



WATER-RIGHT DOCKET

Delaware Water Gap National Recreation Area

Docket No: 3

MOUNT MINSI WELL.

Other Supporting Information

00-00-1970: water-supply test wells at slateford creek; mount minsi; by harry koester.

5 copies

WATER-SUPPLY TEST WELLS AT SLATEFORD CREEK, NORTHAMPTON COUNTY
AND MOUNT MINSI, MONROE COUNTY, PENNSYLVANIA

By
Harry E. Koester, Hydrologist

Prepared for the National Park Service
by the
U.S. Geological Survey

ADMINISTRATIVE REPORT FOR U.S. GOVERNMENT USE ONLY

1970

CONTENTS

	Page
Introduction-----	5
Slateford Creek site-----	7
Geologic and hydrologic environment-----	7
Physical characteristics of well Np-584-----	11
Well completion-----	12
Pumping tests-----	13
Chemical quality of water-----	17
Mount Minsi site-----	19
Geologic and hydrologic environment-----	19
Physical characteristics of well Mo-199-----	21
Well completion-----	22
Aquifer tests-----	27
Chemical quality of water-----	33

ILLUSTRATIONS

	Page
Figure 1.--Map showing location of test wells in the Delaware Water Gap National Recreation Area----	5
2. Self-potential log-----	7
3. Single point-resistivity log-----	7
4. Gamma-ray log-----	7
5. Pumping water level at Slateford Creek well Np-584, September 28, 1970-----	13
6. Recovery of water level in Slateford Creek well Np-584, September 28, 1970-----	13
7. Pumping water level of Slateford Creek well Np-584, September 29, 1970-----	13
8. Self-potential and single-point resistivity log--	19
9. Slug test with brine injections for Mount Minsi well Mo-199-----	27
10. Decay curve of water injection test for Mount Minsi well Mo-199-----	28

3

TABLES

	Page
Table 1. Sample log of Slateford Creek borehole, Np-584---	9
2. Pump test--Slateford Creek, Northampton County, Np-584, September 28, 1970-----	15
3. Pump test--Slateford Creek, Northampton County, Np-584, September 29, 1970-----	16
4. Chemical analyses, Slateford Creek, Northampton County, Np-584-----	18
5. Sample log of Mount Minsi borehole, Mo-199-----	23
6. Slug test--Mount Minsi, Monroe County, Mo-199, October 15, 1970-----	31
7. Chemical analysis, Mount Minsi, Monroe County, Mo-199-----	34

