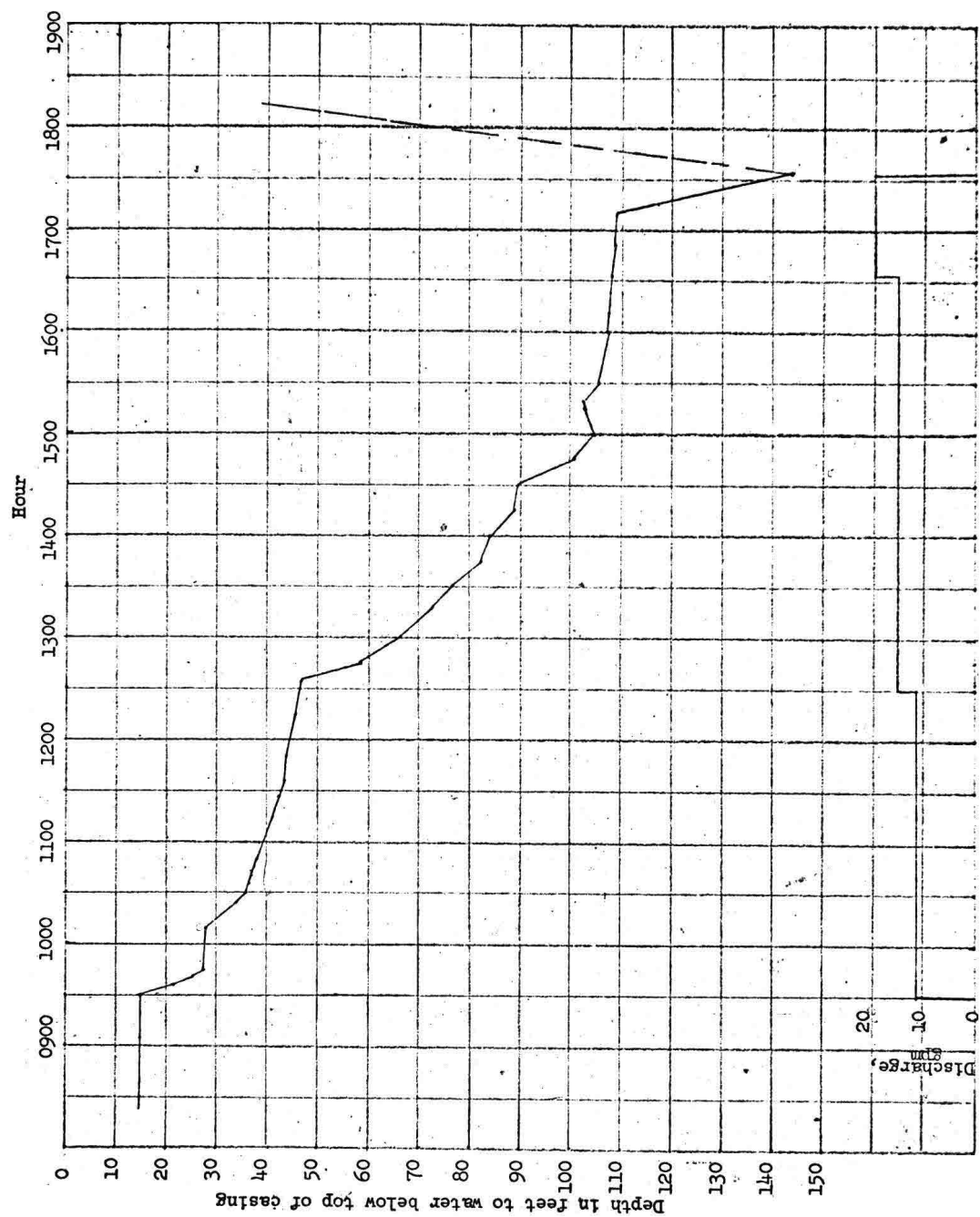


Figure 1. Map of Cosby Creek Campground showing location of test well.

Figure 3. Results of pump test, Cosby Creek Campground well, May 31, 1967.



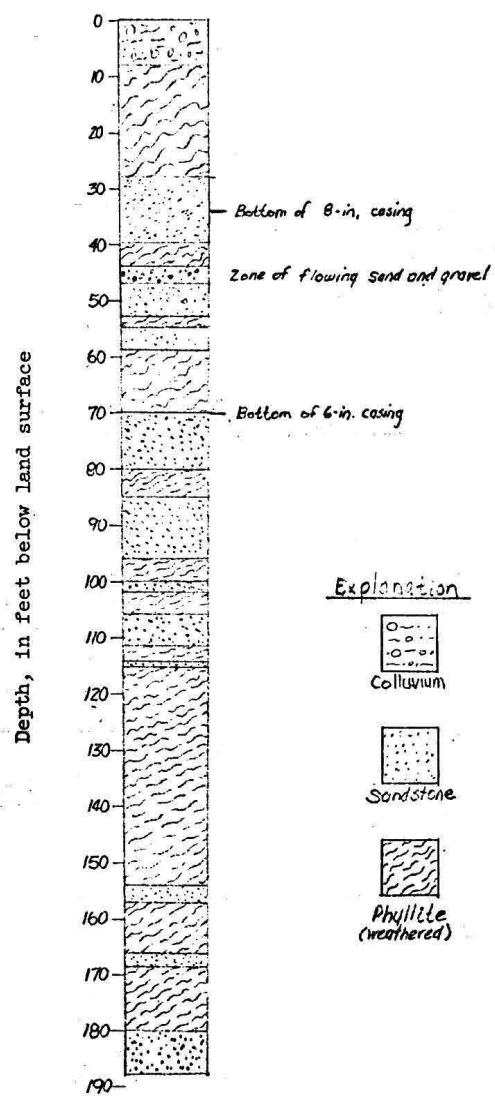


Figure 2. Columnar Section of Cosby Creek Campground Well.

