



WATER-RIGHT DOCKET

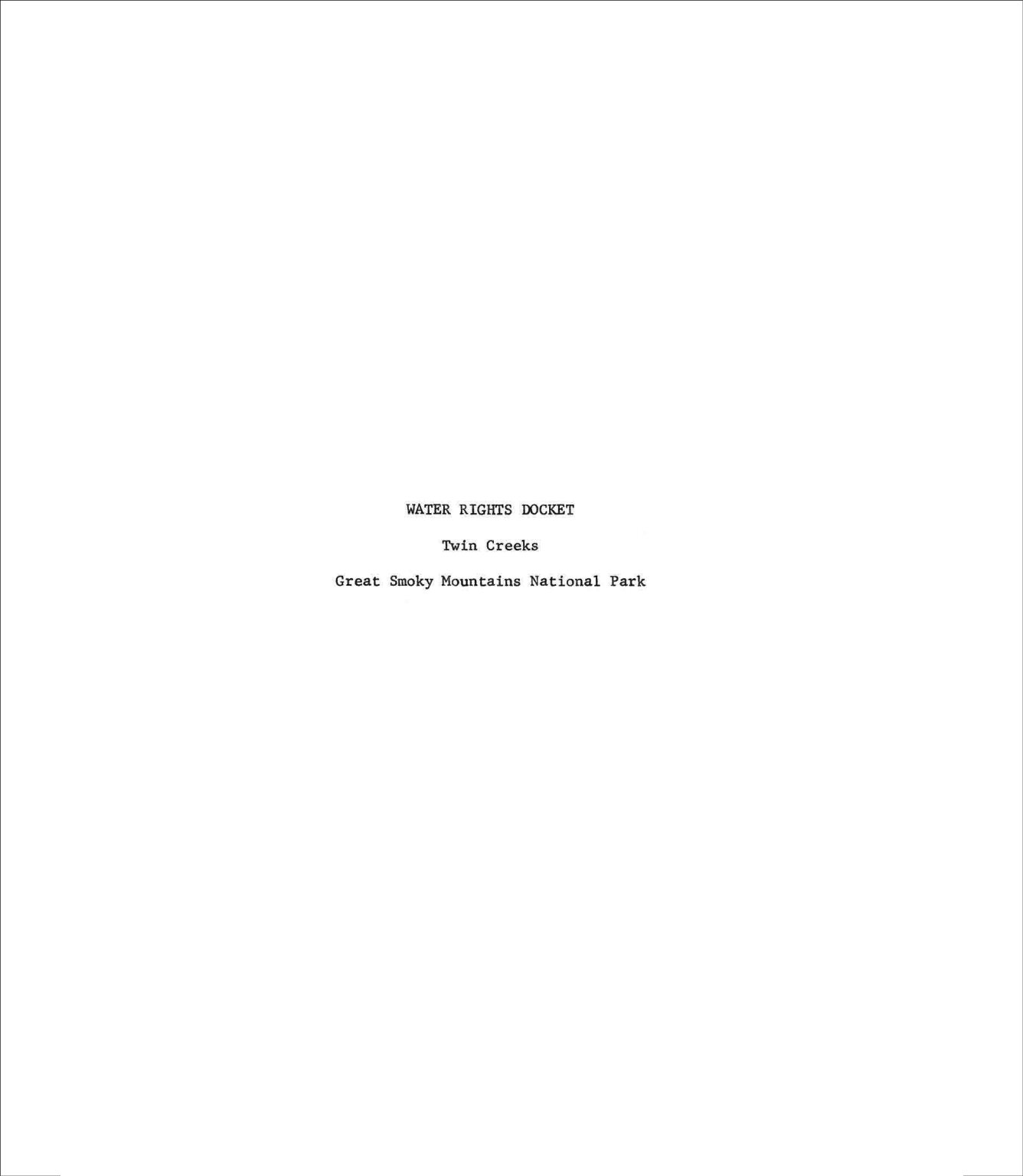
Great Smoky Mountains National Park

Docket No: 32

LECONTE CREEK, TWIN CREEKS SYSTEM

Preliminary Docket Information

00-00-0000: water rights docket cover sheet



WATER RIGHTS DOCKET
Twin Creeks
Great Smoky Mountains National Park

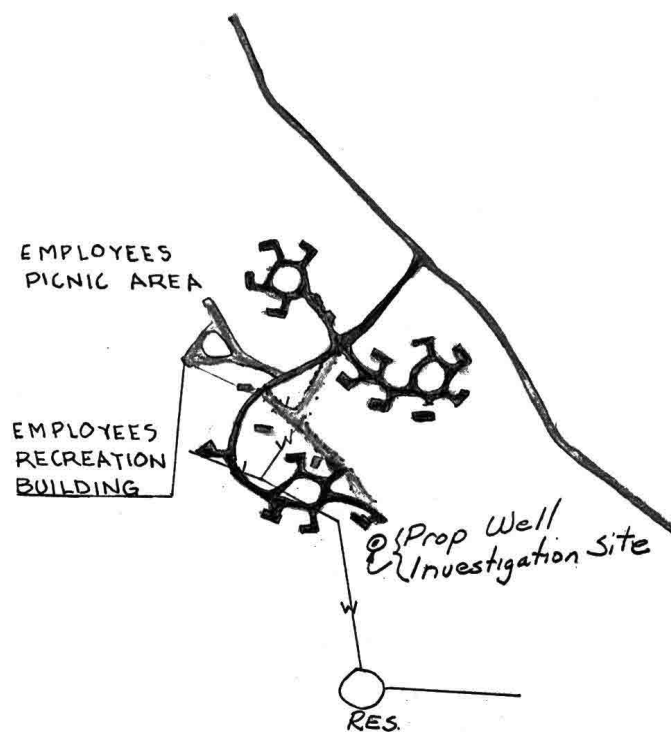
Supporting Hydro Data

TWIN CREEKS

Situation: At the present time, the development in this area consists of 5 residences and water consumption is approximately 2,000 gallons per day (according to meter records). The supply is a small surface stream and periodically there is concern as to whether the quantity will hold up during dry spells. Ultimate plans call for the construction of some 15 additional residences and a 4-unit seasonal apartment in the area. In view of this, we need information as to the most feasible system for the area.

Proposed: Drill a 6" well with a capacity of 20 g.p.m. While this project is not in a current Water Investigations program, because of the emergency nature of need for additional supply for existing development, it appears that we may yet obtain authority to drill this well in 1966 F.Y. if available funds are sufficient for this addition to the program.

Progress to date: Even though it does not appear in an approved program, we have gone ahead with a request for wage rates. We should have knowledge by May 15 as to whether we can go ahead with this project.



TWIN CREEKS
RESIDENCE AREA

Preliminary Report
Test Wells at Twin Creeks
Great Smoky Mountains National Park

Introduction

