



WATER-RIGHT DOCKET

Shiloh National Military Park

Docket No: 1

HEADQUARTERS AREA WATER SYSTEM

Supporting Hydro Data

00-00-0000: water-supply investigation at shiloh national military park

PROVISIONAL, SUBJECT TO REVISION

Water-Supply Investigation at Shiloh National Military Park

By J. H. Criner

Introduction

This report summarizes the results of a study by the U. S. Geological Survey leading to the development of a water-supply well at Shiloh National Military Park, Tennessee. The investigation began in June 1962 with a reconnaissance study of the area to determine, as far as possible, the hydrologic and geologic conditions relating to the selection of test well sites. As a result of this reconnaissance, three sites were selected but the site nearest the present water-supply system was tested first, largely for economic reasons. A contract was entered into with the Layne-Central Company of Memphis to drill a test hole at this site and, if feasible, to develop a water-supply well. Drilling began in July and was completed in August, 1963. The total depth of the test hole was 295 feet.

PROVISIONAL, SUBJECT TO REVISION

Based on a study of the geophysical logs made upon completion of the test hole and information collected during drilling, the zone between 140 to 150 feet below the surface appeared to be the most favorable as a source of water. Accordingly, the test well was back-filled to 165 feet and the sand between 140 and 150 feet was screened. A preliminary pumping test indicated that this zone would yield about 50 gallons per minute continuously. Field tests indicated that the water is of good quality. On the basis of this information it was recommended by the U. S. Geological Survey that the well be developed as a permanent supply. The temporary screen was, therefore, removed and the sand zone between 134 to 154 feet was reamed to 26 inches in diameter. A 6-inch screen with gravel packing was set in the reamed interval, and the bottom of the hole sealed with cement. When construction was completed a pump was installed to develop the well by surge pumping to remove drilling mud, fine sand, and other unwanted material from the well and to arrange the gravel-pack grains in the proper gradational order. Throughout drilling and developing chlorine was used to sanitize the gravel packing, tools, casing, and pumping equipment.

Pumping tests

Pumping tests were conducted during development of the well and a final test was conducted on August 30, 1963 after the well had been completed. The final test was not successful because tape measurements could not be made and the air-line provided for water-level determinations was leaky and too short to determine water-level changes. However, earlier tests indicate that the well will provide up to 50 gpm continuously. On August 30, 1963 the well was pumped for 2 hours at a rate of about 60 gpm and the pumping rate remained essentially constant indicating that the water level did not decline after the first few minutes of pumping. The static water level appeared to have risen since earlier tests, probably as a result of removal of mud from the water-bearing formation during development. All data indicate that the well will supply more water than the 25 gpm needed for the Park facilities.

Quality of Water

Samples of water were analyzed for chemical quality throughout the development of well Hd:K-2. Water samples from the presently used well (no number) and Shiloh Spring were also analyzed to determine the possibility of hydraulic connections and for comparison. The following table shows the results of the analyses in parts per million (ppm) except where noted.

Chemical Constituents	Well Hd:K-2				Currently used well	Shiloh Spring
	USGS complete	Field	Field	Field		
	Laboratory analysis Aug. 8, 1963	Analysis Aug. 8, 1963	Analyses Aug. 28, 1963	Analyses Aug. 30, 1963		
Silica (SiO ₂)	14					
Iron (Fe)	**	0.6	0.5	1.0	0.1	0.1
Calcium (Ca)	40.					
Magnesium (mg)	7.4					
Sodium (Na)	20.					
Potassium (k)	3.6					
Bicarbonate (HCO ₃)	182.0					
Carbonate (CO ₃)	0					
Sulfate (SO ₄)	24					
Chloride (Cl)	2.8					
Nitrate (NO ₃)	0.5					
Temperature	63°F					
Dissolved solids	202					
Hardness as CaCO ₃	131	136	17*	17*	17*	17*
pH (a ratio)	7.7	6.5	7.0	6+	5.5	5.5

* less than

** not analyzed for iron

Iron (Fe) is the only chemical constituent found in the sample from well Hd:K-2 that is objectionable. Iron in excess of 0.3 ppm may cause staining of bath fixtures and tend to coat walls of storage reservoirs and water lines with a rust colored precipitate. Iron is easily precipitated by aeration and may be removed by filtration or settling. The hardness of 131 determined at the laboratory probably is a result of drillers' mud and perhaps water from another formation mixed in the sample. High hardness was noted in the field analysis of sample collected at the same time. The field analysis of a sample collected after the well was developed and other formations sealed off show hardness to be very low - immeasurable by field methods. The low pH of 6 (slightly acid water) rising toward a pH of 7 (neutral) indicates the loss of free CO₂ from the water on exposure to air. The laboratory analysis showing a pH of 7.7 (slightly basic) probably is a result of drillers' mud still in the formation at the time of sampling or leakage of water from another formation. No other chemical constituent or property of the water is sufficiently objectionable to warrant treatment. Field analyses of samples for key elements indicate the water may be considered to be of good quality.

Recommendations

A sufficient quantity of water of suitable chemical quality probably can be obtained from the new well Hd:K-2 at Shiloh Park. This was the recommendation made to Park Superintendent B. T. Campbell after logging the test hole July 31, 1963 and analyzing a sample of water from the hole on Aug. 8, 1963. Subsequent tests show that the quantity of water that may be obtained is greater and the chemical quality is better than earlier tests indicated. Water treatment may not be necessary as may be determined during the first few weeks of use. Further recommendations are not necessary - water from the completed well can be used as pumped from the ground. However, it may be well to point out certain facts coupled with recommendations which will add to the economy of operation of the Shiloh Park water-supply system. Well Hd:K-2 will supply (continuously) more than the stated requirement of 25 gpm although it is recommended that a 25 gpm (approximately) pump be installed in the well. The smaller pump will be more economical and tend to prolong the life of the water supply. It is further recommended that the pump-discharge-line enter the cellar-control-center and be connected to the water lines in such a manner that water could be pumped directly to the water main, the underground reservoir, the overhead tank, or the aerator. During an emergency water could be pumped to either of the storage reservoirs or the main. During normal use the water should be routed through the aerator to precipitate iron and raise the pH toward the neutral point. Any iron carried from the aerator to the underground storage tank could be allowed to settle there, after which clear water could be pumped with presently installed high-lift pump from the underground tank to the overhead tank. This method of iron removal would allow most of the iron to remain in the underground tank which would need to be flushed periodically to remove accumulated iron precipitate.