Test Wells at Cable Mill and Cosby Creek
Campground, Great Smoky Mountains
National Park

Drilling of test wells at Cable Mill, Cades Cove, Great Smoky Mountains National Park, by Jack Terry Well Drilling Co., Sevierville, Tennessee, ended on July 14, 1971. Three holes were drilled as follows (see figure 1 for locations):

	<u>Total Depth</u>	<u>Casing</u>
No. 1.	228 ft	15 ft (pulled
No. 2.	300 ft	not cased
No. 3.	200 ft	not cased
TOTAL	728 ft	

Well No. 1 was abandoned and backfilled. Yield was about 5 gpm. It penetrated 10 ft of overburden and 218 ft of sandstone and phyllite. Well No. 2 was drilled to a depth of 300 ft through yellow-red clay without reaching bedrock. Well No. 3 was drilled through 200 ft of yellow-red clay without reaching bedrock. All holes were abandoned and backfilled.

On July 15, 1971, Jack Terry Well Drilling Co. completed a test well near the Cosby Creek campground (figure 2). Total depth: 228 ft; casing: 31 ft; grout, 31 ft; yield: 50 gpm, as indicated by an 8-hour pumping test run on July 20, 1971. The well penetrates weathered brown phyllite, fresh blue-gray phyllite, and fine-grained

blue-gray sandstone. Several small water-bearing fracture zones were penetrated, the deepest being at 207 ft. A plot of the pumping test is attached. Static water level before pumping began was 10.3 ft below the top of casing which is about 1.5 ft above ground surface. On the previous day, before a 3.5-inch rainfall, the water level was 11.7 ft below the top of casing.

As indicated on figure 3, there was considerable difficulty in adjusting the gate valve to a steady discharge. The well was pumped at 10 gpm, 20 gpm, 30 gpm, 38 gpm and 50 gpm. A brief pumping rate of 70 gpm resulted in such a steep decline in water level that pumping was cut back to 50 gpm and held there.

This well will yield 50 gpm on a continuous basis. Maximum pumping head to ground surface in times of low water table probably will not exceed 80 ft at 50 gpm.

Edward J. Frederick
for: William M. McMaster
Hydrologist

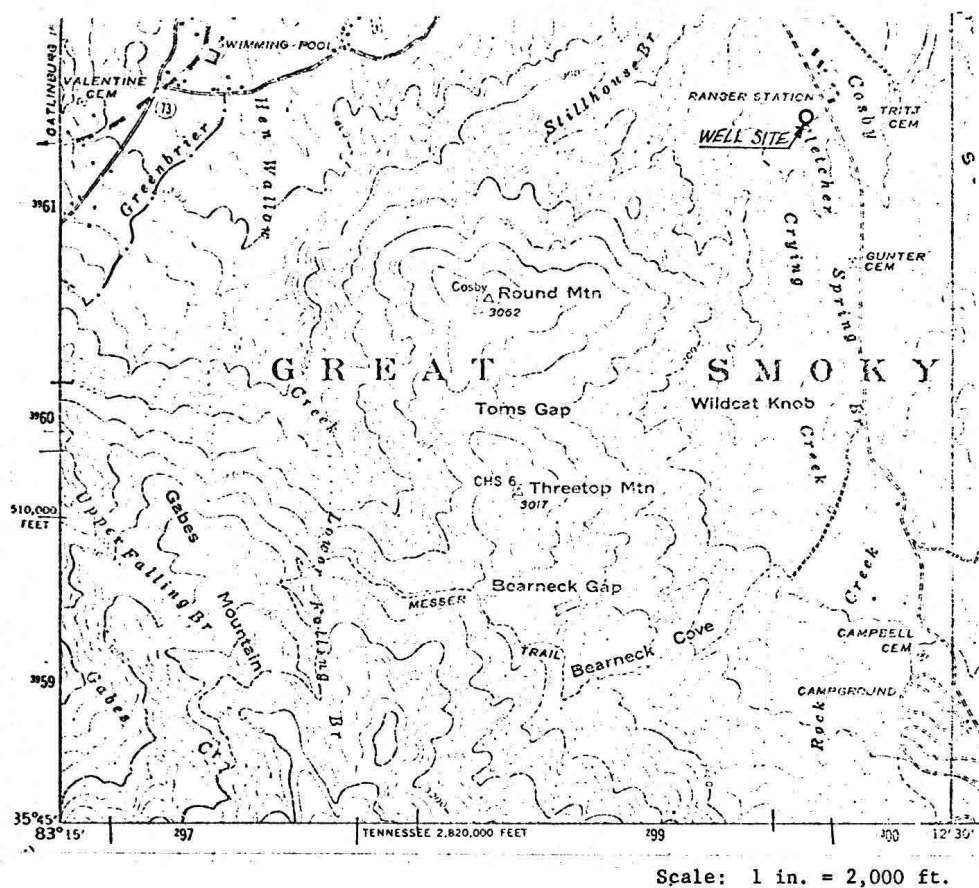
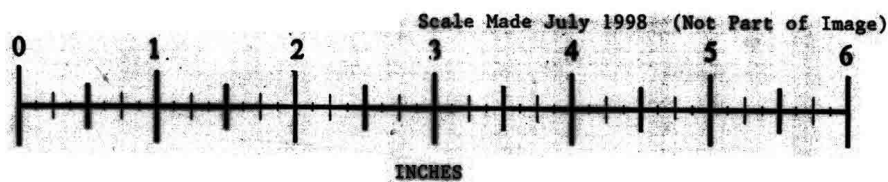


Figure 2. Map of Cosby Creek Campground showing location of well.



