Water System Study

University of Wisconsin-Stevens Point
Treehaven Campus
Lincoln County, Wisconsin

MSA Project No. 374032
DSF Project No. 10D2F

August 2011

DRAFT

Water System Study

University of Wisconsin-Stevens Point
Treehaven Campus
Lincoln County, Wisconsin

MSA Project No. 374032
DSF Project No. 10D2F

Prepared by:

MSA Professional Services, Inc.
1230 South Boulevard
Baraboo, WI 53913
Phone: 608.356.2771

© August 2011 MSA Professional Services, Inc.

TABLE OF CONTENTS

		Page
I.	INTRODUCTION	1
	A. Purpose	1
	B. Background	1
II.	EXISTING FACILITIES	4
	A. Water Supply	4
	B. Water Storage	4
	C. Booster Pumps	5
	D. Water Treatment	5
	E. Distribution System	5
III.	WATER USAGE	5
	A. Records	5
	B. Existing Water Use	5
	C. Future Water Use	5
IV.	DEFICIENCIES	6
	A. Water Supply	6
	B. Water Storage	6
	C. Distribution System	6
V.	ALTERNATIVES ANALYSIS	8
	A. General	8
	B. New Water Supply Source	8
	C. Water Treatment	8
	D. Water Storage	8
	E. Distribution System	9
VI.	DEVELOPMENT OF A NEW WATER SUPPLY SOURCE	9
	A. Summary of Test Well Construction	9
	B. Soil Borings	9
	C. Test Well Construction	9
VII.	SUMMARY OF RECOMMENDATIONS	12
	A. Water Supply	12
	B. Water Treatment	12
	C. Water Storage	13
	D. Booster Pumps	13
	E. Distribution System	13
	F. Cost Estimates	13

LIST OF FIGURES

Figure 1 - Location Map.....2
Figure 2 - Facility Map.....3
Figure 3 – Mechanical Room Piping Layout.....7
Figure 4 - Test Well #2 Location Map.....11

LIST OF APPENDICES

APPENDIX A Well Constructor's Records-Existing Wells
APPENDIX B Well Construction Record-Test Well
APPENDIX C Water Quality Information-Test Well
APPENDIX D Cost Estimates

I. INTRODUCTION

A. Purpose

1. The purpose of this report is to summarize the water system serving the UW Stevens Point – Treehaven Campus. More specifically, the report will:
   - Document the existing water supply, storage and distribution system
   - Document the existing and projected future water usage
   - Document the existing water quality
   - Identify deficiencies in the existing facilities;
   - Identify new system facilities or improvements;
   - Provide estimates of the capital costs of providing the new or improved facilities.

B. Background

The UW Stevens Point – Treehaven Campus is located in Section 26, T35N, R7E, Lincoln County, approximately 10 miles east of Tomahawk, WI as shown in **Figure 1**.

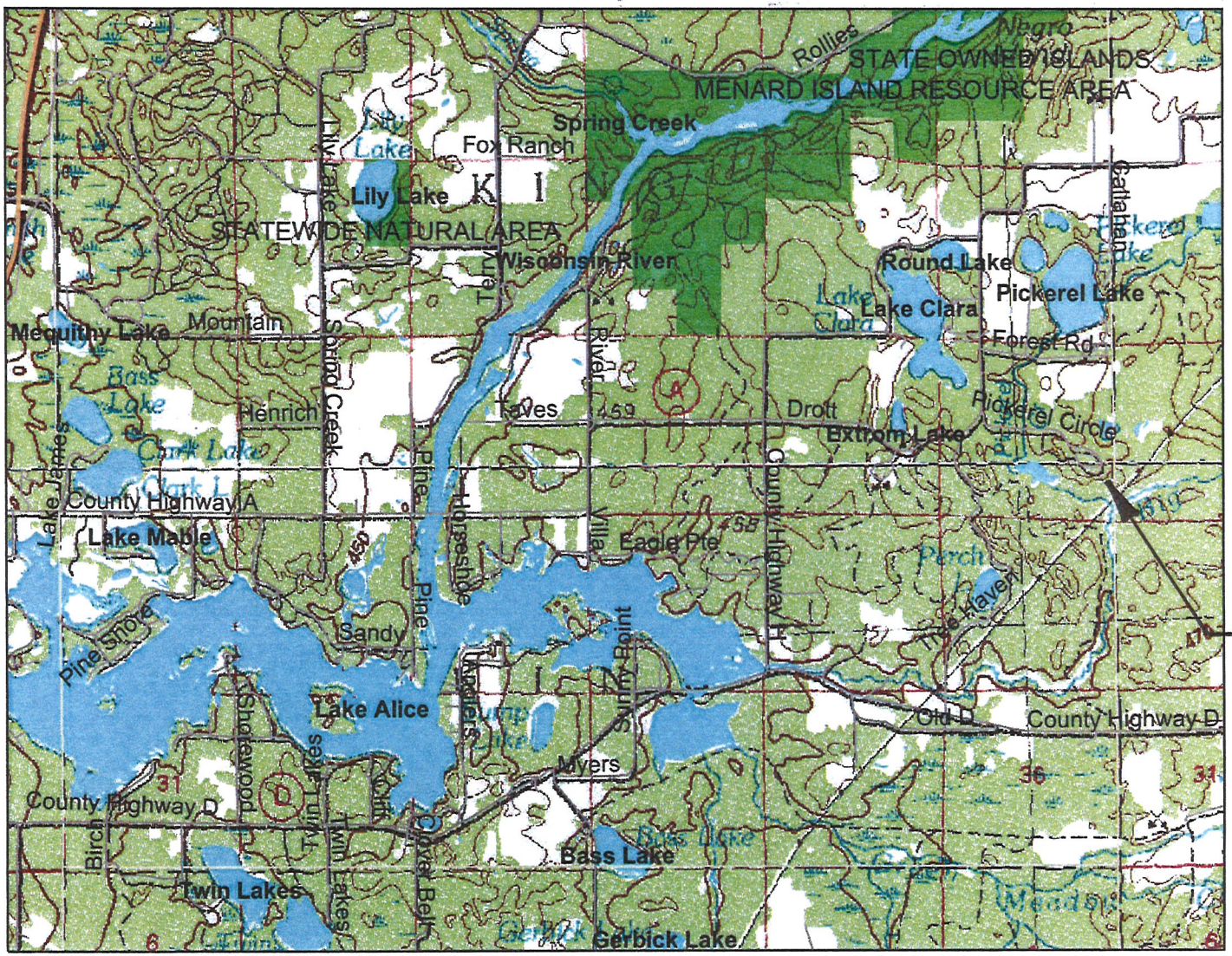
The water system is categorized by the WNDR as a *Transient, Non-Community Public Water Supply*.

The water system consists of the following:

- Two (2) water supply wells
  - Well #1 – East Well (active)
  - Well #2 – West Well (standby)
- Two (2) buried water storage vessels
  - 1,500-gallon fiberglass storage tank (active)
  - 3,000-gallon steel storage tank (inactive)
- Booster Pumps
  - Two (2) located in mechanical room of building
- Water softener/treatment
  - Located in mechanical room of building (active)
- Approximately 1,500 feet of water main.
- System operates on a single pressure zone.
- System does not provide fire protection.

A general layout of the facilities in included in **Figure 2**.

Location Map



Legend

- County Boundaries
- Major Highways
  - Interstate
  - US Highway
  - State Highway
- Local Roads
- Civil Towns
  - Civil Town
- 24K Open Water
- Cities and Villages
  - Village
  - City
- DNR Managed Lands
  - Fee

PROJECT LOCATION

0 6000 12000 18000 ft.