No additional equipment or expenses would be required. The adoption of this idea will solve the immediate problem of supply and treatment and may be used until more adequate facilities are constructed if time and use will prove the need.

It is suggested that when a pump is permanently installed in the well, an arrangement allowing the water level to be measured be made, such as a half-inch pipe anchored to the pump column extending through the pump base or a simple threaded hole (with plug) in the pump base which will accommodate a quarter-inch graduated tape. Most pumps manufactured have such an access hole.

Appended to this report are electric and lithologic logs, drillers' log, and map of the area.

Shiloh National Park Test Drilling - Hd:K-2

Bob Heriot, driller. Layne-Central Co. on contract for test to make 25 gpm well.

Drilling started 6:30 A.M. July 18, 1963. Measurements from rig floor about 3' above ground.

No. of Stems	Length	Sample		Remarks
		Number	Interval (feet)	
1	23' 4"	1	0-9	Yellow clay. Using 9 7/8" bit.
		2	9-15	Same with few gravel
		3	20	Gravel increasing with depth; some fine sand.
2	23' 0"		29-38	Gravel; sand increasing
			38-38.5	Gravel and sand; some clay
7-19-63 8:00 a.m.				Rock; apparently cemented gravel Mud will not carry out all gravel Stopped drilling to bail out gravel
1:15 p.m.				Began bailing: 12" bailer, 10' long Bailed out about 35 bails, half full of gravel. Some gravel 7" diameter. Changed bits (to finer teeth)
2:15 p.m.				Installed 46 ft. of 16" surface casing, about 41 feet set in tight by dropping several times.
3:05 p.m.				Cemented in by pouring cement through 1 1/4" pipe 35' long. Cut off 3' of 16" casing.
7-22-63 10:00 a.m.		4	38.5-44	Finished cementing - closed shop
3	23' 0"	5	44-67	Sand grading to coarse gravel
4	23' 0"		67-72 72	Coarse gravel, some yellow, medium sand
11:30 a.m.				Same
1:05 p.m.				No apparent return. Bottom of gravel and sand.
4:00 p.m.				Pulled out to ream and bail
5:30 p.m.				Fine chips of dark blue-black clay and same sized bits of lignite in sand returns from reaming.
				Started bailing gravel (1/4 to 1/2") Some glauconite(?) Blue black clay with small amount extremely fine sand in clay. 8" bailer, 10' long.
				Stopped

No. of Stems	Length	Sample		Remarks
		Number	Interval (feet)	
7-23-63 7:00 a.m.				Continus bailing. Returns contain gravel-size chunks of glauconite(?)
8:00 a.m.		6	72-82 82-92	Lignite, fine sand, glauconite Fine sand. Soft lignite. May be clay at 91: all well integrated in drill mud.
		7	92	Washed sample of sand above - after circulating mud for 10 min- utes. This is probably source for present well.
5	22'10"		92-100	Alternate streaks of clay and sand Lignitic - more clay than sand - no sample
			100-105	Predominately sand or sandy clay - much lignite
		8	105-115	Sample same slick blue clay
6	22'1"		115-120	Alternate hard and soft 6" layers Sample same as 8
			120-125	Same
			125-130	Same
			130-137	Same
7	23'0"		137-140	Same
			140-160	Sand
		9	140-150	Sand
8	23'0"		160-175 175-178	Sand and clay. Apparently rock. May be cemented sand and gravel.
		10	178	Salt & pepper - probably <u>not</u> what drill is cutting now.
11:15 a.m.			178 +1 for bit ex- tension	No drill progress in past hour - will put on rotary bit
1:30 p.m.				Rotary bit (coarse) on and drilling (50 psi mud line)
			178-184	Alternate layers of clay or shale and 6" ironstone
		11	178-184	Washing from hole - white clay ground up rock
9	22'2"		184-206	Same as sample 11
5:15 p.m.		12	184-206	White clay and shale - driller reports soapstone - same as 11

