

TRANSMITTAL LETTER

TRC 708 Heartland Trail Suite 3000 Madison, WI 53717 Telephone 608-826-3600 Fax 608-826-3941

Wi Re 29	s. Annette Weissbach isconsin Department of Natural esources 84 Shawano Avenue een Bay, WI 54313-6727	Date: Project No: Project Name:	March 14, 2012 186467 Phase 000003 WDNR – Kewaunee Marsh			
Via Mail Courier X Overnight Pick-up Hand Delivered						
We are enclosing the following:						
Shop Drawings Prints Plans Specifications						
Copy of Letter Change Order Permits X Report						
COPIES	DATE	DESCRIP	TION			
1	3/14/12 Arsenic Hot Spot I Baseline Performa		Documentation Report and			
For your approval For your review and comment Returned for corrections						
X For your use Approved as submitted Resubmit copies for approval						
As requested Approved as noted Return corrected prints						
Comments:	Annette,					
	Enclosed is the final Documen for the Arsenic Hot Spot In-Sit Restoration Project. Please contact me at 608-826	u Remediation – Kev	·			
	1 loade domain me at 000-020	- Cooo ii you liave ali	y quoditorio.			

Alyssa Sellwood, P.E.
Project Manager

Sincerely,



Arsenic Source Area In-Situ Remediation Documentation Report and Baseline Performance Monitoring

Kewaunee Marsh Historic Arsenic Spill Restoration Project

March 2012



Arsenic Source Area In-Situ Remediation Documentation Report and Baseline Performance Monitoring

Kewaunee Marsh Historic Arsenic Spill Restoration Project

March 2012

Prepared For Wisconsin Department of Natural Resources Green Bay, Wisconsin

Alyssa Sellwood, P.E. Project Manager

Project Engineer

Theodore O'Connell Hydrogeologist Robert R. Stanforth 'Senior Environmental Scientist

TRC Environmental Corporation | Wisconsin Department of Natural Resources

Final

© 2012 TRC All Rights Reserved

Table of Contents

Exe	cutive	Summa	ary	iv
1.	Intro	oductio	n	1
	1.1	Backg	ground	1
	1.2	Purpo	ose and Scope	1
2.	Remedial Design			3
	2.1	Sourc	e Area Definition	3
	2.2	Reme	edial Approach and Description	3
	2.3		edial Objectives	
3.	Remediation Documentation			5
	3.1	Contr	ractor and Subcontractors	5
	3.2	In Sit	u Mixing Products Used	5
		3.2.1	Hydrogen Peroxide	
		3.2.2	Ferric Sulfate	6
		3.2.3	Limestone	6
		3.2.4	Bentonite	6
	3.3	Site P	reparation	6
		3.3.1	Access Restriction and Signs	6
		3.3.2	Fence Removal	7
		3.3.3	Access Road and Ramp	7
		3.3.4	Contamination Reduction and Storage of Mixing Products	7
		3.3.5	Monitoring Well Abandonment	8
	3.4	Field	Trial – In Situ Stabilization	8
		3.4.1	Purpose	8
		3.4.2	Site Grid	8
		3.4.3	Field Trial – Cell #1	9
		3.4.4	Field Trial – Cell #2	10
		3.4.5	Field Trial Results and Conclusions	11
	3.5	3.5 Full Scale – In Situ Stabilization		12
		3.5.1	Marsh	12
		3.5.2	Trail	13
	3.6	Moni	toring Well Construction	14

i

	3.7	Site Restoration			
		3.7.1 Marsh Restoration	15		
		3.7.2 Trail and Sideslope Restoration			
		3.7.3 Final Site Barriers	16		
		3.7.4 Equipment Decontamination	16		
	3.8	Waste Disposal	16		
	3.9	Post Construction Walk-through	17		
	3.10	Deviations from Specifications			
4.	Perfo	Formance Verification Sampling	19		
	4.1	Pace Analytical SPLP Results			
	4.2	TRC Screening SPLP Results	19		
	4.3	Evaluation of Treatment Effectiveness	20		
5.	Baseline Performance Monitoring				
	5.1	Baseline Water Sampling	22		
	5.2	Results	23		
	5.3	Analysis	24		
	5.4	Recommendations	24		
6.	Conclusions and Recommendations.				
	6.1	In Situ Stabilization	26		
	6.2	Baseline Performance Monitoring	26		
	6.3	Site Restoration	27		
7.	Refe	erences	28		
List o	of Tabl	oles			
Table	· 1	In Situ Treatment Results			
Table		Water Arsenic Concentrations – 2002 through 2011			
Table 3		2011 Baseline Performance Results			
List o	of Figu	ures			
Figure 1		Site Location Map			
Figure 2		Pre-Remedial Source Area Location Map			
Figure 3		Pre-Remedial Conceptual Source Area Cross Section	<u>*</u>		
Figur		Site Access Control During Construction			
Figur		Trail Access Detail			
3					

Figure 6	Remediation Detail
Figure 7	Cell Map and Monitoring Well Location Map
Figure 8	Performance Verification Results
Figure 9	In Situ Remediation Performance Monitoring Well Network
List of Appendices	
Appendix A	Product MSDS and Information Sheets and ORIN's Mixing Quantity
	Summary
Appendix B	Photographs
Appendix C	Well Abandonment and Well Construction Forms
Appendix D	Laboratory Reports
Appendix E	2010 Investigation Tables and Figures
Appendix F	Comparison of SPLP Arsenic Analysis versus Time Post-Treatment
Appendix G	Pre-Treatment Arsenic SPLP Test Result Estimates
Appendix H	Memo: 2011 Baseline Monitoring – Colloid and Long-Term Stability

iii

Executive Summary

Approximately 15 acres of water and sediment in the Buzz Besadny Fish and Wildlife Area (also known as the Kewaunee Marsh), in Kewaunee, Wisconsin, are contaminated with arsenic. The source of the arsenic is attributed to a spill from an overturned railroad car on the now inactive railroad adjacent to the site. The inactive rail line has been converted to part of the Ahnapee Trail network.

Site investigations completed between 2002 and 2005 defined the extent of the arsenic impacts in the groundwater, surface water, and sediment in the marsh, and led to the Wisconsin Department of Natural Resources (WDNR) establishing a site specific arsenic cleanup standard of 19 mg/kg for sediment and 0.148 mg/L for groundwater/surface water (STS, 2004 and STS, 2006).

The results of additional site investigations completed between 2005 and 2010 confirmed that a an area of highly impacted dissolved-phase arsenic was present below the trail and to the east of the trail in the marsh (RMT, 2007 and RMT, 2010). The WDNR selected to remediate the arsenic source area using an in situ stabilization approach designed from site specific treatability studies. Sediment with compositional arsenic concentrations greater than 2,000 mg/kg at the time of RMT's 2009/ 2010 source area investigations (correlated to leach above the hazardous waste criteria of 5 mg/L) were defined as the extent of the source area to be subjected to in situ stabilization. This material was present under a 70-foot length of the trail and extended 80 feet into the marsh. The in situ stabilization was designed to render the source area material non-hazardous, and limit the migration of arsenic in the marsh.

The in situ remediation was completed in October 2011 by Orin Technologies, Inc. (ORIN). Hydrogen peroxide, granular ferric sulfate, crushed limestone, and bentonite were incorporated into 3,000 cubic yards of sediment, in series, to stabilize arsenic in the source area and mitigate the on-going release of dissolved-phase arsenic impacts to the marsh.

TRC Environmental Corporation (TRC), formerly RMT, Inc. (RMT), was retained by the WDNR to oversee and document the in-situ remediation, to complete sediment performance verification sampling and baseline groundwater sampling, and to evaluate the sampling results. ORIN completed the in situ remediation of the arsenic source area and subsequent site restoration in accordance with the specifications (WDNR, 2011). The performance verification results for the treated sediment indicate that arsenic stabilization was achieved throughout the bulk of the treatment area at the time of treatment. The average SPLP arsenic concentration in

the source area prior to treatment was approximately 31 mg/L, and was reduced to approximately 0.2 mg/L as a result of the in situ stabilization.

The results from the baseline monitoring event are inconclusive with respect to the water quality in the treatment area. The arsenic concentrations in the water samples collected from within the treatment zone were between 100 and 300 mg/L, which is higher than anticipated. We expected the arsenic concentrations to be less than 5 mg/L based on SPLP results from the treated sediment. TRC believes the elevated arsenic concentrations in the treatment area may be a result of colloidal solids passing through the filter used to differentiate dissolved and particulate metals, rather than actual aqueous phase concentrations of arsenic. If the arsenic is associated with colloids, then the arsenic detected in the treatment area is not mobile, and will likely settle out of suspension through time. TRC recommends further evaluation of the potential for colloidal particles being present in the water in the treatment area. Specifically, we recommend completing a water sampling event in the spring of 2012 to evaluate low-flow sampling techniques and smaller filter sizes that may be used during sampling. Following analysis of the spring 2012 sampling results, TRC will propose necessary modifications to the June 2011 Performance Monitoring Plan.

1.1 Background

Approximately 15 acres of water and sediment in the Buzz Besadny Fish and Wildlife Area (also known as the Kewaunee Marsh), in Kewaunee, Wisconsin, are contaminated with arsenic. The source of the arsenic is attributed to a spill from an overturned railroad car that likely occurred between 1938 and 1950 on the now inactive railroad adjacent to the site. In 1996, following discovery of the contamination, 4 acres of the marsh were capped and all 15 acres were enclosed in a fence as in interim action to limit direct contact with the arsenic impacts. The cap and fence remain in place at the site, and the inactive rail line has been converted to a hiking, biking, and snowmobile trail as part of the Ahnapee Trail network (Figure 1).

Between 2002 and 2005, STS Consultants (STS) completed site investigation activities to define the distribution of arsenic in the sediment, surface water, and groundwater at the site (STS, 2004 and STS, 2006). Based on the results of the STS investigation, the Wisconsin Department of Natural Resources (WDNR) established site specific cleanup standards of 19 mg/kg for sediment and 0.148 mg/L for groundwater/surface water.

Between 2005 and 2007, following the site investigation, RMT, Inc. (RMT), completed a treatability study and a remedial options analysis for the marsh to evaluate alternatives for achieving the site-specific cleanup standards (RMT, 2007). During the study, RMT noted that an area of elevated arsenic concentrations (2,200 mg/L) was present in groundwater near the former railroad ballast at monitoring well MW04-10. RMT completed an additional groundwater investigation near MW04-10 to test the hypothesis that a source area of dissolved-phase arsenic was present within the railroad ballast (Figure 2). The results of the additional investigation confirmed that an area of highly impacted dissolved-phase arsenic was present below the railroad ballast and to the east of the ballast in the marsh.

1.2 Purpose and Scope

Treatability and feasibility studies were completed to evaluate the remedial options for the source area (RMT, 2010). The WDNR selected to implement in situ remediation of the arsenic source area, with the remedial objective of stabilizing the arsenic in the source area and eliminating the on-going release of dissolved arsenic impacts to the marsh.

The in situ stabilization remedy was completed for the source area in October 2011. The purpose of this report is to document the in situ remediation and analyze the performance verification results for the treated sediment and baseline groundwater samples. The scope of this report includes the following:

- Summary of the remedial design
- Documentation of the remediation
- Analysis of performance verification sampling
- Analysis of baseline groundwater monitoring
- Conclusions and recommendations for post-remedial activities moving forward

2.1 Source Area Definition

Between 2009 and 2010, RMT completed focused source area investigations (RMT, 2010). Material with compositional arsenic concentrations greater than 1,000 mg/kg was found to potentially leach arsenic at concentrations greater than 5 mg/L in a TCLP test. The material with compositional arsenic concentrations greater than 1,000 mg/kg was present under a 70 foot length of the ballast and extended approximately 200 feet northeasterly into the marsh, and was present five to 15 feet below grade in the ballast and zero to seven feet below grade in the marsh. An organic silt layer was evaluated to be impeding further downward migration of the arsenic under the ballast and in the marsh. The arsenic concentrations and cross-sections from the source area investigation are included in Appendix E for reference.

Evaluation of time series data collected from the marsh showed that the concentration of compositional arsenic has decreased through time. The rate of decrease observed in the historical data was projected into the future. From this, we estimated that material with compositional arsenic concentrations less than 2,000 mg/kg would decrease to levels that are below 1,000 mg/kg in less than five years. Thus, the area targeted for remediation, was defined to be areas containing material with compositional arsenic concentrations greater than 2,000 mg/kg at the time of the 2009/ 2010 investigation (RMT, 2010). The extent of the source area targeted for remediation is shown in plan view and cross-sectional view in Figures 2 and 3, respectively. The material containing compositional arsenic greater than 2,000 mg/kg was present under a 70-foot length of the ballast, extended 80 feet into the marsh, and contained an estimated 2,400 cubic yards of material.

2.2 Remedial Approach and Description

The 2,400 cubic yards of source area material containing compositional arsenic concentrations greater than 2,000 mg/kg were targeted for in situ treatment. The remedy was designed using treatability studies completed on samples of material collected from the source area at the site (RMT, 2007 and RMT, 2010). The in situ remedy called for incorporating hydrogen peroxide, granular ferric sulfate, and crushed limestone, in series, into the source area material to stabilize the arsenic in this area. The hydrogen peroxide was first incorporated to convert arsenic present in the form of arsenite to arsenate. Next, the ferric sulfate was added to precipitate the arsenic as ferric arsenate, a non-leachable form of arsenic under standard geochemical conditions. (Ferric sulfate addition also forms ferric hydroxide, which can absorb additional

3

\\NTAPB-MADISON\MSN-VOL6\-\WPMSN\PIT2\186467\0000\000003\R1864670000-001 DOCX3/12/12

arsenate.) Finally, the limestone was added as a buffering agent to neutralize the acid generated from the previous chemical reactions. Following the application of the treatment chemicals, granular bentonite was blended into the treated marsh sediment to reduce the permeability of the material, and improve the long-term performance of the treatment (restrict the flow of groundwater in the area).

2.3 Remedial Objectives

The objective of the remediation was to stabilize the arsenic in the source area and mitigate the on-going release of dissolved-phase arsenic impacts to the marsh, with the long-term objective of achieving the site-specific clean-up level of 0.148 mg/L arsenic in the groundwater and surface water at the site. To meet this long-term objective, a remediation goal of SPLP arsenic concentrations less than 0.148 mg/L for the treated sediment as evaluated during implementation of the remedy, was established for the treated material in the source area. However, flexibility was incorporated into the design to allow acceptance of higher individual SPLP concentrations, up to 5 mg/L, in the performance verification process. In a controlled lab setting the treatment was able to reduce the SPLP arsenic concentrations in the sediments collected from the source area to below 0.148 mg/L; however, at the field scale it was understood that site specific constraints may limit achieving this specific numeric goal, and modifications to the numeric treatment goal were allowed.

4

\NTAPB-MADISON\MSN-VOL6\-\WPMSN\PIT2\186467\0000\000003\R1864670000-001 DOCX3/12/12

Section 3 **Remediation Documentation**

The in situ remediation of the arsenic source area, as defined in the plans and specifications (WDNR, 2011), was completed at the site between October 2 and October 24, 2011. The subcontractors and remediation activities are summarized below.

3.1 Contractor and Subcontractors

ORIN Remediation Technologies, LLC, of McFarland, WI (ORIN) was the contractor retained by the WDNR to implement the in situ remediation in the marsh and trail areas. ORIN was responsible for managing the in situ remediation and site restoration, and overseeing their subcontractors.

Veolia ES Industrial Services, Inc. of Brokaw, WI (Veolia) was subcontracted by ORIN to provide and operate the earthmoving equipment and site construction features. Veolia's work included, but was not limited to the following; install temporary fences and signs; remove portions of permanent fence for marsh access; construct an access road and access ramp; apply and mix the ferric sulfate, limestone, and bentonite during the in situ treatment; restore the disturbed marsh areas with topsoil, mulch, and seed; restore disturbed trail areas; install a permanent access gate; and restore the site to pre-construction conditions.

On-Site Environmental Services, Inc. of Sun Prairie, WI (On-Site) was subcontracted by ORIN to construct five permanent monitoring wells and provide well construction forms.

Technical Engineering Support Services of Green Bay, WI (TESS) was subcontracted by ORIN to survey the elevations of the five newly installed permanent monitoring wells.

3.2 In Situ Mixing Products Used

MSDSs and product information sheets for in situ mixing products and ORIN's summary of the quantities of each chemical applied to the treatment area are presented in Appendix A.

3.2.1 Hydrogen Peroxide

A total of 330 gallons of 50% standard grade aqueous hydrogen peroxide solution from the Hydrite Chemical Company was delivered to the site in six 55-gallon plastic drums. Hydrogen peroxide was diluted and applied in a 5% solution during the remediation. Batches of 5% hydrogen peroxide solution were made by adding 10 gallons of 50%

solution to 90 gallons of water for a total of 100 gallons. All 330 gallons of 50% hydrogen peroxide delivered to the site were mixed into the treatment area.

3.2.2 Ferric Sulfate

Approximately 70.5 tons of Kemiron Ferix-3 granular ferric sulfate from Kemira was delivered to the site in sixty-four 2,204-pound (1.1 ton) super sacks. All 70.5 tons of ferric sulfate was mixed into the treatment area.

3.2.3 Limestone

Approximately 60 tons of limestone (100% passing 3/8" sieve, 95.5% passing No. 4 sieve, and 18.7% passing No. 100 sieve) from Daanen & Janssen, Inc. of De Pere, WI (D&J) was delivered to the site in dump trucks and stockpiled on the trail. All 60 tons of limestone was mixed into the treatment area.

3.2.4 Bentonite

A total of 120 tons of Sorbond UG granular bentonite from Cetco® was delivered to the site in 2,000-pound (1 ton) super sacks. All 120 tons of bentonite was mixed into the treatment area.

3.3 Site Preparation

The in situ treatment area was located along the Ahnapee State Trail, and the trail was used as the access road to the site and staging area during the remediation. In order to restrict public access to the construction area, the trail was closed during remediation at the locations shown on Figure 4. In addition, an access road through the private property adjacent to the trail, was constructed at the site entrance, in order to support construction traffic between River Road and the trail (Figures 4 and 5). The activities associated with the site preparations and access to the site are summarized below.

3.3.1 Access Restriction and Signs

Trail barricades, constructed of eight-foot high chain link fence, as shown in Photo 1 of Appendix B (Photo 1), were installed at the locations shown on Figure 4, to prevent the public from accessing the construction work zone. Signs were installed at the barricades and other trail locations, as shown on Figure 4.

Construction of a lockable swing gate across the access road was called for in the specifications. However, this gate would have restricted truck access for deliveries and

was therefore omitted from the site preparation. Construction of the permanent gate was delayed until site restoration (Photo 42).

3.3.2 Fence Removal

To allow access to the marsh for remedial construction equipment and personnel, a portion of the existing chain link fence adjacent to the trail was cut to the northwest of the treatment area and rolled back southeast of the treatment area (Photos 4 and 5). Fence posts within the treatment area were pulled from the ground and stored on-site for eventual fence re-construction.

3.3.3 Access Road and Ramp

Approximately 150 tons of gravel from D&J was delivered to the access point on private property, and was graded and compacted to construct an access road connecting River Road to the trail (Figure 5 and Photo 3). Topsoil stripping was not required to construct the access road.

Approximately 220 tons of limestone gravel from D&J was delivered to the treatment area, and was graded to construct an access ramp connecting the trail to the marsh for remedial construction equipment and personnel (Photo 6). The approximate location of the ramp is shown on Figure 6.

Contamination Reduction and Storage of Mixing Products

All construction and well-drilling equipment was washed in accordance with the specifications, prior to delivery to the site, to prevent the spread of exotic invasive organisms.

A contaminant reduction zone was established around the in situ treatment area to prevent the transport of contaminated media off the site. Erosion control fencing and decontamination stations were set up within the contaminant reduction zone (Figure 6 and Photo 7). Personal protective equipment (PPE) staging areas, wash stations, and a hazardous waste disposal drum were located at the access point to the treatment zone (Photo 16).

Dedicated staging areas for hydrogen peroxide, ferric sulfate, and bentonite were established as shown on Figure 6. Hydrogen peroxide was stored on the trail in 55-gallon plastic drums (Photo 5) and bentonite and ferric sulfate were stored in super sacks placed in the marsh adjacent to the treatment area (Photos 8 and 19), as well as on

the trail. Super sacks were covered with a tarp when not in use to keep dry. Limestone was stored in stockpiles on the trail and on the site access ramp (Photo 20).

3.3.5 Monitoring Well Abandonment

Monitoring well MW04-10, was located within the treatment area, and therefore was specified to be abandoned prior to in situ mixing. To abandon well MW04-10, Veolia wrapped a strap around the well casing, attached it to the backhoe, and then pulled it up using the backhoe to remove the casing from the ground. The same method was used to remove the PVC well from the ground. The outer casing was sprayed with a pressure washer and disposed off-site as solid waste, and the PVC well and pre-packed screen were disposed as hazardous materials (Section 3.8). The borehole was not abandoned with bentonite or other sealant, because the forthcoming mixing for the remediation would homogenize the sediment at the location of the well. A well abandonment form for MW04-10 is included in Appendix C.

3.4 Field Trial – In Situ Stabilization

3.4.1 Purpose

On October 5, 2011, a field trial was conducted within the treatment area prior to implementing the full-scale remedy. The purpose of the field trial was to evaluate the means and methods selected by ORIN, and the effectiveness of the treatment chemistry when implemented at the field scale. The specific treatment goal described in Section 2 was also evaluated during the field trial, in order to develop treatment criteria that was achievable for full scale implementation of the in situ stabilization, and that met the remedial objective for arsenic stabilization.

3.4.2 Site Grid

Previous investigations have shown that the vertical extent of the source area is contained in the peat and ballast sand, and that significant impacts of arsenic do not extend into in the underlying low permeability organic silt layer (Figure 3 and Appendix E). Previous investigations have also estimated the thickness of the peat layer in the marsh to be approximately seven feet. The initial target area of material to be treated in the marsh measured approximately 80 feet by 80 feet, making the target volume of material to be treated in the marsh approximately 1,600 cubic yards. For ease of tracking work and chemical dosage and application, ORIN established a site grid consisting of sixteen 100-cubic yard cells, each measuring approximately 20 feet by 20 feet in the marsh. As discussed later, two additional cells (cell 14 and cell 17) were

8

\NTAPB-MADISON\MSN-VOL6\-\WPMSN\PIT2\186467\0000\000003\R1864670000-001 DOCX3/12/12

added to the marsh treatment during construction, for a total of eighteen 100 cubic yard cells in the marsh. Eight larger volume cells measuring 20 feet by 20 feet, and depth between 10 and 15 feet were established for the trail and sideslopes to the trail.

The location and number assigned to the twenty-six treatment cells (numbered in sequential order as completed during remediation) are shown in Figure 7, and the estimated treatment volume of each cell is summarized in Table 1. The field trial was completed on cell #1 and cell #2, which is described in further detail below.

3.4.3 Field Trial – Cell #1

The field trial was conducted in cell #1 to evaluate the means and methods selected by ORIN, and the effectiveness of the full scale remedy. Cell #1 was located at the western edge of the marsh treatment area adjacent to the trail embankment (Figure 8 and Photo 9). A mark was made on the backhoe seven feet above the bottom tip of the bucket to indicate approximately when the organic silt layer would be reached. As marsh material was excavated from this cell with a backhoe and placed on the cap within the treatment area, it was sprayed with 5% hydrogen peroxide solution (Photo 11). Approximately one gallon of solution was applied to every cubic yard of material excavated. Excavation stopped once the top of the organic silt layer was observed in the bottom of the excavation (Photo 10). The depth to the organic silt layer was confirmed (with the mark made on the backhoe) to be approximately seven feet below ground surface.

The walls of the excavation remained stable with no sloughing of the peat. The fibrous peat held up well structurally and did not release water when excavated, despite being saturated. The excavation remained dry for approximately, 10 minutes, after which time, groundwater did begin to enter after the open excavation; however, the excavation was backfilled prior to accumulation of groundwater.

After the target depth was reached across the excavation, the excavation was backfilled with approximately half of the excavated material that had been treated with hydrogen peroxide (50 cubic yards). One super sack (1.1 tons) of ferric sulfate was then connected to the backhoe, raised above the first lift of backfilled material, cut open with a utility knife, and spread on the surface of the first lift (Photo 12). The ferric sulfate was then mixed into the first lift with the backhoe bucket (Photo 13). The peat had no cohesion and the backhoe was able to uniformly mix the ferric sulfate into the peat by scooping and spreading these materials throughout the treatment cell. The ferric sulfate began to dissolve upon contact, but there was a delay such that ferric sulfate granules could be observed mixing into the peat, verifying uniform mixing.

9

The backhoe then scooped approximately 2,150 pounds (1.1 tons) of limestone from a stockpile on the trail and spread it on the surface of the first lift. The limestone was then mixed into the first lift with a backhoe bucket. The lack of cohesion of the peat allowed the backhoe to uniformly mix the limestone into the peat by scooping and spreading these materials throughout the treatment cell. Following the limestone mixing step in the first lift, TRC collected a representative sample of treated material from the backhoe bucket (Photo 14). The sample was submitted to Pace Analytical Laboratories, Inc. of Green Bay, WI (Pace) for SPLP arsenic analysis.

The excavation was then backfilled with the remaining 50 cubic yards of excavated material and mixed using the same approach as the first lift. Bentonite was not added to cell #1 during the field trial in order to verify the chemical stabilization of the treated material prior to introducing additives to limit the sediment's hydraulic conductivity.

3.4.4 Field Trial – Cell #2

The field trial in cell #2 was completed to evaluate the effect of bentonite addition immediately following chemical stabilization. The project specifications called for adding bentonite after treatment chemistry had been verified because it was assumed that the bentonite would increase the cohesion of the marsh materials and reduce the ability for chemicals to be uniformly mixed into a cell if additional treatment was needed. However, upon initiation of the work at the site, it became apparent that access to cells would be restricted following chemical stabilization because the disturbed marsh would no longer support the mixing equipment, such that adding the bentonite in sequence with the treatment chemicals was preferred. The second field trial was conducted on the northern edge of the marsh, in the area of lowest arsenic concentrations, where treatment goals were expected to be easiest to achieve (Figure 7). This location was selected to limit the potential of additional chemical mixing being required following bentonite addition.

Excavation for the treatment of cell #2 extended to the top of the organic silt layer, which was observed approximately seven feet below ground surface. The same process described above used to treat cell #1 was used to treat cell #2; with the exception that bentonite was also mixed into the cell #2. Following the limestone mixing step in the first lift, 2.5 super sacks of bentonite were spread on the surface of the first 50 cubic yard lift. The sacks were connected to the backhoe in series, raised above the first lift, cut open with a utility knife, and spread on the surface of the first lift. The bentonite was then mixed into the first lift with a backhoe bucket. The peat in cell #2 had no cohesion and the backhoe was able to uniformly mix the bentonite (as well as ferric sulfate and

limestone) into the peat by scooping and spreading these materials throughout the treatment cell. Bentonite granules mixing into the peat were observed visually.

TRC collected two samples of treated first-lift material from the backhoe bucket. One sample was collected following chemical stabilization, but prior to bentonite addition, and one sample was collected following bentonite addition. The samples were submitted to Pace for SPLP arsenic analysis. The excavation was then backfilled with the remaining 50 cubic yards of excavated material and mixed using the same approach as the first lift.

3.4.5 Field Trial Results and Conclusions

SPLP arsenic testing on the sample collected from cell #1 was completed by Pace on October 7, 2011. Laboratory reports for samples are presented in Appendix D and summarized in Table 1. The concentration from the SPLP arsenic analysis for the sample of treated material from cell #1 was 0.26 mg/L. The target remediation goal concentration set in the specifications was 0.148 mg/L; however, the specifications allowed for flexibility in the numeric concentration achieved during the full scale remedy based on the results of the field trial. Previous analysis has shown that untreated materials in the source area can have SPLP arsenic concentrations up to 93 mg/L. The three order of magnitude reduction in the SPLP arsenic levels achieved by the in situ mixing in cell #1 and the achievement of SPLP arsenic concentration below the hazardous waste criteria (5 mg/L), met the remedial objectives for the in situ treatment. Therefore, the effectiveness of the full scale remedy was determined to be sufficient by TRC and the WDNR.

SPLP arsenic testing on the samples collected from cell #2 pre- and post-bentonite addition were completed by Pace on October 10, 2011. Arsenic was not detected in either sample (limit of detection 0.025 mg/L). The reduction in the SPLP arsenic levels achieved by the in situ mixing in cell #2 was evaluated to be successful by TRC and WDNR, but the effect of bentonite addition on SPLP arsenic concentrations could not be quantitatively evaluated following analysis of cell #2 field trial results since arsenic was not detected in either sample.

The field trial demonstrated that the means and methods selected by ORIN were effective at uniformly mixing the treatment chemicals with the marsh sediment, and that the approach met the remedial objectives for the source area sediment. The field trial also showed that incorporating the bentonite in series with the treatment chemicals did not affect the stabilization of the arsenic, and did not create conditions that would limit additional mixing of chemicals into the marsh sediment if verification results indicated

more treatment was needed during full scale implementation. Based on evaluation of the field trial means and methods and effectiveness, TRC and the WDNR directed ORIN to begin full scale in-situ stabilization using the same means, methods, and chemical dosage applied during the field trial in cell #2.

3.5 Full Scale – In Situ Stabilization

3.5.1 Marsh

Full-scale in situ stabilization of the marsh began on Monday, October 10th and was completed on Friday, October 14th. The marsh included cells #3 – #18, which were numbered in chronological order (Figure 7). A summary of the quantities of materials mixed into each lift, as prepared by ORIN (with footnotes added by TRC), is presented in Appendix A, and the approximate volume treated in each cell is summarized in Table 1. Each cell in the marsh was approximately 20-foot by 20-foot and 7-feet deep and included approximately 100 cubic yards of material.

The same mixing procedure used during the cell #2 field trial was generally followed (Photo 18). One exception to this is that bentonite was spread on top of cell #1 and cells #11 - #14, and was mixed in all at once instead of being mixed in two lifts following chemical stabilization (Photo 20). Bentonite addition was delayed in cell #1 because the field trial was designed to verify the effectiveness of the treatment chemistry prior to reducing the hydraulic conductivity of the peat. Bentonite addition was delayed in cells #11 - #14 because of a delayed bentonite shipment.

It was assumed that sloughing would occur during the excavations, and benching of perimeters marsh materials would be required to reach the base of the targeted source area location. Based on these assumptions, the project was bid assuming 25 percent more than the 2,400 cubic yard targeted volume, or a total of 3,000 cubic yards of material to be treated. However, little to no sloughing occurred and benching was not required. Therefore, the 2,400 cubic yards of material targeted for in situ stabilization could be treated by excavating less than the bid volume of 3,000 cubic yards, and this resulted in a surplus of chemicals and bentonite. In order to achieve a treatment volume similar to the bid volume and use the surplus chemicals, two additional cells (#14 and #17) were added in the marsh (Figure 7 and Photo 23). These cells covered marsh material with compositional arsenic concentrations greater than 1,000 mg/kg.

Because only minimal groundwater entered the treatment cells during excavations, dewatering the excavations was not required to implement the full scale remedy at the site.

Pieces of the cap previously installed over the marsh (geotextile and Styrofoam), were excavated during the treatment of the marsh cells. These scrap pieces of cap where replaced into the bottom of the cell excavations and covered with treated material (Photo 17).

3.5.2 Trail

Full-scale in situ stabilization of the trail (i.e., former railroad ballast) and trail sideslope began on Monday, October 17th and was completed on Tuesday, October 18th. This included cells #19 - #24 (Figure 7). ORIN's summary of the treatment for each cell is included in Appendix E, and the approximate volume treated in each cell is summarized in Table 1. The cells treated near the trail were approximately 20-foot by 20-foot and varied in depth up to 15 feet.

A mixing procedure similar to what was used in the marsh was generally followed; however, clean ballast material, from approximately 0 to 5 feet above the surface elevation of the marsh (Figure 3), was removed from the trail and stockpiled on plastic sheeting within the treated marsh area (Photo 25). Arsenic-contaminated ballast sand, present from approximately 0 to 7 feet below the surface elevation of the marsh (Figure 3), was sprayed with hydrogen peroxide solution as it was excavated from the cells and placed within the treated marsh area (Photos 26 and 30). Arsenic-contaminated peat, from approximately 7 to 10 feet below the surface elevation of the marsh (Figure 3), was sprayed with hydrogen peroxide solution while being mixed within the cells (Photos 26 and 30). The peat and ballast material were moist, but water did not enter any cell excavations beneath the trail or sideslope.

Ferric sulfate, limestone, and bentonite were mixed into the peat beneath the trail and sideslope following the same procedure that was used to mix lifts in the treated marsh area. Only one lift of peat was treated for cells on the trail and sideslope. The peat layer in these cells had compressed over time due to railroad traffic on the trail, and therefore, had a thickness of approximately 3 feet, with a layer of organic silt (also observed in the treated marsh area) beneath. Excavations did not penetrate into the silt layer or into the underlying gravel layer (observed during the source area investigation) during the remediation (Figure 3).

Ferric sulfate and limestone were mixed into the contaminated ballast beneath the trail and sideslope using the same procedure that was used to mix lifts treated in the marsh area. The contaminated ballast beneath the sideslope was treated in one lift and the contaminated ballast beneath the trail was treated in two lifts due to a greater quantity of ballast being located beneath the trail. Additionally, bentonite was not mixed into the

ballast material, in accordance with the project's specifications, to provide for better compaction of the ballast during restoration.

Off-gassing was anticipated to occur during the in-situ mixing of the peroxide, ferric sulfate, and limestone. Off-gassing was not observed in the field, but was observed in some of the samples collected in plastic 1-gallon bags from the treated material. Of note, the production of gas generation following treatment was observed to be significantly lower in the peat than in the ballast, which suggests that the peat has a greater buffering capacity than the ballast material (Photo 32).

3.6 Monitoring Well Construction

The specifications called for the installation of five new wells during construction. These wells would be used to evaluate the long-term performance of the in situ stabilization of the source area material (Figure 7). On Monday, October 17th, On-Site installed monitoring wells MW11-2, MW11-3, and MW11-3i (Photo 28). On Tuesday, October 18th, On-Site installed monitoring wells MW11-1 and MW11-1i. Wells MW11-2, MW11-3 and MW11-3i were developed by TRC on Wednesday, October 19th, and wells MW11-1 and MW11-1i were developed by TRC on Thursday, October 20th. Well construction and development logs are presented in Appendix C. All wells were drilled with a tracked Geoprobe auger attachment and installed with pre-pack well screens (Photo 27). Protective casings were installed over each well and 10-foot-long PVC location poles were installed next to each well (Photo 40).

Wells MW11-1 and MW11-1i were installed near the location of abandoned well MW04-10 (Figure 7), which historically had the highest dissolved arsenic concentrations at the site. MW11-1 was screened within the treated peat material, from 4.5 to 7 feet below the surface, and MW11-1i was screened from 10 to 12.5 feet below the surface in the organic silt layer below the treated zone.

Well MW11-2 was installed near the northeastern edge of the treatment area and screened within the extent of treated sediment, from 4.5 to 7 feet below the surface of the marsh. The location and screening interval of well MW11-2 was chosen to evaluate water quality downgradient from former location of MW04-10, but still within the treatment area.

Wells MW11-3 and MW11-3i were installed just outside of the eastern corner (downgradient) of the treatment area. MW11-3 was screened 4.5 to 7 feet beneath the surface of the marsh, at similar elevations to wells MW11-1 and MW11-2, to evaluate the difference in water quality within the treatment zone and downgradient from the treatment area. Well MW11-3i was screened from 10 to 12.5 feet below the surface of the treated marsh, in the organic silt layer, at a similar elevation to MW11-1i.

3.7 Site Restoration

3.7.1 Marsh Restoration

The marsh restoration called for removal of the access ramp, and blending the disturbed areas to existing grades. The limestone-gravel used to build the access ramp into the marsh was gradually incorporated into the cells during treatment as these portions of the access ramp were no longer needed as the remediation generally progressed from the marsh back towards the trail. The limestone in the access ramp was similar to the limestone that was used for buffering during the treatment. In addition, some treated ballast was graded into the top foot of the treated marsh prior to seeding. The volume of ballast material increased following treatment (Photo 29), and in order to maintain five feet of clean material between the top of the treated ballast and the top of the trail, and to maintain pre-remedial grades of the trail, excess treated ballast had to be graded into the marsh immediately adjacent to the sideslope of the trail.

A six-inch layer of topsoil was spread across all disturbed marsh areas, which primarily consisted of the treatment area and access ramp (Photos 22 and 24). Following topsoil spreading, straw mulch and a seed mixture were applied to these disturbed areas in accordance with the project specifications (Photo 36).

3.7.2 Trail and Sideslope Restoration

The trail restoration required reconstructing the trail to meet or exceed the pre-remedial conditions, and providing for erosion control on the sideslopes. Following mixing, treated ballast beneath the trail was compacted with the bucket of the backhoe. A sixinch layer of select aggregate fill was placed on top of the treated ballast beneath the trail (Photo 31). Clean ballast previously stockpiled on plastic sheeting within the marsh area was placed back on the trail in four 1-foot lifts. Each lift was compacted with a smooth drum roller (Photo 33). Limestone screenings were delivered to the site, placed on top of the clean ballast on the trail in a 1-foot lift, and compacted with the smooth drum roller (Photo 34). All disturbed trail areas within the construction limits were graded at the end of construction to match site conditions prior to the project start (Photo 38).

The clean ballast previously stockpiled on plastic sheeting within the marsh area was placed on the sideslope of the trail and graded. A six-inch layer of topsoil was then spread on the trail sideslope and graded (Photo 21). A seed mixture was applied to the trail sideslope and covered with an erosion control and revegetation mat that was anchored with biodegradable stakes, in accordance with the project specification (Photo 37).

15

\NTAPB-MADISON\MSN-VOL6\-\WPMSN\PIT2\186467\0000\000003\R1864670000-001 DOCX3/12/12

3.7.3 Final Site Barriers

The temporary barriers and signs (Figure 4) were removed from the trail at the completion of the site restoration. In addition, the chain link fence adjacent to the trail that was removed at the start of the project to allow access to the marsh during the remediation, was reconstructed using the salvaged fence. The fence prevents public access to the contaminated marsh area (Photos 38 - 41).

The access road constructed on private property (Figure 5) was left in place at the end of construction per the specification. To restrict access to the trail through the private property, a lockable swing gate was installed near the trail across the access road (Figure 42) in accordance with the specifications.

3.7.4 Equipment Decontamination

All construction equipment and well drilling equipment used within the treatment zone was decontaminated in accordance with the specification. The two backhoes used for mixing were decontaminated with a pressure washer on top of the topsoil layer placed on the trail sideslope (Photo 35). The backhoes then tracked over clean topsoil, onto the restored trail, and over the existing trail to the trail entrance for pickup. The Geoprobe® used for well installation only tracked over clean topsoil placed within the treatment area and the vegetation on top of the capped area outside of the treatment area. The tracks of the Geoprobe® were clean upon exiting the treatment and capped areas. The augers used to drill the well holes were wiped clean within the treatment area and soil cuttings were collected and incorporated into the cells that had yet to be treated. The other pieces of equipment used in the treatment area included: a dozer that only tracked over clean ballast and only moved clean ballast, limestone, and topsoil; a skid steer that only tracked over clean ballast and access ramp gravel and only moved clean ballast, limestone, topsoil, and pallets; and a compactor that only tracked over clean ballast and only compacted clean ballast.

