



WATER-RIGHT DOCKET

Pictured Rocks National Lakeshore

Docket No: 2

MINERS BASIN WELL

Supporting Hydro Data

06-22-1971: water analysis: test well no. 1

PROVISIONAL RECORDS
SUBJECT TO REVISION

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

2GW

WATER ANALYSIS

Location Pictured Rocks National Lakeshore, Michigan (NE NE Sec. 10 T47N R18W)
Source Test well No. 1 Depth (ft) _____ Diam (in.) _____
Cased to (ft) _____ Date drilled _____ Point of coll. _____
Owner _____
Treatment _____ Use _____
WBFI Jacobsville sandstone, 300 ft. WL _____ Yield _____
Temp (°C) _____ Appear. when coll. _____
Collected June 22, 1971, 2255 By C. J. Doonan
Remarks _____

	mg/l	me/l		mg/l	me/l
Silica (SiO ₂)	7.1	--	Bicarbonate (HCO ₃)	178	2.92
Aluminum (Al)			Carbonate (CO ₃)	0	.00
Iron (Fe)					
			Sulfate (SO ₄)	19	.40
			Chloride (Cl)	2.5	.07
			Fluoride (F)	.3	.02
Calcium (Ca)	38	1.90			
Magnesium (Mg)	16	1.32	Nitrate (NO ₃)	.1	.00
Sodium (Na)	3.0	.13			
Potassium (K)	6.9	.18			
Total		3.53	Total		3.41

	mg/l		
		Specific conductance (micromhos at 25° C)	297
Dissolved solids:		pH	8.2
Calculated	181	Color	
Residue on evaporation at 180° C			
Hardness as CaCO ₃	160		
Noncarbonate	14		

Lab. No. Col 59301

Field No.

Project MICH WRD GW

PROJECT 06-22-71

WATER WELL RECORD			Owner No. TW-1	
Sample No.	County	Twp.	NE NE Sec. 10	Town 47 N.S. 10 R.
Distance from Roads, Section Lines, etc.			Lat. 46°29'26" Long 86°32'02" Sheet 1	
FORMATION			THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Start drilling 5:00 PM				
on 5-27-71				
Fine gray sand			2	2
Med yellow sand			25	27
"			13	40
Fine gray sand with wood fiber & what appears to be an occasional clam shell			3	43
Stop drilling @ 6:15 at 43' black muck on bottom of drill				
5-28-71 start drilling 8:25 AM				
Med sand with wood fiber			7	50
Sand stone at				50
Sandstone fractured			1 1/2	51 1/2
Sandstone hard			5	56 1/2
Set casing at 56.5'				
Remarks:				
Owner: National Park Service Address: Munising Mich. Driller and Address: Kleiman Well Depth: 300 ft. Date of Completion: 6-4-71 ☐ Cable tool ☒ Rotary ☐ Dug ☐ R.C. ☐ Driven ☐ Jetted ☐ Bored Use: ☐ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Dewatering ☒ Test Well ☐ Casing: Diam. 6 in. to 56.5 ft. Depth _____ ft. Height: Above/Below surface _____ ft. Type-Weight _____ Screen: Type: _____ Dia: _____ Slot/Gauze _____ Length _____ Set between _____ ft. and _____ ft. Accessories: _____ Water level: _____ ft. above/below _____ _____ ft. above/below _____ Meas. by _____ Date _____ Drawdown: _____ ft. after _____ hrs. pumping _____ g.p.m. _____ ft. after _____ hrs. pumping _____ g.p.m. Meas. by _____ Date _____ Flow: _____ g.p.m./g.p.h. Temp: _____ °F Water Quality in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) _____ Hardness _____ Elevation: 640 ft. above MSL Source of data: Field obs. Record by: C. J. Doonan Date: 6-4-71				

