



WATER-RIGHT DOCKET

Grand Portage National Monument

Docket No: 1

HEADQUARTERS SUPPLY WELL.

State Water Rights Documentation

02-12-1965: letter to nps from minnesota conservation department regarding permit no. 65-94g authorizing appropriation of ground

W55-50
Rev. 11-57

Grand Portage National Monument
RECEIVED

FEB 16 1965

MINNESOTA CONSERVATION DEPARTMENT

OFFICE
Grand Portage, Minn.

DIVISION OF WATERS

February 12, 1965

Mr. Elliot Davis, Supt.
National Park Service
Grand Portage National Monument
Grand Marais, Minnesota

Re: Permit Number 65-94G
Dated February 9, 1965

Dear Sir:

Enclosed is your copy of the permit authorizing appropriation of
ground water by means of a well located in

Cook County
as set forth in the application or as modified to conform to general
practices.

Attached are duplicate forms W55a to be used in recording and reporting
pumping operations incidental to the appropriation authorized there-
under.

You are required to enter thereon the number of hours of pumping, rate
of pumping and total amount of water appropriated each day of operation
during the calendar year and submit one copy of this record, duly ac-
knowledgeed, to the Division of Waters on or before January 15 of the
succeeding year. Failure to make this report is sufficient reason for
revoking the permit. Keep your permit effective by complying with all
of the provisions thereof.

Your cooperation is solicited.

Yours very truly,

Sidney A. Frellsen, Director


Division of Waters

Enc. Copy of Permit
W55a

W 80-59

**STATE OF MINNESOTA
DEPARTMENT OF CONSERVATION**

P. A. No. 65-94 G

IN THE MATTER OF THE APPLICATION OF **National Park Service,
Grand Portage National Monument**
for a PERMIT TO APPROPRIATE GROUND WATER.

PERMIT

Pursuant to Minnesota Statutes, Chapter 105, and on the basis of statements and information contained in the permit application, letters, maps, and plans submitted by the applicant, and other supporting data, all of which are made a part hereof by reference,

PERMISSION IS HEREBY GRANTED to National Park Service, Grand Portage National Monument, whose address for the purpose of notices and other communications pertaining to this permit is

Attn: Eliot Davis, Supt., Grand Marais, Minn. Subject to change by written notice from the permittee,

to appropriate ground water by means of **a well**

located on property described as **NW 1/4 Sec. 4, T. 63 N., R. 6 E., fourth principal meridian,**

Cook COUNTY

for the purpose of **irrigation, domestic use and fire protection.**

This permit is granted subject to the following GENERAL and SPECIAL PROVISIONS:

GENERAL PROVISIONS

1. This permit shall not release the permittee from any liability or obligation imposed by Minnesota Statutes or local ordinances relating thereto and shall remain in force subject to all conditions and limitations now or hereafter imposed by law.
2. This permit is not assignable except with the written consent of the Commissioner of Conservation.
3. The Director of the Division of Waters shall be notified at least five days in advance of the commencement of the work authorized hereunder.
4. No change shall be made, without written permission previously obtained from the Commissioner of Conservation, in the hydraulic dimensions, capacity or location of any items of work authorized hereunder.
5. The permittee shall grant access to the site at all reasonable times during and after construction to authorized representatives of the Commissioner of Conservation for inspection of the operation authorized hereunder.
6. This permit may be terminated by the Commissioner of Conservation, without notice, at any time he deems it necessary for the conservation of the water resources of the state, or in the interest of public health and welfare, or in case it shall be determined that the operations hereunder are causing injury to the property of others, or for violation of any of the provisions of this permit, unless otherwise provided in the Special Provisions.
7. In all cases where the doing by the permittee of anything authorized by this permit shall involve the taking, using, or damaging of any property, rights or interests of any other person or persons, or of any publicly owned lands or improvements thereon or interests therein, the permittee, before proceeding therewith, shall obtain the written consent of all persons, agencies, or authorities concerned, and shall acquire all property, rights and interests necessary therefor.
8. This permit is permissive only. No liability shall be imposed upon or incurred by the State of Minnesota or any of its officers, agents or employees, officially or personally, on account of the granting hereof or on account of any damage to any person or property resulting from any act or omission of the permittee or any of its agents, employees, or contractors relating to any matter hereunder. This permit shall not be construed as estopping or limiting any legal claims or right of action of any person other than the state against the permittee, its agents, employees, or contractors, for any damage or injury resulting from any such act or omission, or as estopping or limiting any legal claim or right of action of the state against the permittee, its agents, employees, or contractors for violation of or failure to comply with the provisions of the permit or applicable provisions of law.
9. This permit shall not be construed as establishing any priority of ~~appropriation or use of ground water.~~
10. The permittee may appropriate ground water at a rate of 30 gallons per minute, except that during an emergency the rate may be increased to the capacity of the installed equipment. The total amount of water appropriated shall not exceed 20 acre feet or 6.6 million gallons per year.
11. Acceptance of the permit by the permittee shall constitute an agreement to all the provisions hereof and shall constitute consent to the Commissioner of Conservation and his authorized representatives to inspect, measure, and collect hydrologic or geologic data. Permittee at reasonable designated times shall pump his well or wells at a constant rate for the purpose of measuring and collecting hydrologic and hydraulic data regarding the water-bearing formation and the well.
12. The permittee shall have available for inspection and use of the Commissioner of Conservation or his agents at all times a continuous record of pumping operations entered on forms supplied by the Division of Waters setting forth the dates, number of hours, and rates of pumping. On or before January 15 of each year, a notarized copy of such record for the preceding year shall be mailed to the Division of Waters, Minnesota Conservation Department, St. Paul 1, Minnesota.
13. The well shall be constructed with a circular opening at least two inches in diameter located at or near the top of the casing to permit water level measurements to be made. Construction of the circular opening shall be in conformance with the sanitary standards approved by the State Board of Health.
14. The permittee shall be jointly responsible with the contract well driller for compliance with the requirements for submission of well logs and test data to the Division of Waters under Minnesota Statutes, Section 105.51, and shall inform the Director, Division of Waters, of the name and address of the contractor five days before commencement of construction of the well.

(over)

SPECIAL PROVISIONS

I

The well or wells by means of which the water appropriation herein authorized is made possible shall not be abandoned, removed, covered, filled, plugged, discontinued or have their pump settings changed without first obtaining a special permit therefor from the Commissioner of Conservation and such abandonment or modification may only be done in accordance with such requirements and procedures as he may then direct.

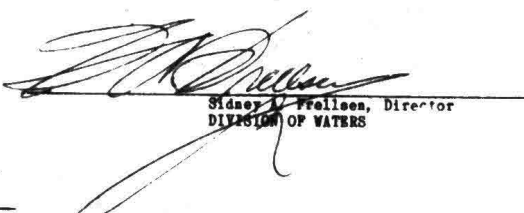
II

To assure accurate records, the permittee shall equip the pump or pumps, by which appropriation is made under this permit, with a timing device that will record the time intervals when the pump is operating so that an accurate estimate of the amount of water pumped can be made by multiplying the rated capacity of the pump, under the applicable conditions, by the total time of pump operation. Such record shall be reported annually to the Director of the Division of Waters on forms supplied herewith on or before January 15 of the following calendar year.

DATED AT ST. PAUL, MINNESOTA, THIS 9th DAY OF
February 19 65

APPROVED:


WAYNE H. OLSON
Commissioner of Conservation


Sidney J. Freilken, Director
DIVISION OF WATERS

By 
Deputy Commissioner

- v. 10-60

PUMPING RECORD

Appropriation of water from _____, _____ **Cook** _____ for year 19 **65**
(Well, or name of lake, stream) (County)

by authority of PERMIT NO. 65-940

s. required by your permit, this form must be mailed to the Director, Division of Waters, Centennial Building, St. Paul 1, Minn., not later than January 15. If no appropriation, so state on form.

[illegible]
$$\text{total gallons} = \text{hours of pumping} \times 60 \times \text{rate in G.P.M.}$$

STATE OF MINNESOTA)
County of _____) ss.

_____ being first duly sworn deposes and says:
 if the above is a true and correct statement based upon original records in his
 session, of the appropriation of public waters under Permit No. _____
 sued by the State of Minnesota, Department of Conservation.

_____(Permittee)

Subscribed and sworn to before me this _____ day of _____ 19_____
_____, Notary Public _____ County, Minn.

Director		Hydro. St.	
Publ.			
Ground W.			
Surface W.			
Permits			

W53-50
Rev. 12/61Minnesota Conservation Department
DIVISION OF WATERSAPPLICATION FOR PERMIT TO APPROPRIATE WATER
Under M.S.A., Chapter 105 and applicable statutesTo: COMMISSIONER OF CONSERVATION,
Centennial Office Building,
St. Paul 1, Minnesota

Director		Hydro Stud	
Deputy		Reports	
Secretary		Surveys	
Permits		Drafting	
Inspection			
Drainage			

PAL5-946

The undersigned is the owner of the land described and hereby applies for a permit to appropriate and use water in the manner and for the purposes hereinafter set forth or as disclosed by supporting data attached.