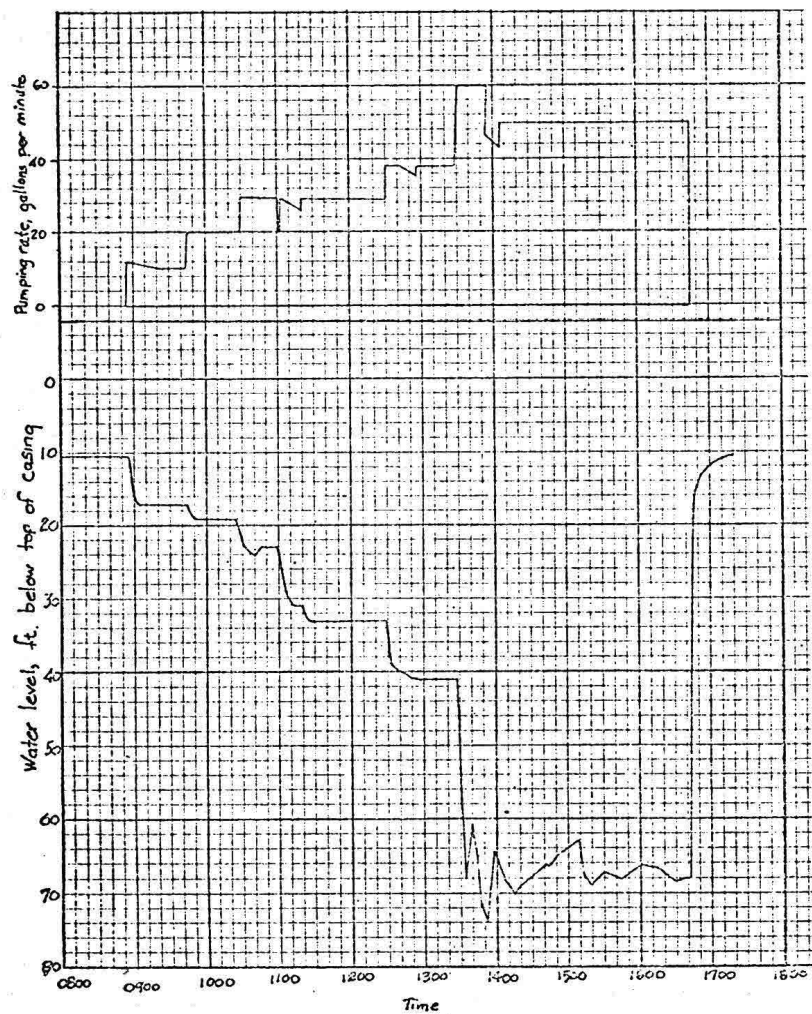


Figure 3. Results of pumping test, Cosby Creek well, July 20, 1971.

Results of Test Drilling, Second Test Well at Cosby Campground

A second effort to obtain a useable ground-water supply was made at the Cosby Campground in February 1969. The well was drilled by Jack Terry Well Drilling Co., Sevierville, Tennessee, using an air rotary rig and a 6-1/4 inch bit, at a location about 500 ft north of the camptender's residence, on the west side of the main campground road.

Casing was set to a depth of 80 ft through boulders and alluvium, and drilling continued to a depth of 196 ft through weathered sandstone containing several fracture openings. The well was blowing 13 gpm from the hole at the end of drilling.

In March, in setting a test pump in the hole it was discovered that an obstruction existed at a depth of 85 ft. A cable tool rig was brought in and it was found that the well was filled with sand, which was slumping into the hole from a zone between 85 and 110 feet. The sand was removed three times and each time it refilled the hole. Rather than case the well deeper, it was decided to pull the casing and refill the hole.

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOV NMENT

Memorandum

TO : Keith Westman, Programmer
Great Smoky Mountains National Park
Gatlinburg, Tenn. 37738
DATE: July 17, 1968

FROM : William M. McMaster, Hydrologist, WRD
USGS, Knoxville, Tennessee

SUBJECT: Abrams Creek and Cosby Creek test well preliminary reports

Enclosed are two copies each of the Abrams Creek and Cosby Creek reports.

WMM

William M. McMaster

(Abrams Creek Ranger Station - Addendum No. 1)

Preliminary Report, Abrams Creek Campground Well

Introduction

The Abrams Creek Campground is located in the narrow valley of Abrams Creek, near the western edge of Great Smoky Mountains National Park. It consists of a ranger's residence and a 20 site primitive campground. Water for the residence is pumped from a small nearby spring and water for the campground is supplied by a second small spring.

The National Park Service plans to reconstruct the ranger residence and to construct a modern comfort station to replace the existing pit toilets. A test well was drilled to determine if the desired 10 gpm (gallons per minute) was available to supply these facilities.

General Geology

The Abrams Creek Campground is located in the outcrop area of the pre-Cambrian Wilhite Formation, which is composed of siltstone, sandstone, and some limestone. At the well site, the rock penetrated by the well is composed only of gray siltstone. The strata strike northeast and dip generally to the southeast. No major fault zones are present in the vicinity of the well site.

Drilling

Drilling of the test well was done on October 4-5, 1966, by Jack Terry Drilling Company of Sevierville, Tenn., using an air rotary rig with a 6 and one-quarter-inch bit. (see figure 1 for location). Ground surface elevation is about 1120 ft.

Ten feet of residual red-brown clay was penetrated and 15 feet of casing was set. Bedrock consists almost entirely of gray siltstone which contains calcite veins in places. Figure 2 is a columnar section of the well.