3.8 Waste Disposal

Minimal waste was generated during the remediation, and all waste was disposed off-site at licensed disposal facilities. The waste included one 55-gallon drum of hazardous material, one roll-off dumpster of general refuse, and one 55-gallon drum of ballast material impacted with a minor leak of hydraulic fluid. The hazardous waste that required off-site disposal included PPE worn in the treatment area (disposable gloves and Tyvek suits), and components from abandoned monitoring well MW04-10. The PPE and well were placed in a plastic 55-gallon drum and disposed of by Veolia Environmental Services through their hazardous materials contract with the State of Wisconsin (Photo 43).

A general refuse roll-off dumpster was provided by Blue Water Services of Kewaunee, WI (BWS). Items placed in the roll-off dumpster included, but were not limited to, the casing for monitoring well MW04-10 (following pressure washing), plastic wrap, and empty super sacks. BWS hauled and disposed of the contents of the dumpster off site as solid waste.

During the remediation, less than one gallon of hydraulic fluid leaked from a backhoe and contacted treated ballast material in cells #21 and #22 (Figure 8). The backhoe was immediately turned off to stop the leak and was repaired. The ballast that was impacted with the hydraulic fluid was immediately removed with shovels and placed in a 55-gallon drum. The contents of this drum were disposed at a WDNR-licensed landfill by Veolia as non-hazardous waste.

3.9 Post Construction Walk-through

A site walk over was completed on Monday, October 24, 2011. Representatives from Kewaunee County (Matt Payette), WDNR (Annette Weissbach), Veolia (Kris Gunderson), ORIN (Scott Craig), and TRC (Alyssa Sellwood) participated in the walk over. The private property access road owner, could not attend, but previously communicated to WDNR that he was satisfied with the final condition of the access road and gate on his property. The County was satisfied with the final condition of the trail and did not require any additional restorative work. WDNR and TRC agreed that final restoration of the site had been completed in accordance with the specification and no additional work was required at that time. WDNR and the County will evaluate the site in the spring/summer of 2012 to determine if additional final trail restoration is required per the project specifications.

3.10 Deviations from Specifications

Deviations from the specifications are summarized below.

- **Specification:** Section 01530, Part 3.5 A Maintain barricades, signs, and access haul road gate during construction to restrict public access to the construction work zone.
 - **Deviation:** The installation of the access haul road gate was delayed until site restoration. Installing the gate during site preparations prior to construction would have restricted truck access for deliveries.
- **Specification:** Section 02315, Part 3.2 B CONTRACTOR to survey to document the depth of excavation in four locations.
 - **Deviation:** Surveying was not required to document the depth of excavation. The peat layer has a uniform thickness of 7 feet throughout the marsh area. The transition from peat to organic silt was visually observed and the 7-foot excavation depth was visually confirmed with the 7-foot line marked on the mixing backhoe. Similar visual observation and bench mark confirmation was used during the treatment of the trail and sideslope.

Contaminated ballast material ranged from 0 to 7 feet below the surface elevation of the marsh and contaminated peat ranged from 7 to 10 feet below the surface elevation of the marsh with organic silt underlying the peat layer.

■ **Specification:** Section 02320, Part 1.1 A and Part 2.1 A – 440 gallons of 35 percent hydrogen peroxide solution will be applied to the treatment area.

Deviation: 330 gallons of 50 percent hydrogen peroxide solution were applied to the treatment area. The specification called for 1.4 gallons of 35 percent solution to be applied to every 10 cubic yards. The 50 percent solution delivered to the site was diluted down to a 5 percent solution and 1 gallon was applied to every cubic yard, achieving the same ratio that was called for in the specifications.

■ **Specification:** Section 02526, Part 3.2 B – Seal [removed well MW04-10] borehole by filling with bentonite granules to the surface.

Deviation: Because the mash material was to be disturbed and mixed during treatment, the addition of bentonite to the borehole was determined not to be necessary.

Section 4 Performance Verification Sampling

4.1 Pace Analytical SPLP Results

In addition to the three field trial samples discussed in section 3.4.5, TRC collected additional verification samples per every 500 cy of treated sediment in accordance with the specifications. Performance verification samples were collected from treated material in cells #7, #12, #19, #22, and #23 for SPLP arsenic testing by Pace during the remediation. Laboratory reports for performance verification samples are presented in Appendix D, and results are summarized in Table 1 and Figure 8.

The SPLP arsenic concentrations from the samples collected from cells #7, #12, #19, and #22, were 0.22 mg/L, 0.067 mg/L, 0.46 mg/L, and 0.19 mg/L, respectively. The arsenic concentrations in these cells met the target cleanup goal (as described in Section 3.4-Field trial). These four samples, and the samples collected during the field trial, verified that the in situ mixing met the performance criteria for approximately 2,400 cy of the treated sediment (see Table 1, cell #1 through cell #22).

The arsenic concentration of the last sample collected from cell #23 was 17.6 mg/L. This concentration was higher than the target clean up goal. The same mixing procedure and chemical dosage evaluated as effective from the other verification samples was used to treat the sediment in cell #23. Because in situ treatment was evaluated to be effective for the 2,400 cubic yards of sediment treated prior to cell #23, we concluded that the sample collected from cell #23 was not likely representative of treated material. Although care was taken to collect representative samples of the treated material, it is possible that the sample collected from cell #23 was taken from a small section of sediment that did not contain a representative amount of treatment additives. Based on this analysis, TRC and WDNR agreed that the elevated arsenic concentration in the sample from cell #23 was an artifact of the sample collection and did not represent the treated conditions in this cell. Based on this conclusion, we did not require ORIN to complete additional treatment in cell #23.

4.2 TRC Screening SPLP Results

In addition to the performance verification completed during construction, TRC screened samples collected from each of the 26 treatments cells for SPLP arsenic concentrations approximately one week after construction, to validate achievement of in situ stabilization of arsenic in each treatment cell. One sample was collected from the treated peat material in each

19

cell, and one sample was also collected of treated ballast material when ballast material was present (trail and sideslope samples). For those cells where samples were submitted to Pace, the samples were split with TRC's screening samples. TRC completed a SPLP arsenic screening analysis on each sample in TRC's applied chemistry laboratory. The results from TRC's screening SPLP analysis are summarized in Table 1 and Figure 8.

TRC's screening SPLP arsenic results from each of the 26 cells confirmed that stabilization of arsenic was achieved in the 3,000 cubic yards of treated sediment. The highest concentration is from the ballast in cell #23. This sample was split from the sample submitted to Pace, and the elevated arsenic concentration is likely an artifact of sample collection, as described in Section 4.1.

In general, higher concentrations of arsenic were generally observed in the zone nearest to the former railroad tracks. The higher arsenic concentrations may be due to this area's proximity to the historic spill, and/or the potential difference in the treatability of the ballast versus peat material at the field scale.

The arsenic concentrations in the samples analyzed by TRC are similar to the concentrations in the samples analyzed by Pace, but are generally lower. The difference in concentrations is likely a result of difference in laboratory equipment and procedures, but could suggest improved stabilization over time. TRC samples were analyzed approximately one week after treatment; whereas, the Pace samples were analyzed within one day after treatment. To further evaluate the potential for improved stabilization over time, TRC selected ten of the screening samples to be analyzed approximately two weeks after treatment. The results of the additional SPLP screening analysis are presented in Appendix F. The results from the two-week delay samples are generally consistent with the one-week delay samples, with some variability shown for samples where duplicates were run. Comparison of the SPLP results for samples analyzed one-week and two-weeks after treatment, were inconclusive with respect to increased stabilization achieved over time. Because the SPLP results from each cell supported achievement of arsenic stabilization for treated source area material and a long-term water monitoring plan has been established for the site, additional lab studies into time effect on material treated in the field are not warranted.

4.3 Evaluation of Treatment Effectiveness

The Pace performance verification samples and TRC screening samples indicate that the treatment goal for the arsenic stabilization was achieved throughout the bulk of the treatment area. The SPLP arsenic concentrations prior to treatment were estimated from the compositional arsenic results from samples collected within the treatment area during the December 2009/March 2010 Geoprobe® Investigation. The calculation to convert compositional

arsenic to SPLP arsenic are included in Appendix G. The results are summarize in Table 1 and presented on Figure 8. The average SPLP arsenic concentration for the material within the treatment area was estimated to be approximately 31 mg/L prior to treatment. Excluding the sample collected from the treated ballast material of cell #23, which was not likely representative of treated material in this cell (see discussion under Section 4.1), the average post-treatment SPLP arsenic concentrations for samples analyzed by Pace and TRC were 0.20 mg/L and 0.16 mg/L, respectively. The results indicate that in situ stabilization reduced the average SPLP arsenic concentration by over 99 percent in the treatment area, and achieved SPLP arsenic concentrations well below hazardous waste criteria (5 mg/L), and near the site specific groundwater/surface water goal of 0.148 mg/L.

Section 5 Baseline Performance Monitoring

5.1 Baseline Water Sampling

A performance monitoring program was established to evaluate the long-term effect of the in situ stabilization on the groundwater quality of the site (RMT, 2011). The wells included in the performance monitoring well program are shown on Figure 9, and include eleven existing monitoring wells, and the five new monitoring wells constructed during the remedy (see Section 3.6). The eleven existing wells in the performance monitoring program include background/upgradient wells (MW02-1, MW02-1i, MW02-1d, and MW04-11), sidegradient/downgradient wells (MW02-8, MW02-8i, and MW04-9), and downgradient wells (GW01-2, MW02-3, MW02-3i, and MW02-3d). The five new monitoring wells include treatment area wells (MW11-1, MW11-1i, and MW11-2) and wells directly downgradient from the treatment area (MW11-3 and MW11-3i).

The sampling protocol used for the performance monitoring is summarized as follows:

- Water levels were recorded in each well prior to sampling.
- After water levels were recorded, each well was purged using dedicated bailers. A minimum of four well volumes were removed, or the wells were purged until the well went dry, whichever came first. If a well that went dry recovered quickly, additional volume was removed to achieve the targeted four well volumes.
- Following purging, the groundwater was allowed to recover in each well. Water samples were then collected using the dedicated bailers, and containerized temporarily in single use containers for transport back to field vehicle.
- Samples were then collected for laboratory analysis from the single-use containers. Laboratory sample bottles were filled using a peristaltic pump and disposable Tygon tubing, and were filtered using a 0.45 micron disposable barrel filter.
- Samples from each of the wells were submitted to Pace for arsenic analysis, and samples from 12 select wells were also submitted for sulfate, iron, and calcium analysis.
- Field parameters (pH, conductivity, DO, ORP, and temperature) were measured for each well in the sample remaining in each single use container.

22

\\NTAPB-MADISON\MSN-VOL6\-\WPMSN\PIT2\186467\0000\000003\R1864670000-001 DOCX3/12/12

5.2 Results

The 2011 baseline groundwater arsenic concentrations, as well as historic arsenic concentrations, are summarized in Table 2. The results for the complete list of 2011 baseline parameters are summarized in Table 3. Arsenic was detected in wells MW11-1 and MW11-2, which are screened within the peat in source area treatment area, at concentrations of 304 mg/L and 108 mg/L, respectively. Arsenic concentrations in abandoned well MW04-10 (previously located within the source area near MW11-1) historically ranged from approximately 1,400 to 2,800 mg/L. The baseline monitoring results at wells MW11-1 and MW11-2 indicate that arsenic concentrations in water have decreased by one order of magnitude throughout the treatment area. However, the arsenic concentrations are higher than anticipated based on the SPLP arsenic concentrations observed in the source area treated materials following the in situ stabilization (average SPLP concentration of 0.2 mg/L). These concentrations may not be representative of the dissolved phase arsenic concentrations in this well, which is discussed in more detail below in Section 5.3.

Arsenic was detected in well MW11-3 at a concentration of 360 mg/L. Well MW11-3 is located just outside of the eastern corner of the treatment area and screened within the same interval as wells MW11-1 and MW11-2. Well MW11-3 is located within the peat evaluated to have total arsenic concentrations above 1,000 mg/kg at the time of the 2010 source area investigations (Appendix E). The elevated concentration of arsenic in the water at MW-3 is considered to be representative of the current conditions in this well.

Wells MW11-1i and MW11-3i are nested with MW11-1 and MW11-3, and screened 10 to 12.5 feet below grade, primarily in the organic silt layer below the treated zone. Baseline groundwater arsenic concentrations in MW11-1i and MW11-3i were 121 and 153 mg/L, respectively. These concentrations suggest that the elevated arsenic impacts to groundwater extend into the organic silt layer near the source area. The historical results for wells screened within the organic silt downgradient from the source area suggest that the impacts present in the shallow organic silt below the source area are sufficiently contained and do not extend at depth into the organic silt or further downgradient into the marsh within this zone (STS, 2002; STS, 2004; RMT, 2010).

Baseline arsenic concentrations in the existing wells located upgradient, sidegradient/downgradient, and downgradient of the treatment area are generally consistent with historic concentrations and are generally below the site-specific clean-up goal of 0.148 mg/L.

23

\NTAPB-MADISON\MSN-VOL6\-\WPMSN\PIT2\186467\0000\000003\R1864670000-001 DOCX3/12/12

The trends in the concentrations of arsenic in each of the performance monitoring wells will be evaluated, and the concentrations of arsenic are expected to decrease through time in response to the in situ stabilization of the source area.

5.3 Analysis

As discussed above, the arsenic concentrations in the November 2011 samples collected from water in contact with treated materials were higher than anticipated, but may not be representative of the water quality within the treatment zone. A detailed memorandum of the evaluation of the water results is presented in Appendix H, and a summary of the memorandum follows.

Wells MW11-1 and MW11-2 are screened within the treatment zone. The samples collected from these wells had relatively high concentrations of sulfate and calcium, which are added to the water by the treatment process (sulfate from ferric sulfate addition and calcium from limestone addition). The high concentration of treatment chemicals in the water samples collected within the treatment zone indicate that the unexpectedly high arsenic concentrations also present in these samples is not a result of incomplete treatment.

The most likely explanation for the high arsenic concentrations in the samples collected from within the treatment zone is that colloidal solids passed through the 0.45 micron filter used to differentiate dissolved and particulate metals. Through the treatment process, arsenic adsorbed to particulate ferric iron. Particulate ferric iron is a solid that often occurs in the colloidal size range (0.001 to 1 micron) and can pass through a 0.45 micron filter, which was used to filter the November 2011 water samples. The pH values and dissolved iron concentrations of the samples, the oxidation state of the iron added for treatment (ferric), and the addition of a bicarbonate (limestone) during treatment, all suggest that the iron is not truly dissolved and that particulate ferric iron, and thus arsenic, passed through the filter used during sampling. The groundwater flow in the marsh is slow and the mobility of colloids in most groundwater systems is generally low. If the high arsenic concentrations in the November 2011 groundwater samples collected within the treatment zone is due to colloids passing through the filters, it is not likely that the arsenic at the site is mobile. Furthermore, colloidal concentrations should decrease over time as colloids settle out.

5.4 Recommendations

TRC recommends completing a phase II baseline water sampling event in spring 2012. The objective will be to improve our understanding of the elevated arsenic concentrations in the water in the treatment area, and determine if changes are needed in the sampling protocol to

24

\NTAPB-MADISON\MSN-VOL6\-\WPMSN\PIT2\186467\0000\000003\R1864670000-001 DOCX3/12/12

obtain representative samples of the dissolved phase arsenic concentrations at the Kewaunee Marsh.

The proposed sampling program is described in further detail in Appendix I. In general, the proposed sampling will follow the scope outlined in the Performance Monitoring Plan (RMT, 2011), but will evaluate low flow purging techniques and filtering samples with multiple filter sizes. The use of low-flow sampling techniques will minimize disturbance to the samples, and use of multiple filter sizes will be used to evaluate the presence of colloids at the site. Following analysis of the spring 2012 sampling results, TRC will propose necessary modifications to the Performance Monitoring Plan.

Section 6 Conclusions and Recommendations

6.1 In Situ Stabilization

TRC was retained by the WDNR to oversee and document the in situ remediation of 3,000 cubic yards of material with compositional arsenic concentrations greater than 2,000 mg/kg (source area) in the Buzz Besadny Fish and Wildlife Area (also known as the Kewaunee Marsh), in Kewaunee, Wisconsin. The in situ stabilization was completed by ORIN in October 2011, in accordance with the design specifications for the project (WDNR, 2011). Hydrogen peroxide, granular ferric sulfate, crushed limestone, and bentonite were incorporated into the treatment area, in series, to stabilize arsenic in the source area and mitigate the on-going release of dissolved-phase arsenic into the marsh.

The performance verification samples collected from the treated marsh sediment and ballast show that arsenic stabilization was achieved throughout the bulk of the source area as a result of the in situ remediation. The average SPLP arsenic concentration in the source area prior to treatment was approximately 31 mg/L, and was reduced to approximately 0.2 mg/L as a result of the in situ stabilization

6.2 Baseline Performance Monitoring

The long-term objective of the in situ treatment is to achieve the site-specific arsenic clean-up level of 0.148 mg/L in the groundwater and surface water at the site. The results from the November 2011 baseline monitoring event are inconclusive with respect to water quality in the treatment area. The arsenic concentrations in the samples collected from within the treatment zone were higher than anticipated. Currently, TRC believes that these elevated concentrations are a result of colloidal solids passing through the filter used to differentiate dissolved and particulate metals, rather than actual aqueous phase concentrations of arsenic. If the arsenic is associated with colloids, than the arsenic detected in water in the treatment area is not mobile, and will likely settle out of suspension through time.

To improve our understanding of the elevated arsenic concentrations in water in the treatment area, TRC recommends completing another sampling event in the spring of 2012 using the sampling protocol described in Appendix I. Following analysis of the spring 2012 sampling results, TRC will propose necessary modifications to the current Performance Monitoring Plan (RMT, 2011).

6.3 Site Restoration

Restoration of the trail, sideslopes, and marsh were completed in October 2011 following completion of the in situ stabilization. The restoration was completed in accordance with the specifications, and to the satisfaction of the stakeholders for the properties within the construction limits (Kewaunee County, WDNR, and the private property owner). A final site walkthrough will be completed by the WDNR, ORIN, and Kewaunee County prior to October 2012 to identify any erosion, settlement, or other deficiencies within the construction limits that require final correction prior to close-out of the construction contract.

Section 7 References

- RMT, Inc. 2007. WDNR Kewaunee Marsh Treatability Study. Prepared for Wisconsin Department of Natural Resources, Kewaunee, Wisconsin. August 2007.
- RMT, Inc. 2010. Hot Spot Investigation Documentation and Remedial Options Analysis Report. Prepared for Wisconsin Department of Natural Resources, Kewaunee, Wisconsin. May 2010.
- RMT, Inc. 2011. Performance Monitoring Plan. Prepared for Wisconsin Department of Natural Resources, Kewaunee, Wisconsin. June 2011.
- STS. 2004. Site Assessment and Remedial Action Alternatives Report. Prepared for Wisconsin Department of Natural Resources, Kewaunee, Wisconsin. March 2004.
- STS. 2006. Site Assessment and Remedial Action Alternatives Report Addendum. Prepared for Wisconsin Department of Natural Resources, Kewaunee, Wisconsin. September 2006.
- WDNR. 2011. Contract document: Kewaunee marsh in situ stabilization of Source area arsenic contamination. Project No. REBA 11. June 2011.

28

Table 1 In Situ Treatment Results

Kewaunee Marsh Arsenic Source Area In-Situ Remediation

		SPLP ARS	SPLP ARSENIC CONCENTRATION (mg/L) POST-TREATMENT								
CEL	L		ESTIMATED VOLUM OF CELL								
ID	MEDIA	PRE-TREATMENT (1)	PACE	TRC ⁽²⁾	(cy)						
larsh											
1 (Field Trial)	Peat		0.26	0.016	100						
2 (Field Trial)	Peat	8.4	<0.025 / <0.025 ⁽³⁾	< 0.013	100						
3	Peat	22		<0.013	100						
4	Peat			0.016	100						
5	Peat			0.035	100						
6	Peat	61		0.041	100						
7	Peat	38	0.22	<0.013	100						
8	Peat	22		0.088	100						
9	Peat			<0.013	100						
10	Peat	30		0.059	100						
11	Peat			<0.013	100						
12	Peat		0.067	0.014	100						
13	Peat			0.015	100						
14	Peat			<0.013	100						
15	Peat			0.092	100						
16	Peat			0.015	100						
17	Peat			<0.013	100						
18	Peat	25		<0.013	100						
ail and Sideslo											
	Ballast		0.46	0.19	50						
19	Peat	57			100						
20	Ballast			0.028	50						
20	Peat	20		0.063	100						
04	Ballast	5.4		0.052	50						
21	Peat	16		0.16	100						
22	Ballast	7.6		0.19	50						
22	Peat	16	0.19	0.095	100						
22	Ballast	12	18	2.6 ⁽⁵⁾	100						
23	Peat	93		0.89	50						
24	Ballast	6.3		0.28	100						
24	Peat			0.059	50						
25	Ballast			0.47	100						
25	Peat	91		1.3	50						
26	Ballast			0.29	100						
26	Peat			0.59	50						
verage Concent eat + Ballast) ⁽⁴		31	0.20	0.16							
reat + Ballast) `			I Tot	al Volume (cy)	3000						
otes:			100	ai Voiuille (cy)	3000						

Notes:

Footnotes:

- (1) Pre-treatment estimates calculated using compositional arsenic results from December 2009/March 2010 Hotspot Geoprobe Investigation. Compositional arsenic concentrations were converted to SPLP arsenic concentrations. Data and conversions are presented in Appendix G.
- (2) SPLP test completed in TRC's Applied Chemistry Laboratory. The results from TRC are screening level results, but have been shown previously to be consistent with results from Certified laboratory (Pace).
- (3) First result represents pre-bentonite addition, and second results from post-bentonite addition.
- (4) Samples with arsenic concentrations less than the detection limit were estimated to have arsenic concentrations equal to half of the detection limit.
- (5) The sample collected from the treated ballast material of cell #23 was not likely representative of treated material in that cell, and is not included in the average concentration for the treated samples.

^{-- =} Sample not collected and/or not analyzed.

Table 2
Water Arsenic Concentrations – 2002 through 2011
Kewaunee Marsh Arsenic Source Area In-Situ Remediation

	WELL DEPTH				AR	SENIC CONCEI	NTRATIONS (m	g/L)			
WELL ID	(ft)	8/13/2002	11/21/2002	2/26/2003	6/11/2003	11/2/2004	4/27/2005	7/14/2005	11/1/2005	5/4/2010	11/14/2011
MW02-1	7	0.0041	0.0016	0.0015	<0.0013			0.0032		0.0033J	0.012J
MW02-1i	12	0.0021	0.0014	0.0019	<0.0013			<0.0012		0.0016J	0.011J
MW02-1d	22	0.0070	0.0056	<0.0013	0.0017			0.0065		0.0068J	0.0067J
MW02-2	5.4	0.0057	0.0014		0.0016			0.0019		0.0030J	
MW02-2i	10	0.0014	<0.0013		<0.0013			0.0015		0.010J	
MW02-3	5.1	0.26	0.20	0.093	0.095	0.034	0.019	0.027	0.037	1.4	0.091
MW02-3i	10	0.040	0.0062	0.0073	0.020	0.018	0.010	0.0099	0.013	0.013J	0.016J
MW02-3d	18.8	0.0049	0.0049	0.0013	0.0026	0.0060	<0.0012	0.0012	<0.0012	0.0053J	0.0040J
MW02-4	5	0.59	0.50	0.21	0.96	1.3	1.9	1.1	3.1	4.4	
MW02-4i	10	0.17	0.047	0.010	0.013	0.0015	0.0090	0.0085	0.013	0.011J	
MW02-4d	20			0.068	0.017	0.038	0.024	0.024	0.044	0.038	
MW02-5	5	0.37	0.75	0.18	1.2	1.9	0.86	0.67	5.4	2.3	
MW02-5i	10	0.0050		0.0033	<0.0013	0.0061	0.0097	0.0070	0.0058	0.0068J	
MW02-6	5	0.50	0.14		0.53	1.1	0.38	0.66	1.6	2.3	
MW02-6i	10	0.092	0.041	0.0069	0.013	0.0163	0.0108	0.0074	0.0063	0.032	
MW02-7	5	0.077	0.021	0.0099	0.034	0.0754	0.0553	0.0019	0.0570	0.076	
MW02-7i	10	0.0022	0.0023	<0.0013	<0.0013	0.0017	0.0012	0.0510	0.0015	<0.0013	
MW02-7d	20	0.0024	0.0016	<0.0013	<0.0013			<0.0012		<0.0013	
MW02-8	5				0.086	0.19	0.11	0.15	0.082	0.14	0.18
MW02-8i	10				<0.0013			0.0036		0.013J	0.012J
MW04-9	7					0.61	0.12	0.11	0.11	0.043	0.043
MW04-10 ⁽¹⁾	7					1,380	1,770	1,630	1,950	2,840	
MW04-11	7					0.0051	0.0048	0.0096	0.0024	0.0039J	0.0068J
MW04-12	7					0.0020	0.0026	0.0029	0.011	0.0044J	
MW04-13	7					0.0019	0.0015	0.0018	0.030	0.0018J	
MW11-1	7.2										304
MW11-1i	12.5										121
MW11-2	7.2										108
MW11-3	7.2										360
MW11-3i	12.5										153
GW01-1	NA		0.0084		<0.0013			<0.0012		0.051	
GW01-2	NA		0.031		0.037	0.030	0.015	0.026	0.056	0.24	0.14

Table 2 (continued) Water Arsenic Concentrations – 2002 through 2011 Kewaunee Marsh - Kewaunee, Wisconsin

	WELL DEPTH				AR	SENIC CONCEI	NTRATIONS (m	g/L)			
WELL ID	(ft)	8/13/2002	11/21/2002	2/26/2003	6/11/2003	11/2/2004	4/27/2005	7/14/2005	11/1/2005	5/4/2010	11/14/2011
GW01-3	NA		0.043	0.014	0.032	0.034	0.49	0.15	0.088	0.25	
GW01-4	NA		0.0049	<0.0013	0.0120			0.0077		0.044	
GW01-5	NA		0.036	0.020	0.41	0.069	0.14	0.058	0.20	0.17	
GW01-6	NA		2.0	0.6	4.8	4.2	4.4	2.5	5.5	5.0	
GW01-7	NA									0.10	
GW01-8	NA		0.050		0.16	0.086	0.50	0.091	0.17	0.63	
GW01-10	NA		< 0.0013		<0.0013			<0.0012		<0.0013	
GW01-11	NA									0.23	
GW-D	NA									0.0021J	
GW-E	NA									<0.0013	

Notes:

- 1. Samples from 1992 through 2005 were collected by STS. The samples from May 2010 were collected by RMT. The samples collected from November 2011 were collected by TRC.
- 2. The results are from filtered samples.
- J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
- -- = Not sampled.

BOLD = concentration exceeds the site specific goal of 0.148 mg/L.

Footnotes:

Well MW04-10 was abandoned in October 2011 during the hot spot remediation.

Table 3
2011 Baseline Performance Monitoring Results
Kewaunee Marsh Arsenic Source Area In-Situ Remediation

WELL ID	SAMPLE DATE	DTW (ft)	pН	TEMP. (°C)	CONDUCTIVITY (µmhos/cm)	ORP (mV)	ARSENIC (mg/L)	CALCIUM (mg/L)	IRON (mg/L)	SULFATE (mg/L)
MW02-1	11/14/11	6.55	6.38	10.39	938	54.3	0.012J	135	5.0	NA
MW02-1i	11/14/11	4.3	6.83	9.66	844	27.6	0.011J	115	1.1	NA
MW02-1d	11/14/11	4.12	7.16	8.87	811	-7.9	0.0067J	92	1.3	NA
MW02-3	11/14/11	3.82	6.68	10.85	1187	-22.8	0.091	137	2.4	9.5
MW02-3i	11/14/11	3.83	6.82	10.17	1020	-61.2	0.016J	160	5.9	< 2
MW02-3d	11/15/11	3.95	7.21	7.62	680	104.3	0.0040J	71	0.23	2.5J
GW01-2	11/14/11	2.26	6.67	9.09	691	-6.8	0.143	97	1.1	< 2
MW02-8	11/14/11	2.12	6.75	9.57	888	11.8	0.178	134	0.88	NS
MW02-8i	11/14/11	2.42	6.78	9.5	945	-20	0.012J	150	2.7	NS
MW04-9	11/14/11	2.58	NA	NA	NA	NA	0.043	148	0.57	< 2
MW04-11	11/15/11	2.15	6.37	6.99	1273	218.3	0.0068J	152	0.43	2.1J
MW11-1	11/15/11	3.61	6.41	11	6462	-83.9	304	590	112	3,340
MW11-1i	11/15/11	3.61	6.99	9.71	1209	-73.5	121	128	3.9	124
MW11-2	11/15/11	3.47	6.88	9.8	5322	-46.7	108	429	165	3120
MW11-3	11/14/11	3.39	7.12	9.42	2197	-24.8	360	285	1.3	<2
MW11-3i	11/14/11	3.58	7.12	9.08	1299	-71.7	156	154	3.7	15.9

Notes:

DTW = depth to water.

BOLD = concentration exceeds the site specific goal of 0.148 mg/L.

^{1.} pH, temperature, conductivity, DO, and ORP were measured in the field. Sampling method introduces oxygen into sample. DO concentrations are not representative of groundwater conditions. Therefore DO is omitted from summary table.

^{2.} The results for arsenic, calcium, and iron are from filtered samples, and results for sulfate are from non-filtered samples.

J = Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

LEGEND

CAPPED AREA

------ CHAIN LINK FENCE

NOTES

1. AERIAL IMAGE FROM KEWAUNEE COUNTY, 2010.



1 " = 1,000 ' 1:12,000

WISCONSIN DEPARTMENT OF NATURAL RESOURCES KEWAUNEE MARSH

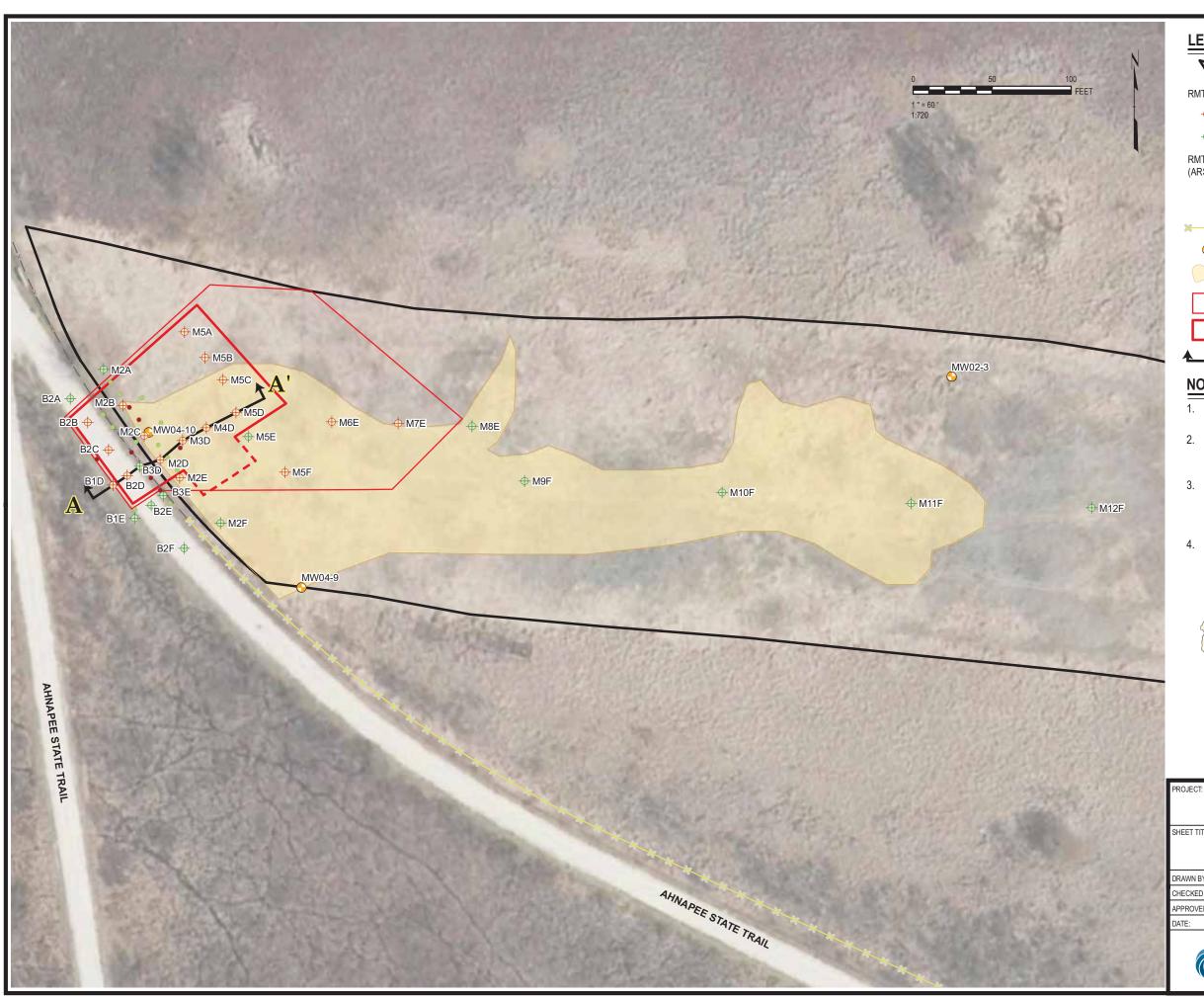
SHEET TITLE:

SITE LOCATION

DRAWN BY:	PAPEZ J	SCALE:	PROJ. NO.	186467-003
CHECKED BY:	WALTER M	AS NOTED	FILE NO.	186467.005.F1.mxd
APPROVED BY:	SELLWOOD A	DATE PRINTED:		FIGURE 4
DATE:	ΙΔΝΙ ΙΔΡΥ 2012			FIGURE 1



708 Heartland Trail Suite 3000 Madison, WI 53717 Phone: 608.826.3600 Fax: 608.826.3941 www.trcsolutions.com



LEGEND



CAPPED AREA

RMT SOURCE AREA SAMPLE (2009/2010)

ARSENIC < 1,000 mg/kg B-SERIES = BALLAST (15-30 FT)

RMT TEMPORARY WELL LOCATION (APRIL 2007) (ARSENIC CONCENTRATION COLOR CODE)

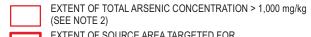
- < 100,000 μg/L</p>
- > 100,000 µg/L

× FENCE

MONITORING WELL LOCATION



APPROXIMATE AREA OF PREVIOUSLY DISTRESSED VEGETATION



EXTENT OF SOURCE AREA TARGETED FOR REMEDIATION (>2,000 mg/kg) (SEE NOTES 3 AND 4)



▲ CROSS-SECTION TRANSECT

NOTES:

- ALL GEOPROBE BORINGS WERE LOCATED USING A TRIMBLE GEOXH
- 2. COMPOSITIONAL ARSENIC CONCENTRATIONS GREATER THAN 1,000 mg/kg CORRELATES TO POTENTIALLY HAZARDOUS MATERIAL (TCLP > 5
- 3. THE SOURCE AREA TARGETED FOR REMEDIATION COVERS THE AREA THAT WILL LIKELY HAVE ARSENIC > 1,000 mg/kg IN 2015 BASED ON THE OBSERVED RATE OF DECREASE IN CONCENTRATION OVER THE LAST 15 YEARS IN THE MARSH.
- 4. DASHED LINE SHOWS ADDITIONAL TREATMENT AREA INCLUDED IN THE FINAL REMEDY BUT NOT TARGETED FOR TREATMENT IN THE ORIGINAL



WISCONSIN DEPARTMENT OF NATURAL RESOURCES **KEWAUNEE MARSH**

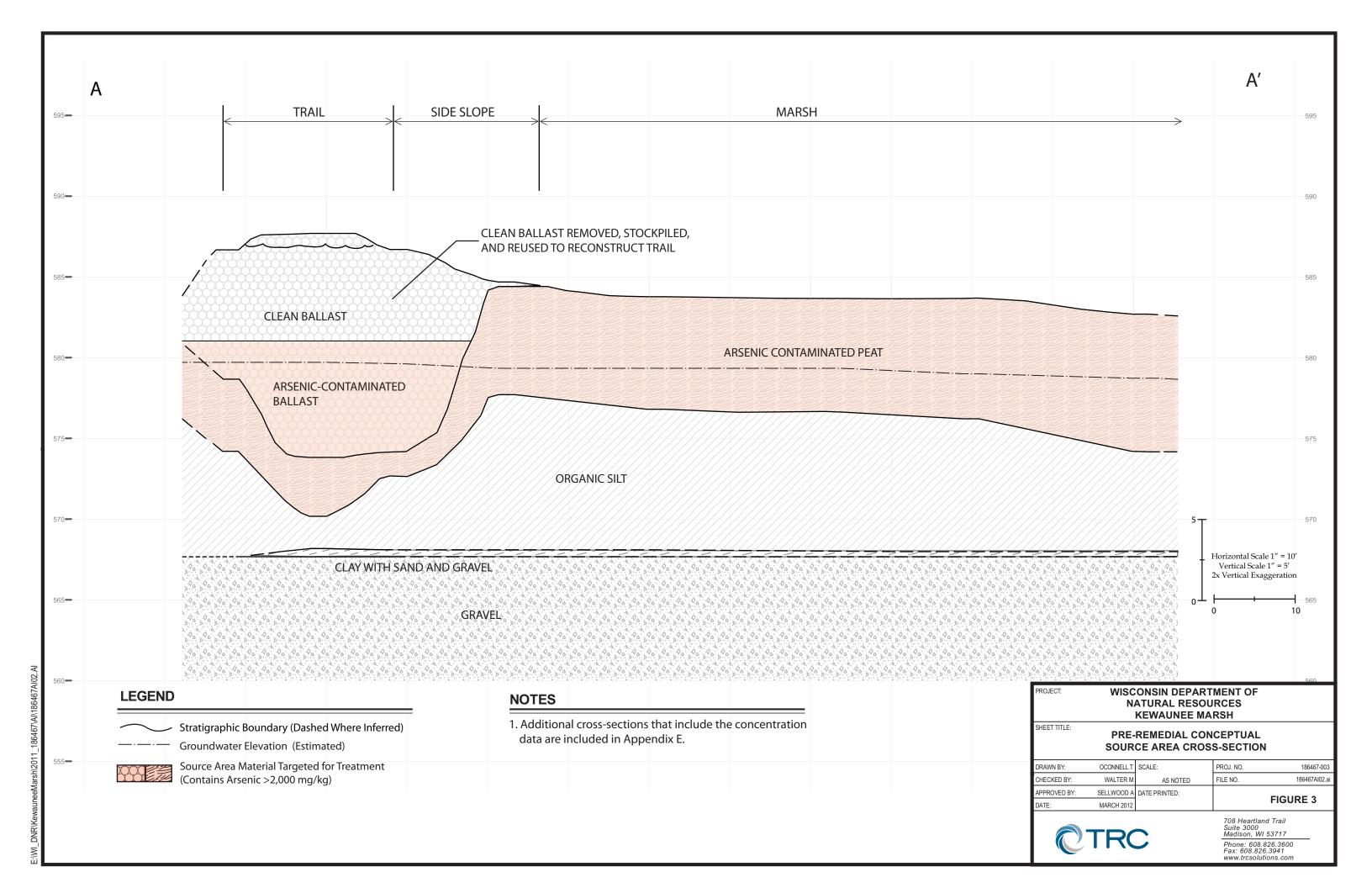
SHEET TITLE:

PRE-REMEDIAL SOURCE AREA LOCATION MAP

DRAWN BY:	PAPEZ J	SCALE:	PROJ. NO.	186467-003
CHECKED BY:	WALTER M	AS NOTED	FILE NO.	186467.006.F2.mxd
APPROVED BY:	SELLWOOD A	DATE PRINTED:		FIGURE 0
DATE:	MARCH 2012			FIGURE 2



708 Heartland Trail Suite 3000 Madison, WI 53717 Phone: 608.826.3600 Fax: 608.826.3941 www.trcsolutions.com



708 Heartland Trail Suite 3000 Madison, WI 53717 Phone: 608.826.3600 Fax: 608.826.3941 www.trcsolutions.com

186467.008.F4.mxd

FIGURE 4

708 Heartland Trail Suite 3000 Madison, WI 53717

186467.009.F5.mxd

FIGURE 5

SITE LOCATION

708 Heartland Trail Suite 3000 Madison, WI 53717

186467.010.F6.mxd

FIGURE 6

Phone: 608.826.3600 Fax: 608.826.3941 www.trcsolutions.com

PROJ. NO. FILE NO.