I	A. Description of lands owned	Fractional Section or Gov't Lot	Sec.	Twp.	Rge.	County
	B. Point of Taking					
	C. Area of Use					
SOURCE OF WATER:						
II	A. ☐ Surface Water. Name _____					
	B. ☐ Existing Wells: Number _____, Diameter _____ inches, Depth _____ feet.					
	C. ☒ New Wells: Number <u>1</u> , Diameter <u>6</u> inches, Depth <u>102</u> feet.					
	D. ☐ Other (specify) _____ Remarks: <u>Well has natural flow of approximately 26 g.p.m.</u>					
MANNER OF TAKING:						
III	A. ☐ Gravity through ☐ Channel (Bottom Bank Slopes) ☐ Pipe (Diameter _____ Inches)					
	B. ☒ Pumping. Number of Pumps <u>1</u> Rate of Delivery <u>30</u> gpm each.					
	C. ☐ Other (specify) _____					
PURPOSE:						
IV	A. ☒ Irrigation of <u>3</u> acres. B. ☐ Municipal C. ☒ Domestic for over 25 persons					
	D. ☐ Industrial for ☐ Cooling, ☐ Processing, ☐ Washing, ☒ Other (specify) <u>Fire Protection</u>					
ESTIMATED TIME AND QUANTITY OF TAKING:						
V	A. <u>10</u> Hours per Day, <u>31</u> Days per Month, <u>3,650</u> Hours per Year.					
	☒ Continuous, ☐ Seasonal from _____ to _____					
	Total for year: <u>6.57</u> Million gallons, <u>20.11</u> Acre feet.					

The applicant declares that the information submitted herewith and the statements made herein are true and a correct representation of the facts, and that the filing of this application and information with the Commissioner of Conservation is prima facie evidence of the correctness thereof.

Dated this _____ day of _____, 19____
United States of America - Department of the Interior
 Applicant National Park Service
 Authorized Signature Eliot Davis (Print or Type Name)
Superintendent (Title)
 Address Grand Portage National Monument
Grand Marais, Minnesota

AFFIDAVIT

State of Minnesota)
County of Cook) ss

On this 28 day of January, 1965, before me personally appeared Eliot Davis, Superintendent of Grand Portage National Monument who being first duly sworn and to me known to be the person who executed the foregoing application, acknowledges that the statements, maps, plans, documents, and other supporting data are true and correct according to his best knowledge and relief and that he executed the same as his own free act and deed.

Jane M. Furlong
 Notary Public Cook County
 My Commission expires 4-30, 1966

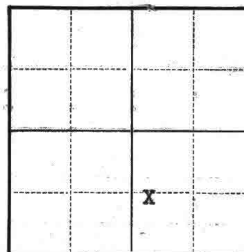
JANE M. FURLONG

NOTARY PUBLIC, Cook County, Minn.
My Commission Expires April 30, 1966

Supporting Hydro Data

9-2855
(Jan. 1927)UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

RECORD OF WELL



Locate well on plat of section.

1. Location: State Minnesota County Cook
 Nearest P. O. Grand Portage, Minn. Direction from P. O. East
 Distance from P. O. 0.1 miles; SE $\frac{1}{4}$ sec. 4, T. 63 N. R. 6 E
 If in city, give street and number _____
2. Owner: U.S. National Park Service Address Grand Marais, Minnesota
 Driller: Moody's of Dayton, Inc. Address Vandalia, Ohio
3. Situation: Is well on upland, in valley, or on hillside? Hillside
4. Elevation of top of well: 30 ft. above the level of Lake Superior
(Above or below) (Sea, depot, lake, or stream)
5. Type of well: Drilled; kind of drilling rig used Rotary
(Dug, driven, bored, or drilled) (Solid tool, jetting, rotary, etc.)
6. Depth of well: 102 ft.; year in which well was finished 1964
 Does well enter rock? yes; if so, at what depth? 43 ft.; kind of rock hard shale
7. Diameter: At top 6 inches; at bottom 5 5/8 inches.
8. Principal water bed: Shale Rock
(Gravel, sand, clay, or rock. If rock, state kind)
 Depth to principal water bed 75 ft.; thickness of bed -- ft. Artesian flow
through rock crevice.
 If other water supplies were found, give depth to each None
9. Casings: Kind C.I. Pipe; size 6"; length 71 ft.; between depths of 0 and 71 ft.
 Kind _____; size _____; length _____ ft.; between depths of _____ and _____ ft.
 Kind _____; size _____; length _____ ft.; between depths of _____ and _____ ft.
 Packers (if any): Depth at which packers were used None; kind _____
 Screen or Strainer: Was well finished with screen? No; kind of screen _____;
 length of screen _____ ft.; diameter _____ inches; size of openings _____
10. Head: Does well at present overflow without pumping? Yes; did it overflow when new? yes;
 if flowing, give pressure 22.5 lb. per sq. inch; or height water will rise in a pipe 52 ft. above surface;
 original pressure or head 22.5 psi; if not flowing, give water level in well _____ ft. below surface.
11. Pump: Is the well pumped? No; kind of pump _____;
 size or capacity of pump _____; kind of power _____
12. Yield: Natural flow at present (if any) 26 gallons per minute; original flow 43 gallons per minute;
 well has been pumped at 50 gallons per minute continuously for 2 hours;
 quantity of water ordinarily obtained from well _____ gallons per day. Not yet in use.
13. Use: For what purpose is the water used? will be used for drinking, utilities, and fire protection.
14. Quality of the water: Hard; is there an analysis? Yes
(Hard or soft, fresh or salty, etc.)
15. Cost of well, not including pump: \$8,831.25 Temperature of water 39 ° F.
- Name of person filling blank Edmund J. Bucknall
 Date October 7, 1964 Address P. O. Box 666, Grand Marais, Minnesota

On the back of this sheet give the record of the beds through which the well passes and any other facts not given above.

16-00005-1

☆ U. S. GOVERNMENT PRINTING OFFICE 16-65665-1

Grand Portage National Monument
Grand Marais, Minnesota 55604
October 2, 1964

COMPLETION REPORT - NARRATIVE STATEMENT

Contract No. 14-10-0232-847

The Artesian-Well that was completed under this contract is located at Grand Portage National Monument about 900 feet north east of the Stockade on the "Old Baseball Field" across from the Catholic Mission Church, 129 feet from the north boundary line of the Monument and about 125 feet east from the gravel road. It was drilled in order to take care of the water needs for the Monument and for the future developments within the Monument area.

The well is able to produce 26.08 GPM by free flow, with 50 GPM max. pumping rate capacity.

It was drilled to 102 feet depth through hard, shale rock. The water enters into the well at an unknown depth with the static level being at about 52 feet above ground level. It is assumed only that the water may enter into the well through rock crevices at about 73 feet depth.

The well consists of 48 feet of 12" I.D. steel pipe casing with 6" I.D. cast-iron pipe casing at center down to 71 feet depth. A cement grout well seal extends 26 feet upward from 68 feet depth. (The 12" I.D. pipe was left in well hole by the Contractor".

A 10 foot deep well pit was dug around the well casings and a 12 foot long 48" I.D. corrugated metal pipe was installed extending 18 inches above ground level, with metallic cover. The cover has a 24" square hinged steel door with padlock.

In the well pit a pitless adapter with 4" discharge is installed on top of 6" casing about 9 feet below ground level with a 4" gate valve with plug at its discharge end. To this end shall be connected the proposed underground water distribution system.

Another 4" gate valve is installed below the pitless adapter on the 6" casing through which a "possible" underground reservoir could be filled by free flow from the well without pumping. A 11 foot long, 2" I.D. galv. steel pipe is attached to the discharge end of this 4" gate valve extending to the top of the well pit. From this 2" pipe an 1 1/4" galv. steel pipe

line is installed to the lake by the park forces. By this arrangement it is possible to open up the well to draw water from it or let it flow at any time. The 4" gate valves can be opened or closed from ground level by a "T" shaped, long handled valve key.

An 11" I.D. steel pipe is attached to the top of the pitless adapter, which houses the sanitary well seal of the pitless adapter. The 11" I.D. pipe is 10 feet long and it extends to top of the well pit. Through this pipe and through the pitless adapter it will be possible to set a pump into the well in the future.

The iron content in the water is 1.2 ppm., which is 0.9 ppm. more than the U.S. Public Health Service allows. (0.3ppm) Therefore, an "Iron remover filter" will be installed at a later date when the well is turned over for public use.

At present, the well is capped, "winterized" and periodically opened up for a few hours to be flown. By the 1 1/4" I.D. galv. steel pipe line that has been installed from the well to the lake shore by the Monument, the free flowing water from the well is drained into Lake Superior to avoid "flooding" the area by the well.


Leslie L. Fugedy
Project Supervisor

PROJECT SYNOPSISContract No. 14-10-0232-047

Invitation for Bids	June 10, 1964
Bids opening	June 25, 1964
Contract awarded	June 26, 1964
Notice of Beginning Date	July 14, 1964
Stop Order	July 18, 1964
Order to Resume Work	August 6, 1964
Change Order No. 1	August 21, 1964
Contract Work Completed	Sept. 10, 1964
Final Inspection	Sept. 10, 1964
Letter of Acceptance	Sept. 11, 1964
Final Estimate	Sept. 14, 1964
Release of Claims	Sept. 22, 1964

Original Contract Allotment: \$9,673.75

Itemized Cost: \$4,581.25 (unit price bid items total as performed)

Change Order Cost: 4,250.00+ (See final Estimate)

Sub-Total Contract Cost: - \$8,831.25 paid to contractor

Other expenses: see form 10-174A on page 2.

