

Hydrostratigraphic Database of West-Central Wisconsin



Site:	Former Four Seasons FS Cooperative
Location:	Hammond, St. Croix County Wisconsin
Unit Evaluated:	Ordovician St. Peter and Prairie du Chien Group

File includes excerpts from:

Summit Envirosolutions, 2003, Additional Site Investigation Report, Former Four Seasons FS Cooperative, Hammond Facility, 1245 Fithian Street, Hammond, Wisconsin, on file at Wisconsin Department of Agriculture Trade and Consumer Protection.

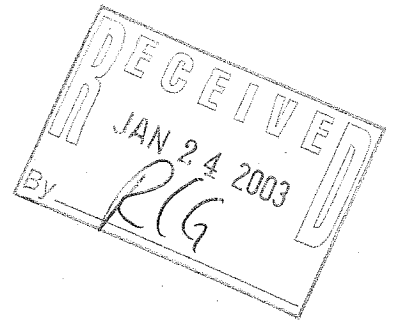
- Well logs

Summit Envirosolutions, 2004a, Letter to DATCP Re: Village of Hammond Monitoring Well Information, Four Seasons FS, Inc., dated December 8, 2004, on file at Wisconsin Department of Agriculture Trade and Consumer Protection.

- Tables: well construction details, water-level elevations
- Water table figure

Summit Envirosolutions, 2004b, Annual Groundwater Monitoring Report with Additional Monitoring Well Installations, Former Four Seasons FS Cooperative, 1245 Fithian Street, Hammond, Wisconsin, on file at Wisconsin Department of Agriculture Trade and Consumer Protection.

- Full text with discussion of hydrogeology, and slug testing
- Figures: site location, hydrograph, water table map
- Well logs
- Slug test results and analyses



ADDITIONAL SITE INVESTIGATION REPORT

FORMER FOUR SEASONS FS COOPERATIVE

**HAMMOND FACILITY
1245 FITHIAN STREET
HAMMOND, WISCONSIN**

SUMMIT PROJECT NO. 1188-003

ADDITIONAL SITE INVESTIGATION REPORT

Former Four Seasons FS Cooperative
Hammond Facility
1245 Fithian Street
Hammond, Wisconsin

Summit Project No. 1188-003
DATCP Case No. 98409101901

Prepared By:

Summit Envirosolutions, Inc.
1217 Bandana Boulevard North
St. Paul, Minnesota 55108
(651) 644-8080

January 21, 2003

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Former Fourseasons FS, Inc.
1245 Fithian Street
Hammond, WI

Summit Project No. 1188-003

Project Name : Former Four Seasons FS
Project Location : Hammond, WI
County : St. Croix
Form Completed By : MDH

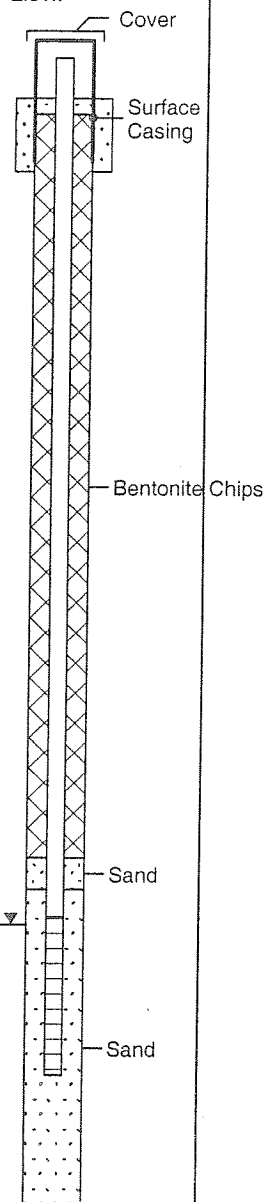
LOG OF BORING MW001

(Page 1 of 1)

Date : 11/26/02
Company/Method : Boart Longyear
Sample Method : Air Rotary
Observer(s) : MDH
Weather : Clear - 20 degrees F

Depth in feet	Lab No.	GRAPHIC	USCS	PID ppm	DESCRIPTION	Water Levels	REMARKS
0			GP		Class five gravel, brown, moist. (cuttings)		
2			SW		SAND, brown, fine with trace coarse grained, well sorted, some silt, moist.		
4							
6							
8							
10							
12					SANDSTONE, cuttings consisted of SAND, tan, fine grained, well sorted, some silt, moist.		
14							
16							
18							
20							
22							
24							
26			SS				
28							
30							
32							
34							
36							
38							
40							
42							
44					SANDSTONE, cuttings consisted of Sandy SILT, brown, fine grained, some clay, very moist to wet.		
46			SS				
48							
50							
52			SS		As above - trace clay, trace medium to coarse gravel, moist.		
54							
56					SANDSTONE, cuttings consisted of SAND, tan, fine with trace coarse grained, well sorted, trace silt, moist.		
58			SS				
60							
62							
64							
66			SS		As above - with some coarse grained sand, moist. Poor sample recovery from 63 to 70 feet (sandy water)		
68							
70							
72					End of boring approximately 70 feet below grade.		

Well: MW001
Elev.:



Augured to 20 feet below grade. Air rotary to 70 feet below grade.

Route To:

Watershed/Wastewater ☐
Remediation/Redevelopment ☐

Waste Management ☐
Other ☐

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 6-97

Facility/Project Name Hammond Drill Site	Local Grid Location of Well _____ ft. <input type="checkbox"/> N. _____ ft. <input type="checkbox"/> E. _____ ft. <input type="checkbox"/> S. _____ ft. <input type="checkbox"/> W.	Well Name MW-001
Facility License, Permit or Monitoring No.	Grid Origin Location (Check if estimated: <input type="checkbox"/>) Lat. _____ Long. _____ or _____	Wis. Unique Well No. _____ DNR Well Number _____
Facility ID 11417	St. Plane _____ ft. N. _____ ft. E. S/C/N	Date Well Installed 11/27/2002
Type of Well Well Code 11/mw	Section Location of Waste/Source _____ 1/4 of _____ 1/4 of Sec. _____ T. _____ N, R. _____ <input type="checkbox"/> E <input type="checkbox"/> W	Well Installed By: (Person's Name and Firm) P. Dickinson
Distance Well Is From Waste/Source Boundary _____ ft.	Location of Well Relative to Waste/Source u <input type="checkbox"/> Upgradient s <input type="checkbox"/> Sidegradient d <input type="checkbox"/> Downgradient n <input type="checkbox"/> Not Known	Boart Longyear

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation **2.50** ft. MSL
C. Land surface elevation _____ ft. MSL
D. Surface seal, bottom _____ ft. MSL or **48.0** ft.

12. USC classification of soil near screen:

GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ☐ 5 0
Hollow Stem Auger ☒ 4 1
Air _____ Other ☒

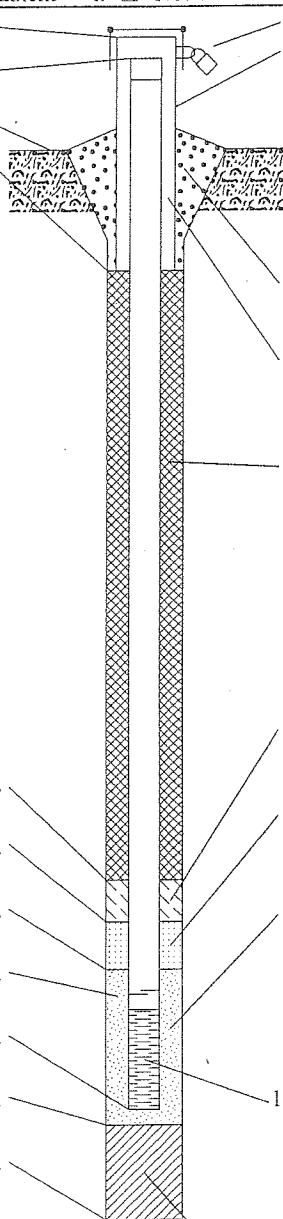
15. Drilling fluid used: Water ☐ 0 2 Air ☐ 0 1
Drilling Mud ☐ 0 3 None ☐ 9 9

16. Drilling additives used? ☐ Yes ☒ No

Describe _____

17. Source of water (attach analysis):

E. Bentonite seal, top _____ ft. MSL or **1.0** ft.
F. Fine sand, top _____ ft. MSL or **48.0** ft.
G. Filter pack, top _____ ft. MSL or **50.0** ft.
H. Screen joint, top _____ ft. MSL or **52.0** ft.
I. Well bottom _____ ft. MSL or **62.0** ft.
J. Filter pack, bottom _____ ft. MSL or **70.0** ft.
K. Borehole, bottom _____ ft. MSL or **70.0** ft.
L. Borehole, diameter **6.0** in.
M. O.D. well casing **2.37** in.
N. I.D. well casing **1.94** in.



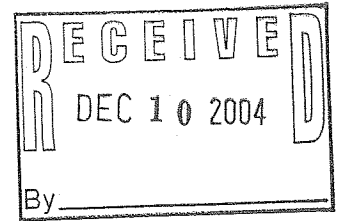
1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: **5.0** in.
b. Length: **7.0** ft.
c. Material: Steel ☒ 0 4
Other ☐
d. Additional protection? ☒ Yes ☐ No
If yes, describe: **3" Bumper Posts**
3. Surface seal: Bentonite ☒ 3 0
Concrete ☐ 0 1
Other ☐
4. Material between well casing and protective pipe:
Bentonite ☐ 3 0
Sand _____ Other ☒
5. Annular space seal: a. Granular Bentonite ☒ 3 3
b. _____ Lbs/gal mud weight . Bentonite-sand slurry ☐ 3 5
c. _____ Lbs/gal mud weight . . . Bentonite slurry ☐ 3 1
d. _____ % Bentonite . . . Bentonite-cement grout ☐ 5 0
e. _____ Ft³ volume added for any of the above
f. How installed: Tremie ☐ 0 1
Tremie pumped ☐ 0 2
Gravity ☒ 0 8
6. Bentonite seal: a. Bentonite granules ☐ 3 3
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite pellets ☒ 3 2
c. _____ Other ☐
7. Fine sand material: Manufacturer, product name and mesh size
a. **#7 Badger**
b. Volume added _____ ft³
8. Filter pack material: Manufacturer, product name and mesh size
a. **#40 Badger**
b. Volume added _____ ft³
9. Well casing: Flush threaded PVC schedule 40 ☐ 2 3
Flush threaded PVC schedule 80 ☒ 2 4
Other ☐
10. Screen material: **PVC**
a. Screen Type: Factory cut ☒ 1 1
Continuous slot ☐ 0 1
Other ☐
b. Manufacturer **Boart Longyear**
c. Slot size: **0.010** in.
d. Slotted length: **10.0** ft.
11. Backfill material (below filter pack): None ☒ 1 4
Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature [Signature] Firm **Boart Longyear Company**
101 Alderson Street Schofield, WI 54476

Tel: 715-359-7090
Fax: 715-355-5715

Please Complete both Forms 4400-113A and 4400-113B and return to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.



December 8, 2004

Mr. Richard Graham
Wisconsin Department of Agriculture, Trade and Consumer Protection
2811 Agriculture Drive
P.O. Box 8911
Madison, Wisconsin 53708-8911

Subject: Village of Hammond Monitoring Well Information
Four Seasons FS, Inc.
Hammond, Wisconsin
DATCP Case #98409101901
Summit Project #1188-003

Dear Rick:

As we discussed, the Village of Hammond was reluctant to grant right-of-entry for installing the previously proposed monitoring well because that area may be developed in the future as part of the sewage treatment plant. However, the Village has two groundwater monitoring wells (HMW-5 and HMW-6) that should serve as our hydrologically downgradient definition for dissolved impacts from the site. The locations of the two monitoring wells are depicted on the enclosed figures. A monitoring well completion information table, groundwater elevations table, and groundwater elevation contour maps for the August and November sampling events are attached to this letter.

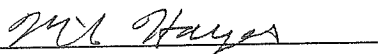
Mr. Rodney Turk with the Village of Hammond was unable to provide well construction information on the two Village wells (they are reportedly about 20 years old). On November 29, 2004, Summit Envirosolutions, Inc. (Summit) personnel measured the well depths of the two village wells (MMW-5 and HMW-6). As indicated in Table 1, Village wells HMW-5 and HMW-6 are completed 15.5 and 14.51 feet deeper than off-site monitoring well MW003, respectively. Summit collected groundwater elevation measurements at the Village wells during the August and November 2004 groundwater sampling events. Based on the data collected, the Village monitoring wells HMW-5 and HMW-6 are located in a hydrologically downgradient direction from the site. The August and November 2004 data indicate that groundwater flow at the site is to the northwest which is consistent with previous contour maps created from data collected at the site monitoring wells and is also consistent with the regional groundwater flow for the Hammond area (Young, H. L. and Hindall, S. M., 1973, Water Resources of Wisconsin St. Croix River Basin, Hydrogeologic Investigations Atlas HA-451, U.S. Geologic Survey). The groundwater gradients for the August and November 2004 sampling events was approximately 0.003 which is consistent with prior sampling events.

Mr. Richard Graham
DATCP
12/8/2004

The Village monitoring wells are sampled on a quarterly basis and have reported nitrate/nitrite-nitrogen concentrations below the ES. Summit will include current analytical data for the Village wells with the next annual groundwater monitoring report that will be due after the May 2005 groundwater sampling event. Based on the well depths, the consistent flow direction and groundwater gradients that are produced by adding the Village monitoring wells to the groundwater contour maps, and the regional groundwater flow for the Hammond area, the Village monitoring wells HMW-5 and HMW-6 appear to be completed in the same aquifer as the site monitoring wells. Please let me know if the Village wells will adequately serve as our downgradient monitoring wells for the site. If you have any questions about the project, please call me at (651) 842-4205.

Sincerely,

Summit Envirosolutions, Inc.