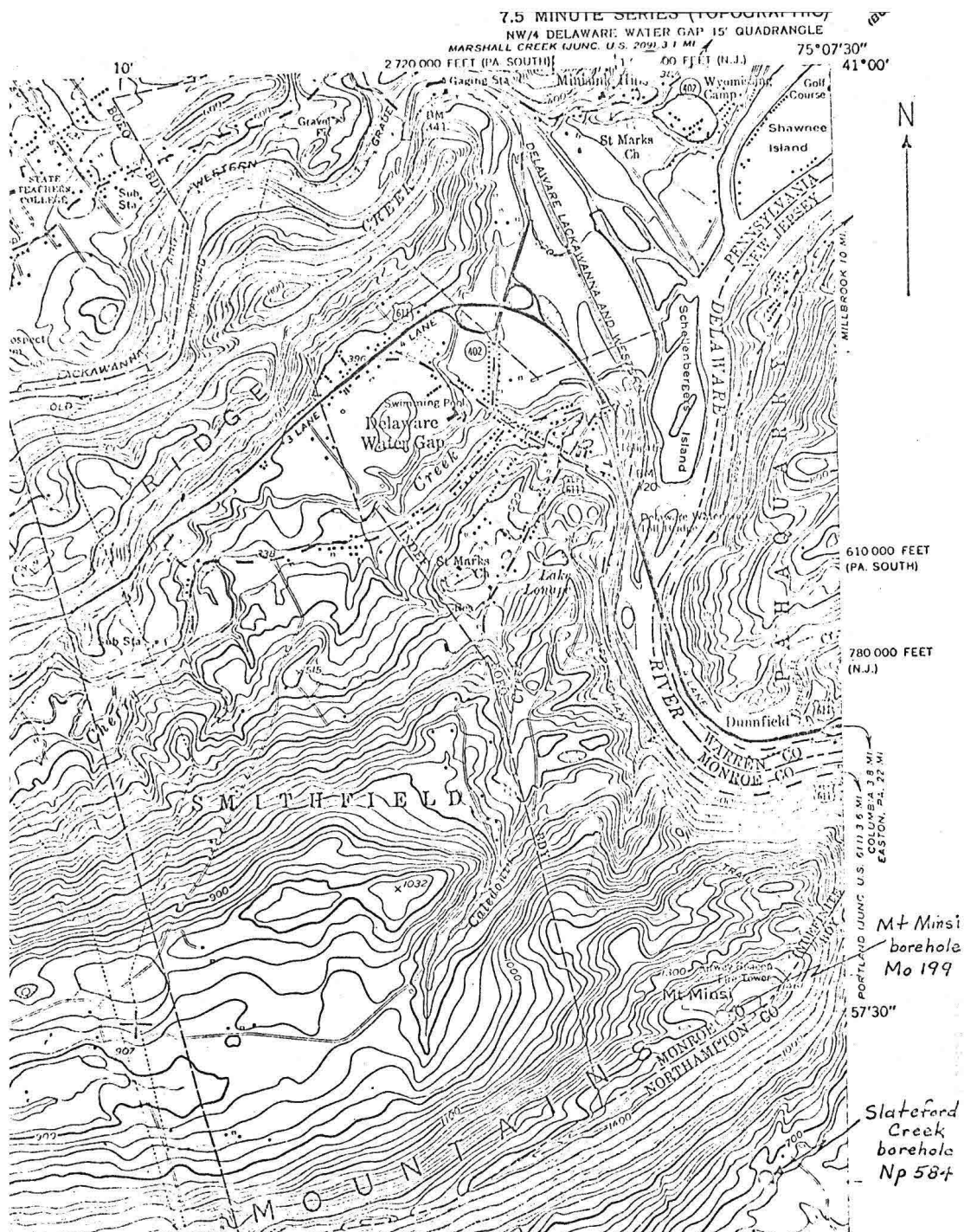


Figure 1.--Map showing location of test wells in the Delaware Water Gap National

MOUNT MINSI SITE

(North Latitude 40°57'28", West Longitude 75°07'57")

Geologic and Hydrologic Environment

The Mount Minsi well site is underlain by 63 feet of glacial till composed of material ranging in size from clay-sized particles to huge boulders. Some partially stratified zones of silt, sand, and gravel are also present. The Shawangunk Formation of Silurian age underlies the till and consists mostly of quartzites and conglomerates. It forms most of the ridge of Kittatinny Mountain. Bedding in the formation dips to the north at more than 40 degrees and cleavage planes dip to the south at about 60 degrees. Table 5 shows the sample log for the borehole. The electrical resistivity and self-potential logs of the rocks are shown in figure 8.

Figure 8.--(Caption on next page) belongs near here.