CAPPED AREA

APPROXIMATE TREATMENT CELL

TREATMENT AREA, HORIZONTAL LIMITS AT BASE OF EXCAVATION

FENCE (NOTE 2)

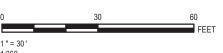


MONITORING WELL

ABANDONED MONITORING WELL

- 1. BASE MAP IMAGERY FROM KEWAUNEE COUNTY, 2010.
- 2. GREYED OUT SECTION OF THE FENCE WAS REMOVED AND REPLACED TO PROVIDE ACCESS TO TREATMENT AREA IN THE MARSH.
- 3. TREATMENT AREA COORDINATES (WISCONSIN TRANSVERSE MERCATOR-METERS):

POINT	X	Υ
А	717445	447685
В	717469	447707
С	717486	447688
D	717457	447668



WISCONSIN DEPARTMENT OF NATURAL RESOURCES **KEWAUNEE MARSH**

TREATMENT CELL MAP AND MONITORING WELL LOCATION MAP

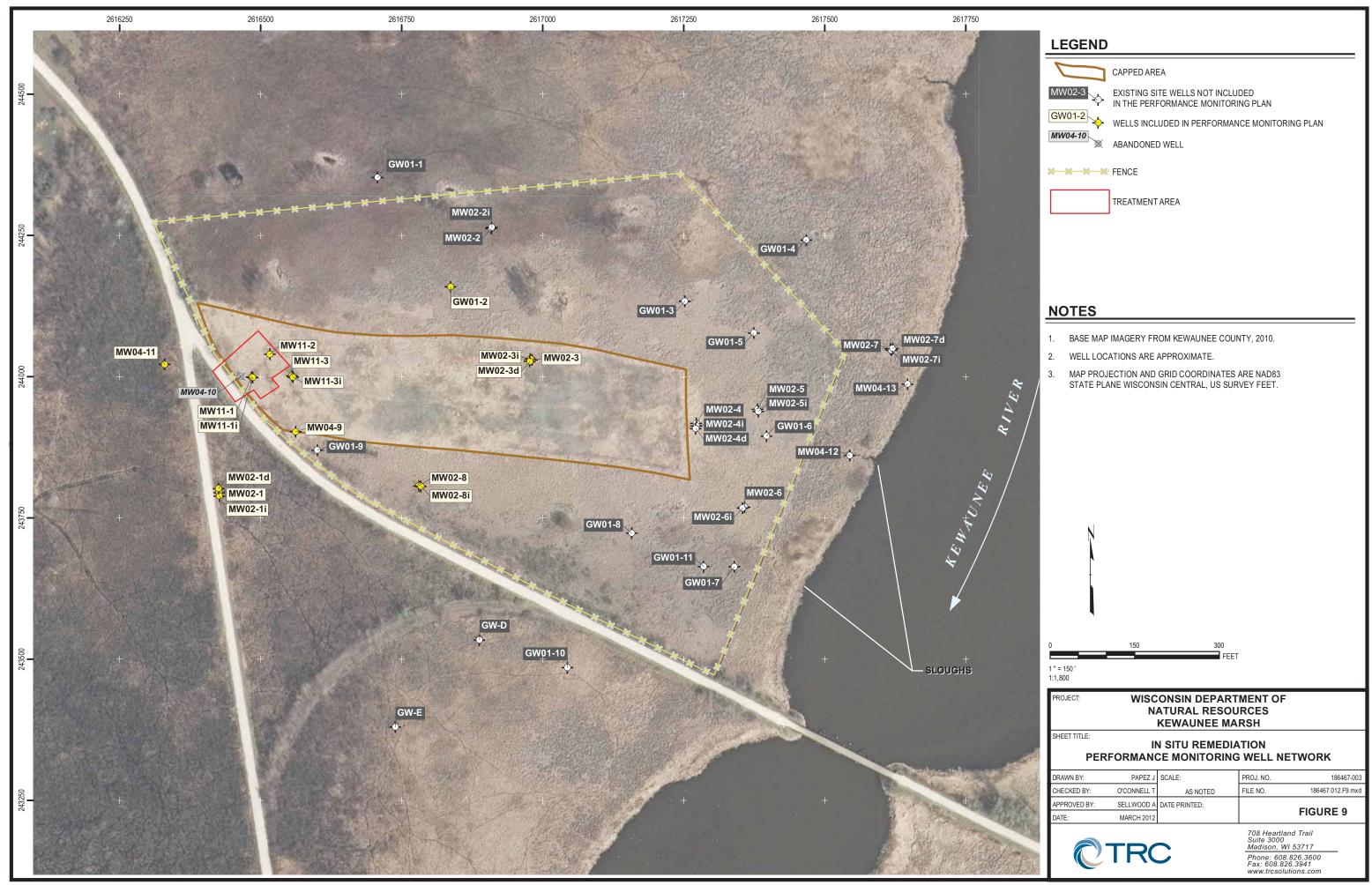
DATE:	MARCH 2012			FIGURE 7
APPROVED BY:	SELLWOOD A	DATE PRINTED:		FIGURE 7
CHECKED BY:	WALTER M	AS NOTED	FILE NO.	186467.011.F7.mxd
DRAWN BY:	PAPEZ J	SCALE:	PROJ. NO.	186467-003



708 Heartland Trail Suite 3000 Madison, WI 53717 Phone: 608.826.3600 Fax: 608.826.3941 www.trcsolutions.com

www.trcsolutions.com

E:\W|_DNR\Kewaunee\Marsh\2011_186467\186467.013.F8.m>



Appendix A Product MSDS and Information Sheets and ORIN's Mixing Quantity Summary

DATE	CELL#	DEPTH ⁽¹⁾	BATCH VOL. (yd3)	TIME ON	TIME OFF	5% PEROXIDE VOLUME (gal)	FERRIC SULFATE (lbs.)	LIMESTONE (lbs.)	BENTONITE (lbs.)	COMMENTS
10/5/11	1	3.5' - 7.0'	50	11:10	11:23	50				Water entering hole
				11:35	11:48		2350			
				11:49	11:55			2150		
	1	0 - 3.5'	50	12:04	12:16	50				
				12:20	12:27		2350			
				12:28	12:40			2150		
10/11/11	1	0 - 7.0'	100	early m	orning				8000	
10/5/11	2	0 - 7.0'	100	13:50	14:15	100				Water entering hole
	2	3.5' - 7.0'	50	14:27	14:35		2350			
				14:37	14:41			2150		
				15:00	15:15				4000	
	2	0 - 3.5'	50	15:18	15:27		2350			
				15:38	15:49			2150		
				15:55	16:05				4000	
10/10/11	3	0 - 7.0'	100	9:00	9:20	100				
	3	3.5' - 7.0'	50	9:23	9:30		2350			
				9:31	9:40			2150		
				9:41	9:54				4000	
	3	0 - 3.5'	50	10:02	10:08		2350			
				10:09	10:14			2150		
				10:15	10:27				4000	
10/10/11	4	0 - 7.0'	100	10:50	11:20	100				Starting to see Styrofoam under
	4	3.5' - 7.0'	50	11:25	11:36		3700			barrier liner
				11:37	11:46			2150		Darrier liner
				11:50	12:01				4000	
	4	0 - 3.5'	50	12:09	12:16		2350			
				12:17	12:20			2150		
				12:21	12:34				4000	
10/10/11	5	0 - 7.0'	100	13:40	14:08	100				Styrofoam
	5	3.5' - 7.0'	50	14:08	14:16		2350			
				14:17				2150		
					14:35				4000	
	5	0 - 3.5'	50	14:41	14:51		2350			
				14:53				2150		
					14:58				4000	

			BATCH VOL.	TIME	TIME	5% PEROXIDE VOLUME	FERRIC SULFATE	LIMESTONE	BENTONITE	
DATE	CELL#	DEPTH ⁽¹⁾	(yd3)	ON	OFF	(gal)	(lbs.)	(lbs.)	(lbs.)	COMMENTS
10/10/11	6	0 - 7.0'	100	15:08	15:36	100				Styrofoam
	6	3.5' - 7.0'	50	15:37	15:42		2350			
				15:43				2150		
					15:53				4000	
	6	0 - 3.5'	50	15:59	16:06		2350			
				16:07				2150		
					16:15				4000	
10/11/11	7	0 - 7.0'	100	7:43	8:12	100				
	7	3.5' - 7.0'	50	8:13	8:21		2350			
				8:22				2150		
					8:32				4000	
	7	0 - 3.5'	50	8:42	8:55		2350			
				9:01				2150		
12/11/11					9:10				4000	
10/11/11	8	0 - 7.0'	100	9:23	9:39	100				
	8	3.5' - 7.0'	50	9:43	9:53		2350			
				9:55				2150		
					10:01				4000	
	8	0 - 3.5'	50	10:08	10:17		2350	0.1.50		
				10:19	10.00			2150	4000	
40/44/44		0 70	400	40.57	10:30	400			4000	
10/11/11	9	0 - 7.0'	100	10:57	11:11	100	0050			
	9	3.5' - 7.0'	50	11:13	11:20		2350	0450		
				11:23	44.00			2150	4000	
		0 0 5!	50	44.04	11:30		2250		4000	
 	9	0 - 3.5'	50	11:31	11:36		2350	2450		
				11:37	11:56			2150	4000	
10/11/11	10	0 - 7.0'	100	13:23	13:43	100			4000	
10/11/11	10	3.5' - 7.0'	50	13:44	13:54	100	2350			
-	10	3.3 - 7.0	30	14:01	13.34		2550	2150		
 				14.01	14:15			2130	4000	
 	10	0 - 3.5'	50	14:19	14:15		2350		7000	
 	10	0 0.0	30	14:30	17.20		2000	2150		
 				17.50	14:41			2100	4000	
10/12/11	11	0 - 7.0'	100	8:16	8:34	100			7000	
15/12/11	11	3.5' - 7.0'	50	8:37	8:46	100	2350			
 		0.0 7.0		8:48	8:57		2000	2150		
 	11	0 - 3.5'	50	9:01	9:08		2350	2.00		
		0 0.0	- 55	9:09	9:15		2000	2150		

			DATOUVOI	T184E	TIME	5% PEROXIDE	EEDDIO OLII EATE	LIMEGEONE	DENTANTE	
DATE	CELL#	DEPTH ⁽¹⁾	BATCH VOL. (yd3)	TIME ON	TIME OFF	VOLUME (gal)	FERRIC SULFATE (lbs.)	LIMESTONE (lbs.)	BENTONITE (lbs.)	COMMENTS
10/14/11	11	0 - 7.0'	100	7:57	8:16				10000	
10/12/11	12	0 - 7.0'	100	9:32	9:47	100				
	12	3.5' - 7.0'	50	9:48	9:52		2350			
				9:53	9:57			2150		
	12	0 - 3.5'	50	10:01	10:06		2350			
				10:07	10:11			2150		
10/14/11	12	0 - 7.0'	100	8:20	8:40				10000	
10/12/11	13	0 - 7.0'	100	10:19	10:33	100				
	13	3.5' - 7.0'	50	10:37	10:41		2350			
				10:42	10:45			2150		
	13	0 - 3.5'	50	10:49	10:54		2350			
				10:55	11:00			2150		
10/14/11	13	0 - 7.0'	100	8:42	9:00				10000	
10/12/11	14	0 - 7.0'	100	15:15	15:35	100				Additional cell to the SE
	14	3.5' - 7.0'	50	15:37	15:42		2350			Additional cell to the 3E
				15:43	15:47			2150		
	14	0 - 3.5'	50	15:53	16:02		2350			
				16:03	16:08			2150		
10/14/11	14	0 - 7.0'	100	7:20	7:35				10000	
10/14/11	15	0 - 7.0'	100	10:17	10:33	100				
	15	3.5' - 7.0'	50	10:34	10:39		3525			
				10:40				2150		
					10:52				5000	
	15	0 - 3.5'	50	10:55	10:59		3525			
				11:00				2150		
					11:16				5000	
10/14/11	16	0 - 7.0'	100	11:43	12:00	100				
	16	3.5' - 7.0'	50	12:01	12:14		3525			
				12:16				2150		
					12:28	-			5000	
	16	0 - 3.5'	50	12:34	12:40	-	3525			
				12:42				2150		
					13:00	-			5000	
10/14/11	17	0 - 7.0'	100	13:58	14:15	100				Additional cell to the SE
	17	3.5' - 7.0'	50	14:20	14:25		3525			Additional cell to the GL
				14:27				2150		
					14:38				10000	
	17	0 - 3.5'	50	14:45	14:52		3525			
				14:54				2150		
					15:07				10000	

DATE	CELL#	DEPTH ⁽¹⁾	BATCH VOL. (yd3)	TIME ON	TIME OFF	5% PEROXIDE VOLUME (gal)	FERRIC SULFATE (lbs.)	LIMESTONE (lbs.)	BENTONITE (lbs.)	COMMENTS
10/14/11	18	0 - 7.0'	100	15:22	15:36	100				
	18	3.5' - 7.0'	50	15:41	15:49		3525			
				15:50				2150		
					16:02				8000	
	18	0 - 3.5'	50	16:05	16:14		3525			
				16:16				2150		
					16:27				8000	
10/17/11	19	0 - 10.0'	100	9:44	10:01	100				
	19	3.5' - 10.0'	50	11:50	12:00		2350			Peat
				12:08				2150		
					12:20				8000	
	19	0 - 3.5'	50	12:27	12:42		3700			Ballast
				12:43	12:50			2150		
10/17/11	20	0 - 10.0'	100	12:53	13:13	100				
	20	3.5' - 10.0'	50	13:14	13:23		2350			Peat
				13:24				2150		
					13:44				8000	
	20	0 - 3.5'	50	13:54	14:05		3700			Ballast
				14:06	14:10			2150		
10/17/11	21	5' - 19.0'	100	14:27	14:50	100				
	21	15' - 19.0'	50	14:56	15:02		2350			Peat
				15:04				2150		
					15:25				8000	
	21	5' - 15.0'	50	15:33			3700			Too much ballast. Did in two
					15:58			2150		lifts.
10/17/11	22	5' - 19.0'	100	16:55	17:15	100				
10/18/11	22	15' - 19.0'	50	7:31	7:36		2350			Peat
				7:37				2150		
					7:51				8000	
10/18/11	22	5' - 15.0'	50	7:52			3700			Too much ballast. Did in two
					10:33			4300		lifts.
10/18/11	23	5' - 19.0'	100	11:47	12:07	100				
	23	15' - 19.0'	50	12:09	12:20		2350			Peat
				12:21				2150		
				· - · - ·	12:36				8000	
	23	5' - 15.0'	50	13:08			3700			Too much ballast. Did in two
					13:38			4300		lifts.

DATE	CELL#	DEPTH ⁽¹⁾	BATCH VOL. (yd3)	TIME ON	TIME OFF	5% PEROXIDE VOLUME (gal)	FERRIC SULFATE (lbs.)	LIMESTONE (lbs.)	BENTONITE (lbs.)	COMMENTS
10/18/11	24	5 '- 19.0'	100	13:44	14:00	100				
	24	15' - 19.0'	50	14:01	14:10		2350			Peat
				14:11				2150		
					14:39				8000	
	24	5' - 15.0'	50	14:42			3700			Too much ballast. Did in two
					15:10			4300		lifts.
10/18/11	25 ⁽²⁾	0 - 10.0'	200	16:20	17:07	200				
	25 ⁽²⁾	3.5' - 10.0'	100	17:08	17:21		4700			Peat
				17:23				4300		
					17:54				10000	
	25 ⁽²⁾	0 - 3.5'	100	17:56			4700			Too much ballast. Did in two
					18:04			4300		lifts.
				18:05	18:16				6000 ⁽³⁾	

Notes:

Footnotes:

- (1) Depth of excavation in marsh cells (#1 #18) measured from marsh surface. Depth of excavation in sideslope and trail cells (#19 #25) measured from trail surface (5 feet above marsh surface). TRC estimated that sideslope and trail cells contained clean (untreated) ballast from 0' 5' bgs, contaminated ballast from 5' 12' bgs, and contaminated peat from 12' 15' bgs.
- (2) TRC designated this area as cells #25 and #26. Cell #26 (last cell treated) ended up significantly smaller than the rest, so it was treated simultaneously with cell #25. Appropriate quantities of chemicals were used for mixing.
- (3) Bentonite mixed with contaminated ballast and mixed into the treated marsh area. Mixing created bulking effect in trail and sideslope cells. Contaminated ballast mixed into marsh area so clean ballast previously removed could be placed on trail sideslope.

^{1.} Orin submitted this table to TRC as seen above without footnotes. TRC added footnotes described below.

Material Safety Data Sheet

.Hydrogen Peroxide 30-50%

ACC# 11189

Section 1 - Chemical Product and Company Identification

MSDS Name: .Hydrogen Peroxide 30-50%

Catalog Numbers: AC9470941, S74876, S74876-1, S748761, S74879, S74882, H323-500, H323500, H325-100, H325-100, H325-30GAL, H325-4, H325-500, H325100, H32530GAL, H3254, H325500, H325500001, H327-500, H327-500, H327500, H327500LC, H341-500, H341-500, H341500, NC9839610, S748761MF, WESH325500, ZZH3253015

Synonyms: Carbamide Peroxide; Hydrogen Dioxide; Peroxide; Hydroperoxide; Urea Peroxide;

Hydrogen Peroxide 100 Volumes.

Company Identification:

Fisher Scientific 1 Reagent Lane Fair Lawn, NJ 07410

For information, call: 201-796-7100 Emergency Number: 201-796-7100

For CHEMTREC assistance, call: 800-424-9300

For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7722-84-1	Hydrogen peroxide	30-50	231-765-0
7732-18-5	Water	Balance	231-791-2

Hazard Symbols: 0 C Risk Phrases: 34 8

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless. **Danger!** Strong oxidizer. Contact with other material may cause a fire. Eye contact may result in permanent eye damage. May cause central nervous system effects. Causes eye and skin irritation and possible burns. Corrosive. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. Mutagen. Light sensitive. May be harmful if swallowed. May cause blood abnormalities.

Target Organs: Blood, central nervous system.

Potential Health Effects

Eye: Contact with liquid is corrosive to the eyes and causes severe burns. Contact with the eyes may cause corneal damage.

Skin: Causes severe skin irritation and possible burns. May cause discoloration, erythema (redness), swelling, and the formation of papules and vesicles (blisters).

Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Causes gastrointestinal tract burns. May cause vascular collapse and damage. May cause damage to the red blood cells. May cause difficulty in swallowing, stomach distension, possible cerebral swelling and death. Ingestion may result in irritation of the esophagus, bleeding of the stomach and ulcer formation.

Inhalation: Causes chemical burns to the respiratory tract. May cause ulceration of nasal tissue, insomnia, nervous tremors with numb extremities, chemical pneumonia, unconsciousness, and death. At high concentrations, respiratory effects may include acute lung damage and delayed pulmonary edema.

Chronic: Prolonged or repeated skin contact may cause dermatitis. Laboratory experiments have resulted in mutagenic effects. Repeated contact may cause corneal damage.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

Skin: Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.

Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Wash mouth out with water. Vomiting may occur spontaneously. If vomiting occurs and the victim is conscious, give water to further dilute the chemical.

Inhalation: Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician: Treat symptomatically and supportively. Attempts at evacuating the stomach via emesis induction or gastric lavage should be avoided. In the event of severe distension of the stomach or esophagus due to gas formation, insertion of a gastric tube may be required. To treat corneal damage, careful ophthalmologic evaluation is recommended and the possibility of local corticosteroid therapy should be considered.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. Strong oxidizer. Contact with combustible materials may cause a fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Substance is noncombustible. Use water with caution and in flooding amounts. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Some oxidizers may react explosively with hydrocarbons(fuel). May decompose explosively when heated or involved in a fire. May accelerate burning if involved in a fire.

Extinguishing Media: Use water only! Do NOT use carbon dioxide. Do NOT use dry chemical. Do NOT get water inside containers. Contact professional fire-fighters immediately. Cool containers with flooding quantities of water until well after fire is out. For large fires, flood fire area with large quantities of water, while knocking down vapors with water fog.

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8. **Spills/Leaks:** Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Use water spray to disperse the gas/vapor. Remove all sources of ignition. Absorb spill using an absorbent, noncombustible material such as earth, sand, or vermiculite. Do not use combustible materials such as saw dust. Flush spill area with water. Provide ventilation. Do not get water inside containers. Keep combustibles (wood, paper, oil, etc.,) away from spilled material.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Contents may develop pressure upon prolonged storage. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Avoid contact with clothing and other combustible materials. Do not ingest or inhale. Store protected from light. Discard contaminated shoes. Unused chemicals should not be returned to the container. Rinse empty drums and containers thoroughly with water before discarding.

Storage: Keep away from heat, sparks, and flame. Do not store near combustible materials. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from light. Keep away form alkalies, oxidizable materials, finely divided metals, alcohols, and permanganates. Store below 35°C. Store only in light-resistent containers fitted with a safety vent.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Hydrogen peroxide	1 ppm TWA	1 ppm TWA; 1.4 mg/m3 TWA 75 ppm IDLH	1 ppm TWA; 1.4 mg/m3 TWA
Water	none listed	none listed	none listed

OSHA Vacated PELs: Hydrogen peroxide: 1 ppm TWA; 1.4 mg/m3 TWA Water: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR §1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid Appearance: clear, colorless

Odor: slight acid odor pH: 3.3 (30% solution)

Vapor Pressure: 23 mm Hg @ 30C

Vapor Density: 1.10

Evaporation Rate:>1.0 (Butyl acetate=1)

Viscosity: 1.25 cP

Boiling Point: 108 deg C @ 760 mmHg **Freezing/Melting Point**:-33 deg C

Autoignition Temperature: Noncombustible

Flash Point: Noncombustible

Decomposition Temperature: Not available.

NFPA Rating: (estimated) Health: 3; Flammability: 0; Reactivity: 1

Explosion Limits, Lower:40 vol %

Upper: 100 vol %

Solubility: Miscible in water.

Specific Gravity/Density:1.1-1.2 (30-50%)

Molecular Formula:H2O2 Molecular Weight:34.0128

Section 10 - Stability and Reactivity

Chemical Stability: Decomposes slowly to release oxygen. Unstable when heated or contaminated with heavy metals, reducing agents, rust, dirt or organic materials. Stability is reduced when pH is above 4.0.

Conditions to Avoid: Mechanical shock, incompatible materials, light, ignition sources, dust generation, excess heat, combustible materials, reducing agents, alkaline materials, strong oxidants, rust, dust, pH > 4.0.

Incompatibilities with Other Materials: Strong oxidizing agents, strong reducing agents, acetic acid, acetic anhydride, alcohols, brass, copper, copper alloys, finely powdered metals, galvanized iron, hydrazine, iron, magnesium, nitric acid, sodium carbonate, potassium permanganate, cyanides (e.g. potassium cyanide, sodium cyanide), ethers (e.g. dioxane, furfuran, tetrahydrofuran (THF)), urea, chlorosulfonic acid, alkalies, lead, nitrogen compounds, triethylamine, silver, nickel, palladium, organic matter, charcoal, sodium borate, aniline, platinum, formic acid, cyclopentadiene, activated carbon, tert-butyl alcohol, hydrogen selenide, manganese dioxide, mercurous chloride, rust, ketones, carboxylic acids, glycerine, sodium fluoride, sodium pyrophosphate, soluble fuels (acetone, ethanol, glycerol), wood, wood, asbestos, hexavalent chromium compounds, salts of iron, copper, chromium, vanadium, tungsten, molybdeum, and platinum.

Hazardous Decomposition Products: Oxygen, hydrogen gas, water, heat, steam. **Hazardous Polymerization:** Will not occur.

Section 11 - Toxicological Information

RTECS#:

CAS# 7722-84-1: MX0887000; MX0890000; MX0899000; MX0899500; MX0900000

CAS# 7732-18-5: ZC0110000

LD50/LC50: CAS# 7722-84-1:

Inhalation, rat: LC50 = 2 gm/m3/4H;

Oral, mouse: LD50 = 2 gm/kg; Oral, rabbit: LD50 = 820 mg/kg; Oral, rat: LD50 = 1518 mg/kg; Oral, rat: LD50 = 910 mg/kg; Oral, rat: LD50 = 376 mg/kg; Skin, rat: LD50 = 3 gm/kg; Skin, rat: LD50 = 4060 mg/kg;

CAS# 7732-18-5:

Oral, rat: LD50 = >90 mL/kg;

Carcinogenicity: CAS# 7722-84-1:

ACGIH: A3 - Animal Carcinogen

IARC: Group 3 carcinogen CAS# 7732-18-5: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.

Epidemiology: No information available. **Teratogenicity:** No information available.

Reproductive Effects: No information available.

Neurotoxicity: No information available.

Mutagenicity: CAS#: 7722-84-1 Mutation in Microorganisms: Salmonella typhimurium = 100 ug/plate.; Hyman, embryo = 50 umol/L.; Cytogenetic Analysis: Human, embryo = 20 umol/L.

Mutation in Mammalian Somatic Cells: Hamster, lung = 1mmol/L.

Other Studies: No data available.

Section 12 - Ecological Information

Ecotoxicity: Fish: Carp: LC50 = 42 mg/L; 48 Hr; Unspecified Fathead Minnow: LC50 = 16.4 mg/L; 96 Hr; Fresh water Fathead Minnow: NOEC = 5 mg/L; 96 Hr; Fresh water flea Daphnia: EC50 = 2.4 mg/L; 48 Hr; Fresh water Channel catfish: LC50 = 37.4 mg/L; 96 Hr; Fresh water No data available.

Environmental: Rain washout is expected due to condensation of hydrogen peroxide on contact with water droplets. In the atmosphere, indirect photooxidation is perdicted with a half-life of 10 to 20 hours. Non-significant evaporation and adsorption from water surfaces and soil/sediments is expected. Rapid and cosiderable aerobic biodegradation was determined with a half-life < 1 minute (biological treatment sludge) and 0.3 to 2 days (fresh water). Hydrogen peroxide is non-bioaccumulable.

Physical: No information available. **Other:** No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed. RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	HYDROGEN PEROXIDE, AQUEOUS SOLUTIONS 30%				HYDROGEN PEROXIDE
Hazard Class:	5.1				5.1(8)
UN Number:	UN2014				UN2014
Packing Group:	П				П

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 7722-84-1 is listed on the TSCA inventory.

CAS# 7732-18-5 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

SARA

Section 302 (RQ)

None of the chemicals in this material have an RQ.

Section 302 (TPQ)

CAS# 7722-84-1: concentration > 52%: TPQ = 1000 pounds; RQ = 1000 poun ds

SARA Codes

CAS # 7722-84-1: acute, flammable.

Section 313

No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

CAS# 7722-84-1 is considered highly hazardous by OSHA.

STATE

CAS# 7722-84-1 can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives Hazard Symbols:

O C

Risk Phrases:

R 34 Causes burns.

R 8 Contact with combustible material may cause fire.

Safety Phrases:

S 28 After contact with skin, wash immediately with...

S 3 Keep in a cool place.

S 36/39 Wear suitable protective clothing and eye/face protection.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 7722-84-1: 0

CAS# 7732-18-5: No information available.

Canada

CAS# 7722-84-1 is listed on Canada's DSL List. CAS# 7722-84-1 is listed on Canada's DSL List. CAS# 7732-18-5 is listed on Canada's DSL List. CAS# 7732-18-5 is listed on Canada's DSL List.

This product has a WHMIS classification of C, E, D2A.

CAS# 7722-84-1 is listed on Canada's Ingredient Disclosure List.

CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 7722-84-1: OEL-AUSTRALIA: TWA 1 ppm (1.5 mg/m3) OEL-BELGIUM: TWA 1 ppm (1.4 mg/m3) OEL-DENMARK: TWA 1 ppm (1.4 mg/m3) OEL-FINLAND: TWA 1 ppm (1.4 mg/m3); STEL 3 ppm (4.2 mg/m3) OEL-FRANCE: TWA 1 ppm (1.5 m g/m3) OEL-GERMANY: TWA 1 ppm (1.4 mg/m3) OEL-THE NETHERLANDS: TWA 1 ppm (1.4 mg/m3) OEL-THE PHILIPPINES: TWA 1 ppm (1.4 mg/m3) OEL-SWITZERL AND: TWA 1 ppm (1.4 mg/m3); STEL 2 ppm (2.8 mg/m3) OEL-TURKEY: TWA 1 ppm (1.4 mg/m3) OEL-UNITED KINGDOM: TWA 1 ppm (1.5 mg/m3); STEL 2 ppm (3 m g/m3)

Section 16 - Additional Information

MSDS Creation Date: 4/21/1999 Revision #4 Date: 8/02/2000

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.



MSDS: 0075000 Print Date: 12/07/2010

Revision Date: 12/07/2010

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Kemira FERIX-3
Synonyms: Iron (III) Sulfate
Formula Fe2(SO4)3*9H2O

Product Description: Granulated and compounded Iron III hydrates

Intended/Recommended Use: Water treating chemical

Supplied By: KEMIRA WATER SOLUTIONS CANADA, INC., 3405 BLVD. MARIE VICTORIN, VARENNES, QUEBEC,

CANADA J3X 1T6 1-800/ 465-6171, 1-450/652-0665, 1-800/450-7352 - Polymers

EMERGENCY PHONE: In CANADA: 613/996-6666 In USA: 1-800/424-9300 or 1-703/527-3887.

Manufactured By: KEMIRA WATER SOLUTIONS, INC., 316 BARTOW MUNICIPAL AIRPORT,

BARTOW, FLORIDA 33830, USA -1-785/842-7424

2. COMPOSITION/INFORMATION ON INGREDIENTS

WHMIS REGULATED COMPONENTS

Component / CAS No. % (w/w) OSHA (PEL): ACGIH (TLV) Carcinogen

Ferric sulfate 66 - 74 $1 \text{ mg/m}^3 \text{ Fe (TWA)}$ $0.1 \text{ mg/m}^3 \text{ as}$ -

10028-22-5 (dry weight: persulfate (TWA) 69 - 77%) 1 mg/m³ as Fe (TWA)

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE AND ODOR:

Color: yellow-tannish-gray

Appearance: granular Odor: granular

STATEMENTS OF HAZARD:

WARNING! HARMFUL IF SWALLOWED OR INHALED

IRRITATING TO EYES, SKIN, RESPIRATORY AND DIGESTIVE TRACTS

POTENTIAL HEALTH EFFECTS

EFFECTS OF EXPOSURE:

Refer to Section 11 for toxicology information on the regulated components of this product. Skin or eye contact with solutions of this product may cause moderate skin and eye irritation.

4. FIRST AID MEASURES

Kemira FERIX-3 MSDS: 0075000 Print Date: 12/07/2010 Page 2 of 7

4. FIRST AID MEASURES

Ingestion:

Never give anything by mouth to an unconscious person. Obtain medical attention. Do not induce vomiting. Administer 250 - 300 ml water to dilute material in the stomach.

Skin Contact:

In case of skin contact, wash affected areas of skin with soap and water. If skin irritation persists, call a physician.

Eye Contact

Rinse immediately with plenty of water for at least 15 minutes. Obtain medical advice if there are persistent symptoms.

Inhalation:

If breathing has stopped, trained personnel should administer artificial respiration. If the heart has stopped, trained personnel should administer cardio-pulmonary resuscitation. Remove to fresh air. If breathing is difficult, give oxygen. Obtain medical advice if there are persistent symptoms.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media:

Use an extinguishing media appropriate for the surrounding fire. This material will not burn readily.

Protective Equipment:

Wear full firefighting protective clothing. See MSDS Section 8 (Exposure Controls/Personal Protection). Firefighters, and others exposed, wear self-contained breathing apparatus.

Special Hazards:

Keep unnecessary people away.

Mechanical/Static Sensitivity Statements:

None

6. ACCIDENTAL RELEASE MEASURES

Personal precautions:

Where exposure level is not known, wear approved, positive pressure, self-contained respirator. Where exposure level is known, wear approved respirator suitable for level of exposure. Refer to Section 8 (Exposure Controls/Personal Protection) for appropriate personal protective equipment.

Methods For Cleaning Up:

Sweep up into containers for disposal. Dispose of contaminated material as prescribed

Environmental Precautions:

Use appropriate containment to avoid environmental contamination. Prevent water contaminated with this product from entering drains, sewers or streams, growng crops/keeping animal areas, and sites of native flora and fauna.

7. HANDLING AND STORAGE

HANDLING

Precautionary Measures: Do not get in eyes. Handle with caution. Wash thoroughly after handling. See MSDS for details.

Special Handling Statements: Review the label, this MSDS and any other applicable information before use. Keep separated from incompatible substances. Use appropriate Personal Protective Equipment per Section 8. Handle only with equipment, materials and supplies specified by their manufacturer as being compatible and appropriate for use with this product.

Kemira FERIX-3 MSDS: 0075000 Print Date: 12/07/2010 Page 3 of 7

STORAGE

Prevent material from coming in contact with common metals. Ensure that al storage vessels are labeled. Avoid skin and eye contact. Wear appropriate protective clothing. Store only in dry rubber-lined, plastic, FRP or stainless steel (304, 316). Keep storage temperatures between 100 and 300 C. Store away from incompatible materials such as alkalis. Keep smaller containers as drums and totes tightly closed when not in use or when empty. Product should be used within one year. Storage facilities should have secondary containment as required by law or regulation. Storage tanks, piping and offloading points should be labeled with appropriate signage to avoid accidents.

Containers of this material may be hazardous when empty, since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Measures:

Engineering controls are not necessary if good hygiene practices are followed.

Respiratory Protection:

Where exposures are below the established exposure limit, no respiratory protection is required. Where exposures exceed the established exposure limit, use respiratory protection recommended for the material and level of exposure.

Eye Protection:

Wear eye/face protection. Prevent eye and skin contact.

Skin Protection:

Wear suitable protective clothing.

Additional Advice:

Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water. Food, beverages, and tobacco products should not be carried, stored, or consumed where this material is in use.

9. PHYSICAL AND CHEMICAL PROPERTIES

Color: yellow-tannish-gray

Appearance: granular **Odor:** slight

Boiling Point:

Melting Point:

Vapor Pressure:

Not applicable

>300 °C

Not applicable

Specific Gravity/Density: 3.1

Vapor Density: Not available

Percent Volatile (% by wt.): None

pH: Not applicable
Saturation In Air (% By Vol.): Not available
Evaporation Rate: Similar to water

Solubility In Water:
Volatile Organic Content:
Flash Point:
Flammable Limits (% By Vol):
Autoignition Temperature:
Decomposition Temperature:
Partition coefficient (n
Soluble
Not available
Not applicable
Not applicable
Not applicable
Not available

octanol/water):

Odor Threshold: Not available

10. STABILITY AND REACTIVITY

Stability: Stable

Kemira FERIX-3 MSDS: 0075000 Print Date: 12/07/2010 Page 4 of 7

Conditions To Avoid: To avoid product degradation and equipment corrosion, do not use iron, copper, or

aluminum containers or equipment. Avoid contact with strong acids or bases and

excessive heat.

Polymerization: Will not occur

Conditions To Avoid: None known

Hazardous Decomposition

Products:

oxides of sulfur (includes sulfur di and tri oxides)

11. TOXICOLOGICAL INFORMATION

Toxicological information for the product is found under Section 3. HAZARDS IDENTIFICATION. Toxicological information on the regulated components of this product is as follows:

Ferric Sulfate

Available TOXICOLOGICAL DATA:

LD50 (intraperitoneal mouse): 168 mg/kg

LD50 (oral, rat) = 500 mg/kg

Mutagenicity: Not available

Reproductive Effects: Not available

Teratogenicity and Fetotoxicity: Not available

Synergistic Materials: Not available

Kemira FERIX-3 MSDS: 0075000 Print Date: 12/07/2010 Page 5 of 7

12. ECOLOGICAL INFORMATION

The test values shown for this product are actually the results for studies conducted on anhydrous ferric sulfate.

ALGAE TEST RESULTS

Test: Acute toxicity, freshwater

Duration: 7 day.

Species: Green Algae (Scenedesmus subspicatus)

10000 ug/l Toxicity endpoint not

reported.

Based on the anhydrous material. 1978 Journal: Egypt.J.Bot.

21(2):121-130

FISH TEST RESULTS

Test: Acute toxicity, freshwater

Duration: 24 hr. **Procedure:** Static. **Species:** Mosquitofish (Gambusia affinis)

37,200 ug/l LC50 Based on the anhydrous material. 1957 Journal: Sewage

Ind.Wastes 29(6):695-711

Test: Acute toxicity, freshwater

Duration: 96 hr **Procedure:** Static **Species:** Mosquitofish (Gambusia affinis)

37,200 ug/l LC50 Based on the anhydrous material. 1957 Journal: Sewage

Ind.Wastes 29(6):695-711

OTHER TEST RESULTS

Test: Acute toxicity, freshwater

Duration: 48 hr

Species: Rock Oyster (Saccostrea commercialis)

100 - 200 ug/l NOEC Based on the anhydrous material. 1997 Journal:

Ectoxicol.Environ.Saf. 37:30-36

13. DISPOSAL CONSIDERATIONS

Kemira encourages the recycle, recovery and reuse of materials, where permitted, as an alternative to disposal as a waste. Kemira recommends that organic materials classified as hazardous waste according to the relevant local or national regulations be disposed of by thermal treatment or incineration at approved facilities. All local and national regulations should be followed.

14. TRANSPORT INFORMATION

Kemira FERIX-3 MSDS: 0075000 Print Date: 12/07/2010 Page 6 of 7

14. TRANSPORT INFORMATION

This section provides basic shipping classification information. Refer to appropriate transportation regulations for specific requirements.

US DOT

Proper Shipping Name: Environmentally hazardous substance, solid, n.o.s.

Hazard Class: 9 Packing Group: III UN/ID Number: UN3077

Transport Label Required: Class 9

Technical Name (N.O.S.): Contains ferric sulfate

Hazardous Substances:

Component / CAS No. Reportable Quantity of Product (lbs)
Ferric sulfate ~1299 lbs. (Ferric Sulfate RQ = 1000 lbs)

Comments: Hazardous Substances/Reportable Quantities - DOT requirements specific to

Hazardous Substances only apply if the quantity in one package equals or exceeds

the reportable quantity.

TRANSPORT CANADA

Proper Shipping Name: Not applicable/Not regulated

ICAO / IATA

Proper Shipping Name: Environmentally hazardous substance, solid, n.o.s.

Hazard Class: 9 Packing Group: III UN Number: UN3077

Packing Instructions/Maximum Net Quantity Per Package:

Passenger Aircraft: No Limit Cargo Aircraft: No Limit

Technical Name (N.O.S.): Contains ferric sulfate

IMO

Proper Shipping Name: Environmentally hazardous substance, solid, n.o.s.