Michael D. Hayes
Senior Project Manager / Geologist

Enclosures

cc: Mr. Randy Tomic, GROWMARK, Inc.

TABLE 1
MONITORING WELL COMPLETION INFORMATION
Former Four Seasons FS
Hammond, Wisconsin
Summit Project No. 1188-003
DATCP Case No. 98409101901

<u>Monitoring Well</u>	<u>Date Installed</u>	<u>Surface Elevation (ft)</u>	<u>Top of Riser Elevation (ft)</u>	<u>Bottom of Well</u>	<u>Screened Interval (Elevation - Elevation)</u>
MW001	11/26/2002	1,107.08	1,109.62	1,045.43	1,045.43 - 1,055.43
MW002	6/25/2003	1,113.63	1,116.38	1,046.73	1,046.73 - 1,056.73
MW003	6/25/2003	1,089.55	1,092.01	1,042.09	1,042.09 - 1,052.09
MW004	11/5/2003	1,106.56	1,109.07	1,047.32	1,047.32 - 1,057.32
HMW-5	Unknown	Unknown	1,095.99	1,026.59	Unknown
HMW-6	Unknown	Unknown	1,106.43	1,027.58	Unknown

Elevations referenced to mean sea level.

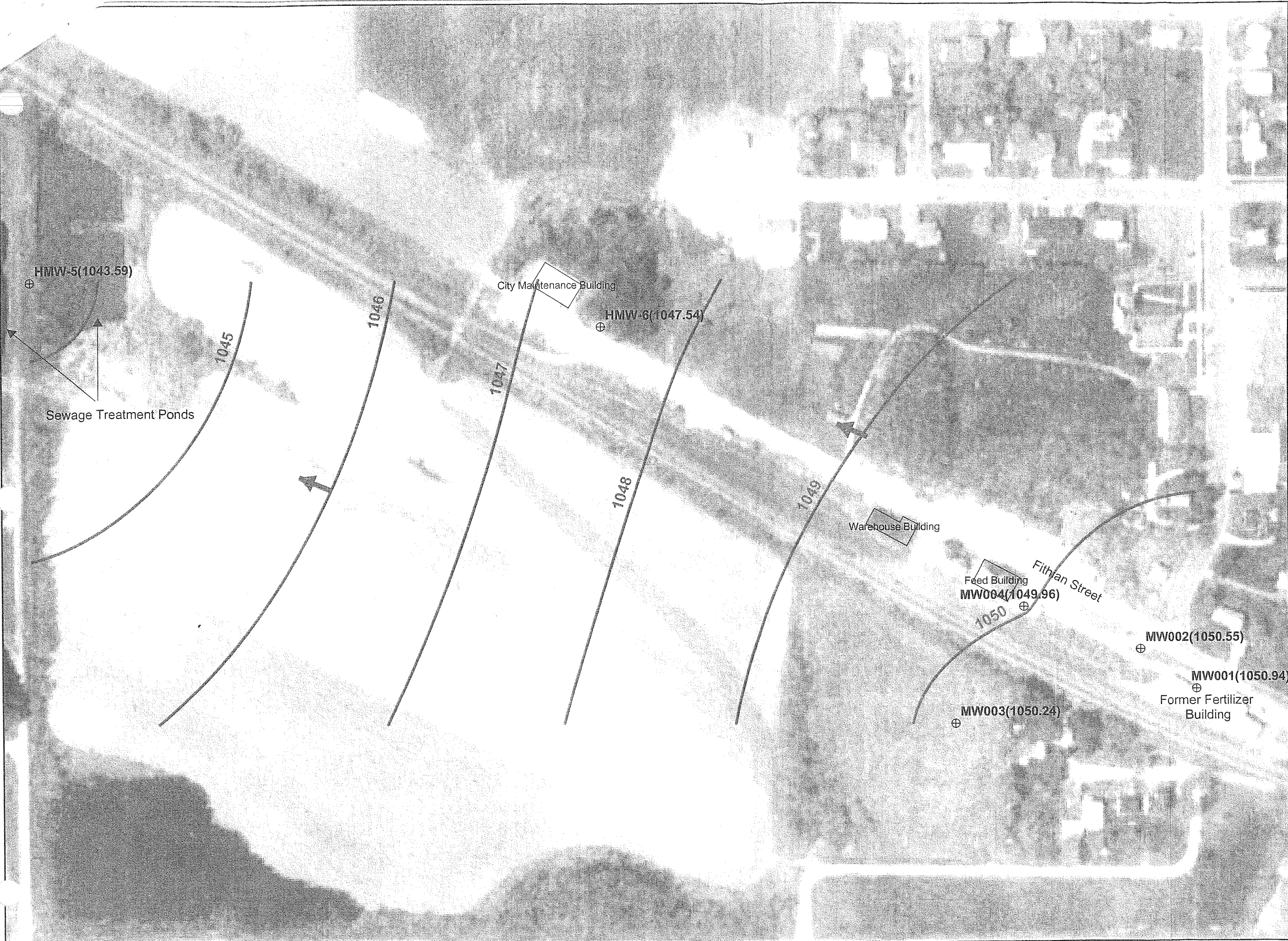
TABLE 2
GROUNDWATER ELEVATIONS
Four Seasons FS, Inc.
Hammond, Wisconsin
Summit Project No. 1188-003

Monitoring Well	Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation
MW001	11/27/2002	1109.62	54.77	1054.85
	6/27/2003		57.17	1052.45
	9/5/2003		55.95	1053.67
	12/9/2003		56.66	1052.96
	3/4/2004		57.95	1051.67
	8/11/2004		58.68	1050.94
	11/29/2004		59.79	1049.83
MW002	6/27/2003	1116.38	64.35	1052.03
	9/5/2003		63.17	1053.21
	12/9/2003		63.91	1052.47
	3/4/2004		65.11	1051.27
	8/11/2004		65.83	1050.55
	11/29/2004		66.90	1049.48
MW003	6/27/2003	1092.01	40.06	1051.95
	9/5/2003		39.02	1052.99
	12/9/2003		40.29	1051.72
	3/4/2004		41.50	1050.51
	8/11/2004		41.77	1050.24
	11/29/2004		42.99	1049.02
MW004	12/9/2003	1109.07	57.31	1051.76
	3/4/2004		58.39	1050.68
	8/11/2004		59.11	1049.96
	11/29/2004		60.12	1048.95
HMW-5	8/11/2004	1095.99	52.40	1043.59
	11/29/2004		53.22	1042.77
HMW-6	8/11/2004	1106.43	58.89	1047.54
	11/29/2004		60.05	1046.38

Notes:

Depth to water measured in feet below top of casing.

Groundwater elevations referenced to feet above mean sea level.

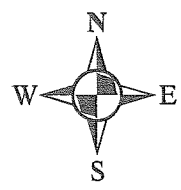


LEGEND

- ⊕ Monitoring Wells
- Buildings
- Groundwater Contour (08/11/04)
- ➔ Inferred Groundwater Flow Direction

0 80 160 Feet

1 inch equals 160 feet



Groundwater Elevation Contour Map (08/11/04)

Four Seasons FS, Inc.
Fithian Street Facility
Hammond, Wisconsin

Figure 4

File: 20040811_gwelev.mxd
Summit Proj. No.: 1188-003
Plot Date: 08/13/04
Arc Operator: JLT
Reviewed by: MDH





**ANNUAL GROUNDWATER MONITORING REPORT WITH ADDITIONAL
MONITORING WELL INSTALLATIONS**

FORMER FOUR SEASONS FS COOPERATIVE

**HAMMOND FACILITY
1245 FITHIAN STREET
HAMMOND, WISCONSIN**

SUMMIT PROJECT NO. 1188-003

**ANNUAL GROUNDWATER MONITORING REPORT WITH ADDITIONAL
MONITORING WELL INSTALLATIONS**

Former Four Seasons FS Cooperative
Hammond Facility
1245 Fithian Street
Hammond, Wisconsin

Summit Project No. 1188-003
DATCP Case No. 98409101901

Prepared By:

Summit Envirosolutions, Inc.
1217 Bandana Boulevard North
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(651) 644-8080

April 29, 2004

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Figure 7	Groundwater Elevation Contour Map (3/4/04)

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Appendix II	Laboratory Analytical Reports
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ANNUAL GROUNDWATER MONITORING REPORT WITH ADDITIONAL MONITORING WELL INSTALLATIONS

FORMER FOUR SEASONS FS COOPERATIVE
1245 FITHIAN STREET
HAMMOND, WISCONSIN

SUMMIT PROJECT NO. 1188-003
DATCP CASE NO. 98409101901

1.0 EXECUTIVE SUMMARY

Summit Envirosolutions, Inc. (Summit) has completed additional site investigation activities at the former Four Seasons FS, Inc. facility located in Hammond, Wisconsin. The additional site investigation activities were completed under Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP) approved work plans.

On June 25, 2003, additional bedrock monitoring wells MW002 and MW003 were installed at the facility located at 1245 Fithian Street in Hammond, Wisconsin (MW002) and an off-site location south of the railroad tracks (MW003). Groundwater sampling events were conducted in June, September and December 2003, and in March 2004. Groundwater samples were sent to an independent laboratory for analysis of nitrate/nitrite-nitrogen and the DATCP Standard Analyte List for Pesticides. Groundwater flow direction was to the northwest for groundwater sampling events in June and September 2003. The flow directions indicated that monitoring well MW002 was in a hydrologically downgradient position to the former fertilizer building at the site. Reported concentrations of nitrate/nitrite-nitrogen at monitoring well MW002 (38 to 20 milligrams-per-liter (mg/l)) exceeded the Wisconsin NR 140 Enforcement Standard (10 mg/l) for the June and September sampling events. On November 5, 2003, monitoring well MW004 was installed approximately 213 feet northwest of monitoring well MW002 to further define the horizontal extent of the dissolved nitrate/nitrite-nitrogen plume at the site. Groundwater samples collected from monitoring well MW004 for the December 2003 and March 2004 sampling events had reported nitrate/nitrite-nitrogen concentrations above the ES (34 and 35 mg/l). Groundwater flow direction for the December 2003 and March 2004 sampling events was to the west/northwest.

On September 23, 2003, Summit personnel conducted rising head conductivity tests at site monitoring wells MW001 through MW003. The average linear groundwater velocity $[(\text{conductivity} * \text{gradient}) / \text{assumed porosity}]$ was determined for the site using the geometric mean value of hydraulic conductivity determined by Bouwer-Rice method (1.96 feet per day) for monitoring wells MW001 and MW002, a gradient of 0.002 feet per foot (ft/ft) determined from the June and September 2003 groundwater elevation data, and an assumed porosity of 0.30. The average linear groundwater velocity for the on-site monitoring wells was calculated to be approximately 0.02 feet per day. Fracture flow conditions were encountered at off-site

monitoring well MW003. The hydraulic conductivity and linear groundwater velocity would be much larger in a fracture flow system.

The downgradient extent of the dissolved nitrate/nitrite-nitrogen plume must be determined in order for the site to close in accordance with Wisconsin Administrative Code NR 176. Therefore, Summit proposes to install an additional bedrock groundwater monitoring well at the site in order to define the hydrologically downgradient extent of the dissolved nitrate/nitrite-nitrogen plume. Based on the observed groundwater flow at the site, the monitoring well should be placed to the west/northwest as indicated in Figure 2. The monitoring well network should be sampled on a quarterly basis for the next year for nitrate/nitrite-nitrogen and the DATCP Standard Analyte List for pesticides.

2.0 INTRODUCTION

2.1 Purpose and Scope

The purpose of this report is to present the data, results, and conclusions following the completion of additional site investigation at the former Four Seasons FS (Four Seasons) facility located in Hammond, Wisconsin. Summit Envirosolutions, Inc. (Summit) completed additional site investigation following approval of the work plans submitted to the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP) on March 11th and October 13, 2003.

The scope of services completed by Summit included the following tasks:

- Prepared work plans for the additional site investigation activities;
- Observed the installation of two bedrock monitoring wells at the site and one bedrock monitoring well in an off-site location;
- Completed development of bedrock monitoring wells MW002 and MW003 and observed the development of MW004;
- Conducted four quarterly groundwater sampling events at the site;
- Submitted groundwater samples to an independent laboratory for analysis of nitrate/nitrite-nitrogen and the DATCP Standard Analyte List for Pesticides;
- Conducted hydraulic conductivity testing at three of the site monitoring wells; and

- Prepared this report presenting results for activities completed, laboratory data, with conclusions and recommendations for the site.

2.2 Site Location and Description

The former Four Seasons facility is located at 1245 Fithian Street in the village of Hammond, Wisconsin. The site is located in the northeast $\frac{1}{4}$ of Section 28, Township 29 North, Range 17 West (Figure 1). Figure 2 is a site map that is comprised of an aerial photo with the site structures, current monitoring wells, and proposed monitoring well location illustrated. The site consists of two vacant buildings: one formerly used as a feed mill and one formerly used as a warehouse building. A building was removed from the site that was formerly used for the storage of bulk and bagged dry fertilizer and pesticides. The facility lies north of and adjacent to a Union Pacific Railroad Company (UPRR) spur and mainline. The site is surrounded by residential properties to the north across Fithian Street, and to the south across the UPRR railroad tracks.

2.3 Regional Geology and Hydrogeology

Summit reviewed the U.S. Geological Survey Hydrologic Investigations Atlas HA-451 dated 1973 to evaluate the regional geology of the Hammond area. In summary, Hammond lies within and near the eastern edge of the St. Croix River Basin. According to the Hydrologic Atlas, Hammond is underlain by up to 50 feet of Quaternary age glacial ground moraine deposits consisting of till (unstratified sand, silt, clay, and gravel). The first encountered bedrock below the site is reportedly the Ordovician age Prairie du Chien Group that consists of dolomite of the Shakopee and Oneota Formations.