The Twin Creeks area, located about one mile southeast of Gatlinburg on the Cherokee Orchard road, consists of five residences, now supplied by water from LeConte Creek, which reportedly has caused concern due to a low flow in dry periods. The Park Service plans to construct additional residences in the area.

A ground water source capable of supplying at least 20 gpm (gallons per minute) is desired for this area.

Geology

The Twin Creeks area is underlain by the pre-Cambrian Roaring Fork Sandstone. In the vicinity of Twin Creeks, the formation is composed mostly of green-gray phyllite, siltstone, and thinly-bedded sandstone.

The strata strike generally northeast and dip southeast. No major fault zones are present in the area.

Drilling

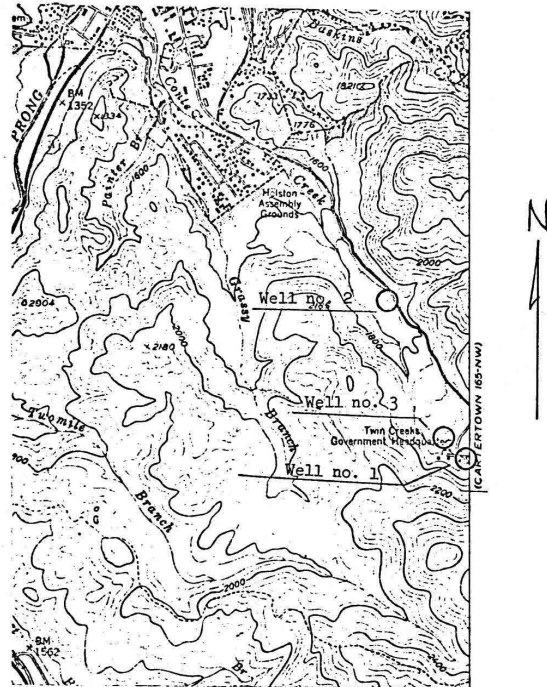
Three test wells have been drilled at the Twin Creeks area, all by Jack Terry Well Drilling Co., Sevierville, Tenn., using an air rotary rig and a 6-1/4-inch bit.

The first test well, drilled in October, 1966, and located as shown in figure 1, was drilled to a depth of 165 ft. Since the well had a yield of less than 5 gpm, the casing was pulled and the hole was backfilled.

The second well, drilled in April, 1968, was 120 ft deep and had a yield of only 2 gpm. It was also backfilled.

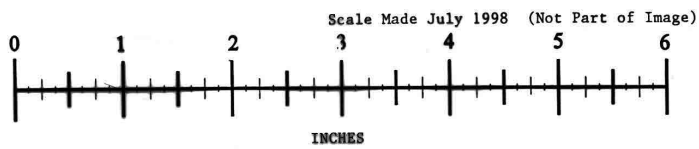
The third well penetrates 35 ft of alluvial boulders, gravel, and sand, is cased to 45 ft, and is 150 ft deep, the 105 ft of open hole being mostly in weathered phyllite. A columnar section of this well is shown in figure 2. At the completion of drilling, the rig was blowing 15 gpm from the hole. Most of the water enters from the zone between 45 and 70 ft. Ground altitude at the well is about 1,980 ft.