Hazard Class: 9 UN Number: UN3077 Packing Group: III

Technical Name (N.O.S.): Contains ferric sulfate

15. REGULATORY INFORMATION

This product has been classified in accordance with the hazard criteria of the Controlled products Regulations and this Material Safety Data Sheet contains all the information required by the Controlled Products Regulations.

WHMIS CLASSIFICATION:

Class D2B Toxic

INVENTORY INFORMATION

United States (USA): This product is manufactured in compliance with all provisions of the Toxic Substances Control Act, 15 U. S. C. 2601 et. seq.

Canada: Components of this product have been reported to Environment Canada in accordance with Sections 66 and/or 81 of the Canadian Environmental Protection Act (1999), and are included on the Domestic Substances List.

European Union (EU): All components of this product are included in the European Inventory of Existing Chemical Substances (EINECS) in compliance with Council Directive 67/548/EEC and its amendments.

Kemira FERIX-3 MSDS: 0075000 Print Date: 12/07/2010 Page 7 of 7

16. OTHER INFORMATION

NFPA Hazard Rating (National Fire Protection Association)

Health: 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

Fire: 0 - Materials that will not burn.

Reactivity: 0 - Materials that in themselves are normally stable, even under fire exposure conditions.

Reasons For Issue: Revised Section 9

Prepared By: Richard Moye, Product Regulatory 1-251-662-1581 12/07/2010

This information is given without any warranty or representation. We do not assume any legal responsibility for same, nor do we give permission, inducement, or recommendation to practice any patented invention without a license. It is offered solely for your consideration, investigation, and verification. Before using any product, read its label.

KEMIRON FERIX-3

Granular Ferric Sulfate

KEMIRON FERIX-3 is an effective primary coagulant in dry granulated form based on trivalent iron (Fe³⁺). KEMIRON FERIX-3 can be easily dissolved with suitable equipment into a 10 - 11.8% Fe solution. It functions very well for both potable and wastewater clarification over a wide range of pH and can be used for color removal, phosphate removal, heavy metal removal and lime softening applications.

PRODUCT SPECIFICATIONS

Appearance	Grayish granule		
Total Iron (Fe tot)	$20.5\pm2\%$		
Fe (III)	$19.5\pm1\%$		
Fe (II)	≤ 1.0%		
Free H ₂ SO ₄	< 1.5%		
Water-Insoluble Matter	< 1%		
Bulk Density	70 lb / ft ³		
(Above analysis according to AWWA B406-92)			

Particle Size Distribution:

50%	< 2-3 mm
100%	< 7 mm
Dust (< 0.2 mm)	max 3%
Angle of repose	37°

CERTIFICATION / APPROVAL

KEMIRON FERIX-3 meets or exceeds all **AWWA** standards and is **ANSI/NSF Standard 60** certified for use in potable water treatment up to 275 mg/l.

DOSING AND DISSOLVING

KEMIRON FERIX-3 can be dissolved in water and dosed via suitable chemical metering pumps.

STORAGE

The dry granules are mildly hygroscopic and therefore should be stored in dry conditions.

HANDLING / SAFETY

The handling of any chemical requires care. Anyone responsible for using or handling KEMIRON FERIX-3 should familiarize themselves with the full safety precautions outlined in our Material Safety Data Sheet

DELIVERY

In bulk, by rail car or hopper truck. Bags (50#) and Super Sacks (2,000#) are also available. Environmentally, Hazardous Substance, Solid, n.o.s. (Ferric Sulfate), 9, UN 3077, P.G.III

PRODUCTION / DISTRIBUTION

KEMIRON FERIX-3 is produced in Finland by Kemira Oy. US distribution through Kemira Water Solutions.

CUSTOMER SERVICE

If you have any questions concerning this material, please contact our Customer Service Department.

US;

Lawrence, KS	(800) 879-6353
Lawrence KS	(800) 879-0.353

Canada

Varennes, QC (800) 465-6171

KEMIRON Water Solutions, Inc., and KEMIRON Water Solutions Canada, Inc. provide the foregoing information in good faith and make no representations as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using the product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. KEMIRON Water Solutions, Inc., and KEMIRON Water Solutions Canada, Inc. make no representations or warranties, either expressed or implied, including without limitation any warranties of merchantability or fitness for a particular purpose with respect to the information set forth herein or the product to which the information refers. Accordingly, KEMIRON Water Solutions, Inc., and KEMIRON Water Solutions of Canada, Inc. disclaim responsibility for damages resulting from use or reliance upon this information.



55 Industrial Street Toronto, Ontario M4G 3W9 Phone: 416-423-1300



MATERIAL SAFETY DATA SHEET LIMESTONE

SECTION I - MATERIAL IDENTIFICATION AND USE

Material Name/Identifier:LimestoneChemical Name:LimestoneChemical Family:Carbonate Rock

Chemical Formula: Complex mixture (naturally variable)

Trade Name and Synonyms: Aglime, manufactured sand, aggregate, dolomite, crushed stone

Molecular Weight: Not available

Material Use: Construction, ready mix concrete, concrete products, asphalt,

agriculture.

SECTION II - HAZARDOUS INGREDIENTS OF MATERIAL

Limestone: A complex mixture (naturally variable composition of primarily

Calcium and Magnesium Carbonates.

C.A.S., N.A., or U.N. Number: 1317 – 65 - 3
L.D.: Not available
L.C.: Not available

*Limestone may contain varying concentrations of Quartz (Crystalline Silica) C.A.S., N.A., or U.N.

Number: 14808-60-7

Note: This MSDS is applicable to limestone only when the Quartz concentration is greater than 0.1 (%)

percent.

SECTION III - PHYSICAL DATA FOR MATERIAL

Physical State: Solid

Odour and Appearance: No odour; angular grey/brown/ white particles of varying sizes.

Odour Threshold (P.P.M.):

Specific Gravity:

Vapour Pressure (MM):

Not applicable

Not applicable

Not applicable

Evaporation Rate: 0

Solubility in Water (20°C):

Boiling Point (°C):

Negligible

Not applicable

Not applicable

PH:

Not applicable

Percentage Volatile (By volume): 0

Coefficient of Water/Oil Distribution: Not applicable

SECTION IV - FIRE AND EXPLOSION HAZARD OF MATERIAL

Section not applicable



SECTION V - REACTIVITY DATA

Chemical Stability: Yes **Incompatibility to Other Substances:** No

Reactivity and Under What Conditions: Neutralizing agent for strong acids.

Hazardous Decomposition Products: CO₂ may be released on contact with strong acids

SECTION VI - TOXICOLOGICAL PROPERTIES OF MATERIAL

Route of Entry: Inhalation

Effects of Acute to Material: Exposure to dust may irritate respiratory system.

Effects of Chronic Exposure to Material:

 Chronic exposure to respirable limestone dust at levels exceeding exposure limits has caused pneumoconiosis.

2. Chronic exposure to respirable limestone dust at levels exceeding exposure limits has caused silicosis, a serious and progressive pneumoconiosis that can be disabling, and lead to death. Symptoms may appear at any time; even years after exposure has ceased. Symptoms of silicosis may include shortness of breath, difficulty in breathing, coughing, diminished work capacity, diminished chest expansion, reduction of lung volume and right heart enlargement and or failure. The only reliable method of detecting silicosis is through a chest X-ray. Silicosis may aggravate other chronic pulmonary conditions and may increase the risk of pulmonary tuberculosis infection. Smoking aggravates the effects of silica exposure.

L.D. of Material (Specify Species and Route): Not available

L.C. of Material (Specify Species and Route): Not available

Exposure Limites (Ontario):1. Limestone (Total Dust) 10mg/metre³ (TWAEV¹)

2. Respirable Silica Dust 0.2mg/metre³ (TWAEV)

For additional information on the above exposure limits, consult Ontario Regulations 654/86 and 769/83,

amended 23/87.

Irritancy of Material: Respiratory system, eyes, skin.

Sensitization of Material: Not available
Synergisitc Material: None known

Carcinogenicity, Reproducitve Effects, Teratogenicity, Mutagenicity:

As date of preparation of this MSDS:

1. Limestone is not included on the ACGIH, NTP or OSHA lists of potential carcinogens.

2. Silica, in the form of crystalline Quartz, and as a component of this material, is listed as a potential carcingoen by IARC. IARC (Intarnational Agency for Research on Cancer) has determined that there is limited evidence of carcinogenicity to humans. Limited evidence of carcinogencity indicates that casual interpretation is credible, but alternate explanations such as chance, bias or confounding factors could not adequately be excluded. There is no evidence that limestone is a teratogen, a mutagen or has a reproductive effect.

SECTION VII - PREVENTATIVE MEASURES

Personal Protective Equipment: Respiratory protection should be used whenever dust is

generated. Refer to the Ontario Regulation 769/83 as amended for respiratory equipment specified for various respirable silica

dust levels.

Engineering Controls (Ventilation, Enclosed Process): Where feasible, dust levels should be

reduced through wet suppression, dust collection, ventilation,

¹ Time Weighted Average Exposure Value



process enclosure and enclosed pressurized employee work

stations.

Leak and Soil Procedure: Spilled materials, where dust can be generated, may expose

clean up personnel to respirable dust. Wetting of spilled

materials and/or use of protective respiratory equipment may be

necessary.

Waste Disposal: Re-use clean materials; dispose of waste materials only in

accordance with applicable federal, provincial and local laws and

regulations.

Handling Procedures and Equipment: Respirable dust may be generated during processing, handling

and storage-avoid inhalation. Refer to "Personal Protective

Equipment-Respiratory".

Storage Requirements: Not applicable Special Shipping Information: Not applicable

SECTION VIII - FIRST AID MEASURES

Dust in Eyes: Flush out eyes with running water for 15 minutes. Contact a

physician if irritation persists.

Dust on Skin: Wash with soap and water. Contact a physician if irritation is

aggravated.

Dust Inhalation: Remove to fresh air. Dust in throat and nasal passage should

clear spontaneously. Contact a physician if irritation persists.

SECTION IX - PREPARATION DATE OF MSDS

Prepared by:

Manufacturer's Name: CBM Aggregates
Address: 55 Industrial Street

Telephone: 416-426-1300 Date: July 2008

SECTION X - LABEL INFORMATION

Labeling of bulk products is not required, however, label information is as follows:

LIMESTONE

◐

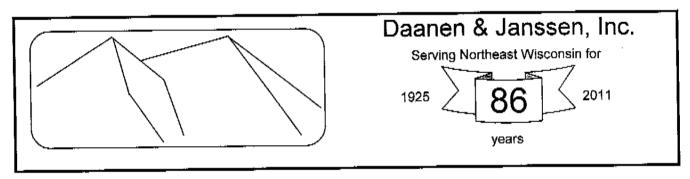
CAUTION DUST INHALATION HAZARD

- Avoid inhalation of dust
- Wear appropriate personal protection equipment

Additional Notes or References: Physical irritation may result from handling limestone. Work gloves and work clothing are recommended.

The company believes that the information contained herein is factual. The data and information presented are without warranty, guarantee or liability on our part, and are presented to the customer for his own consideration, investigation, and verification.

Tons



07/29/11 Date: 8727 Quotation # Phone 608-838-6699 Orin Remediation CUSTOMER: 608-838-6695 Fax Tyler Emerson CONTACT: Remediation Project PROJECT: Start LOCATION: Kewaunee CITY/TOWN: <u>DELIVERED</u> **FACILITY** <u>F.O.B</u> **PRODUCT SPEC** <u>QTY</u> MEAS \$10.25 D&J Crusher Dust

> * Requires Specification Net 30 days with approved credit Prices do not include sales tax Quote # must accompany pickup

AECOM

Report of	Sieve	Analysis	of A	∖ggregate	? \$

AECOM Proje	act No.:		6019413	2	Date:	6/13/2011	
Client Project	,				Report No.: _		
Architect / En	·				Contractor:	Daanen & Jans	sen
	igirieer.	D	aanen & Ja	nssen	 Source: _	Chase Quarr	у
Project: Report of Te:	nt of	WDOT B.3.					
Report of Tes	st oi.	VIBO 1 B.O.					
Sleve Size or No.	Weight Retained	% Retained	% Passing	Specifi- cations	Received at Laboratory:	06/10/11	
3-Inch					Quantity Represented:	2,49 <u>3 gram</u>	s
2-Inch					Submitted By:	Pat Schrade	er
1 1/4-Inch					Sampled From:	Stockpile	·
1-Inch	0	0	100	100	Identification:	Crushed Sto	ne
3/4-Inch					Date Sampled:	6/10/2011	
1/2-Inch					Intended Use:	Backfill	
3/8-Inch	0	0	100				
No. 4	113	4.5	95.5		Remarks:		
No. 8					Organic matte	r, colorimetric:	
No. 10	942	37.8	57.7		Co	al and Lignite:	
No. 16				:		Clay Lumps:	
No. 20						Chert:	
No. 30		" '				Soft Particles:	
No. 40	469	30.8	26.9	0-60	Perce	ent Absorption:	
No. 50					s	pecific Gravity:	
No. 80					Dry R	odded Weight:	
No. 100	204	8.2	18.7		Was	hed Gradation:	
No. 200	112	4.5	14.2	0-15	Percent Passing	No. 200 Sieve:	14.2
Pan	353	14.2					1.1
Fineness	Modulus						

Checked by:		
Tested By:	Robert J. Peeters	

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

SORBOND® UG **Material name**

Version #

Revision date 22-January-2009

CAS# 1302-78-9

Synonym(s) SMECTITE CLAY

Manufacturer **CETCO Oilfield Services Company**

Industrial Wastewater Products

2870 Forbs Avenue

Hoffman Estates, IL 60192 US safetydata@amcol.com

http://www.cetcooilfieldservices.com/ General Information (800) 527-9948

Emergency (800) 424-9300

2. Hazards Identification

Emergency overview Material can be slippery when wet.

Potential health effects

Routes of exposure Inhalation. Eye contact.

Eves Dust or powder may irritate eye tissue. Symptoms include itching, burning, redness and tearing.

Skin Non-irritating to the skin.

Inhalation Inhalation of dusts may cause respiratory irritation. Repeated or prolonged inhalation may cause

toxic effects. For additional information on inhalation hazards, see Section 11 of this safety data

sheet.

Ingestion No significant adverse effects are expected upon ingestion of the product.

Target organs

Chronic effects This product has the potential for generation of respirable dust during handling and use. Dust may

> contain respirable crystalline silica. Overexposure to dust may result in pneumocononiosis, a respiratory disease caused by inhalation of mineral dust, which can lead to fibrotic changes to the lung tissue, or silicosis, a respiratory disease caused by inhalation of silica dust, which can lead to

inflammation and fibrosis of the lung tissue.

3. Composition / Information on Ingredients

The manufacturer lists no ingredients as hazardous according to OSHA 29 CFR 1910.1200.

Bentonite contains naturally occurring crystalline silica (not listed in Annex I of Directive **Composition comments**

67/548/EEC) in quantities less than 6%. Occupational Exposure Limits for impurities are listed in

Section 8.

4. First Aid Measures

First aid procedures

Eye contact Flush eyes immediately with large amounts of water. Get medical attention if irritation develops or

persists.

Skin contact No special measures required. Get medical attention if irritation develops or persists.

Inhalation If symptoms are experienced, remove source of contamination or move victim to fresh air. If the

affected person is not breathing, apply artificial respiration. If breathing is difficult, give oxygen.

Call a physician if symptoms develop or persist.

Ingestion No special measures required. If ingestion of a large amount does occur, seek medical attention.

Notes to physician Provide general supportive measures and treat symptomatically.

General advice If you feel unwell, seek medical advice (show the label where possible).

5. Fire Fighting Measures

The product is not flammable. This material will not burn. Flammable properties

Material name: SORBOND® UG CETCO - Industrial Wastewater MSDS US 5302 Version #: 01 Revision date: 22-January-2009 Print date: 22-January-2

Extinguishing media

Suitable extinguishing

media

Dry chemical, CO2, water spray or regular foam. Use any media suitable for the surrounding fires.

Protection of firefighters

Protective equipment and precautions for firefighters

Material can be slippery when wet.

Hazardous combustion

products

None known.

6. Accidental Release Measures

Personal precautionsMaterial can be slippery when wet. Forms smooth, slippery surfaces on floors, posing an accident

risk. Wear a dust mask if dust is generated above exposure limits.

Environmental precautions No special environmental precautions required.

Methods for containment None necessary.

Methods for cleaning upAvoid the generation of dusts during clean-up. Collect dust or particulates using a vacuum cleaner

with a HEPA filter. Reduce airborne dust and prevent scattering by moistening with water.

7. Handling and Storage

Handling Keep formation of airborne dusts to a minimum. Provide appropriate exhaust ventilation at places

where dust is formed. In case of insufficient ventilation, wear suitable respiratory equipment.

Material can be slippery when wet. Forms smooth, slippery surfaces on floors, posing an accident

risk.

Storage Guard against dust accumulation of this material. No special storage conditions required. No

special restrictions on storage with other products.

8. Exposure Controls / Personal Protection

Occupational exposure limits

ACGIH

Impurities	Туре	Value	Form
INERT OR NUISANCE DUST (SEQ250)	TWA	10 mg/m3	Inhalable particles.
		3 mg/m3	Respirable particles.
QUARTZ (14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.

U.S. - OSHA

Impurities	Туре	Value	Form
INERT OR NUISANCE DUST (SEQ250)	PEL	15 mg/m3	Total dust.
		5 mg/m3	Respirable fraction.
	TWA	5 mg/m3	Respirable fraction.
		50 mppcf	Total dust.
		15 mppcf	Respirable fraction.
		15 mg/m3	Total dust.
QUARTZ (14808-60-7)	TWA	2.4 mppcf	Respirable.
		0.3 mg/m3	Total dust.
		0.1 mg/m3	Respirable.
		0.1 mg/m3	Respirable dust.

Exposure guidelinesOccupational exposure to nuisance dust (total and respirable) and respirable crystalline silica

should be monitored and controlled.

Engineering controls If material is ground, cut, or used in any operation which may generate dusts, use appropriate

local exhaust ventilation to keep exposures below the recommended exposure limits. If

engineering measures are not sufficient to maintain concentrations of dust particulates below the OEL, suitable respiratory protection must be worn.

Personal protective equipment

Eye / face protection Wear dust goggles.

Skin protection No special protective equipment required.

Material name: SORBOND® UG CETCO - Industrial Wastewater
5302 Version #: 01 Revision date: 22-January-2009 Print date: 22-January-2

Respiratory protection Use a particulate filter respirator for particulate concentrations exceeding the Occupational

Exposure Limit.

General hygeine Eye wash fountain is recommended. Use good industrial hygiene practices in handling this

considerations material.

9. Physical & Chemical Properties

Not available. **Appearance** Color Various. Odor None.

Odor threshold Not available.

Physical state Solid. **Form** Various. 8 - 11 Hα

Not available. **Melting point** Freezing point Not available. **Boiling point** Not available. Non-flammable Flash point **Evaporation rate** Not available. **Flammability** Not available. Flammability limits in air, Non-explosive

upper, % by volume

Flammability limits in air, lower, % by volume

Non-explosive

Not available. Vapor pressure Not available. Vapor density Not available. Specific gravity **Relative density** Not available. Solubility (water) Negligible **Partition coefficient** Not available.

(n-octanol/water)

Not available. **Auto-ignition temperature Decomposition temperature** Not available. VOC 0 % estimated **Percent volatile** 0 % estimated Molecular formula UNKNOWN

10. Chemical Stability & Reactivity Information

Chemical stability Stable at normal conditions.

Conditions to avoid None known. **Incompatible materials** None known. **Hazardous decomposition** None known.

Material name: SORBOND® UG CETCO - Industrial Wastewater

products

reactions

Possibility of hazardous

Will not occur.

11. Toxicological Information

Acute effects Mild irritant to eyes (according to the modified Kay & Calandra criteria).

Chronic effects

In 1997, IARC (the International Agency for Research on Cancer) concluded that crystalline silica inhaled from occupational sources can cause lung cancer in humans. However in making the overall evaluation, IARC noted that "carcinogenicity was not detected in all industrial circumstances studied. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." (IARC Monographs on the evaluation of the carcinogenic risks of chemicals to humans, Silica, silicates dust and organic fibres, 1997, Vol. 68, IARC, Lyon, France.)

In June 2003, SCOEL (the EU Scientific Committee on Occupational Exposure Limits) concluded that the main effect in humans of the inhalation of respirable crystalline silica dust is silicosis. "There is sufficient information to conclude that the relative risk of lung cancer is increased in persons with silicosis (and, apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore, preventing the onset of silicosis will also reduce the cancer risk..." (SCOEL SUM Doc 94-final, June 2003)

According to the current state of the art, worker protection against silicosis can be consistently assured by respecting the existing regulatory occupational exposure limits. Occupational exposure to nuisance dust (total and respirable) and respirable crystalline silica should be monitored and controlled.

Carcinogenicity

IARC Monographs on Occupational Exposures to Chemical Agents: Overall evaluation

QUARTZ (14808-60-7) 1 Human carcinogen.

US ACGIH Threshold Limit Values: A2 carcinogen

QUARTZ (14808-60-7) Group A2 Suspected human carcinogen.

US NTP Report on Carcinogens: Known carcinogen

QUARTZ (14808-60-7) Known carcinogen.

12. Ecological Information

Ecotoxicological data

Product Test Results

SORBOND® UG (1302-78-9) LC50 Fish: 19000 mg/l 96.00 Hours estimated

Ecotoxicity This material is not expected to be harmful to aquatic life.

Environmental effects Based on the physical properties of this product, significant environmental persistence and

bioaccumulation would not be expected.

Persistence and degradability Not available.

13. Disposal Considerations

Disposal instructionsDispose in accordance with all applicable regulations. Material should be recycled if possible.

14. Transport Information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

15. Regulatory Information

US federal regulationsOSHA Process Safety Standard: This material is not known to be hazardous by the OSHA Highly

Hazardous Process Safety Standard, 29 CFR 1910.119.

CERCLA (Superfund) reportable quantity

None

Material name: SORBOND® UG CETCO - Industrial Wastewater MSDS US

^{*} Estimates for product may be based on additional component data not shown.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - No

Delayed Hazard - Yes Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No

Inventory name

Section 302 extremely

hazardous substance

Section 311 hazardous

Country(s) or region

ous Yes

chemical

Food and Drug
Administration (FDA)

Total food additive
Direct food additive
GRAS food additive

Inventory status

country(s) or region	inventory name	On inventory (yes/no)
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of New and Existing Chemicals (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes

United States & Puerto Rico Toxic Substances Control Act (TSCA) Inventory

A "You" indicates that all components of this product comply with the inventory requirements administered by the governing country (c)

A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

State regulations WARNING: This product contains a chemical known to the State of California to cause cancer.

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

QUARTZ (14808-60-7) Listed.

US - California Proposition 65 - CRT: Listed date/Carcinogenic substance

QUARTZ (14808-60-7) Listed: October 1, 1988 Carcinogenic.

US - Pennsylvania RTK - Hazardous Substances: Listed substance

QUARTZ (14808-60-7) Listed.

16. Other Information

Further informationThis safety datasheet only contains information relating to safety and does not replace any product

information or product specification.

Recommended restrictions Workers (and your customers or users in the case of resale) should be informed of the potential

presence of respirable dust and respirable crystalline silica as well as their potential hazards. Appropriate training in the proper use and handling of this material should be provided as required

under applicable regulations.

HMIS ratings



NFPA ratings Health: 1 Flammability: 0

Instability: 0

5302 Version #: 01 Revision date: 22-January-2009 Print date: 22-January-2

On inventory (yes/no)*

Yes

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The manufacturer expressly does not make any representations, warranties, or guarantees as to its accuracy, reliability or completeness nor assumes any liability, for its use. It is the user's responsibility to verify the suitability and completeness of such information for each particular use.

Third party materials: Insofar as materials not manufactured or supplied by this manufacturer are used in conjunction with, or instead of this product, it is the responsibility of the customer to obtain, from the manufacturer or supplier, all technical data and other properties relating to these and other materials and to obtain all necessary information relating to them. No liability can be accepted in respect of the use of this product in conjunction with materials from another supplier. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Issue date 22-January-2009

Other information CETCO is an AMCOL International company.





Sorbond® UG

Sorbond UG is a granular, clay based stabilization media used for the fixation of free liquids in sludge. **Sorbond UG** is made from a non-biodegradable mineral that is designed for use on waste that fails the Paint Filter Liquids Test (PFT).

Color:		Beige
Toxicity Analysis:	EPA Standard ppm	Typical 2001 ppm
Arsenic	5.0	0.005
Barium	100.0	0.4
Cadmium	1.0	0.005
Chromium	5.0	0.005
Lead	5.0	0.05
Mercury	0.2	0.02
Selenium	1.0	0.02
Silver	5.0	0.005
pH (5% dispersion):	9	2.0 - 11.0

Moisture Content:	6 - 9 %
Particle Size:	
U.S. Std. Sieve Size	% Retained
30 mesh	60.3
50 mesh	30.1
70 mesh	3.5
100 mesh	1.5
200 mesh	2.1
- 200 mesh	2.5
Bulk Density (lbs/ft³):	70 ± 2
Specific Gravity:	2.5 ± 0.5

Sorbond UG Benefits

- Absorbs 7.5 times its own weight in water.
- Sets up in 24—72 hours.
- Helps waste pass Toxicity Characteristic Leach Procedure (EPA Method 3015).
- Minimal humidity effects.

Appendix B Photographs



Wisconsin Department of Natural Resources

Client Name:

Site Location: Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin **Project No.:** 186467.0000.0000

Photo No. Date
1 10/4/2011

Description

Temporary fence and signs constructed to limit access to the site during construction.



Photo No. Date
2 10/4/2011

Description

Project identification sign. Note that WDNR requested that the title of project be changed from Kewaunee Marsh Arsenic Spill to Kewaunee Marsh Historic Arsenic Spill Clean-up.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin **Project No.:**

186467.0000.0000

Photo No. Date
3 10/4/2011

Description

Looking north at the access road constructed between the trail and River Road on Maynard Kuehl's property.



Photo No.	Date
4	10/4/2011

Description

Chain link fence is removed beginning at the gate. Fence is rolled up and stored on trail. Project information sign is left in place.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin **Project No.:**

186467.0000.0000

 Photo No.
 Date

 5
 10/4/2011

Description

Looking south at the field trailer and clean water supply tank staging area. The salvaged chain link fence and drums of 50% hydrogen peroxide solution also visible.



Photo No.	Date
6	10/4/2011

Description

Veolia constructs access ramp in the capped area of the marsh from crushed limestone. The limestone material is later incorporated into the treatment area.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin Project No.:

186467.0000.0000

Photo No. Date 7 10/5/2011

Description

Silt fence constructed around treatment area.



Photo No.	Date
8	10/5/2011

Description

Off-loading the 1.1-ton super sacks of ferric sulfate. Bentonite and ferric sulfate are stored on the capped area of the marsh. Bentonite also in super sacks and covered with black tarp to keep dry.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin Project No.:

186467.0000.0000

Photo No. Date
9 10/5/2011

Description

Start of excavation for Cell #1.



Photo No.	Date
10	10/5/2011

Description

Bottom of excavation in Cell #1. Water temporarily stays out of excavation and walls hold up without sloughing. The clay silt layer target as the base of the excavation is visible.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin **Project No.:**

186467.0000.0000

Photo No. Date
11 10/5/2011

Description

Spraying hydrogen peroxide solution onto soil as it is excavated.



Photo No.	Date	
12	10/5/2011	

Description

Placement of ferric sulfate onto the top of the lower lift of soil treated with hydrogen peroxide solution. One 2,204 lb (1.1 ton) super sack of ferric sulfate per 50 cy (one lift) meets the specified dosage.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin Project No.:

186467.0000.0000

Photo No. Date
13 10/5/2011

Description

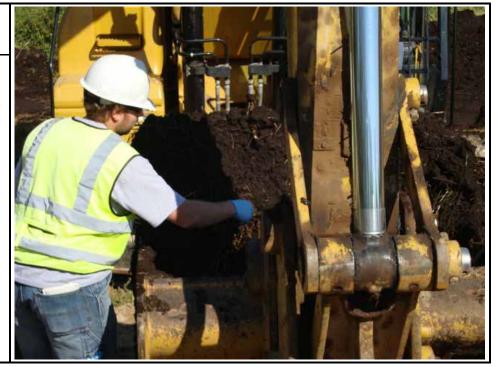
Mixing ferric sulfate into the lower lift using a backhoe bucket.



Photo No.	Date
14	10/5/2011

Description

TRC collecting a performance verification sample from Cell #1 following mixing of hydrogen peroxide solution, ferric sulfate, and limestone.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin **Project No.:**

186467.0000.0000

Photo No. Date
15 10/5/2011

Description

Cell #1 visible in foreground as complete. Cell #2 started in background. The stockpile of soil is that excavated from Cell #2 and to be placed back into excavation in two 50 cy lifts.



Photo No.	Date
16	10/5/2011

Description

Health and safety and contamination reduction achieved. Example shown here of boot storage area kept in the contamination reduction zone.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin Project No.:

186467.0000.0000

 Photo No.
 Date

 17
 10/10/2011

Description

Pieces of Styrofoam in cap excavated during treatment, then buried in bottom of cell excavation.



Photo No.	Date
18	10/10/2011

Description

Hydrogen peroxide solution applied to soil excavated from Cell #5.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin Project No.:

186467.0000.0000

Photo No. Date
19 10/10/2011

Description

Bentonite applied to lower lift of Cell #5.



 Photo No.
 Date

 20
 10/11/2011

Description

Bentonite applied to upper lift of Cell #1.





Client Name:
Wisconsin Department of Natural Resources

Site Location: Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin Project No.: 186467.0000.0000

 Photo No.
 Date

 21
 10/11/2011

Description

Delivery of topsoil to the site for placement over disturbed areas in the marsh.



Photo No. Date
22 10/11/2011

Description

Placement of topsoil to restore disturbed areas in the marsh following in situ mixing.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin **Project No.:**

186467.0000.0000

Photo No. Date
23 10/12/2011

Description

Completing in situ treatment in Cell #14, which is one of two cells added to meet the target treatment volume of sediment. Additional cells added because minimal sloughing occurred in the marsh sediment excavations.



Photo No.	Date	
24	10/12/2011	

Description

Topsoil placed and raked on disturbed areas of the marsh as part of the site restoration.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin Project No.:

186467.0000.0000

Photo No.

Date

25 10/17/2011

Description

Clean ballast placed on plastic sheeting within treated marsh area.



Photo No. 26

Date 10/17/2011

Description

Hydrogen peroxide solution applied to peat and ballast excavated from Cell #19.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin Project No.:

186467.0000.0000

Photo No. 27

Date

10/17/2011

Description

Pre-packed screen for well MW11-3.



Photo No.

No. Date 28 10/17/2011

Description

Installation of well MW11-2.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin Project No.:

186467.0000.0000

Photo No. Date
29 10/17/2011

Description

Observation of bulking of material that occurred in the ballast (Cell #21).



 Photo No.
 Date

 30
 10/17/2011

Description

Hydrogen peroxide solution applied to peat and ballast excavated from Cell #22.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin **Project No.:**

186467.0000.0000

 Photo No.
 Date

 31
 10/18/2011

Description

Select aggregate fill to be placed over the treated ballast to provide stable base course for compaction of material during restoration of the trail.



Photo No.	Date
32	10/18/2011

Description

Observation of off-gassing within samples collected from treated sediment in Cell #22. Peat material is shown on the left, and ballast material is shown on the right. The difference in the amount of gas, is a result of the peat having a stronger buffering capacity than the ballast sand.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin Project No.:

186467.0000.0000

Photo No. Date

33 10/19/2011

Description

Compaction of clean sand along the trail.



Photo No.	Date
34	10/19/2011

Description

Compaction of limestone screenings delivered to site and placed on top of clean ballast as part of the restoration of the trail.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin Project No.:

186467.0000.0000

Photo No. Date 35 10/20/2011

Description

Decontamination of the backhoe at the end of the in situ mixing.



Photo No.	Date		
36	10/20/2011		

Description

Spreading of mulch and seed over the disturbed areas in the marsh as part of the site restoration.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin Project No.:

186467.0000.0000

 Photo No.
 Date

 37
 10/20/2011

Description

Placement of erosion control and revegetation mat along the sideslope of the trail during site restoration.



 Photo No.
 Date

 38
 10/24/2011

Description

Looking northwest at treatment area on trail, following restoration.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin Project No.:

186467.0000.0000

 Photo No.
 Date

 39
 10/24/2011

Description

Close up view of the sideslope with erosion control mat and fence reconstruction along the trail.



Photo No. Date
40 10/24/2011

Description

Final condition of marsh following restoration, including three monitoring wells.





Client Name:

Wisconsin Department of Natural Resources

Site Location:

Kewaunee Marsh Arsenic Hot Spot Kewaunee, Wisconsin **Project No.:**

186467.0000.0000

Photo No. Date
41 10/24/2011

Description

Final condition of the sign, fence, and trail following restoration.



 Photo No.
 Date

 42
 10/24/2011

Description

Final condition of the access road and gate on Maynard Kuehl's property at the completion of the project. Access road and gate were left in place per the agreement made with Maynard Kuehl.





Site Location: Project No.: **Client Name:** Kewaunee Marsh Arsenic Hot Spot Wisconsin Department of Natural Resources 186467.0000.0000 Kewaunee, Wisconsin Photo No. Date 43 10/24/2011 Description One drum of hazardous waste generated during the in-situ remediation. Drum was removed and disposed by Veolia.

Appendix C Well Abandonment and Well Construction Forms

State of Wis., Dept. of Natural Resources dnr.wi.gov

Well / Drillhole / Borehole Filling & Sealing

Form 3300-005 (R 4/08)

Notice: Completion of this report is required by chs. 160, 281, 283, 289, 291-293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291-293, 295, and 299, Wis. Stats., failure to file this form may result in a forfeiture of between \$10-25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. Return form to the appropriate DNR office and bureau. See Instructions on reverse for more information. Route to: Remediation/Redevelopment Watershed/Wastewater **Drinking Water** Verification Only of Fill and Seal Waste Management Other: /基字高詞/fowneilingmailain Well-location nomation WI Unique Well # of Hicap# acility Name County Kewaunee acility ID (FID or PWS) de (Degrees and Minutes) Method Code (see instructions) icense/Permit/Monitoring# 2,616,469 Original Well Owner Nottural Resource Section Township Range X Wisconsin or Gov't Lot # resent Well Owner Well Street Address Mailing Address of Present Owner Well ZIP Code Well City, Village or Town 54216 Kewaune City of Present Owner State ZIP Code Subdivision Name W Unique Well # of Replacement Well Filme Liner Surren Casing & Sealing Wateria Reason For Removal From Service Pump and piping removed? Ll No. Liner(s) removed? INo Screen removed? Original Construction Date (mm/dd/yyyy) X Monitoring Well Casing left in place? Water Well If a Well Construction Report is available, Was casing cut off below surface? please attach. Borehole / Drillhole Did sealing material rise to surface? Construction Type: Ll № Did material settle after 24 hours? Drilled Dug Driven (Sandpoint) If yes, was hole retopped? If bentonite chips were used, were they hydrated with water from a known safe source? Other (specify): Llyes Required Method of Placing Sealing Material Formation Type: Conductor Pipe-Gravity Conductor Pipe Unconsolidated Formation Bedrock Other (Explain) Screened & Poured Total Well Depth From Ground Surface (ft.) Casing Diameter (in.) (Bentonite Chips) 4.0 Sealing Materials In-Stutreety Clay-Sand Slurry (11 lb./gal. wt.) Lower Driffhole Diameter (in.) asing Depth (ft.) L. Neat Cement Grout 4.0 Bentonite-Sand Slurry " 6,0 Sand-Cement (Concrete) Grout Concrete Bentonite Chips XI_{No} Unknown Was well annular space grouted? or Monitoring Wells and Monitoring Well Boreholes Only: If yes, to what depth (feet)? Depth to Water (feet Bentonite - Cement Grout Bentonite Chips Granular Bentonite Bentonite - Sand Slurry Yards Sacks Sealant Surface

Z Supervisien of Work			PARTY OF THE PARTY ON THE	Jee Only District
Name of Person or Firm Doing Filling & Sealing ORIN Kem cui ation	License # Date o	f Filling & Sealing (mm/dd/yyyy) D/ひち ロ		Notes By
Street or Route 4908 Meinders Rd.		Telephone Number	Sommente	
City	tate ZIP Code W1 53558	Signature of Person Doing	Nork, CREA	Date Signed 8 -/9 - //

epartment of Natural Resources Route To:	Watershed/Wastewater ☐ Remediation/Redevelopment ☒	Waste Management ☐ Other ☐	MONITORING WELL CONSTRUCTION Form 4400-113A Rev. 7-98
acility/Project Name	Local Grid Location of Well	Oulei 🗆	Well Name
Kewaunee Marsh		ft. □ E. ft. □ W.	MW11-1
acility License, Permit or Monitoring No.	Local Grid Origin (estimated:	or Well Location	Wis. Unique Well No. DNR Well Number
	Lat Lor	ng or	
acility ID	St. Plane 243,999 ft. N		Data Wall Taskellad
	Section Location of Waste/Source	II. E. 3/G/ N	10/18/2011
ype of Well	7		Well Installed By: (Person's Name and Firm)
Well Code 71/dw	Location of Well Relative to Waste/S	, T N, R Volume	
istance from Waste/ Enf. Stds.		degradient Gov. Lot Number	
ource ft. Apply			On-Site Environmental Services
. Protective pipe, top elevation	ft. MSL	1. Cap and lock?	⊠ Yes □ No
Wall against on alayation	86.34 ft. MSL	2. Protective cover	
- -	10, 141315	a. Inside diamete	
. Land surface elevation	583.8 ft. MSL	b. Length:	5.0
. Surface seal, bottom580.1_ ft. MSI	or <u>3.8</u> ft.	c. Material:	Steel ⊠ 04
			Other 🗆 💂
2. USCS classification of soil near screen:		d. Additional pro	tection? □ Yes ☑ No
	W SP CH		e:
Bedrock □		3. Surface seal:	Bentonite ⊠ 3 0
	′es ⊠ No	× \	Concrete 0 1
•		3. Surface seal: 4. Material between 5. Annular space se bLbs/gal i c% Bento e1.1 Ft f. How installed 6. Bentonite seal: b1/4 in,	Other 🗆 💻
=	ury □ 5 0	4. Material between	well casing and protective pipe:
Hollow Stem Aug	ger 🗵 4 1	₩	Bentonite 🗵 3 0
Oth	ner 🗆 🔛		Other 🗆 💆
5 Duilling Strid words Western D 0.2	 	5. Annular space se	
•	Air □ 01	bLbs/gal ı	mud weight Bentonite-sand slurry 🛘 3 5
Drilling Mud □ 0 3 No	me 🗵 99 📓 🕻	cLbs/gal 1	mud weight Bentonite slurry □ 31
6. Drilling additives used?	′es ⊠No	d% Bento	
	· · · · · · · · · · · · · · · · · · ·	e. <u>1.1</u> Ft	³ volume added for any of the above
Describe		f. How installed	
7. Source of water (attach analysis, if require	<u>d):</u>	8	Tremie pumped 🗀 0 2
		8	Gravity ⊠ 08
		6. Bentonite seal:	a. Bentonite granules 3 3
	🔉	8 / b, ⊔1/4 in, ⊠	3/8 in. □ 1/2 in. Bentonite chips ⊠ 3 2
Bentonite seal, top583.8 ft. MSL	O# U.U # MM M	vi / c	Other 🗆
500.1	or	7. Fine sand materia a. b. Volume added	al: Manufacturer, product name & mesh size
Fine sand, top 580.1 ft. MSL	or3.8 ft.	8 / a	Sidley Ohio #4000
570.0	4.0	b. Volume added	
Filter pack, top <u>579.8</u> ft. MSL	or <u>4.0</u> ft.	8. Filter pack mater	ial: Manufacturer, product name & mesh size
570.2	15 .	a	Sidley Ohio #5
. Screen joint, top <u>579.3</u> ft. MSI	or 4.5 ft.	b. Volume added	
W7.11.1 576.6	72 2	9. Well casing:	Flush threaded PVC schedule 40 🛛 2 3
Wall bottom J/U.U # M/Si	or	XX	Flush threaded PVC schedule 80 2 4
Filter pack, bottom 576.3 ft. MSI		*	Other 🗆 🗏
Filter pack, bottom 5/0.3 ft. MSI	or	10. Screen material:	
	7.5	a. Screen Type:	Factory cut 1 1 1
Borehole, bottom 576.3 ft. MSI	or		Continuous slot ⊠ 0 1
	\\\\\\		Other 🗆 💹
Borehole, diameter 8.3 in.	VIIIII	b. Manufacturer	Monoflex/Geoprove
		c. Slot size:	i
I. O.D. well casing in.		d. Slotted length	
		11. Backfill material	
. I.D. well casing <u>2.03</u> in.			Other 🗆 💂
A			
		knowledge.	
hereby certify that the information on his for		-	T-1, (09,02(,260
hereby certify that the information on his formation on his formation of h	Firm TRC Environn	nental Corporation	Tel: 608.826.360
ignature MMM MMA	708 Heartland	Trail Madison WI 53717	Fax: 608.826,394
lease complete both Forms 4400-113A and 4400-1	708 Heartland	Trail Madison WI 53717 R office and bureau. Completion of	