Scale: 1:60,000

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

FIGURE 1

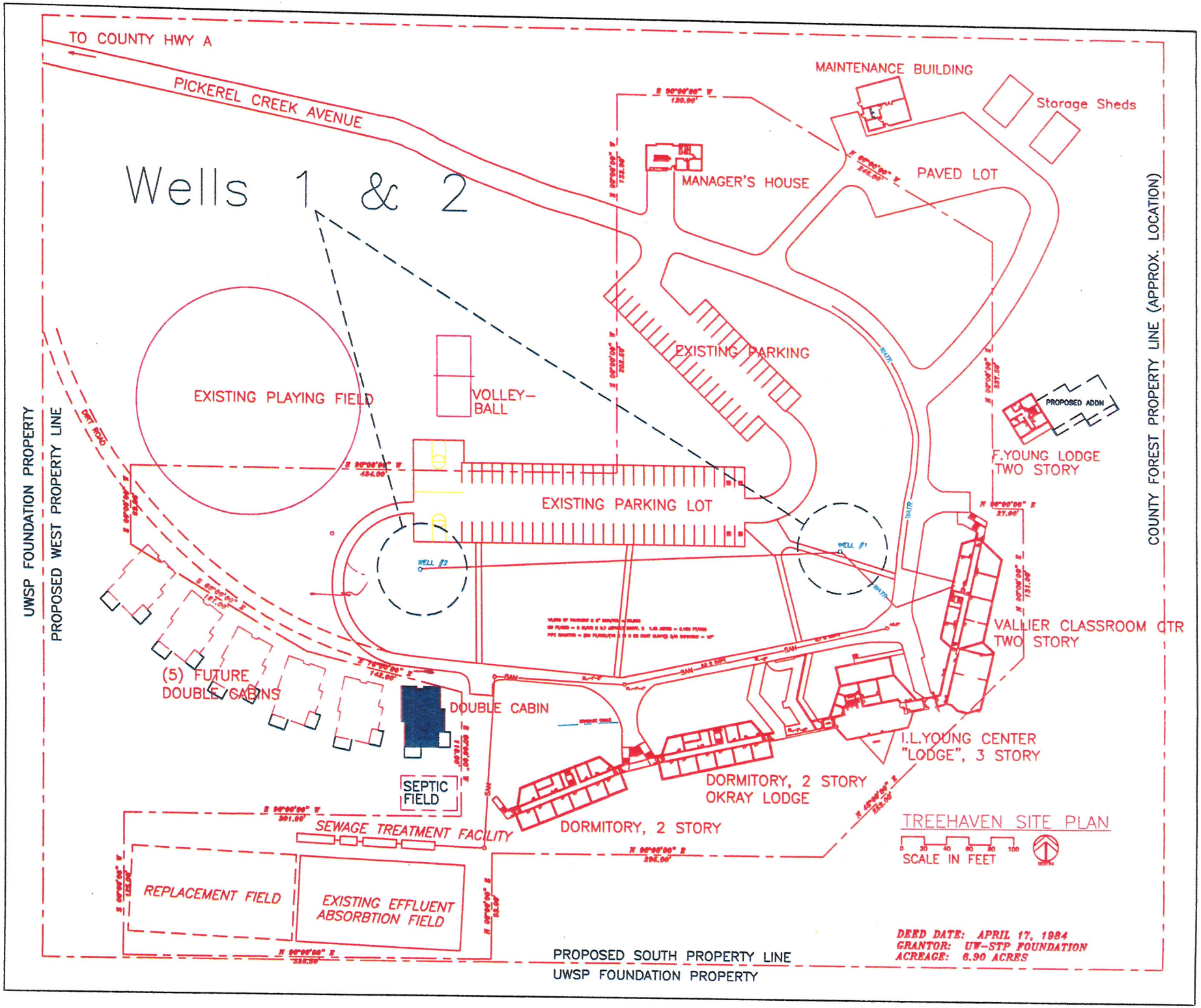

TO COUNTY HWY A
PICKEREL CREEK AVENUE
Wells 1 & 2
MAINTENANCE BUILDING
Storage Sheds
MANAGER'S HOUSE
PAVED LOT
EXISTING PARKING
EXISTING PLAYING FIELD
VOLLEY-BALL
PROPOSED ADDN
F.YOUNG LODGE
TWO STORY
EXISTING PARKING LOT
WELL #2
WELL #1
VALLIER CLASSROOM CTR
TWO STORY
(5) FUTURE
DOUBLE CABINS
DOUBLE CABIN
I.L.YOUNG CENTER
"LODGE", 3 STORY
SEPTIC
FIELD
DORMITORY, 2 STORY
OKRAY LODGE
SEWAGE TREATMENT FACILITY
DORMITORY, 2 STORY
TREEHAVEN SITE PLAN
SCALE IN FEET
REPLACEMENT FIELD
EXISTING EFFLUENT
ABSORBTION FIELD
DEED DATE: APRIL 17, 1984
GRANTOR: UW-STP FOUNDATION
ACREAGE: 6.90 ACRES
PROPOSED SOUTH PROPERTY LINE
UWSP FOUNDATION PROPERTY
UWSP FOUNDATION PROPERTY
PROPOSED WEST PROPERTY LINE
COUNTY FOREST PROPERTY LINE (APPROX. LOCATION)

FIGURE 2

II. EXISTING FACILITIES

A. Water Supply

1. Well No. 1 (Wisconsin Unique Well #GP468) - Active
   a) Constructed in 1981, Well No. 1 is cased to 108 feet with a 6-inch open drillhole extending to 181 feet. This well terminates in the Precambrian bedrock (granite).
   b) Static water level at the time of construction was 53 feet and the water level dropped 80 feet pumping at 33 gallons per minute (gpm) over a 72-hour pumping test.
   c) The well is equipped with a 5-horsepower, 230 V, single phase submersible well pump.
   d) Current estimated capacity of 30 gpm.
2. Well No. 2 (Wisconsin Unique Well #GP467) - Standby
   a) Constructed in 1981, Well No. 1 is cased to 108 feet with a 6-inch open drillhole extending to 202 feet. This well terminates in the Precambrian bedrock (granite).
   b) Static water level at the time of construction was 53 feet and the water level dropped 77 feet pumping at 42 gallons per minute (gpm) over a 72-hour pumping test.
   c) The well is equipped with a 5-horsepower, 230 V, single phase submersible well pump
   d) Current estimated capacity of 30 gpm.
   e) This well is available on standby purpose primarily due to concerns with the discharge line freezing during winter months.
3. Both wells discharge through a pitless adaptor to the mechanical room within the Vallier Classroom Center.
4. Copies of the Well Constructor's records are included in **Appendix A**.

B. Water Storage

1. The primary water storage facilities consist of two (2) buried water storage tanks located adjacent to the Vallier Classroom Center.
   a) Originally, a 3,000-gallon steel hydropneumatic storage tank was used to provide storage and system pressure.
      (1) Throughout the years this tank has been difficult to operate and maintain, and in 2009 was taken off line.
      (2) The tank is also presumed to be leaking
   b) Presently, the system is operating in conjunction with a 1,500-gallon fiberglass non-pressurized storage tank.
   c) The piping exiting the existing storage tank leads to a primary mechanical equipment room located within the lower level of the Vallier Classroom Center.
2. Secondary storage is provided to maintain distribution system pressure.

a) Two (2) Well X Trol WX-350 bladder-type pressure tanks are located within the mechanical room in the lower level of the Vallier Classroom Center.
   (1) Gross capacity = 119 gallons each (238 gallons total)
   (2) Usable volume operating at 30/50 psi = 37 gallons each (74 gallons total). Acceptance factor = 0.309

C. Booster Pumps

1. Water from the primary storage tank is then boosted to the distribution system via two (2) 5-horsepower centrifugal pumps.
   a) At the time of the June 2011 meeting, one of the pumps was inoperable. That pump has been replaced at this time.
   b) Booster pump capacity is estimated to be 30 - 50 gpm.

D. Water Treatment

1. The facilities consist of a single water softening unit located in the mechanical room adjacent to the booster pumps and pressure tanks.
   a) The unit is a Homite Industries Water Softener/Filter
      (1) No information is available on system design capacity.
   b) The unit is currently in operation.
2. A copy of the general piping arrangement within the mechanical room is shown in **Figure 3**.

E. Distribution System

1. After exiting the mechanical room, water is distributed throughout the Treehaven facilities through a series of 2-inch, 4-inch, and 6-inch cast iron mains.
2. Total length of mains and services is unknown, however, is estimated to be nearly 1,500 feet.

III. WATER USAGE

A. Records

1. No metering devices are installed on any of the existing water supply or distribution facilities.

B. Existing Water Use

1. In December 2009, a report was prepared by KJWW Engineering Consultants (KJWW #09.0544.00). In that report a summary of fixtures was tabulated. Based on that plumbing fixture count (177 Total Fixtures), a total of 415 supply fixture units (SFU) was calculated.
2. Using Department of Commerce Chapter 82, Table 82.40-3 for with predominately flush tank type water closets or washdown urinals, the equivalent flow is 108 gpm. By assuming predominately flushometer type water closets or siphon jet urinals the equivalent flow is 128 gpm.

C. Future Water Use

1. No anticipated major improvements are planned presently, so the future peak demand is estimated to range from 125 gpm to 150 gpm.

IV. DEFICIENCIES

A. Water Supply

1. Water Quality
   a) Water quality from the two existing wells is poor. Limited data is available for review, however, the primary issues relate to elevated levels of iron and manganese.
   b) The secondary (aesthetic) standards of each are 0.30 mg/l and 50 ug/l respectively. Water containing inorganic chemicals at levels above these limits is not hazardous to health but maybe objectionable to users.
      (1) Iron concentrations found in Well No. 1 have been recorded as high as 5.37 mg/l.
      (2) Manganese concentrations found in Well No. 1 have been recorded as high as 1130 ug/l.
   c) Additionally, the level of arsenic was found to be 0.015 mg/l, which is above the maximum contaminant level (MCL) of 0.010 mg/l.
   d) Due to the health concerns with arsenic and generally water quality complaints, the facilities have been providing bottled water for consumption, beginning in 2010.
   e) While no specific data is available for Well No. 2, water quality is presumed to be similar.

B. Water Storage

1. The 3,000-gallon steel hydropneumatic tank is no longer operational due to a presumed leak and repeated operational problems associated with maintaining the correct air/water ratio.
2. The 1,500-gallon fiberglass non-pressurized storage tank may be subject to freezing concerns due to low water usage in the winter months and limited bury depth.

C. Distribution System

1. The discharge line between Well No. 2 and the remote water storage tanks is relatively shallow and has frozen regularly.
2. Distribution mains throughout the facility are generally coated with deposits due to elevated levels of iron and manganese.
3. Limited valving is present to allow for system isolation.
4. Limited availability of flushing hydrants.

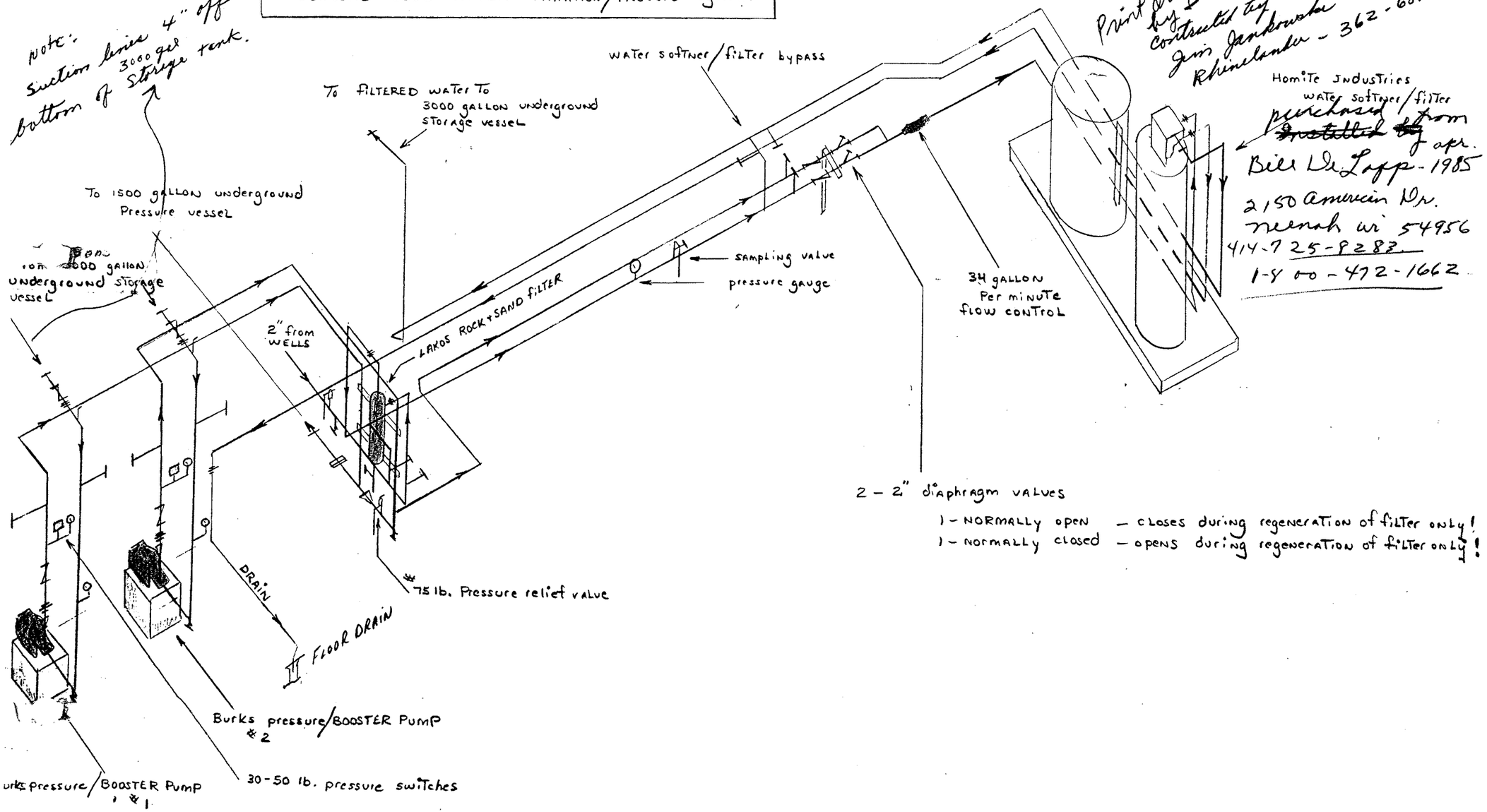
Domestic COLD WATER filtration/Pressure System

4-23-86

Print drawn by + contracted by Jim Jankowski Rhinelander - 362-6816 home

Homite Industries water softner/filter purchased ~~installed by~~ from apr. Bill DeLapp - 1985
2150 American Dr.
Neenah wi 54956
414-725-8283
1-800-472-1662

note: suction lines 4" off bottom of 3000 gal storage tank.