PS&S Cost

TOTAL CONTRACT COST \$

Top of the 48" I.D. corrugated-metal pipe well-pit at ground level, showing the top of the 2" galvanized steel pipe capped and the top of the 11" steel pipe with a special cap.



Bottom of well-pit, showing two 4" gate valves; the lower one is attached to the 6" well casing with a 2" galvanized steel pipe extending to ground level. The upper valve is attached to the pitless adapter. A 11" I.D. steel pipe, housing the sanitary well-seal is extending from the pitless adapter to ground level.

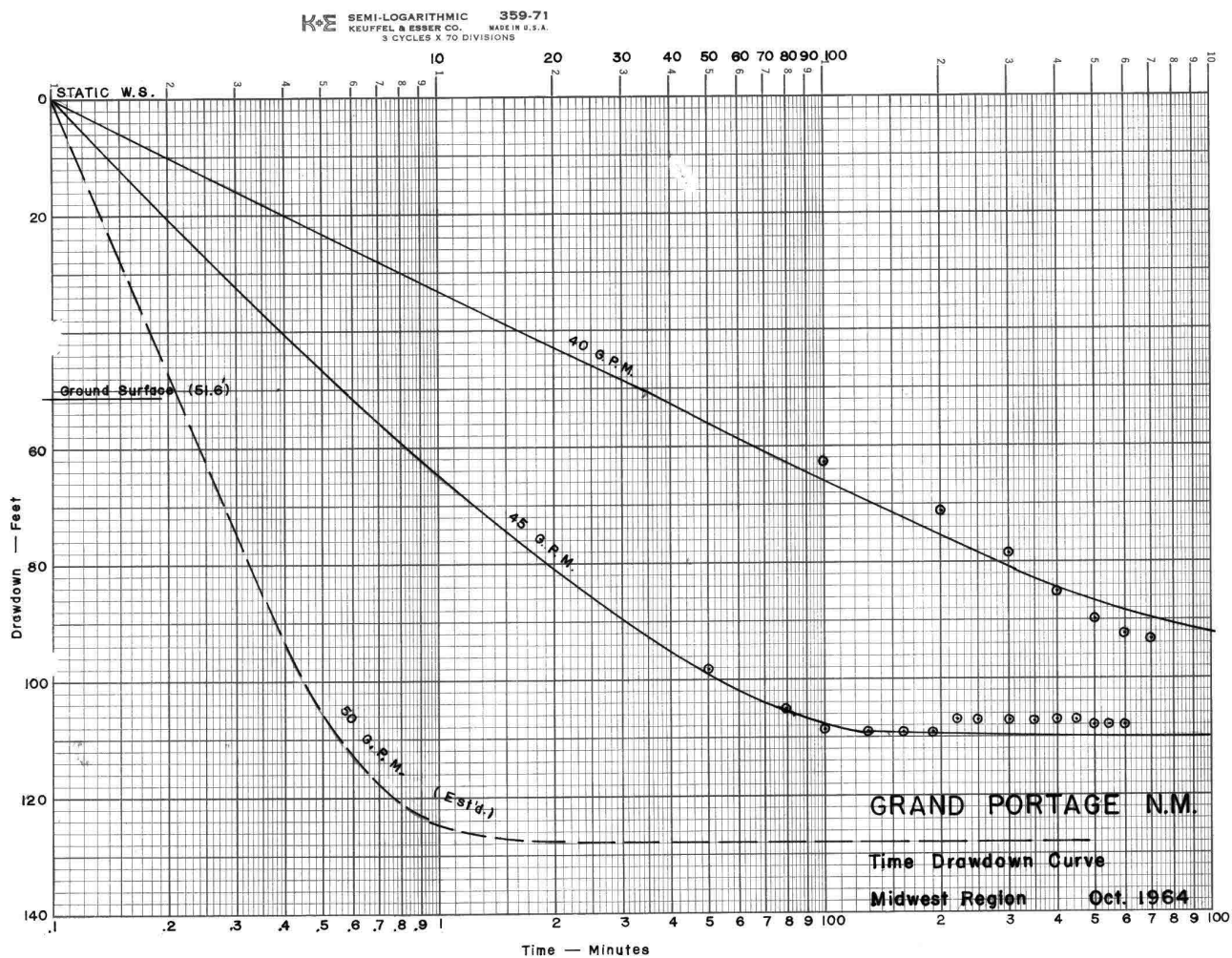


Location of well pit, 129 feet from the north boundary of the Monument near the Catholic Mission Church.

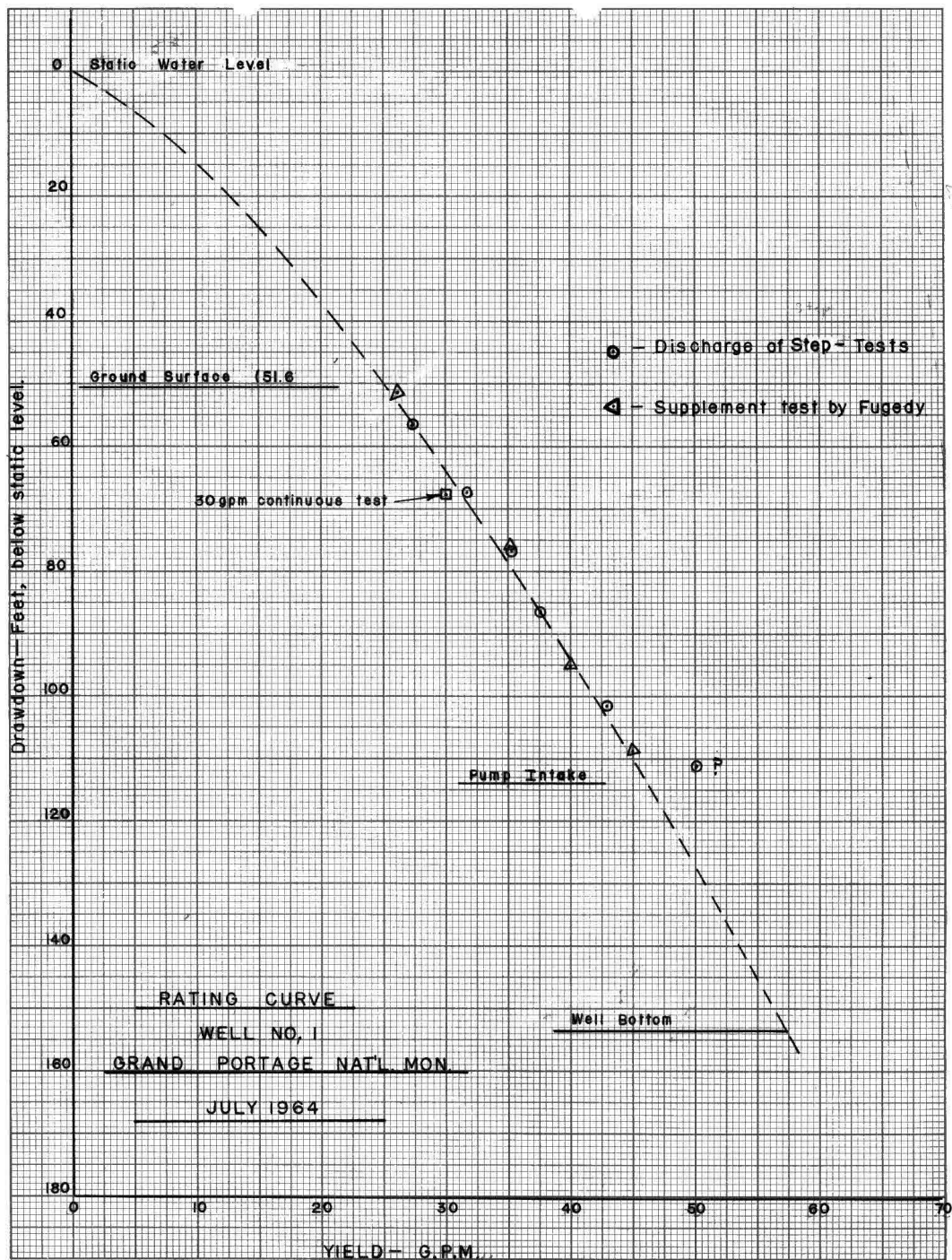


Well-pit as completed showing the top of the steel cover with the 24" square manhole door with padlock. An 1 $\frac{1}{2}$ " steel pipe is draining the water from this flowing artesian well to Lake Superior.





K&E 10 X 10 TO THE 1/2 INCH 359-12 KEUFFEL & ESSER CO. MADE IN U.S.A.



Starting on September 9, 1964, at 8:00 A.M. - Grand Portage National Monument, Minnesota

TEST PUMPING DATA - by Leslie L. Pagedy
Project Supervisor, E.O.D.C.