(Twin Creeks - Addendum No. 1)



Scale 1:24,000

Figure 1. Map of Twin Creeks area showing locations of test wells.



Pumping

An 8-hour pumping test was run on well no. 3 on May 21, 1968, using a 1-hp generator-powered submersible pump set at a depth of 105 ft. A plot of the test is shown in figure 3.

The well was pumped at 16 gpm for 2 hrs 50 mins, and at 20 gpm for 5 hrs 10 mins. Maximum drawdown below the static water level of 27.5 ft was 32 ft. The well has a specific capacity of 0.71 gpm/ft of drawdown at 16 gpm and 0.66 at 20 gpm.

The well recovered to within 11 ft of static water level in less than 15 mins. About 8900 gallons was removed from the well during pumping.

A copy of results of chemical analysis of water taken after six hours pumpage is attached. Water quality is excellent but the pH of 6.2 is rather low.

Conclusions

The Twin Creeks well is capable of yielding at least 20 gpm on a continuous basis. Pumping head to ground surface at this discharge will be about 60 ft. The water is of excellent chemical quality.

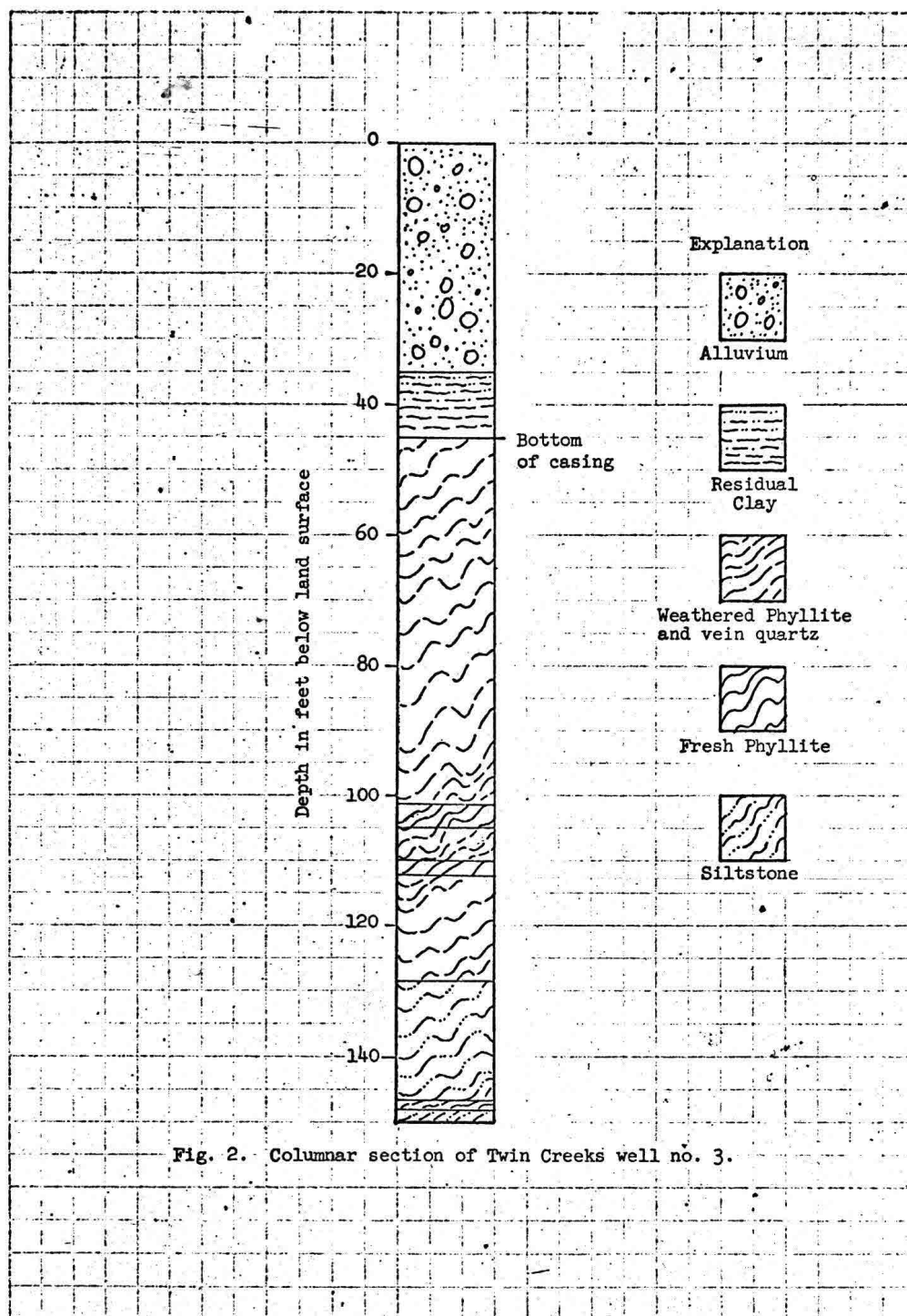


Fig. 2. Columnar section of Twin Creeks well no. 3.