Summit reviewed well drilling logs for the Hammond area supplied by the Wisconsin Geological and Natural History Survey (WGNHS). The well logs reviewed indicated the presence of Ordovician age St. Peter Sandstone Formation at nearly every well location at depths ranging from 4 to 30 feet below grade. Most of the well logs reviewed indicated the presence of "sand" above the first encountered dolomite/limestone, although some of the well drillers do not refer to this sand as sandstone or St. Peter Sandstone. Limestone and dolomite of the Prairie du Chien Group was noted at each well at depths ranging from 15 to 118 feet below grade. A majority of the wells in the Hammond area appear to be open hole wells drawing water from the Prairie du Chien Group. The static water level in wells completed within the Prairie du Chien Group ranged from 60 to 130 feet below grade.

The log for Village of Hammond water supply Well No. 1, drilled in 1938 and located approximately 2,200 feet north of the Four Seasons facility, indicated St. Peter Sandstone at a depth of 20 feet. The Prairie du Chien Group was observed from 118 feet to 350 feet. Cambrian sandstone was observed at 350 feet to the termination depth of the well at 440 feet. The static

water level at Well No. 1, completed near the base of the Prairie du Chien Group and within the Cambrian sandstone, was observed to be 168 feet below grade.

Village Well No. 2 which is located on Fithian Street approximately 200 to 300 feet east of the Four Seasons facility is 373 feet deep and cased to 274 feet. The well is open hole from 274 to 373 feet and draws its water from Cambrian sandstone. The static water level at Well No. 2 on August 24, 2000, was 71 feet below grade. The Village of Hammond utility department indicated that the well was sampled annually for nitrate-nitrogen. Laboratory results for 1999 indicated a nitrate concentration of 0.01 milligrams-per-liter (mg/l). Nitrate results for 2000 did not indicate the presence of nitrate above the laboratory detection limit of 0.1 mg/L. The groundwater sample collected at Well No. 2 in 1999 was also analyzed for pesticides. According to Summit's contact at the village utility department, results of the analysis did not indicate the presence of pesticides at or above laboratory detection limits.

3.0 PROJECT BACKGROUND/PREVIOUS ASSESSMENT RESULTS

On July 11 and 12, 2000, forty two Geoprobe test probes were advanced at the site. The assessment activities were completed at the request of the WDATCP to evaluate the magnitude and extent of nitrogen and pesticide residues in soil. Agricultural chemical residues were previously identified in surface soil at the site based on soil sampling conducted by the WDATCP.

Soil samples were screened on-site using ion-selective electrode methods for nitrate-nitrogen and ammonia-nitrogen. Selected soil samples were also submitted to an independent laboratory for confirmation analysis of nitrate- and ammonia-nitrogen. Field and laboratory analytical results indicated areas with significant (greater than 100 milligrams-per-kilogram (mg/kg)) concentrations of combined nitrogen residue in soil. Pesticide analysis of soil samples submitted to the laboratory indicated two areas with total pesticide residue at concentrations exceeding typical cleanup standards (1 mg/kg).

In a report titled *Subsurface Assessment and Recommended Remedial Action Plan* dated September 1, 2000, Summit recommended a total nitrogen cleanup standard of 100 mg/kg and a total pesticide residue cleanup standard of 1 mg/kg. The recommended remedial action was excavation and land application of impacted soil.

The recommended remedial action was approved by the WDATCP in correspondence dated September 27, 2000. A change order to the Remedial Action Plan, dated February 15, 2001 was submitted to the DATCP when it was determined that the former fertilizer building at the site would be demolished, thereby allowing access to an additional volume of nitrogen-impacted soil.

Excavation of the additional soil volume was approved by the WDATCP in correspondence dated March 16, 2001.

On May 7 and 8, 2001, Summit personnel observed excavation activities at three areas proposed in the approved Remedial Action Plan. Landspreading activities occurred between May 8 and 10, 2001. A total of approximately 1,707 cubic yards of soil were removed and landspread during the referenced time period.

On November 26, 2002, Summit personnel observed and directed the installation of bedrock monitoring well MW001 at the site to determine if groundwater had been impacted below the site. Groundwater samples collected from monitoring well MW001 were submitted to an independent laboratory for analysis of nitrate/nitrite-nitrogen and the DATCP Standard Analyte List for Pesticides. The results of the groundwater analysis indicated that the reported concentration of nitrate/nitrite-nitrogen (170 mg/l) was above the Wisconsin Administrative Code (NR 140) Enforcement Standard (ES) of 10 mg/l (Summit, 2003). Pesticides were not detected at concentrations above the ESs.

4.0 PROJECT ACTIVITIES AND RESULTS

4.1 Monitoring Well Installations

On June 25, 2003, Summit personnel observed and directed the installation of bedrock monitoring wells MW002 and MW003 at the site located at 1245 Fithian Street (MW002) and an off-site location south of the railroad tracks (MW003) in Hammond, Wisconsin. Monitoring well MW004 was installed On November 5, 2003, approximately 213 feet northwest of monitoring well MW002 to further define the horizontal extent of the dissolved nitrate/nitrite-nitrogen plume at the site. Monitoring well completion information is summarized in Table 1. Hollow stem auger and air rotary drilling techniques were utilized to install the bedrock monitoring wells. There were approximately eight to 13 feet of unconsolidated sand over the St. Peter Sandstone formation at monitoring wells MW002 and MW004. There was approximately 35 feet of unconsolidated deposits over Ordovician age Prairie du Chien Group Limestone at off-site monitoring well MW003.

The upper sandstone at the site was lightly consolidated and hollow stem augers were advanced to 17 feet below grade at MW002 and 45 feet below grade at MW004. Hollow stem augers were advanced to bedrock (35 feet below grade) at MW003. Air rotary drilling was used to complete the monitoring wells. Summit personnel observed the drill cuttings and prepared drill logs. Monitoring wells MW002, MW003 and MW004 were constructed with 10 feet of 0.010-inch slot polyvinyl chloride (PVC) screen and casing and are completed above grade. Monitoring wells MW002 and MW003 were constructed with schedule 80 PVC and monitoring well MW004 was

constructed with schedule 40 PVC. Summit drill logs, The Wisconsin Department of Natural Resources (WDNR) Monitoring Well Construction Forms (4400-113A), and WDNR Soil Boring Log Information Forms (4400-122) are presented in Appendix I.

4.2 Groundwater Elevation

Summit personnel collected groundwater elevation measurements at the monitoring wells on June 27, September 5, and December 5, 2003 and March 4, 2004. Groundwater elevation data is summarized in Table 2 and a groundwater hydrograph is presented as Figure 3. Groundwater elevations ranged from 1050.51 feet above mean sea level (amsl) at monitoring well MW003 to 1053.67 amsl at monitoring well MW001. Groundwater elevations have generally been decreasing with the exception of June to September 2003 when the groundwater elevations increased at the monitoring wells.

Groundwater elevation contour maps were generated for the June, September, December 2003, and March 2004 sampling events and are presented as Figures 4, 5, 6 and 7, respectively. Based on these data, groundwater flow was determined to be to the northwest for the June and September 2003 sampling events and to the west/northwest for the December 2003 and March 2004 sampling events. The groundwater gradients across the site ranged from 0.002 (June and September 2003) to 0.003 (December 2003 and March 2004). The flow directions indicated that monitoring wells MW002 and MW004 are in a hydrologically downgradient position to the former fertilizer building at the site. Monitoring well MW003 is in a down and side gradient position to the former fertilizer building at the site.

4.3 Groundwater Sample Collection

Summit personnel performed initial development of monitoring wells MW002 and MW003 on June 27, 2003. Boart Longyear developed monitoring well MW004 with a direct current pump on November 5, 2003. The WDNR Well Development Forms (4400-113B) are included in Appendix I. After the monitoring wells were initially developed, Summit used disposable bailers to purge and sample the monitoring wells. Monitoring wells were purged by removing five casing volumes of groundwater. Groundwater sampling events were conducted in June, September, December 2003, and in March 2004.

4.4 Groundwater Analytical Results

Summit personnel collected groundwater samples at monitoring wells MW001 through MW003 on June 27 and September 5, 2003. Summit personnel collected groundwater samples at monitoring wells MW001 through MW004 on December 9, 2003 and March 4, 2004. Groundwater samples were submitted to Environmental Chemistry Consulting Services, Inc. (ECCS) for analysis of nitrate/nitrite-nitrogen and the DATCP Standard Analyte List for

Blind duplicate groundwater samples were collected at monitoring wells MW001 or MW004 for QA / QC purposes. Duplication of the analytical results for nitrate/nitrite-nitrogen and pesticides appears to be within acceptable ranges.

4.6 Hydraulic Conductivity Testing

On September 23, 2003, Summit personnel conducted rising head conductivity tests at site monitoring wells MW001 through MW003. The tests were conducted by utilizing Druck pressure transducers and Telog dataloggers to constantly measure groundwater elevations in the monitoring wells as a volume of groundwater was removed from the wells and groundwater elevations were allowed to recover by greater than 90%. Reduction of the conductivity data was performed using software by Aquifer Test, Version 2.56 (Waterloo Hydrogeologic, Inc.), that utilized Bouwer-Rice and Hvorslev analysis methods to provide hydraulic conductivity estimates. A summary of the aquifer calculations and the corresponding graphs are included as Appendix III. The geometric mean of the hydraulic conductivity values from monitoring wells MW002 and MW003 was 1.96 feet per day using the Bouwer-Rice Method and 0.58 feet per day using the Hvorslev Method. The St. Peter Sandstone at the site is loosely consolidated and has been treated as an unconsolidated aquifer in reducing the data from monitoring wells MW001 and MW002. Conductivity values are also presented in Table 3 for monitoring well MW003. However, monitoring well MW003 is screened across fractured limestone and determination of hydraulic conductivity in this environment would be more appropriately done through fracture flow analysis methods (Moench) that would require a pump test to be conducted.

The average linear groundwater velocity $[(\text{conductivity} * \text{gradient}) / \text{assumed porosity}]$ was determined for the site using the geometric mean value of hydraulic conductivity determined by Bouwer-Rice method (1.96 feet per day), a gradient of 0.002 feet per foot (ft/ft) determined from the June and September 2003 groundwater elevation data, and an assumed porosity of 0.30. The determined hydraulic conductivity value for the site was within the common range for silty sands and fine sands. The assumed porosity of 30% is within the common range for well sorted sand (Fetter, 1988). The average linear groundwater velocity for the on-site monitoring wells was calculated to be approximately 0.02 feet per day. The hydraulic conductivity and linear groundwater velocity would be much larger in a fracture flow system as encountered at monitoring well MW003.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The downgradient extent of the dissolved nitrate/nitrite-nitrogen plume must be determined in order for the site to close in accordance with Wisconsin Administrative Code NR 176. Therefore, Summit proposes to install an additional bedrock groundwater monitoring well at the site in order to define the hydrologically downgradient extent of the dissolved

nitrate/nitrite-nitrogen plume. Based on the observed groundwater flow at the site, the monitoring well should be placed to the west/northwest as indicated in Figure 2. The monitoring well network should be sampled on a quarterly basis for the next year for nitrate/nitrite-nitrogen and the DATCP Standard Analyte List for pesticides. If this recommendation is conceptually approved, Summit will provide a work plan and cost estimate under a separate cover.

6.0 REFERENCES

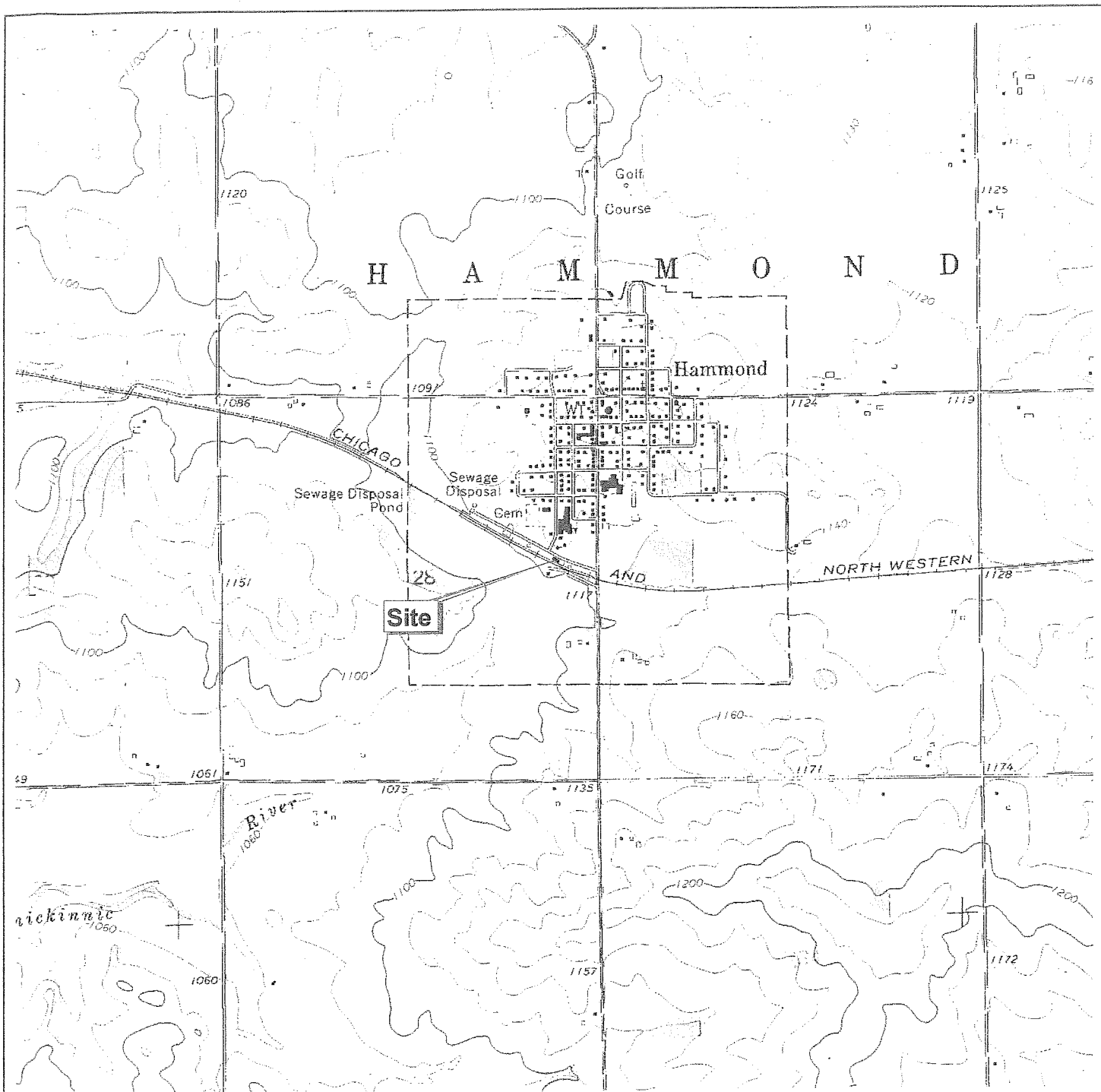
- Summit Envirosolutions, Inc., September 1, 2000. Subsurface Assessment and Recommended Remedial Action Plan, Four Seasons FS, Inc., Hammond, Wisconsin.
- Summit Envirosolutions, Inc., October 15, 2001. Corrective Action Report, Four Seasons FS, Inc., Hammond, Wisconsin.
- Summit Envirosolutions, Inc., January 21, 2003. Additional Site Investigation Report, Four Seasons FS, Inc., Hammond, Wisconsin.
- Young, H. L. and Hindall, S. M., 1973, Water Resources of Wisconsin St. Croix River Basin, Hydrogeologic Investigations Atlas HA-451, U.S. Geologic Survey.
- Waterloo Hydrogeologic, Aquifer Test – Intuitive Analysis and Reporting of Pumping Test and Slug Test Data, version 2.56.
- Fetter, C. W., 1988. Applied Hydrogeology, Second Edition.