Sample No.		7" 54 15		GEOLOGICAL SURVEY DIVISION		Permit No.	
County		Twp.		Sec.		Owner No. TW #1	
Distance from Roads, Section Lines, etc.		Miners Basin Test Well		Sheet 2			
FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	Owner: ☐				
Start drilling @ 8:35 AM			Address:				
6-3-71			Driller and Address:				
Sandstone tan	15	71	Well Depth: _____ ft. Date of Completion _____				
" Pink	4	75	☐ Cable tool ☐ Rotary ☐ Dug ☐ R.C. ☐ Driven ☐ Jetted ☐ Bored				
Harder ~~tan~~ ss			Use: ☐ Domestic ☐ Public Supply ☐ Industry				
Pink & gray zones			☐ Irrigation ☐ Air Conditioning ☐ Dewatering				
alternating			☐ Test Well ☐				
Producing about 159 gpm			Casing: Diam. _____ in. to _____ ft. Depth _____ ft. Height: Above/Below surface _____ ft. Type-Weight _____				
between 70' & 80'			Screen: Type: _____ Dia: _____				
Red streak @ 82'			Slot/Gauze _____ Length _____				
Producing 20-9 gpm			Set between _____ ft. and _____ ft.				
between 80'-90'	16	91	Accessories: _____				
Hard zone, red, pink, gray	2	93	Water level: _____ ft. above/below _____				
Red streak @ 99			_____ ft. above/below _____				
Tan @ 101			Meas. by _____ Date _____				
Red streak @ 104			Drawdown: _____ ft. after _____ hrs. pumping _____ g.p.m.				
100 to 105 tan & pink			_____ ft. after _____ hrs. pumping _____ g.p.m.				
105 to 110 tan & pink		110	Meas. by _____ Date _____				
mostly tan			Flow: _____ g.p.m./g.p.h. Temp: _____ °F				
between 30-40 gpm			Water Quality in Parts Per Million:				
@ 120			Iron (Fe) _____ Chlorides (Cl) _____				
			Hardness _____				
			Elevation: _____ ft. above _____				
			Source of data: _____				
			Record by: _____ Date: _____				
Remarks:							

GEOLOGICAL SURVEY DIVISION			
WATER WELL RECORD		Owner No. <i>TW-1</i>	
Sample No.	County	Twp.	Range
Distance from Roads, Section Lines, etc.		Sec.	N/S. E/W.
<i>Miner's Basin Test Well</i>		<i>Sheet 3</i>	
FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	Owner: <i>National Park Service</i>
<i>Pink streak @ 120</i>			Address:
<i>" @ 125</i>			Driller and Address:
<i>Gray @ 127</i>			Well Depth: _____ ft. Date of Completion _____
<i>Gray & red 130-135</i>			☐ Cable tool ☐ Rotary ☐ Dug ☐ R.F. ☐ Driven ☐ Jetted ☐ bored
<i>30 to 40 gpm @ 140'</i>			Use: ☐ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Dewatering ☐ Test Well ☐ _____
<i>Gray @ 138</i>			Casing: Diam. _____ in. to _____ ft. Depth _____ ft. Height: Above/Below surface _____ ft.
<i>Red @ 163</i>			Type-Weight _____
<i>Tan @ 164</i>			Screen: Type: _____ Dia: _____
<i>Red streak @ 167</i>			Slot/Gauze _____ Length _____
<i>Rock border @ 171</i>		<i>181</i>	Set between _____ ft. and _____ ft.
<i>Hard, red @ 181 with some soft clay-like red material, water</i>		~~181~~	Accessories: _____
<i>Very red</i>	<i>4</i>	<i>185</i>	Water level: _____ ft. above/below _____
<i>Gray</i>	<i>2</i>	<i>187</i>	_____ ft. above/below _____
<i>Pink @ 187</i>	<i>5</i>	<i>192</i>	Meas. by _____ Date _____
<i>Red @ 192 with red clay water very red</i>			Drawdown: _____ ft. after _____ hrs. pumping _____ g.p.m.
			_____ ft. after _____ hrs. pumping _____ g.p.m.
			Meas. by _____ Date _____
			Flow: _____ g.p.m./g.p.h. Temp: _____ °F
			Water Quality in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) _____
			Hardness _____
			Elevation: _____ ft. above _____
			Source of data: _____
			Record by: _____ Date: _____
Remarks: _____			