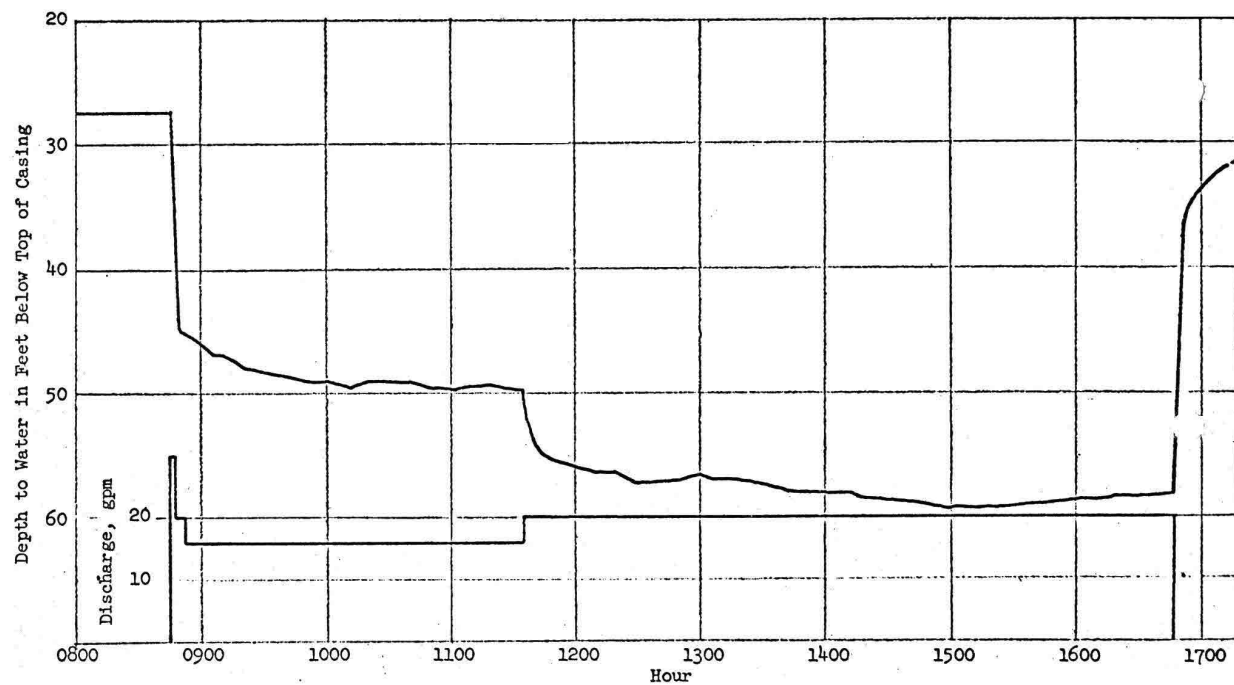


Fig. 3. Results of test pumping, Twin Creeks well no. 3, May 21, 1968.

GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
WATER ANALYSIS

W.R. Lab. No. NC 50063

Location <u>Twin Creeks</u> County - <u>Sevier, Tennessee</u>			
Source <u>Drilled. Dept. 150'; pt. of coll.: pump discharge. Owner. National</u>			
Park Service. Use: <u>Dom Park Ser. Residence. WL 55 PWL below LSD; yield: 20 gm</u>			
pump (meas.). Sampled after pumping 4 hours. Date drilled: <u>April 1968. Appear.</u>			
when collected: <u>clear.</u>			
Date of collection <u>May 21, 1968</u>			
Gage height(ft.) _____		Discharge(sec.ft.) _____ Temp. (^C / _F) <u>13</u>	
(Parts per million) (in milligrams per liter)			
Silica (SiO ₂).....	16	Carbonate (CO ₃).....	0
Aluminum (Al).....	.1	Bicarbonate (HCO ₃).....	21
Iron (Fe).....	.17	Sulfate (SO ₄).....	.2
Manganese (Mn).....	.00	Chloride (Cl).....	1.5
Calcium (Ca).....	2.5	Fluoride (F).....	.1
Magnesium (Mg).....	.6	Nitrate (NO ₃).....	.1
Sodium (Na).....	3.8	Phosphate (PO ₄).....	.06
Potassium (K).....	.4		
Lithium (Li).....			
(Parts per million) (in milligrams per liter)			
Dissolved solids:			
Sum.....	36	ABS.....	*
Residue upon evapo- ration @ 180°C.....	38	Color.....	0
Hardness as CaCO ₃	8		
Noncarbonate.....	0		
(Parts per million) (in milligrams per liter)			
pH.....	6.2	Specific conductance (micromhos at 25°C).....	35

Unpublished records subject to revision

B. Consumption:METER READINGS - 1969 OPERATING SEASON

Breakdown according to usages:

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>
Residences (5).....	28	25	28	27	28	27	28	28	27	28	27	28	329
Unaccounted.....	<u>12</u>	<u>6</u>	<u>2</u>	<u>(7)</u>	<u>(16)</u>	<u>(16)</u>	<u>(17)</u>	<u>(18)</u>	<u>(12)</u>	<u>(10)</u>	<u>(11)</u>	<u>(13)</u>	<u>(100)</u>
TOTALS.....	40	31	30	20	12	11	11	10	15	18	16	15	229

METER READINGS - 1970 OPERATING SEASON

Breakdown according to usages:

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>
Residences (5).....	23	21	23	22	23	22	23	23	22	23	22	23	270
Unaccounted.....	<u>(14)</u>	<u>(6)</u>	<u>(8)**</u>	<u>8</u>	<u>5</u>	<u>3</u>	<u>79</u>	<u>9</u>	<u>3</u>	<u>8</u>	<u>15</u>	<u>4</u>	<u>106</u>
TOTALS.....	9	15	15	30	28	25	102*	32	25	31	37	27	376

*High meter reading due to waste during new waterline construction.

**Negative numbers in the "unaccounted" column are due to a faulty meter which was replaced in April of 1970.

(Twin Creeks - Addendum No. 2)

(2/8/71)

NAME OF SYSTEM: Twin CreeksLOCATION: Park Route 18 about
1.5 miles from Park
BoundaryLOCATION: STATE: Tennessee COUNTY: SevierA. Source of SupplyLocation - Reference to Permanent LandmarkCoordinates1. LeConte CreekAbout 1,500 feet upstream from intersection
of LeConte Creek, a tributary, un-named, that
runs east through Cherokee Orchard.Lat. N 35°41'02.5"
Long. W 83°29'44.2"

This is a gravity flow system with the intake structure located in LeConte Creek.

The intake structure consists of a small concrete dam with a flood gate. The intake pipe is 2" in diameter with a 30" length of screen at the end. The intake line runs through a chlorinator and into a newly constructed 11,000 gallon wood stave reservoir. A 1½" galvanized iron main runs from the reservoir to the existing quarters.

2. A Deep Well

About 100 feet southeast of Quarters #237

Lat. N 35°41'09"
Long. W 83°30'00"

A deep well was drilled in the summer of 1966 to a depth of 165 feet. The well capability was insufficient, only 3.0 gallons per minute looking for about 20 gallons per minute.

3. A Deep WellAbout 1,000 feet downstream from bridge and
approximately 200 feet from Route 18.Lat. N 35°41'23"
Long. W 83°30'12"

This well was drilled in April, 1968, to a depth of 112 feet and abandoned, no water bearing rock in evidence.

A. (Continued)

Source of Supply

Location - Reference to Permanent Landmark

Coordinates

4. A Deep Well

300 feet west of entrance road and 200 feet
north of LeConte Creek

Lat. N 35°41'15"
Long. W 83°30'05"

This well was drilled in the vicinity of the Employees Picnic Area. It was
drilled to a depth of 150 feet, and preliminary pumping indicates a capacity
of 20 gallons per minute.

B. Consumption:

Maximum daily - 4,500 gallons

Maximum monthly - 130,000 gallons

Maximum annual - 1,600,000 gallons

Breakdown according to usage

METER READINGS -- March 1966 - February 1967

Monthly (Consumption in 1,000 gal.)	<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>Jan</u>	<u>Feb</u>	<u>Totals</u>
Residents	47	48	51	60	57	32	57	72	57	66	62	54	663
Unaccounted for	<u>13</u>	<u>6</u>	<u>11</u>	<u>30</u>	<u>32</u>	<u>-10</u>	<u>37</u>	<u>49</u>	<u>29</u>	<u>40</u>	<u>44</u>	<u>31</u>	<u>312</u>
TOTALS	60	54	62	90	89	22	94	121	86	106	106	85	975

Breakdown according to usage

METER READINGS -- March 1967 - February 1968

Monthly (Consumption in 1,000 gal.)	<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>Jan</u>	<u>Feb</u>	<u>Totals</u>
Residents	54	42	54	52	54	54	52	54	53	54*	54*	51	628
Unaccounted for	<u>46</u>	<u>85</u>	<u>97</u>	<u>135</u>	<u>109</u>	<u>71</u>	<u>148</u>	<u>190</u>	<u>20</u>	<u>-51*</u>	<u>-23*</u>	<u>4</u>	<u>831</u>
TOTALS	100	127	151	187	163	125	200	244	73	3*	31*	55	1,459

*Meter not working correctly

(Twin Creeks - Addendum No. 1)

C. Distribution Mains and Laterals:

<u>Size</u>	<u>Type</u>	<u>Length</u>
2"	Galvanized Iron	1,500 Lineal Feet (Estimate)
1-1/4"	Galvanized Iron	466 Lineal Feet
1"	Galvanized Iron	1,694 Lineal Feet -- (1,012 Lineal Feet Abandoned)
3/4"	Galvanized Iron	<u>553 Lineal Feet</u>
TOTAL		4,213 Lineal Feet

D. Problems:

At the present time, the development in this area consists of five residences, and water consumption is approximately 4,500 gallons per day (according to meter records). The supply is a small surface stream and periodically there is concern as to whether the quantity will hold up during extended dry spells. Ultimate plans call for the construction of some fifteen additional residences and a 4-unit seasonal apartment in the area.