Water-bearing zones were penetrated at 25 to 28 feet, 55 to 60 feet, 85 to 90 feet, and 170-180 feet. Most of the small quantity of water yielded by the well enters in the 55 to 60 feet zone.

Drilling was stopped at a depth of 185 feet, at which time the rig was blowing 4.5 gpm from the hole.

Pumping

A pumping test was run on October 6, 1966, using a generator-powered submersible pump set at a depth of 168 feet. Static water level was 5.1 feet below ground surface. Results of the test are shown in figure 3.

As shown in figure 3, various rates of pumping were used, ranging from 4 gpm to 10 gpm. The well is very sensitive to small changes in discharge. It will yield 6 gpm on a continuous basis but will not pump as much as 8 gpm for more than one hour.

This well is similar to some other low-yield wells in silt-stone in that the water level shows recovery against pumpage when the maximum yield is not exceeded. It is believed that the pumping water level probably would not have reached a depth of more than 80 ft if maximum yield of 6 gpm had not been exceeded. About 2800 gallons was removed during the pumping test.

Conductivity of the water was 95 and pH was 7.2.

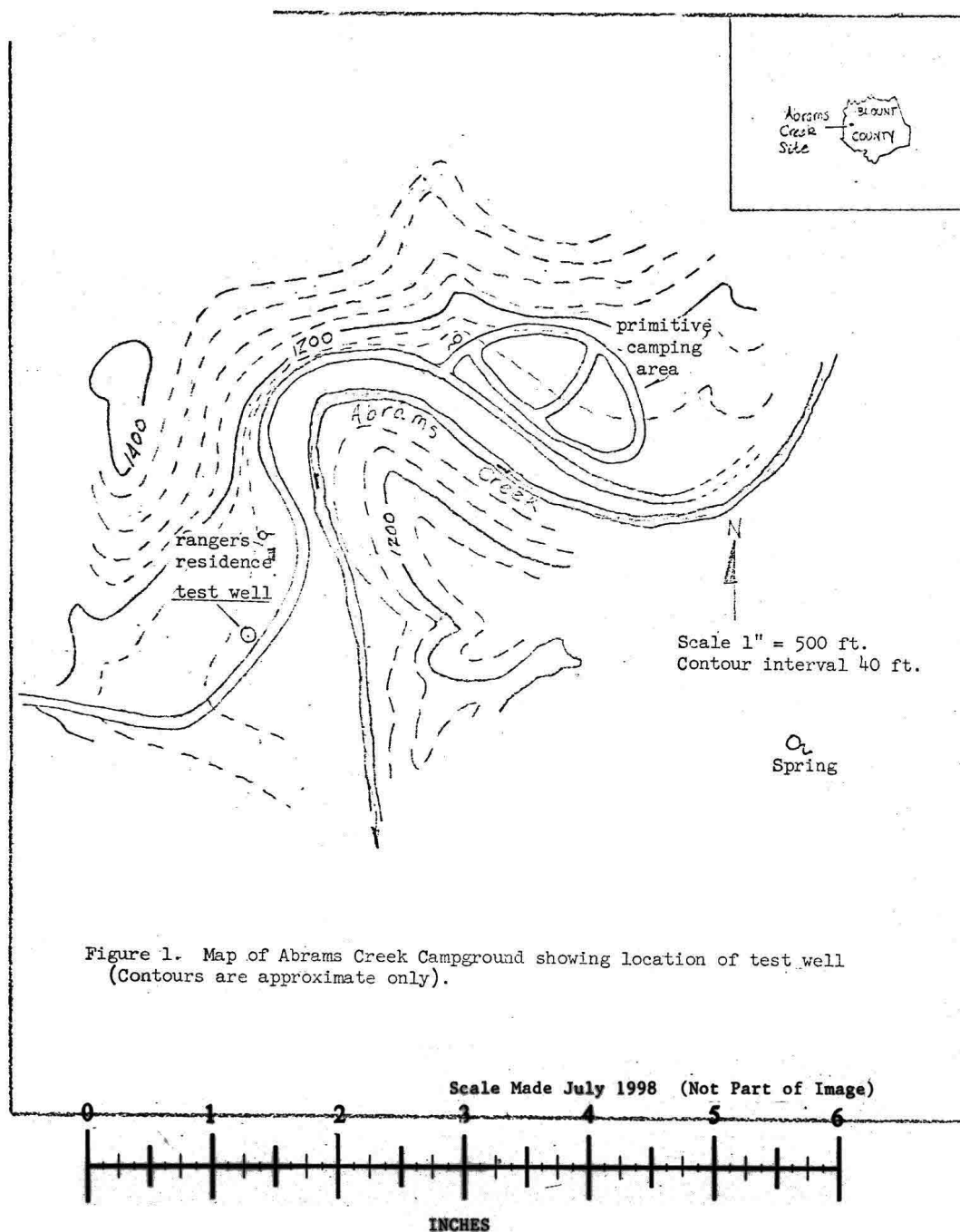
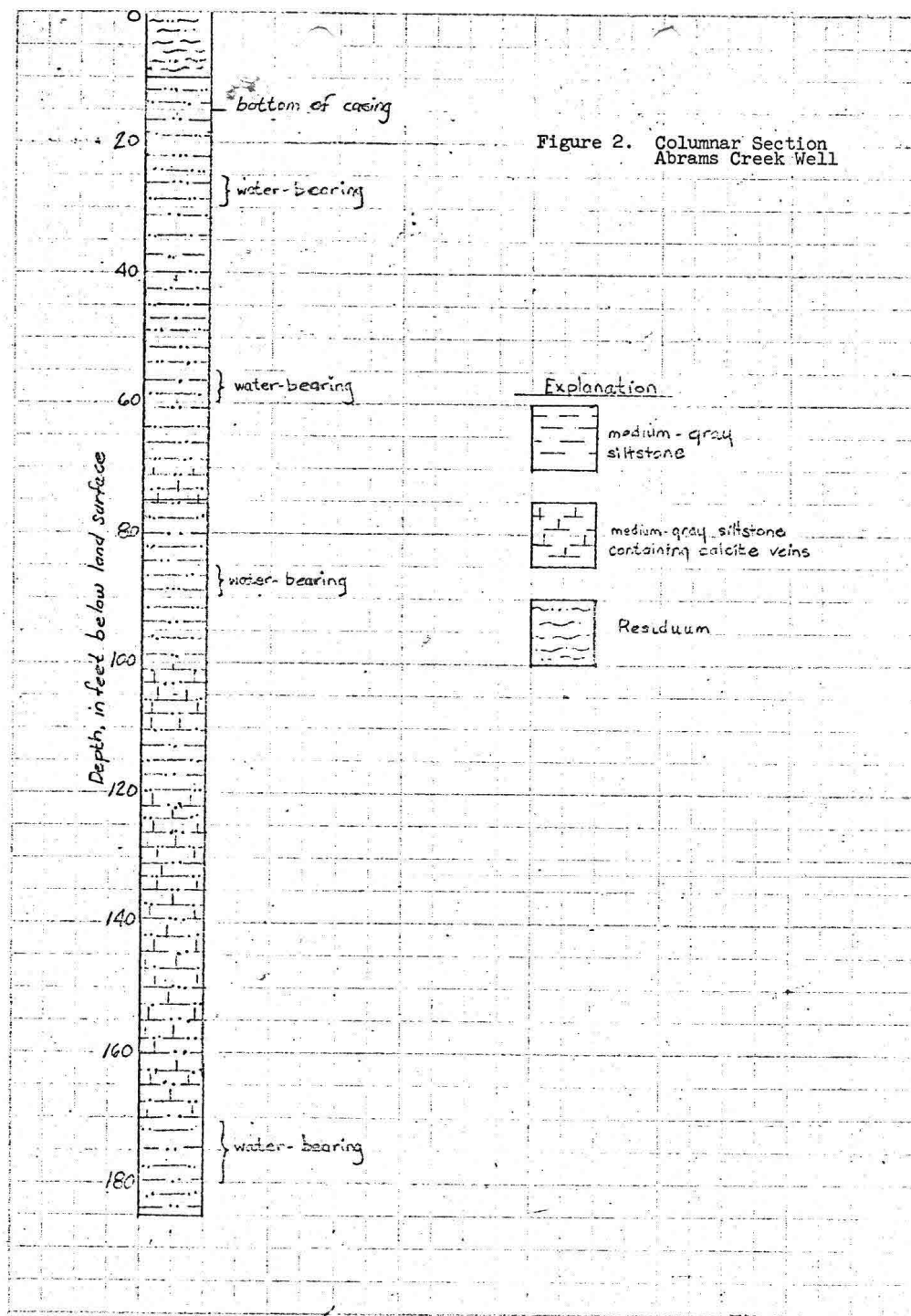
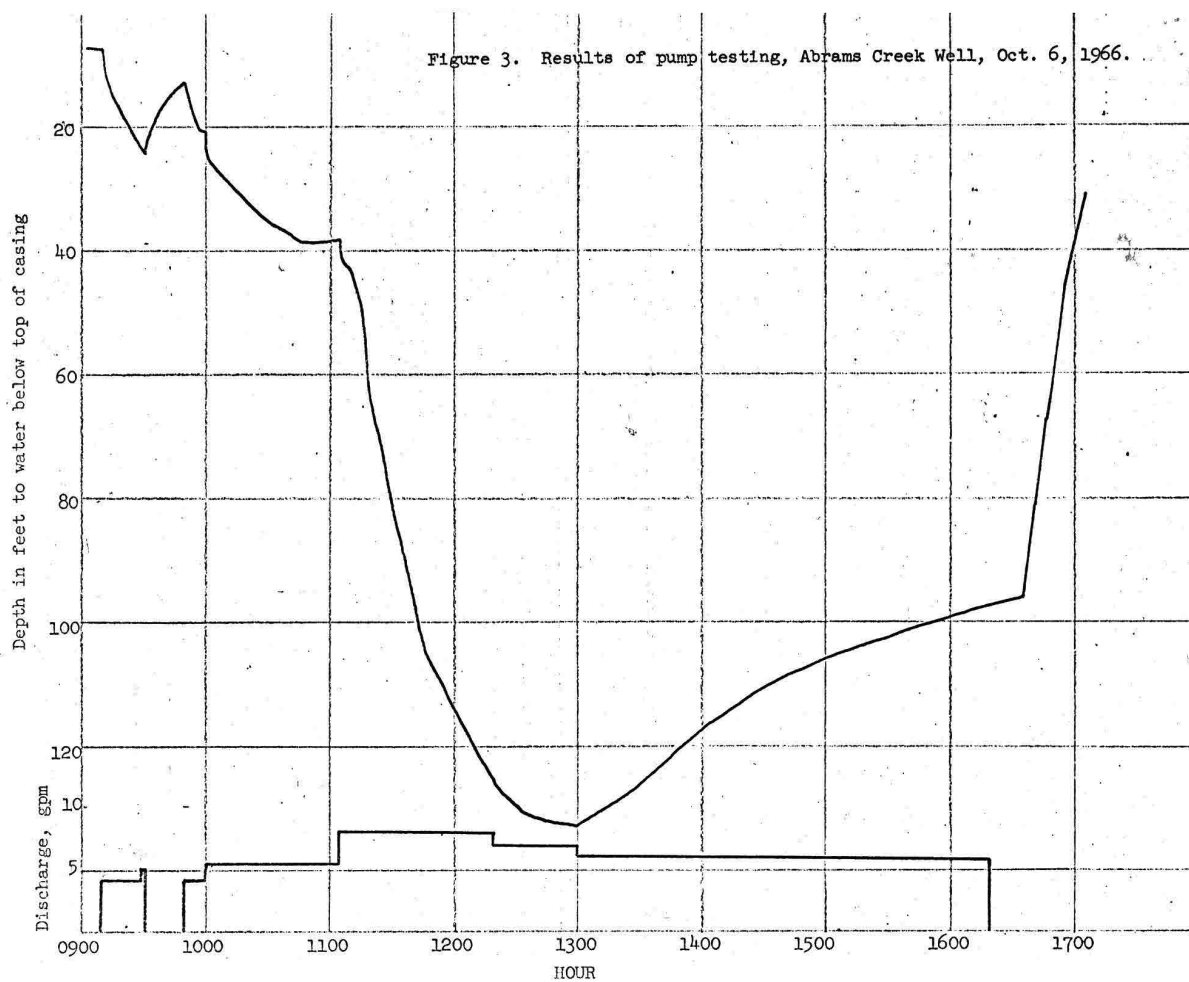