7.0 LIMITATIONS OF ENVIRONMENTAL ASSESSMENTS

Summit's activities and opinions were based in part on information Summit obtained and evaluated from sources including the client and private, municipal, and state agencies. Verification of the authenticity or accuracy of this information is not warranted by Summit or included in Summit's scope of services. A conventional Phase-I/II environmental assessment/property history review and reconnaissance was not included in our initial proposal, and as such, conclusions and recommendations as to the overall environmental liabilities from on- and off-site sources were not included as part of the scope of services.

7.1 Sample Collection and Analysis

Sample locations, quantity of samples and analyses performed were selected to provide qualitative data to evaluate and document current property conditions or past property activities.



Map adapted from USGS 7.5 minute topographic map(s): Baldwin West, Wisconsin.

LEGEND

Site Description: NE 1/4 of Section 28,
Township 29 North, Range 17 West



0 2000 4000 Feet



GENERAL SITE LOCATION MAP

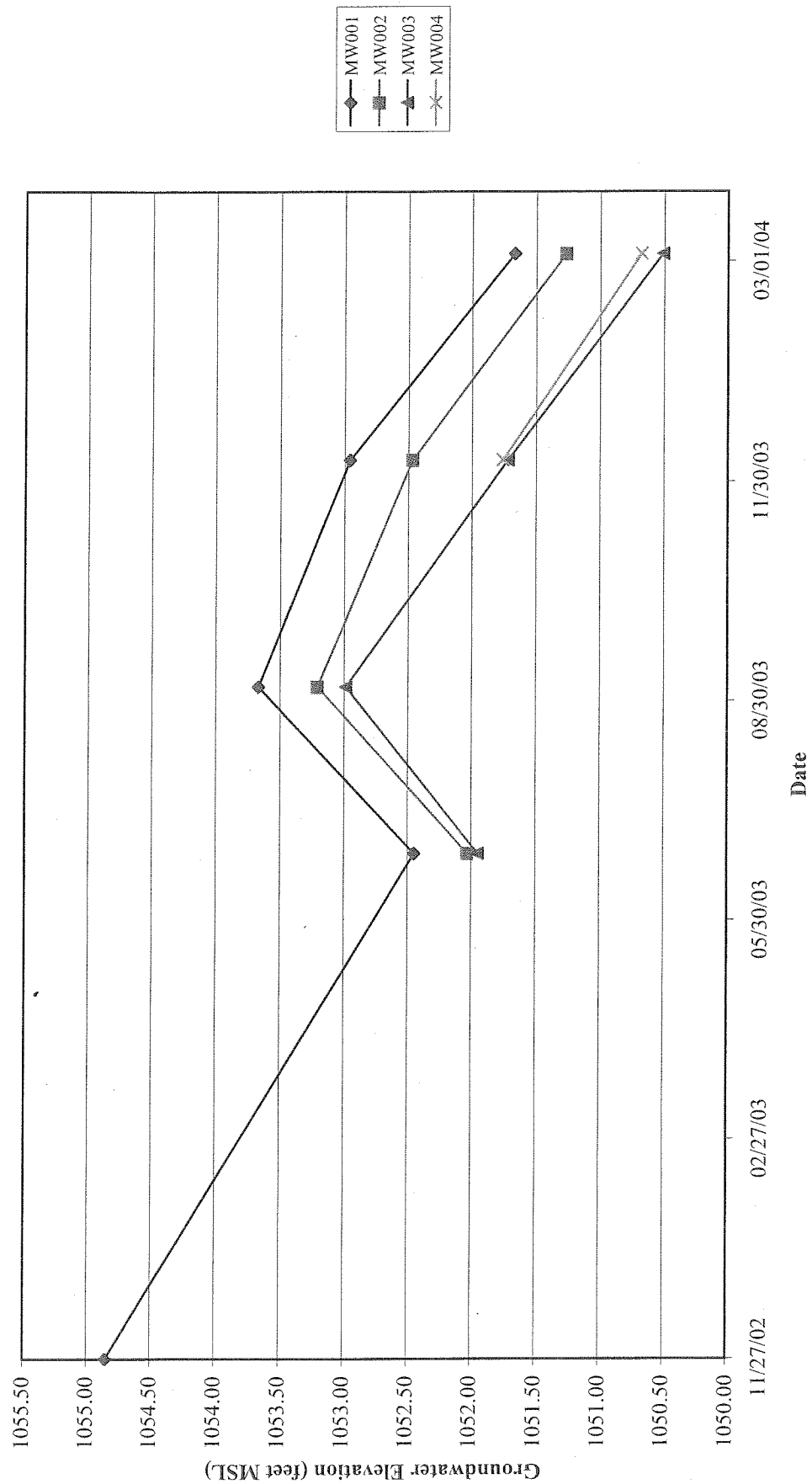
Four Seasons FS, Inc.
Fithian Street
Hammond, Wisconsin

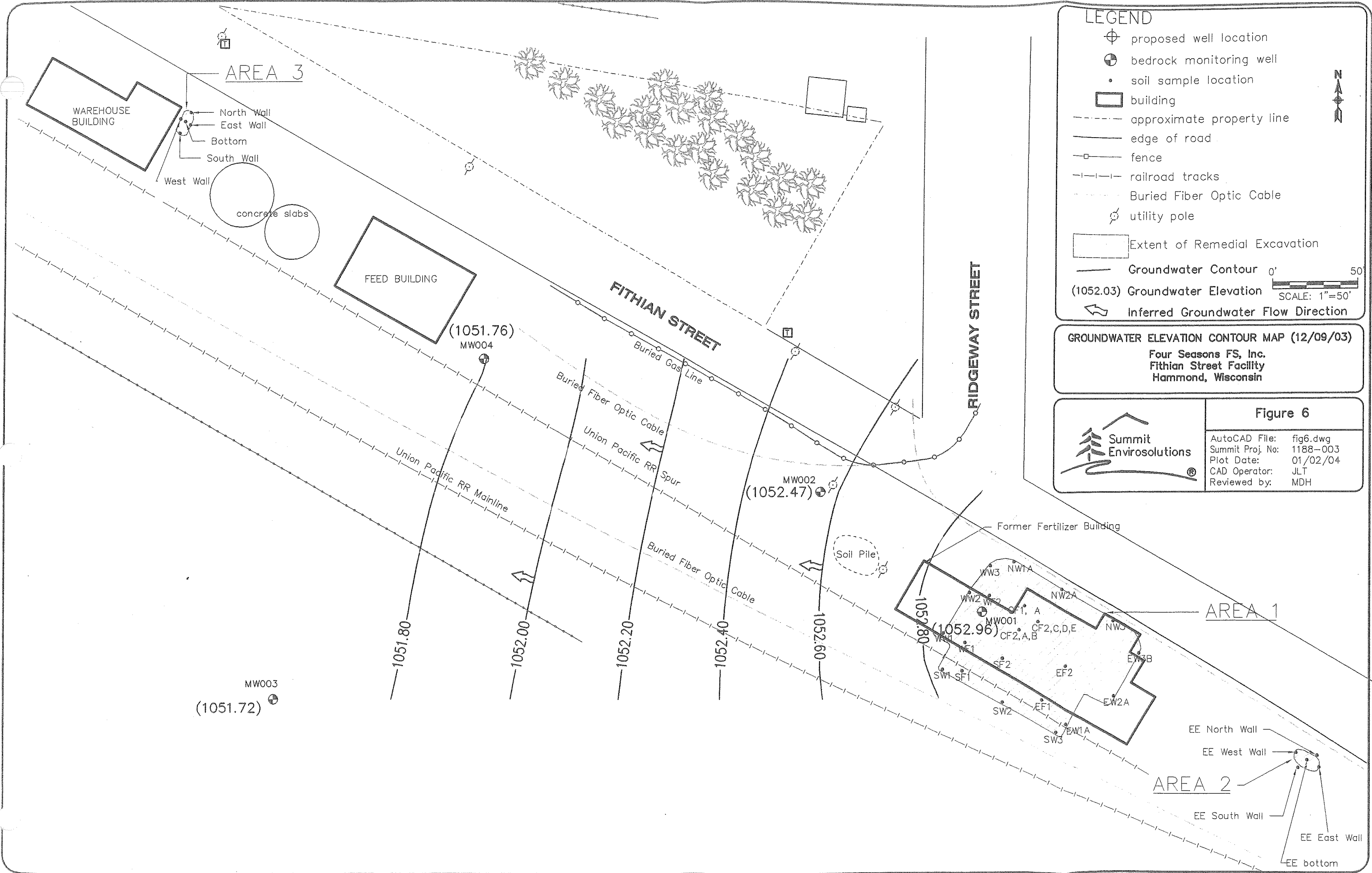



Figure 1

File: 1188-003.apr
Summit Proj. No.: 1188-003
Plot Date: 11-23-1999
Arc Operator: RWV
Reviewed by: BDJ

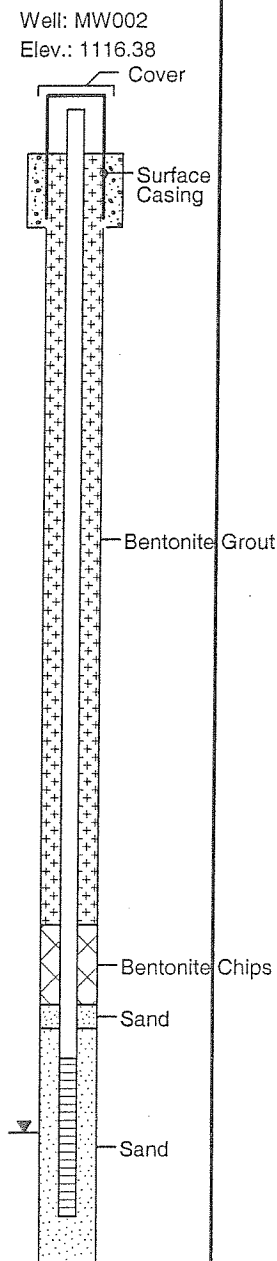
Figure 3.
 GROUNDWATER HYDROGRAPH
 Four Seasons FS, Inc.
 Hammond, Wisconsin
 Summit Project No. 1188-003





 Summit Envirosolutions	Project Name : Former Four Seasons FS	<h2 style="margin: 0;">LOG OF BORING MW002</h2> <p style="margin: 0;">(Page 1 of 1)</p>
	Project Location : Hammond, WI	
	County : St. Croix	
Former Four Seasons FS, Inc. 1245 Fithian Street Hammond, WI	Form Completed By : MDH	Date : 6/25/03 Company/Method : Boart Longyear Sample Method : Air Rotary Observer(s) : MDH Weather : Overcast ~ 80 degrees F
Summit Project No. 1188-003		

Depth in feet	Lab No.	GRAPHIC	USCS	PID ppm	DESCRIPTION	Water Levels	REMARKS
0							
2							
4			SM		Silty SAND, tan and brown, very fine with trace medium to coarse grained, moderately well graded, moist. (cuttings)		
6							
8							
10			SS		Lightly consolidated SANDSTONE, cuttings consisted of SAND, tan, very fine grained, well graded, moist.		
12							
14			SS		SANDSTONE, cuttings consisted of SAND, tan, very fine grained, well graded, some silt, moist.		
16							
18					SANDSTONE, cuttings consisted of Silty SAND, tan/brown, very fine grained, trace medium to coarse grained, wet from drilling fluid.		
20							
22							
24							
26							
28							
30							
32							
34							
36			SS				
38							
40							
42							
44							
46							
48							
50							
52							
54							
56							
58							
60			SS		SANDSTONE, cuttings consisted of Silty SAND, tan and brown, very fine grained, well graded, moist.		
62							
64							
66							
68			SS		SANDSTONE, cuttings consisted of SAND, tan, fine grained, well graded, some silt, trace clay, wet.		
70							
72					End of boring approximately 70 feet below grade.		



Augered to 17 feet below grade and set casing for air rotary. Air rotary to 70 feet below grade.