V. ALTERNATIVES ANALYSIS

A. General

1. Due to the water quality concerns from the existing wells, two options exist:
   a) Develop a new water supply source
   b) Provide water treatment for the existing water supply source

B. New Water Supply Source

1. This alternative would include construction of a new production well to serve the facilities, with the goal to provide ample water quantity with water quality parameters better than the existing well(s).

C. Water Treatment

1. Options for treatment for the elevated manganese levels include filtration or chemical treatment.
2. Filtration
   a) Generally, the water would be pumped directly through a vessel filled with media to remove the manganese prior to entering the distribution system.
   b) This type of system is common and the most effective for removal of the inorganics.
   c) In order to utilize this type of treatment, a new building would be required at the site of the well to treat the water at the source prior to entering the distribution system piping.
   d) Other considerations include the disposal of backwash water, chemical usage and increased operation and maintenance.
3. Chemical Addition
   a) With levels of manganese similar to those found in Test Well #2, there are chemicals (blended phosphates) that are capable of addressing the manganese.
   b) In order to utilize this type of treatment, a new building would be required at the site of the well to treat the water at the source prior to entering the distribution system piping.
   c) Other considerations include chemical usage.
   d) Operation and maintenance should remain fairly consistent with the current conditions.
4. The DNR has confirmed this method is being used in other installations within the state which exhibit similar water quality.

D. Water Storage

1. The scope of this project did not include modifications to the existing storage arrangement.

2. Depending on the future water supply needs, a modification to the current the system operation may be warranted.
3. There are two general types of systems available:
   a) Well discharging to a non-pressurized vessel, with booster pumps lifting the water to a higher pressure into the distribution system. The booster pumps in conjunction with a small bladder type pressure tank maintain system pressure. This is the current configuration.
   b) Well discharging to a pressurized vessel which provides system storage and maintains system pressure.

E. Distribution System

1. Alternatives for distribution system include replacement or rehabilitation in place.
2. When practical replacement of mains and services would allow for increased bury depth for frost protection.

VI. DEVELOPMENT OF A NEW WATER SUPPLY SOURCE

A. Summary of Test Well Construction

1. In response to the need for a water supply with more acceptable water quality, an investigation was undertaken as outlined below.

B. Soil Borings

1. Soil Borings were constructed to identify potential new sites (three total).
   a) SB #1 hit refusal (inadequate formation)
   b) SB #2 hit bedrock (inadequate formation)
   c) SB # 3 looked good (formations appeared favorable)

C. Test Well Construction

1. Test Well #1 was constructed at the location of Soil Boring #3
   a) The overall depth was too shallow to meet the minimum Wisconsin Administrative Code NR 812 requirements.
   b) Due to those requirements, the decision was made to move north to a new location and drill Test Well #2.
2. Test Well #2.
   a) The location of Test Well #2 is shown in **Figure 4**.
   b) Well is 6-inch diameter, 124-feet deep with stainless steel screen from 106 feet to 124 feet. A copy of the Well Constructor's record is included in **Appendix B**.
   c) The well is capable of producing approximately 110 gallons per minute (gpm).
      (1) This well cannot be modified to use as final production well.
3. Water Quality

a) A 72 hour pumping test was conducted and water quality samples were collected.

b) Samples were collected daily for arsenic, iron and manganese, with a full range of inorganics, synthetic organic compounds (SOC's) and volatile organic compounds (VOC's) being collected near the end of the pumping test.

   (1) Arsenic results were noted between the level of detection (LOD) and the level of quantification (LOQ), well below the MCL (10 mg/l).

   (2) Iron results were noted between the level of detection and the level of quantification, well below the secondary standard (0.030 mg/l).

   (3) Manganese results were noted ranged from 150 ug/l at the beginning of the pumping test to 100 ug/l near the end of the pumping test. While the levels are still above the secondary standard (50 ug/l), they are significantly lower than the existing well (1130 ug/l).

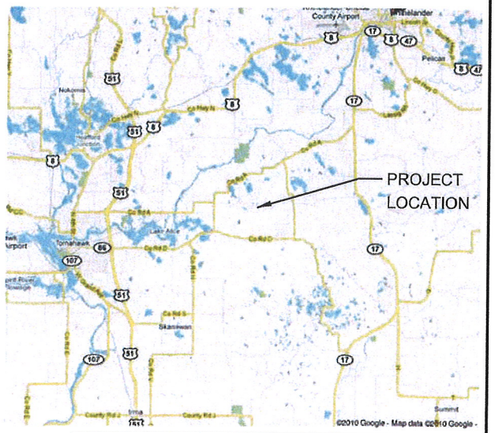
c) There were no detections for SOC's or VOC's.

d) A copy of those results is included in **Appendix C**.

LEGEND

- EXISTING WELL
- LUST SITE
- HOUSE SERVED BY SEPTIC
- MW6 MONITORING WELL
- SB2 SOIL BORING
- W TEST WELL #2
- W PROPOSED WATERMAIN

0 150 300 600



WELL SITE LOCATION MAP
UW STEVENS POINT TREE HAVEN
W2540 PICKEREL CREEK AVE
TOMAHAWK, WI

MSA PROFESSIONAL SERVICES

TRANSPORTATION • MUNICIPAL
DEVELOPMENT • ENVIRONMENTAL
1835 N Stevens St. Rhinelander, WI 54501
715-362-3344 1-800-844-7654 Fax: 715-362-4116
Web Address: www.msa-ps.com

DRAWN BY	CAR	DATE	8/10
CHECKED BY	JB	SCALE	AS SHOWN

SHEET X of X
FILE NO. 374032

FIGURE 3

VII. SUMMARY OF RECOMMENDATIONS

A. Water Supply

1. New Well
   a) Based on the water quality and water quantity found in Test Well #2, development of a new water supply source should proceed.
   b) The new well should be located as close to existing Test Well #2 as practical, while allowing for construction of a building around the new well.
   c) Test Well #2 should remain intact for monitoring during construction.
   d) Well characteristics:
      (1) 8-inch diameter (minimum)
      (2) Screen-20 feet (minimum)
2. Pumping equipment
   a) A submersible well pump will be used in conjunction with a DNR-approved pitless adaptor.
   b) Pump will be equipped with a variable frequency drive.
3. Pump Capacity
   a) As stated previously in the report, the future peak demand is estimated to range from 125 gpm to 150 gpm.
   b) The methodology used assumes that all fixtures identified are operating at the same time, which is quite conservative.
   c) Based on discussions with the operator, there have been no instances of insufficient water supply to the facilities.
      (1) Note that the supply will be controlled by the size of the booster pumps which is estimated to range from 30 – 50 gpm *(actual capacity needs to be verified)*.
   d) Until verified, the recommendation would include design of a 50 gpm pump.
4. Wellhouse
   a) A new building should be constructed to house the well and related equipment.
      (1) Building options should be reviewed, but could include a wood-framed building, masonry building or precast concrete building.
5. Electrical Supply
   a) Single phase electric service will need to be extended to the site.

B. Water Treatment

1. Manganese levels in the final well are anticipated to range from 100 – 150 ug/l. The secondary (aesthetic) standard for manganese is 50 ug/l.

2. Due to high capital costs, and long term operation and maintenance costs, the use of pressure filters will not be pursued, however, the new facilities should be designed to accommodate their addition in the future.
3. Facilities for injecting a blended phosphate at the well discharge should be incorporated into the current design.
   a) Chemical feed equipment will include a liquid chemical feed pump, liquid chemical storage container, chemical resistant scale, and controls to feed during pumping cycles.

C. Water Storage

1. No changes to the existing storage facilities are planned.

D. Booster Pumps

1. No changes to the existing booster pumps are planned.

E. Distribution System

1. To prevent freezing problems any mains with less than 7- feet of cover over the top of the main should be replaced.
2. Mains that are not replaced should be chemically and/or mechanically cleaned to remove mineral deposits. Aggressive flushing will be required.
3. Flushing hydrants should be installed at all dead ends or near the service entrance to buildings to allow for routine flushing.
4. Water main replacements can be made in a phased manner to allow for budget constraints.

F. Cost Estimates

1. A summary of the cost for the proposed improvements follows:

Facility	Estimated Cost
Well	$ 86,000
Building	$ 153,000
Distribution	$ 141,000
Total	$ 380,000

2. Detailed cost estimates are included in **Appendix D**.
   a) Note that construction estimates include 10% construction contingencies and 20% engineering/administration/legal until a final scope of work is determined.