TOTAL STATIC PRESSURE = $51.6 \times 0.433 = 22.34$ p.s.i. †

NATURAL DISCHARGE OF WELL = 26.08 GPM

TIME HRS. & MINS.	DRAW- DOWN (FT.)	GPM	AIR-LINE- (FT.)-GAUGE	REMARKS:
8:00 A.M.	5.0'	27.27	56.5'	With No Drawdown the Air-Line Gauge showed 61.5' - with water flowing out over top of well casing.
8:05				Thus, pump-intake was set at 61.5' ft. depth in well - within the 6" I.D. pipe well casing. End of Air-Line hose was attached to pump intake.
8:10				Total Length of 6" I.D. Well Casing is 60.5 feet plus 10.5 feet of 11" I.D. pipe on top of pitless adapter.
8:15				Thus total length of pipe casing in well = $60.5 + 10.5 = 71$ feet.
8:20				Total Depth of Well = 102 feet.
8:25				$102 - 71 = 31$ feet without well casing
8:30				It is a $5 \frac{5}{8}$ " drilled hole.
8:35				
8:40				
8:45				
8:50				
8:55				
9:00				
9:05	16.0'	31.58	45.5'	
9:10				
9:15				
9:20				
9:25				
9:30				
9:35				
9:40				
9:45				
9:50				
9:55				
10:00				
10:05	25.0'	35.29	36.5'	
10:10				
10:15				
10:20				
10:25				
10:30				
10:35				
10:40				
10:45				
10:50				
10:55				

TEST PUMPING DATA (CONT'D)

September 9, 1964

GRAND PORTAGE NATIONAL MONUMENT, MINNESOTA

TIME HRS: MINS.	DRAW- DOWN (FT.)	GPM	AIR-LINE - (FT.) - GAUGE	REMARKS
11:00 A.M.				
11:05	35.0'	37.50	26.5'	
11:10				
11:15				
11:20				
11:25				
11:30				
11:35				
11:40				
11:45				
11:50				
11:55				
12:00				
12:05 P.M.	50.0'	42.86	11.5'	
12:10				
12:15				
12:20				
12:25				
12:30				
12:35				
12:40				
12:45				
12:50				
12:55				
1:00				
1:05	60.0'	50.0	1.5'	THIS: - The Critical Pumping Rate at this drawdown and at this pump setting depth. This is our critical- pumping rate limit. <u>50 GPM at 60' Drawdown</u>
1:10				
1:15				
1:20				
1:25				
1:30				
1:35				
1:40				
1:45				
1:50				
1:55				
2:00	12.5'	26.09	60.9	

TEST PUMPING DATA (CONT'D)

September 9, 1964

GRAND PORTAGE NATIONAL MONUMENT, MINNESOTA

TIME HRS: MINS.	DRAW-DOWN IN INCHES	GPM	AIR-LINE GAUGE (FT.)	REMARKS
2:00 P.M.	12.5"	26.09	60.5	
2:15	13.0"	26.09		
2:30	12.5"	26.09		Thus the out put of
2:45	13.0"	26.09		well at 12" steady
3:00	11.5"	26.09		drawdown is 26.09 GPM
3:15	11.0"	26.09		
3:30	11.5"	26.09		
3:45	12.0"	26.09		
4:00	12.0"	26.09		

NOTE: That there was only a very slight difference between the pumping rate at 12" drawdown and the Natural Discharge rate. I was unable to measure or read that close better than I did.

TEST PUMPING DATA (CONT'D)

September 9, 1964

GRAND PORTAGE NATIONAL MONUMENT, MINNESOTA

TIME HRS: MINS.	DRAW- DOWN (FT.)	GPM	AIR-LINE- (FT.) - GAUGE	REMARKS
		60% of Discharge at 60'		Difference + Recovery - Drawdown in feet
4:04 P.M.	8.0'	level - 30.0	53.5	
4:07	7.5		54.0	
4:10	7.0		54.5	
4:13	6.7		54.8	
4:16	6.5		55.0	
4:19	6.2		55.3	
4:22	5.9		55.6	
4:25	5.7		55.8	
4:28	5.5		56.0	
4:31	5.4		56.1	
4:34	5.3		56.2	
4:37	5.2		56.3	
4:40	5.1		56.4	
4:43	5.0		56.5	
4:46	5.0		56.5	
4:49	5.0		56.5	
4:52	5.0		56.5	
4:55	5.0		56.5	
4:58	5.0		56.5	
5:01	4.8		56.7	
5:04	4.8		56.7	
5:07	4.8		56.7	
5:10	4.8		56.8	
5:13	4.8		56.8	
5:16	6.5		55.0	
5:19	7.5		54.0	
5:22	8.9		52.6	
5:25	10.0		51.5	
5:28	12.0		49.5	
5:31	12.8		48.7	
5:34	12.9		48.6	
5:37	12.5		49.0	
5:40	12.6		48.9	
5:43	12.5		49.0	
5:46	12.5		49.0	
5:49	19.0	30.0	42.5	
5:52	18.9		42.6	
5:55	18.5		43.0	
5:58	18.3		43.2	
6:01	18.1		43.4	

Pumping rate gradually dropped
below 30 GPMBetween
29.27 - 33.33
GPM ???

Twice closed & opened.
The flow was regulated
by operating the 4" G.V.
on pump discharge line,
so a pumping rate of
30 GPM was maintained,
which is 60% of the
output at 60 feet draw-
down level.

This "disturbed" our
readings but the rate
and difference in draw-
down did not change much.

TEST PUMPING DATA (CONT'D)

September 9, 1964

GRAND PORTAGE NATIONAL MONUMENT, MINNESOTA

TIME HRS: MINS.	DRAW- DOWN (FT.)	GPM	AIR-LINE- (FT.) - GAUGE	REMARKS
				DIFFERENCES:
				+ Recovery
				Drawdown in
				- Feet
6:04 P.M.	17.7	30.0	43.8	
6:07	17.5		44.0	
6:10	17.3		44.2	
6:13	17.3		44.2	
6:16	17.3		44.2	
6:19	17.2		44.3	
6:22	17.0		44.5	
6:25	16.7		44.8	
6:28	16.5		45.0	
6:31	16.3		45.7	
6:34	16.1		45.4	
6:37	15.9		45.6	
6:40	15.7		45.8	
6:43	15.5		46.0	
6:46	15.3		46.2	
6:49	15.1		46.4	
6:52	15.0		46.5	
6:55	15.0		46.5	
6:58	15.0		46.5	
7:01	14.9		46.5	
7:04	14.7		46.8	
7:07	14.7		46.8	
7:10	14.7		46.8	
7:13			46.8	
7:16			46.8	
7:19			46.8	
7:22			46.8	
7:25			46.8	
7:30			46.8	
7:45			46.8	
8:00			46.8	
8:15			46.8	
8:22			46.8	
8:30			45.8	
8:45			46.8	
8:50			46.8	
8:55			46.8	
9:00			46.8	

Differences in feet

Drawdown Remained
Constant For two hours
of Pumping Time, from
7 to 9 P.M.
Thus at 30 GPM the
drawdown remained
constant at 14.7 feet.

TEST PUMPING DATA (CONT'D)

September 10, 1964

GRAND PORTAGE NATIONAL MONUMENT, MINNESOTA

WELL RECOVERY DATA

<u>TIME</u> <u>(HRS: MINS: SECS.)</u>	<u>AIR-LINE</u> <u>GAUGE</u> <u>(FT.)</u>	<u>DIFFERENCE BETWEEN AIR-</u> <u>LINE GAUGE READINGS (FT.)</u>	<u>REMARKS</u>
3 : 00 : 00 A.M.	1.5'	9.5'	Pump was shut-
3 : 00 : 15	11.0	11	down at exactly
3 : 00 : 30	22.0	11	3:00:00 A.M. on
3 : 00 : 45	33.0	10	Sept. 10, 1964.
3 : 01 : 00	43.0	8	6" I.D. Well-Casing
3 : 01 : 15	51.0	1.5	(51 feet long)
3 : 01 : 30	52.5	1.5	(above pump intake)
3 : 01 : 45	54.0	1.5	Change from 6" to
3 : 02 : 00	55.5	1.5	11" I.D. pipe
3 : 02 : 15	57.0	1.5	11" I.D. Pipe on
3 : 02 : 30	59.5	1.5	top of pitless
3 : 02 : 43	61.5 *	2.0	adapter (10.5 feet)

*Ground level
Flowing freely
26.08 GPM

Thus - Well is
able to recover
fully from 60 feet
depth to ground -
level in 2 Minutes
43 Seconds.

NOTE: Great abrupt
change in recovery
rate at the change
from 6" to 11" I.D.
pipe casing.
(Continued on next)
(page)

TEST PUMPING DATA (CONT'D)

September 10, 1964

GRAND PORTAGE NATIONAL MONUMENT, MINNESOTA

WELL RECOVERY DATA - CONTINUED FROM PAGE 6

NOTE:

Sorry to tell you Bill that we were unable to follow your instructions for the recovery-process for the above-ground-part. It may perhaps could be applied to an "ordinary - well" only, and not to our artesian well.

It took quite a bit of time to remove test pump, replace the "special - ed cap" on top of 11" pipe, (on top of pitless adapter), then attach 1" hose on top of the "special - cap" - then started to climb upon the drill rig.

During all that time the well fully recovered.

Note that the well recovers in 2 minutes, 43 seconds.

When we were ready, we closed 4" Gate Valve - (that we opened to drawdown water in 11" pipe to be able to replace "special cap") - then when water reached the 1" hose - started to climb drill rig and tried to follow the rise of water in the 1" hose. But the water "ran ahead" of us, however, and reached the end of hose before we had a chance to mark down any data of its rise, etc....

Buddy was able to stick up end of hose by standing on top of rig like an acrobat - holding end of hose way above his head at 48.6 feet above ground.