Figure 1. Map of Abrams Creek Campground showing location of test well
(Contours are approximate only).



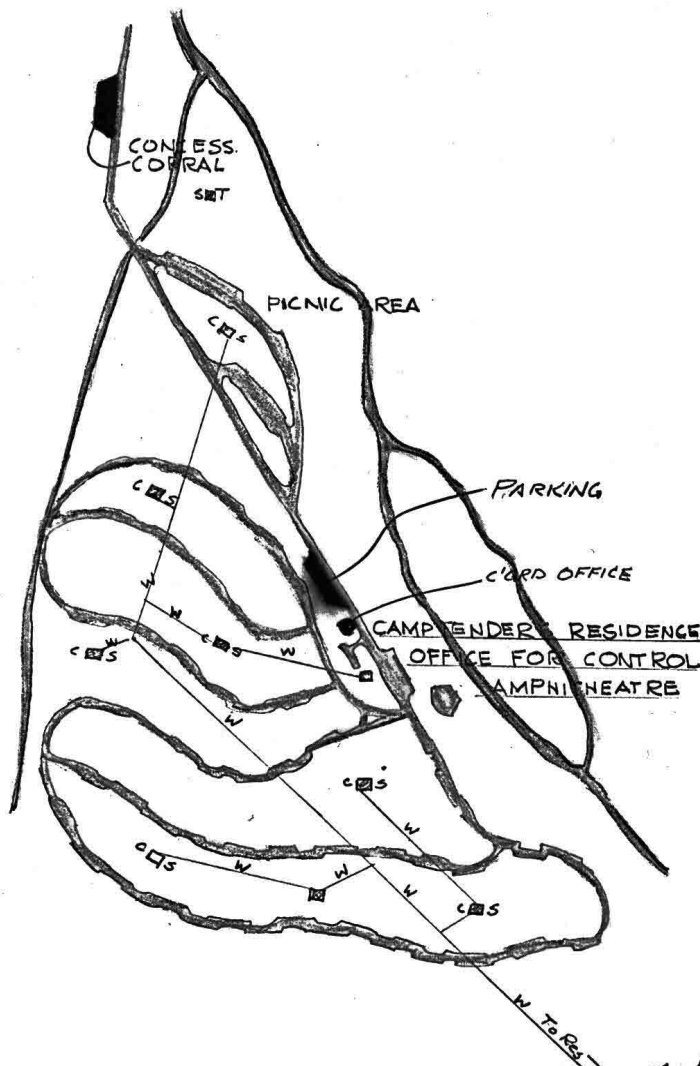


COSBY

Situation: The development of the Cosby area consists of a 230-site campground, a 100-site picnic area and a Park Service residential area. No actual metered consumption figures are available for the area but it is estimated at 30,000 gallons per day. This is a gravity water supply taken from Cosby Creek and the capacity becomes somewhat limited because of the difficulty involved in keeping the intake structure free of sand, silt and high water damage. The visitor use pattern in the area also poses a problem because of horse and pedestrian travel in the intake and watershed areas. If a good well could be developed, it is entirely possible that it might replace the existing supply.

Proposed: Drill an 8" exploratory well to determine availability of a new water source with a capacity of at least 35 g.p.m.

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



COSBY CAMPGROUND AND PICNIC AREA

1" = 500'

230 C' SITES
100 PIC. SITES

Prop Well
Invas. Site
(Between Residences)

NAME OF SYSTEM: Cosby CampgroundLOCATION: Route 5LOCATION: STATE: Tennessee COUNTY: CockeA. Source of SupplyLocation - Reference to permanent LandmarkCoordinates

1. Cosby Creek

About 1,200 feet due east of the south end of the campground

Lat. N 35°45'05"
Long. W 83°12'19.5"

This is a gravity flow system with the intake located southeast of the campground in Cosby Creek. The intake consists of 15 feet of perforated, corrugated metal pipe buried across the creek bed. A 2' x 2' x 2' reinforced concrete collection box on the west bank is connected to the intake gallery. From the collection box, which is at an elevation of 2,450 feet, runs a 2½" galvanized iron pipe along the creek for a distance of 226 feet. This line is then reduced to a 2" galvanized steel and runs 805 feet west to a 25,000 gallon reinforced concrete reservoir, elevation 2,415, with a Mathieson type chlorinator located in a small house on top of the reservoir. From this reservoir leads a 6" AC main 927 feet to the campground. A second 20,000 gallon reservoir was constructed in 1961 and tied to the 6" main 100 feet down line from the existing reservoir.