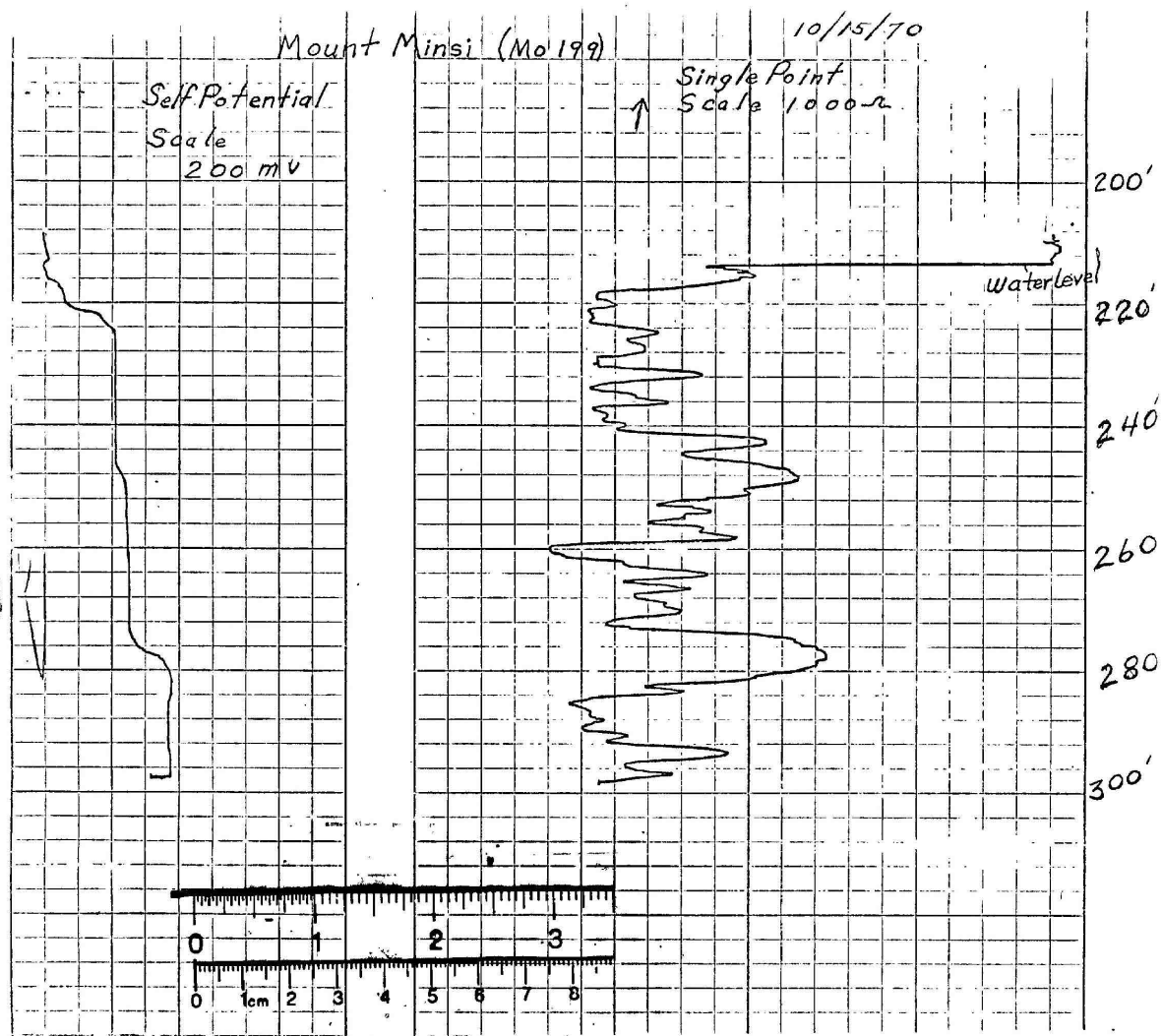


Figure 8.--Self-potential and single-point resistivity log.

Physical Characteristics of Well Mo-199

Depth of well	300 feet		
Diameter of well	10 inches to a depth of 12 feet 8 inches between depths of 12 and 74 feet 6 inches below depth of 74 feet		
Depth of casing	74 feet		
Diameter of casing	6 inches		
Water-bearing zones	<u>Depth to zone (feet)</u>	<u>Yield of zone (gpm)</u>	<u>Total yield (gpm)</u>
	104	0.2	0.2
	137	.3	.5
	280	1.3	2.0

Well Completion

The well was reamed to 8 inches in diameter to a depth of 74 feet, and 6-inch diameter casing, to which a drive shoe was attached, was driven into the formation to seal off the unconsolidated materials. Four sacks of concrete grouting mixed with sand were forced into the annular space outside the casing to about 30 feet above the bottom of the casing. Drill cuttings then were packed firmly over the top of the grout and around the casing to land surface.

An attempt was made to develop the well by surging with air. No increase in yield of 2 gpm was noted.

Table 5.--Sample log of Mount Minsi borehole--Mo-199

Interval (feet)	Thickness (feet)	Description	Remarks
0 - 17	17	Boulder gravel; sand; silt (glacial debris).	Set 10-inch casing (pulled later).
17 - 22	5	Gravel, fairly uniform size (angular and slightly rounded); schist, sandstone, and quartzite. Sand, silt, and rock flour (clay size), interbedded sand and silt with abundant clay, light brown to light gray; sand is fine to medium grained near top--coarse grained at bottom.	Probably glacial in origin.
22 - 36	14	Gravel (uniform grain size), schist, quartzite, siltstone, sandstone, and fibrous mineral (Wollastonite?); iron stain.	Probably glacial in origin. See 8-inch casing (pulled later). Easy, fast drilling.
36 - 50	14		Glacial.
50 - 63	13	Gravel, sand, silt, and clay.	Glacial.
63 - 66	3	Siltstone, light gray; quartzite, medium grained, little mica. Sandstone, light gray to reddish brown, resinous, medium to coarse grained. Quartzite, light gray to brown, coarse-grained, massive.	
66 - 86	20	Siltstone, light olive gray, sandy, fine-grained, much iron stain; little pyrite; large oxidized zone; voids.	Slow drilling.
86 - 90	4	Conglomerate, medium gray, fine grained, angular pebbles; sandstone, resinous, fine grained, silty; fracture zone; iron stains common.	Voids and fracturing at 86 feet.
90 - 99	9		Slow drilling.