APPENDIX A

Well Constructor's Records-Existing Wells

WISCONSIN UNIQUE WELL NUMBER **GP468**
Source: SWAP PROJECT KEYED

State of Wi-Private Water Systems-DG/2
Department Of Natural Resources, Box 7921
Madison, WI 53707

Form 3300-77A
(Rev 02/02)bw

Depth **181** FT

Property Owner	UW STEVENS POINT FOUNDATION
Telephone Number	- -
Mailing Address	2100 MAIN ST
City	STEVENS POINT
State	WI
Zip Code	54481
County of Well Location	35 LINCOLN
NO	
Co Well Permit No	W
Well Completion Date	November 13, 1981

1. Well Location
T=Town C=City V=Village
T of KING
Fire#
Street Address or Road Name and Number
KING
Subdivision Name | Lot# | Block #

Gov't Lot or **NE** 1/4 of **NE** 1/4 of
Section **26** T **35** N R **7** **E**

Well Constructor	RHINELANDER WELL DRILLING INC
License #	632
Facility ID (Public)	
Address	PO BOX 584
Public Well Plan Approval#	
City	RHINELANDER
State	WI
Zip Code	54501
Date Of Approval	
Hicap Permanent Well #	
Common Well #	
Specific Capacity	.4 gpm/ft

2. Well Type **1** (See item 12 below)
1=New 2=Replacement 3=Reconstruction
of previous unique well # _____ constructed in _____
Reason for replaced or reconstructed Well?
1 1=Drilled 2=Driven Point 3=Jetted 4=Other

3. Well Serves **N** # of homes and or **DWELLING**
(eg: barn, restaurant, church, school, industry, etc.)
M=Munic O=OTM N=NonCom P=Private Z=Other X=NonPot A=Anode L=Loop H=Drillhole

High Capacity:
Well? N
Property? N

4. Is the well located upslope or sideslope and not downslope from any contamination sources, including those on neighboring properties? **N**
Well located in floodplain? **N**
Distance in feet from well to nearest: (including proposed)

1. Landfill
150 2. Building Overhang
450 3. 1=Septic 2= Holding Tank
500 4. Sewage Absorption Unit
5. Nonconforming Pit
6. Buried Home Heating Oil Tank
7. Buried Petroleum Tank
8. **1** 1=Shoreline 2= Swimming Pool
9. Downspout/ Yard Hydrant
10. Privy
11. Foundation Drain to Clearwater
12. Foundation Drain to Sewer
13. Building Drain 1=Cast Iron or Plastic 2=Other
14. Building Sewer 1=Gravity 2=Pressure 1=Cast Iron or Plastic 2=Other
15. Collector Sewer: ___ units ___ in . diam.
16. Clearwater Sump
17. Wastewater Sump
18. Paved Animal Barn Pen
19. Animal Yard or Shelter
20. Silo
21. Barn Gutter
22. Manure Pipe 1=Gravity 2=Pressure 1=Cast iron or Plastic 2=Other
23. Other manure Storage
24. Ditch
25. Other NR 812 Waste Source

5. Drillhole Dimensions and Construction Method

Dia.(in.)	From (ft)	To (ft)
8.0	surface	108
6.0	108	181

Upper Enlarged Drillhole
-- 1. Rotary - Mud Circulation ----------
X -- 2. Rotary - Air ----------
-- 3. Rotary - Air and Foam ----------
-- 4. Drill-Through Casing Hammer
-- 5. Reverse Rotary
-- 6. Cable-tool Bit _ n. dia ----------
-- 7. Temp. Outer Casing _ in. dia. _____ depth ft.
Removed ?
Other

Lower Open Bedrock

Geology Codes	8. Geology Type, Caving/Noncaving, Color, Hardness, etc	From (ft.)	To (ft.)
_QS_	CAVING SAND	0	60
__C_	CLAY	60	70
__Z_	GRAVEL & CLAY	70	100
__G_	GRAVEL	100	102
K_Q_	BLACK GRANITE	102	181

6. Casing Liner Screen

Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly	From (ft.)	To (ft.)
6.0	NEW BLACK STEEL 19.00#, PE A53 US STEEL	surface	108

Dia.(in.)	Screen type, material & slot size	From	To

9. Static Water Level
53.0 feet **B** ground surface
A=Above B=Below

10. Pump Test
Pumping level **133.0** ft. below surface
Pumping at **33.0** GP **72.0** Hrs

11. Well Is: 18 in. A Grade
A=Above B=Below
Developed? N
Disinfected? Y
Capped? Y

7. Grout or Other Sealing Material

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
NEAT CEMENT	surface	108.0	

12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property? **N**
If no, explain

13. Initials of Well Constructor or Supervisory Driller Date Signed

Initials of Drill Rig Operator (Mandatory unless same as above) Date Signed

Additonal Comments? WELL NO. 1 - EAST WELL
Owner Sent Label? Y
Variance Issued?
More Geology?

Batch 777777777

WISCONSIN UNIQUE WELL NUMBER **GP467**
Source: SWAP PROJECT KEYED

State of Wi-Private Water Systems-DG/2
Department Of Natural Resources, Box 7921
Madison, WI 53707

Form 3300-77A
(Rev 02/02)bw

Depth **202** FT

Property Owner	UW STEVENS POINT FOUNDATION
Telephone Number	- -
Mailing Address	2100 MAIN ST
City	STEVENS POINT
State	WI
Zip Code	54481
County of Well Location	35 LINCOLN
NO	
Co Well Permit No	W
Well Completion Date	December 17, 1981

1. Well Location
T=Town C=City V=Village
T of KING
Fire#
Street Address or Road Name and Number
KING
Subdivision Name
Lot#
Block #

Gov't Lot or **NE** 1/4 of **NE** 1/4 of
Section **26** T **35** N R **7** E

Well Constructor	RHINELANDER WELL DRILLING INC
License #	632
Facility ID (Public)	
Address	PO BOX 584
Public Well Plan Approval#	
City	RHINELANDER
State	WI
Zip Code	54501
Date Of Approval	
Hicap Permanent Well #	
Common Well #	
Specific Capacity	.5 gpm/ft

2. Well Type **1** (See item 12 below)
1=New 2=Replacement 3=Reconstruction
of previous unique well # _____ constructed in _____
Reason for replaced or reconstructed Well?

1 1=Drilled 2=Driven Point 3=Jetted 4=Other

3. Well Serves **N** # of homes and or **DWELLING**
(eg: barn, restaurant, church, school, industry, etc.)
M=Munic O=OTM N=NonCom P=Private Z=Other X=NonPot A=Anode L=Loop H=Drillhole

High Capacity:
Well? N
Property? N

4. Is the well located upslope or sideslope and not downslope from any contamination sources, including those on neighboring properties? **N**
Well located in floodplain? **N**
Distance in feet from well to nearest: (including proposed)

1. Landfill
350 2. Building Overhang
300 3. 1=Septic 2= Holding Tank
350 4. Sewage Absorption Unit
5. Nonconforming Pit
6. Buried Home Heating Oil Tank
7. Buried Petroleum Tank
8. **1** 1=Shoreline 2= Swimming Pool
9. Downspout/ Yard Hydrant
10. Privy
11. Foundation Drain to Clearwater
12. Foundation Drain to Sewer
13. Building Drain 1=Cast Iron or Plastic 2=Other
14. Building Sewer 1=Gravity 2=Pressure 1=Cast Iron or Plastic 2=Other
15. Collector Sewer: ___ units ___ in . diam.
16. Clearwater Sump
17. Wastewater Sump
18. Paved Animal Barn Pen
19. Animal Yard or Shelter
20. Silo
21. Barn Gutter
22. Manure Pipe 1=Gravity 2=Pressure 1=Cast iron or Plastic 2=Other
23. Other manure Storage
24. Ditch
25. Other NR 812 Waste Source

5. Drillhole Dimensions and Construction Method

Dia.(in.)	From (ft)	To (ft)
8.0	surface	92
6.0	92	202

Upper Enlarged Drillhole
-- 1. Rotary - Mud Circulation ----------
X -- 2. Rotary - Air ----------
-- 3. Rotary - Air and Foam ----------
-- 4. Drill-Through Casing Hammer
-- 5. Reverse Rotary
-- 6. Cable-tool Bit _ n. dia ----------
-- 7. Temp. Outer Casing _ in. dia. _____ depth ft.
Removed ?
Other

Lower Open Bedrock

Geology Codes	8. Geology Type, Caving/Noncaving, Color, Hardness, etc	From (ft.)	To (ft.)
_QX_	SAND & CLAY	0	35
__Y_	SAND & GRAVEL	35	62
__C_	CLAY	62	92
K_Q_	BLACK GRANITE	92	202

6. Casing Liner Screen

Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly	From (ft.)	To (ft.)
6.0	NEW BLACK STEEL 19.00#, PEA53 US STEEL	surface	108

Dia.(in.)	Screen type, material & slot size	From	To

9. Static Water Level
53.0 feet **B** ground surface
A=Above B=Below

10. Pump Test
Pumping level **130.0** ft. below surface
Pumping at **42.0** GP **72.0** Hrs

11. Well Is: 12 in. **A** Grade
A=Above B=Below
Developed? N
Disinfected? Y
Capped? Y

7. Grout or Other Sealing Material

Method / Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
NEAT CEMENT	surface	65.0	

12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property? **N**
If no, explain

13. Initials of Well Constructor or Supervisory Driller Date Signed

Initials of Drill Rig Operator (Mandatory unless same as above) Date Signed

Additonal Comments?
Owner Sent Label? Y
Variance Issued?
More Geology?

WELL NO. 2 - WEST WELL

Batch 777777777

APPENDIX B

Well Construction Record-Test Well

Well Construction Report

WISCONSIN UNIQUE WELL NUMBER VH 997

State of WI - Private Water Systems-DG/2
Department of Natural Resources, Box 7921
Madison, WI 53707

Form 3300-77A (R 9/05)

TW #2

Property Owner: Wis Stevens Pt. Tree Haven	Telephone Number: (715) 453-4106
Mailing Address: W2540 Pickeral Creek Ave	
City: Tomahawk	State: WI; Zip Code: 54487
County of Well Location: Lincoln	Co. Well permit No. W; Well Completion Date (mm-dd-yyyy): 01-20-2011

1. Well Location
☒ Town ☐ City ☐ Village of King
Fire # (If avail.) W2540
Street Address or Road Name and Number: Pickeral Creek Ave
Subdivision Name | Lot # | Block #
Gov't Lot # ____ or NW 1/4 of SE 1/4 of Section 24, T 35 N; R 7 ☒ E ☐ W
Latitude Deg. 45 Min. 30.040
Longitude Deg. 89 Min. 33.219
Lat/Long Method

Well Constructor (Business Name): Rhinelander Well Drilling	License #: 632
Address: PO Box 581	
City: Rhinelander; State: WI; Zip Code: 54501	
Hicap Permanent Well #	Common Well #

Facility ID Number (Public Wells)
Well Plan Approval #
Date of Approval (mm/dd/yyyy)
Specific Capacity gpm/ft