(Cosby Campground - Addendum No. 1)

B. Consumption:

This system is not metered, but the estimated consumption is about 25,000 gallons per day during the summer visitation period. (700,000 gallons per year) During the 1967 season, these facilities were used by 31,970 campers and 14,087 picnickers. During the 1968 season, these facilities were used by 45,509 campers and 11,589 picnickers.

C. Distribution Mains and Laterals:

<u>Size</u>	<u>Type</u>	<u>Length</u>
6"	AC	927 Lineal Feet
4"	AC	1,145 Lineal Feet
3"	Galvanized Steel	157 Lineal Feet
2½"	Galvanized Steel	226 Lineal Feet
2"	Galvanized Steel	3,262 Lineal Feet
1"	Galvanized Steel	<u>1,487 Lineal Feet</u>
TOTAL		7,204 Lineal Feet

D. Problems of Present System:

The developed area consists of a 230-site campground, a 100-site picnic area, and a campground ranger residence. The supply from Cosby Creek becomes somewhat limited because of the difficulty involved in keeping the intake structure free of sand, silt, and high water damage. The visitors' use pattern in the area also poses a problem because of horse and pedestrian travel in the intake and watershed area.

(Cosby Campground - Addendum No. 1)

E. Proposed:

Ultimately, we need to develop a well as water supply for the area. The use pattern, with completion of Interstate 40 and the Foothills Parkway, can be expected to be double the present number of visitations. Presently, this improvement is in no current construction program.

F. Additional Information:

An initial well was drilled under the Water Resources Program in 1968 F.Y. and was abandoned due to unstable walls. A second effort to obtain a usable well at Cosby Campground was made under the Water Resources Program in the 1969 F.Y. The walls of this well also proved to be unstable, necessitating the pulling of the casing and the filling of the well. It now appears water is available in the Cosby area and any future effort to use deep well water for domestic supply will involve use of a perforated or screened casing. Because of low pH, the use of a special casing may be necessary.

(Cosby Campground - Addendum No. 1)



INTAKE STRUCTURE FOR COSBY CAMPGROUND WATER SYSTEM ON COSBY CREEK



25,000 GALLON RESERVOIR WITH CHLORINATOR HOUSE



20,000 GALLON RESERVOIR

Other Supporting Information

5010-108-01
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 [redacted] 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 and publication. However, if insufficient opportunities to collect [redacted] 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

Reed
ELC 9/17
WTR

Memorandum

To: Superintendent, Great Smoky Mountains

From: Acting Assistant Regional Director, Operations,
Southeast Region

Subject: Water Resources Investigations, Great Smoky Mountains
National Park

We will be glad to assist you in developing a detailed water resources study at Great Smoky Mountains National Park during the 1966 fiscal year as requested in your memorandum of August 23. The results produced from such a study should provide us with the basis for a full and most effective development of all water resources located within the Park boundaries. It is evident that new sources of water are needed to meet the demands of future and existing Park facilities.

We believe the investigative work should include the following:

(1) The first and most pressing problem involves the need to expand several water supply systems in order to provide more water to take care of a greater number of Park visitors and increased Park uses. This requires an evaluation of the probable capacity of the present sources of supply and the locating of possible new sources of water supply of acceptable quality for increased demands of the future and (2) The second phase of the project (extending over a period of several years) would be to conduct surface and ground water studies throughout the Park in order to obtain a general knowledge of all water resources. With such information at hand, the Park staff will be able to plan efficiently for new or expanded developments.

An over-ceiling item was included in the 1966 F.Y. Regional Water Resources Program in the amount of \$26,000 to initiate a study of domestic water supply needs and test well drilling work at the Park. Mr. E. W. Reed, Chief, Water Resources, has recently advised that at present the Washington Office reserve contains sufficient funds to finance this study.

We agree a meeting and field reconnaissance should be held at the Park between representatives of the U. S. Geological Survey, the Regional Office and the Park staff to properly formulate a logical approach to this water resources project. In early October, we will take the necessary action to firm up a satisfactory date for the meeting with all those concerned.

(SIGNED)

W. Mikell

cc:

~~Director, w/c of inc.~~

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



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. (D)	
Resource Studies Act.	
X <i>Land & Water</i> <i>Main</i>	

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

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
13. 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



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.

75-9-17-65-

LS4 SER(OLW)

SEP 14 1965

[Handwritten signature]
EVR
MAR 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, RODO (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

Memorandum

To: Regional Director, Southeast Region
From: Superintendent, Great Smoky Mountains
Subject: Water Resources Investigations, Great Smoky Mountains
National Park

EAST REGION	
AUG 26 1965	
Regional Director	
Asst. Dir., (A)	
Asst. Dir., (CA)	
Asst. to Reg. Dir. (PA)	
Asst. to Reg. Dir. (D)	
Resource Studies	
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<i>Handwritten: Maint</i>	

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.