Table 5.--Sample log of Mount Minsi borehole--Mo-199--Continued

Interval (feet)	Thickness (feet)	Description	Remarks
99 - 110	11	Sandstone, dark gray, very fine grained; silty, pyrite veins; fracture zone; little mica.	Less than 0.2 gpm water at 104 feet; easy drilling.
110 - 129	19	Conglomerate, dark gray, fine to medium grained, silty, sandstone pebbles; pyrite; some partings of shale (fissile).	Graphite float present on drilling fluid.
129 - 130	1	Sandstone, dark gray, medium grained; much iron staining on fragments.	
130 - 138	8	Siltstone, sandy, dark gray, fissile; possible bedding slickensides; sandstone, medium grained, light to medium gray, hard; noncalcareous vein material.	Less than 0.5 gpm water at 137 feet. Slow drilling.
138 - 148	10	Sandstone and quartzite, light gray to medium to dark gray, fine to coarse grained, hard, pyritic.	Slow drilling.
148 - 149	1	Sandstone, brown, fine grained.	
149 - 160	11	Siltstone, medium to dark gray, sandy; fracture zone with iron stain; soft, fissile, gray-green shale.	Easy drilling.
160 - 170	10	Sandstone, dark-gray to light olive green, fine to medium grained, little or no fissility; fracture zone, possible slickensides.	Slow drilling.

Table 5.--Sample log of Mount Minsi borehole--Mo-199--Continued

Interval (feet)	Thickness (feet)	Description	Remarks
170 - 182	12	Siltstone, dark gray with white opaque quartz veins, some fissility; fracture zone, iron stain; shale fragments.	Slow drilling.
182 - 184	2	Sandstone, medium to dark gray, medium grained; highly fractured zone; much iron staining; a little pyrite.	Fast drilling.
184 - 193	9	Siltstone, dark gray to black, soft; fracture zone, iron stain, very shaly, sandy, quartzitic.	Much graphitic float. Fast drilling.
193 - 209	16	Sandstone, medium gray, medium grained, quartz veins; vuggy with iron stain; some primary porosity.	Approximately 0.5 gpm water (total) at 200 feet. Very easy drilling.
209 - 219	10	Quartzite, light to olive gray, coarse grained, pyritic, hard; some shale with iron stain; vuggy with quartz crystals.	Slow drilling.
219 - 220	1	Siltstone, dark gray, schistose, iron stain, very fissile.	Water level 125 feet below land surface.
220 - 240	20	Mudstone, very silty, conglomeratic, medium to dark gray pebbles; schist, mica; some shale or siltstone, soft, resinous.	Easy drilling.

Table 5.--Sample log of Mount Minsi borehole--Mo-199--Continued

Interval (feet)	Thickness (feet)	Description	Remarks
240 - 260	20	Quartzite, light gray, coarse grained, vuggy with quartz crystals; much broken fractured rock with iron staining. Cleavages present in quartzite; some pyrite and quartz veins.	Easy drilling.
260 - 270	10	Siltstone, dark gray, conglomeratic, sandy, interbedded; pyritic, fissile, bedding slickensides.	
270 - 288	18	Quartzite, light to medium gray, coarse grained; conglomeratic, white quartz pebbles; vuggy with crystalline quartz; black mineral, pyritic; bottom part is much fractured with iron stain.	2 gpm water (total) at 280 feet. Drilling fast in lower part. Water level 215 feet below land- surface. Cased 73 feet with 6-inch diameter steel, 10 feet into solid rock. Grouted with 4 sacks concrete and sand; cuttings around casing to land surface..
288 - 300	12	Siltstone, dark gray, hard interbedded sandy, quartz veins, conglomeratic, pyritic.	

Aquifer Tests

A pumping test was not performed on the Mount Minsi well because of the very deep static water level, which was 212 feet below land surface. The well was brine traced and slug tested on October 5, 1970, in order to properly evaluate the potential yield of the well.

Brine solution was injected at various depths in the well both before and after the start of the slug test (fig. 9). The movement of

Figure 9.--(Caption on next page) belongs near here.

the brine bodies under static water level conditions, and under increased head conditions during the slug test, indicates that water is moving out into the formation through one or more water-bearing zones, mainly between depths of 259 and 284 feet below land surface.