Facility/Project Name Hammond Drill Site	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> E. ft. <input type="checkbox"/> S. <input type="checkbox"/> W.	Well Name MW002
Facility License, Permit or Monitoring No. 11549	Grid Origin Location (Check if estimated: <input type="checkbox"/>) Lat. _____ Long. _____ or St. Plane _____ ft. N. _____ ft. E. S/C/N	Wis. Unique Well No/DNR Well Number
Type of Well Well Code 11/mw	Section Location of Waste/Source 1/4 of _____ 1/4 of Sec. _____ T. _____ N. R. _____ <input type="checkbox"/> E <input type="checkbox"/> W	Date Well Installed 06/25/2003
Distance Well Is From Waste/Source Boundary ft. _____	Location of Well Relative to Waste/Source u <input type="checkbox"/> Upgradient s <input type="checkbox"/> Sidegradient d <input type="checkbox"/> Downgradient n <input type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) T. Schmalfeldt Boart Longyear

- A. Protective pipe, top elevation _____ ft. MSL
- B. Well casing, top elevation 2.50 ft. MSL
- C. Land surface elevation _____ ft. MSL
- D. Surface seal, bottom _____ ft. MSL or 53.5 ft.

12. USC classification of soil near screen:

GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached?
- ☐
- Yes
- ☐
- No

14. Drilling method used: Rotary
- ☐
- 50
-
- Hollow Stem Auger
- ☒
- 41
-
- Air _____ Other
- ☒

15. Drilling fluid used: Water
- ☐
- 02 Air
- ☐
- 01
-
- Drilling Mud
- ☐
- 03 None
- ☐
- 99

16. Drilling additives used?
- ☐
- Yes
- ☒
- No

Describe _____

Source of water (attach analysis): _____

- E. Bentonite seal, top _____ ft. MSL or 45.0 ft.
- F. Fine sand, top _____ ft. MSL or 53.5 ft.
- G. Filter pack, top _____ ft. MSL or 55.0 ft.
- H. Screen joint, top _____ ft. MSL or 57.0 ft.
- I. Well bottom _____ ft. MSL or 67.0 ft.
- J. Filter pack, bottom _____ ft. MSL or 67.0 ft.
- K. Borehole, bottom _____ ft. MSL or 70.5 ft.
- L. Borehole, diameter 6.0 in.
- M. O.D. well casing 2.37 in.
- N. I.D. well casing 1.94 in.

1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 7.0 ft.
c. Material: Steel ☒ 04
Other ☐
d. Additional protection? ☒ Yes ☐ No
If yes, describe: 3" Bumper Post
3. Surface seal: Bentonite ☒ 30
Concrete ☐ 01
Other ☐
4. Material between well casing and protective pipe:
Bentonite ☐ 30
#30 American Materials Other ☒
5. Annular space seal:
a. Granular Bentonite ☐ 33
b. _____ Lbs/gal mud weight . Bentonite-sand slurry ☐ 35
c. _____ Lbs/gal mud weight . Bentonite slurry ☒ 31
d. _____ % Bentonite . Bentonite-cement grout ☐ 50
e. _____ Ft³ volume added for any of the above
f. How installed: Tremie ☐ 01
Tremie pumped ☒ 02
Gravity ☐ 08
6. Bentonite seal:
a. Bentonite granules ☒ 33
b. ☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite pellets ☐ 32
c. _____ Other ☐
7. Fine sand material: Manufacturer, product name and mesh size:
a. #7 Badger
b. Volume added _____ ft³
8. Filter pack material: Manufacturer, product name and mesh size:
a. #30 American Materials
b. Volume added _____ ft³
9. Well casing: Flush threaded PVC schedule 40 ☐ 23
Flush threaded PVC schedule 80 ☒ 24
Other ☐
10. Screen material: PVC
a. Screen Type: Factory cut ☒ 11
Continuous cut ☐ 01
Other ☐
b. Manufacturer Boart Longyear
c. Slot size: 0.010 in.
d. Slotted length: 10.0 ft.
11. Backfill material (below filter pack): None ☐ 14
Native Other ☒

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm


Boart Longyear Company

101 Alderson Street Schofield, WI 54476

Tel: 715-359-7090

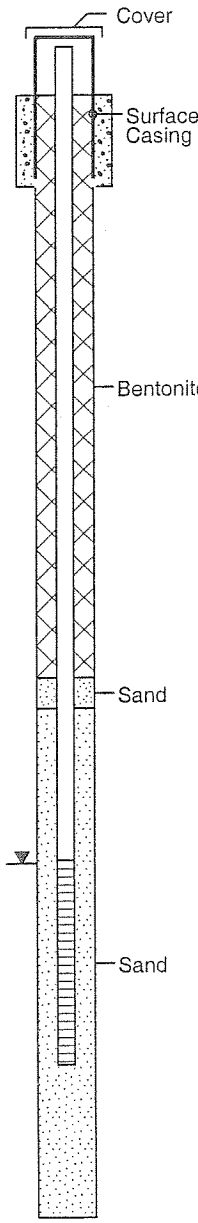
Fax: 715-355-5715

Please complete both Forms 4400-113A and 4400-113B and return to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

				Project Name : Former Four Seasons FS Project Location : Hammond, WI County : St. Croix Form Completed By : MDH		LOG OF BORING MW003 (Page 1 of 1)	
				Date : 6/25/03 Company/Method : Boart Longyear Sample Method : Air Rotary Observer(s) : MDH Weather : Overcast ~ 80 degrees F			
Former Four Seasons FS, Inc. 1245 Fithian Street Hammond, WI Summit Project No. 1188-003							

Depth in feet	Lab No.	GRAPHIC	USCS	PID ppm	DESCRIPTION	Water Levels	REMARKS
0			SC		Clayey SAND, brown, fine to medium with trace coarse grained, moderately well graded, very moist to wet. (from auger cuttings)		
2					Silty SAND, brown, fine to medium with trace coarse grained, trace clay, very moist to wet.		
4							
6							
8			SM				
10							
12							
14			SM		Silty SAND, tan/brown, very fine to medium grained, some coarse grained, trace fine to coarse gravel, very moist to wet.		
16							
18					Silty SAND, brown, very fine to coarse grained, poorly graded, some fine to coarse gravel, some cobbles, very moist to wet.		
20							
22			SM				
24							
26							
28							
30			SP		SAND, tan, medium to coarse grained, poorly graded, some silt, trace fine gravel, moist.		
32							
34			SM		Silty SAND, reddish brown, fine to coarse grained, poorly graded, some fine gravel, trace to some clay, moist.		
36			SC				
38					Clayey SAND, dark brown, fine to coarse grained sand, poorly graded, some fine to coarse gravel, some cobbles, moist. Auger refusal @ 35 feet below grade (bedrock).		
40			LS		LIMESTONE, brown and dark brown, moist.		
42							
44			SP		SAND, dark brown grading to light brown, wet.		
46					LIMESTONE, tan/brown, wet.		
48							
50			LS				
52							
54							
56	End of boring approximately 55 feet below grade.						

Augered to 35 feet below grade. Air rotary to 55 feet below grade.



Well: MW003
Elev.: 1092.01

Cover

Surface Casing

Bentonite Chips

Sand

Sand

Route To:

Watershed/Wastewater ☐
Remediation/Redevelopment ☐

Waste Management ☐
Other ☐

MONITORING WELL CONSTRUCTION

Form 4400-113A

Rev. 6-97

Facility/Project Name Hammond Drill Site	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> S. ft. <input type="checkbox"/> E. <input type="checkbox"/> W.	Well Name MW003
Facility License, Permit or Monitoring No.	Grid Origin Location (Check if estimated: <input type="checkbox"/>) Lat. _____ Long. _____ or St. Plane _____ ft. N. _____ ft. E. S/C/N	Wis. Unique Well No. DNR Well Number
Facility ID 11549	Section Location of Waste/Source _____ 1/4 of _____ 1/4 of Sec. _____ T. _____ N. R. _____ <input type="checkbox"/> E <input type="checkbox"/> W	Date Well Installed 06/25/2003
Type of Well Well Code 11/mw	Location of Well Relative to Waste/Source u <input type="checkbox"/> Upgradient s <input type="checkbox"/> Sidegradient d <input type="checkbox"/> Downgradient n <input type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) T. Schmalfeldt
Distance Well Is From Waste/Source Boundary ft.		Boart Longyear

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation 2.60 ft. MSL
C. Land surface elevation _____ ft. MSL
D. Surface seal, bottom _____ ft. MSL or 28.0 ft.

12. USC classification of soil near screen:

GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

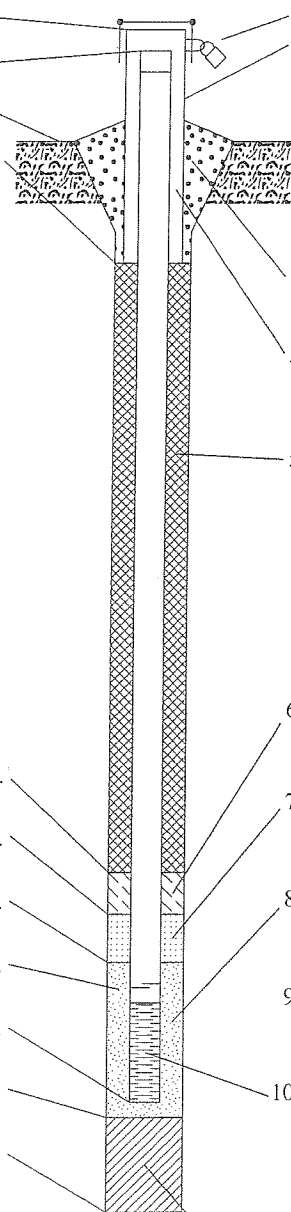
14. Drilling method used: Rotary ☐ 5 0
Hollow Stem Auger ☒ 4 1
Air _____ Other ☒

15. Drilling fluid used: Water ☐ 0 2 Air ☐ 0 1
Drilling Mud ☐ 0 3 None ☐ 9 9

16. Drilling additives used? ☐ Yes ☒ No

Describe _____

17. Source of water (attach analysis):



E. Bentonite seal, top _____ ft. MSL or 1.0 ft.

F. Fine sand, top _____ ft. MSL or 28.0 ft.

G. Filter pack, top _____ ft. MSL or 30.0 ft.

H. Screen joint, top _____ ft. MSL or 32.0 ft.

I. Well bottom _____ ft. MSL or 47.0 ft.

J. Filter pack, bottom _____ ft. MSL or 55.0 ft.

K. Borehole, bottom _____ ft. MSL or 55.0 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.37 in.

N. I.D. well casing 1.94 in.

1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 7.0 ft.
c. Material: Steel ☒ 0 4
d. Additional protection? ☐ Yes ☒ No
If yes, describe: _____
3. Surface seal: Bentonite ☒ 3 0
Concrete ☐ 0 1
Other ☐
4. Material between well casing and protective pipe:
Bentonite ☐ 3 0
#30 American Materials Other ☒
5. Annular space seal:
a. Granular Bentonite ☐ 3 3
b. Lbs/gal mud weight . Bentonite-sand slurry ☐ 3 5
c. Lbs/gal mud weight . . . Bentonite slurry ☒ 3 1
d. % Bentonite . . . Bentonite-cement grout ☐ 5 0
e. Ft³ volume added for any of the above
f. How installed: Tremie ☐ 0 1
Tremie pumped ☒ 0 2
Gravity ☐ 0 8
6. Bentonite seal:
a. Bentonite granules ☒ 3 3
b. ☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite pellets ☐ 3 2
c. Other ☐
7. Fine sand material: Manufacturer, product name and mesh size:
a. #7 Badger
b. Volume added ft³
8. Filter pack material: Manufacturer, product name and mesh size:
a. #30 American Materials
b. Volume added ft³
9. Well casing: Flush threaded PVC schedule 40 ☐ 2 3
Flush threaded PVC schedule 80 ☒ 2 4
Other ☐
10. Screen material: PVC
a. Screen Type: Factory cut ☒ 1 1
Continuous slot ☐ 0 1
Other ☐
b. Manufacturer Boart Longyear
c. Slot size: 0.010 in.
d. Slotted length: 10.0 ft.
11. Backfill material (below filter pack): None ☐ 1 4
#30 American Materials Other ☒

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm

Boart Longyear Company
101 Alderson Street Schofield, WI 54476

Tel: 715-359-7090
Fax: 715-355-5715

Please complete both forms 4400-113A and 4400-113B and return to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.



Former Four Seasons FS, Inc.
1245 Fithian Street
Hammond, WI

Summit Project No. 1188-003

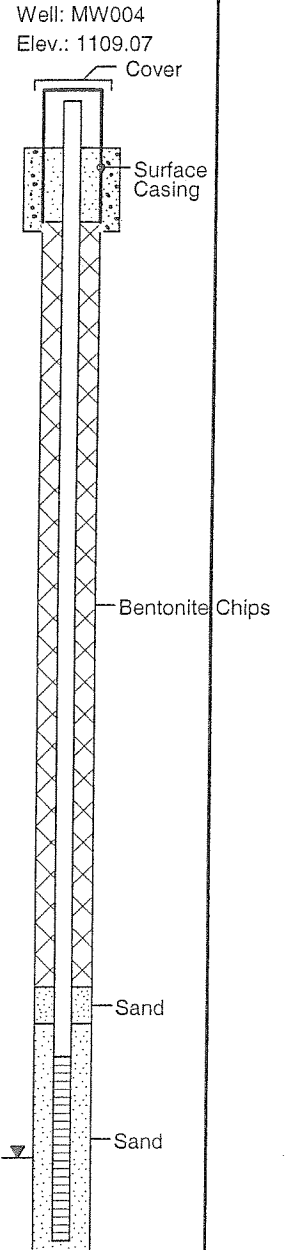
Project Name : Former Four Seasons FS
Project Location : Hammond, WI
County : St. Croix
Form Completed By : MDH

LOG OF BORING MW004

(Page 1 of 1)

Date : 11/5/03
Company/Method : Boart Longyear
Sample Method : Air Rotary
Observer(s) : MDH
Weather : Overcast ~ 30 degrees F

Depth in feet	Lab No.	GRAPHIC	USCS	PID ppm	DESCRIPTION	Water Levels	REMARKS
0					Silty SAND and GRAVEL, dark brown, fine to coarse grained sand, fine to coarse gravel, trace clay, moist. (cuttings)		
2							
4			SM				
6							
8			SC		Sandy CLAY, dark brown, soft, fine to coarse grained sand, moist.		
10			SW				
12			SC		SAND, brown, very fine to fine grained with trace medium to coarse grained, moderately well graded, some fine to coarse gravel, moist.		
14							
16					Clayey SAND, dark brown, very fine to fine grained with trace medium to coarse grained, moderately well graded, moist.		
18							
20					Lightly consolidated SANDSTONE, cuttings consisted of SAND, light tan and tan/brown, very fine to fine grained, well graded, some silt, moist. (brown at ~ 22 feet, tan at ~ 30 feet)		
22							
24							
26							
28							
30			SS				
32							
34							
36							
38							
40							
42							
44							
46							
48					As above - some brown clay at ~ 50 feet, wet at approximately 50 feet below grade.		
50							
52			SS				
54							
56							
58							
60							
62							



Augered to 45 feet below grade. Air rotary to 60 feet below grade.