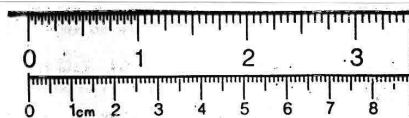
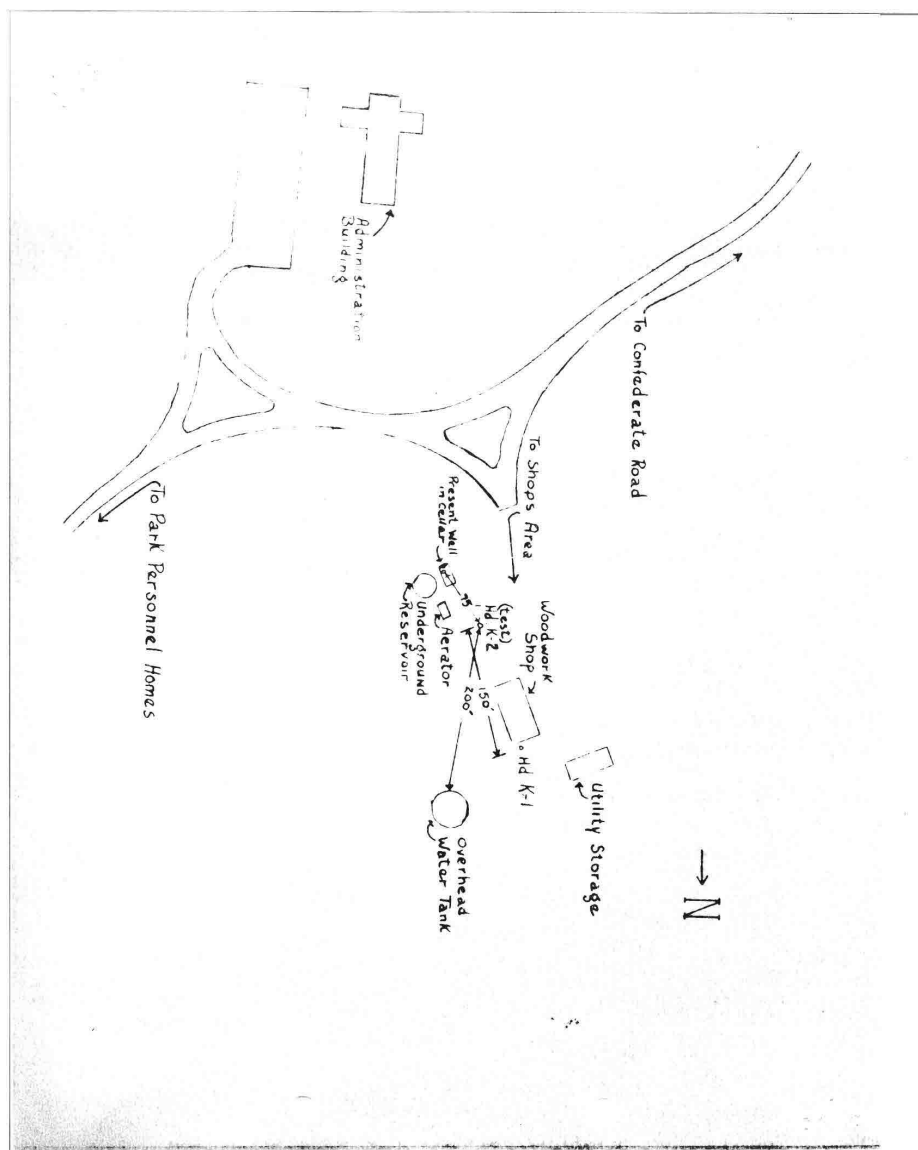
No. of Stems	Length	Sample		Remarks
		Number	Interval (feet)	
7-24-63 7:00 a.m. 10	23'0"			Same drill actions - hard gray brittle shale - thin layers of clay, (white). Practically no clay return. All gray shale. Samples identical to No. 12. Since yesterday noon (184 ft.) drilling has been relatively constant at about 5' per hour. White clay balls in lower few feet.
1:15 p.m. 11	23	13	206-229	
7-25-63 7:00 a.m.			229-	Drill continues as above - no change in samples
			229-235	Drilling now at about 1' per hour. Same material.
			235	Few flakes of red brown shale showing in samples at 236'
		14	236	Red shale about 2'(?) thick.
			235-238	Same returns - no red shale now
3:30 p.m.			238	Changed to finer bit.
			238-252	No returns - 100 PSI mud line - smaller openings on this bit.
		15	238-252	Drilling about 4' per hour for 2.5 feet.
7-26-63 7:00 a.m. 12	23'0"		252-261	Red shale show similar to above
		16	252-261	Similar to above - mud beginning to redden. Started with coarse bit again. Pulled fine bit last night - came out with dark red clay with teeth.
			262	Drilled 10' per hour to 261 and about 1' per hour from 261-262
12:00 noon			262-	Clay probably lost in sample.
			263-	More gray to green shale shows minor amount of red shale - no red clay but minor amount of white clay.
			265	Returns are red and grey-green shale, some red clay - more fines
3:00 p.m.				Same returns - more reddish brown
				No evidence of limestone or chert.
				Stopped drilling for weekend

No. of Stems	Length	Number	Interval (feet)	Remarks
7-29-63				
8:00 a.m.				
12		17	265-270	Same as 262' - no red material Some fine sand gray to gray-brown
			270-275	Same
3:30 p.m.				
13	23'0"		275-276	Same - with few "rock chips" causing drill to "dance"
7-30-63				
6:45 a.m.			276	Practically no returns - some look like sand but is ground- up shale - same as above. Drilling at about 2' per hour.
		18	276-280	Same as above - cleaned mud ditch and washed 5 gallons to collect sample 18. Seems to be less hard than at 276.
2:10 p.m.			285-295	Same - material ground finer, drilling slower, about 1' per hour, appears to be finely ground limestone - acid test so indicates.

Logged by J. H. Criner, Engineer, Nashville, Tennessee
See electric also.

Drillers log by Bob Heriot, Layne-Central Company

0-5	Red clay	157-174	Sandy shale
5-12	Clay and gravel	174-176	Rock - boulders
12-38	Gravel	176-181	Shale
38-65	Sand and gravel	181-220	Hard shale
65-72	" " "	220-252	Shale rock, very hard
72-88	Soft sand - lignite	252-265	Shale rock
88-112	Clay	265-272	Hard shale
112-134	Sandy shale	272-285	Red hard shale
134-140	Soft sand streaks	285-287	Limestone
140-148	Find sand	287-	"
148-157	Sandy shale		



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER ANALYSIS

20W

Location Shiloh National Military Park, Shiloh, Tenn County Shiloh
 Source Hd: K-2 well Depth (ft) 150 Diam (in.) 6
 Cased to (ft) _____ Date drilled _____ Point of coll. _____
 Owner _____
 Treatment _____ Use _____
 WBF 130-150' WL _____ Yield _____
 Temp (°F) _____ Appear. when coll. _____
 Collected Sept. 17, 1963 By J. H. Griner
 Remarks To check Fe and Hardness against previous analyses.

	ppm	epm		ppm	epm
<u>Silica (SiO₂)</u>			<u>Bicarbonate (HCO₃)</u>		
<u>Aluminum (Al)</u>			<u>Carbonate (CO₃)</u>		
<u>Iron (Fe)</u>	0.35				
			<u>Sulfate (SO₄)</u>		
			<u>Chloride (Cl)</u>		
			<u>Fluoride (F)</u>		
<u>Calcium (Ca)</u>					
<u>Magnesium (Mg)</u>			<u>Nitrate (NO₃)</u>		
<u>Sodium (Na)</u>					
<u>Potassium (K)</u>					
Total			Total		

	ppm		
		<u>Specific conductance</u> (micromhos at 25° C)	
<u>Dissolved solids:</u>		<u>pH</u>	
<u>Calculated</u>		<u>Color</u>	
<u>Residue on evaporation at 180° C</u>			
<u>Hardness as CaCO₃</u>	9		
<u>Noncarbonate</u>			

Lab No. 31895

Field No.