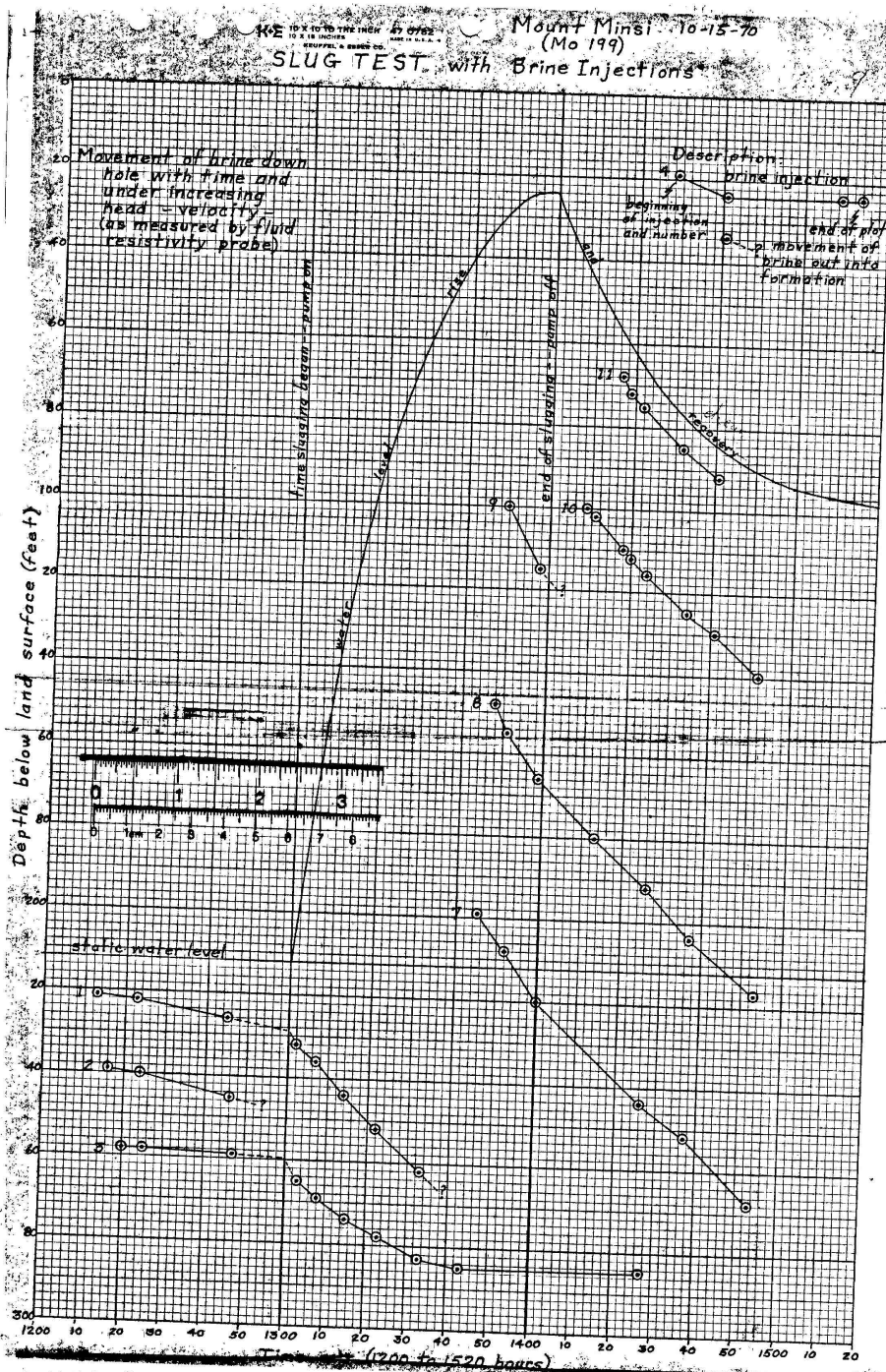


Figure 9. Slug test with brine injections for Mount Minsi well Mo-199

A slug injection test was used to estimate the coefficient of transmissivity for the aquifer (fig. 9 and table 6). This technique assumes that the rate of water-level decline following the injection of water into the well equals the rate of water-level recovery following the withdrawal of an equal volume of water from the well; therefore, an estimate for specific capacity can be made. Only one zone, about 280 feet deep, yields a significant amount of water to the well (about 2 gpm), and this zone acts also as the major thieving zone when water is added to the well. For the first 2 hours after the slug test began, the velocity of injected brine moved down the hole an average of 1 foot per minute, and the rate did not accelerate appreciably as the head increased. An estimated 1.5 gpm discharged into the aquifer near 280 feet below land surface. The specific capacity, estimated from 1 hour of head decay, is roughly 0.02 gpm per foot of drawdown. (See fig. 10.)