2. Well Type ☒ New ☐ Replacement ☐ Reconstruction (see item 12 below)
of previous unique well # ____ constructed in ____
Reason for replaced or reconstructed well?
☒ Drilled ☐ Driven Point ☐ Jetted ☐ Other ____

3. Well serves ____ # of test well
(For example: home, barn, restaurant, church, school, industry, etc.)
High Capacity: Well? ☐ Yes ☒ No; Property? ☐ Yes ☒ No

4. Is the well located upslope or sideslope and not downslope from any contamination sources, including those on neighboring properties? ☒ Yes ☐ No (If no, explain on back side.)
Well located within 1,200 feet of a quarry? ☐ Yes ☒ No If yes, distance in feet from quarry: ____
Well located in floodplain? ☐ Yes ☒ No

Distance in feet from well to nearest: (include proposed)

____ 1. Landfill
____ 2. Building Overhang
+100 3. Septic ☒ Holding Tank ☐
+600 4. Sewage Absorption Unit
____ 5. Nonconforming Pit
____ 6. Buried Home Heating Oil Tank
____ 7. Buried Petroleum Tank
____ 8. Shoreline ☐ Swimming Pool ☐
____ 9. Downspout/Yard Hydrant
____ 10. Privy
____ 11. Foundation Drain to Clearwater
____ 12. Foundation Drain to Sewer
____ 13. Building Drain ☐ Cast Iron or Plastic ☐ Other
____ 14. Building Sewer ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
____ 15. Collector Sewer: ☐ sanitary ___ units ___ in. diam. ☐ storm ☐ ≤ 6" ☐ > 6"
____ 16. Clearwater Sump
____ 17. Wastewater Sump
____ 18. Paved Animal Barn Pen
____ 19. Animal Yard or Shelter
____ 20. Silo
____ 21. Barn Gutter
____ 22. Manure Pipe ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
____ 23. Other Manure Storage ____
____ 24. Ditch
____ 25. Other NR 812 Waste Source ____

5. Drillhole Dimensions and Construction Method

Dia.(in.)	From (ft.)	To (ft.)
6	surface	124

Upper Enlarged Drillhole / Lower Open Bedrock
☐ ---1. Rotary - Mud Circulation
☐ ---2. Rotary - Air
☐ ---3. Rotary - Air and Foam
☐ ---4. Drill-Through Casing Hammer
☐ ---5. Reverse Rotary
☐ ---6. Cable-tool Bit ____ in. dia.
☐ ---7. Temp. Outer Casing ____ in. dia. Removed? ____ depth ft. ☐ Yes ☐ No - If no, explain on back side.

8. Geology

Geology Codes	Type, Caving/Noncaving, Color, Hardness, etc.	From (ft.)	To (ft.)
	Caving Sand & Gravel	surface	29
	Silt and Sand	29	41
	Silty Sand & Gravel	41	55
	Sand and Gravel	55	63
	Fine sand & Silt	63	79
	Fine Sand w/ Clay some Gravel	79	102
	Coarse Gravel, Sand some Silt	102	124

6. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly	From (ft.)	To (ft.)
6	A53 Grade B	surface	106
	Plain end, Welded		
	Excel Pipe USA		
Dia. (in.) 6	Screen type, material & slot size: Stainless Steel 25 Slot	From 106	To 124

9. Static Water Level
____ ft. above ground surface
45 ft. below ground surface

10. Pump Test
Pumping level 75' ft. below surface
Pumping at 110 GPM/GPH for 72 Hrs.

11. Well Is:
16 in. ☒ Above Grade ☐ Below
Developed? ☒ Yes ☐ No
Disinfected? ☒ Yes ☐ No
Capped? ☒ Yes ☐ No

7. Grout or Other Sealing Material
Method ____

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
	surface		
(Gravel pack if applicable)			

12. Did you permanently abandon and fill all unused, noncomplying or unsafe wells on this property?
☐ Yes ☒ No If no, explain on reverse.

13. Signature of Well Constructor or Supervisory Driller: Dean Fuhl — Date Signed: 1/31/11
Print Name of Drill Rig Operator (Mandatory unless same as above) Date

Make additional comments on reverse side about geology, additional screens, water quality, etc.
Comments on reverse side ____ **(CHECK √, IF YES)** **Variance Issued** ☐ Yes ☐ No

Notification # 39333262

WELL OWNER

Report Date:	1/30/2011 15:09
Report User Name:	Unknown
Report Computer Name:	Pocket PC
Application:	WinSituMobile.exe
Application Version:	5.6.0.10

Log File Properties

File Name	72 HR 2011-01-30 15.00.15.wsl
Create Date	1/30/2011 15:00

Device Properties

Device	Level TROLL 700		
Site	[redacted] TEST WELL 2		
Device Name			
Serial Number	156493		
Firmware Version	2.07		
Hardware Version	3		
Device Address	1		
Device Comm Cfg	19200	8 Even	1 (Modbus-RTU)
Used Memory	1		
Used Battery	14		

Log Configuration

Log Name	72 HR
Created By	Unknown
Computer Name	Pocket PC
Application	WinSituMobile.exe
Application Versio	5.6.0.10
Create Date	1/25/11 9:52:18 AM Central Standard Time
Log Setup Time Zo	Central Standard Time
Notes Size(bytes)	4096
Overwrite when fu	Disabled
Scheduled Start Ti	1/25/11 11:30:00 AM Central Standard Time
Scheduled Stop Tir	1/28/11 12:30:00 PM Central Standard Time
Type	Step Test

Steps 3 (Linear)

Step	1
Duration	Days: 0 hrs: 00 mins: 15 secs: 00
Interval	Days: 0 hrs: 00 mins: 01 secs: 00
Step	2
Duration	Days: 0 hrs: 00 mins: 45 secs: 00
Interval	Days: 0 hrs: 00 mins: 05 secs: 00
Step	3
Duration	Days: 3 hrs: 00 mins: 00 secs: 00
Interval	Days: 0 hrs: 01 mins: 00 secs: 00

Level Reference Settings At Log Creation

Level Measure	Level Depth To Water
Specific Gr	0.999
Level Referer	Set first logged value to offset
Level Referen	45 (ft)

Other Log Settings

Zero Pressure Offs	-0.319749 (PSI)
Depth of Probe:	-0.249974 (ft)
Head Pressure:	-0.108262 (PSI)
Temperature:	56.1021 (F)

Log Notes:

Date and Time	Note
1/25/2011 9:53	Sensor: 156493 Factory calibration has expired.: 1/14/11 2:09:40 PM
1/25/2011 9:53	Used Battery: 14% Used Memory: 1% User Name: Unknown

Log Data:

Record Count	97		
Sensors	1		
	1	156493	Pressure/Temp 30 PSIG (21m/69ft)

Time Zone: Central Standard Time

Date and Time	Elapsed Time Seconds	Sensor: Pres(G) 69ft SN#: 156493 Pressure (PSI)	Sensor: Pres(G) 69ft SN#: 156493 Temperature (F)	Sensor: Pres(G) 69ft SN#: 156493 Level Depth To Water (ft)
1/25/2011 11:30	0	17.21	44.998	45
1/25/2011 11:31	60.001	17.209	44.999	45.003
1/25/2011 11:32	120.001	11.421	45	58.367
1/25/2011 11:33	180.001	10.508	45.005	60.476
1/25/2011 11:34	240.001	10.311	45.012	60.93
1/25/2011 11:35	300.001	10.236	45.031	61.103
1/25/2011 11:36	360.001	10.105	45.057	61.406
1/25/2011 11:37	420.001	10.074	45.076	61.477
1/25/2011 11:38	480.001	10.015	45.1	61.613
1/25/2011 11:39	540.001	9.982	45.116	61.69
1/25/2011 11:40	600.001	9.939	45.131	61.789
1/25/2011 11:41	660.001	9.97	45.146	61.718
1/25/2011 11:42	720.001	9.907	45.144	61.862
1/25/2011 11:43	780.001	9.882	45.143	61.921
1/25/2011 11:44	840.001	9.859	45.156	61.975
1/25/2011 11:45	900.001	9.79	45.155	62.134
1/25/2011 11:50	1200.001	9.745	45.152	62.238
1/25/2011 11:55	1500.001	9.683	45.196	62.381
1/25/2011 12:00	1800.001	9.631	45.255	62.5
1/25/2011 12:05	2100.001	9.618	45.244	62.531
1/25/2011 12:10	2400.001	9.616	45.276	62.535
1/25/2011 12:15	2700.001	9.552	45.268	62.684
1/25/2011 12:20	3000.001	9.491	45.302	62.823
1/25/2011 12:25	3300.001	9.532	45.318	62.73
1/25/2011 12:30	3600.001	9.495	45.317	62.813
1/25/2011 13:30	7200.001	9.433	45.329	62.958
1/25/2011 14:30	10800.001	9.431	45.416	62.962
1/25/2011 15:30	14400.001	9.376	45.407	63.089
1/25/2011 16:30	18000.001	9.304	45.459	63.255
1/25/2011 17:30	21600.001	9.316	45.467	63.229
1/25/2011 18:30	25200.001	9.314	45.511	63.232

1/25/2011 19:30	28800.001	9.296	45.562	63.273
1/25/2011 20:30	32400.001	9.259	45.537	63.359
1/25/2011 21:30	36000.001	9.278	45.533	63.314
1/25/2011 22:30	39600.001	9.268	45.565	63.34
1/25/2011 23:30	43200.001	9.212	45.557	63.468
1/26/2011 0:30	46800.001	9.226	45.571	63.435
1/26/2011 1:30	50400.001	9.269	45.56	63.336
1/26/2011 2:30	54000.001	9.232	45.586	63.421
1/26/2011 3:30	57600.001	9.295	45.616	63.275
1/26/2011 4:30	61200.001	9.188	45.584	63.522
1/26/2011 5:30	64800.001	9.225	45.605	63.439
1/26/2011 6:30	68400.001	9.24	45.605	63.402
1/26/2011 7:30	72000.001	9.213	45.528	63.465
1/26/2011 8:30	75600.001	9.205	45.542	63.484
1/26/2011 9:30	79200.001	9.197	45.617	63.504
1/26/2011 10:30	82800.001	9.216	45.619	63.459
1/26/2011 11:30	86400.001	9.184	45.619	63.532
1/26/2011 12:30	90000.001	9.197	45.603	63.503
1/26/2011 13:30	93600.001	9.183	45.62	63.536
1/26/2011 14:30	97200.001	9.151	45.66	63.61
1/26/2011 15:30	100800.001	9.121	45.647	63.678
1/26/2011 16:30	104400.001	9.118	45.595	63.685
1/26/2011 17:30	108000.001	9.065	45.612	63.808
1/26/2011 18:30	111600.001	9.113	45.64	63.697
1/26/2011 19:30	115200.001	9.092	45.622	63.746
1/26/2011 20:30	118800.001	9.086	45.672	63.758
1/26/2011 21:30	122400.001	9.037	45.683	63.871
1/26/2011 22:30	126000.001	9.069	45.72	63.798
1/26/2011 23:30	129600.001	9.027	45.716	63.896
1/27/2011 0:30	133200.001	9.005	45.671	63.946
1/27/2011 1:30	136800.001	9.031	45.69	63.886
1/27/2011 2:30	140400.001	9.039	45.674	63.868
1/27/2011 3:30	144000.001	9.04	45.664	63.865
1/27/2011 4:30	147600.001	9.02	45.657	63.911