Project



IN REPLY REFER TO:
L54

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
Shiloh National Military Park
Shiloh, Tennessee

August 9, 1963

SOUTHEAST REGION	
AUG 12 '63	
Dir. (Director)	
Asst. Dir. (Asst. Dir.)	
Asst. Dir. (Asst. Dir.)	
Asst. Dir. (Asst. Dir.)	
Asst. to Dir. (Asst. to Dir.)	

Memorandum

To: Regional Director, Southeast Region
From: Superintendent, Shiloh
Subject: Test Well, Shiloh

H

Boundary Studies	
Land	
Planning Service	
Proposed Areas	

Hick
and

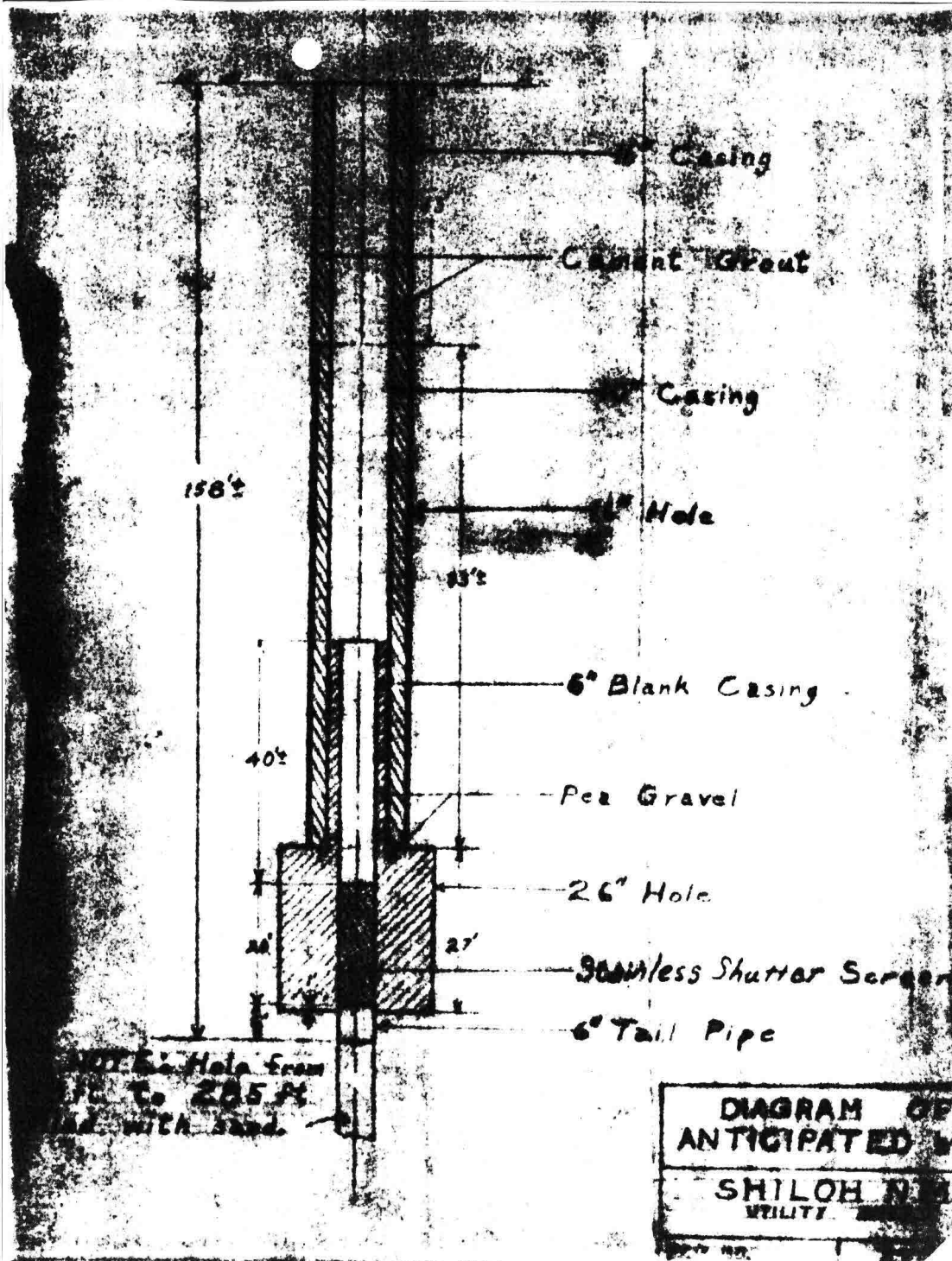
It is anticipated that the test well will be a productive one in that more than 25-gpm will be produced. The driller went to a depth of 285 feet at which point impervious rock was struck. They now intend to place a 20-foot screen at approximately the 150-foot level from which adequate water should be available. Tests so far indicate the head of water at 104 feet.