Figure 10.--(Caption on next page) belongs near here.

The data indicate that the well can be pumped at about 2 gpm for at least 1 hour when the static water level is approximately 200 feet below land surface. To maximize available water-level drawdown in the well, the pump should be set at a depth of at least 280 feet below land surface.

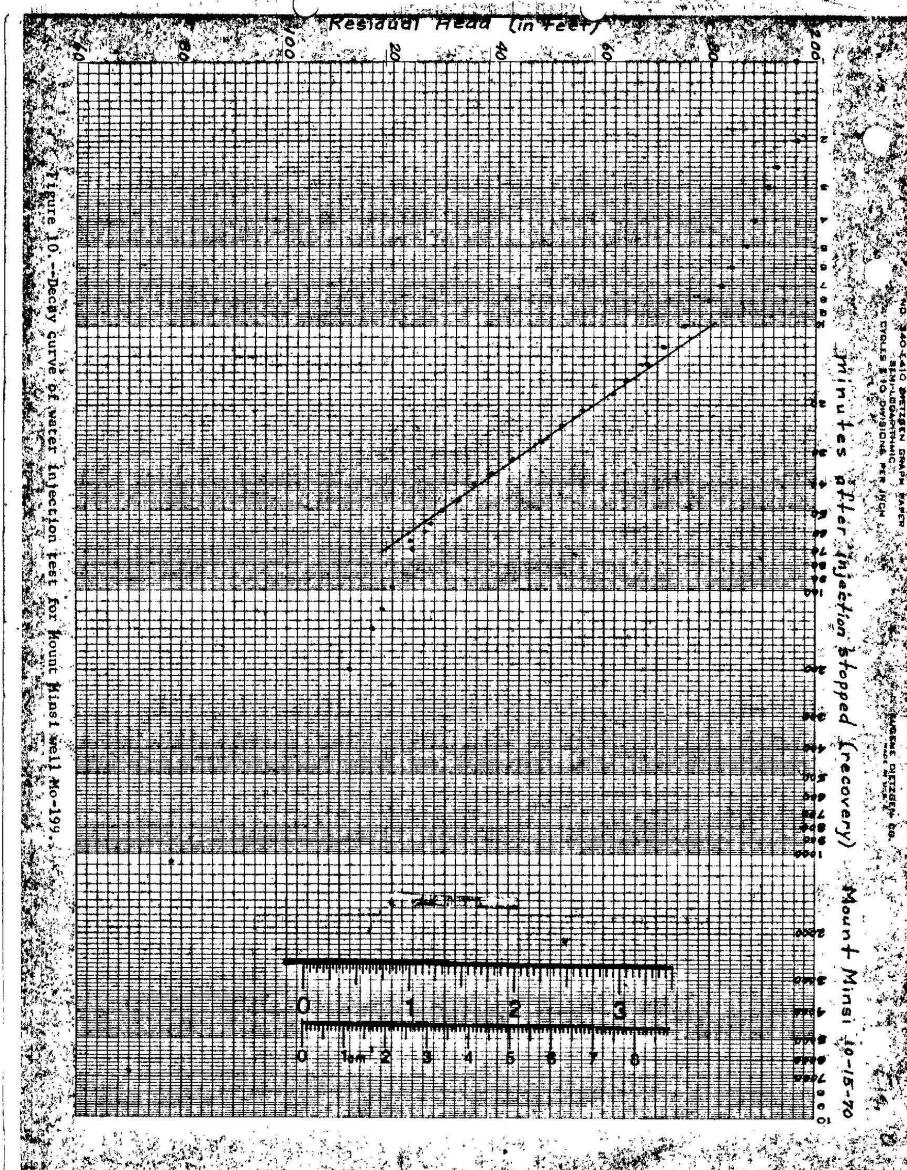


Table 6
NATIONAL PARK SERVICE

SLUG TEST--MOUNT MINSI, MONROE COUNTY

(Well Mo-199)

Recovery of water level following injection of water into hole from land surface.

Date: October 15, 1970

Time 2:00 p.m.

Static water level: 212 feet below top of casing.

Duration: 17 hours, 40 minutes: continuing record by water-level recorder.

Rate of pumping into hole: 7.5

Total amount of water pumped into hole: 450 gallons.

Volume of water above static level: 282 gallons or 188 feet of water referred
to as residual head.

Volume of water lost to formation: 168 gallons.