Plate No.		WATER WELL RECORD		Owner No. TW-1	
County	Twp.	Sec.	Range	W/S.	E/W.
Distance from Roads, Section Lines, etc.					
Miner's Basin test well					
FORMATION		THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	Owner: National Park Service	
Tan @ 195				Address:	
softer @ 200				Driller and Address:	
Very light tan @ 214				Well Depth: _____ ft. Date of Completion: _____	
Pink at 223				☐ Cable tool ☐ Rotary ☐ Dug ☐ R.C. ☐ Driven ☐ Jetted ☐ Bored	
Very light tan @ 226				Use: ☐ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Dewatering ☐ Test Well ☐ _____	
Pink @ 233				Casing: Diam. _____ in. to _____ ft. Depth _____ ft. Height: Above/Below surface _____ ft. Type-Weight _____	
Tan @ 234				Between: _____	
Red @ 238 streak				Type: _____ Dia: _____	
Start bag 43-240'-245'				Slot/size _____ Length _____	
start drilling 925 am 5-4-71				Set between _____ ft. and _____ ft.	
light tan @ 240				Accessories:	
Pink streak @ 248				Water level: _____ ft. above/below _____	
Very soft cuts easily				_____ ft. above/below _____	
Est 80 gpm @ 26'				Meas. by _____ Date _____	
Pink streak @ 26'				Drawdown: _____ ft. after _____ hrs. pumping _____ g.p.m.	
Red streak @ 26'				_____ ft. after _____ hrs. pumping _____ g.p.m.	
Red streak 27' soft				Meas. by _____ Date _____	
red clay water				Flow: _____ g.p.m./g.p.h. Temp: _____ °F	
Very red				Water Quality in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) _____	
Red hard ss @ 274-283				Hardness _____	
light tan 274-283				Elevation: _____ ft. above _____	
Red streak @ 283				Source of data: _____	
Soft light tan ss				Record by: _____ Date: _____	
Red streak w/ red cl @ 297					
Stopped drilling @ 300 ft					

WATER WELL RECORD				Owner NO. Test Well #1	
County	Twp.	Range	Section	Town	Range
Alger	Munising	4 NE	4 NE	Sec. 10	47N W/S. 18W E
Distance from Roads, Section Lines, etc. <i>Miners Basin</i>					
FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	Owner: National Park Service		
Drift, sand, tan	27	27	Address: Munising, Michigan		
Drift, sand, white, some wood	at	40	Driller and Address: H. Kleiman Iron Mountain		
Drift, sand, white, plus wood	at	43	Well Depth: 300 ft. Date of Completion: 6/4/71		
Drift, sand, white, still some wood	7	50	☐ Cable tool ☒ Rotary ☐ Dug ☐ R.C. ☐ Driven ☐ Jetted ☐ Pored		
Drift, sand, some tan cemented sand-- may be ledge; trace red sand	5	55	Use: ☐ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Dewatering ☒ Test Well ☐		
Drift	at	55	Casing: Diam. 6 in. to 56.5 ft. Depth: _____ ft. Weight: _____		
Sandstone, some red cemented, some tan cemented	5	60	Screen: Type: _____ Dia: _____ Slot/Gauze _____ Length _____ Set between _____ ft. and _____ ft. Accessories: _____		
Sandstone, white, medium	5	65	Water level: _____ ft. above/below _____		
Sandstone, white, trace pink, medium	10	75	Meas. by _____ Date _____		
Sandstone, white, trace pink, medium to coarse, rounded, frosted	5	80	Drawdown: _____ ft. after _____ hrs. pumping _____ g.p.m. _____ ft. after _____ hrs. pumping _____ g.p.m. Meas. by _____ Date _____		
Sandstone, as above, slightly finer	10	90	Flow: _____ g.p.m./g.p.h. Temp: _____ °F		
Quartzitic conglomerate, white to pink to purple quartz	5	95	Water Quality in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) _____ Hardness _____		
TOP OF JACOBSVILLE			Elevation: 640 ft. above MSL		
Sandstone, white, some pink, red, friable to cemented (any red sandstone appears to be better cemented)	35	130	Source of data: Field observation, CJD; samples, KAG		
As above	5	135	Record by: K. Gravelle Date: 6/28/71		
As above, trace glauconite	5	140			
As above, less red	5	145			
Sandstone, white, some pink, red, friable to cemented; the red is either argillaceous or silty, trace glauconite	5	150			
Sandstone, white, medium, friable	5	155			
Sandstone, white to pink to red, fine to medium, red as above is better cemented	5	160			
As above, trace glauconite 165-170, some friable, some well cemented	10	170			
As above	5	175			
Sandstone, white and red, fine to medium, angular, friable to well cemented	5	180			
Sandstone, red, fine to silty, well cemented, trace glauconite	5	185			
Sandstone, white with some red	5	190			
Sandstone, red, fine to silty, some micaceous	5	195			
Sandstone, white to red, with variety of minerals; larger sand grains are rounded, frosted	15	210			
Remarks:					