MONITORING WELL DEVELOPMENT Form 4400-113B Rev 7-98

TOTILE OFFICE	
rm 4400-113B	Rev. 7-98

	/Wastewater		ste Management				
	on/Redevelopment	⊠ Oth	er 🗆				
Facility/Project Name	County			Well Name			
Kewaunee Marsh		Kewa				V11-1	
Facility License, Permit or Monitoring Number	County		. Unique Well Nu		DNR Well	Number	
	3	31	PA26	56			<u>. </u>
1. Can this well be purged dry?	⊠ Yes □ No		Depth to Water	Before Dev	velopment	After D	evelopment
W-11 d1			(from top of		0.15		
2. Well development method:	- 41		well casing)	a.	2.15 ft.		ft.
surged with bailer and bailed	□ 41 □ 61						
surged with bailer and pumped surged with block and bailed	□ 61 □ 42		Date	b. 10/20	0/2011	10	/20/2011
surged with block and pumped	□ 42 □ 62		Date	0. 10/2	0/2011	10	72072011
surged with block, bailed, and pumped							_
	□ 70 □ 20		Time		□ a 02:50 ⊠ p		02:05 87
compressed air	□ 20 ⊠ 10		Time	c.	02.30 🗵 p).III.	03:05 ⋈
bailed only	⊠ 10 □ 51	12	Sediment in well	(0.0 inches		0.0 inches
pumped only	□ 51 □ 50		bottom	,	0.0 inches		U.U inches
pumped slowly	□ 50 □			a = =	• 0	~· _	• •
other	_ 🗆 📗	13.	Water clarity		10	Clear 🗆	
					1 5	Turbid 🗵	2 5
3. Time spent developing well	15 min	l.		(Describe)		(Describe)	
				Moderate	<u> </u>	Slightly	turbid,
l. Depth of well (from top of well casing)	10.0 ft.			turbidity,	Slight	slight li	ght brown
				orange/y	ellow	color	
5. Inside diameter of well	2.03 in.						
5. Volume of water in filter pack and well							
casing	1.3 gal.			0 ,			
		Fill	in if drilling fluids	s were used and	well is at soli	id waste faci	ility:
7. Volume of water removed from well	3.0 gal.		_				-
B. Volume of water added (if any)	0.0 gal.		Total suspended solids		mg/l		mg/l
Source of water added	_		COD		mg/l		mg/l
5. Source of water attued		_					
10. Analysis performed on water added?	☐ Yes ☐ No	_	Well developed by		e and Firm		
(If yes, attach results)			Mark W	√alter			
			TRC E	nvironmental	I		
17. Additional comments on development:							
	•						
		٠					
Facility Address or Owner/Responsible Party Address	****			-			<u></u>
	1622		reby certify that th	ne above inform	ation is true a	ınd correct to	the best of my
Name: Annette Weissbach		kno	wledge.		Δ		
Name: Annette Weissbach Firm: WDNR		G	1	mull 3	1 Maple	_	
		Sign	nature:		Wy V-		
Street: 2984 Shawano Avenue	<u> </u>	Prin	nt Name: Mark	Walter			
City/State/Zip: Green Bay, WI 54313		Firm	m: TRC	Environment	tal		
			<u> </u>				
Street: 2984 Shawano Avenue City/State/Zip: Green Bay, WI 54313 NOTE: See instructions for more inform	nation including						

State of Wisconsin Department of Natural Resources Route To:	Watershed/Wastewater ☐ Remediation/Redevelopment ☑	Waste Management ☐	MONITORING WELL CONSTRUCTION 4400-113A Rev. 7-9	
Facility/Project Name	Local Grid Location of Well		Well Name	
Kewaunee Marsh	_₽ □N.	₽ □E.	MW11-1i	
Facility License, Permit or Monitoring No.	ft. \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	□) or Well Location □	Wis. Unique Well No. DNR Well N	lumber
Facility ID			PA267 Date Well Installed	
Tuesday III	St. Plane243,998 ft. N,	2,616,486 ft. E. S/C/N		
Type of Well	Section Location of Waste/Source	□E	Well Installed By: (Person's Name a	nd Firm)
• •	1/4 of 1/4 of Sec		7	1011111)
Well Code 71/dw Distance from Waste/ Enf. Stds.	Location of Well Relative to Waste/So		Tony Kapugi	
Source ft. Apply	u □ Upgradient s □ Sid d □ Downgradient n □ No	legradient	On-Site Environmental Servi	ces
	-	1. Cap and lock?		□ No
• • •	ft. MSL	2. Protective cover p		i Li No
B. Well casing, top elevation58	6.24 ft. MSL	a. Inside diameter	-	4.0 in.
C. Land surface elevation	83.7 ft. MSL	b. Length:	• =	5.0 ft.
		c. Material:	- Steel	n. ⊠ 04
D. Surface seal, bottom 574.7 ft. MSL	or <u>9.0</u> ft.	A Layery	Other	S24 2 PRESS22
12. USCS classification of soil near screen:		d. Additional prot		⊠ No
	v o spol		:	2 10
	сп сној 📜 👢	1 \ \	Bentonite	_ ⊠ 2∩
Bedrock □		3. Surface seal:	Concrete	
13. Sieve analysis attached? ☐ Ye	s⊠No 👹 🕷		Other	200.0004300622
	y □50	4 Material between	well casing and protective pipe:	
14. Drilling method used: Rotar Hollow Stem Auge	y 🖂 30	4. Materiai between	Bentonite	⊠ 2 N
			Other	324V41994A
One				
15. Drilling fluid used: Water □ 0 2 A	ir □ 0 1	5. Annular space sea		
Drilling Mud	. ⊠01	bLbs/gal n	nud weight Bentonite-sand slurry	
Diming widd C 0 5 140h	[™]	cLbs/gal n	nud weight Bentonite slurry	
16. Drilling additives used? ☐ Ye	es ⊠ No	d% Benton		□ 50
		e. <u>2.3</u> Ft	volume added for any of the above	
Describe		f. How installed		□ 01
17. Source of water (attach analysis, if required	<u>·· </u>		Tremie pumped	
art source of water (many sto, if require	´ 🐰 🕷		· · · · · · · · · · · · · · · · · · ·	⊠ 08
	J	6. Bentonite seal:	 a. Bentonite granules 	
	CH □ CH □ SS ⊠ No St	/ b. □1/4 in. ⊠	3/8 in. □ 1/2 in. Bentonite chips	⊠ 32
E. Bentonite seal, top583.7 ft. MSL			Other	
	or	7. Fine sand materia	l: Manufacturer, product name & mes	- Methodosopo o
F. Fine sand, top574.7 ft. MSL	or9.0 ft. \ 📉 📓	/ a	Sidley Ohio #4000	
		b. Volume added		
G. Filter pack, top 574.2 ft. MSL	or9.5 ft.	8. Filter pack materi	al: Manufacturer, product name & me	
		a	Sidley Ohio #5	
H. Screen joint, top 573.7 ft. MSL	or10.0 ft.	b. Volume added	$\frac{1.2}{}$ ft ³	
		9. Well casing:	Flush threaded PVC schedule 40	□ 23
I. Well bottom 571.2 ft. MSL	or12.5 ft. or12.5 ft.		Flush threaded PVC schedule 80	>>>>>>
			Other	
J. Filter pack, bottom571.2 ft. MSL	or 12.5 ft.	10. Screen material:	PVC	
		a. Screen Type:	Factory cut	
K. Borehole, bottom576.2 ft. MSL	or7.5 ft. <		Continuous slot	⊠ 01
2	\ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		Other	
L. Borehole, diameter8.3 in.	VIIII	b. Manufacturer		
		c. Slot size:	_	0.010 in.
M. O.D. well casing 2.38 in.	•	d. Slotted length:		<u>2.5</u> ft.
		11. Backfill material		⊠ 14
N. I.D. well casing <u>2.03</u> in.			Other	
٠ و				
I hereby certify that the information on this form		nowledge.		
Signature	T2:	ental Corporation	Tel· 608	3.826.3600
1/M/W/ 1/M/T		Frail Madison WI 53717		3.826.3941

Please complete both Forms 4400-113B and return them 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.

MONITORING WELL DEVELOPMENT Form 4400-113B Rev. 7-98

· · · · · · · · · · · · · · · · · · ·	d/Wastewater □	. 🔽	Waste Management				
Facility/Project Name	ion/Redevelopmen		Other	Well Name		y. <u>.</u>	
Kewaunee Marsh	Cour	•	7 auam a a	Well Name		/11-1i	
Facility License, Permit or Monitoring Number	Com	nty Code	Yewaunee Wis. Unique Well Nu	mber	DNR Well		
dentity District National Producting Production	Cou	31	PA26		DIVIC WOL		
. Can this well be purged dry?	⊠ Yes □	No	11 75 41 (307)	Before De	velopment	After De	evelopment
Well development method: surged with bailer and bailed	□ 41		11. Depth to Water (from top of well casing)	a.	2.75 ft.		ft.
surged with bailer and pumped	□ 61			40.0	0.10.0.1.1		
surged with block and bailed surged with block and pumped	□ 42 □ 62		Date	b. 10/2	0/2011	10/	20/2011
surged with block, bailed, and pumped compressed air	□ 70 □ 20		Time	c.	□ a 02:15 ⊠ r		□ a 02:30 ⊠ r
bailed only	⊠ 10				_	7.111.	
pumped only pumped slowly	□ 51 □ 50		12. Sediment in well bottom		0.0 inches		0.0 inches
other			13. Water clarity	Clear ⊠ Turbid □	1 0 1 5	Clear ⊠ Turbid □	2 0 2 5
. Time spent developing well	15 :	min.		(Describe)		(Describe)	
. Depth of well (from top of well casing)	15.0	ft.					
i. Inside diameter of well	2.03 i	in.					
. Volume of water in filter pack and well casing	2.0	gal.					
V. Volume of water removed from well	3.5	gal.	Fill in if drilling fluids	were used and		id waste facil	•
3. Volume of water added (if any)	0.0	gal.	14. Total suspended solids		mg/l		mg/l
). Source of water added			15. COD		mg/l		mg/l
Analysis performed on water added?	☐ Yes ☐	No.	16. Well developed by		ne and Firm		
(If yes, attach results)	L 103 L	140	Mark V	/alter nvironmenta	ıl		
7. Additional comments on development:							
Facility Address or Owner/Responsible Party Add	lress		I hereby certify that the	ue above inforn	nation is true a	and correct to	the best of my
Name: Annette Weissbach Firm: WDNR			knowledge.	6.1	o Man	·	
Firm: WDNR			Signature:	ANII / Th			
Street: 2984 Shawano Avenue			Print Name: Mark	Walter			
City/State/Zip: Green Bay, WI 54313			Firm: TRC	Environmen	ıtal		

State of Wisconsin Department of Natural Resources Route To:	Watershed/Wastewater] Waste Ma	nagement	MONITORING WELI	. CONSTR	UCT	TON
	Remediation/Redevelopmen			Form 4400-113A	Rev. 7-9		101
Facility/Project Name	Local Grid Location of Well			Well Name		_	
Kewaunee Marsh	ft. □ N. Local Grid Origin □ (est	ft.	ŬŴ.	MW	11-2		
Facility License, Permit or Monitoring No.	Local Grid Origin (est	imated: 🗌) or V	Well Location 🔀	Wis. Unique Well No.	DNR Well N	Jumb	ber
T. W. ID.	Lat'	Long	or	PA268			
Facility ID	St. Plane 244,039 ft		ft, E S / © /N	Date Well Installed			
Type of Well	Section Location of Waste/So	ource	□Е	Well Installed By: (Pers			
	1/4 of 1/4 of S	Sec, T	_N, R U	1 '		na Fi	ırm)
Well Code 71/dw Distance from Waste/ Enf. Stds.	Location of Well Relative to	Waste/Source	Gov. Lot Number	Tony K	apugi		
Source Annly	10	Sidegradient		On-Site Environ	mental Servi	ces	
	d □ Downgradient n ft. MSL		Cap and lock?	<u> </u>	⊠ Yes	=	<u></u>
• • •			 Protective cover pi 	ine:	E 103	. 니	140
B. Well casing, top elevation58	33.01 ft. MSL		a. Inside diameter:	-	_	4	.0 in.
C. Land surface elevation	583.0 ft. MSL <		b. Length:		~	5	.0 ft.
			c. Material:		Steel	\boxtimes	04
D. Surface seal, bottom 579.3 ft. MSL	or ft.				Other		
12. USCS classification of soil near screen:	246.00	. AVENUE	d. Additional prote	ection?	☐ Yes	×	No
	W □ SP □ \		If yes, describe:			_	
SM SC ML MH C	∟□ СН□ `	₩ ₩ \ \:	3. Surface seal:		Bentonite		
	es 🛮 No				Concrete		Bacanas (85) ba
•			4.36 . 1.11 .		Other	П	
1	ry □ 5 0	₩ ₩ '	4. Material between	well casing and protective	e pipe: Bentonite		2.0
Hollow Stem Aug	er 🗆 💂					_	30
Our							
15. Drilling fluid used: Water □ 0 2 A	ir 🗆 0 1			l: a. Granular/Chipp			
Drilling Mud 0 3 Nor				ud weight Bentonite ud weight Ber			
. -				ite Bentonite-			
16. Drilling additives used? □ Ye	es 🛮 No			volume added for any of			30
			f. How installed:		Tremie		0.1
Describe	·· ····				mie pumped		
17. Source of water (attach analysis, if required):				Gravity		
			6. Bentonite seal:	a. Bento	nite granules		3 3
			b. □ 1/4 in. ⊠ 3	3/8 in. □ 1/2 in. Be			
E. Bentonite seal, top583.0 ft, MSL	or0.0 ft. \		C		Other		
				: Manufacturer, product Sidley Ohio #4000	name & mes	h siz	ze
F. Fine sand, top <u>579.3</u> ft. MSL	or n. \	₩ ₩//	a b. Volume added	0.2 ft	3	_	
G. Filter pack, top 579.0 ft. MSL	or4.0 ft.			al: Manufacturer, produc		eh ei	ize
o. Thei pack, top	51 1L.		•	Sidley Ohio #5	i mano ec me	311 31	
H. Screen joint, top578.5 ft. MSL	or <u>4.5</u> ft.		a b. Volume added		3	_	
	vi iii		9. Well casing:	Flush threaded PVC		×	2 3
I. Well bottom575.8 ft. MSL	or7.2 ft. <		or won onomig.	Flush threaded PVC			
					Other		1945380014423
J. Filter pack, bottom575.5 ft. MSL	or7.5 ft.	WEW	0. Screen material:	PVC		_	
-			a. Screen Type:		Factory cut		11
K. Borehole, bottom 575.5 ft. MSL	or7.5 ft. <			Co	ntinuous slot	\boxtimes	01
					Other		
L. Borehole, diameter8.3 in.		VIIIIO	b. Manufacturer	Monoflex/Geopro		0.01	10
			c. Slot size:		-	0.01	10 in.
M. O.D. well casing 2.38 in.		\.	d. Slotted length:	1. 1	-		<u>.7</u> ft.
3.02		`1	1. Backfill material (below filter pack):	None		2630554630002
$\frac{1}{2}$ N. I.D. well casing $\frac{2.03}{}$ in.					Other		
I haraby contify that the information on this form	a ja tena and somest to the 1	t of my language des					
I hereby certify that the information on this form	T2						
March Hally	r IKCE	Environmental Corpor eartland Trail Madiso			Tel: 608 Fax: 608		

Trace of the least of the best of the best

MONITORING WELL DEVELOPMENT Form 4400-113B Rev. 7-98

	I/Wastewater □	Waste Management]			
	on/Redevelopment 🛛	Other				
Facility/Project Name	County	7	Well Name	1.03	71.1.0	
Kewaunee Marsh Facility License, Permit or Monitoring Number	County Code	Kewaunee Wis, Unique Well Nur		IVI W DNR Well	/11-2	<u>-</u>
racinty License, Fermit or Monitoring Number	County Code 31	PA26		DINK WEIL	Number	
	•	17120		.1	4 G T	
1. Can this well be purged dry?	⊠ Yes □ No	11. Depth to Water	Before Dev	elopment	After De	evelopment
2. Well development method:		(from top of	a.	4.15 ft.		ft.
surged with bailer and bailed	□ 4 1	well casing)				
surged with bailer and pumped	□ 61					
surged with block and bailed	□ 42	Date	b. 10/19	/2011	10	/19/2011
surged with block and pumped	□ 62					
surged with block, bailed, and pumped	□ 70			□ a.		
compressed air	□ 20	Time	c.	04:15 ⊠ p	.m.	04:35 ⊠ ;
bailed only	□ 10		_	_		
pumped only	□ 51	12. Sediment in well	0.	0 inches		0.0 inches
pumped slowly	□ 50 	bottom				
other		13. Water clarity		0	Clear \square	20
				. 5	Turbid 🛛	2 5
3. Time spent developing well	20 min.		(Describe)		(Describe)	
	•		Moderate	slight	Modera	te slight
. Depth of well (from top of well casing)	10.0 ft.		light brow	'n	light bro	own
i, Inside diameter of well	2.03 in.		****			
. Volume of water in filter pack and well						
casing	1.0 gal.					
7. Volume of water removed from well	4.8 gal.	Fill in if drilling fluids	s were used and v	vell is at soli	d waste faci	lity:
volume of water removed from wen	4.0 gai.	14. Total suspended		mg/l		mg/l
B. Volume of water added (if any)	0.0 gal.	solids				
9. Source of water added	-	15. COD		mg/l		mg/l
		16. Well developed by:	: Person's Name	and Firm		·
10. Analysis performed on water added?	☐ Yes ☐ No	Mark W	/alter			
(If yes, attach results)		TRC Er	nvironmental			
17. Additional comments on development:		inc Er	1 v II o III II o II u I		***	
					•	
Facility Address or Owner/Responsible Party Add	ress	I hereby certify that th	e ahove informs	ion is true o	nd correct to	the heat of my
Name: Annette Weissbach		knowledge.	le above informa	A L	na coneci u	die best of my
Name: Annette Weissbach Firm: WDNR		Signature:	ark Mi			
Street: 2984 Shawano Avenue		Print Name: Mark	Walter	= 		
City/State/Zip: Green Bay, WI 54313			Environmenta	ıl		
,						
NOTE: See instructions for more inform	mation including a list	of county codes an	d well type co	odes.		
NOTE: See instructions for more information	mation including a list	of county codes and	d well type co	odes.		

Kewaunee Marsh Facility License, Permit or Monitoring No. Facility ID Sype of Well Well Code 71/dw Distance from Waste/ ft. Distance from Waste/ ft. A. Protective pipe, top elevation S. Well casing, top elevation S. Land surface elevation S. Surface seal, bottom STR.4 12. USCS classification of soil near screen: GP GM GC GW SW SM SC ML MH CL Bedrock 13. Sieve analysis attached? Hollow Stem Auger Other 15. Drilling fluid used: Water 0 2 Air Drilling Mud 0 3 None	Lat St. Plane 244,00 Section Location of 1/4 of Location of Well Reiu Upgradient d Downgradie ft. MSL 2.18 ft. MSL	N. S. Cestimated I. I. O. O. 1 ft. N, S. Waste/Source I./4 of Sec. Lelative to Waste/s S S S Sent N N N	T. Source Sidegradient Not Known	ft. E. S / C/N N, R.	Date Well Installed 10/1 Well Installed By: (Pe Tony On-Site Enviro	8/2011 rson's Name a Kapugi mmental Servi X Yes Steel Other Yes Bentonite Concrete Other ve pipe: Bentonite Other ped Bentonite	4.0	No 0 i 0 4 No 3 0 0 1 3 3 3
Well Code 71/dw Distance from Waste/ Source M. Protective pipe, top elevation 3. Well casing, top elevation 5. Land surface elevation 5. Surface seal, bottom 578.4 ft. MSL 12. USCS classification of soil near screen: GP GM GC GW SW SM SC ML MH CL Bedrock 13. Sieve analysis attached? 14. Drilling method used: Rotary Hollow Stem Auger Other 15. Drilling fluid used: Water 02 Air Drilling Mud 03 None	Lat St. Plane 244,00 Section Location of 1/4 of Location of Well Re u Upgradient d Downgradie ft. MSL 2.18 ft. MSL S2.2 ft. MSL S82.2 ft. MSL CH CH	Waste/Source 1/4 of Sec. clative to Waste/ s Sent n N	2,616,556 T. Source Sidegradient Not Known	ft. E. S / C/N N, R.	PA269 Date Well Installed 10/1 Well Installed By: (Pe Tony On-Site Enviro pipe: r: tection? e: well casing and protectival: a. Granular/Chip.	8/2011 rson's Name a Kapugi mmental Servi X Yes Steel Other Yes Bentonite Concrete Other ve pipe: Bentonite Other ped Bentonite	4.0	No 0 i 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Well Code 71/dw Distance from Waste/ Source M. Protective pipe, top elevation 3. Well casing, top elevation 5. Land surface elevation 5. Surface seal, bottom 578.4 ft. MSL 12. USCS classification of soil near screen: GP GM GC GW SW SM SC ML MH CL Bedrock 13. Sieve analysis attached? 14. Drilling method used: Rotary Hollow Stem Auger Other 15. Drilling fluid used: Water 02 Air Drilling Mud 03 None	Lat St. Plane 244,00 Section Location of 1/4 of Location of Well Re u Upgradient d Downgradie ft. MSL 2.18 ft. MSL S2.2 ft. MSL S82.2 ft. MSL CH CH	Waste/Source 1/4 of Sec. clative to Waste/ s Sent n N	2,616,556 T. Source Sidegradient Not Known	ft. E. S / C/N N, R.	PA269 Date Well Installed 10/1 Well Installed By: (Pe Tony On-Site Enviro pipe: r: tection? e: well casing and protectival: a. Granular/Chip.	8/2011 rson's Name a Kapugi mmental Servi X Yes Steel Other Yes Bentonite Concrete Other ve pipe: Bentonite Other ped Bentonite	4.0	No 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Well Code 71/dw Distance from Waste/ Source Distance from Waste/ Source Distance from Waste/ Source Distance from Waste/ Source Distance from Waste/ Enf. Stds. Apply Source Distance from Waste/ Enf. Stds. Apply Source Source Distance from Waste/ Enf. Stds. Apply Source Sou	St. Plane244,00 Section Location of1/4 of	01 ft. N, _ Waste/Source 1/4 of Sec clative to Waste/ s S	Z,616,556 T. Source Sidegradient Not Known	ft. E. S / C/N N, R.	Date Well Installed 10/1 Well Installed By: (Pe Tony On-Site Enviro pipe: r: tection? e: well casing and protectival: a. Granular/Chip	Steel Other Concrete Other Bentonite Concrete Other Other Other Description	4.0 5.0 × × × × × × × × × × × × × × × × × × ×	No 0 0 0 0 0 4 No 3 0 0 1
Well Code 71/dw Distance from Waste/ Distance from Vaste/ Distance from		lative to Waste/s S Sent n S	Sidegradient Not Known	1. Cap and lock? 2. Protective cover; a. Inside diamete b. Length: c. Material: d. Additional pro If yes, describe 3. Surface seal: 4. Material between 5. Annular space se bLbs/gal re	Well Installed By: (Pe Tony On-Site Enviro pipe: r: tection? e: well casing and protective al: a. Granular/Chip	Steel Other Concrete Other Bentonite Concrete Other Other Other Description	4.0 5.0 × × × × × × × × × × × × × × × × × × ×	No 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Distance from Waste/ ft. A. Protective pipe, top elevation B. Well casing, top elevation C. Land surface elevation C. Land surface seal, bottom	U Upgradient d Downgradie ft. MSL	s S S S S S S S S S S S S S S S S S S S	Sidegradient Not Known	1. Cap and lock? 2. Protective cover; a. Inside diamete b. Length: c. Material: d. Additional pro If yes, describe 3. Surface seal: 4. Material between 5. Annular space se bLbs/gal re	On-Site Environment of the Control o	Steel Other Concrete Other Bentonite Concrete Other Dentonite Concrete Other Dentonite Dentonite Dentonite Dentonite	4.0 5.0 × × × × × × × × × × × × × × × × × × ×	No 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
A. Protective pipe, top elevation 3. Well casing, top elevation 5. Land surface elevation 5. Surface seal, bottom 6. Surface seal, bottom 7. Surface seal, bottom 8. Surface seal, bottom 8. Surface seal, bottom 8. Surface seal, bottom 9. Surface seal, bottom 9. Surface seal, bottom 9. Surface seal, bottom 9.	d □ Downgradie ft. MSL 22.18 ft. MSL 82.2 ft. MSL or	ent n N	Not Known	1. Cap and lock? 2. Protective cover a. Inside diamete b. Length: c. Material: d. Additional pro If yes, describe 3. Surface seal: 4. Material between 5. Annular space se bLbs/gal re	pipe: r: tection? e: well casing and protective al: a. Granular/Chip	Steel Other Concrete Other ve pipe: Bentonite Conter Other ve pipe: Bentonite	4.0 5.0 8	0 0 0 4 No 3 0 0 1
A. Protective pipe, top elevation 3. Well casing, top elevation 5. Land surface elevation 5. Surface seal, bottom 6. GP	ft. MSL 22.18 ft. MSL 82.2 ft. MSL or			1. Cap and lock? 2. Protective cover a. Inside diamete b. Length: c. Material: d. Additional pro If yes, describe 3. Surface seal: 4. Material between 5. Annular space se bLbs/gal re	pipe: r: tection? e: well casing and protective al: a. Granular/Chip	Steel Other Sentonite Concrete Other ve pipe: Bentonite Other ped Bentonite	4.0 5.0 8 9	0 0 0 4 No 3 0 0 1
3. Well casing, top elevation 58. 2. Land surface elevation 55. 3. Surface seal, bottom 578.4 ft. MSL- 12. USCS classification of soil near screen: GP GM GC GW SW SM SC ML MH CL Bedrock 113. Sieve analysis attached? Yes 14. Drilling method used: Rotary Hollow Stem Auger Other 15. Drilling fluid used: Water 102 Air Drilling Mud 103 None	2.18 ft. MSL 82.2 ft. MSL or			a. Inside diamete b. Length: c. Material: d. Additional pro If yes, describe 3. Surface seal: 4. Material between 5. Annular space se bLbs/gal n	tection? e: well casing and protection. al: a. Granular/Chip.	Bentonite Concrete Other Ve pipe: Bentonite Other ped Bentonite	5.0	0 0 4 No 3 0 0 1
D. Surface seal, bottom578.4 ft. MSL = 12. USCS classification of soil near screen: GP □ GM □ GC □ GW □ SW SM □ SC □ ML □ MH □ CL Bedrock □ 13. Sieve analysis attached? □ Ye: 14. Drilling method used: Rotary Hollow Stem Auge: Other 15. Drilling fluid used: Water □ 0 2 Air Drilling Mud □ 0 3 None	or3.8 ft. V			b. Length: c. Material: d. Additional pro If yes, describe 3. Surface seal: 4. Material between 5. Annular space se bLbs/gal r	tection? e: well casing and protection al: a. Granular/Chip	Bentonite Concrete Other Ve pipe: Bentonite Other ped Bentonite	5.0	0 0 4 No 3 0 0 1
D. Surface seal, bottom578.4 ft. MSL = 12. USCS classification of soil near screen: GP □ GM □ GC □ GW □ SW SM □ SC □ ML □ MH □ CL Bedrock □ 13. Sieve analysis attached? □ Ye: 14. Drilling method used: Rotary Hollow Stem Auge: Other 15. Drilling fluid used: Water □ 0 2 Air Drilling Mud □ 0 3 None	or3.8 ft. V			d. Additional pro If yes, describe 3. Surface seal: 4. Material between 5. Annular space se bLbs/gal r	well casing and protective al: a. Granular/Chip	Bentonite Concrete Other Ve pipe: Bentonite Other ped Bentonite		No 3 0 0 1 3 0 3 3
12. USCS classification of soil near screen: GP GM GC GW SW SM SC ML MH CL Bedrock 13. Sieve analysis attached? Yes 14. Drilling method used: Rotary Hollow Stem Auger Other 15. Drilling fluid used: Water 0 2 Air Drilling Mud 0 3 None	SP			3. Surface seal: 4. Material between 5. Annular space se bLbs/gal n	well casing and protective al: a. Granular/Chip	Bentonite Concrete Other ve pipe: Bentonite Other ped Bentonite		No 3 0 0 1 3 0 3 3 3
GP GM GM GC GW SW SM SM SC ML MH CL Bedrock 13. Sieve analysis attached? Yes 14. Drilling method used: Rotary Hollow Stem Auge Other 15. Drilling fluid used: Water 02 Air Drilling Mud 03 None	CH C	3		3. Surface seal: 4. Material between 5. Annular space se bLbs/gal n	well casing and protective al: a. Granular/Chip	Bentonite Concrete Other ve pipe: Bentonite Other ped Bentonite		3 0 0 1 3 0 3 3
Bedrock 13. Sieve analysis attached? 14. Drilling method used: Rotary Hollow Stem Auger Other 15. Drilling fluid used: Water Drilling Mud 0 3 None	ss ⊠ No y □ 5 0 or ⊠ 4 1 or □ □ □ □ ir □ 0 1 e			4. Material between 5. Annular space se bLbs/gal n	well casing and protection	Concrete Other ve pipe: Bentonite Other ped Bentonite		3 0
14. Drilling method used: Hollow Stem Auger Othe 15. Drilling fluid used: Water □ 0 2 Air Drilling Mud □ 0 3 None	y □ 5 0 or ⋈ 4 1 or □ □ □ ir □ 0 1 ee ⋈ 9 9			5. Annular space se bLbs/gal r	well casing and protection	Other ve pipe: Bentonite Other ped Bentonite		3 (
Hollow Stem Auger Other 15. Drilling fluid used: Water □ 0 2 Air Drilling Mud □ 0 3 None	ir □ 01 e ⊠ 99			5. Annular space se bLbs/gal r	al; a. Granular/Chip	Bentonite Other ped Bentonite		3 3
Other 15. Drilling fluid used: Water □ 0 2 Air Drilling Mud □ 0 3 None	ir □ 0 1 e ⊠ 9 9			bLbs/gal r		Other ped Bentonite		3 3
15. Drilling fluid used: Water □ 0 2 Ai Drilling Mud □ 0 3 None	ir □01 e ⊠99			bLbs/gal r		ped Bentonite		3 3
Drilling Mud □ 0 3 None	e ⊠99			bLbs/gal r				
_	}		₩	. 71/1		•	[7]	
16. Drilling additives used? ☐ Yes	s 🛭 No		₩		-	entonite slurry		
					3 volume added for any o			
Describe				f. How installed		Tremie remie pumped		
17. Source of water (attach analysis, if required)):					Gravity		
			X	6. Bentonite seal:		onite granules		
Bentonite seal, top582.2 ft. MSL o	or0.0 ft. <			c		entonite chips Other		
Fine sand, top578.4 ft. MSL o	or3.8 ft. <			a	al: Manufacturer, produc Sidley Ohio #4000			
6. Filter pack, top578.2 ft. MSL o	or <u>4.0</u> ft. \		X	b. Volume added	ial: Manufacturer, produ	ft³ ust nama & ma	ah aia	
• • •				a	Sidley Ohio #5			
I. Screen joint, top 577.7 ft. MSL o	or <u>4.5</u> ft. ~			b. Volume added9. Well casing:	1.2 flush threaded PV0	ft ³ Cashadula 40	121	23
Well bottom575.0 ft. MSL o	or7.2 ft. <			9. Wen cashig.	Flush threaded PV			2 4
Filter pack, bottom575.0 ft. MSL o	or7.2 ft. ~		1	10. Screen material:	PVC		_ :	
574.7	75 ^			a. Screen Type:	_	Factory cut		
	or7.5 ft. \	\ <i>\\\\</i>			Co	ontinuous slot Other		0 1
. Borehole, diameter 8.3 in. 4. O.D. well casing 2.38 in.			28.	b. Manufacturer	Monoflex/Geopre	obe		
A. O.D. well casing 2.38 in				c. Slot size:d. Slotted length		_	0.010 2.7	<u>)</u> i 7
A. O.D. well casing 2.38 in.			1	d. Stotled length		None		<u>′</u> 14
I. I.D. well casing						Other	1	
hereby certify that the information on this form	is true and correct to	the best of my	knowledge.			-		_
Signature Made Mall	Firm	TRC Environ	mental Corpo	ration		Tel: 608	.826.	360
Please complete both forms 4400-113A and 4400-113	R and raturn them to the	708 Heartland			hana ranarta in manda d	Fax: 608		

MONITORING WELL DEVELOPMENT Form 4400-113B Rev. 7-98

Facility/Project Name	Cou	ntv		Well Name		",	
Kewaunee Marsh	Cou	-	·	wen name	M	V11-3	
Facility License, Permit or Monitoring Number	Com	nty Code	Lewaunee Wis. Unique Well Nu	 nher	DNR Wel		
definity Disease, 1 crime of Presidenting Persident	Cou	31	PA26		DIVIC WEL	I INUITIBOI	
1. Can this well be purged dry?	⊠ Yes □	No	44 5	Before Dev	velopment	After D	evelopment
7 W-11 January			11. Depth to Water (from top of		4.55		
Well development method: surged with bailer and bailed	□ 41		well casing)	a.	4.55 ft.		ft.
surged with bailer and pumped			<i>3</i> ″				
surged with block and bailed	□ 42		Date	b. 10/19	9/2011	10	/19/2011
surged with block and pumped			Date	0. 10/1/	7,2011	10	17/2011
surged with block, bailed, and pumped	□ 70				□ a	ı m	□а
compressed air	□ 70 □ 20		Time	c.	02:40 ⋈ г		03:10 ⊠ p
bailed only	□ 20 □ 10		Thic	.	02.10 23 1	7.111.	03.10 M p
pumped only	□ 51		12. Sediment in well	ſ	0.0 inches		0.0 inches
pumped slowly	□ 50		bottom		.o mones		0.0 Inches
other			13. Water clarity	Clear □	10	Clear 🗆	2 0
	_ 🔲 2261826		15. Water clarity		15	Turbid 🛛	
3. Time spent developing well	30 :	•.		(Describe)		(Describe)	
o. Time spent developing wen	30	mın,		Moderate	aliaht		ght brown
1. Depth of well (from top of well casing)	10.0	ft.		light brov		Sugnen	giii orowii
5. Inside diameter of well	2.03	in.					
6. Volume of water in filter pack and well	0.0						
casing	0.9	gai.					
			Fill in if drilling fluids	were used and	well is at sol	id waste faci	lity:
7. Volume of water removed from well	11.8	gal.					
N X 1	0.0		14. Total suspended solids		mg/l		mg/l
3. Volume of water added (if any)	0.0	gal.	solius				
P. Source of water added			15. COD		mg/l		mg/l
10. Analysis performed on water added?		NT-	16. Well developed by:	Person's Name	e and Firm		
	□ Yes □	100	Mark V	Valter			
(11 yes, atmorresures)			TRC Er	vironmental			
17. Additional comments on development:			1 RC El	IVIIOIIIIIEIIIai	•	<u> </u>	
(If yes, attach results) 17. Additional comments on development: Facility Address or Owner/Responsible Party Address Name: Annette Weissbach Firm: WDNR							
Facility Address or Owner/Responsible Party Addr	ress		I hereby certify that th	e above informs	ation is true a	and correct to	the best of my
Name: Annette Weissbach			knowledge.				
Firm: WDNR			Signature:	M/ 1	10/11		
Street: 2984 Shawano Avenue City/State/Zip: Green Bay, WI 54313			Print Name: Mark	Walter	;- ` 		
C D WW 54040			Firm: TRC 1	Environment	·a1		
City/State/Zip: Green Bay, WI 54313			Firm:	<u> </u>			

State of Wisconsin Department of Natural Resources Route To:		aste Management her	MONITORING WELL Form 4400-113A	CONSTRU Rev. 7-98		ION
Facility/Project Name	Local Grid Location of Well		Well Name	101, 7-31		
Kewaunee Marsh	f. □ N. 	——ft. □ E.	MW1			
Facility License, Permit or Monitoring No.	Local Grid Origin	or Well Location		NR Well N	lumi	er
Facility ID	1	6,557 ft. E. S/©/N	PA270 Date Well Installed	 ,		
	Section Location of Waste/Source		10/18/2			
Type of Well	1/4 of 1/4 of Sec, T	N. R DE	Well Installed By: (Person		nd F	irm)
Well Code 71/dw Distance from Waste/ Enf. Stds.	Location of Well Relative to Waste/Source	Gov. Lot Number	Tony Ka	ıpugi		
Source ft. Apply	u □ Upgradient s □ Sidegra d □ Downgradient n □ Not Kn		On-Site Environm	ental Servi	ces	
A. Protective pipe, top elevation	ft. MSL	1. Cap and lock? 2. Protective cover p	ina.	⊠ Yes		No
B. Well casing, top elevation58	34.80 ft. MSL	a. Inside diameter		_	4	.0_ in
C. Land surface elevation	582.3 ft. MSL	b. Length:		_		<u>.0</u> ft
D. Surface seal, bottom573.3 ft. MSL	or9.0 ft.	c. Material:		Steel Other		04
12. USCS classification of soil near screen:		d. Additional prot		☐ Yes		
	W C SP C CH C	If yes, describe	: <u> </u>		_	• •
Bedrock □	es	3. Surface seal:		Bentonite Concrete	_	
13. Sieve analysis attached?	es ⊠No					307000000
	y □50	4. Material between	well casing and protective		_	
Hollow Stem Aug Oth	er 🛚 4 1 W W W			Bentonite Other		30
		5. Annular space sea	l: a. Granular/Chipped			3 3
1	ir 🗆 0 1	bLbs/gal m	and weight Bentonite-	sand slurry		3 5
Drilling Mud □ 0 3 Nor		cLbs/gal m d% Benton	_	onite slurry		
16. Drilling additives used?	es ⊠ No		volume added for any of the		ш	50
Describe		f. How installed		Tremie		
17. Source of water (attach analysis, if required):		Trem	nie pumped Gravity		
		6. Bentonite seal:	a. Bentoni	ite granules		
	y	/ b. □ 1/4 in. ⊠	3/8 in. □ 1/2 in. Bent	tonite chips	\boxtimes	32
E. Bentonite seal, top582.3 ft. MSL		7. Fine sand materia	i: Manufacturer, product n	Other		
F. Fine sand, top 573.3 ft. MSL	or	a	Sidley Ohio #4000		_	
C Eller and 4 572 8 A MSI	or9.5 ft.	b. Volume added	al: Manufacturer, product	nama li ma	ah a	izo
G. Filter pack, top 572.8 ft. MSL	or ————————————————————————————————————	a.	Sidley Ohio #5	name & me	SII SI	ize
H. Screen joint, top572.3 ft. MSL	or10.0 ft.	b. Volume added				-
H. Screen joint, top <u>572.3</u> ft. MSL	or12.5 ft. \	9. Well casing:	Flush threaded PVC s			
I. Well bottom 569.8 ft. MSL	or n.		Flush threaded PVC s	Other		903090000000000000000000000000000000000
J. Filter pack, bottom ft. MSL	or12.5 ft.	10. Screen material:	PVC			
1. Well bottom 509.8 ft. MSL J. Filter pack, bottom 569.8 ft. MSL K. Borehole, bottom 569.8 ft. MSL	12.5	a. Screen Type:		Factory cut		
K. Borehole, bottom ft. MSL	or <u>12.5</u> ft.		Cont	tinuous slot Other		100400 170 Heb
L. Borehole, diameter8.3 in.		b. Manufacturer	Monoflex/Geoprobe	e		
2.20		c. Slot size:		_	0.01	10 in. 2.5 ft
M. O.D. well casing		d. Slotted length:		None		
L. Borehole, diameter 8.3 in. M. O.D. well casing 2.38 in. N. I.D. well casing 2.03 in.		· · ·		Other		200011266
I hereby certify that the information on this form	n is true and correct to the best of my know	ledge.				
	Firm TRC Environmenta	-		Tel: 608	3.826	 5.3600
Signature Application of the App	708 Heartland Trail	Madison WI 53717	hasa ramarte la sacrela d'has 1	Fax: 608	3.826	6.3941
Please complete both Forms 4400-11 X and 4400-11 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR result in a forfeiture of between \$10 and \$25,000, or forms is not intended to be used for any other purpose	141, Wis. Adm. Code. In accordance with chs.:	281, 289, 291, 292, 293, 295, au ne program and conduct involve	nd 299, Wis. Stats., failure to f ed. Personally identifiable info	file these forn	ns ma	ay