Route To:

Watershed/Wastewater ☐

Remediation/Redevelopment ☐

Waste Management ☐

Other ☐

MONITORING WELL CONSTRUCTION

Form 4400-113A

Rev. 6-97

Facility/Project Name Four Seasons	Local Grid Location of Well ft. <input type="checkbox"/> N. <input type="checkbox"/> E. ft. <input type="checkbox"/> S. <input type="checkbox"/> W.	Well Name MW-004
Facility License, Permit or Monitoring No.	Grid Origin Location (Check if estimated: <input type="checkbox"/>) Lat. _____ Long. _____ or St. Plane _____ ft. N. _____ ft. E. S/C/N	Wis. Unique Well No. _____ DNR Well Number _____
Facility ID 11673	Section Location of Waste/Source 1/4 of _____ 1/4 of Sec. _____ T. _____ N. R. _____ <input type="checkbox"/> E <input type="checkbox"/> W	Date Well Installed 11/05/2003
Type of Well Well Code 11/mw	Location of Well Relative to Waste/Source u <input type="checkbox"/> Upgradient s <input type="checkbox"/> Sidegradient d <input type="checkbox"/> Downgradient n <input type="checkbox"/> Not Known	Well Installed By: (Person's Name and Firm) S. Abel
Distance Well Is From Waste/Source Boundary ft.		Boart Longyear

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation 2.50 ft. MSL
C. Land surface elevation _____ ft. MSL
D. Surface seal, bottom _____ ft. MSL or 1.0 ft.

12. USC classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ☐ 5 0
Hollow Stem Auger ☒ 4 1
Air _____ Other ☒

15. Drilling fluid used: Water ☐ 0 2 Air ☐ 0 1
Drilling Mud ☐ 0 3 None ☐ 9 9

16. Drilling additives used? ☐ Yes ☒ No

Describe _____

Source of water (attach analysis): _____

E. Bentonite seal, top _____ ft. MSL or 1.0 ft.

F. Fine sand, top _____ ft. MSL or 45.5 ft.

G. Filter pack, top _____ ft. MSL or 47.5 ft.

H. Screen joint, top _____ ft. MSL or 49.5 ft.

I. Well bottom _____ ft. MSL or 59.5 ft.

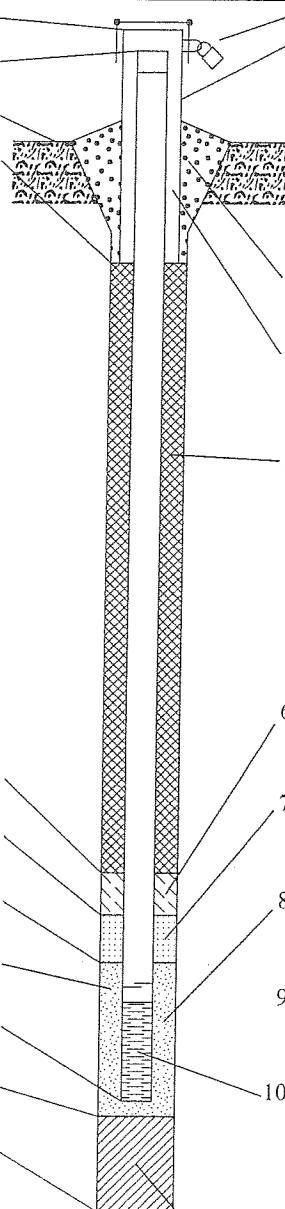
J. Filter pack, bottom _____ ft. MSL or 60.0 ft.

K. Borehole, bottom _____ ft. MSL or 60.0 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.37 in.

N. I.D. well casing 2.06 in.



1. Cap and lock? ☒ Yes ☐ No

2. Protective cover pipe:

a. Inside diameter: 4.0 in.

b. Length: 7.0 ft.

c. Material: Steel ☒ 0 4

Other ☐

d. Additional protection? ☒ Yes ☐ No

If yes, describe: 2 Bumper Posts

3. Surface seal: Bentonite ☒ 3 0

Concrete ☐ 0 1

Other ☐

4. Material between well casing and protective pipe:

Bentonite ☐ 3 0

Other ☒

#40 Badger

5. Annular space seal: a. Granular Bentonite ☒ 3 3

b. _____ Lbs/gal mud weight . Bentonite-sand slurry ☐ 3 5

c. _____ Lbs/gal mud weight . . . Bentonite slurry ☐ 3 1

d. _____ % Bentonite . . . Bentonite-cement grout ☐ 5 0

e. _____ Ft³ volume added for any of the above

f. How installed: Tremie ☐ 0 1

Tremie pumped ☐ 0 2

Gravity ☒ 0 8

6. Bentonite seal: a. Bentonite granules ☒ 3 3

b. ☐ 1/4 in. ☐ 3/8 in. ☐ 1/2 in. Bentonite pellets ☐ 3 2

c. _____ Other ☐

7. Fine sand material: Manufacturer, product name and mesh size

a. #7 Badger

b. Volume added _____ ft³

8. Filter pack material: Manufacturer, product name and mesh size

a. #40 Badger

b. Volume added _____ ft³

9. Well casing: Flush threaded PVC schedule 40 ☒ 2 3

Flush threaded PVC schedule 80 ☐ 2 4

Other ☐

10. Screen material: PVC

a. Screen Type: Factory cut ☒ 1 1

Continuous slot ☐ 0 1

Other ☐

b. Manufacturer Boart Longyear

c. Slot size: 0.010 in.

d. Slotted length: 10.0 ft.

11. Backfill material (below filter pack): None ☒ 1 4

Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature *[Signature]*

Firm Boart Longyear Company
101 Alderson Street Schofield, WI 54476

Tel: 715-359-7090

Fax: 715-355-5715

Please complete both Forms 4400-113A and 4400-113B and return to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

Summary Of Aquifer Calculations
 Four Seasons FS
 Hammond, Wisconsin
 Summit Project No. 1188-003

Hydraulic Conductivity (K)
(feet/day)

<u>Well:</u>	<u>Bouwer-Rice Method</u>	<u>Hvorslev Method</u>
MW001	9.84	2.79
MW002	0.39	0.12
Geometric Mean = $e^{(\text{mean}(\ln))}$ (MW001 and MW002)	1.96 ft/d	0.58 ft/d
MW003	81.7	22.9

Summit Envirosolutions, Inc.

1217 Bandana Boulevard North

St. Paul, Minnesota 55108

(651) 644-8080

Pumping test analysis

Time-Drawdown plot

Date: 6.10.2003

Page 1

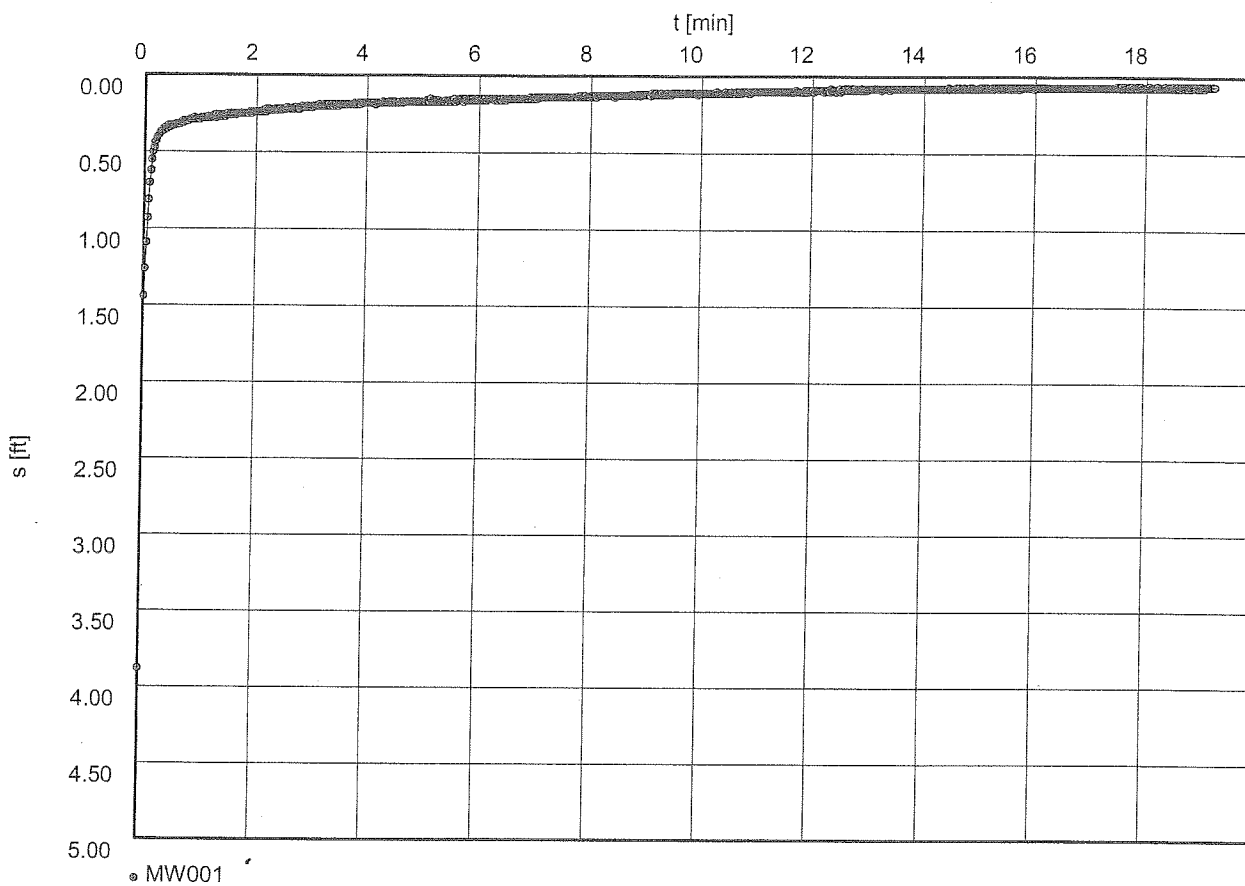
Project: Four Seasons FS - Hammond

Evaluated by: MDH

Pumping Test No.

Test conducted on: 9/23/03

MW001



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slug/bail test analysis
BOUWER-RICE's method

Date: 6.10.2003

Page 1

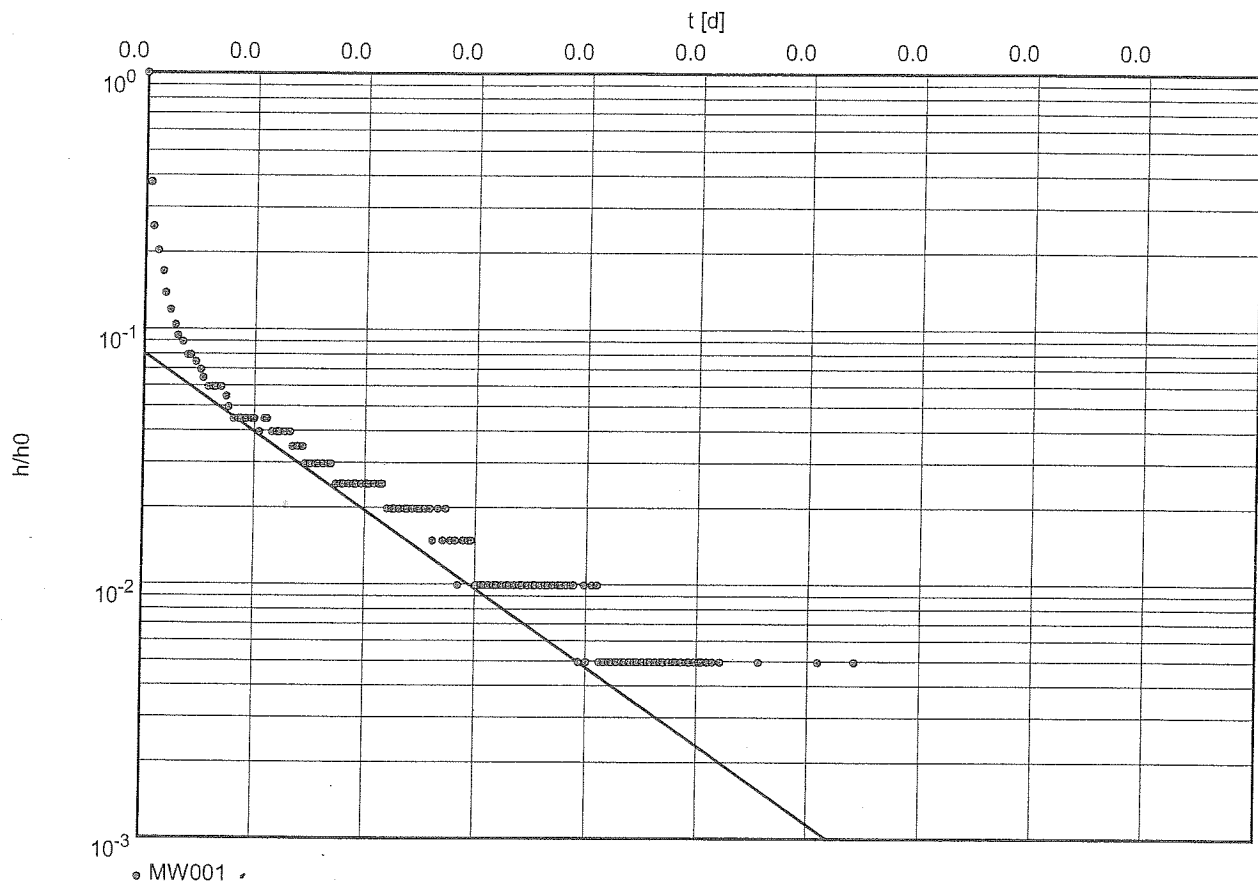
Project: Four Seasons FS - Hammond

Evaluated by: MDH

Slug Test No.