E. Proposed:

Accomplish an additional water resource investigation for the area. This study, which is included in the 1968 F.Y. program, calls for location of a well of at least 20 gallons per minute.

(Twin Creeks - Addendum No. 1)

E. Proposed: (Continued)

Ultimate design calls for a 30,000 gallon reservoir and new lines (mains and laterals). If an acceptable deep well can be developed, it will become the domestic supply for the area. Otherwise, an additional surface supply will have to be developed for the area.

F. Additional Information:

Under the 1968 F.Y. well drilling program, two additional 6" test holes were drilled in the Twin Creeks area. Hole #2 was drilled to 120 feet with a yield of only 2 gpm. This hole was abandoned and filled. Hole #3 was drilled to a depth of 150 feet, yielding water at a rate of 20 gallons per minute.

In March of 1969 all of the existing mains and laterals from the reservoir to the quarters were replaced. Seven hundred sixty feet of 4-inch cast iron main now run from the reservoir past Quarters No. 237 and No. 238 over the bridge at LeConte Creek to a 4-inch "T" approximately 30 feet north beyond the bridge. When this main was laid, an electrical control cable was also laid in the same ditch in order to expedite installation whenever it is deemed necessary to put the newly drilled well into production. From "T"s on this new main run 1" and 1½" galvanized iron laterals to the existing buildings as shown on the attached "As Built" drawing. Ultimately, this deep well should be developed and tied into the area mains as the domestic supply.

(Twin Creeks - Addendum No. 1)



11,000 GALLON WOOD STAVE RESERVOIR



CHLORINATOR HOUSE HOUSING AN AERO-FEED CHLORINATOR
AND A WATER METER



WATER INTAKE CONSISTING OF A ROCK DAM WITH A 2"
DIAMETER SCREENED INLET BEHIND THE DAM

Other Supporting Information

PROPOSED SITES FOR WATER RESOURCES INVESTIGATION

1. Park Headquarters
2. Green Mountain (Foothills Parkway)
3. Newfound Gap
4. Cades Cove
5. Deep Creek
6. Smokemont
7. Abrams Creek
8. Twin Creeks
9. Collins Creek
10. Metcalf Bottoms
11. Cataloochee
12. Elkmont
13. Cosby
14. Chimneys
15. Rocky Mountain (Foothills Parkway)
16. Webb Mountain (Foothills Parkway)
17. Little Greenbrier
18. Greenbrier
19. Sinks
20. Towstring
21. Indian Camp Creek
22. Tremont Ranger Station
23. Round Bottom Campground
24. Balsam Mountain Campground
25. Main Oconaluftee Residential Area
26. Old Oconaluftee Residence Area (Ravensford)
27. Big Creek Ranger Station
28. Cataloochee Ranger Station
29. Cataloochee Maintenance Area
30. Twentymile Ranger Station
31. Cherokee Orchard
32. Sugarlands

(09/28/67)

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

TO : Gerald Rowe, Chief of Maintenance
Great Smoky Mountains National Park
Gatlinburg, Tennessee 37738

DATE: September 7, 1967

FROM : W. M. McMaster, USGS, WRD
Knoxville, Tennessee

SUBJECT: Summary of work plans for study of water resources of Great Smoky Mountains
National Park, North Carolina and Tennessee Districts

As I promised you on August 11, I am sending you our plans for the study of water resources of Great Smoky Mountains National Park that have been modified as a result of a meeting between North Carolina and Tennessee U. S. Geological Survey personnel July 6-7, 1967.

W. M. McMaster
W. M. McMaster
Hydrologist

cc: Edward J. Kennedy, Chief, Tenn. District
Ralph C. Heath, Chief, N. C. District



5010-108

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

Summary of work plans for study of water resources of Great Smoky Mountains
National Park, North Carolina and Tennessee Districts

Sept. 7, 1967

At a meeting in Knoxville during July 6-7, 1967, North Carolina and Tennessee personnel discussed modification of plans in the study of water resources of the Great Smoky Mountains National Park. Those who attended the meeting were: Ralph C. Heath, North Carolina District Chief; Edward J. Kennedy, Tennessee District Chief; D. R. Rima, Assistant District Chief for Tennessee; Nat Thomas, G. C. Goddard, and E. F. Hubbard of North Carolina; and W. M. McMaster of Tennessee.

At the meeting it was agreed that the effort in both districts should be combined under leadership of one individual; McMaster was delegated project leadership. McMaster will be responsible for ground water interpretive aspects of the study and Hubbard will be responsible for surface water interpretive aspects.