APPENDIX C

Water Quality Information-Test Well

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

NLS Project: 157734
NLS Customer: 20851

Fax: 715 362 4116 Phone: 800 844 7854

Client: MSA Professional Services (Rhinelander)
Attn: Jim Bollmann
1835 North Stevens Street
Rhinelander, WI 54501 2163

Project: Treehaven Test Well #2

8hr Test NLS ID: 598993
COC: 129933:1 Matrix: DW
Collected: 01/25/11 07:00 Received: 01/28/11

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Arsenic, tot. recoverable as As by ICP-MS	[0.85]	ug/L	1	0.50*	1.0 / 10*	02/01/11	EPA 200.8	721026460
Iron, tot. recoverable as Fe by ICP-MS	[0.054]	mg/L	1	0.018*	0.064 / 0.30*	02/01/11	EPA 200.8	721026460
Manganese, tot. recoverable as Mn by ICP-MS	150	ug/L	1	1.0*	2.0 / 50*	02/01/11	EPA 200.8	721026460

24hr Test NLS ID: 598994
COC: 129933:2 Matrix: DW
Collected: 01/26/11 11:15 Received: 01/28/11

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Arsenic, tot. recoverable as As by ICP-MS	[0.82]	ug/L	1	0.50*	1.0 / 10*	02/01/11	EPA 200.8	721026460
Iron, tot. recoverable as Fe by ICP-MS	[0.049]	mg/L	1	0.018*	0.064 / 0.30*	02/01/11	EPA 200.8	721026460
Manganese, tot. recoverable as Mn by ICP-MS	120	ug/L	1	1.0*	2.0 / 50*	02/01/11	EPA 200.8	721026460

48hr Test NLS ID: 598995
COC: 129933:3 Matrix: DW
Collected: 01/27/11 11:15 Received: 01/28/11

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Arsenic, tot. recoverable as As by ICP-MS	[0.77]	ug/L	1	0.50*	1.0 / 10*	02/01/11	EPA 200.8	721026460
Iron, tot. recoverable as Fe by ICP-MS	[0.049]	mg/L	1	0.018*	0.064 / 0.30*	02/01/11	EPA 200.8	721026460
Manganese, tot. recoverable as Mn by ICP-MS	110	ug/L	1	1.0*	2.0 / 50*	02/01/11	EPA 200.8	721026460

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

NLS Project: 157734
NLS Customer: 20851

Client: MSA Professional Services (Rhinelander)
Attn: Jim Bollmann
1835 North Stevens Street
Rhinelander, WI 54501 2163

Fax: 715 362 4116 Phone: 800 844 7854

Project: Treehaven Test Well #2

72hr Test NLS ID: 598996

COC: 129933:4 Matrix: DW
Collected: 01/28/11 11:30 Received: 01/28/11
Notes: Sample received for cyanide analysis did not meet pH preservation requirement of >12 s.u. An additional 4 tablet(s) of NaOH were added to the sample and pH requirements were met. Result may not be used for compliance reporting purposes.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Alkalinity, tot. as CaCO3 (unfiltered)	52	mg/L	1	1.0	2.0	02/02/11	SM 2320-B 20ed	721026460
Aluminum, tot. recoverable as Al by ICP-MS	ND	mg/L	1	0.0050*	0.010 / 0.20*	02/11/11	EPA 200.8	721026460
Antimony, tot. recoverable as Sb by ICP-MS	ND	ug/L	1	0.13*	0.25 / 6.0*	02/01/11	EPA 200.8	721026460
Arsenic, tot. recoverable as As by ICP-MS	[0.72]	ug/L	1	0.50*	1.0 / 10*	02/01/11	EPA 200.8	721026460
Asbestos, water by TEM	ND	MF/L	1	0.20	/ 7000000	02/02/11	EPA 100.2	11839
Barium, tot. recoverable as Ba by ICP-MS	7.0	ug/L	1	0.10*	0.20 / 2000*	02/01/11	EPA 200.8	721026460
Beryllium, tot. recoverable as Be by ICP-MS	ND	ug/L	1	0.13*	0.25 / 4.0*	02/01/11	EPA 200.8	721026460
Cadmium, tot. recoverable as Cd by ICP-MS	ND	ug/L	1	0.10*	0.20 / 5.0*	02/01/11	EPA 200.8	721026460
Calcium, tot. recoverable as Ca by ICP-MS	11	mg/L	1	0.15*	0.30*	02/01/11	EPA 200.8	721026460
Chloride, as Cl (unfiltered)	ND	mg/L	10	2.5	5.0 / 250	01/31/11	EPA 300.0	721026460
Chromium, tot. recoverable as Cr by ICP	1.3	ug/L	1	0.18	0.63 / 100	01/31/11	EPA 200.7	721026460
Copper, tot. recoverable as Cu by ICP-MS	ND	ug/L	1	1.0*	2.0 / 1300*	02/01/11	EPA 200.8	721026460
Cyanide, tot. (distilled) as CN	ND	mg/L	1	0.0050	0.015 / 0.20	01/31/11	EPA 335.4	721026460
	Result may not be used for compliance reporting purposes.							
Fluoride, as F (unfiltered)	[0.085]	mg/L	1	0.050*	0.10 / 4.0*	02/08/11	EPA 300.0	721026460
Hardness, tot. recoverable as CaCO3 (calc/unfilt/icpms)	48	mg/L	1	1.0*	2.0*	02/01/11	EPA 200.8	721026460
Sulfur Reducing Bacteria	Absent		1		*	02/22/11	NA	113133790
Iron, tot. recoverable as Fe by ICP-MS	[0.063]	mg/L	1	0.018*	0.064 / 0.30*	02/01/11	EPA 200.8	721026460
Lead, tot. recoverable as Pb by ICP-MS	0.46	ug/L	1	0.10*	0.20 / 15*	02/01/11	EPA 200.8	721026460
Magnesium, tot. recoverable as Mg by ICP-MS	4.3	mg/L	1	0.15*	0.30*	02/11/11	EPA 200.8	721026460
Manganese, tot. recoverable as Mn by ICP-MS	100	ug/L	1	1.0*	2.0 / 50*	02/01/11	EPA 200.8	721026460
Mercury, tot. recoverable as Hg by ICP-MS	ND	ug/L	1	0.067	0.20 / 2.0	01/31/11	EPA 200.8	721026460
Nickel, tot. recoverable as Ni by ICP-MS	ND	ug/L	1	0.50*	1.0 / 100*	02/04/11	EPA 200.8	721026460
Nitrate as N, corr. for NO2 (unfilt)	0.11	mg/L	1	0.025	0.075 / 10	01/31/11	EPA 353.2	721026460
Nitrogen, nitrite as N	ND	mg/L	1	0.0067*	0.020 / 1.0*	01/28/11	SM 4500NO2-B 20ed	721026460
Nitrogen, NO2 + NO3 as N (unfiltered)	0.11	mg/L	1	0.025	0.075 / 10	01/31/11	EPA 353.2	721026460
pH, Lab	7.14	s.u.	1			01/28/11	SM4500-H+B 20ed	721026460
Radioactivity, gross alpha	-0.175 +/- 0.583	pCi/L		1.8	/ 15	02/07/11	EPA 900.0	999407970
Radon-222	485.0 +/- 38.0	pCi/L		42		01/31/11	SM7500 RnB	999407970
Radium 226, total	-0.076 +/- 0.396	pCi/L		0.92	/ 5.0	02/14/11	EPA 903.1	999407970
Radium 228, total	0.525 +/- 0.379	pCi/L		0.77	/ 5.0	02/17/11	EPA 904.0	999407970
Uranium	0.079 +/- 0.002	ug/L		0.21	/ 30	02/04/11	ASTM D5174.97	999407970
Selenium, tot. recoverable as Se by ICP-MS	ND	ug/L	1	2.0*	4.0 / 50*	02/11/11	EPA 200.8	721026460
Silver, tot. recoverable as Ag by ICP-MS	ND	ug/L	1	0.13*	0.25 / 100*	02/01/11	EPA 200.8	721026460
Sodium, tot. recoverable as Na by ICP	3.0	mg/L	1	0.15	0.30	01/31/11	EPA 200.7	721026460
Solids, total	83	mg/L	1	2.0*	2.0*	01/31/11	SM 2540-B 20ed	721026460
Sulfate, as SO4 (unfiltered)	6.9	mg/L	10	2.5	5.0	01/31/11	EPA 300.0	721026460
Thallium, tot. recoverable as Tl by ICP-MS	ND	ug/L	1	0.10*	0.20 / 2.0*	02/01/11	EPA 200.8	721026460
Total Organic Carbon (TOC)	0.38	mg/L	1	0.084	0.27	01/31/11	SM 5310B 20ed	721026460
SDWA Volatile Organics (VOCs) by EPA 524.2	see attached					02/02/11	EPA 524.2	721026460
1,2-Dibromoethane (EDB) by EPA 504.1	ND	ug/L	1	0.0041	0.014 / 0.050	02/08/11	EPA 504.1	721026460
1,2-Dibromo-3-Chloropropane (DBCP) by EPA 504.1	ND	ug/L	1	0.0047	0.016 / 0.20	02/08/11	EPA 504.1	721026460
Multi-Component Pesticides and PCBs by EPA 505	see attached					02/03/11	EPA 505	721026460

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

NLS Project: 157734
NLS Customer: 20851

Fax: 715 362 4116 Phone: 800 844 7854

Client: MSA Professional Services (Rhinelander)
Attn: Jim Bollmann
1835 North Stevens Street
Rhinelander, WI 54501 2163

Project: Treehaven Test Well #2

72hr Test NLS ID: 598996
COC: 129933:4 Matrix: DW
Collected: 01/28/11 11:30 Received: 01/28/11
Notes: Sample received for cyanide analysis did not meet pH preservation requirement of >12 s.u. An additional 4 tablet(s) of NaOH were added to the sample and pH requirements were met. Result may not be used for compliance reporting purposes.