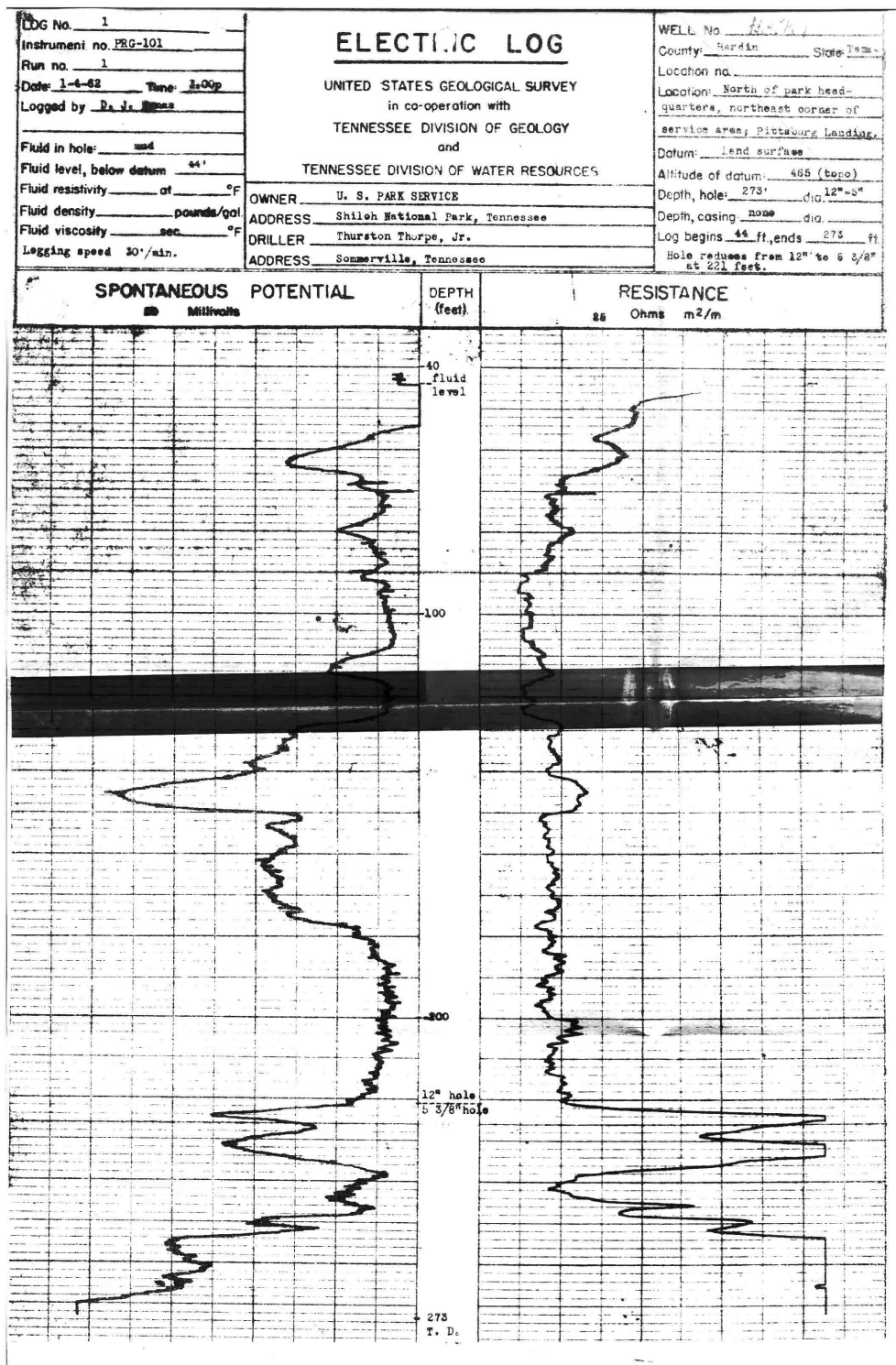
We have prepared a diagram of the proposed well based on my conversation with the driller this morning. He tells me that by August 14, we should know whether the well is satisfactory. We will write further then.


Bernard T. Campbell

In duplicate

Enclosures - 1, in duplicate





Other Supporting Information

Form 10-174
(June 1962)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

FACE SHEET FOR COMPLETION REPORT

Docket 1

Park <u>Shiloh National Military Park</u>		Region <u>Southeast</u>	Order No. <u>P-6 SHI (1st Rev.)</u>
Location in Park <u>Headquarters Utility Area</u>		State(s) <u>Tennessee</u>	Fund Symbol <u>1041035</u>
☒ Contract and/or ☐ Day Labor		County or Counties <u>Hardin</u>	Year Programmed <u>1964</u>
Work Order Title <u>Completion of Water System (construct pumphouse, filtering system, install pump and connect well with present system. Obliterate existing structures as required)</u>			PCP No. <u>1-20</u>
			Master Plan No. <u>1964-SHT 3021</u>
			Master Plan Corrected By
			As Built Drawings By
			Date Started <u>July 18, 1963</u>
			Date Completed <u>June 3, 1964</u>
DESCRIPTION OF FIXED ASSETS (For completion by employee in charge of project)		TOTAL COSTS (For completion by FFO)	
A. Water Supply Well \$6,160.00			
B. Pump 975.00			
C. Pumphouse, Filters and Obliteration of existing structures 5,600.00			
100.8 Utilities 12,735.00		14,772.60	
TOTAL		\$ 14,772.60	

DISTRIBUTION		THE FIXED ASSET DESCRIBED ABOVE HAS BEEN COMPLETED IN ACCORDANCE WITH APPROVED DRAWINGS, SPECIFICATIONS, AND AUTHORIZED CHANGES	
No.	To	Submitted	Date:
1	EODC	By: <u>Thomas E. Barton</u>	<u>July 30, 1964</u>
1	SERO	By: <u>T. J. Baer</u>	<u>July 30, 1964</u>
1	DAC	By: <u>T. J. Baer</u>	<u>July 30, 1964</u>
1	FFO	By: <u>T. J. Baer</u>	<u>July 30, 1964</u>
1	SUPT	By: <u>T. J. Baer</u>	<u>July 30, 1964</u>
COSTS VERIFIED - <u>Ellsworth</u>		Title: <u>Regional Accountant</u>	Date: <u>9/8/64</u>
BY <u>T. J. Baer</u>			

T. J. Baer

Rec'd w/Reg. memo 1/22/65

35716

Form 10-174A
(June 1962)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

COMPOSITION OF COST FOR COMPLETION REPORT

Work Order Number
B-6 SHILOHFund Symbol
14K1035

Park Shiloh NM Park	Region SE	Year Programmed
Location in Park Headquarters Utility Area		
Work Order Title Completion of Water System (Construct pumphouse, filtering system, install pump & connect well with present system).		