I estimated that it took about 8 - 13 seconds or perhaps much less??? for the water to reach the end of hose and it was still flowing slightly. We estimated that in about another three (3) feet higher we would have had reached the static level of the water from the well, at about 51.6 feet.

It was a very bad, cold, rainy, foggy, miserable night. I was much too tired to "fight" it too long.

I am convinced that we would have nothing to gain by this data, since the "below ground" recovery data indicates that the rate of recovery (rise in feet in 15 seconds intervals) varies depending on the size of pipe well casing.

Note that the water rose 11 feet in 15 seconds in the "small" 6" I.D. pipe casing and it changed "suddenly" to 1.5 feet in the "large" 11" I.D. pipe casing.

Therefore, it shall rise much faster in the very small 1" I.D. pipe. Remember the well yields 26.08 GPM as soon as it reaches ground level (See Page 6).

You may be able to work out a "curve" by hydraulics formulas or theory, etc., or try to do it with a long hose when you will be here at Grand Portage next time. Sorry Sir Bill !!!!

Total Static Pressure approximately = $51.6' \times 0.433 = 22.34$ P.S.I. +

Natural Discharge of Well = 26.08 GPM

P.S: Please send copies of the plotted curves and data to E.O.D.C.
Thank you. End of Test Pumping Data
 /s/ Leslie /s/ Leslie L. Fugedy
 Project Supervisor, E.O.D.C.

AUXILIARY TEST DATA

GRAND PORTAGE NATIONAL MONUMENT, MINNESOTA

September ⁹ & 10, 1964

NOTE: These data were not required, but you may be able to use them???
 I took them for my own extra information, since we had all that
 pumping time (30 hours) on Change Orders. Note that we have
 "wasted" 10 hours of pumping on Tuesday, September 8 because of
 faulty equipment; used wrong measuring device for flow. It
 worked wrong, etc.

TIME HRS: MINS.	DRAW- DOWN (FT.)	GPM	AIR-LINE GAUGE (FT.)	REMARKS
9: 00 P.M.	24.1	35.0	37.4	
9: 05	24.3		37.2	
9: 10	24.4		37.1	
9: 15	24.6		36.9	
9: 20	24.6		36.9	
9: 25	24.6		36.9	
9: 30				
9: 35				
9: 40				
9: 45				
9: 50				
9: 55				
10: 00				
10: 05				
10: 10				
10: 15				
10: 20				
10: 25				
10: 30				
10: 35				
10: 40				
10: 45				
10: 50				
10: 55				
11: 00				
11: 15				
11: 30				
11: 45				
11: 55				

AUXILIARY TEST PUMP DATA (CONT'D)

September 10, 1964

GRAND PORTAGE NATIONAL MONUMENT, MINNESOTA

TIME HRS: MINS.	DRAW- DOWN (FT.)	GPM	AIR-LINE GAUGE - (FT.)	REMARKS
Midnight				
12: 00	0'	40.0	61.5	Well was let to be recovered then pumping started
Sept. 10				
12: 10 A.M.	11.4		50.1	
12: 20	20.00		41.5	
12: 30	27.2		34.3	
12: 40	33.6		27.9	
12: 50	38.4		23.1	
1: 00	40.7		20.8	
1: 10	41.8		19.7	
1: 30				
1: 45				
1: 50				

AUXILIARY TEST PUMP DATA (CONT'D)

September 10, 1964

GRAND PORTAGE NATIONAL MONUMENT, MINNESOTA

TIME HRS: MINS.	DRAW- DOWN (FT.)	GPM	AIR-LINE GAUGE (FT.)	REMARKS
1: 55 A.M.	0'	45.0	61.5	Well was let to be recovered then pump started
2: 00	46.5		15.0	
2: 03	53.5		8.0	
2: 05	57.0		4.5	
2: 08	57.7		3.8	
2: 11	57.7		3.8	
2: 14	57.7		3.8	
2: 17	55.5		6.0	
2: 20	55.5		6.0	
2: 25	55.5		6.0	
2: 30	56.0		5.5	
2: 35	55.7		5.8	
2: 40	56.0		5.5	
2: 45	56.5		5.0	
2: 50	56.5		5.0	
2: 55	56.5		5.0	

Synopsis of Well Construction

Grand Portage National Monument

In all instances where test wells were drilled, a hard shale formation was chiefly encountered. Some test drillings resulted in dry holes. One test well near Grand Portage Creek encountered an unpotable supply of water. The geological report, by Dr. J. P. Gries, indicated any supply of water would likely be obtained from fractures in the formation. A rotary drill rig was used on this work. The successful and accepted well is located approximately 700 ft. from Grand Portage Bay and about 260 ft. east of Grand Portage Creek.

The final supply well derives its water from some source, possibly a remote area, other than Lake Superior. Fractures in the formation undoubtedly provides the supply of water. Static pressure head of the well is 52 ft. above the ground surface at the well. With a free flow of 26 gpm and such a static pressure head, it would appear the transmissibility factor of the formation might be rather low. Too, 26 gpm at ground surface level reflects the transmissibility factor characteristics of the formation.

Analysis of the yield, of the flowing well, by test pumping and study of its recovery was much more involved than it is for a non-flowing well. Particularly, the observation of the recovery test was affected by factors making it very difficult to obtain satisfactory data. The recovery of the water surface after the pump was shut off, was affected by a rush of water from the pump drop-pipe, as there was no foot valve to limit this surge of water from the drop-pipe. Thus, the rate of recovery was much quicker, and did not indicate the true recovery to static head pressure. The recovery test is pertinent to the determination of the transmissibility characteristic of the aquifer.

Mr. Leslie Fugedy, Engineer from EODC, supervised the test pumping operations. His assistance, was very much appreciated, in obtaining the desired data and under such unusual conditions.

The potential available supply of water, of course, is dependent upon the recharge of the aquifer and any possible change in its transmissibility. It would be advisable to make periodic observations of the static pressure head on the well, and its normal flow.



William A. Mott
Hydraulic Engineer

L54 MWR(OL)

JAN 26 1965

E. O. D. C.	
JAN 28 1965	
Chief	
Admin.	
Pl. & Eng.	
Arch.	
Comm.	
Ec.	
Environ. Arch.	
Forest	
Ge.	
Eng.	1/28/65
Forest	1/28/65
Arch.	1/28/65
Comm. & Spec.	1/28/65
Environ.	1/28/65
Action Taken:	

Memorandum

To: Superintendent, Grand Portage

From: Acting Assistant Regional Director

Subject: Application for Permit to Appropriate Water, Minnesota Conservation Department, Division of Waters; Water Supply, Grand Portage National Monument, Minnesota

Enclosed are six copies of the subject application and one small area map for your signature as Superintendent. Please forward all six copies of Applications to the Minnesota Conservation Department for their signature and approval. The map should accompany the State's copy of the application for their records.

Please return four approved copies to this office for inclusion in our water right dockets. We will supply maps for the water right dockets and make distribution when copies of the State approved Permits are received.

Sgd/ John F. Allen

Acting Assistant Regional Director

Enclosures

cc:
The Director (2)
Chief, EODC (2)

LSA MMR (OL)

DEC 9 1964

Memorandum

To: Superintendent, Grand Portage

From: Associate Regional Director

Subject: Application for Permit to Appropriate Water, Minnesota
Conservation Department, Division of Waters; Water
Supply, Grand Portage National Monument, Minnesota

Enclosed are duplicate copies of subject application for your signature as Superintendent. Please obtain Notary Public signature and seal, and forward to Minnesota Conservation Department, Division of Waters.

There is only one copy of the map enclosed to accompany the Application to the State. We will supply maps for the Water Right Docket, and make distribution when copies of the State approved Permit are received. You should request quadruplicate copies of the Approved Permit.

(Sgd) George F. Baggley

Associate Regional Director

Enclosures

cc:
The Director (2), w/o enclosures
Chief, EODC (2), w/o enclosures

7

E. O. D. C.	
DEC 11 1964	
Chief	
Admin.	
Pl. & Eng.	
Arch.	
Coord.	
Br.	
Land. Arch.	
Coord.	
Br.	
Br.	#108 12/11
Coord.	
Br.	K. Baggley 12/15
Contr. & Spec.	
Action Taken:	

REPORT ON TEST WELL DRILLING AT GRAND PORTAGE NATIONAL MONUMENT

I. Invitation to Bid

Bids were scheduled for opening on June 17, 1963 in the Office of the Superintendent at Grand Marais, Minnesota. No bids were received. It seemed advisable to negotiate a contract for test well drilling, so the undersigned pursued to contact a number of drillers in the St. Paul and Duluth areas. A contract was negotiated with Atkins-Walker Company of Duluth, Minnesota.

II. Type of Rig Used

The Atkins-Walker Company used a Schramm Toto-Tool which could either be operated using a regular rotary bit or an air bit which was activated by the air pressure down the drill stem. This rig was reported to have a capacity of drilling 35' to 40' per hour in relatively hard formations.