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Iron Bacteria (Mixed Culture)	see attached					02/01/11	JAWWA Vol. 54,#6,751	113133790
Micro extraction - (504.1)	yes					02/08/11	EPA 504.1	721026460
Micro extraction - (505)	yes					02/03/11	EPA 505	721026460
EPA 549.2 Solid Phase Extraction	yes					02/01/11	EPA 549.2	721026460
Endothall by EPA 548.1	ND	ug/L	1	0.51	1.7	02/02/11	EPA 548.1	721026460
Glyphosate by EPA 547	ND	ug/L	1	4.7	16	02/01/11	EPA 547	721026460
Carbamates by EPA 531.1	see attached					02/14/11	EPA 531.1	721026460
Cyanazine Drinking Water Analysis GC/MS by EPA 525.2	see attached					02/09/11	EPA 525.2	721026460
EPA 525.2 Cyanazine Solid Phase Extraction	yes					02/08/11	EPA 525.2	721026460
EPA 525.2 Solid Phase Extraction	yes					02/02/11	EPA 525.2	721026460
EPA 548.1 Solid Phase Extraction	yes					02/01/11	EPA 548.1	721026460
Semi-Volatile Drinking Water Analysis GC/MS by 525.2	see attached					02/08/11	EPA 525.2	721026460
Diquat (DW) by EPA549	ND	ug/L	1	0.32	1.1	02/02/11	EPA 549	721026460
Acid Herbicides (DW) by EPA 515.3	see attached					02/03/11	EPA 515.3	632021390

Values in brackets represent results greater than or equal to the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation". Results greater than or equal to the LOQ are considered to be in the region of "Certain Quantitation". LOD and/or LOQ tagged with an asterisk(*) are considered Reporting Limits. All LOD/LOQs adjusted to reflect dilution.

LOD = Limit of Detection LOQ = Limit of Quantitation ND = Not Detected (< LOD) 1000 ug/L = 1 mg/L
DWB = Dry Weight Basis NA = Not Applicable %DWB = (mg/kg DWB) / 10000
MCL = Maximum Contaminant Levels for Drinking Water Samples. Shaded results indicate >MCL.

Reviewed by:

Authorized by:
R. T. Krueger
President

ANALYTICAL RESULTS: GCMS 524.2 Safe Drinking Water Analysis - DNR Form

Customer: MSA Professional Services (Rhinelander) **NLS Project: 157734**

Project Description: Treehaven Test Well #2

Project Title: **Template: SAT3DNRX** **Printed: 02/24/2011 15:51**

Sample: 598996 72hr Test Collected: 01/28/11 Analyzed: 02/02/11 -

ANALYTE NAME	RESULT	UNITS	DIL	LOD	LOQ	MCL	Note
BENZENE	ND	ug/L	1	0.12	0.39	5	
BROMOBENZENE	ND	ug/L	1	0.21	0.70		
BROMODICHLOROMETHANE	ND	ug/L	1	0.21	0.70	80	
BROMOFORM	ND	ug/L	1	0.33	1.1	80	
BROMOMETHANE	ND	ug/L	1	0.26	0.87		
CARBON TETRACHLORIDE	ND	ug/L	1	0.19	0.63	5	
CHLOROETHANE	ND	ug/L	1	1.0	3.4		
CHLOROFORM	ND	ug/L	1	0.11	0.37	80	
CHLOROMETHANE	ND	ug/L	1	0.16	0.54		
O-CHLOROTOLUENE	ND	ug/L	1	0.15	0.50		
P-CHLOROTOLUENE	ND	ug/L	1	0.11	0.38		
DIBROMOCHLOROMETHANE	ND	ug/L	1	0.27	0.91	80	
DIBROMOMETHANE	ND	ug/L	1	0.24	0.79		
1,3-DICHLOROBENZENE (M-)	ND	ug/L	1	0.11	0.38		
1,2-DICHLOROBENZENE (O-)	ND	ug/L	1	0.17	0.58	600	
1,4-DICHLOROBENZENE (P-)	ND	ug/L	1	0.12	0.39	75	
DICHLORODIFLUOROMETHANE	ND	ug/L	1	0.11	0.42		
1,1-DICHLOROETHANE	ND	ug/L	1	0.14	0.55		
1,2-DICHLOROETHANE	ND	ug/L	1	0.16	0.54	5	
1,1-DICHLOROETHYLENE	ND	ug/L	1	0.11	0.37	7	
1,2-DICHLOROETHYLENE CIS	ND	ug/L	1	0.13	0.47	70	
1,2-DICHLOROETHYLENE, TRA	ND	ug/L	1	0.11	0.38	100	
DICHLOROMETHANE	ND	ug/L	1	0.34	1.1	5	
1,2-DICHLOROPROPANE	ND	ug/L	1	0.16	0.53	5	
1,3-DICHLOROPROPANE	ND	ug/L	1	0.26	0.86		
2,2-DICHLOROPROPANE	ND	ug/L	1	0.13	0.42		
1,1-DICHLOROPROPENE	ND	ug/L	1	0.11	0.37		
1,3-DICHLOROPROPENE	ND	ug/L	1	0.40	1.3		
ETHYL BENZENE	ND	ug/L	1	0.11	0.42	700	
HEXACHLOROBUTADIENE	ND	ug/L	1	0.17	0.57		
ISOPROPYLBENZENE	ND	ug/L	1	0.14	0.53		
ISOPROPYLTOLUENE P	ND	ug/L	1	0.12	0.38		
METHYL T-BUTYL ETHER	ND	ug/L	1	0.32	1.1		
CHLOROBENZENE	ND	ug/L	1	0.13	0.42	100	
NAPHTHALENE	ND	ug/L	1	0.44	1.5		
STYRENE	ND	ug/L	1	0.14	0.46	100	
1,1,1,2 TETRACHLOROETHANE	ND	ug/L	1	0.18	0.61		
1,1,2,2 TETRACHLOROETHANE	ND	ug/L	1	0.33	1.1		
TETRACHLOROETHYLENE	ND	ug/L	1	0.10	0.34	5	
TOLUENE	ND	ug/L	1	0.11	0.43	1000	
1,2,4-TRICHLOROBENZENE	ND	ug/L	1	0.36	1.2	70	
1,1,1-TRICHLOROETHANE	ND	ug/L	1	0.12	0.43	200	
1,1,2-TRICHLOROETHANE	ND	ug/L	1	0.28	0.94	5	
TRICHLOROETHYLENE	ND	ug/L	1	0.12	0.41	5	
TRICHLOROFLUOROMETHANE	ND	ug/L	1	0.12	0.39		
1,2,3-TRICHLOROPROPANE	ND	ug/L	1	0.46	1.5		
TRICHLOROTRIFLUOROETHANE	ND	ug/L	1	0.10	0.34		
1,2,4-TRIMETHYLBENZENE	ND	ug/L	1	0.10	0.37		
1,3,5-TRIMETHYLBENZENE	ND	ug/L	1	0.15	0.49		
VINYL CHLORIDE	ND	ug/L	1	0.13	0.42	.2	
XYLENE TOTAL	ND	ug/L	1	0.33	1.1	10000	
4-Bromofluorobenzene (SURR)	107%						S
1,2-Dichlorobenzene-d4 (SURR)	110%						S

ANALYTICAL RESULTS: GCMS 524.2 Safe Drinking Water Analysis - DNR Form

Customer: MSA Professional Services (Rhinelander) **NLS Project: 157734**

Project Description: Treehaven Test Well #2

Project Title: **Template: SAT3DNRX** **Printed: 02/24/2011 15:51**

Sample: 598996 72hr Test Collected: 01/28/11 Analyzed: 02/02/11 -

ANALYTE NAME	RESULT	UNITS	DIL	LOD	LOQ	MCL	Note

NOTES APPLICABLE TO THIS ANALYSIS:

S = This compound is a surrogate used to evaluate the quality control of a method.

ANALYTICAL RESULTS: GCMS 525.2 Safe Drinking Water Analysis - DNR form

Customer: MSA Professional Services (Rhinelander) **NLS Project: 157734**

Project Description: Treehaven Test Well #2

Project Title: **Template: 525DNRL** **Printed: 02/24/2011 15:50**

Sample: 598996 72hr Test Collected: 01/28/11 Analyzed: 02/08/11 -

ANALYTE NAME	RESULT	UNITS	DIL	LOD	LOQ	MCL	Note
Alachlor (Lasso)	ND	ug/L	1	0.029	0.096	2	
Aldrin	ND	ug/L	1	0.047	0.16		
Atrazine	ND	ug/L	1	0.060	0.20	3	
Benzo[a]pyrene	ND	ug/L	1	0.019	0.065	.2	
Butachlor	ND	ug/L	1	0.032	0.11		
Chlordane alpha	ND	ug/L	1	0.028	0.092		
Chlordane gamma	ND	ug/L	1	0.031	0.10		
Deethylatrazine	ND	ug/L	1	0.067	0.20		LC
Deisopropylatrazine	ND	ug/L	1	4.0	8.0		LC
Dieldrin	ND	ug/L	1	0.067	0.20		
Di(2-ethylhexyl)adipate	ND	ug/L	1	0.60	1.2	400	
Di(2-ethylhexyl)phthalate	ND	ug/L	1	0.60	1.2	6	
Endrin	ND	ug/L	1	0.010	0.035	2	
Heptachlor	ND	ug/L	1	0.014	0.044	.4	
Heptachlor epoxide	ND	ug/L	1	0.020	0.062	.2	
Hexachlorobenzene	ND	ug/L	1	0.038	0.13	1	
Hexachlorocyclopentadiene	ND	ug/L	1	0.027	0.090	50	
BHC gamma (Lindane)	ND	ug/L	1	0.020	0.066	.2	
Methoxychlor	ND	ug/L	1	0.029	0.095	40	
Dual (Metolachlor)	ND	ug/L	1	0.029	0.097		
Metribuzin (Sencor)	ND	ug/L	1	0.067	0.20		
Propachlor	ND	ug/L	1	0.036	0.12		
Simazine	ND	ug/L	1	0.067	0.20	4	
1,3-Dimethyl-2-Nitrobenzene (SURR)	122%						S
Triphenylphosphate (SURR)	120%						S
Perylene-d12 (SURR)	112%						S

NOTES APPLICABLE TO THIS ANALYSIS:

S = This compound is a surrogate used to evaluate the quality control of a method.

LC = Laboratory control spike recovery was outside QC limits.