The final product will be a hydrologic atlas of the Smokies area, published by the Geological Survey, that will consist of the 1:125,000 base map upon which will be delineated ground water and surface water information. Ground water occurrence and availability will be shown as a series of patterns, each defining a range between a minimum, a maximum, and an average of expected well yields within the area covered by the pattern. These areas are expected to be established by topographic criteria, geologic location, estimated soil thickness, and background information provided by test wells drilled during the course of the study. If a test well appears capable of yielding the desired quantity of water for water supply at the drilling site, a pumping test will be run.

Surface water information will be indicated by isopleths of minimum flow in cubic feet per second per square mile at the 2-year 7-day recurrence interval, based on a series of low-flow measurements made during the course of the study, at a total of about 100 sites throughout the Park distributed so as to define variations in flow with location and altitude. It is hoped that these sites can be measured a total of 6-8 times following periods of about 7 days of no rainfall.

Ground water and surface water chemical quality will be described, based on results of analyses of water from test wells and samples collected from streams. A series of coliform analyses of stream water is planned to define possible areas of contamination.

An explanatory text and supplementary illustrations will be included. The atlas is expected to provide the NPS engineer a basis for planning future developments of any kind in the Park for which knowledge of water resources is required.

775-9-17-65-

L54 SER (OLW)

SEP 14 1965

Reed
ARC 9/17
WRR

Memorandum

To: Superintendent, Great Smoky Mountains

From: Acting Assistant Regional Director, Operations,
Southeast Region

Subject: Water Resources Investigations, Great Smoky Mountains
National Park

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

We believe the investigative work should include the following:

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

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

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

(SIGNED)

W. Mikell

cc:
Director, w/c of inc.
Chief, EODC (2), w/c of inc.



UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

Great Smoky Mountains National Park
Gatlinburg, Tennessee 37738

Y REFER TO:

LS4

August 23, 1965

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. Reg. Dir. (A)	
Asst. Reg. Dir. (CA)	
Asst. to Reg. Dir. (PA)	
Asst. to Reg. Dir. (DI)	
Resource Studies	

X *Land & Water*
Point

Over the past couple of years, continued increases in demands on the numerous surface water supplies have gradually developed into a problem that needs immediate attention. While it is recognized that in the past we have shown little or no interest in water resources investigations, it now appears that well supplies may not only be a desirability but a necessity. During periods of prolonged drouth such as we are now experiencing in the Park, the surface supplies diminish to the point of nearly drying up, and supplemental supplies of low quality water are heavily treated and pumped into the supply lines.

During USPHS Engineer Henderson's recent trip to the Park, we had occasion to closely observe several of our major supplies. For example, we found that the Ash Hopper Branch gravity supply that ordinarily supplies headquarters was providing 19 gallons per minute (actual meter readings) over a period of a week. The consumption at this time was metered at 35,000 to 37,000 gallons per day and so, needless to say, we had to pump a supplemental supply out of a branch of Fighting Creek which runs through the residential area. We actually were only able to obtain a maximum of 15 gallons per minute from this supply. Incidentally, this creek pumping station is only a couple of hundred feet from the first domestic user and less than 1,000 feet from our major development area which definitely does not allow the desired chlorine retention time for safe water treatment. Also, when you realize that our actual usage exceeded an average of 25 gallons per minute and all available water in the system amounted to 34 gallons per minute, it is easy to see there is little margin for any emergency whether it be a leak in the line, any type of fire drawdown or allowance for any consideration of lawn sprinkling. If either of these supplies decrease further, we do have several alternatives in order to retain a minimum supply on hand.

By metering, we have determined that we are wasting 13,000 gallons per day through our Visitor Center dehumidifier system. This is quite a luxury and one that needs some study as to the possibility of re-circulation of this water. If our present supply should decrease any further, we would of course have to shut down the dehumidifier system which would have rather detrimental effects on artifacts storage as well as causing the Visitor Center to be rather uncomfortable.

Further checks on other major supplies in the Park showed similar conditions but none as critical as that that exists in the Headquarters area. If at all possible, and if it can be worked into your Water Resources Investigation program as an emergency measure, we would like to suggest the programming of an exploratory well for this fall. While we have little information on the characteristics of wells in this area, Mr. Henderson felt that a well programmed for 100-foot depth with rotary drill method (possible heavy river boulder sub-surface) should provide a plentiful supply for the area. On this basis, it appears that funds in the construction amount of \$2,500 would be needed to drill, case and test the well.