III. Drilling Vertical Well

Drilling started July 9, 1963. The location to drill the vertical well was taken as shown on the drawing in the specifications and proposed by Eastern Office of Design and Construction. A short section of 8" casing was set at the ground surface. A 7-7/8" bore was drilled to receive a 6" casing, which was set to a depth of 27'3 1/2" below the ground surface. To seal the lower end of the 6" casing, about one-half bucket of aluminite cement was dumped down the inside of the casing and the casing was raised and lowered to permit the cement to go outside the casing for a seal. Thence, drilling proceeded to make a 6" bore to a depth of 150'. At this depth no water had yet been incurred, so a change order was issued to permit drilling to a depth of 270'. Still no appreciable supply of water was observed. The driller advised most of the wells along the north shore of Lake Superior were drilled to depths of 300' to 350'. Considering the rate of drilling per hour, the driller was instructed to continue drilling to explore the possible water supply available at approximately the 300' level. Primarily the driller encountered shale and slate the entire distance. Between the 300' and 306' level a little more permeable formation was found which supplied a small amount of water. The drilling was continued to a total depth of 320'. The supply of water available was estimated by sealing around the drill stem at the top of the casing and collecting the supply in a container, as the water was blown from the well. As this quantity was so inadequate, it was deemed unnecessary to install a test pump. The available yield was about .5 gallons per minute.

The following morning the water surface had raised in the well to within 33' of the ground surface. Finally, as the well was allowed

to stand undisturbed, the water surface rose to within $5\frac{1}{2}$ ' of the ground surface. This indicated that the supply was derived from a source other than the Grand Portage Bay, as the head of the well was between 24' and 25' above the water surface in Grand Portage Bay. This inadequate supply was the cause for abandoning the vertical well as a source of water supply.

IV. Sloping Well

The drill rig was relocated so the head of the Sloping Well would be in the proximity of the previously drilled Vertical Well. The rig was moved forward as far as practicable so when the boom was lowered to the slope of 25 degrees from the horizontal, it placed the head of the Sloping Well 11' east of the head of the Vertical Well. Some difficulty was experienced in starting the Sloping Well as the upper 4' to 5' of the ground surface consisted of a weathered shale. With the slope of the well being set at 25° from the horizontal, a 7-7/8" bore was drilled to provide for the installation of about 28' of 6" casing. The casing was not sealed into position. Drilling proceeded then with a 6" bore to a depth of 164'.

The formation encountered during the drilling was shale and slate, though we had expected possibly to encounter some clay, as was reported by local persons, "The water from the Bay is sealed by a layer of clay."

The Sloping Well bore was loaded with approximately 400# of DuPont's Pelletol 1. In an attempt to place the Pelletol 1 to eliminate any space between the explosive and the well bore, the pellets were washed down a 1-3/4" pipe, the pipe being retracted as the explosive was placed. As soon as the Pelletol 1 had been placed, the bore was stemmed (packed) with sand. This likewise was flushed down the 1-3/4" pipe. Approximately 20' of sand stemming was placed on top of the explosive. The explosive was detonated, by use of one primer to which was attached a string of DuPont's Permacord and an electric shock. The primer was constructed by using a 2' section of aluminum casing (thin wall), placing about 12" Pelletol 1 in the bottom and on top of the Pelletol 1 were 13 sticks of 60% dynamite. The Pelletol 1 required confinement and a heavy shock before it could be detonated. The explosive was detonated but proved ineffective as the entire charge of Pelletol 1 was not activated. It was observed that the shot created a limited sound and vibration and expelled from the well bore the greater percent of the unexploded Pelletol. The unexploded Pelletol was scattered between the head of the Sloping Well and the distance 75' to 80' away. We were advised by Mr. Luft of the DuPont Company, Duluth, Minnesota, after reporting to him the characteristics of the explosion, it was decided that the sand stemming must have mixed with the Pelletol 1 charge and was the reason that it was not entirely exploded.

The well bore was cleaned by inserting the rotary bit and as the bore was in good condition, the contractor proposed that we place another charge in the well. The contractor proposed to use a metallized slurry from the Dow Chemical Company, Virginia, Minnesota, as they had conducted considerable research on various explosives and one of their representatives proposed using a metallized slurry. The contractor advised he could place the charge of metallized slurry in the well and shoot it the second time without further cost to the United States for the explosives. The charge of metallized slurry was placed entirely within an aluminum thin wall sleeve. This charge was equipped with two special primers; one placed about 10' to 12' from the bottom of the well, the other placed about 10' from the top of the charge. The over-all length of the charge was approximately 50' and contained 525# of metallized slurry. Again the well was stemmed with sand on top of the explosive charge for an estimated distance of 15 - 20 feet.

The second charge of explosives was detonated, causing considerable shock to the ground surface, raising some dust from the gravel along the side of the roadway, producing a crack in the slope of the bay-bank about 2' below the top, dislodging some large rocks on the bank near the water's edge and caused some bubbles to issue up through the water surface, extending over a limited area. In one place the bubbles persisted for 15 minutes and it was not known if the bubbles were created by the gases formed from the explosion, or just what was the exact cause. The rotary drill was again inserted into the well bore and operated to the entire depth. As the drill was withdrawn from the well bore, pieces of fractured, shattered materials would fall from within the zone of impact (explosion zone).

The following morning the water surface in the well bore had assumed the same elevation as the water surface in the bay. Cleaning of the well continued for a considerable length of time, but as the materials kept falling into the bore from the zone of impact, it was decided to set the test pump and obtain an estimate of the available water supply. The test pump was set at 116' from the head of the Sloping Well. An air line was set with the lower end being 3' above the pump's intake. The testing was conducted with increasing discharges, starting at about 1 gallon per minute and increasing to the maximum of about 2.4 gallons per minute. It was noted during the test pumping that the discharge appeared quite cloudy with materials, a portion of which appeared to be fine silt or clay. As the test pumping progressed and the water surface was drawn down into the zone of impact, it appeared to have a higher concentration of silt or clay. It is believed that this would indicate the presence of a layer of possibly clay, beneath the bed of the bay. However, we could find no records of any log of materials beneath the bed of the bay.

This supply was too inadequate, and the well was abandoned.

Mr. Leslie Fugedy, EODC Engineer, Superintendent Davis, and Mr. Mott conferred on the results of the test drilling and the available water supplies and concluded it would be advisable to obtain the desired water supply from the bay.

The drilling samples obtained from both the vertical and sloping wells will be analyzed by the U. S. Geological Survey, St. Paul Office, who will prepare a well log. The entire drilling apparently intercepted slates and shale having various degrees of permeability.

Both wells were plugged with a cement - bentonite mixture made with 1 part cement and 5 parts of bentonite.

The work was completed July 30, 1963.

Contract for drilling the vertical well was based upon lineal feet of drilling and the sloping well was per hour basis. Total cost of both wells is estimated at about \$7,000.00, though the contractor's invoice has not been received.

(Sgd) William A. Mott
William A. Mott
Hydraulic Engineer

GRAND PORTAGE NATIONAL MONUMENT

TEST PUMPING DATA - SLOPING WELL

July 27, 1963

Pump set at 116 feet below ground surface

End of Air line 113 feet below ground surface

Capacity of bucket measure = 5.158 gallons

Drilling Contractor - Atkins-Walker, Duluth, Minnesota

Data observed by Mr. Mott, Hydraulic Engineer - Midwest Region

Time	Pressure Gauge Lbs.	Head Above Air line	Time in Minutes	G.P.M.	Foot of Drawdown	 Drawdown Foot/ Minutes
7:15 A.M.	13.5	71.1				Started pump
	Static Water Surface 42' below head of well.					
7:40	11.7	61.6			9.5	
7:54	11.2	59.			12.1	
8:03	10.8	56.9	4' 20"	1.193	14.2	.1834
8:14	10.5	55.3	4' 22"	1.178	15.8	.1455
8:34	10.2	53.7	4' 43"	1.093	17.4	.0800
8:57	10.0	52.7	4' 46"	1.081	18.4	.0435
9:10	7.1	36.9	1' 19"	3.92	Can't close valve Put on different valve	

9:33	6.5	37.65	2' 43"	1.902	33.45	
9:43	6.6	34.75	3' 17"	1.572	36.35	
9:54	6.7	35.3	3' 31"	1.470	35.8	
10:10	6.6	34.75	2' 55"	1.77	36.35	.0344
10:21	6.5	34.2	3' 08"	1.65	36.9	.0344
-----Changed Flow						
10:52	3.2	16.8	1' 43"	3.00	54.3	
11:03	3.1	17.9	2' 05"	2.48	53.2	
11:12	3.0	15.8	2' 15"	2.29	55.3	.234
11:22	3.0	15.8	2' 21"	2.19	55.3	.000

Time	Pressure Gauge Lbs.	Head Above Air line	Time in Minutes	G.P.M.	Foot of Drawdown	Δ Drawdown Foot/ Minutes
11:32	2.95	15.55	2' 23"	2.16	55.5	.025
12:08	1.75	9.21	2' 06"	2.46	61.9	Changed Flow
12:21	1.76	9.28	3' 08"	1.65	61.8	
12:33	1.65	8.69	1' 47"	2.89	62.4	
12:49	1.65	8.69	3' 00"	1.72	62.4	
12:52	Stopped pump. Max. Av. Q. = 2.4 g.p.m.					

NOTE: (1) Head above airline in feet measured along slope of well.

(2) Drawdown is distance along slope of well.