Test conducted on: 9/23/03

MW001



Hydraulic conductivity [ft/d]: 9.84×10^0

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slug/bail test analysis
HVORSLEV's method

Date: 6.10.2003

Page 1

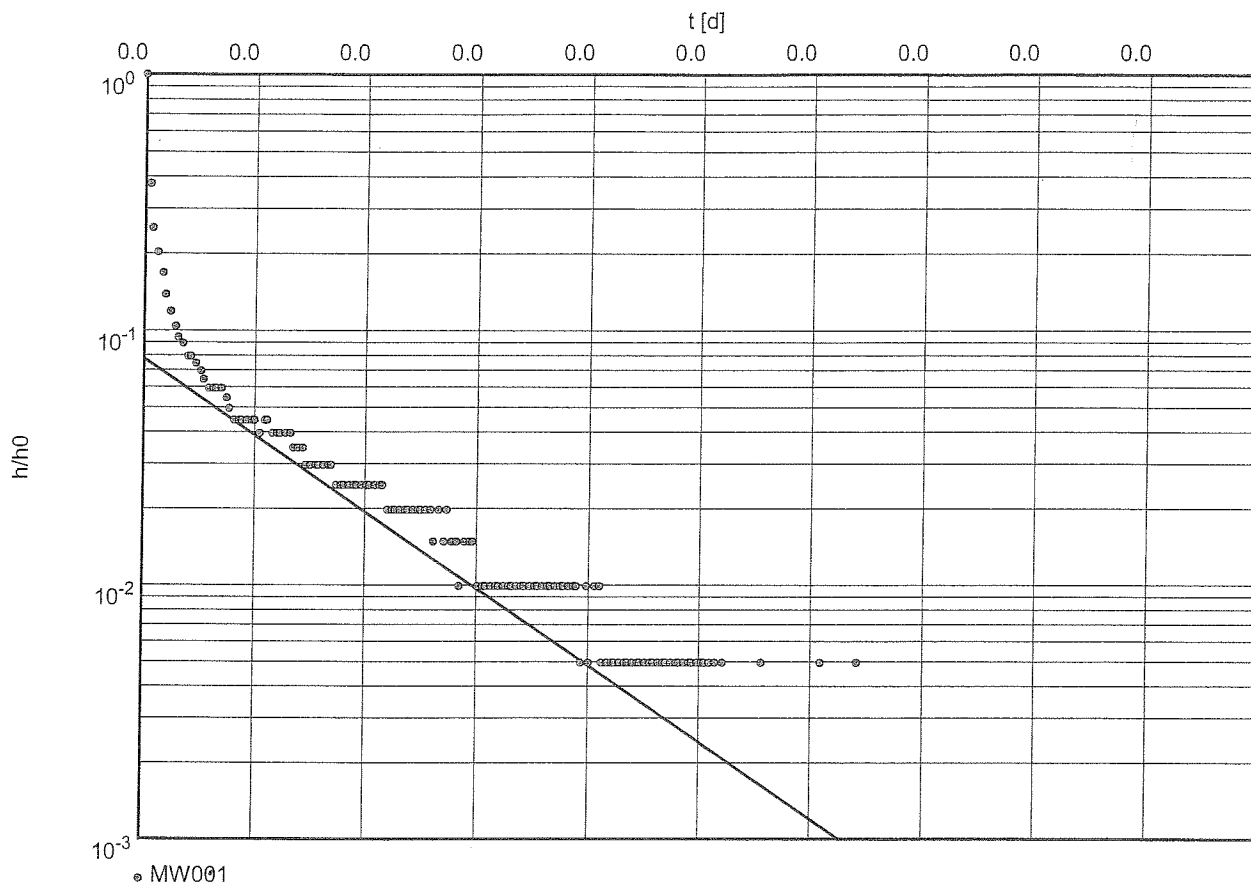
Project: Four Seasons FS - Hammond

Evaluated by: MDH

Slug Test No.

Test conducted on: 9/23/03

MW001

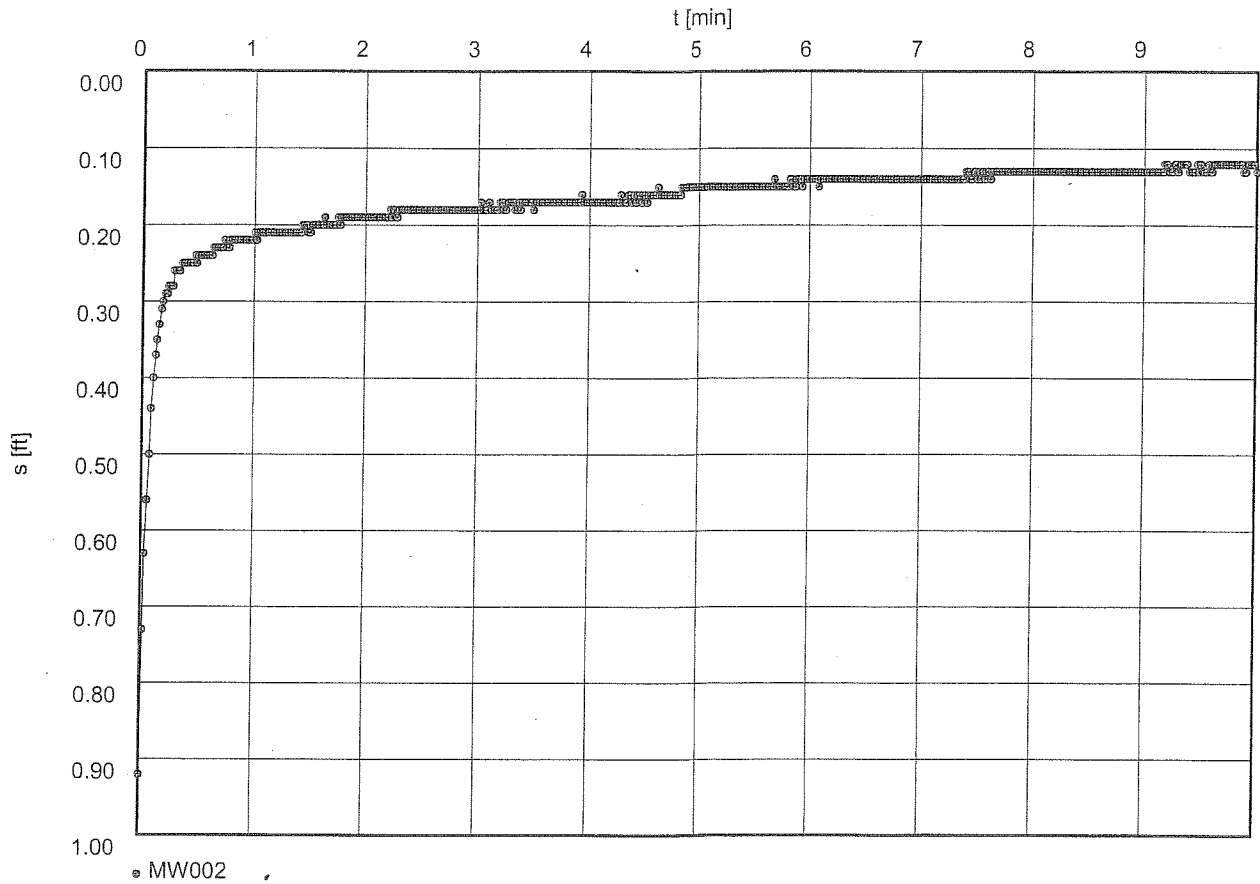


Hydraulic conductivity [ft/d]: 2.79×10^0

Pumping Test No.

Test conducted on: 9/23/03

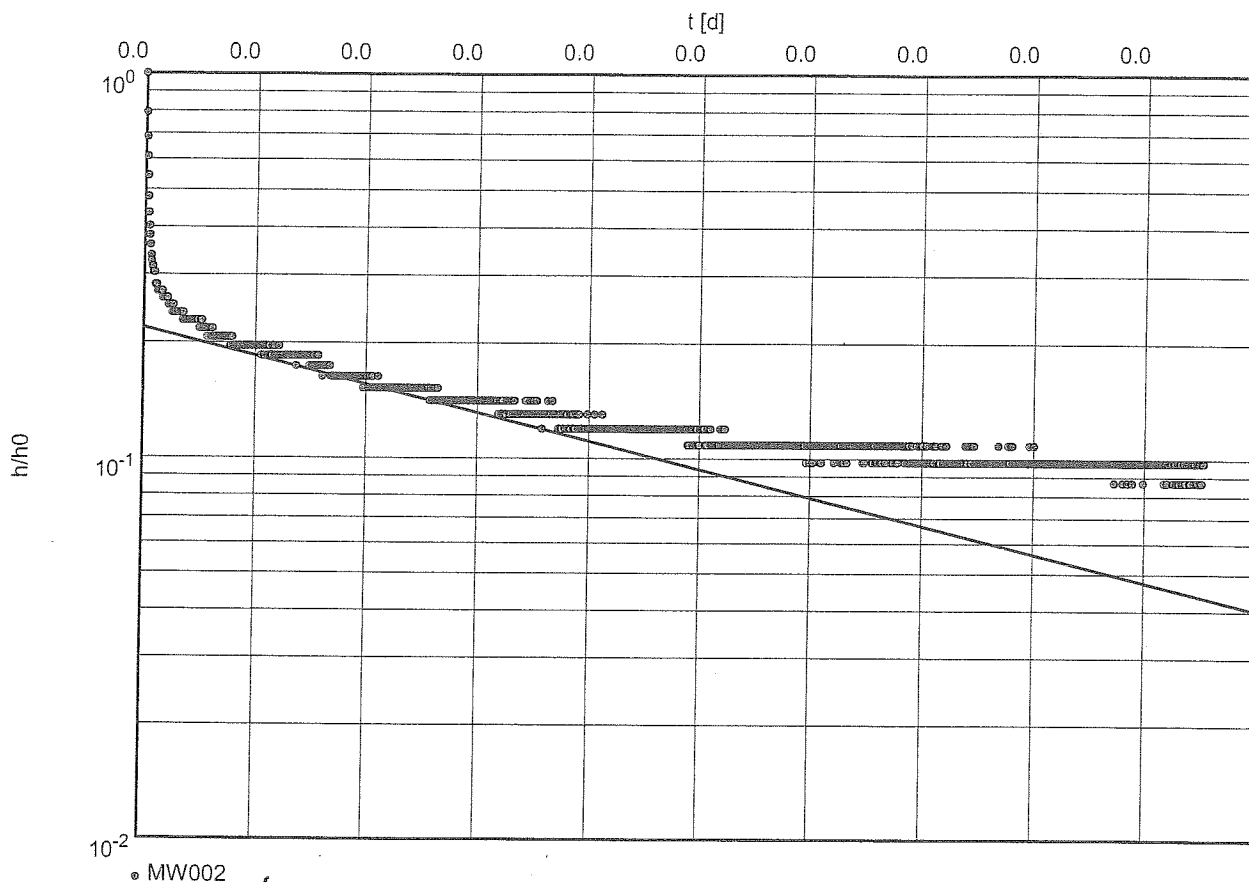
MW002



Slug Test No.