COMPOSITION OF COST

COSTS CHARGED TO FUNDS ALLOTTED TO FIELD FINANCE OFFICE		
(1) Personal Services.....	\$	
(2) Travel.....		
(3) Contract Work	5,300.00	
(4) Supplies and Materials.....		
(5) Other Direct Expenses.....	7,135.00	
(6) Operation of Equipment.....		
(7) Depreciation of Equipment.....		
(8) Purchase of Construction Equipment.....		
(9) Purchase of Other Accountable Equipment		
(10) Other Costs:		
(11) TOTAL COST CHARGED TO FFO FUNDS	xxxxxxxxxx	\$ 12,735.00
OTHER COSTS:		
(12) PS&S, AP, and/or Facilitating Services @ 16 %.....	\$ 2,037.60	
(13) Inventory and Other Non-Fund Costs		2,037.60
(14) GROSS WORK ORDER COSTS	xxxxxxxxxx	\$ 14,772.60
LESS:		
(15) Residual Value of Construction Equipment on Line 8	\$	
(16) Other Credits		
(17) NET COST OF FIXED ASSETS	xxxxxxxxxx	\$ 14,772.60

Identify other costs and other credits by line item entry, on an attached schedule, or explain in narrative.

Narrative to accompany Project Completion Report for water supply well, pump, pumphouse, and connection to water system, Shiloh National Military Park, Headquarters Area.

The project consisted of well, pump, pumphouse, filtering tanks, pump controls, and demolition of old pumphouse and aeration system.

a. Water Supply Well:

Bids were opened on May 8, 1963. Layne-Central Company, Memphis, Tennessee submitted the lone bid of \$9,535.00, however, it was decided this bid was too high therefore negotiations began with said company to reduce this figure. On June 5, 1963 a negotiated contract was awarded to Layne-Central Company for \$6,695.00. Drilling began July 18, 1963. A test hole was made to a depth of 295 ft. below ground surface in an effort to develop the well in the Devonian chart, however this formation was not found at this depth, hence it became necessary to fill the test hole back to a depth of 158 ft. below ground surface and develop the well at this depth. The well was made in the following order: drilling test hole 295; filling hole back to 158 ft.; reaming test hole to receive 10" casing, placing with 2" cement grout ring 13 1/2 lin. ft. 10" casing, underreaming 20 lin. ft. to diameter of 30"; placing and gravel packing 20 lin. ft. of 6" shutter screen, developing and testing well for drawdown. The job was completed and accepted in September 1963.

b. Pump:

In order to place the well in use immediately the pump was purchased on an informal quotation basis, Layne-Central Company, Memphis, Tennessee submitted the low quotation of \$975.00 installed. Materials used were as follows:

Myers submersible pump Model SE30A-21, 3HP, single phase, 220 volt motor, motor control. 110 feet 1 1/2 inch rigid plastic pipe and 3/16 inch stainless steel support cable. All these materials were furnished by The Layne-Central Company, Memphis, Tennessee. Completed on October 24, 1963.

c. Pumphouse and Filters:

This project consisted of pumphouse, 2 water filters, underground electric cable, and pump controls. Bids were opened on January 28, 1964, Carroll and George of Michie, Tennessee was the low bidder of two bids. This project was awarded along with pumphouse, etc., at Sowell Field Picnic Area, an APW project. The following items were accomplished:

1. Pumphouse:
The pumphouse was constructed substantially according to plans and specifications. The construction began February 4, 1964, and was completed June 3, 1964.
2. Water Meter:
A one inch Colmet cold water meter was installed. The meter may be disassembled for inspection without removing it from the pipe line. The meter has a straight reading register in U. S. Gallons with a range between 10 and 999,990 gallons and a circular dial indicating fractions of each ten gallons.
3. Neutralizing Filters:
Two (2) Neutralizing Filters, each capable of handling a maximum intermittent flow of 15 gpm were installed. The filters are Permutit neutralizing filters, Model NF-25. The Filters and Neutralizing agent were installed in accordance with manufacturer's recommendations. The neutralizing agent is Q-890 Neutralite. Galvanized steel pipe was used in the installation.
4. Altitude Gauge and Drop Tube:
An altitude gauge and 110 feet of 1/4 inch copper drop tube was installed in the well in accordance with plans and specifications.
5. Underground Electric Service:
Three number 6 direct burial wires were installed from the existing underground Junction Box to the control panel in the pumphouse. The wires were buried to a minimum depth of 2 feet.
6. Pump Controls:
The pump controls that were installed are the "Procontrol Flanpack" manufactured by the Automatic Control Company, St. Paul, Minnesota. The controls automatically controls the liquid level of water in the elevated storage tank by the use of electrodes mounted in the tank. The pump is automatically stopped by a low water cut-off electrical probe installed in the well about 3 feet above the pump intake. The pump is reset by another electrode installed 5 feet above the low-water cut-off.
7. Water line connection:
The pump was connected to the existing 6" water main by means of a pipe saddle supplied by the Viking Supply Company, 2625 Elm Street, Dallas, Texas.
8. Disinfection:
A chlorine solution was introduced into the system prior to putting into service; and water samples were taken and tested. The test showed no coliform organisms.

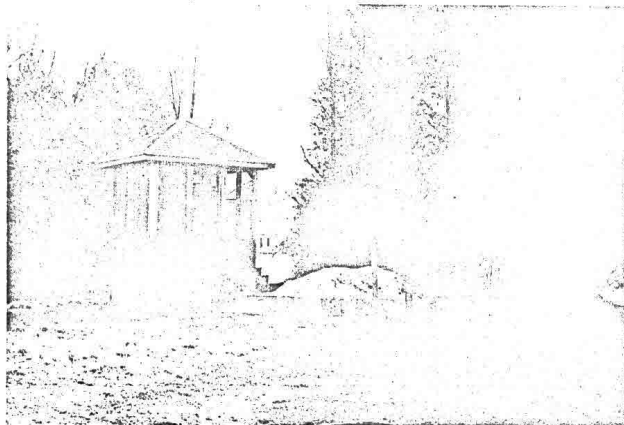
9. Water Rights Application:

Since The State of Tennessee does not require a permit or license, no application was made.