In an August 19 telephone conversation between Hydraulic Engineer Vick of your office and Chief of Maintenance Rowe, Mr. Vick had mentioned that he had put an over-ceiling item in his 1966 F.Y. Water Resources budget in the amount of \$24,000 to initiate a study of Park domestic water supply needs. We support this program whole-heartedly and hope that a necessary field inspection involving personnel from the USGS, the Regional Office, and the Park can be set up for the month of November. //

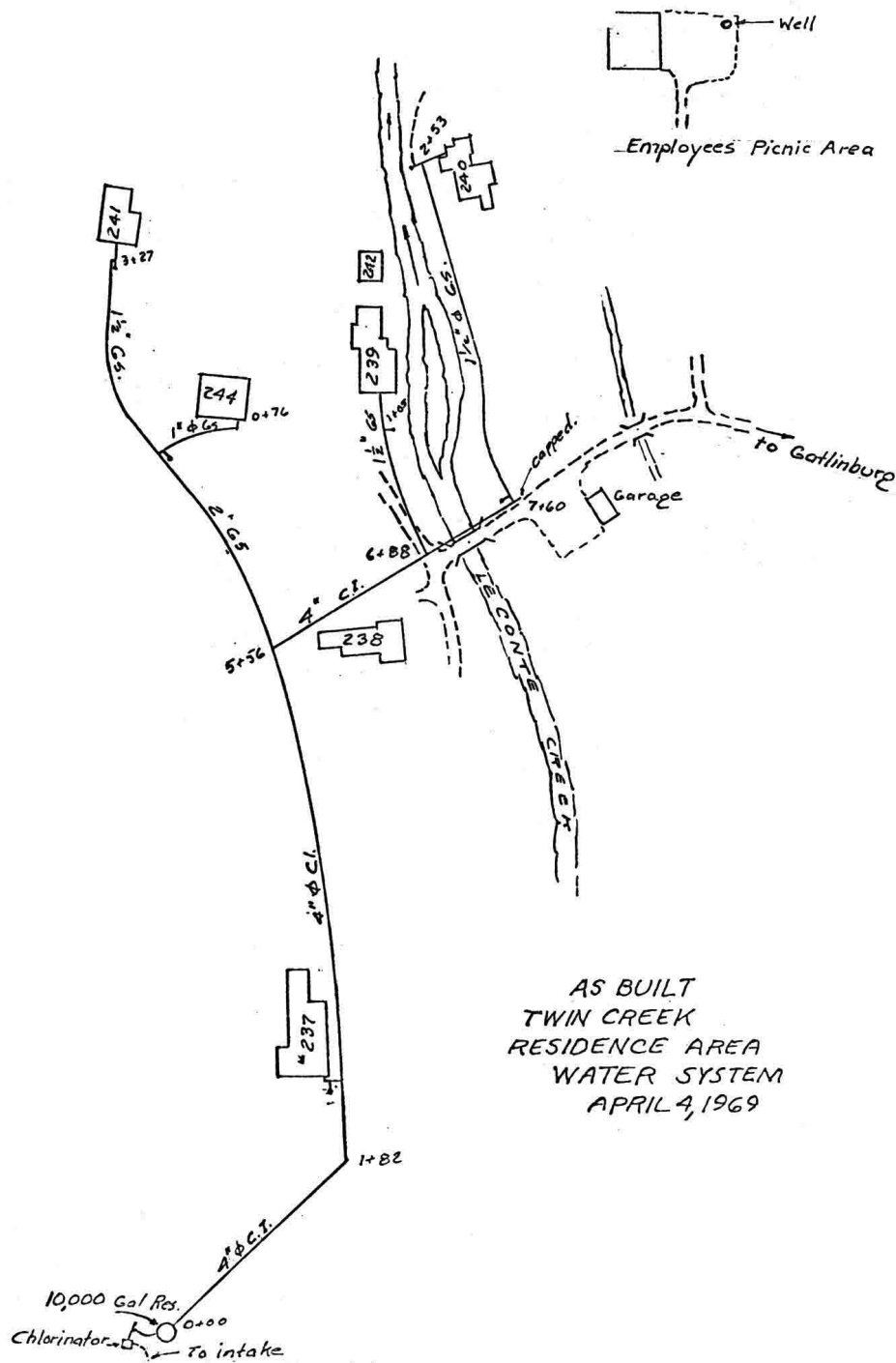
As suggested to Mr. Vick in the abovementioned telephone call, the following listing is a tentative priority list of well investigations which we would like to see programmed:

1. Headquarters -- As soon as possible.
2. Green Mountain Picnic Area, Foothills Parkway -- 1967 F.Y.
3. Cades Cove -- 1967 F.Y.
4. Cataloochee -- 1967 F.Y.
5. Rocky Mountain -- 1967 F.Y.
6. Chilhowee, Foothills Parkway -- 1968 F.Y.

7. Cades Cove -- 1968 F.Y.
8. Deep Creek -- 1968 F.Y.
9. Smokemont -- 1968 F.Y.
10. Chimneys -- 1969 F.Y.
11. Elkmont -- 1969 F.Y.
12. Cosby -- 1969 F.Y.
13. Webb Mountain, Foothills Parkway -- 1969 F.Y.


George W. Fry

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



Docket Information

Number of Documents in Docket 27

Documents Dated from 8/14/1965 to 4/4/1969

Docket Compiled: 3/30/2011