MONITORING WELL DEVELOPMENT Form 4400-113B

DIMITORING.	
orm 4400-113B	Rev. 7-98

Remediation/Rede Kewaunee Marsh Facility License, Permit or Monitoring Number 1. Can this well be purged dry? 2. Well development method: surged with bailer and bailed surged with bailer and pumped surged with block and bailed surged with block and pumped surged with block, bailed, and pumped compressed air bailed only	County County Code 31 Yes □ No 41 61 42 62	Other Cewaunee Wis. Unique Well Num PA27 11. Depth to Water (from top of well casing) Date		DNR Well		evelopme
Kewaunee Marsh Facility License, Permit or Monitoring Number 1. Can this well be purged dry? 2. Well development method: surged with bailer and bailed surged with bailer and pumped surged with block and pumped surged with block and pumped surged with block, bailed, and pumped compressed air □	County Code 31 Yes □ No 41 61 42 62	Wis. Unique Well Num PA27 11. Depth to Water (from top of well casing)	nber 0 Before Deve	DNR Well	Number	evelopme
Facility License, Permit or Monitoring Number 1. Can this well be purged dry? 2. Well development method: surged with bailer and bailed surged with bailer and pumped surged with block and bailed surged with block and pumped surged with block, bailed, and pumped compressed air	County Code 31 Yes □ No 41 61 42 62	Wis. Unique Well Num PA27 11. Depth to Water (from top of well casing)	Before Deve	DNR Well	Number	evelopme
2. Well development method: surged with bailer and bailed surged with bailer and pumped surged with block and bailed surged with block and pumped surged with block, bailed, and pumped compressed air	Yes □ No 4 1 6 1 4 2 6 2	PA27 11. Depth to Water (from top of well casing)	Before Deve		After D	evelopme
2. Well development method: surged with bailer and bailed surged with bailer and pumped surged with block and bailed surged with block and pumped surged with block, bailed, and pumped compressed air	4 1 6 1 4 2 6 2	(from top of well casing)			After D	evelopme
surged with bailer and bailed surged with bailer and pumped surged with block and bailed surged with block and pumped surged with block, bailed, and pumped compressed air	6 1 4 2 6 2	(from top of well casing)	a.			
surged with bailer and pumped surged with block and bailed surged with block and pumped surged with block, bailed, and pumped compressed air	6 1 4 2 6 2	Date		4.83 ft.		
surged with block and bailed surged with block and pumped surged with block, bailed, and pumped compressed air	62	Date				
surged with block, bailed, and pumped compressed air			b. 10/19/	/2011	10	/19/2011
compressed air						
	7 0			□ a		
bailed only	20	Time	c.	03:20 ⊠ p	o.m.	03:50
	10					
pumped only	5 1	12. Sediment in well	0.	0 inches		0.0 incl
pumped slowly	5 0	bottom				
other		13. Water clarity	Clear □ 1	1 0	Clear	20
				l 5	Turbid 🛛	25
3. Time spent developing well	30 min.		(Describe)		(Describe)	
5. Time spent developing wen	50 mm.		Slight ligh	nt brown	Slight 1	ight brow
4. Depth of well (from top of well casing)	15.0 ft.		Olight ligh	it Olowii	Oligiit I	ight blow
5. Inside diameter of well	2.03 in.					
Volume of water in filter pack and well						
casing	1.7 gal.		-			
		Fill in if drilling fluids	were used and v	zell is at sol	id waste faci	liter
7. Volume of water removed from well	6.5 gal.	Thi in in drining naids	were used and v	4CH 15 at 501	id wasic faci	mty.
7. Volume of water removed from wen	O.5 gai.	14. Total suspended		mg/l		m
8. Volume of water added (if any)	0.0 gal.	solids		•		
9. Source of water added		15. COD		mg/l		m
		16. Well developed by	Person's Name	and Firm		
10. Analysis performed on water added?	Yes □ No	Mark W	/alter			
(2,50,4,4,4,4,5,4,4,5,4,4,4,4,4,4,4,4,4,4,		TRC E	nvironmental			
(If yes, attach results) 17. Additional comments on development:		-1				7,,,,,,
		•				
Facility Address or Owner/Responsible Party Address						
Facility Address or Owner/Responsible Party Address		Th1 20 4 14	-1	· · · · ·		
		I hereby certify that the knowledge.	e above informat	non is true a	ma correct to	o me best of
Name: Annette Weissbach		Ma	Se Siste	4		
Name: Annette Weissbach Firm: WDNR		Signature:				
Street: 2984 Shawano Avenue			Walter			
City/State/Zip: Green Bay, WI 54313		Firm: TRC	Environmenta	al .		
NOTE: See instructions for more information						

Appendix D Laboratory Reports





October 07, 2011

ALYSSA SELLWOOD TRC - Madison 744 HEARTLAND TRAIL Madison, WI 53717

RE: Project: KEWAUNEE MARSH 186467.0000.000

Pace Project No.: 4051774

Dear ALYSSA SELLWOOD:

Enclosed are the analytical results for sample(s) received by the laboratory on October 05, 2011. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com Project Manager

Enclosures

cc: ALEX GOERGEN, TRC - MADISON BOB STANFORTH, TRC - Madison





CERTIFICATIONS

Project:

KEWAUNEE MARSH 186467.0000.000

Pace Project No.:

4051774

Green Bay Certification IDs 1241 Bellevue Street, Green Bay, WI 54302 Florida/NELAP Certification #: E87948 Illinois Certification #: 200050 Kentucky Certification #: 82 Louisiana Certification #: 04168 Minnesota Certification #: 055-999-334 New York Certification #: 11888

North Carolina Certification #: 503 North Dakota Certification #: R-150 South Carolina Certification #: 83006001 US Dept of Agriculture #: S-76505 Wisconsin Certification #: 405132750 Wisconsin DATCP Certification #: 105-444





SAMPLE SUMMARY

Project:

KEWAUNEE MARSH 186467.0000.000

Pace Project No.: 4051774

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4051774001	FIELD TRIAL	Solid	10/05/11 12:00	10/05/11 13:05



SAMPLE ANALYTE COUNT

Project:

KEWAUNEE MARSH 186467.0000.000

Pace Project No.: 4051774

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4051774001	FIELD TRIAL	EPA 6010	DLB	1



ANALYTICAL RESULTS

Project:

KEWAUNEE MARSH 186467.0000.000

Results

Pace Project No.: 4051774

Sample: FIELD TRIAL

Results reported on a "wet-weight" basis

Lab ID: 4051774001

Units

Collected: 10/05/11 12:00

LOD

Prepared

Received: 10/05/11 13:05

Analyzed

Matrix: Solid

CAS No.

Qual

Parameters 6010 MET ICP, SPLP

Analytical Method: EPA 6010 Preparation Method: EPA 3010

LOQ

Leachate Method/Date: EPA 1312; 10/05/11 00:00

Arsenic

0.26 mg/L

0.050

0.025

DF

10/06/11 10:20 10/06/11 18:43 7440-38-2





QUALITY CONTROL DATA

Project:

KEWAUNEE MARSH 186467.0000.000

Pace Project No.:

4051774

QC Batch:

MPRP/6043

Analysis Method:

EPA 6010

QC Batch Method:

EPA 3010

Analysis Description:

6010 MET SPLP

Associated Lab Samples:

4051774001

METHOD BLANK: 513621

Matrix: Water

Associated Lab Samples:

4051774001

Reporting Limit

0.49

513624

Qualifiers Analyzed

Arsenic

mg/L

Units

< 0.025

Blank

Result

0.050 10/06/11 18:35

LABORATORY CONTROL SAMPLE:

Parameter

513622

Spike

LCS

LCS

% Rec

98

80-120

Qualifiers

Parameter Arsenic

Parameter

Units

mg/L

Units

mg/L

Conc.

.5

Result

% Rec

Limits

MATRIX SPIKE & MATRIX SPIKE DUPLICATE:

MŞ

.5

MSD

.5

MSD

Result

0.76

MS

98

MSD

100

% Rec

Max

Arsenic

4051774001 Result

0.26

Spike Conc.

Spike Conc.

MS Result 0.75

% Rec

% Rec

Limits 75-125 RPD RPD

Qual

20

Date: 10/07/2011 08:49 AM



QUALIFIERS

Project:

KEWAUNEE MARSH 186467.0000.000

Pace Project No.: 4051774

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

Page

₽

UPPER MIDWEST REGION

Please Print Clearly

104 will be sent in Profile# Madison, W.E. 53717 TRC Accts Paugale Cooler Custedy Sea Present (Not Presen Intact /Not intact Sample Receipt ph PACE Project No. OK / Adjusted 708 HEARHOUR Tri ecelpt Temp = X LAB COMMENTS (Lab Use Only) Samo -402 p Alusso 12:15° Invoice To Contact: Invoice To Company: Invoice To Address: Mail To Company: Date/Time: Date/Time: Mail To Address: Invoice To Phone: Mail To Contact: COMMENTS MN: 612-607-1700 WI: 920-469-2436 Quote #: CLIENT F=Methanol G=NaOH J=Other ecaived By: Received By: CHAIN OF CUSTODY *Preservation Codes
B=HCL C≠H2SO4 D≠HNO3 E=DI Water
Sisulfate Solution Thosulfate Pace Analytical* Date/Time: Date/Time: H=Sodium Bisulfate Solution Mark Malter PRESERVATION (CODE)* MATTREX FILTERED? (YES/NO) 10/5/11/15:00 Minquished By: Relinquished By: 1836-467,0000.0000 85%-728-805 Transmit Prelim Rush Results by (complete what you want): Rush Tumaround Time Requested Prelims Mark Worte rcharge) (billable)
NOT needed on your sample On your sample ASELLWOOD FICSOLY CLIENT FIELD ID *cendulree* Tria Masison (Rush TAT subject to approvalist DO/ P_{1} pecial pricing and release of tlability Samples on HOLD are subject to A14550 FIELOA Data Package Options 00#: \N; [[Senol EPA Level III EPA Level IV ampled By (Sign): Sampled By (Print): ranch/Location: Project Number: Company Name: Project Contact Project Name: Project State: PACE LAB# 0 Email #2: hone: Email #1:

Pace Analytical Services, Inc. 1241 Bellevue Street, Suite 9 Green Bay, Wt 54302

Pace Analytical

Sample Condition Upon Receipt

Official Name.	Project #	174
Courier: Fed Ex FUPS FUSPS 7	Dient T Commercial Pace Other	
Tracking #:	<u> </u>	
Custody Seal on Cooler/Box Present: yes	no Seals intact: Tyes Tho Optional	
Custody Seal on Samples Present: yes		
Packing Material: Bubble Wrap Bubble	ole Bags None OPE Zdry	SERVICE PROPERTY.
Thermometer Used NA	Type of Ice: Wet Blue Dry None Samples on ice, cooling	And the second s
Cooler Temperature	Biological Tissue is Frozen: Yes	
Temp Blank Present: Tyes 7 no	no Person examining con	tents:
Temp should be above freezing to 6°C for all sample exce	ept Biota. Date: 10	
Biota Samples should be received ≤ 0°C.	Comments: Initials: JK	
Chain of Custody Present:	Yes ONo ONA 1.	
Chain of Custody Filled Out:	ZYes Ono Onya 2.	
Chain of Custody Relinquished:	TYES TINO TINIA 3.	•
Sampler Name & Signature on COC:	Zyes Qno Qn/A 4.	
Samples Arrived within Hold Time:	Yes ONO ONIA 5.	
Short Hold Time Analysis (<72hr):	□Yes ⊠No □N/A 6.	
Rush Turn Around Time Requested:	EVes CINO CIN/A 7.	
Sufficient Volume:	EYes Ono Onya 8.	
Correct Containers Used:		
-Pace Containers Used:		
Containers Intact:	Yes ONO ONA	
	ØYes □No □N/A 10.	•
Filtered volume received for Dissolved tests	□Yes DNo □N/A 11.	·
Sample Labels match COC:	Yes ONO ON/A 12.	
-Includes date/time/ID/Analysis Matrix: All containers needing preservation have been checked.	_5	
i .	□Yes □No ØNA 13.	
All containers needing preservation are found to be in compliance with EPA recommendation.	OYES ONO DAVA	
	Initial when Lot # of added	<u> </u>
exceptions: VOA, cotiform, TOC, O&G, WI-DRO (water)	☐Yes ☐No completed preservative	
Samples checked for dechlorination:	□Yes □No ØN/A 14.	·
Headspace in VOA Vials (>6mm):	Oves Ono Priva 15.	
Trip Blank Present:	□Yes □No ØN/A 16.	
Trip Blank Custody Seals Present	□Yes □No ☑N/A	
Pace Trip Blank Lot # (if purchased):		
Client Notification/ Resolution:	Field Data Required?	Y / N
Person Contacted:	Date/Time:	, , , , ,
Comments/ Resolution:		
		· · · · · · · · · · · · · · · · · · ·
		
Project Manager Review:	Date:	0-4-11
Note: Whenever there is a discrepancy affecting North Carolina	complex amples, a copy of this form will be sent to the North Carolina DEHNR Certif	





October 10, 2011

ALYSSA SELLWOOD TRC - Madison 744 HEARTLAND TRAIL Madison, WI 53717

RE: Project: 186467 PH2 KEWAUNEE MARSH

Pace Project No.: 4051796

Dear ALYSSA SELLWOOD:

Enclosed are the analytical results for sample(s) received by the laboratory on October 05, 2011. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com Project Manager

Enclosures

cc: ALEX GOERGEN, TRC - MADISON BOB STANFORTH, TRC - Madison





CERTIFICATIONS

Project:

186467 PH2 KEWAUNEE MARSH

Pace Project No.:

4051796

Green Bay Certification IDs 1241 Bellevue Street, Green Bay, WI 54302 Florida/NELAP Certification #: E87948 Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888

North Carolina Certification #: 503 North Carolina Certification #: 8-150
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750
Wisconsin DATCP Certification #: 105-444



Pace Analytical Services, Inc. 1241 Bellevue Street - Suite 9

Green Bay, WI 54302 (920)469-2436

SAMPLE SUMMARY

Project:

186467 PH2 KEWAUNEE MARSH

Pace Project No.: 4051796

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4051796001	CELL #2 PRE-BENTONITE	Solid	10/05/11 14:40	10/05/11 16:30
4051796002	CELL #2 POST-BENTONITE	Solid	10/05/11 15:10	10/05/11 16:30





SAMPLE ANALYTE COUNT

Project:

186467 PH2 KEWAUNEE MARSH

Pace Project No.: 4051796

Lab İD	Sample ID	Method	Analysts	Analytes Reported
4051796001	CELL #2 PRE-BENTONITE	EPA 6010	MMZ	1
4051796002	CELL #2 POST-BENTONITE	EPA 6010	MMZ	1





ANALYTICAL RESULTS

Project:

186467 PH2 KEWAUNEE MARSH

Pace Project No.:

4051796

Sample: CELL #2 PRE-BENTONITE

Lab ID: 4051796001

Collected: 10/05/11 14:40 Received: 10/05/11 16:30

Matrix: Solid

Results reported on a "wet-weight" basis

Parameters

Results

Units

LQQ

DF

Prepared

Analyzed

CAS No. Qual

6010 MET ICP, SPLP

Analytical Method: EPA 6010 Preparation Method: EPA 3010

Leachate Method/Date: EPA 1312; 10/06/11 00:00

Arsenic

<0.025 mg/L

0.050

0.025

LOD

10/07/11 09:20 10/10/11 15:43 7440-38-2

Sample: CELL #2 POST-

BENTONITE

Lab ID: 4051796002

Collected: 10/05/11 15:10 Received: 10/05/11 16:30

Matrix: Solid

Results reported on a "wet-weight" basis

Parameters

Results

Units

LOQ

LOD

DF

Prepared

Analyzed

CAS No.

Qual

6010 MET ICP, SPLP

Analytical Method: EPA 6010 Preparation Method: EPA 3010

Leachate Method/Date: EPA 1312; 10/06/11 00:00

Arsenic

<0.025 mg/L

0.050

0.025

10/07/11 09:20 10/10/11 15:47 7440-38-2

Date: 10/10/2011 04:27 PM





QUALITY CONTROL DATA

Project:

186467 PH2 KEWAUNEE MARSH

Pace Project No.:

4051796

QC Batch:

MPRP/6049

Analysis Method:

EPA 6010

QC Batch Method:

EPA 3010

Analysis Description:

Matrix: Water

6010 MET SPLP

Associated Lab Samples:

Associated Lab Samples:

4051796001, 4051796002

METHOD BLANK: 513961

4051796001, 4051796002

Units

4050724001

Result

<0.025

Blank Result Reporting Limit

Analyzed

95

Qualifiers

Arsenic

mg/L

< 0.025

0.050 10/10/11 15:19

LABORATORY CONTROL SAMPLE:

Parameter

513962

Spike

.5

.5

LCS

LCS

% Rec

80-120

Parameter Arsenic

Units

mg/L

Units

mg/L

Conc.

Result 0.47 % Rec

Limits

Qualifiers

MATRIX SPIKE & MATRIX SPIKE DUPLICATE:

513963 MS

MSD

.5

513964

MSD

0.48

MS

95

% Rec

Max

Arsenic

Parameter

Spike Conc.

Spike Conc.

MS Result Result 0.48

% Rec

MSD % Rec

Limits 75-125

RPD RPD

20

Qual

Date: 10/10/2011 04:27 PM



QUALIFIERS

Project:

186467 PH2 KEWAUNEE MARSH

Pace Project No.: 4051796

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

IN INI CIEC

Present / Not Present

Intact / Not Intact

Cooler Custody Seal

OK / Adjusted

Date/Fime:

scelved By: sceived By:

Date/Time:

elinquished By:

1008-759-4001

Email #2: Emall #1:

Indode tresolutions

Transmit Prelim Rush Results by (qon

Date Needed:

elinquished By:

sceived By:

Date/Time:

Sample Receipt pH

calpt Temp = 66 (

1630

16 30

(O) 5/11

PO# will be sent in emil Profile # 4051796 703 HEALTHAND Th TRC Acets Vayable Madison, VIII 5371 PACE Project No. Se_[[wood ō LAB COMMENTS (Lab Use Only) Page 085n SAME 704-1 L. Date/Turne: 10/5/1 Invoice To Company: Invoice To Contact: Invoice To Address: Mail To Company: Mail To Address: Invoice To Phone: Mail To Contact: COMMENTS MN: 612-607-1700 WI: 920-469-2436 UPPER MIDWEST REGION ALLESA SHIWOOD #Preservation Codes
B#HCL C=HZSO4 D=HNO3 E=D! Water F=Methanol G=NaOH CHAIN OF CUSTODY J=Other l=Sodium Thiosuffale Pace Analytical® H=Sodlum Bisulfate Solution Relinquished By: Her III **RESERVATION** FILTERED? (YES/NO) (cope) lost- Bentonite 1015/113:10 Regulatory Alysson Sellywood 2018 - 826-3658 Rush Turnaround Time Requested Prelims 10 Te (Surcharge) On your sample (billable)
NOT needed on your sample **CLIENT FIELD ID** Please Print Clearly Kewpunee. Madison (Rush TAT subject to approve Sampled By (Print): | Mol | | ell#2 [JR PR Data Package Options (blabbs) ro* Will Seind EPA Level III EPA Level IV Branch/Location: Company Name: Project Number: Project Contact: Project Name: Project State: PACE LAB'#

8 G 90

Phone:

C019a(27Jun2006)

pecial pricing and release of llability

Samples on HOLD are subject to

Pace Analytical Services, Inc. 1241 Bellevue Street, Suite 9 Green Bay, WI 54302

[©]ace Analytical ̂

incorrect preservative, out of temp, incorrect containers)

Sample Condition Upon Receipt

Client Name:	/ 		roject #	4051796
Courier: Fed Ex TUPS TUSPS TO	lient Commerci	ial Pace Othe	er	
Tracking #:	_			
Custody Seal on Cooler/Box Present: yes	no Seals	intact: Tyes Tn	o Optional	
		intact: Tyes Tr	WIND DAY OF PARTIES	
		e Other	ProcNat	
Thermometer Used UH	Type of Ice: Wet	Blue Dry None	Samples on ice, cooling	
Cooler Temperature	Biological Tissue	is Frozen: Ves	·	
Temp Blank Present: Tyes no		្ ⊓o	Person examining co	ntents:
Temp should be above freezing to 6°€ for all sample exc Biota Samples should be received ≤ 0°C.	ept Biota.	_	Date: <u>// S</u> Initials: <u>// S</u>	
		Comments:	mindis.	
Chain of Custody Present:	Yes No NA			<u> </u>
Chain of Custody Filled Out:	Yes ONO ONA	2	<u> </u>	
Chain of Custody Relinquished:	Yes ONO ONA	3.		<u> </u>
Sampler Name & Signature on COC.	Tes Ono On/A	4.	· · · · · · · · · · · · · · · · · · ·	
Samples Arrived within Hold Time:	Yes ONO ON/A	5.	:	
Short Hold Time Analysis (<72hr):	Dyes ONO ON/A	6.		· · · · · · · · · · · · · · · · · · ·
Rush Turn Around Time Requested:	Yes ONO ONA	7.		
Sufficient Volume:	Øves □No □N/A			
Correct Containers Used:	ZVes ONO ON/A	1		
-Pace Containers Used:	Yes ONO ON/A	i		
Containers Intact:	ZYes ONO ON/A			-
Filtered volume received for Dissolved tests	OYes ONO ONIA		<u></u>	
Sample Labels match COC:	ZYes ONO ON/A			
-Includes date/time/ID/Analysis Matrix:	S CINO CINA	12.		
All containers needing preservation have been checked.		<u></u>		
All containers needing preservation are found to be in	□Yes □No □N/A	13.		
compliance with EPA recommendation.	DYES ONO DAVA	,		
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☐No	Initial when completed	Lot # of added	* * * *
Samples checked for dechlorination:			preservative	
	OYes ONG ZINA		· · · · · · · · · · · · · · · · · · ·	
Headspace in VOA Viats (>6mm):	☐Yes ☐No ☐KVA	1	<u> </u>	
Trip Blank Present:	□Yes □No □NVA	16.	•	
Trip Blank Custody Seals Present	□Yes □No ZIN/A	· ·		The second secon
Pace Trip Blank Lot # (if purchased):				
Client Notification/ Resolution: Person Contacted:			Field Data Required?	Y / N
Comments/ Resolution:	Date	/Time:		
				<u> </u>
		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
Project Manager Review:	-66		Date: /	0-5-11
Project Manager Review: Note: Whenever there is a discrepancy affecting North Carolina incorrect preservative out of temp, incorrect containers)	compliants samples, a cop	by of this form will be sent to t	<u> </u>	0-5-// lification Office (i.e

		·	
			:
		· ·	





October 13, 2011

ALYSSA SELLWOOD TRC - Madison 744 HEARTLAND TRAIL Madison, WI 53717

RE: Project: 186467.0000.0000 KEWAUNEE MARS

Pace Project No.: 4052033

Dear ALYSSA SELLWOOD:

Enclosed are the analytical results for sample(s) received by the laboratory on October 11, 2011. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com Project Manager

Enclosures

cc: ALEX GOERGEN, TRC - MADISON BOB STANFORTH, TRC - Madison





CERTIFICATIONS

Project:

186467.0000.0000 KEWAUNEE MARS

Pace Project No.:

4052033

Green Bay Certification IDs 1241 Bellevue Street, Green Bay, WI 54302 Florida/NELAP Certification #: E87948 Illinois Certification #: 200050 Kentucky Certification #: 82 Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888

North Carolina Certification #: 503 North Dakota Certification #: R-150 South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750
Wisconsin DATCP Certification #: 105-444



SAMPLE SUMMARY

Project:

186467.0000.0000 KEWAUNEE MARS

Pace Project No.: 4052033

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4052033001	CELL #7	Solid	10/11/11 08:45	10/11/11 10:05



SAMPLE ANALYTE COUNT

Project:

186467.0000.0000 KEWAUNEE MARS

Pace Project No.: 4052033

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4052033001	CELL #7	EPA 6010	DLB	1





ANALYTICAL RESULTS

Project:

186467.0000.0000 KEWAUNEE MARS

Pace Project No.: Sample: CELL#7 4052033

Results reported on a "wet-weight" basis

Lab ID: 4052033001

Collected: 10/11/11 08:45

Received: 10/11/11 10:05

Matrix: Solid

CAS No.

Parameters

Results

Units

LOD

DF

Prepared

Analyzed

Qual

6010 MET ICP, SPLP

Analytical Method: EPA 6010 Preparation Method: EPA 3010

LOQ

Leachate Method/Date: EPA 1312; 10/11/11 00:00

Arsenic

0.22 mg/L

0.050

0.025

10/11/11 08:35 10/13/11 01:25 7440-38-2



QUALITY CONTROL DATA

Project:

186467.0000.0000 KEWAUNEE MARS

Pace Project No.:

4052033

QC Batch:

Arsenic

MPRP/6072

Analysis Method:

EPA 6010

QC Batch Method:

EPA 3010

Analysis Description:

6010 MET SPLP

Associated Lab Samples:

4052033001

Matrix: Water

METHOD BLANK: 516483 Associated Lab Samples:

4052033001

Blank Result Reporting Limit

0.53

516486

MS

Qualifiers

Parameter

mg/L

< 0.025

10/13/11 01:17 0.050

Analyzed

105

0.77

LABORATORY CONTROL SAMPLE:

516484

mg/L

Spike

.5

LCS

LCS

% Rec

80-120

Parameter Arsenic

Units

Units

Conc.

Result

% Rec

Limits

105

Qualifiers

MATRIX SPIKE & MATRIX SPIKE DUPLICATE:

Parameter

MSD

.5

MSD

MS

MSD

110

% Rec

Max

Arsenic

Units

mg/L

4052033001 Result 0.22

Spike Conc.

.5

MS

Spike Conc.

Result Result 0.74

% Rec

% Rec

Limits 75-125

RPD RPD

Qual 20



QUALIFIERS

Project:

186467.0000.0000 KEWAUNEE MARS

Pace Project No.:

4052033

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

OBIGINIAL

Profile # Modelison, WI 53717 TRC Accts polyoble Present / Not Present Intact * Not Intact ion 6.0 06/14/06 Cooler Custody Best Invoice to Address: TRC PO# 37809 Sample Receipt pr PACE Protect No. 708 Heartland Tri OK / Adjusted ō KOW # scelpt Temp = LAB COMMENTS (Lab Use Only) Page Alyson 1997 Invoice To Company: Involce To Contact: Date/Time: Mail To Company: Date/Time: Date/Time: Mail To Address: Mail To Contact: Invoice To Phone: COMMENTS MN: 612-607-1700 WI: 920-469-2436 Quote #: UPPER MIDWEST REGION "Preservation Codes
B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH eceived By: eceived By: tecsived By: CHAIN OF CUSTODY Face Analytical . J=Other ESodium Thiosulfate Date/Time: Date/Time: Date/Time: H=Sodium Bisuffate Solution PRESERVATION (CODE)* Vark Water MATTRUX FILTERED? (YES/NO) A=None linquished By: dinguished By: telinguished By: Regulatory Alussa Sellinad 608-926-3658 186467,0000.000 plin Rush Results by (complete what you want);

C.S. WOO O HOCALL (OFF. CO)

M.N. L. L. L. C. SOLL ON (S. CO). ceudiment Morsh Bush Turnaround Time Requested Prelims (surcharge) Wark Walter On your sample (billable)
NOT needed on **CLIENT FIELD ID** (Rush TAT subject to approval/surch Date Needed: 10/13/11 MS/MSD Please Print Clearly) special pricing and release of listality Madison Samples on HOLD are subject to Cell#7 Transmit Prelim Rush Results by Data Package Options EPA Level III EPA Level IV Sampled By (Print): ranch/Location: Company Name: Project Number: roject Contact: Project Name: Project State: PACE LAB* Telephone:

hone:

Email #1: Email #2:

Pace Analytical Services, Inc. 1241 Bellevue Street, Suite 9 Green Bay, WI 54302

incorrect preservative, out of temp, incorrect containers)

Sample Condition Upon Receipt

□Yes □No DiN/	A 16. A ≥/Time:	Field Data Required? Y / N
□Yes □No DiN/	A	Field Data Required? Y / N
		Field Data Required? Y / N
. 13/ [61- [7/63/		
7;		
,		
7		preservative
/	Inilial when	Lot # of added
Over Due Para		
Tes LING LINA	1	
. /		
• _		
	1	
]	
·		
•		
, ,		<u> </u>
٠,		
Dres Ono On/A	1.	
J. Biola.	Comments:	Initials:
187-4	1 10	Person examining contents:
Biological Tissue	entire la	
		Samples on ice, cooling process has begun
Hamir .		ProgName - 2 Land
~ /		Prof. Due Date
Soale Soale	intact: Evos to a	Optional
	Type of Ice: Wet Biological Tissue of Biota. Dres Ono Onva Oves Ono Oves	Pres Ono Onya 1. Oves Ono Onya 2. Oves Ono Onya 3. Oves Ono Onya 4. Oves Ono Onya 5. Oves Ono Onya 6. Oves Ono Onya 7. Oves Ono Onya 8. Oves Ono Onya 9. Oves Ono Onya 10. Oves Ono Onya 11. Oves Ono Onya 12. Oves Ono Onya 12. Oves Ono Onya 13. Oves Ono Onya 14. Oves Ono Onya 15. Oves Ono Onya 10. Oves Ono Onya 11. Oves Ono Onya 12. Oves Ono Onya 13. Oves Ono Onya 13. Oves Ono Onya 14. Oves Ono Onya 14. Oves Ono Onya 14. Oves Ono Onya 14. Oves Ono Onya 15.

	•	





October 18, 2011

ALYSSA SELLWOOD TRC - Madison 744 HEARTLAND TRAIL Madison, WI 53717

RE: Project: 186467 TASK 2 KEWAUNEE MARSH

Pace Project No.: 4052225

Dear ALYSSA SELLWOOD:

Enclosed are the analytical results for sample(s) received by the laboratory on October 14, 2011. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com Project Manager

Enclosures

cc: ALEX GOERGEN, TRC - MADISON BOB STANFORTH, TRC - Madison





CERTIFICATIONS

Project:

186467 TASK 2 KEWAUNEE MARSH

Pace Project No.: 4052225

Green Bay Certification IDs 1241 Bellevue Street, Green Bay, WI 54302 Florida/NELAP Certification #: E87948 Illinois Certification #: 200050 Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888

North Carolina Certification #: 503 North Carolina Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750 Wisconsin DATCP Certification #: 105-444



SAMPLE SUMMARY

Project:

186467 TASK 2 KEWAUNEE MARSH

Pace Project No.: 4052225

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4052225001	CELL #12	Solid	10/14/11 08:35	10/14/11 11:11



SAMPLE ANALYTE COUNT

Project:

186467 TASK 2 KEWAUNEE MARSH

Pace Project No.: 4052225

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4052225001	CELL #12	EPA 6010	DLB	1



ANALYTICAL RESULTS

Project:

186467 TASK 2 KEWAUNEE MARSH

Pace Project No.: 4052225

Sample: CELL#12

Lab ID: 4052225001

Units

Collected: 10/14/11 08:35 Received: 10/14/11 11:11

Results reported on a "wet-weight" basis

Parameters

Results

LOQ

LOD

DF

Prepared

Analyzed

CAS No.

Qual

6010 MET ICP, SPLP

Analytical Method: EPA 6010 Preparation Method: EPA 3010

Leachate Method/Date: EPA 1312; 10/18/11 06:22

Arsenic

0.067 mg/L

0.050

0.025

10/18/11 07:50 10/18/11 13:51 7440-38-2





QUALITY CONTROL DATA

Project:

186467 TASK 2 KEWAUNEE MARSH

Pace Project No.:

4052225

QC Batch:

Arsenic

MPRP/6094

Units

Analysis Method:

EPA 6010

QC Batch Method:

EPA 3010

Analysis Description:

6010 MET SPLP

Associated Lab Samples: METHOD BLANK: 520191

4052225001

Matrix: Water

Associated Lab Samples:

4052225001

Reporting

Limit

0.47

520194

MS

Analyzed Qualifiers

Parameter

mg/L

< 0.025

Blank

Result

0.050 10/18/11 13:44

LABORATORY CONTROL SAMPLE:

520192

mg/L

Units

mg/L

Spike

LCS

LCS

94

0.55

% Rec

80-120

Parameter Arsenic

Units

Conc.

MS

Result .5

% Rec

Limits

Qualifiers

MATRIX SPIKE & MATRIX SPIKE DUPLICATE:

Parameter

520193

MSD

.5

MSD

MS

MSD

% Rec

75-125

Max

Arsenic

4052225001 Result

0.067

Spike Conc.

.5

Spike Conc.

Result Result 0.56

% Rec 98 % Rec

Limits

RPD RPD

Qual 20

2



QUALIFIERS

Project:

186467 TASK 2 KEWAUNEE MARSH

Pace Project No.:

4052225

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

OPIGINAL.

Present / Not Present Intact Intact Version 6.0 06/14/06

Date/Time:

eceived By:

Date/Time:

Relinquished By:

Samples on HOLD are subject to special pricing and release of Babili

UPPER MIDWEST REGION

(Me INDICE to 10#) ō 4652225 Page 1 Alussa Sellupoi Madison, W.T. E SOMME Invoice To Company: Invoice To Contact: Invoice To Address: Mail To Company: Mail To Contact: Mail To Address: MN: 612-607-1700 WI: 920-469-2436 Quote #: *Preservation Codes
B=HCL C=H2SO4 D=HNO3 E=Di Water F=Methanol G=NaOH
Sisulfate Solution I=Sodium Thiosulfate J=Other CHAIN OF CUSTODY Pace Analytical " H=Sodium Bisulfate Solution PRESERVATION (CODE)* FILTERED? (YES/NO) Kendunge, Nounsh 608-826-3658 On your sample 186467 Task Same MSINSD NOVE WAITE Sampled By (Sign): MM/IL Hell (Please Print Clearly) Madison Alussa H H Data Package Options (billable) ampled By (Print): Branch/Location: Company Name: Project Contact: Project Number: Project Name: Project State: Phone: <u>*</u>

Profile #

LAB COMMENTS

Invoice To Phone:

(Lab Use Only)

COMMENTS

10/14/11 8:35

(billabje) (billabje) (billabje)

EPA Level III EPA Level IV

your sample

CLIENT FIELD ID

PACE LAB# 00

CLIENT

-402 10R1 A

Receipt Temp = 100 °C	Section By Muld - All Determines	Date/Times	1250 BOOK	Refinquished By	Date Needed: VILY 10/7-10/8 Reinquished by Transmit Prelim Rush Results by (complete what you want):
	W. W. Sayara		No. Hec Markellad	Kelinquished By:	(Rush TAT subject to appropriately charge)
DACE Divisor No					
		7			

Pace Analytical Services, Inc. 1241 Bellevue Street, Suite 9 Green Bay, WI 54302

Pace Analytical

Sample Condition Upon Receipt

/ Client Name:				- FIC	oject#	46522	25
courier: Fed Ex TUPS TUSPS TO	lient Com	mercia	I Pace	Other_			
racking #:							
Custody Seal on Cooler/Box Present: yes	I no	Seals in	nlact: Tyes	no	Ohli	ja al	
Custody Seal on Samples Present: Tyes	no s	Seals in	ntact:yes	L uo		วังเอเซ็กซ	
Packing Material: T Bubble Wrap T Bubb	ole Bags	None	Other		Proj	Neuros	
Thermometer Used	_		Blue Dry None	_	Samples on ice, o	eoling proces	s has begun
Cooler Temperature WCZ	Biological Ti	ssue is	s Frozen: 🦵 ye no			· · · · · ·	
Temp Blank Present: Tyes 7 no Temp should be above freezing to 6°C for all sample exc	4 Dî-4-		, IN		Person examinic	1/4	/,,
Biota Samples should be received ≤ 0°C.		. (Comments:		Initials:	/ //	- /
Chain of Custody Present:	ZÍYes □No	□N⁄A	1		·		
Chain of Custody Filled Out:	Yes ONo	□N/A	2		-		
Chain of Custody Relinquished:	Oyes □No	1					
Sampler Name & Signature on COC:	Yes ONo	□N/A	4.				
Samples Arrived within Hold Time:	Oves ONo						
Short Hold Time Analysis (<72hr):	□Yes ØNo	ĺ			· •		· · · · · · · · · · · · · · · · · · ·
Rush Turn Around Time Requested:	Ves ONo	□N/A	7.			,	
Sufficient Volume:	Yes ONo		·				
Correct Containers Used:	ZYes ONo						
-Pace Containers Used:	ZYes □No	□N/A					
Containers Intact:	ZYes UNO	□n/a	10.				
Filtered volume received for Dissolved tests	□Yes □No	QK/A	11.				•
Sample Labels match COC:	ØYes □No	□N/A	12.		•	-	
-Includes date/time/ID/Analysis Matrix:	<u> </u>	_					
All containers needing preservation have been checked.	□Yes □No	NIA	13.				
All containers needing preservation are found to be in compliance with EPA recommendation.	□Yes □No	ZNIA					
Compliance with Li A recommendation.		<i>-</i>	Initial when		Lot # of added	 · · · · · · · · · · · · · · · · · · 	
exceptions: VOA, coliform, TDC, O&G, WI-DRO (water)	□Yes □No		completed		preservative	· · · · · · · · · · · · · · · · · · ·	
Samples checked for dechlorination:	□Yes □No	ZINVA	14.			· · · · · · · · · · · · · · · · · · ·	
Headspace in VOA Vials (>6mm):	☐Yes ☐No	ZINA	15.		·		
Trip Blank Present:	☐Yes ☐No	DINVA	16.				
Trip Blank Custody Seals Present	.□Yes. □No	GNVA					
Pace Trip Blank Lot # (if purchased):		<u> </u>				<u> </u>	
Client Notification/ Resolution: Person Contacted:		Date/	Time:		Field Data Red	quired?	Y / N
Comments/ Resolution:		_		···.	··········		
	•						·
	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	 .	· · · · · · · · · · · · · · · · · · ·	- ; · · ·	
			· - · · · · · · · · · · · · · · · · · · ·		<u> </u>		
Project Manager Review:	18				Date:	10-14	2//
Note: Whenever there is a discrepancy affecting North Carolin					<u></u> `		

	
	•





October 19, 2011

ALYSSA SELLWOOD TRC - Madison 744 HEARTLAND TRAIL Madison, WI 53717

RE: Project: 186467 PH2 KEWAUNEE MARSH

Pace Project No.: 4052347

Dear ALYSSA SELLWOOD:

Enclosed are the analytical results for sample(s) received by the laboratory on October 17, 2011. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com **Project Manager**

Enclosures

cc: ALEX GOERGEN, TRC - MADISON BOB STANFORTH, TRC - Madison





CERTIFICATIONS

Project:

186467 PH2 KEWAUNEE MARSH

Pace Project No.:

4052347

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888

North Carolina Certification #: 503 North Dakota Certification #: R-150 South Carolina Certification #: 83006001 US Dept of Agriculture #: S-76505 Wisconsin Certification #: 405132750 Wisconsin DATCP Certification #: 105-444



SAMPLE SUMMARY

Project:

186467 PH2 KEWAUNEE MARSH

4052347

Pace Project No.:

 Lab ID
 Sample ID
 Matrix
 Date Collected
 Date Received

 4052347001
 CELL #19
 Solid
 10/17/11 12:45
 10/17/11 13:40



SAMPLE ANALYTE COUNT

Project:

186467 PH2 KEWAUNEE MARSH

Pace Project No.:

4052347

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4052347001	CELL #19	EPA 6010	DLB	1
		ASTM D2974-87	KMF	1





ANALYTICAL RESULTS

Project:

186467 PH2 KEWAUNEE MARSH

Pace Project No.:

4052347

Results reported on a "dry-weight" basis

Parameters

Sample: CELL #19

Lab ID: 4052347001

Collected: 10/17/11 12:45

LOD

DF

1

Received: 10/17/11 13:40

Matrix: Solid

CAS No.