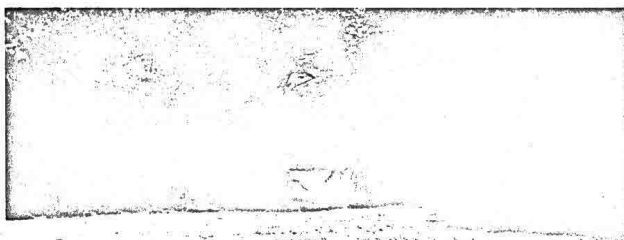
The following materials were used on this project:

Concrete	Ready Mix Concrete Concrete Inc. Corinth, Mississippi
Concrete Blocks	Tupelo Concrete Block Company Tupelo, Mississippi
Water Meter	Meter Service & Supply Company 1496 Humbert Street Memphis, Tennessee
Neutralizing Filters	The Permutit Company E. 49 Midland Avenue Passaic, New Jersey
Altitude Gauge	Carlson Well Supply Company 115 Concord Street Memphis, Tennessee
Pump Controls	Autocon Industries, Inc. St. Paul 4, Minnesota
Pipe Saddle	Viking Supply Company 2625 Elm Street Dallas, Texas

Thomas E. Barton
Project Supervisor



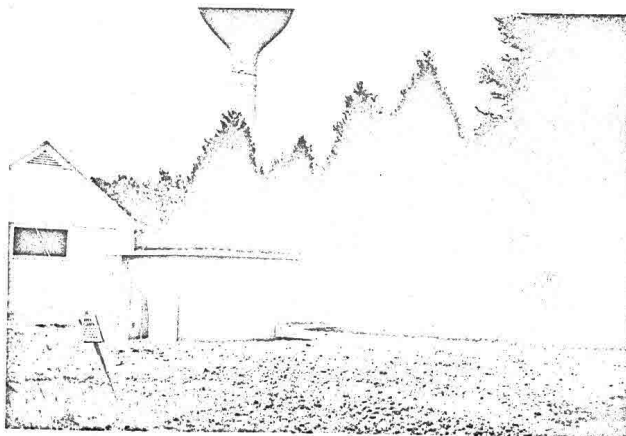
Before obliteration of old Filter, Reservoir and Pump Pit



After Obliteration



Finished Pump house showing Block Pattern Hq. Area



Headquarters Area after Grading

Shiloh National Military Park Water Supply

Analyses by Geological Survey, United States Department of the Interior
(Parts per million)

Well no. <u>1/</u>	Hd:K-2	Hd:K-2	Hd:K-3	Hd:K-3	Hd:K-4	
Treatment	Raw	Treated	Raw	Treated	Raw	
Lab. no.	32576	32738	32739	32740	32577	
Date of collection	7-27-64	10-2-64	10-2-64	10-2-64	7-27-64	
Silica (SiO ₂)	24	22	16	15	19	
Iron (Fe) <u>2/</u>	1.1	.13	2.2	.47	.85	
Manganese (Mn)	.02	.01	.1	.1	.02	
Calcium (Ca)	3.8	41	2.4	50	3.0	
Magnesium (Mg)	1.0	2.7	2.0	4.4	2.5	
Sodium (Na)	2.4	2.3	1.8	2.0	2.0	
Potassium (K)	1.2	1.2	.7	.7	.7	
Bicarbonate (HCO ₃)	14	135	15	164	16	
Sulfate (SO ₄)	4.0	7.0	7.6	7.6	4.4	
Chloride (Cl)	2.0	1.0	3.0	3.0	3.0	
Fluoride (F)	.0	.2	.0	.0	.0	
Nitrate (NO ₃)	.2	.0	.1	.0	.2	
Dissolved solids	47	144	43	164	44	
Total hardness as CaCO ₃	16	115	16	151	22	
Specific conductance (Kx10 ⁵ at 25°C.)	43	236	54	287	41	
pH (at time of analysis)	5.8	7.0	5.9	7.4	6.0	
Temperature (°F) field	63	-	-	-	67	
Color	5	3	25	3	5	

1/ Hd:K-2 - Park headquarters well

Hd:K-3 - Picnic grounds well

Hd:K-4 - Benny property well

2/ In solution when collected

WATER SUPPLY

A new water well has been completed and test pumped and a report on the construction of this well has been submitted by the U. S. Geological Survey. During the pumping tests, the initial chemical analyses indicated an excessive amount of iron and an acid-type water. Since the pumping tests, a considerable amount of water has been pumped from the well, by use of the contractor's pump to remove all drilling mud, as well as sand and foreign material from the gravel packing.

A representative of the U. S. Geological Survey met me at the well site and some field analyses were performed. Our analyses indicated an iron content of 0.35 ppm. The Public Health Service Drinking Water Standards recommend a limit of 0.30 ppm for iron. Since the limit of 0.30 ppm of iron is exceeded by only 0.05 ppm, it is recommended that no treatment be provided for iron removal.

The pH of the water was 6.3, indicating that it would be very readily aggressive toward any metal surfaces. In order to stabilize this water, it is recommended that pressure-type, neutralizing filters be used.

It was agreed that the new pump should have a capacity of 25 gpm against 220 feet total head, and the pump should be set at a depth of 130 feet below the ground surface. The surface casing is 16 inches in diameter and the top of this casing should terminate at least 6 inches above the pump house floor. A steel cover for this casing, should be fabricated with the edges turned downward at least two inches. The hole in the center of this cover should be of such size that a sanitary well seal can be installed between the cover and the pump discharge pipe.