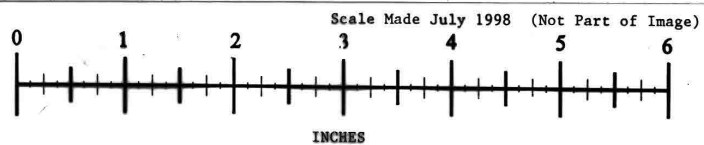
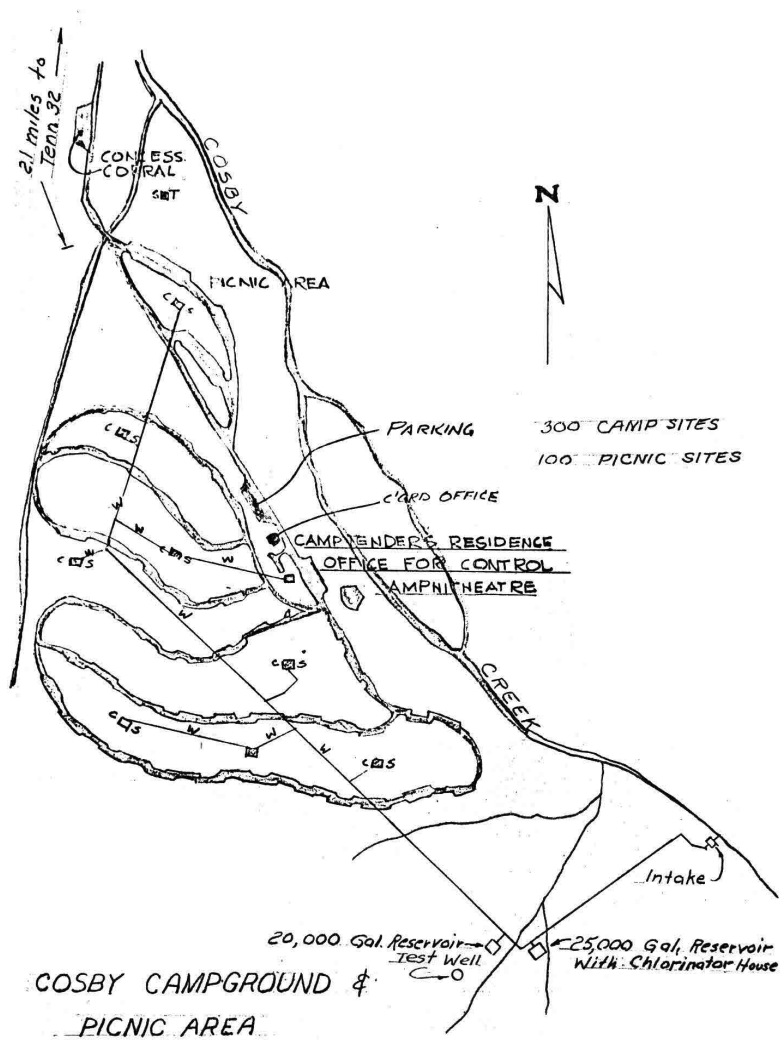
In an August 19 telephone conversation between Hydraulic Engineer Vick of your office and Chief of Maintenance Rowe, Mr. Vick had mentioned that he had put an over-ceiling item in his 1966 F.Y. Water Resources budget in the amount of \$24,000 to initiate a study of Park domestic water supply needs. We 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. / /

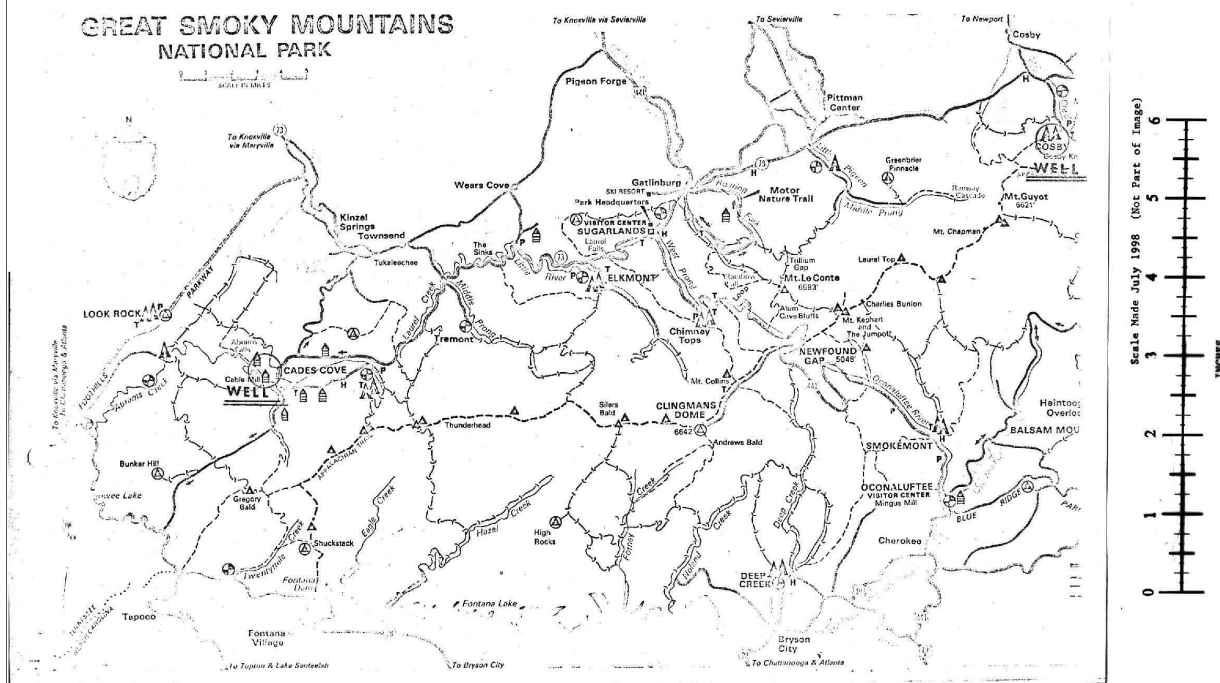
As suggested to Mr. Vick in the abovementioned telephone call, the following listing is a tentative priority list of well investigations which we would like to see programmed:

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.
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13. Webb Mountain, Foothills Parkway -- 1969 F.Y.


George W. Fry





Docket Information

Number of Documents in Docket 46

Documents Dated from 8/23/1965 to 7/20/1971

Docket Compiled: 3/29/2011