WATER WELL RECORD			Owner Box TW#1
W2356	County Alger	Twp. Munising	NE d NE d Sec. 10 Town 47N N/S. Range 18W E/W.
Distance from Roads, Section Lines, etc.			
FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM	Owner: National Park Service
Sandstone, white, medium	10	220	Address: Munising, Michigan
As above, slight increase in red	5	225	Driller and Address: H. Kleiman Iron Mountain
Sandstone, white, medium	5	230	Well Depth: 300 ft. Date of Completion: 6/4/71
Sandstone, white, medium, some red, fine cemented, vari-colored quartz and feldspars	15	245	☐ Cable tool ☒ Rotary ☐ Dug ☐ R.C. ☐ Driven ☐ Jetted ☐ Bored
Sandstone, white, medium	25	270	Use: ☐ Domestic ☐ Public Supply ☐ Industry
Sandstone, white, medium, increase in red, some micaceous	5	275	☐ Irrigation ☐ Air Conditioning ☐ Dewatering
Sandstone, white, medium, rounded, frosted	5	280	☒ Test Well ☐ _____
Sandstone, white, medium, increase in red, fine, trace glauconite, pyrite and soft green shale	5	285	Casing: Diam. 6 in. to 56.5 ft. Depth surface _____ ft.
Sandstone, white, medium, frosted, trace soft green shale	10	295	Type-Weight _____ in. to _____ ft. Depth
Sandstone, white, medium and sand- stone, red, fine, cemented; some soft green micaceous shale and red shale	5	300	Screen: Type: _____ Dia: _____
Shale, red	at 300		Slot/Gauze _____ Length _____
			Set between _____ ft. and _____ ft.
			Accessories: _____
			Water level: _____ ft. above/below _____
			_____ ft. above/below _____
			Meas. by _____ Date _____
			Drawdown: _____ ft. after _____ hrs. pumping _____ g.p.m.
			_____ ft. after _____ hrs. pumping _____ g.p.m.
			Meas. by _____ Date _____
			Flow: _____ g.p.m./g.p.h. _____ Tem: _____ °F
			Water Quality in Parts Per Million: Iron (Fe) _____ Chlorides (Cl) _____
			Hardness _____
			Elevation: _____ ft. above _____
			Source of data: _____
			Record by: K. Gravelle Date: 6/28/71
Remarks:			

Test Well No 1 Pump Test

①

June 22, 1971

MP = Top of Casing = Lsd + 2± feet

Watch time	Water level	Remarks
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2:40	10.04	Static
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3:00 Start pump at 60 gpm

3:05	27.05	
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10	27.35	
----	-------	--

15	27.85	
----	-------	--

20	27.80	check rate 60 gpm
----	-------	-------------------

25	29.30	
----	-------	--

30	30.40	
----	-------	--

35	30.90	
----	-------	--

40	33.45	
----	-------	--

Shut down 6 min

50	27.80	
----	-------	--

55	28.80	
----	-------	--

4:00	60	28.40	check rate 60 gpm
------	----	-------	-------------------

05	30.35	
----	-------	--

Shut down 10 min.

4:15	25.15	
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4:20	30.75	
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4:25	85	28.95
------	----	-------

4:30	31.20	check rate 60 gpm
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4:40	31.65	Field Test #1
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4:50	33.50	
------	-------	--

5:00	120	33.55	check rate 60 gpm
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10	33.65	
----	-------	--

20	33.80	
----	-------	--

30	34.45	
----	-------	--

Test well No 1 Pump test cont'd (2)

Watch time	Water level	Remarks
5:40	34.55	
5:50	34.75	
6:00 180	34.80	check rate 60gpm
6:30	34.70 (?)	
7:00 240	36.20	check rate 60gpm, water cloudy
7:30	36.45	
8:00 300	36.65	Field test #2 @ 8:25
8:30	36.80	check rate 60gpm, a little clearer
9:00 360	36.95	check rate 60gpm, a little clearer
9:30	37.75	
10:00 420	37.80	
start 83gpm at 10:00		
10:05	45.10	
10:10	46.00	
10:15	46.45	
10:20 440	46.95	
10:25	47.20	rate check 83gpm. water more cloudy
10:30	47.45	
10:35	47.65	rate check 83gpm, still cloudy, pumping some sand, coarse.
10:40 460	47.75	Field test #3
10:45	47.95	
10:50	48.05	
10:55	46.25	
11:00 480	48.35	
11:05	48.45	

Test Well No 1, Pump test contd.