A pump house should be constructed over the new well. The automatic pump controls, on the old high-duty pump in the underground pump house, should be moved to the new pump house and connected to the new pump.

The concrete floor in the new pump house should be sloped to a floor drain that can discharge to the nearby wooded area.

The neutralizing filters, mentioned above, should be located in the pump house. Two 28 inch diameter neutralizing filters are recommended and each filter should be equipped with two loss-of-head gauges. Use of Permutit Model No. NF-28 neutralizing filters or equipment of equal design is recommended. The piping on these filters should be installed so that individual filters can be backwashed at appropriate intervals of use.

A water meter, with straight reading register instead of circular reading register, should be installed between the pump and the filters.

The discharge from the filters should be connected to a 6-inch cast iron water main, located about 13 feet from the center of the well. The present underground pump station, water well, underground storage tank, and marble chip filter can then be taken out of service. The old well is very inadequate as to quantity and the wooden portions of the marble chip filter are in very poor structural condition.

RECOMMENDATIONS

It is recommended that:

1. Funds should be obtained as soon as possible for construction of adequate treatment facilities of the sewage from Shiloh National Military Park. The estimate of funds needed can be based on construction of a subsurface sand filter. If the present septic tank is to remain in use, then the manhole covers should be repaired so as to make them watertight.
2. If a suitable site above the flood zone can be located, then use of a sewage stabilization lagoon should be seriously considered.
3. The new water well should be equipped, as quickly as possible, with a new pump and appurtenances as described above. The only treatment recommended is use of neutralizing filters.

Sincerely yours,


Paul C. Henderson
Sanitary Engineer Consultant to
National Park Service

cc:
BODC

Eastern Office
Division of Design and Construction
Philadelphia 6, Pa.

D9099-E

April 4, 1962

Memorandum

To: Project Supervisor David Henderson, Shiloh

From: Chief Engineer, EDC

Subject: Water Well - Contract No. 14-10-0131-815,
Shiloh National Military Park

This memorandum supplements our teletype of Monday, April 2 regarding the subject.

Since the well driller has been unable to develop a satisfactory well, we have determined that, in the best interests of all concerned, all present operations in regard to the well and related installation should be terminated until further geological studies have been made. These studies might take a year or so to complete, therefore it would be inadvisable to hold up the completion of the contract pending the additional studies.

Negotiations should therefore be made with the Contractor to establish the costs involved in drilling the first 120' of the well and also for the costs of the additional work involved in drilling below 120', being sure to take into consideration that only a hole has been drilled and no materials have been placed.

Negotiations should also be made for eliminating in part Bid Schedule Item 5, Well Pump and Controls, that is, eliminate the well pump, sanitary seal, and suspension cable, but arrange to have the controls installed in place of the existing pressure control switch to control the operation of the existing 15 hp centrifugal pump.

The "pump up" control shall be installed to automatically control the water level in the elevated tank. The additional conduit and control wire required to extend the control line to existing pump shall be installed. The "pump down" control shall be installed to override the "pump up" control and shut the pump off in case of extremely low water level in the concrete ground reservoir.

An agreement should also be reached for eliminating entirely from the Contract Bid Schedule

- Item 3, 2" Water Line (G.S.)
- Item 4, Pumphouse (Structure and Treatment)
- Item 7, Complete well, maximum depth 120'
- Item 8, Testing well for yield and drawdown and
- Item B-1, Overdepth Water Well, as specified in Change Order No. 1.

Paragraph 5c, Existing Underground Pumphouse of Section 20 of the specifications shall be deleted in its entirety.

When satisfactory negotiations have been completed a change order to the contract should be issued which covers all the above items.

Ross F. Sweeney
Chief Engineer

~~Signature~~ Sweeney

By: _____
C. Gordon Cummings

Copy to: Supt., Shiloh

Shiloh National Military Park
Shiloh, Tennessee

April 2, 1962

B3415

D2698

Memorandum

To: Chief, HODC
Through: Chief Architect

From: Project Supervisor

Subject: Weekly Progress Report, Week Ending April 1, 1962
Contract No. 14-10-0131-815

REGION ONE	
APR 4 1962	
Reg. Director	
Asst. Reg. Dir.	
Ch. Conservation	
Ch. Ranger Act.	
Ch. Interpretation	
Ch. Admin.	
Ch. Res. Res. Pl.	

WATSON
VICK

I. Addition and Alteration to Visitor Center

Carpenters completed parapet wall and cornice at porch. Framed forms for basement concrete stairs. Completed miscellaneous blocking and furring for plasterers. Museum exhibit framing 40% complete. Stripping and furring complete at stage wall in auditorium.

Plaster brown coat complete in first floor of existing building, white coat on lobby and office ceilings complete. Walls 50% complete. All plastering completed at second floor and stairwell.

Lathers completed auditorium walls, including stage wall. Ceiling completed except projection room and light troughs; also porch ceiling.

Concrete stairs in auditorium poured, also sills in areaways.

Slate roofing, built-up roof, flashing, caps and gutter completed.

Additional copper lines and valves installed in mechanical room.

Electrician completed telephone conduit to junction box. Pulling wires in auditorium, installing fixture housings in lobby.

Ducts insulated, museum and crawl space and piping in crawl space.

II. Water and Sewage Utilities

Well contractor washed well out thoroughly, but could not get rid of fine gray sand and also could not get significant water yield.

Abandoned well and offered to drill a new test well at his own expense near old existing well. I called Engineer Cummings at EODC who agreed to this.

Engineer Cummings later requested that the prime contractor furnish alternate prices for a complete new well near the existing well and for rehabilitating the existing well. This information was given to Engineer Cummings, who said that he would advise early next week as to the decision taken.

6" water and sewer lines laid, connected to existing mains and tested. New sewer manhole completed.

David G. Henderson
Project Supervisor

Docket Information

Number of Documents in Docket 31
Documents Dated from 4/2/1962 to 7/30/1964
Docket Compiled: 6/17/2011