Recovery time in minutes after injection	Depth to water below measuring point (feet)	Residual head ^{1/} (feet)
.0	24.00	188.00
1.5	23.98	188.02
2.5	27.00	185.0
3	28.44	183.56
4	31.8	180.2
5	33.2	178.8
6	36.0	176.0
7	38.0	174.0
8	40.2	171.8
10	44.4	167.6
12	48.4	163.6
14	52.1	159.9
16	55.7	156.3
18	58.9	153.1
21	63.7	148.3
24	67.7	144.3
27	71.5	140.5
32	77.3	134.7
36	81.5	130.5
40	84.7	127.3
45	87.8	124.2
50	90.5	121.5
56	92.6	119.4
60	93.9	118.1
65	94.7	117.7
70	96.0	116.0
96	99.96	112.04
116	101.65	110.35
140	103.17	108.83
200	108.00	104.00
1,060	141.61	70.39
6,600	150.00	38.00

^{1/} Head of water (in feet) above static water level.

Following the aquifer tests on October 29, 1970, a water-level recorder was installed on this well. The hydrograph indicates a wide range of water-level fluctuations that is probably caused by rapid infiltration and very low storage capacity in the rocks. Because of this, and the fact that the well was drilled during a period of normal or above-normal rainfall, it should be pointed out that the water supply to this well may be insufficient during periods of

Chemical Quality of Water

Water was not sampled during drilling because of the very low yields to the well. After drilling was completed the well was pumped for 30 minutes with a sustained yield of over 2 gpm, until the water had cleared enough for sampling. The following field determinations were made:

Depth (feet)	Approximate yield (gpm)	Temperature °C	Specific conductance (micromhos at 25°C)	pH	Concentrations milligrams per liter		
					Total hardness	Total iron	Total manganese
300	2	10.7	65	7.9	15	0.00	0.00

Water samples also were collected for complete chemical analysis in the laboratory. Results are shown in table 7. The water is very soft. The concentration of dissolved solids is 53 mg/l, and except for the possibility of anomalously high iron and manganese concentrations, the water is considered to be of excellent quality, passing U.S. Public Health Service drinking water standards. The high concentrations of dissolved iron and manganese were probably caused by acidifying the water for laboratory analysis and thereby dissolving the suspended material that occurred in the water sample. These metals were not detected in the field analysis where it was not necessary to acidify the water sample for metal analysis.

Table 7
NATIONAL PARK SERVICE
CHEMICAL ANALYSIS--MOUNT MINSI, MONROE COUNTY
(WELL Mo-199)

	Date
	9-28-50
Depth (feet)	300
Total yield (gpm)	2 or more
Specific conductance (micromhos at 25°C)	57
pH	7.1
Color	4
Concentrations in milligrams per liter:	
Silica (SiO ₂)	5.0
Total iron (Fe)	6.2
Manganese (Mn)	.43
Calcium (Ca)	2.3
Magnesium (Mg)	3.0
Sodium (Na)	1.5
Potassium (K)	4.6
Bicarbonate (HCO ₃)	12
Carbonate (CO ₃)	0
Sulfate (SO ₄)	12
Chloride (Cl)	2.2
Fluoride (F)	.3
Nitrate (NO ₃)	.0
Phosphate (PO ₄)	.07
Dissolved solids:	
Residue on evaporation	53
Sum of dissolved constituents	37
Hardness as CaCO ₃ :	
Total Ca+Mg	18
Non-carbonate	8

*at Cape
Contract*

RELEASE OF CLAIMS

For and in consideration of the receipt of final payment in the amount of \$9,562.50 from the United States of America (hereinafter called the Government) under and pursuant to Contract No. 14-10-7:993-473 for drilling of a test well at Delaware Water Gap National Recreation Area, Pennsylvania, and for and in consideration of the receipt of final payment in the amount of \$2,800.00 from the Government under and pursuant to Contract No. 14-10-7:993-488 for drilling of a test well at Delaware Water Gap National Recreation Area, New Jersey, the undersigned hereby, does remise, release, and discharge the Government, its officers, agents, and employees of and from any and all claims and demands whatsoever under or arising from the said contracts, except specified claims in stated amounts listed as follows:

" NO EXCEPTIONS "

This release has been executed this 21 day of Dec 1970

Allen J. Greening
(Contractor)

By Allen J. Greening Sr.
owner
(Title)

LS4 ESC-LW

December 5, 1970

LETTER OF ACCEPTANCE

Mr. Allen J. Greening, Sr.
300 West Ann Street
Milford, Pennsylvania 18337

Dear Mr. Greening:

A final inspection of your contract No. 14-10-7:893-473 for drilling of a test well at Delaware Water Gap National Recreation Area, Pennsylvania, and of your contract No. 14-10-7:893-448 for the drilling of a test well at Delaware Water Gap National Recreation Area, New Jersey, was made on November 17, 1970, by Park Planner James L. Isenogle of Delaware Water Gap National Recreation Area.