Qual

6010 MET ICP, SPLP

LOQ Analytical Method: EPA 6010 Preparation Method: EPA 3010

Leachate Method/Date: EPA 1312; 10/18/11 06:22

Arsenic

0.46 mg/L

0.050

0.025

Prepared

10/18/11 07:50 10/18/11 14:03 7440-38-2

Percent Moisture Percent Moisture

Analytical Method: ASTM D2974-87

Units

17.4 %

Results

0.10

0.10

10/19/11 08:03

Analyzed



QUALITY CONTROL DATA

Project:

186467 PH2 KEWAUNEE MARSH

Pace Project No.:

4052347

QC Batch:

MPRP/6094

Analysis Method:

EPA 6010

QC Batch Method:

EPA 3010

Analysis Description:

6010 MET SPLP

Associated Lab Samples:

METHOD BLANK: 520191

4052347001

Matrix: Water

Associated Lab Samples:

4052347001

Blank Result

Reporting Limit

Analyzed

Qualifiers

Parameter Arsenic

mg/L

< 0.025

0.050 10/18/11 13:44

LABORATORY CONTROL SAMPLE:

520192

mg/L

Units

mg/L

Spike

LCS

LCS

% Rec

Parameter Arsenic

Units

4052225001

Units

Conc. .5

Result

% Rec

Limits

Qualifiers

MATRIX SPIKE & MATRIX SPIKE DUPLICATE:

520193

520194

MS MSD

MŞ

MS

MSD

80-120

% Rec

Max Qual

Parameter

Spike

Conc.

Result .5

0.47

MSD Result

% Rec

Limits

RPD RPD

Arsenic

Result 0.067

Spike Conc. .5

0.56

0.55

94

% Rec 98

75-125

20

Date: 10/19/2011 01:13 PM



QUALITY CONTROL DATA

Project:

186467 PH2 KEWAUNEE MARSH

Pace Project No.:

4052347

QC Batch:

PMST/6206

Analysis Method:

ASTM D2974-87

QC Batch Method:

ASTM D2974-87

Analysis Description:

Dry Weight/Percent Moisture

Associated Lab Samples:

4052347001

SAMPLE DUPLICATE: 520183

4051795001

Dup

Max

Parameter

Units

Result

Result

RPD

RPD

Qualifiers

Percent Moisture

%

19.3

18.9

10



QUALIFIERS

Project:

186467 PH2 KEWAUNEE MARSH

Pace Project No.:

4052347

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes,

ORIGINAL

Cooler Custody Sea Present / Not Presen Intact / Not-Intact

Date/Time:

aceived By:

Date/Time:

lelinquished By:

UPPER MIDWEST REGION

₽

Page Mail To Company: Mail To Address: Mail To Contact: MN: 612-607-1709 WI: 920-469-2436 Quote #: Face Analytical W Keundunge Marsh (Please Print Clearly) Madison Aluesa Branch/Location: Company Name: Project Number: Project Contact: Project Name:

Phone:

	ストラングでする	1	-				1		-		_
Project State:	3	(YES/NO)							Madi	1)1/95 IM/100	
Sampled By	Sampled By (Print): May K, Wild (Jex	PRESERVATION (CODE)*						Invoice To Contact:		TRC Acts houghe	_
Sampled By (Sign):	(Sign): Name (Jeffer			. 7				Invoice To Company:	TRC	-	
PO #:	SAME Regulatory Program:	Regulatory Program:			, <u>. </u>			Invoice To Address:	Thosa	Invoice to PO#	
Data Pack	Options	Matrix Codes					m)		
	On your sample (billable)	le C	IV.	11 F			<u> </u>	Invoice To Phone:			_
造 □	EPA Level IV NOT needed on S=Coll Solution S=Coll Solution Solution		Gen					CLIENT	LAB CO	LAB COMMENTS Profile #	_
PACE LAB*	CLIENT FIELD ID	COLLECTION						COMMENTS	(Lab U	(Lab Use Only)	
වි	(est #19	-							2h-1	1-4020A	_
		ļ									
i i						-					_
						 					_
						 					_
				2							
									ì		
				l u					*1		
Rush I	Rush Turnaround Time Requested) Prelims	Relinquished By: He		11/Light	_	13 % Received	Maik	MINISTER SEPTEMENT	1 1349	PACE Project No.	
lienu)	Date Needed: (0//9//	Relinquished By:		Date/Time:	ļ	Received By:		Date/Time:		1 45C50H	
Transmit Pr	-	MODI								Receipt Temp = 7 / T	
EEEE #1:	0.5011,000d (0.47,50ldTiO)	Retinquished By:		Date/Time;		Received By:		Data/Time:		를	
Telephone:		Relinquished By:		Date/Time:		Received By:	:	Date/Time:		OK / Adjusted	

special pricing and release of liability Samples on HOLD are subject to

Pace Analytical Services, Inc. 1241 Bellevue Street, Suite 9 Green Bay, Wt 54302

Pace Analytical

Sample Condition Upon Receipt

Client Name:	TRC	Mac	lison	Pro	oject # 4052347
Courier: Fed Ex F UPS F USPS F C	lient Con	nmercia	al Pace	— Other	
Tracking #:			,		
Custody Seal on Cooler/Box Present: yes	17 no	Seals in	ntact: 「yes	∕ no	Optional Service and Co.
Custody Seal on Samples Present: Tyes	7 no		ntact: yes		Epole Dividio I pode Assessment
Packing Material: Bubble Wrap Bubb	le Bags 🏻 🗓		Other	1	Problem - Carlotte
Thermometer Used N/A	- <i>j</i> .	Wet	Blue Dry None		Samples on ice, cooling process has begun
Cooler Temperature ROT	Biological T	issue i	s Frozen: 🗂 y		g process nad degun
Temp Blank Present: yes no			T n	0	Person examining contents:
Temp should be above freezing to 6°C for all sample exce	pt Biota.	•			Date: 10/17/11
Biota Samples should be received ≤ 0°C.	· / · · ·		Comments:	,	Initials: <u>KM</u>
Chain of Custody Present:	□/res □No	□N/A	1.		
Chain of Custody Filled Out:	ØYes □No	DINA	2		<u> </u>
Chain of Custody Relinquished:	Yes ONO	.□N/A	3.		
Sampler Name & Signature on COC:	'Okes ONo	□N/A.	4.		•
Samples Arrived within Hold Time:	Øves □No	□N⁄A	5.	•	
Short Hold Time Analysis (<72hr):	Dres Dio				
Rush Turn Around Time Requested:	Zyes DNo	1017	_		
Sufficient Volume:	ØYes □No				
Correct Containers Used:	ZYes □No				
-Pace Containers Used:	ØYes □No	- 1			
Containers Intact:	Yes ONO		10	_	
Filtered volume received for Dissolved tests	Yes ONo	1			•
Sample Labels match COC:	Yes ONO	,		· • • • • • • • • • • • • • • • • • • •	
-Includes date/time/ID/Analysis Matrix:	5	LIWA	12.	•	
All containers needing preservation have been checked.		-/		 -	· · · · · · · · · · · · · · · · · · ·
All containers needing preservation are found to be in	□Yes □No	UNIA	13.		
compliance with EPA recommendation.	□Yes □No	ZINVA		•	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☐No	•	Initial when completed		Lot # of added preservative
Samples checked for dechlorination:	· · · · · ·		· - · · · · · · · · · · · · · · · · ·		preservative
Headspace in VOA Viats (>6mm):	☐Yes ☐No				
	☐Yes ☐No	2			
Trip Blank Present:	☐Yes ☐No	EJKVA	16.		•
Trip Blank Custody Seals Present	□Yes □No	□NA			والمنافع والمنافع والمرافع والمنافي والمنافي
Pace Trip Blank Lot # (If purchased):					
Client Notification/ Resolution: Person Contacted:	•	Dato/	Time:		Field Data Required? Y / N
Comments/ Resolution:		Ualer			
-	••				
	·			· · · <u>-</u>	
Project Manager Review:	IR.				Date: /0-17-1/
Note: Whenever there is a discrepancy affecting North Carolina incorrect preservative, out of temp, incorrect containers)	compliance simp	eles, a cop	y of this form will be	sent to the	

E-ATT -C-006-Rest OS (2000-12000) SCTID FORM





October 21, 2011

ALYSSA SELLWOOD TRC - Madison 744 HEARTLAND TRAIL Madison, WI 53717

RE: Project: 186467 PH 2 KEWAUNEE MARSH

Pace Project No.: 4052421

Dear ALYSSA SELLWOOD:

Enclosed are the analytical results for sample(s) received by the laboratory on October 19, 2011. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com Project Manager

Enclosures

cc: ALEX GOERGEN, TRC - MADISON BOB STANFORTH, TRC - Madison





CERTIFICATIONS

Project:

186467 PH 2 KEWAUNEE MARSH

Pace Project No.:

4052421

Green Bay Certification IDs 1241 Bellevue Street, Green Bay, WI 54302 Florida/NELAP Certification #: E87948 Illinois Certification #: 200050 Kentucky Certification #: 82 Louisiana Certification #: 04168 Minnesota Certification #: 055-999-334 New York Certification #: 11888

North Carolina Certification #: 503 North Dakota Certification #: R-150 South Carolina Certification #: 83006001 US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750
Wisconsin DATCP Certification #: 105-444



SAMPLE SUMMARY

Project:

186467 PH 2 KEWAUNEE MARSH

Pace Project No.: 4052421

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4052421001	CELL #22 PEAT	Solid	10/18/11 07:45	10/19/11 09:12
4052421002	CELL #23 BALLAST	Solid	10/18/11 13:30	10/19/11 09:12



SAMPLE ANALYTE COUNT

Project:

186467 PH 2 KEWAUNEE MARSH

Pace Project No.: 4052421

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4052421001	CELL #22 PEAT	EPA 6010	DLB	1
4052421002	CELL #23 BALLAST	EPA 6010	DLB	1





ANALYTICAL RESULTS

Project:

186467 PH 2 KEWAUNEE MARSH

Pace Project No.: 4052421

Sample: CELL #22 PEAT

Results reported on a "dry-weight" basis

Lab ID: 4052421001

Collected: 10/18/11 07:45

Received: 10/19/11 09:12

Parameters

Results

Results

Units LQQ LOD

DF

Prepared Analyzed CAS No.

Qual

6010 MET ICP, SPLP

Analytical Method: EPA 6010 Preparation Method: EPA 3010

Leachate Method/Date: EPA 1312; 10/19/11 00:00

Arsenic

0.19 mg/L

0.050

0.025

10/20/11 10:30 10/21/11 13:11 7440-38-2

Sample: CELL #23 BALLAST

Lab ID: 4052421002

Units

Collected: 10/18/11 13:30

Received: 10/19/11 09:12 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters

LOD

DF

Prepared Analyzed

CAS No.

Qual

6010 MET ICP, SPLP

Analytical Method: EPA 6010 Preparation Method: EPA 3010

LOQ

Leachate Method/Date: EPA 1312; 10/19/11 00:00

Arsenic

17.6 mg/L

0.050

0.025

10/20/11 10:30 10/21/11 13:15 7440-38-2

Date: 10/21/2011 02:40 PM





QUALITY CONTROL DATA

Project:

QC Batch:

186467 PH 2 KEWAUNEE MARSH

Pace Project No.:

4052421

MPRP/6110

Analysis Method:

EPA 6010

QC Batch Method:

EPA 3010

Analysis Description:

6010 MET SPLP

Associated Lab Samples:

METHOD BLANK: 521408

4052421001, 4052421002

Matrix: Water

Associated Lab Samples:

4052421001, 4052421002

Blank Result

Reporting Limit

Analyzed

95

Qualifiers

Parameter Arsenic

mg/L

< 0.025

0.050 10/21/11 12:05

LABORATORY CONTROL SAMPLE:

Parameter

521409

mg/L

Units

mg/L

Spike

LCS

LCS

% Rec

Qualifiers

Parameter Arsenic

Units

4052330007

Result

0.49

Units

Conc. .5

Result 0.47 % Rec

Limits

MATRIX SPIKE & MATRIX SPIKE DUPLICATE:

521410 MS

MSD

.5

521411 MS Result

MSD

MS MSD

80-120

% Rec

Max

Arsenic

Spike Conc.

Spike Conc.

.5

Result 0.96 0.96

% Rec 95 % Rec

Limits 75-125

RPD RPD

Qual 20

Date: 10/21/2011 02:40 PM



QUALIFIERS

Project:

186467 PH 2 KEWAUNEE MARSH

Pace Project No.: 4052421

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

IVNICIOO

UPPER MIDWEST REGION

₽

Profile # Present / Not Present Cooler Custedy Sea 402342 Intact / Not Intact Sample Receipt pH 708 Hear-Hand Tri Madison, VII. 53717 でかで50十 OK / Adjusted scalpt Temp = Ro (LAB COMMENTS (Lab Use Only) 50k Page 3 1255×1 S S Invoice To Company: Invoice To Address: Invoice To Contact: Mail To Company: Date/Time: Date/Time: Date/Time: Mail To Address: Invoice To Phone: Mail To Contact: COMMENTS MIN: 612-607-1700 WI: 920-469-2436 Quote #: CLIENT B **公認** teceived By7 Preservation Codes

B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH sceived By: Received By: Received By: CHAIN OF CUSTODY 9 |=Sodium Thiosulfate 10 19/1. Dated Time: Face Analytical ** Date/Time: Date/Time: H=Sodium Bisulfate Solution PRESERVATION (CODE)* FILTERED? (YES/NO) 7/15/11/5 V -Nove 1.24 elinquished By: elinquished By: Regulatory KELNAULYBO MOUSE Alusson Sell wood 608-826-365 Rush Turnaround Time Requested | Prelims Watter (Rush TAT subject to approval/surpharge)
Date.Needed: | 0 / 1 / 1 | On your sample NOT needed on your sample Peat CLIENT FIELD ID (billable) (Please Print Clearly) MS/MSD Same special pricing and release of liability R Samples on HOLD are subject to Madison 186467 Mark Bonil 一形の Data Package Options EPA Level IV EPA Level III Sampled By (Print): Sampled By (Sign): Branch/Location: Company Name: Project Contact: Project Number: Project Name: Project State: PACE LAB# **Telephone:** ETS #: Email #2: Phone:

Pace Analytical Services, Inc. 1241 Bellevue Street, Suite 9 Green Bay, WI 54302

Pace Analytical

Sample Condition Upon Receipt

Client Name:	1 KC			Pro	oject#	4052421
courier: Fed Ex TUPS TUSPS TO	lient Cor	nmercia	af Pace	- Other		
racking #:						
custody Seal on Cooler/Box Present: yes	no	Seals i	ntact: Tyes	厂 no	Out	police and the second
Custody Seal on Samples Present: Yes	no	Seals i	ntact:yes	по		Notice District
acking Material: Bubble Wrap Bubb	ole Bags	- Ñone	Other)			
Thermometer Used ////	Type of Ice:	Wet	Blue Dry None	7	Samples on ice, o	ooling process has begun
Cooler Temperature WO	Biological '	lissue i	s Frozen: Tye	es		· · · · · · · · · · · · · · · · · · ·
Temp Blank Present: Yes Tono			∏ nc)	Person examinin	
Femp should be above freezing to 6°C for all sample excitions Samples should be received \leq 0°C.	ept Biota.		Comments:		Date: <i>()(()</i> Initials:	10/14/17
Chain of Custody Present:	□xes □No	□N/A	1.			
Chain of Custody Filled Out:	ØYes □No	ĺ			• • • • • • • • • • • • • • • • • • • •	. *
Chain of Custody Relinquished:	(□Yres □No					
Sampler Name & Signature on COC:	Tares DNo					-
Samples Arrived within Hold Time:	ØYes □No	ı		•		
Short Hold Time Analysis (<72hr):	□Yes ØNo	- 1				
Rush Turn Around Time Requested:	Øyes □No		·			
Sufficient Volume:	Yes ONo					
Correct Containers Used:	□/es □No			•		7712
-Pace Containers Used:	ØYes □No					•
Containers Intact:	ZYes □No		10.		•	
Filtered volume received for Dissolved tests	☐Yes ☐No	<i>f</i> :				-
Sample Labels match COC:	□xes □No					-
-Includes date/time/iD/Analysis Matrix:	<u>'S</u>		1			
All containers needing preservation have been checked.	□Yes □No	DINA	12			
All containers needing preservation are found to be in			13.			
compliance with EPA recommendation.	□Yes □No	KINA	Initial when		Lot # of added	<u>`</u>
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☐No) 	completed		preservative	
Samples checked for dechlorination:		ZIN/A	14.			
Headspace in VOA Vials (>6mm):	OYes □N	/· Zin/a	15.			
Trip Blank Present:	□Yes □N	ZINVA	16.			
Trip Blank Custody Seals Present	.□Yes □N	(Dinya			ā.	
Pace Trip Blank Lot # (if purchased):	<u></u>	/	100			
Client Notification/ Resolution:	-				Field Data Req	uired? Y / N
Person Contacted: Comments/ Resolution:	:	Date/	Time:	.		
		···				
	•		· .			
			· · · · · · · · · · · · · · · · · · ·	,		
Project Manager Review:	LA				Dete	. 10.10
		٣			Date:	10/15-17







November 30, 2011

ALYSSA SELLWOOD TRC - Madison 744 HEARTLAND TRAIL Madison, WI 53717

RE: Project: 186467 KEWAUNEE MARSH

Pace Project No.: 4053755

Dear ALYSSA SELLWOOD:

Enclosed are the analytical results for sample(s) received by the laboratory on November 17, 2011. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Brian Basten

brian.basten@pacelabs.com Project Manager

Enclosures

cc: ALEX GOERGEN, TRC - MADISON BOB STANFORTH, TRC - Madison





CERTIFICATIONS

Project:

186467 KEWAUNEE MARSH

Pace Project No.:

4053755

Green Bay Certification IDs 1241 Bellevue Street, Green Bay, WI 54302 Florida/NELAP Certification #: E87948 Hilinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334 New York Certification #: 11888

North Carolina Certification #: 503 North Carolina Certification #: 8-150
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750 Wisconsin DATCP Certification #: 105-444





SAMPLE SUMMARY

Project:

186467 KEWAUNEE MARSH

Pace Project No.: 4053755

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4053755001	GW01-2	Water	11/14/11 13:45	11/17/11 09:00
4053755002	MW02-1	Water	11/14/11 11:05	11/17/11 09:00
4053755003	MW02-11	Water	11/14/11 11:10	11/17/11 09:00
4053755004	MW02-1D	Water	11/14/11 11:00	11/17/11 09:00
4053755005	MW02-3	Water	11/14/11 12:50	11/17/11 09:00
4053755006	MW02-31	Water	11/14/11 13:15	11/17/11 09:00
4053755007	MW02-3D	Water	11/15/11 09:20	11/17/11 09:00
4053755008	MW02-8	Water	11/14/11 13:00	11/17/11 09:00
4053755009	MW02-81	Water	11/14/11 13:05	11/17/11 09:00
4053755010	MW04-9	Water	11/14/11 15:00	11/17/11 09:00
4053755011	MW04-11	Water	11/15/11 08:30	11/17/11 09:00
4053755012	MW11-1	Water	11/15/11 10:25	11/17/11 09:00
4053755013	MW11-1I	Water	11/15/11 10:30	11/17/11 09:00
4053755014	MW11-2	Water	11/15/11 09:00	11/17/11 09:00
4053755015	MW11-3	Water	11/14/11 14:45	11/17/11 09:00
4053755016	MW11-3!	Water	11/14/11 15:05	11/17/11 09:00





SAMPLE ANALYTE COUNT

Project:

186467 KEWAUNEE MARSH

Pace Project No.: 4053755

Lab ID	Sample ID	Method	Analysts	Analytes Reported
4053755001	GW01-2	EPA 6010	DLB	3
		EPA 300.0	JCJ	1
4053755002	MW02-1	EPA 6010	DLB	3
4053755003	MW02-1I	EPA 6010	DLB	3
4053755004	MW02-1D	EPA 6010	DLB	3
4053755005	MW02-3	EPA 6010	DLB	3
		EPA 300.0	JC J	1
4053755006	MW02-3I	EPA 6010	DLB	3
		EPA 300.0	JCJ	1
4053755007	MW02-3D	EPA 6010	DLB	3
		EPA 300.0	JCJ	1
4053755008	MW02-8	EPA 6010	DLB	3
4053755009	MW02-8I	EPA 6010	DLB	3
4053755010	MW04-9	EPA 6010	DLB	3
		EPA 300.0	JCJ	1
4053755011	MW04-11	EPA 6010	DLB	3
		EPA 300.0	JCJ	1
4053755012	MW11-1	EPA 6010	DLB	3
		EPA 300.0	JCJ	1
4053755013	MW11-1I	EPA 6010	DLB	3
		EPA 300.0	JCJ	1
4053755014	MW11-2	EPA 6010	DLB	3
		EPA 300.0	JCJ	1
4053755015	MW11-3	EPA 6010	DLB	3
		EPA 300.0	JCJ	1
4053755016	MW11-3I	EPA 6010	DLB	3
		EPA 300.0	J CJ	1





Project:

186467 KEWAUNEE MARSH

Pace Project No.: 4053755

Sample: GW01-2	Lab ID:	4053755001	Collected	d: 11/1 <mark>4/</mark> 11	13:45	Received: 11	/17/11 09:00 M	atrix: Water	
Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qua
6010 MET ICP, Dissolved	Analytical	Method: EPA	3010						
Arsenic, Dissolved	143 u	ıg/L	20.0	2.0	1		11/21/11 16:33	7440-38-2	
Calcium, Dissolved	9 6900 L	•	200	6.1	1		11/21/11 16:33		
Iron, Dissolved	1080 ւ	ıg/L	100	3.3	1		11/21/11 16:33	7439-89-6	
300.0 IC Anions 28 Days	Analytical	Method: EPA	300.0						
Sulfate	<2.0 r	ng/L	4.0	2.0	1		11/28/11 20:14	14808-79-8	
Sample: MW02-1	Lab ID:	4053755002	Collected	d: 11/14/11	11:05	Received: 11	/17/11 09:00 M	atrix: Water	
Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qua
6010 MET ICP, Dissolved	Analytical	Method: EPA 6	6010						
Arsenic, Dissolved	11.9J ւ	ıa/L	20.0	2.0	1		11/21/11 16:45	7440-38-2	
Calcium, Dissolved	135000 เ		200	6.1	1		11/21/11 16:45		
Iron, Dissolved	4960 ι	ıg/L	100	3.3	1		11/21/11 16:45	7439-89-6	
Sample: MW02-1I	Lab ID:	4053755003	Collected	d: 11/14/11	11:10	Received: 11	/17/11 09:00 M	atrix: Water	
Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qua
6010 MET ICP, Dissolved	Analytical	Method: EPA 6	8010						
Arsenic, Dissolved	11.2J ւ	ıg/L	20.0	2.0	1		11/21/11 16:49	7440-38-2	
Calcium, Dissolved	115000 և	ıg/L	200	6.1	1		11/21/11 16:49	7440-70-2	
Iron, Dissolved	1060 u	ıg/L	100	3.3	1		11/21/11 16:49	7439-89-6	
Sample: MW02-1D	Lab ID:	4053755004	Collected	d: 11/14/11	11:00	Received: 11	/17/11 09:00 M	atrix: Water	
Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qua
6010 MET ICP, Dissolved	Analytical	Method: EPA 6							
Arsenic, Dissolved	6.7J u	ıa/L.	20.0	2.0	1		11/21/11 16:53	7440-38-2	
Calcium, Dissolved	92000 u	_	200	6.1	1		11/21/11 16:53		
Iron, Dissolved	1280 U	_	100	3.3	1		11/21/11 16:53		





Project:

186467 KEWAUNEE MARSH

Pace Project No.: 4053755

Sample: MW02-3	Lab ID:	4053755005	Collected	i: 11/14/1 ¹	1 12:50	Received: 1	1/17/11 09:00 M	atrix: Water	
Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytica	l Method: EPA 6	6010						
Arsenic, Dissolved	91.4 u	ıg/L	20.0	2.0	1		11/21/11 16:57	7440-38-2	
Calcium, Dissolved	137000 t	ug/L	200	6.1	1		11/21/11 16:57	7440-70-2	
Iron, Dissolved	2370 t	ug/L	100	3.3	1		11/21/11 16:57	7439-89-6	
300.0 IC Anions 28 Days	Analytica	l Method: EPA 3	300.0						
Sulfate	9.5 r	mg/L	4 .0	2.0	1		11/28/11 20:57	14808-79-8	
Sample: MW02-3I	Lab ID:	4053755006	Collected	i: 11/14/1 ⁻	1 13:15	Received: 1	I/17/11 09:00 M	atrix: Water	<u></u>
Parameters	Results	Units	LOQ	LOD	_DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytica	l Method: EPA 6	3010						
Arsenic, Dissolved	16.0J ı	ug/L	20.0	2.0	1		11/21/11 17:01	7440-38-2	
Calcium, Dissolved	160000 t		200	6.1	1		11/21/11 17:01		
Iron, Dissolved	5940 t	-	100	3.3	1		11/21/11 17:01	7439-89-6	
300.0 IC Anions 28 Days	Analytica	l Method: EPA 3	300.0						
Sulfate	<2.0 r	ng/L	4.0	2.0	1		11/28/11 21:11	14808-79-8	
Sample: MW02-3D	Lab ID:	4053755007	Collected	l: 11/15/11	1 09:20	Received: 11	I/17/11 09:00 M	atrix: Water	
Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytica	Method: EPA 6	6010						
Arsenic, Dissolved	4.0J ւ	ıg/L	20.0	2.0	1		11/21/11 17:05	7440-38-2	
Calcium, Dissolved	71200 t		200	6.1	1		11/21/11 17:05	7440-70-2	
Iron, Dissolved	226 ι		100	3.3	1		11/21/11 17:05	7439-89-6	
300.0 IC Anions 28 Days	Analytica	l Method: EPA 3	300.0						
Sulfate	2.5J r	mg/L	4.0	2.0	1		11/28/11 21:25	14808-79-8	
Sample: MW02-8	Lab ID:	4053755008	Collected	l: 11/14/ 11	1 13:00	Received: 11	I/17/11 09:00 M	atrix: Water	
Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
	Analytica	Method: EPA 6					 		·
6010 MET ICP, Dissolved									
•	179 (ıa/l	20.0	2.0	1		11/21/11 17:00	7440-38-2	
6010 MET ICP, Dissolved Arsenic, Dissolved Calcium, Dissolved	178 ։ 1 34000 ւ	•	20.0 200	2.0 6.1	1 1		11/21/11 17:09 11/21/11 17:09		

Date: 11/30/2011 03:08 PM

REPORT OF LABORATORY ANALYSIS





Project:

186467 KEWAUNEE MARSH

Pace Project No.: 4053755

Sample: MW02-8I	Lab ID:	4053755009	Collected	1: 11/14/1	1 13:05	Received: 11	1/17/11 09:00 M	atrix: Water	
Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qua
6010 MET ICP, Dissolved	Analytica	I Method: EPA	6010				•		
Arsenic, Dissolved	11.5J ւ	ıg/L	20.0	2.0	1		11/21/11 17:13	7440-38-2	
Calcium, Dissolved	150000 ເ		200	6.1	1		11/21/11 17:13	7440-70-2	
Iron, Dissolved	2730 ເ	ıg/L	100	3.3	1		11/21/11 17:13	7439-89-6	
Sample: MW04-9	Lab ID:	4053755010	Collected	l: 11/14/1	1 15:00	Received: 11	1/17/11 09:00 M	atrix: Water	
Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qua
6010 MET ICP, Dissolved	Analytical	l Method: EPA	3010				,		
Arsenic, Dissolved	42.8 c	ug/L	20.0	2.0	1		11/21/11 17:17	7440-38-2	
Calcium, Dissolved	148000 u	-	200	6.1	1		11/21/11 17:17		
Iron, Dissolved	572 ι	ıg/L	100	3.3	1		11/21/11 17:17		
300.0 IC Anions 28 Days	Analytical	Method: EPA	300.0						
Sulfate	<2.0 г	mg/L	4.0	2.0	1		11/28/11 21:40	14808-79-8	
Sample: MW04-11	Lab ID:	4053755011	Collected	l: 11/15/1 ⁻	1 08:30	Received: 11	I/17/11 09:00 M	atrix: Water	
Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qua
3010 MET ICP, Dissolved	Analytical	Method: EPA	8010					<u>-</u>	
Arsenic, Dissolved	6.8 J L	ıg/L	20.0	2.0	1	•	11/21/11 17:21	7440-38-2	
Calcium, Dissolved	152000 և	ıg/L	200	6.1	1		11/21/11 17:21		
ron, Dissolved	433 t	ıg/L	100	3.3	1		11/21/11 17:21	7439-89-6	
300.0 IC Anions 28 Days	Analytical	Method: EPA 3	300.0						
Sulfate	2.1J n	ng/L	4.0	2.0	1		11/28/11 22:22	14808-79-8	
Sample: MW11-1	Lab ID:	4053755012	Collected	: 11/15/1	1 10:25	Received: 11	/17/11 09:00 M	atrix: Water	
Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qua
6010 MET ICP, Dissolved	Analytical	I Method: EPA 6	5010				·		
Arsenic, Dissolved	304000 u	ıg/L	200	20.0	10		11/23/11 03:22	7440-38-2	
Calcium, Dissolved	590000 u	•	2000	61.4	10		11/23/11 03:22		
ron, Dissolved	112000 u	ıg/L	100	3.3	1		11/21/11 17:32		
300.0 IC Anions 28 Days	Analytical	Method: EPA 3	300.0						
Sulfate	3340 n	ng/L	400	200	100		11/29/11 18:09	14808-79-8	

Date: 11/30/2011 03:08 PM

REPORT OF LABORATORY ANALYSIS





Project:

186467 KEWAUNEE MARSH

Pace Project No.: 4053755

Sample: MW11-1I	Lab ID:	4053755013	Collected	d: 11/15/1	1 10:30	Received: 11	/17/11 09:00 M	atrix: Water	
Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytica	l Method: EPA 6	5010						
Arsenic, Dissolved	121000 t	ıg/L	200	20.0	10		11/23/11 03:26	7440-38-2	
Calcium, Dissolved	128000 (•	200	6.1	1		11/21/11 17:37	7440-70-2	
Iron, Dissolved	3940 (ıg/L	100	3.3	1		11/21/11 17:37	7439-89-6	
300.0 IC Anions 28 Days	Analytica	Method: EPA 3	300.0						
Sulfate	124 ı	mg/L	20.0	10.0	5		11/29/11 18:23	14808-79-8	
Sample: MW11-2	Lab ID:	4053755014	Collected	d: 11/15/1	1 09:00	Received: 11	/17/11 09:00 M	atrix: Water	_
Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytica	l Method: EPA 6	6010						
Arsenic, Dissolved	108000 t	ıg/L	200	20.0	10		11/23/11 03:30	7440-38-2	
Calcium, Dissolved	429000 ւ	ığ/L	200	6.1	1		11/21/11 17:41		
Iron, Dissolved	165000 ເ	ıg/L	100	3.3	1		11/21/11 17:41	7439-89-6	
300.0 IC Anions 28 Days	Analytica	l Method: EPA 3	300.0						
Sulfate	3120 r	ng/L	400	200	100		11/29/11 18:38	14808-79-8	
Sample: MW11-3	Lab ID:	4053755015	Collected	: 11/14/1	1 14:45	Received: 11	/17/11 09:00 M	atrix: Water	
Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytica	Method: EPA 6	6010						-
Arsenic, Dissolved	360000 t	ıg/L	200	20.0	10		11/23/11 03:34	7440-38-2	
Calcium, Dissolved	285000 ເ	ıg/L	200	6.1	1		11/21/11 17:45		
Iron, Dissolved	1280 ւ	ıg/L	100	3.3	1		11/21/11 17:45	7439-89-6	
300.0 IC Anions 28 Days	Analytica	Method: EPA 3	0.00						
Sulfate	<2.0 r	ng/L	4.0	2.0	1		11/28/11 23:19	14808-79-8	
Sample: MW11-3I	Lab ID:	4053755016	Collected	l: 11/14/1 ⁻	l 15:05	Received: 11	/17/11 09:00 M	atrix: Water	
Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytica	Method: EPA 6							
Arsenic, Dissolved	1 53000 u	ıa/L	200	20.0	10		11/23/11 03:38	7440-38-2	
Calcium, Dissolved	154000 u	•	200	6.1	1		11/21/11 17:49		
Iron, Dissolved	3770 u		100	3.3	1		11/21/11 17:49		

Date: 11/30/2011 03:08 PM

REPORT OF LABORATORY ANALYSIS



ANALYTICAL RESULTS

Project:

186467 KEWAUNEE MARSH

Pace Project No.:

4053755

Sample: MW11-3I

Lab ID: 4053755016

Collected: 11/14/11 15:05

LOD

Received: 11/17/11 09:00

Prepared

11/17/11 09:00 Matrix: Water

Analyzed

CAS No.

Qual

300.0 IC Anions 28 Days

Parameters

Analytical Method: EPA 300.0

Units

Sulfate

15.9 mg/L

Results

4.0

LOQ

2.0 1

DF

11/28/11 23:33 14808-79-8



QUALITY CONTROL DATA

Project:

186467 KEWAUNEE MARSH

Pace Project No.:

4053755

QC Batch:

ICP/5319

Analysis Method:

EPA 6010

QC Batch Method:

EPA 6010

Analysis Description:

ICP Metals, Trace, Dissolved

Associated Lab Samples:

4053755001, 4053755002, 4053755003, 4053755004, 4053755005, 4053755006, 4053755007, 4053755008,

4053755009, 4053755010, 4053755011, 4053755012, 4053755013, 4053755014, 4053755015, 4053755016

METHOD BLANK: 537399

Matrix: Water

Associated Lab Samples:

4053755009, 4053755010, 4053755011, 4053755012, 4053755013, 4053755014, 4053755015, 4053755016

Blank Reporting Parameter Units Result Limit Analyzed Qualifiers Arsenic, Dissolved <2.0 ug/L 20.0 11/21/11 16:06 Calcium, Dissolved ug/L 6.5J 11/21/11 16:06 200 Iron, Dissolved ug/L <3.3 100 11/21/11 16:06

LABORATORY CONTROL SAMPLE:	537400					
		Spike	LCS	LCS	% Rec	
Parameter	Units	Conc.	Result	% Rec	Limits	Qualifiers
Arsenic, Dissolved	ug/L	500	480	96	80-120	
Calcium, Dissolved	ug/L	5000	4810	96	80-120	
Iron, Dissolved	ug/L	5000	4850	97	80-120	

MATRIX SPIKE & MATRIX S	SPIKE DUPLICAT	E: 53740	1		537402							
	41	053702006	MS Spike	MSD Spike	MS	MSD	MS	MSD	% Rec		Max	
Parameter	Units	Result	Conc.	Conc.	Result	Result	% Rec	% Rec	Limits	RPD	RPD	Qual
Arsenic, Dissolved	ug/L	<2.0	500	500	517	511	103	102	75-125		20	
Calcium, Dissolved	ug/L	77.0 mg/L	5000	5000	79700	79500	54	51	75-125	.2	20 F	2 6
Iron, Dissolved	ug/L	152	5000	5000	5000	5000	97	97	75-125	.2	20	



QUALITY CONTROL DATA

Project:

186467 KEWAUNEE MARSH

Pace Project No.:

4053755

QC Batch:

WETA/10695

Analysis Method:

EPA 300.0

QC Batch Method:

EPA 300.0

Analysis Description:

300.0 IC Anions

Associated Lab Samples:

4053755001, 4053755005, 4053755006, 4053755007, 4053755010, 4053755011, 4053755012, 4053755013,

4053755014, 4053755015, 4053755016

METHOD BLANK: 539066

Matrix: Water

Associated Lab Samples:

4053755001, 4053755005, 4053755006, 4053755007, 4053755010, 4053755011, 4053755012, 4053755013,

4053755014, 4053755015, 4053755016

Blank Result

Reporting

Parameter

Units

Limit Analyzed Qualifiers

Sulfate

mg/L

<2.0

4.0 11/28/11 11:18

LABORATORY CONTROL SAMPLE: 539067

Parameter

Units

4053755001

4053789001

Result

<2.0

211

Spike Conc.

LCS Result

LCS % Rec % Rec Limits

Qualifiers

Sulfate

Parameter

Parameter

mg/L

Units

mg/L

Spike

Conc.

20

18.9

539069

Result

20.4

415

94

90-110

MATRIX SPIKE & MATRIX SPIKE DUPLICATE:

539068

20

MS MSD

Conc.

20

Spike MS

MSD Result

MS % Rec

MSD % Rec % Rec Limits

90-110

Max RPD RPD Qual 20

MATRIX SPIKE & MATRIX SPIKE DUPLICATE:

539070

539071

MS MSD Spike

MS

MSD MS

MSD

94

Max RPD RPD

.6

Sulfate

Sulfate

Units Result mg/L

Spike Conc.