(3)

Recovery

Watch time	Water level	Remarks
11:05	Shut off pump	
11:06	33.20	
:07	30.05	
:08	28.10	
:09	26.80	
:10	25.80	
:11	25.05	
:12	24.40	
:13	23.85	
:14	23.40	
:15	22.90	
:20	21.30	
:25	20.20	
:30	19.30	
:35	18.65	

7:20 AM 6-23-71 static 10.67

Pictured Rocks National Lakeshore
Test Well #1, Pump test
Chemical quality field analysis
6-22-71

Field test #1 at 4:40
Specific conductance 175 (micromhos at 25°C)
Hardness = 135 mg/l
Iron = 0.2 mg/l
pH = 7.6
Temp = 8.5°C
Water cloudy

Field test #2 at 8:25
Specific conductance = 300 (micromhos at 25°C)
Hardness = 150 mg/l
Iron = 0.2 mg/l
Temp = 7.0°C
Water cloudy

Field test #3
Specific conductance = 300 (micromhos at 25°C)
Temp = 7.0°C
Water cloudy

Other Supporting Information

Ground-Water Conditions at Test-Well Sites
Pictured Rocks National Lakeshore, Michigan
by C. J. Doonan

On Nov. 11, 1970 Gordon Hulbert and Charles Doonan made a reconnaissance of the Pictured Rocks area to determine locations for two test wells to be drilled at proposed development sites near Sand Point and Miners Basin in Alger County.

A site for test well no. 1 (see enclosed map) was tentatively selected between Miners River and the county road known as "Pictured Rocks Trail." When preliminary plans for development in Miners Basin became available an alternate site was selected east of the road and as close to the base of the bluff as possible. From a geologic standpoint both sites appeared equal, and the new location was better adapted to proposed development.

Test well no. 2 was intended to ascertain the availability of water for use in proposed development along the lake shore at Sand Point. The first site selected for test well no. 2 was on a sand ridge east of the county road; however, because of difficulties moving the drill rig in sand, the site was changed to get closer to the road near present headquarters.

Drilling started at test site no. 1 at 5:00 p.m. on May 27. Bedrock was encountered at 50 feet and casing set to 56.5 feet. A 2 inch grout ring was poured from the bottom of casing to land surface. Water began entering the hole soon after the bedrock was penetrated. Drilling stopped when a depth of 300 feet below surface was reached. Logs of