This inspection revealed that the work was completed in accordance with specifications and is hereby accepted.

Sincerely yours,

(Sgd) RAY G. MARTINEZ

Ray G. Martinez
Chief, Procurement and Contracting
Officer

 Signed

By Marvin Feldman
Hydrologist, ESC

cc:
General Superintendent NCP Attn: Finance Office
Director, Northeast Region
Superintendent, Delaware Water Gap NRA
Chief, Division of Water Resources, WASO
ESC-Contracts
ESC-OPM

ESC-LW (Water Resources - DWG Contracts)
ESC-D

MFeldman:egz 12/8/70

Form 10-74
(Rev. 9/60)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

EASTERN SERVICE CENTER

(Park)

Check One:

Monthly
Estimate ☐Final
Estimate ☒

UNIT PRICE CONTRACT

Proposed

ESTIMATE NO. 1	FOR (Period) August 16, 1970 - November 19, 1970	DATE December 7, 1970
CONTRACT NO. 14-10-7:993-473	COMPLETION DATE October 5, 1970	EXTENDED DATE
CONTRACTOR Allen J. Greening, Sr.		ORIGINAL CONTRACT \$ 3,980.00
PROJECT Test well Drilling - Delaware Water Gap National Recreation Area		CHANGE ORDERS* \$
LOCATION Mt. Minsi, Pennsylvania		TOTAL CONTRACT \$

ITEM NO.	CONTRACT QUANTITY	DESCRIPTION	QUANTITY TO DATE	UNIT PRICE	AMOUNT TO DATE
1	50'	Drill 6 inch hole, case, and grout	74'	\$27.50	\$2,035.00
2	250'	Drill 6 inch open hole	300'	8.50	2,550.00
3	0	Bid not accepted	0	120.00	00
4	8 hrs	Develop well by surging	0	20.00	00
5	8 hrs	Standby time	2 hrs	20.00	40.00
6	Job	Plugging well hole	0	160.00	00

RECOMMENDED (Project Supervisor)

Signed

Marvin Feldman, Hydrologist

Office of Land Acquisition & Water Resources, ES

APPROVED (Contracting Officer)

Signed

Ray G. Martinez, Chief, Procurement
and Contracting Officer

DEC 29 1970

SUMMARY

TOTAL TO DATE	\$ 4,625.00
LESS RETAINED AMOUNT.....	00
NET.....	4,625.00
LESS PREVIOUS PAYMENTS.....	00
LESS LIQUIDATED DAMAGES.....	00
DUE THIS ESTIMATE.....	\$4,625.00
% COMPLETED TO DATE:	100%

*Show Breakdown on Reverse

(See Reverse for Distribution)



IN REPLY REFER TO:

D52

United States Department of the Interior

NATIONAL PARK SERVICE
Delaware Water Gap National Recreation Area
Highway I-80
Columbia, New Jersey 07832

November 19, 1970

Memorandum

To: Director, Eastern Service Center
Attention: Garry Moore

From: Acting Superintendent, Delaware Water Gap

Subject: Contract #14-10-7-993-473, Mt. Minsi & Slateford Wells
Contract #14-10-7-993-488, Karamac Well

The following is a list of the work completed by Greening on the test wells covered under the above-mentioned contracts:

Slateford Creek Well:

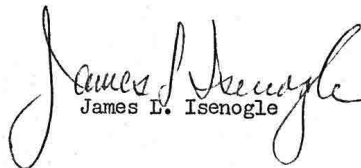
1. Installed 81' of casing
2. Drilled down 300'
3. No pump testing for yield, drawdown, and recovery of well.
4. 8 hrs. spent to develop well by surging.
5. No standby time.
6. Did not plug well hole.

Mt. Minsi Well:

1. Installed 74' of casing.
2. Drilled down 300'
3. No pump testing for yield, drawdown and recovery of well.
4. Did not develop well by surging.
5. 2 hrs. standby time for crew and equipment.
6. Did not plug well hole.

Karamac Well:

1. No casing installed.
2. Drilled down 300'
3. No pump testing for yield, drawdown and recovery of well.
4. No hours spent to develop well by surging.
5. No standby time for crew and equipment.
6. Well hole plugged.


James E. Isenogle

Docket Information

Number of Documents in Docket 25

Documents Dated from 6/15/1970 to 12/8/1970

Docket Compiled: 3/1/2011