Test conducted on: 9/23/03

MW002



Hydraulic conductivity [ft/d]: 3.93×10^{-1}

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slug/bail test analysis
HVORSLEV's method

Date: 6.10.2003

Page 1

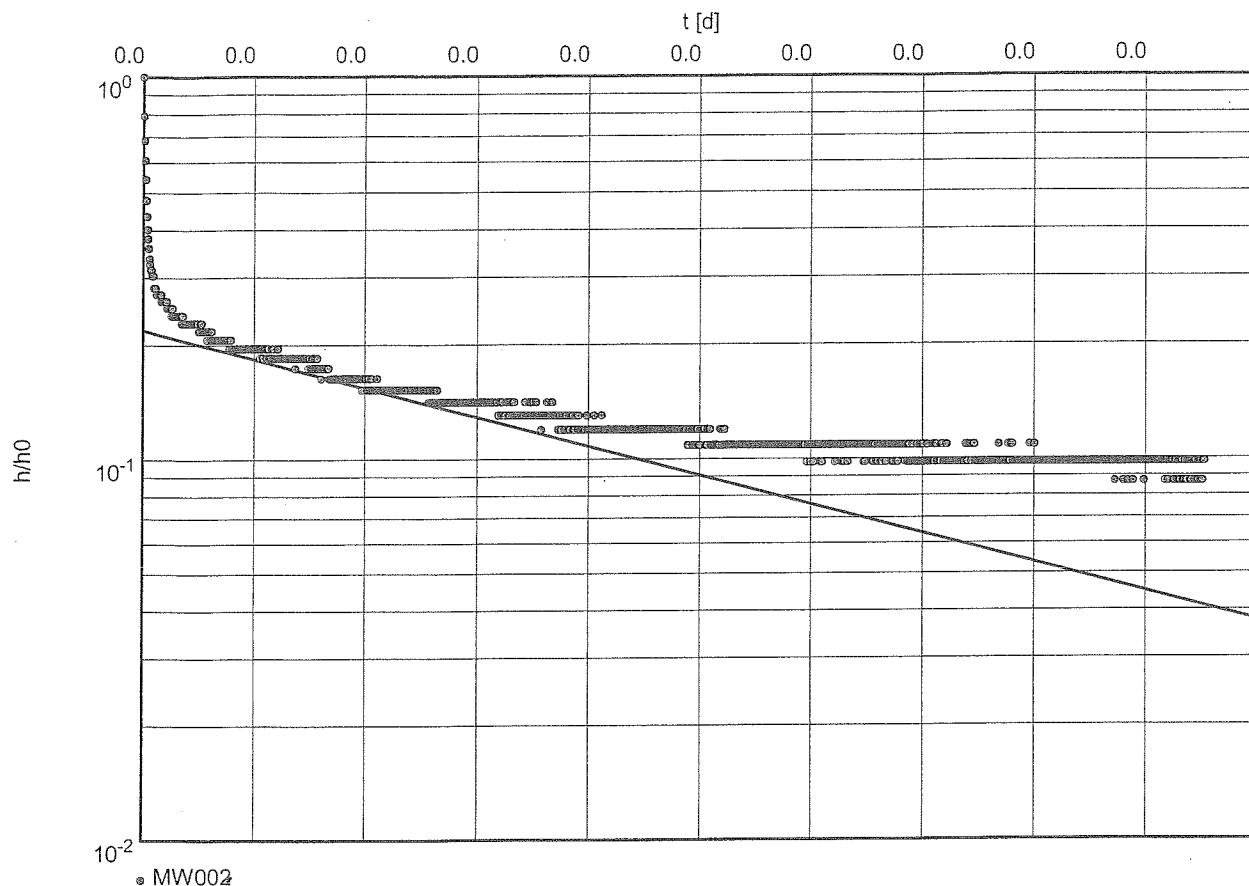
Project: Four Seasons FS - Hammond

Evaluated by: MDH

Slug Test No.

Test conducted on: 9/23/03

MW002



Hydraulic conductivity [ft/d]: 1.24×10^{-1}

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Pumping test analysis
Time-Drawdown plot

Date: 6.10.2003

Page 1

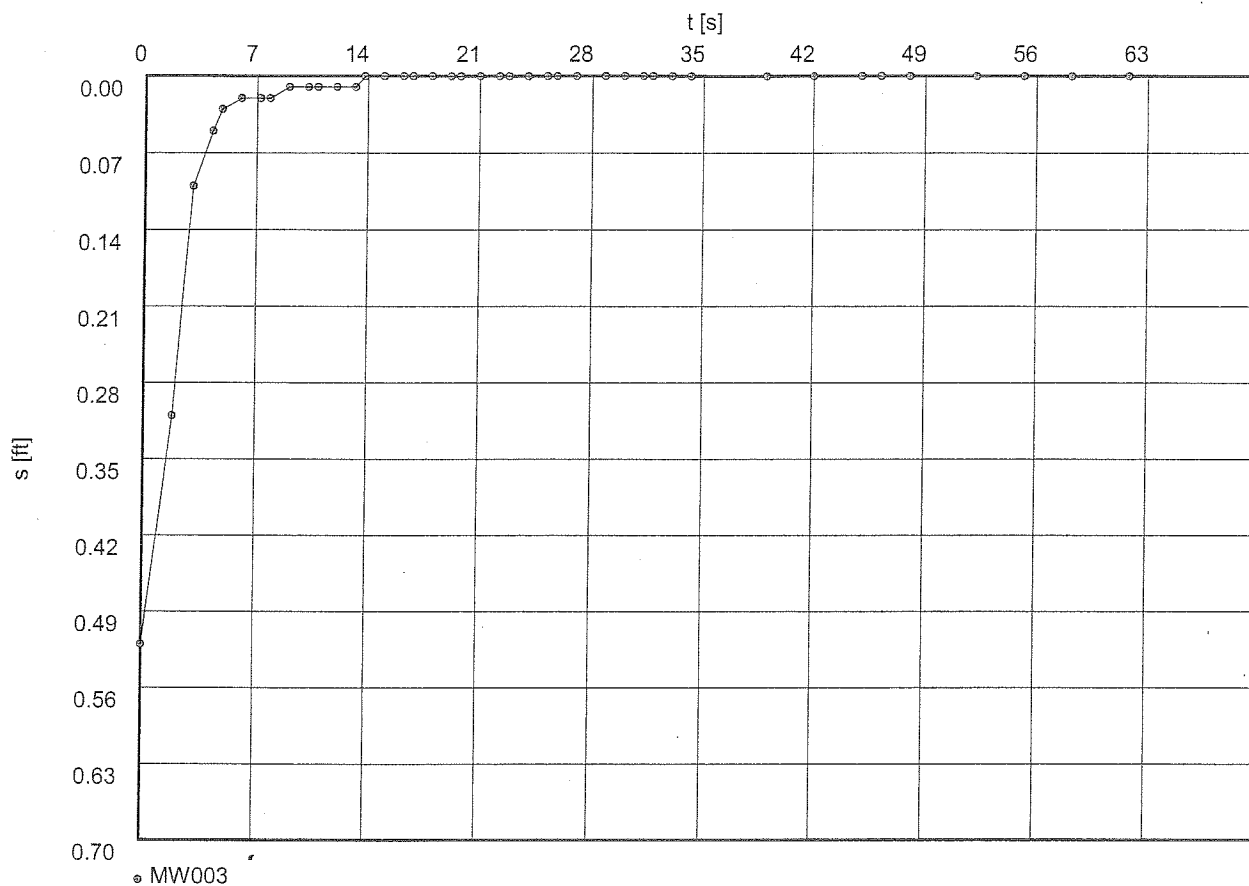
Project: Four Seasons FS - Hammond

Evaluated by: MDH

Pumping Test No.

Test conducted on: 9/23/03

MW003



• MW003

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slug/bail test analysis
BOUWER-RICE's method

Date: 6.10.2003

Page 1

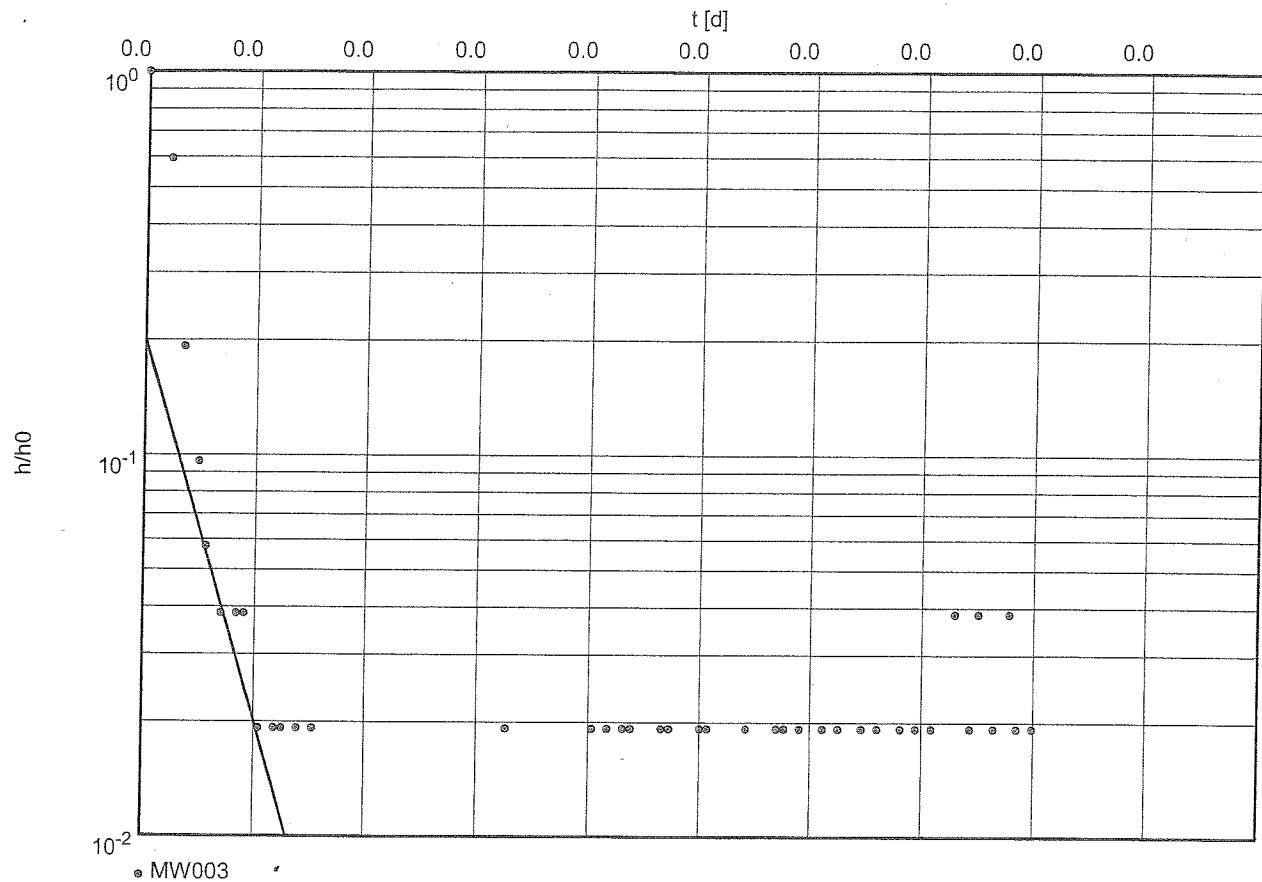
Project: Four Seasons FS - Hammond

Evaluated by: MDH

Slug Test No.

Test conducted on: 9/23/03

MW003



Hydraulic conductivity [ft/d]: 8.17×10^1

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slug/bail test analysis
HVORSLEV's method

Date: 6.10.2003 Page 1

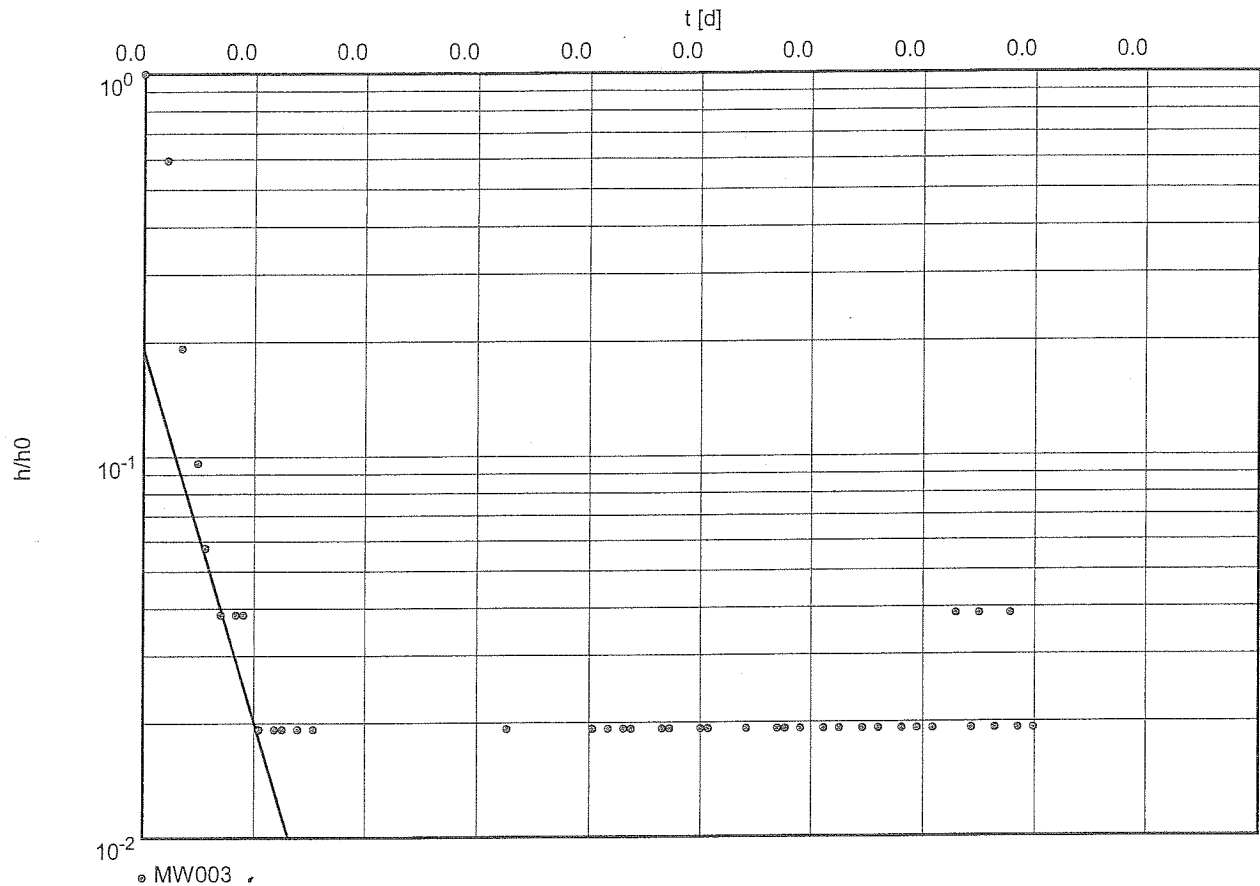
Project: Four Seasons FS - Hammond

Evaluated by: MDH

Slug Test No.

Test conducted on: 9/23/03

MW003



Hydraulic conductivity [ft/d]: 2.29×10^1