Outline of Drilling Operations

- July 8 - Monday. Drill rig and pickup truck of equipment arrived at 5:35 P.M. The rig and pickup was parked in Grand Portage parking lot over night. Elmer Spry (foreman) and Gordon LaGarde hauled some poles and planks and constructed a crossing over the ditch to get rig to drill site.
- July 9 - Tuesday. Set up drill rig. Drilled for and set 3 feet of 8" surface casing. Drilled 7-7/8" Bore 27' - 3 1/2" for 6 inch casing. Set 28' - 4 1/2" of 6 inch casing. The lower end of casing was furnished with a coupling upon which was welded spacers to center the casing in bore. About 1/2 bucket of cement was placed in bottom of casing, then the casing was raised and lowered to permit the cement to flow outside casing. Then drilling of a 6" bore proceeded to a depth of 78 feet by 4:30 P.M. The crew is working 8 hours per day.
- July 10 - Wednesday. Drilling of 6" bore continued from 78 to 180 feet depth.
- July 11 - Thursday. Drill crew left about 8:00 A.M. to get more drill stem from a job site on Gunflint Trail. Returned to drilling site 1:30 P.M. Continued drilling to a depth of 250 feet. Extended drilling of the 6" bore was based on reports by the driller and others the depths of wells along the North Shore, as far east as Hovland would average between 250 and 300 feet of depth. All drilling was in shale. Some wells along North Shore are in excess of 400 feet depth.
- July 12 - Friday. At depth of 240' sufficient moisture collected in the bore to cause the cutting to adhere to the bore wall. It was necessary then to fill the drill stem with water to flush the cuttings from the well bore. At depth of 300 feet adequate moisture was encountered to flush the cuttings to the ground surface. Between 300' and 306' white colored particles were found in the shale and we expected a change in formation. The drilling continued to a depth of 320'. An estimate of yield was calculated at about .5 g.p.m. Crew quit at 4:30 P.M. Called Mr. Walker in Duluth and advised the vertical well proved unsatisfactory and we would proceed to explore a Sloping Well. Mr. Walker will come to Grand Portage tomorrow and bring a support-stand to be used in the slope drilling to support the suspended sections of drill stem. The crew worked 8 hours.
- July 13 - Saturday. Crew started work at 8:00 A.M. Water surface in the well raised overnight to 33 feet below ground surface.

Computed volume of water is 339.234 gallons during a 16 hour period, or equivalent of .354 g.p.m. The crew blew the water from the well and pulled the drill from the bore. Mr. Walker arrived at 9:20 A.M. Two Indians, Ben Cyrett and Robert LaGarde were employed to do some digging to relocate drill rig into position for drilling sloping well. Hand excavation is most practical and economical as bed rock was found very close to the surface. The rig was moved forward and set-up. The boom was positioned at 25 degrees from horizontal, and sloping well was started 11 feet east of the vertical well. The small angle between the drill stem and the slope of the ground surface, caused the rock to fracture and loosen necessitating the removal of rock from a trench 10 feet long from the head of the well to solid rock where the bore held its definition. Drilling continued to depth of 24' by quitting time. Crew worked 10 hours.

July 15 - Monday. Drilled 7-7/8" bore to depth of 28' - 5" and installed 6 inch casing. The top of casing extends approximately 0.8' above ground level in the Isle Royale parking lot. Drilling continued to 36' - 4" depth at quitting time. Crew worked a 10 hour shift.

July 16, - Tuesday. Drilling continued in slate to a total depth of 163 feet. This depth was reached at about 4:30 P.M. Handling of additional drill stems was slower than in the vertical drilling as the boom had to be raised to a vertical position, then lowered to drilling position to connect the drill stem. Crew worked 10 hours. Called Mr. Walker in Duluth that the drilling was completed.

July 17 - Wednesday. Drill crew removed the drill stem and bit from the well bore, after the bore was flushed of cuttings and was clean. The bit was removed from the bore by 9:00 A.M. Crew worked 10 hour shift - 7:00 A.M. to 5:30 P.M. After 9:00 A.M., crew worked at cleaning up the drill rig. The slope drilling required that water be circulated through the drill stem to wash the cuttings from the bore. The air pressure used while drilling caused intermittent spurts of water to shoot from the bore, and dirty up the entire drill rig. Mr. Walker spent all day collecting the explosives from Virginia, Minnesota, and the necessary equipment and supplies for the blast. Walker called a little after noon that he would be up tomorrow around 9:00 A.M.

July 18 - Thursday. Crew started work at 7:00 A.M. Worked on drilling, cleaning and maintenance. Mr. Walker arrived about 8:45 A.M. with explosives and equipment.

Prior to placing the explosives in the well bore, the contractor surveyed the slope profile of the well. This survey was accomplished by lowering a glass tube partially filled with

hydrophlouric acid to the desired position and letting it set undisturbed for 12 to 15 minutes. The acid etched the glass indicating the angle of slope. The acid had a slight capillary action which requires a correction to be applied to determine the true slope of the bore. The slope was determined by three different positions in the well bore, thus indicating the profile of the bore. The contractor charged three hours of time for making this survey.

The explosive was Pelletol 1, a product of DuPont deNemours Company. A primer was made up inside a 5 inch aluminum sleeve, 2' in length. The lower end of the primer had a wooden nose attached. Twelve inches of Pelletol 1 was placed in bottom of the primers, then 13 sticks of 60% dynamite was encased in the sleeve. Three lines of Permacord were secured in the wooden nose and extended the full length of the charge. The primer charge was pushed to bottom of the bore with a line of 1-3/4" pipe. At each coupling and each mid-point of each pipe an illet was provided through which the blasting wire was supported to prevent damage to the wire as the pipe was removed. The Pelletol 1 was flushed to the bottom, as the pipe was withdrawn. After 400 pounds of Pelletol 1 had been flushed down the pipe, fine sand was flushed down the bore to form about 10 lineal feet of stemming atop the Pelletol 1.

The specific gravity of Pelletol 1 is 1.5 and its loading density is 1.0. By loading the shot to completely fill the cross section of the bore, we had a total length of shot of 37.5 feet. A second electric blasting cap was placed at the upper end of the charge. Water stood in the bore nearly to the top. Velocity of the flushing water was regulated to an estimated 15-20 g.p.m. as it flowed from the top of the casing.

After the sand stemming was completed, flagmen were placed out along the highway, and the shot detonated at 8:01 P.M. Immediately with the blast, a slug of water issued from the casing, then after a couple of seconds of time a spew of water and unexploded Pelletol 1 blew from the casing. The blast did not create any disturbance from the lake bed. Crew worked from 7:00 A.M. to 8:10 P.M.

July 19 - Friday. Crew started work at 7:00 A.M. Aligned drill rig into drilling position, placed rotary drill bit into bore and flushed out the well. The flushing produced more unexploded Pelletol 1. Therefore, it is concluded the shot was not successfully placed to obtain the full effect of the explosive.

The rotary drill was operated to the bottom of the bore and extended 18 inches to a total depth of 164.5, making sure the bore is entirely clear.

As the bore is clear and clean, it was decided the contractor will reload the well with 525# of Metalized Slurry without any further charge to the Government for explosives. Crew quit work at 1:45 P.M., and left for home over the week end; will return 8:00 A.M. Monday. Mr. Walker plans to arrive about 9:30 A.M. Monday with 500# of explosives from Dow Chemical Company.

July 22 - Monday. The crew arrived to the job at 2:45 P.M. Mr. Walker arrived at 3:20 P.M. The crew removed the drill stem from the well and cleaned up drill rig. Mr. Walker studied the placing of the explosive in the well. He tried to insert the plastic casing of explosives (5-3/4" diameter) into 5 inch aluminum tubes, snagging the plastic on corner of metal tube. Decided to replace explosive from plastic casing to aluminum tubing. Crew quit work at 5:30 P.M.

July 23 - Tuesday. The crew and Mr. Walker commenced work at 7:00 A.M.. The 525# explosives were in 14 heavy weight polyethene casings 5-3/4" diameter and approximately 3 feet long. The explosive was opened and poured into 5 inch aluminum sleeve 50 feet long. The sections of sleeving was held together by metal screws. On the lower end of the cartridge sleeve was a wooden nose-cone. A number 9 wire was placed down the center of the cartridge and secured through the nose-cone, and extended to ground surface. Also the primacord was attached to the nose-cone and extended the entire length of the cartridge.

About 10-12 feet from the lower end of the cartridge a special primer was set and an electric cap placed just above and adjacent to the primer. Packing of the slurry in the cartridge continued to within about 12 feet of the upper end of the cartridge where another primer and electric cap was placed within the slurry. The rest of the slurry was packed and formed a cartridge 50 feet in length. The entire cartridge was pushed and placed in the bottom of the well bore. About 50 lineal feet of sand stemming was flushed into place above the cartridge. During all the loading operations the well bore was kept full of water.

The charge was detonated at 5:59 (Central Daylight Saving Time). Two spurts of water was blown from the head of the well. Some of the sand packed the upper end of the casing. The shock of the blast reacted on the bed of the lake, rilling the water and issuing bubbles to the water surface. Some of the large pieces of ledge rock at the waters edge were moved. A crack in the bank appeared about 2 feet from the top. The 5 foot strip of gravel between the edge of pavement and top of lake bank was shaken on dust raised one foot above the gravel. At one spot in the water approximately 20 feet from the edge bubbling persisted for more than 15 minutes.

The crew stopped work at 6:00 P.M.