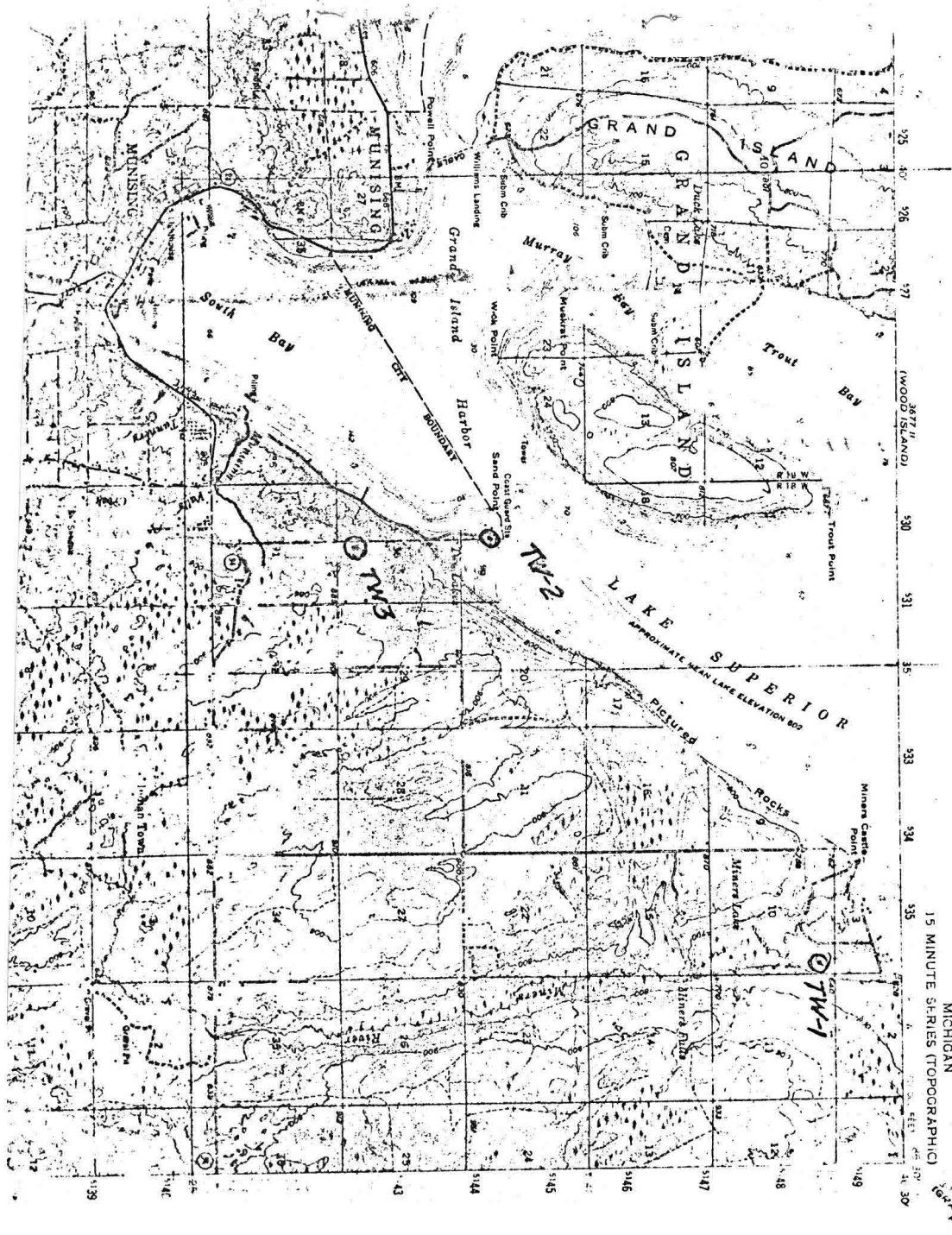
test wells are attached. These include the driller's log prepared on site by C. J. Doonan, and more detailed logs prepared from laboratory examination of samples by K. Gravelle.

On June 8 drilling started on test well no. 2 near the headquarters building on Sand Point. Glacial drift here consists of fine sand mixed with silt and muck. Wood and other vegetable fibers were present in every sample. At a depth of 119 feet artesian pressure forced water up through the tools to a height of 5 feet above surface. Water started flowing and caving the ground around the surface pipe. Because of the danger of an uncontrolled flow from the unstable material drilling was discontinued at 119 feet. As the tools were removed the walls of the hole collapsed shutting off the flow. The hole was backfilled and capped with cement after subsidence stopped.

After field consultation with Mr. Garland Moore, a new site was selected on top of the bluff. This site is labeled test well no. 3. Drilling was started here on June 15. Bedrock was encountered at 41 feet and the casing set to 46.5 feet below surface. In a verbal agreement with Mr. Moore it was decided to forego the expense of grouting this hole with cement; however, the driller did grout with clay and cuttings washed down with water blown from the hole while drilling. Drilling was stopped at 300 feet below surface.

Pump tests were performed on wells one and three on June 22 and 23. Test well no. 1 had a specific capacity of about 2.5 gpm (gallons per minute) per foot of drawdown after pumping 60 minutes at 60 gpm. Test well no. 3 had a specific capacity of about 4 gpm per foot of drawdown after pumping 60 minutes at 60 gpm. Detailed records of pumping tests, with pumping rates and water levels, are attached.

Water from both wells is of good quality according to field analyses performed during test pumping. However, water from test well no. 1 remained cloudy during the entire test, and this well will require further developing to remove the clay from the water-bearing formation. Test well no. 3 cleared up quickly. Results of field analyses of water are enclosed. Results of laboratory analyses will be forwarded as soon as completed by our laboratory at Columbus, Ohio.



Docket Information

Number of Documents in Docket 15

Documents Dated from 6/22/1971 to 6/22/1971

Docket Compiled: 6/7/2011