Deethylatrazine recovered below QC limits.

Deisopropylatrazine recovered below QC limits.

ANALYTICAL RESULTS: ACID HERBICIDE ANALYSES BY SDWA METHOD 515.3

Customer: MSA Professional Services (Rhinelander) **NLS Project: 157734**

Project Description: Treehaven Test Well #2

Project Title: **Template: DAVYSDW6** **Printed: 02/24/2011 15:50**

Sample: 598996 72hr Test Collected: 01/28/11 Analyzed: 02/03/11 -

ANALYTE NAME	RESULT	UNITS	DIL	LOD	LOQ	MCL	Note
2,4-D	ND	ug/L	1	0.058	0.18	70	
Dalapon	ND	ug/L	1	0.70	2.2	200	
Dicamba	ND	ug/L	1	0.23	0.72		
Dinoseb	ND	ug/L	1	0.14	0.45	7	
Pentachlorophenol	ND	ug/L	1	0.022	0.069	1	
Picloram (Tordon)	ND	ug/L	1	0.072	0.23	500	
2,4,5-TP (Silvex)	ND	ug/L	1	0.16	0.51	50	
2,4-Dichlorophenylacetic Acid (SURR)	103%						S

NOTES APPLICABLE TO THIS ANALYSIS:

S = This compound is a surrogate used to evaluate the quality control of a method.

ANALYTICAL RESULTS: GCMS 525.2 Safe Drinking Water Analysis - DNR form

Customer: MSA Professional Services (Rhinelander) **NLS Project: 157734**

Project Description: Treehaven Test Well #2

Project Title: **Template: 525DNRC** **Printed: 02/24/2011 15:51**

Sample: 598996 72hr Test Collected: 01/28/11 Analyzed: 02/09/11 -

ANALYTE NAME	RESULT	UNITS	DIL	LOD	LOQ	MCL	Note
Cyanazine	ND	ug/L	1	0.067	0.20		
1,3-Dimethyl-2-Nitrobenzene (SURR)	128%						S
Triphenylphosphate (SURR)	118%						S
Perylene-d12 (SURR)	93%						S

NOTES APPLICABLE TO THIS ANALYSIS:

S = This compound is a surrogate used to evaluate the quality control of a method.

ANALYTICAL RESULTS: Carbamates by EPA Method 531.1

Customer: MSA Professional Services (Rhinelander) **NLS Project: 157734**

Project Description: Treehaven Test Well #2

Project Title: **Template: 531DW** **Printed: 02/24/2011 15:51**

Sample: 598996 72hr Test Collected: 01/28/11 Analyzed: 02/14/11 -

ANALYTE NAME	RESULT	UNITS	DIL	LOD	LOQ	MCL	Note
Aldicarb	ND	ug/L	1	0.35	1.2	3	
Aldicarb Sulfone	ND	ug/L	1	0.34	1.1	2	
Aldicarb Sulfoxide	ND	ug/L	1	0.32	1.1	4	
Carbaryl	ND	ug/L	1	0.34	1.1		
Carbofuran	ND	ug/L	1	0.38	1.3	40	
3-Hydroxycarbofuran	ND	ug/L	1	0.39	1.3		
Methomyl	ND	ug/L	1	0.36	1.2		
Oxamyl (Vydate)	ND	ug/L	1	0.32	1.1	200	

ANALYTICAL RESULTS: Iron Bacteria
Customer: MSA Professional Services (Rhinelander) **NLS Project: 157734**
Project Description: Treehaven Test Well #2
Project Title: **Template: IRONBACT** **Printed: 02/24/2011 15:51**

Sample: 598996 72hr Test Collected: 01/28/11 Analyzed: 02/01/11 -

ANALYTE NAME	RESULT	UNITS WWB	DIL	LOD	LOQ	MCL	Note
Crenothrix	0.0	/mL	1				
Gallionella	0.0	/mL	1				
Leptothrix	0.0	/ml	1				

The presence of iron bacteria is not considered a health hazard. The bacteria adhere to the plumbing, concentrating iron and manganese from the water and causing a reddish tinge and unpleasant taste and odor. In severe cases, corrosion of the plumbing or flow rate reduction may occur. Although any level of iron bacteria is significant, a count of 200 per ML or greater is almost always associated with problems. (The count is based on adding all three of the reported numbers.) Disinfection of the well and plumbing with chlorine bleach will help to control iron bacteria, although in some cases the control is temporary and disinfection must be repeated periodically.

APPENDIX D

Cost Estimates

PRELIMINARY COST ESTIMATE

Treehaven Water System Upgrades
DSF Project No. 10D2F
Proposed Well/Wellhouse/Treatment Facilities

	Description	Quantity	Unit	Unit Price	Total		
*	Mobilization, Bonds, and Insurance	1	L.S.	$2,500.00	$2,500.00		
	Access to Well	1	L.S.	$1,500.00	$1,500.00		
	12-inch Diameter Drillhole, including casing	124	L.F.	$135.00	$16,740.00		
	12-inch Diameter Steel Casing	127	L.F.	$0.00	$0.00		
	Retract 12-inch Diameter Steel Casing	127	L.F.	$25.00	$3,175.00		
	8-inch Diameter Steel Casing	106	L.F.	$50.00	$5,300.00		
	8-inch Diameter Stainless Steel Screen, Furnish and Install	20	L.F.	$250.00	$5,000.00		
	Gravel Filter Pack, Furnish and Install, Complete	1	L.S.	$1,500.00	$1,500.00		
	Neat Cement Grout Set-Up	1	L.S.	$3,000.00	$3,000.00		
	Neat Cement Grout Seal	101	Bag	$35.00	$3,535.00		
	Setup High Velocity Water Jetting Equipment, Complete	1	L.S.	$1,500.00	$1,500.00		
	High Velocity Water Jetting and Pumping Development	8	HR.	$150.00	$1,200.00		
	Set/Remove Pump, Disch. Piping, and Equip., Complete	1	L.S.	$2,500.00	$2,500.00		
	Test Pumping, Manned	24	HR.	$125.00	$3,000.00		
	Test Pumping, Unmanned	48	HR.	$50.00	$2,400.00		
	Collect Drill Samples	1	EA.	$500.00	$500.00		
	Plumbness and Alignment	0	EA.	$750.00	$0.00		
	Well Disinfection	1	L.S.	$500.00	$500.00		
	Field Chemical Tests, Hach Test or Equal	4	EA.	$100.00	$400.00		
	Water Sampling and Laboratory Analysis	1	L.S.	$3,500.00	$3,500.00		
	Well Televising	0	EA.	$1,000.00	$0.00		
	Abandon Test Well	1	EA.	$2,500.00	$2,500.00		
	Abandon Well No. 1 and Well No. 2	2	EA.	$2,500.00	$5,000.00		
						$65,250.00	Well Construction
	Three-phase Electric Service Allowance	1	L.S.	$0.00	$0.00		
	Natural Gas Service Allowance	1	L.S.	$0.00	$0.00		
						$0.00	Gas/Electric
*	Mobilization, Bonds, and Insurance	1	L.S.	$15,000.00	$15,000.00		
	Wellhouse/Treatment Building	360	S.F.	$150.00	$54,000.00		
	Process Mechanical Piping	1	L.S.	$12,000.00	$12,000.00		
	Pressure Filter and Chemical Feed Equipment	0	L.S.	$80,000.00	$0.00		
	Pressure Filter and Chemical Feed Equipment Installation	0	L.S.	$20,000.00	$0.00		
	Yard Piping	1	L.S.	$2,500.00	$2,500.00		
	Holding Tank	0	Gal	$1.00	$0.00		
	Backwash Disposal	0	L.S.	$7,500.00	$0.00		
	Well Pump and Motor, Complete	1	L.S.	$15,000.00	$15,000.00		
	Electrical Controls and System Integration	1	L.S.	$10,000.00	$10,000.00		
	Standby Generator, transfer switch	0	L.S.	$40,000.00	$0.00		
	12-Inch Crushed Aggregate Base Course	200	S.Y.	$10.00	$2,000.00	*driveway*	
	3.5-Inch Asphalt Concrete Pavement	200	S.Y.	$24.00	$4,800.00	*driveway*	
						$115,300.00	Wellhouse Facility
*	Mobilization, Bonds, & Insurance	1	L.S.	$10,000.00	$10,000.00		
	Erosion and Sedimentation Control	1	L.S.	$3,000.00	$3,000.00		
	Turf Restoration	1	L.S.	$6,000.00	$6,000.00		
	Clearing & Grubbing	1	L.S.	$6,000.00	$6,000.00		
	Trucked Backfill	250	C.Y.	$8.00	$2,000.00		
	Furnish & Install 2" Insulation	256	S.F.	$1.80	$460.80		
	Furnish & Install 6" Dia. D.I. Class 350 Watermain	1,150	L.F.	$28.00	$42,550.00		
	Furnish & Install 6" Valve & Box	3	EA.	$800.00	$4,500.00		
	Furnish & Install 6"x 4" Tee	2	EA.	$250.00	$800.00		
	Furnish & Install 6" 45 Bend	2	EA.	$200.00	$600.00		
	Furnish & Install 6" x 4" Reducer	3	EA.	$150.00	$600.00		
	Furnish & Install Flushing Hydrant	2	EA.	$1,800.00	$3,600.00		
	Furnish & Install 1 Inch Corp, Curb Stop & Box	2	EA.	$275.00	$550.00		
	Furnish & Install 1 Inch Water service	80	L.F.	$22.00	$1,760.00		
	Connect to Existing Water Main	3	EA.	$900.00	$2,700.00		
	Furnish & Install 9" Thick Aggregate Base Course	1,190	S.Y.	$5.50	$6,545.00		
	4" Thick Concrete Sidewalk	300	S.F.	$4.20	$1,260.00		
	Furnish & Install 3" Thick Asphaltic Pavement	830	S.Y.	$13.50	$11,205.00		
	Sawcut Asphalt Pavement	400	L.F.	$1.75	$700.00		
	Sawcut Concrete	20	L.F.	$3.00	$60.00		
	1.5-inch Corp., Curb Stop & Box, & Reconnect	1	EA.	$350.00	$350.00	*for wellhouse*	
	1.5-inch Copper Water Service	50	L.F.	$20.00	$1,000.00	*for wellhouse*	
						$106,240.80	Watermain
				Subtotal	$286,790.80		
				Construction Contingencies (10%)	$28,679.08		
				Construction Total	*$315,469.88*		
				Engineering, Administration and Legal (20%)	$63,093.98		
				Project Total	**$378,563.86**		

* Combine if a single GC is used.