July 24 - Wednesday. Crew started work at 7:00 A.M. Walker arrived about 10:00 A.M. Crew set rotary drill in well bore and started to clean out the well bore. There seemed to be some large pieces of slate dislodged by the blast and required some drilling. The bit went to bottom of bore. As it was retracted, the air ports plugged. The air pressure was boosted to 200# and surged. Drill stem was then pulled from the bore. After removing 2 sections of stem, the air ports cleared themselves.

The bit was removed for inspection. This was accomplished at 1:15 P.M. I proposed the test pump be installed 20-25 feet below the water surface and obtain an estimate of the specific yield. The contractor said he would have to reset the drill to a point below the pump setting. He directed crew to reset the rotary drill bit. I advised the contractor that I wanted some idea of available supply by 2:30 P.M. when I was going to call EODC. I made the call to EODC at 2:40 P.M. Upon my return to the well the contractor had retrieved the No. 9 loading wire that had wadded up in the bore. At 3:20 P.M. the crew started to set the test pump in the well at 104 feet position. Walker opened up the control valve which quickly exhausted the supply. Another section of pipe was added to the pump column. Again the supply was soon exhausted because of improper throttling of the discharge. Pump was shut off. Subsequent attempts to pump water failed, so the test pump was removed from well at 5:40 P.M. The crew quit work for the day.

July 25 - Thursday. Crew started work at 7:15 A.M. Walker told crew last evening they could sleep 15 minutes later this morning to compensate for the time after 5:30 P.M. last night, required to pull the test pump from the well. The water surface stood at 48' - 3" from well head; this is practically at lake level. Walker arrived 7:55 A.M.

Crew worked at cleaning the well of shattered rocks. This was conducted by rotating the drill stem in the bore, surging with 180# of air pressure. Some rocks had dislodged in the blast area that had to be drilled out as the drill stem was reinserted.

At 4:30 P.M. the rig was stopped due to a broken copper tubing, that regulated the air pressure in the compressor.

The crew worked until 5:30 P.M. on the cleaning of the rig.

July 26 - Friday. Crew started at 7:00 A.M. to clean out the well,

flushing the fines from the bore, repeatedly running the bit in and out of the bore. Hans Ovaska (Employee) was running the rig when Walker (contractor) thought it wasn't being done correctly, so Walker began to run the rig. About 2:00 P.M. I told Walker we should set test pump to ascertain if there was a reasonable supply of water available. Walker insisted the well would have to be cleaned thoroughly first. I told Walker if the supply was only $1\frac{1}{2}$ to 2 g.p.m., it would not pay to polish the well bore. They set test pump by 5:15 P.M. and I told Walker we would start the test pumping in the morning. Crew quit at 5:30 P.M.

July 27 - Saturday. Crew on job at 7:00 A.M. I had to return to cabin for Black Field book and met Walker on curve at foot of big hill driving to job. It was 7:12 A.M. I returned to job at 7:38 and the test pump was running. I asked Walker "Where was the water surface?" He yodled "13.5 lbs.," at 7:15. I question the generator connections were made and pump started at 7:15 A.M. Test pumping proceeded. I took my own data. Comparison of time with Walker's watch showed 20 minutes difference. He was 20 minutes slow. He admitted that his watch stopped and he set it by Guess.

Test pumping stopped at 12:52 P.M. Walker opened discharge valve and continued to run the pump for his own information, to see what happened. I went to Great Hall for lunch. Met Mr. Fugedy, EODC Engineer, at 1:30 P.M. Discussed the well drilling work, first on the site, then retired to NPS office in the trailer. Contractor pulled test pump from the well. At 3:30 P.M., Walker came to trailer and inquired of our further plans on the well. I advised him I would call him in Duluth tonight.

I called Walker at 10:15 P.M. and he could not be contacted. Finally contact was made at about 10:40 P.M.



RECEIVED
REGION TWO OFFICE
UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
Eastern Office
Division of Design and Construction
Philadelphia 6, Pa.

IN REPLY REFER TO: 1961 JUN 19 AM 11 15

L54-E

JUN 16, 1961
NATIONAL PARK SERVICE
OMAHA, NEBRASKA

Reg. Director

Asst. Reg. Director

Chf. Div. of Admin.

Chf. Div. of Operations

Chf. Div. of Interp.

Chf. Rec. Res. Planning

Chf. Ranger Activities

Field Solicitor

Action Taken

Memorandum

To: Regional Director, Region Two
Attention: Regional Chief of Operations

From: Acting Chief, EODC

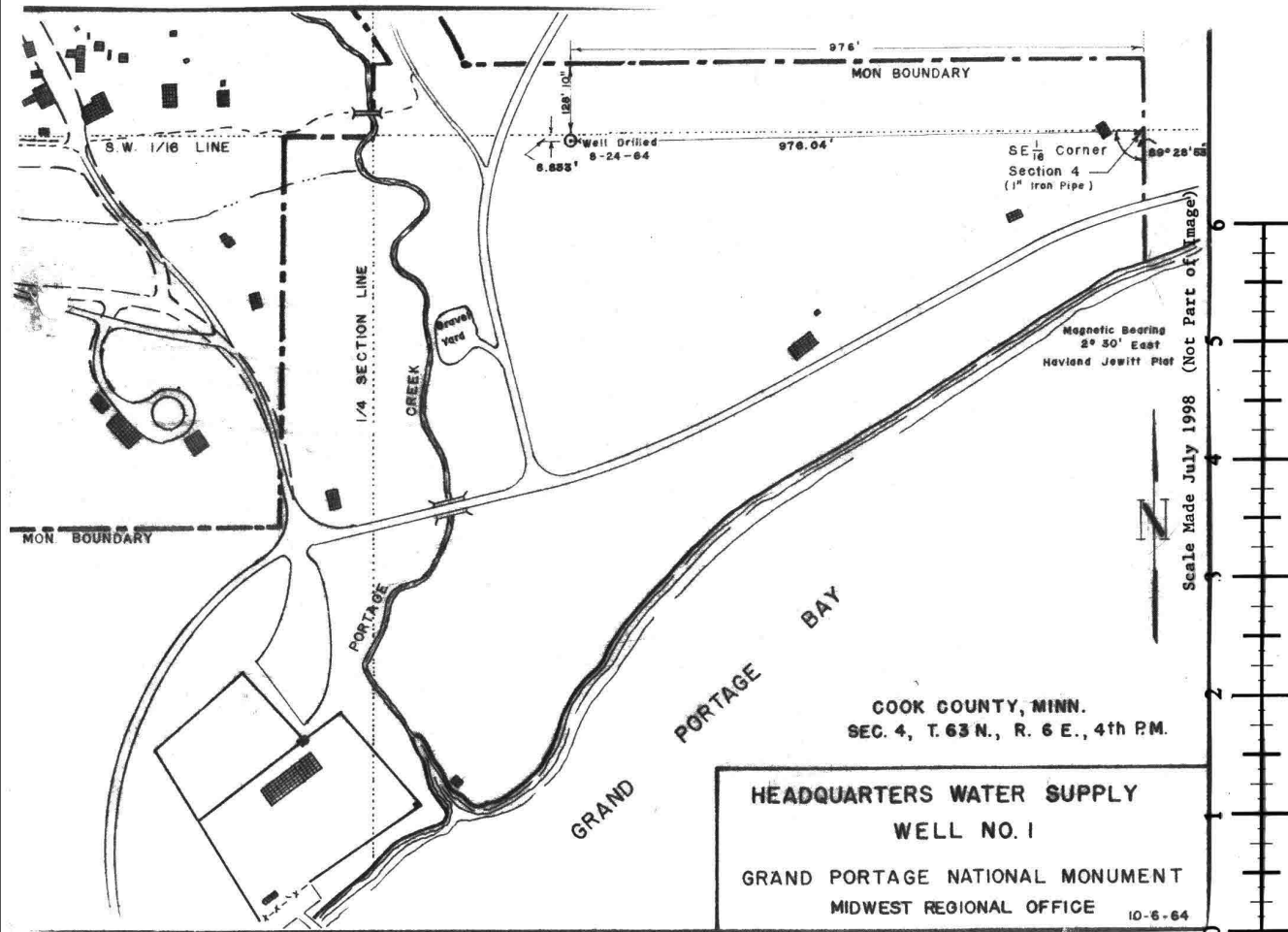
Subject: Water Supply, Grand Portage National Monument, Minnesota

In reply to Acting Chief of Operations Binnewies' memorandum of June 8, 1961 to Superintendent, Grand Portage National Monument, with copy to this office, we wish to advise that:

1. We estimate the proposed Museum and Visitor Center, Residences, Quarters and Office development will require 6000 gallons of water per day. This requirement, broken down further, will require an average of 10 gpm for 10 hours with daily peak loads of 20 gpm for short durations.
2. We have standard type specifications, adaptable to a job of this type, which we will be glad to assemble and incorporate with the bidding material when it is required.
3. We are reluctant to estimate the costs of our furnishing an engineer for the supervision of this construction since we are right in the midst of our heavy construction season and our engineers are spread "pretty thin" at this time.

We agree with Mr. Binnewies that the area personnel should be able to handle the supervision of this construction without any trouble especially if they are properly briefed prior to the actual construction.

Eugene R. DeSilets
Eugene R. DeSilets
Acting Chief



Docket Information

Number of Documents in Docket 48

Documents Dated from 7/27/1963 to 2/12/1965

Docket Compiled: 3/28/2011