200

Conc. Result

200

Result 413

20.6

% Rec 102

94

% Rec Limits 90-110

% Rec

.5 20 Qual



QUALIFIERS

Project:

186467 KEWAUNEE MARSH

Pace Project No.: 4053755

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

ANALYTE QUALIFIERS

P6

Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

Page

UPPER MIDWEST REGION

Profile # مُ 120 PACE Project No. Tob Hearthard trai suite 3006 Madison Wi 53717 608-826-3658 4-arcmit LAB COMMENTS (Lab Use Only) 3. 250 muns d-ACOM MO 1-255mb A.Sellwood atorfane: L/15 940 Involce To Company: Invoice To Address: Invoice To Contact: Invoice To Phone: Mail To Company: Mail To Contact: Mail To Address: COMMENTS MN: 612-607-1700 WI: 920-469-2436 Quote #: CLIENT Received By: F=Methanol G=NaOH CHAIN OF CUSTODY 11/16/11 9UD Face Analytical * 4 *Preservation Codes. D=HNO3 E=Di Water l⇒Sodium Thiosulfate 2-Q B=HCL C=H2SO4 H=Sodium Bisulfate Solution PRESERVATION (CODE)* BLATREX <u>ટ</u> FILTERED? (YES/NO) ામાયા ભ્યુડ 12/2 **ELGIN 99D** 1/15/4 830 वड्टा भागा 18/1 W30 203 JEN 1305 1500 INTERIOR WHISTAN TO DES Why kn ||/#/i| DATE 11/11 RC ENVIONMENTAL Regulatory Kenunes-Marsh 608-826- 3658 Rush Tumaround Time Requested - Prelims (Rush TAT subject to approval/surcharge) (billable) NOT needed on On your sample your sample A. SELLINGOD **CLIENT FIELD ID** (Please Print Clearly)) Connel 746 Son [26467 MWOD-10 MW 63 - 8 MW02-30 MWOS-B 1- COMW MW62-3 MWO4-9 1 - HOMW 1 - 1 N N MWIGG -9401-MELL MWOD Data Package Options EPA Level IV EPA Level III ampled By (Sign): Sampled By (Print): ranch/Location: Company Name: roject Number: roject Contact: roject Name: Project State: PACE LAB# 30 S 00 3 B 8 を 8 g 3 Phone: ó

Present //Not Present Cooler Custody See

OK / Adjusted

Date/Time:

caived By:

Date/Time:

telinquished By:

Telephone:

Email #1: Ernall #2: Relinquished By

Received By:

Date/Time:

Intact (Not Intact

どのあるした

ecelpt Temp = () (

17 9:COA

Daker/Gries: CAP

N FF IN

Selfmulshed By:

Transmit Prelim Rush Results by (complete what you want):

Date Needed

elinquished By:

Date/Time:

special pricing and release of Hability Samples on HOLD are subject to

ORIGINAL

Cooler Cuatody Sa

Present /

Date/Time:

OK / Adjusted

Date/Time:

ecaived By:

Date/Time:

Contentine:

Relinquished By:

Transmit Pretim Rush Results by (complete what you want):

Date Needed:

elinquished By:

tellnquished By:

Telephone:

Email #1:

Emall #2:

elinquished By:

eceived By:

Date/Time:

celpt Temp≃ (T). (

Intact / Not Intact

UPPER MIDWEST REGION

Profile # Page 2 of 2 405376 PACE Project No. LAB COMMENTS (Lab Use Only) - JEComuRD 240 Invoice To Company: Invoice To Address: Involce To Contact: Mail To Company: Involce To Phone: Mail To Address: Mail To Contact: COMMENTS MN: 612-607-1700 WI: 920-469-2436 Quote #: CLIENT Preservedon Codes

B=HCL C=HZSO4 D=HNO3 E=DI Water F=Methanol G=NaOH
Bisulfate Solution I=Socium Thiosulfate J=Other CHAIN OF CUSTODY X ₹ Ł Pace Analytical " Date/Time: Δ Δ H=Sodium Bisulfate Solution Rolliquisped By: FILTERED? (YES/NO) PRESERVATION (CODE)* 11514900 GW Matrix Codes 1/2/2/1/3/2V 1/14/11/150S Regulatory Program: Rush Turnaround Time Requested - Prelims (Rush TAT subject to approval/surcharge) NOT needed on On your sample your sample CLIENT FIELD ID (Please Print Clearly) MS/MSD 100 MW11-3 MW11-2 Data Package Options (hillable) ĭ. ≷ EPA Level III ☐ EPA Level IV Sampled By (Sign): ampled By (Print): Branch/Location: Company Name: roject Number: Project Contact: roject Name: roject State: PACE LAB# <u>و</u> 550 70 Phone: ₩ 2

special pricing and release of Hability Samples on HOLD are subject to

Pace Analytical

Sample Condition Upon Receipt

Client Name:	TRC	En	٧.	Pro	oject#	WKR3-	788
Courier: Fed Ex UPS USPS C	lient N Co	mmerc	ial II Pace	- Other	· —		
Tracking #:	. —			, Odici			_
Custody Seal on Cooler/Box Present:	T po	Seals	ntact: 🗍 yes	V no	ley.	Hopes Johns	
Custody Seal on Samples Present:	☑ no	Seals i	ntact: yes	no			g distance de la p ersona de la compansa de la comp Esta de la compansa de
Packing Material: Bubble Wrap Bubble			o (Other) Zi	plock			
Thermometer Used			Blue Dry None	· E	Samples on ice	, cooling process	has begun
Cooler Temperature 0 C	Biological 1	ïssue i	is Frozen: 🔲 ye			·····	· · · · · · · · · · · · · · · · · · ·
Temp Blank Present: yes no Temp should be above freezing to 6°C for all sample exce			. □ no		Person examinates 11 115	ning contents: - (\	
Biota Samples should be received $\leq 0^{\circ}$ C.	ept Blota.		Comments:	•	initials:	A9¥	· ·
Chain of Custody Present:	©Yes □No	□N⁄A	1.				
Chain of Custody Filled Out:	Yes 🗆 No	□N⁄A	2.		•		
Chain of Custody Relinquished:	MYes □No	□NA	3.				
Sampler Name & Signature on COC:	00 Yes □No	□NA	4.				:
Samples Arrived within Hold Time:	∐Yes □No	□N/A	5.			<u>.</u>	
Short Hold Time Analysis (<72hr):	☐Yes ☑No	□N⁄A	6.				
Rush Turn Around Time Requested:	□Yes ☑No	□N/A	7.				
Sufficient Volume:	10Yes □No	□N⁄A	8.				
Correct Containers Used:	Yes □No	□N/Ą	9.				
-Pace Containers Used:	res □No	□N/A	· _ <u> </u>				
Containers Intact:	EYes □No	□N⁄A	10.				
Filtered volume received for Dissolved tests	□Yes □No	₩N/A	11.				
Sample Labels match COC:	es □No	□N⁄A	12.		,		
Includes date/time/ID/Analysis Matrix: All containers needing preservation have been checked.	<u> </u>	· 					
	Yes No	□N⁄A	13.				
All containers needing preservation are found to be in compliance with EPA recommendation.	MYes □No	□nva		٠			•
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	□Yes □No		Initial when	<u></u>	Lot # of added		<u> </u>
Samples checked for dechlorination:	☐Yes ☐No	Tolerin.	completed AC	<u> </u>	preservative		
Headspace in VOA Vials (>6mm):	☐Yes ☐No		·			<u> </u>	· · · · · · · · · · · · · · · · · · ·
Trip Blank Present:					<u> </u>	<u> </u>	·
Trip Blank Custody Seats Present	□Yes □No		10.				,
Pace Trip Blank Lot # (if purchased):	, DIA	GHVA	<i>,</i>	•			
Client Notification/ Resolution:					Field Data Re	quired?	Y / N : a · ·
Person Contacted: Comments/ Resolution:		_Date/	Fime:	·			-
Commercy Resolution:		· ·	 		·		<u> </u>
							, -
	•						
Project Manager Parison	-/-		·				·
Project Manager Review:					Date:		//
Note: Whenever there is a discrepancy affecting North Carolina	Sophpliarice sempi	ės, a cop	y of this form will be se	ent to the N	lorth Carolina DE	NR Certification Of	ice (i.e. out of hold,

Appendix E 2010 Investigation Tables and Figures

Table 1

December 2009/March 2010 Hotspot Geoprobe Investigation
Compositional Arsenic Results - Soil Sampling
Kewaunee Marsh, Kewaunee, Wisconsin

			Transect	B1				Transect I	B2				Transect I	B3				Transect M	2				Transect M	13				Transect M	14				Transect M	15	
			•	Moisture					Moisture				•	Moisture				•	Moisture				•	Moisture					Moisture					Moisture	
	ID	Date	(ft bgs)	(%)	(mg/kg)	ID	Date	(ft bgs)	(%)	(mg/kg)) ID	Date	(ft bgs)	(%)	(mg/kg)	ID	Date	(ft bgs)	(%)	(mg/kg)	ID	Date	(ft bgs)	(%)	(mg/kg)	ID	Date	(ft bgs)	(%)	(mg/kg)		Date	(ft bgs)	(%)	(mg/kg)
						B2-A	10-Dec-09	0-2 2-4	4.3 3	3.8 2.2						M-2A	17-Mar-10	0-2.5' 2.5-5.0'	43.9 63.1	13.6 107											M-5A	17-Mar-10	0-2.0' 2-4.0'	48.8 69.7	20.8 1090
۲ ×								4-6	6.3	30.9								5.0-7.5'	79.5	67													4-6.0'	82.5	3000
Sec								6-8 8-10	12.9 12.6	27.5 1.6J								7.5-10.0'	66.5	63.9													6-8.0' 8-10.0'	76.4 61.9	590 3.9 J
Trai								10-12	17.6	2.4																							0 10.0	01.0	0.00
								12-14	24.2	7.1J																									
						B2-B	10-Dec-09	14-15 0-2	56.2 3.3	2.9J 9.5						M-2B	17-Mar-10	0-2.5'	41.4	4500											M-5B	17-Mar-10	0-2.0'	82	1460
								2-4	5.8	527								2.5-5.0'	79.4	13200													2.0-4.0'	50.5	400
t B								4-6 6-8	7.4 15.1	3830 309								5.0-7.5' 7.5-10.0'	51.4 22.8	834 2100													4.0-6.0' 6.0-8.0'	82 84.1	4350 4300
sec								8-10	14	343								7.5-10.0	22.0	2100													8.0-10.0'		91.6
Lran								10-12	15.5	240																									
								12-14 15-19	54.9 50.6	140 8.7																									
								19-20	18	2.8																									
						B2-C	10-Dec-09		3.9	332						M-2C	17-Mar-10	0-2.5' 2.5-5.0'	47 38.4	1510 4510											M-5C	17-Mar-10	0-2.5' 2.5-5.0'	75.2 85.2	3070
ပ								2-4 4-6	4.9 5.6	804 2880								2.5-5.0 5.0-7.5'	38.4 74.4	11400													2.5-5.0 5.0-7.5'	85.2 82.3	5060 4080
sect								6-8	15	996								7.5-10.0'	82.3	9950													7.5-10.0'	79.3	1780
ran								8-10 10-12	8.7 13.3	1470 1270																									
_								12-14	72.6	9050																									
	D 4D	10-Dec-09	0.0	14.7	7.1	B2 D	10-Dec-09	14-20	50.8	708 4.3	B 2D	10-Dec-09	0.2	46 F	408	Man	10 Dec 00	0.2	19.5	454	Map	10-Dec-09	0.0	EG E	2310	M 4D	10-Dec-09	0-5	53.5	1850	MED	10-Dec-09	0.5	77 7	4960
	טו-ם	10-Dec-09	0-2 2-4	12.8	7.1 105	B2-D	10-Dec-09	0-2 2-4	6.7 2.3	3.3	6-30	10-066-09	0-2 2-4	46.5 8.5	11.8	IVI-2D	10-Dec-09	0-2 2-4	71.1	5120	IVI-3D	10-Dec-09	0-2 2-4	56.5 82.3	3800	WI-4D	10-Dec-09	5-7	84.5	4770	WI-SD	10-Dec-09	0-5 5-7	77.7 87.9	7300
			4-6	20.2	719			4-6	5.7	4.1			4-6	13.5	14.9			4-6	78.6	1930			4-6	78.8	2450			6-10	67.9	628			6-10	68.8	500
ن ا			6-8 8-10	25.5 75.9	1850 2160			6-8 8-10	13.4 12.8	1030 1420			6-8 8-10	11.8 17.5	538 2130			6-8 8-10	81.1 67.4	2180 633			6-8 8-10	75.7 67.1	1610 654										
Sec			10-12	80.8	1070			10-12	17.4	798			10-12	18.4	1210			0.10	0	000			0.0	0											
Trar			12-14 15-19	53.4	151 86.4			12-14 14-15	13.9	533 2820			12-14 14-16	77.3 59.4	2030 759																				
			19-20	54.3 16.2	4.6			15-17.5	72.8 44.9	1330			14-10	59.4	759																				
								17.5-20	24.7	81.5																									
-	B-1E	10-Dec-09	0-2	8.6	2.8	B2-E	10-Dec-09	20-25 0-2	9.7 2.6	15.5 2.6	B-3E	10-Dec-09	0-2	8.9	2.9	M-2E	17-Mar-10	0-2.5'	48.3	734	-										M-5E	17-Mar-10	0-2.0'	70.3	269
			2-4	17.8	35.4			2-4	4.2	1.5J			2-4	9.9	23.2			2.5-5.0'	59.6	1720													2.0-4.0'	82.6	215
ш			4-6 6-8	18 23.2	49.9 232			4-6 6-8	6.2 14.6	112 100			4-6 6-8	17.3 17.4	330 249			5.0-7.5' 7.5-10.0'	55 77.4	906 1400													4.0-6.0' 6.0-8.0'	87.9 83.8	46.6 9.8 J
ect			8-10	77.5	932			8-10	13.1	107			8-10	14	151			7.5 10.0	77.4	1400													8.0-10.0	60.7	2.7 J
ans			10-12	63.3	294			10-13.8 13.8-15	10.1	87.1 324			10-12	66.8	927 582																		10.0-12.0	60.1	40.3
F			12-14 14-16	77.1 58	341 6.2			20-23	75.2 62.8	324 86.5			12-14 14-16	79 61.7	582 63.1																		12-14' 14-15'	64.1 20.1	8.1 3.1
			16-19	53.6	3.4J			23-25	12.4	2.6			16-20	53	11.7																				
			19-20	21.5	2.7	B. 2E	10-Dec-09	0-2	2.7	4.1	+		20-25	15.4	2.9	M. 2E	17-Mar-10	0-2.5'	53.6	109 M0	-										M-5F	17-Mar-10	0-2.5'	51.7	98.2
						D-ZP	10-060-09	0-2 2-4	4.8	4. i 1.8J						IVI-ZI'	i / -iviai - 10	2.5-5.0'	78.7	664											M-OL	i i -iviai - 10	0-2.5 2.5-5.0'	77.7	96.2 1 300
								4-6	5.4	21.8								5.0-7.5	77.2	407													5.0-7.5'	86	1260
ш								6-8 8-10	10.5 12.2	68.1 10.4								7.5-10.0'	78.1	54.7													7.5-10.0'	76.7	111
sect								10-12	15.6	11.8																									
ran								12-13.8	16.7	16 4 8 1																									
-								13.8-15 15-16	76 67	4.8J 37.5																									
								16-20	37.6	2.6J																									
								23-25 25-30	7.8 10.9	1.9J 3.2																									
						I		20-00	10.9	3.2											1														

Table 1 (continued) December 2009/March 2010 Hotspot Geoprobe Investigation Compositional Arsenic Results - Soil Sampling Kewaunee Marsh, Kewaunee, Wisconsin

			Tra	ansect M	6				Transect	: M7					Transect	M8				Transect	M9				Transect M	10				Transect N	M11				Transect M	112	
			D	epth N	Moisture	As		_	Depth	Moistu	ure /	As			Depth	Moisture	As		_	Depth	Moisture	As			Depth	Moisture	As			Depth	Moisture	As			Depth	Moisture	As
Transect A	ID	<u>Date</u>	e (ft	bgs)	(%)	(mg/kg)	ID	Date	(ft bgs)	(%)) (m <u>g</u>	g/kg)	ID	Date	(ft bgs)	(%)	(mg/kg)	ID	<u>Date</u>	(ft bgs)	(%)	(mg/kg)	ID	Date	(ft bgs)	(%)	(mg/kg)	ID	Date	(ft bgs)	(%)	(mg/kg)	ID	Date	(ft bgs)	(%)	(mg/kg)
Transect B																																					
Transect C																																					
Transect D																																					
Transect E	M-6	E 17-Mai	4	-4.0' -6.0' -8.0'	77.2 78.2 88.2	895 1910 2020	M-7E	17-Mar-10	0 0-2.0' 2-4.0' 4-6.0' 6-8.0'	42 48.4 83.2 86.8	4 2 2 1 2	5.1 ?77 260 ?78	M-8E 1	7-Mar-10	0-4.0' 4-6.0' 6-8.0'	61.8 60.5 87.8	311 24.4 12.9 J																				
Transect F																		M-9F	17-Mar-10	0-4.0' 4.0-6.0' 6.0-8.0'		348 452 82.1	M-10F 1	7-Mar-10	0-4.0' 4-6' 6-8.0'	59.3 69.3 86.3	357 589 52.7	M-11F	17-Mar-10	0-2.0' 2.0-4.0' 4.0-6.0' 6.0-8.0' 8.0-10.0' 10.0-12.0'	60.7 73.3 86 87.7 84.5 75.3	106 549 160 27.5 62.9 3.3 JB	M-12F	17-Mar-10	0 0-4.0' 4.0-6.0' 6.0-8.0'	84.7	204 313 7.6

Notes

1. Sample data presented in the grid orientation shown on Figure 2.

J = Estimated concentrations above the detection limit and below the reporting limit

B = Analyte was detected in the associated method blank

M0 = Matrix spike recover and/or matrix spike duplicate recovery was outside laboratory control limits

BOLD = Arsenic concentration greater than 1,000 mg/kg, which corresponds to the material that has been classified as "hot spot" based on its potential to be hazardous (TCLP > 5 mg/L).

Prepared By: A. Goergen 12/29/09, A. Sellwood 4/5/10 Checked By: A. Sellwood 12/30/09, T. O'Connell 5/12/10

SCALE OF DETAIL 1 " = 60 ' 1:720 M5A M5B M5C В2А M5D B2B[♣] ₩4D M6E M7E M8E M5E M3D M2D M5F M9F M12F TEST PLOTS GROUNDWATER SOURCE PROJECT: D:\PRE_TESS_PROJECTS\07201\19\MXD\72011904.mxd 5/27/2010 11:55:22

LEGEND

- ◆ ARSENIC > 1,000 mg/kg
 ◆ ARSENIC < 1,000 mg/kg
 M-SERIES = MARSH (8-12 FT)
 B-SERIES = BALLAST (15-30 FT)
- MONITORING WELL LOCATION

—×—×—× FENCE



CAPPED AREA



APPROXIMATE AREA OF PREVIOUSLY DISTRESSED VEGETATION



▲CROSS-SECTION TRANSECT

NOTES:

ALL GEOPROBE BORINGS WERE LOCATED USING A TRIMBLE GEOXH GPS UNIT.

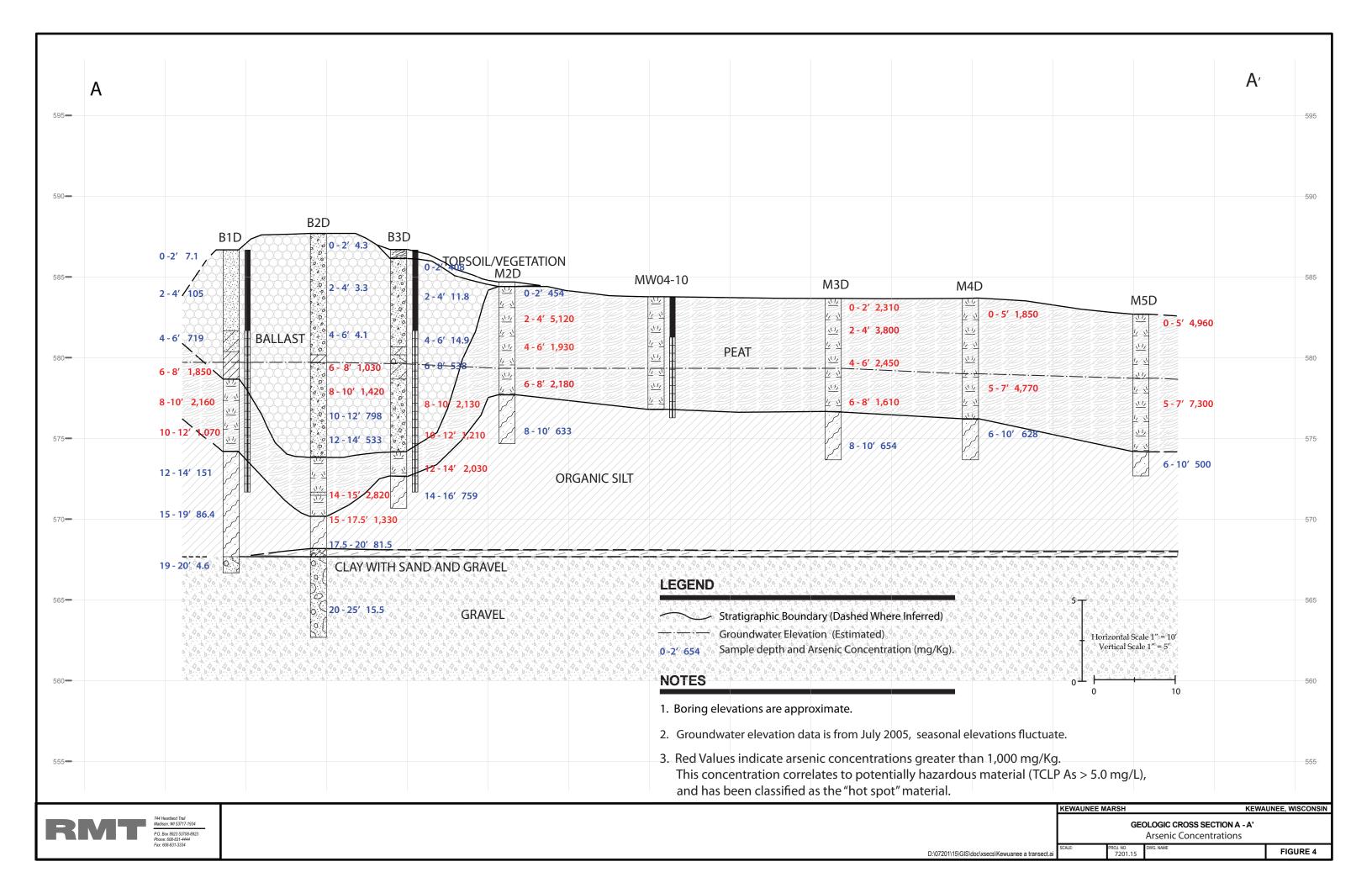


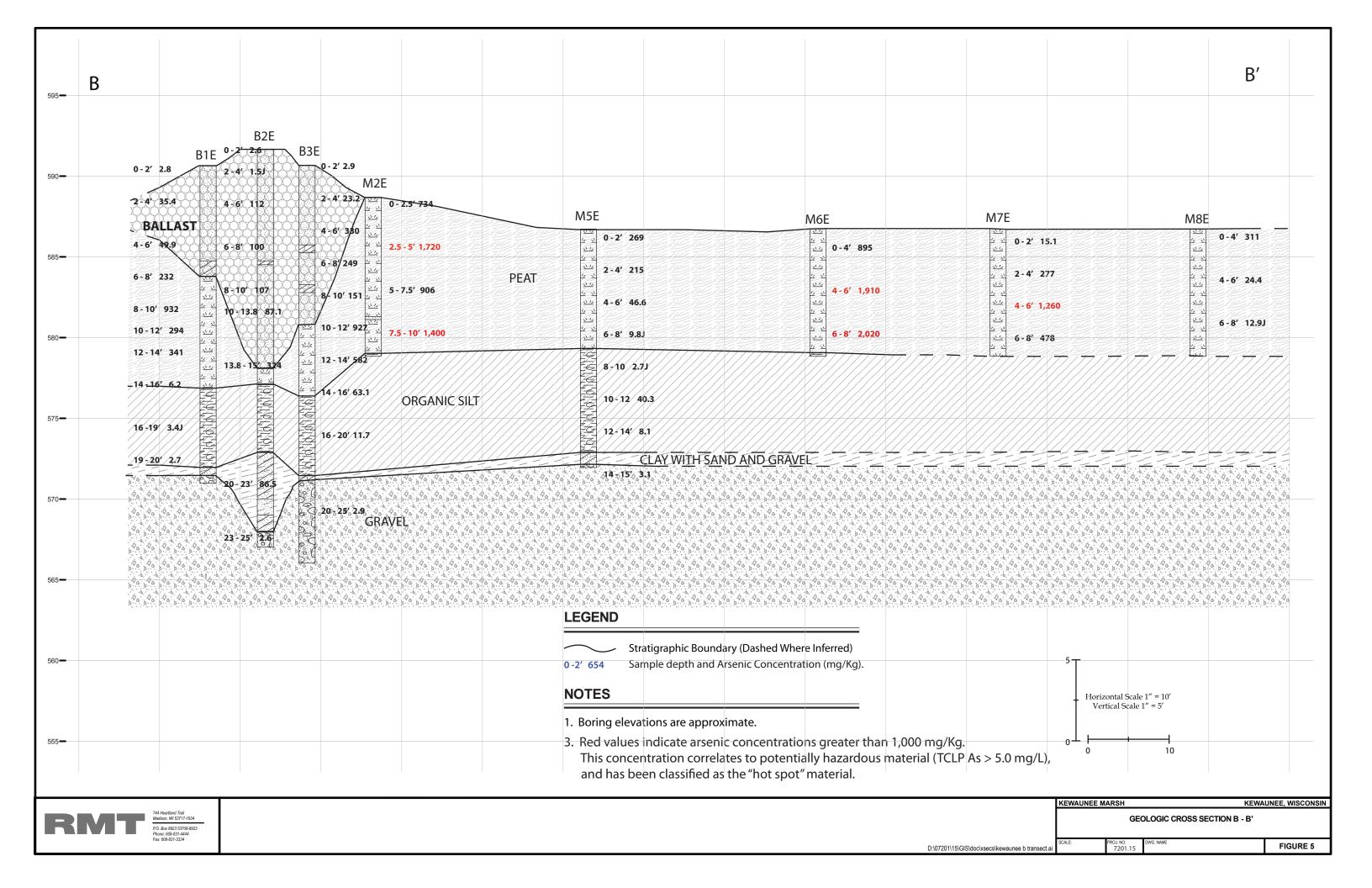
WISCONSIN DEPARTMENT OF NATURAL RESOURCES **KEWAUNEE MARSH**

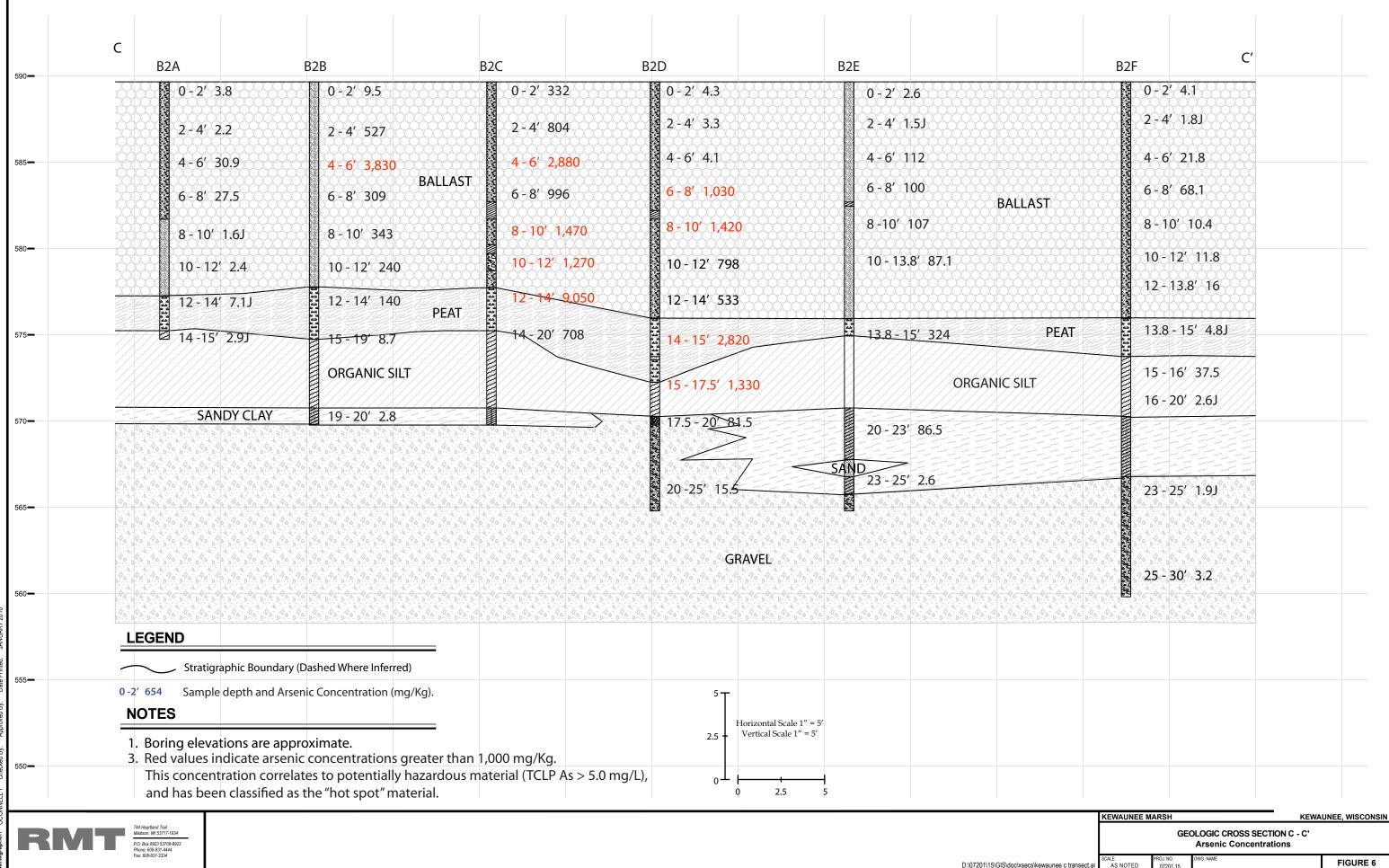
SHEET TITLE: 2009/2010 HOT SPOT GEOPROBE INVESTIGATION **CROSS-SECTION TRANSECTS**

DRAWN BY: PAPEZ J SCALE: 00-07201.22 SELLWOOD A FILE NO. 72011904.mxd CHECKED BY: AS NOTED FIGURE 3 MAY 2010

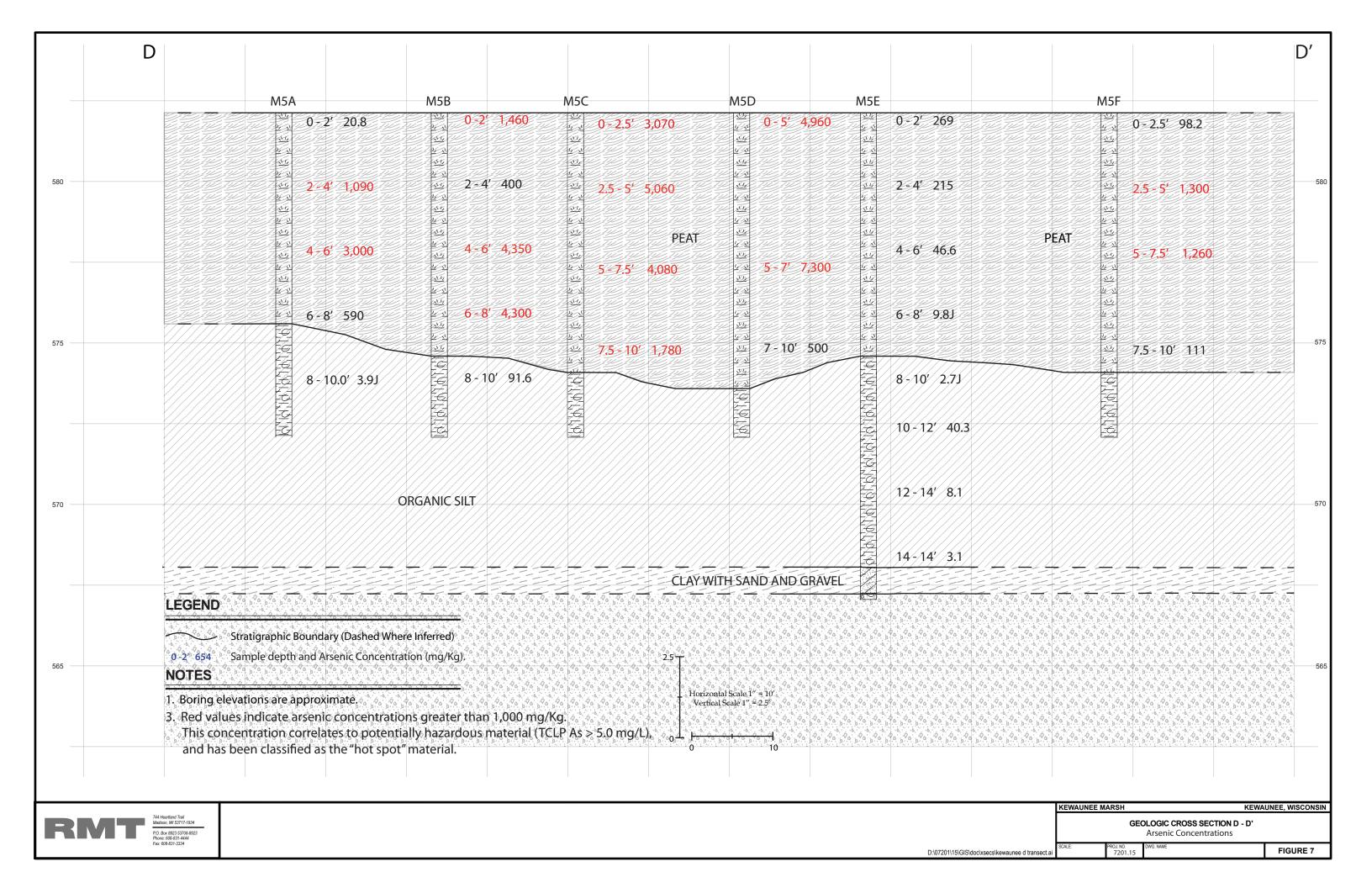
744 Heartland Trail Madison, WI 53717-1934 P.O. Box 8923 53708-8923 Phone: 608-831-4444 Fax: 608-831-3334

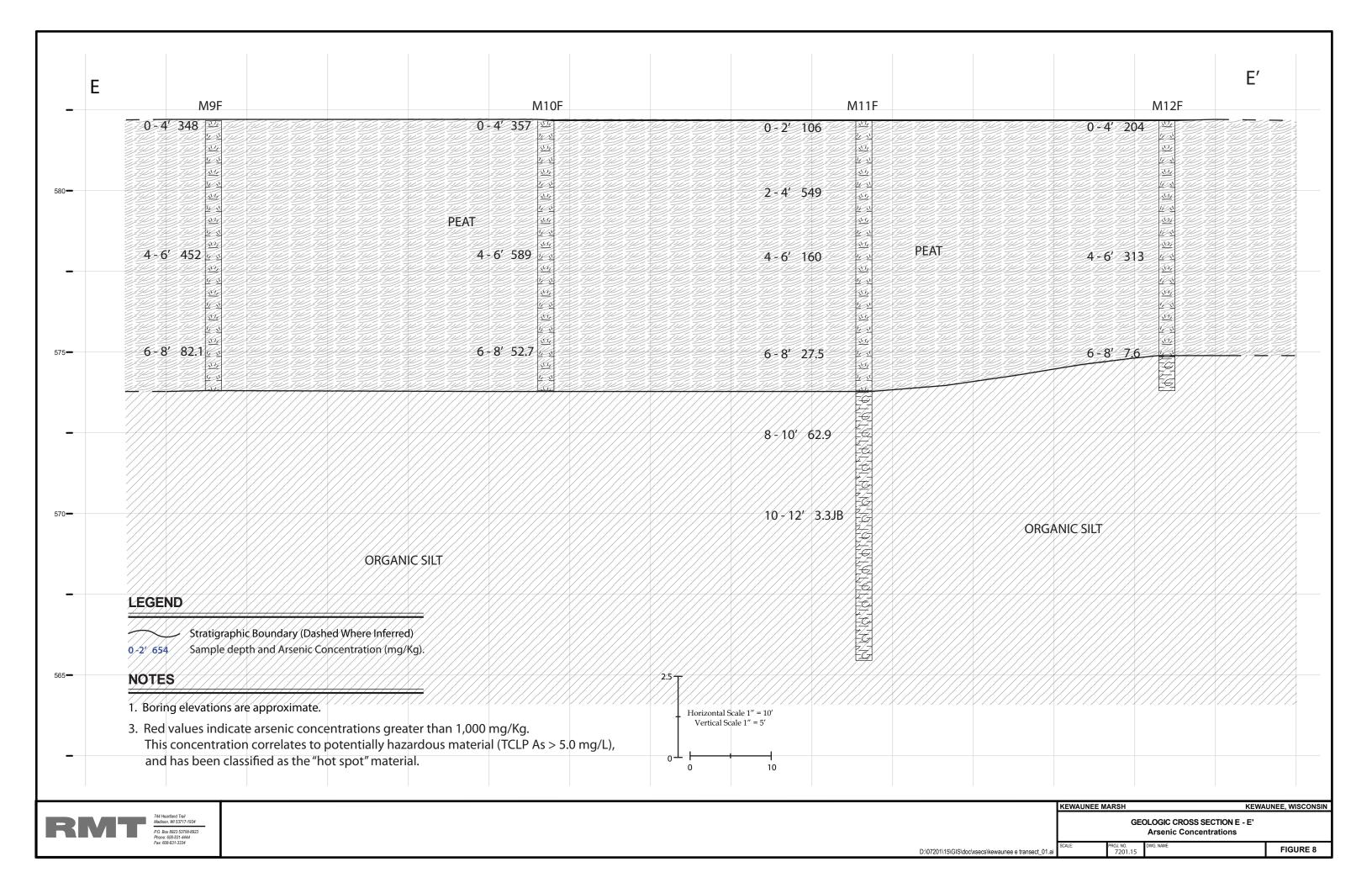






Sartographer: OCONNELL T Chooked By:





Appendix F Comparison of SPLP Arsenic Analysis versus Time Post-Treatment

Appendix F
Comparison of SPLP Arsenic Analysis versus Time Post-Treatment
Kewaunee Marsh Arsenic Source Area In-Situ Remediation

	CELL	SPLP ARSENIC CONC	CENTRATION ⁽¹⁾ (mg/L)
ID	MEDIA	1-WEEK POST-TREATMENT	2-WEEK POST-TREATMENT
7	Peat	<0.013	0.0123
8	Peat	0.088	<0.013
10	Peat	0.059	<0.013
15	Peat	0.092	0.017
19	Ballast	0.19	0.138
23 ⁽²⁾	Ballast	2.62	8.725
23\`	Peat	0.89	3.175
25	Ballast	0.47	0.253
25	Peat	1.3	3.05
26	Peat	0.59	2.175

Footnotes:

⁽¹⁾ SPLP test completed in TRC's Applied Chemistry Laboratory. The results from TRC are screening level results, but have been previously shown to be consistent with results from a Certified laboratory (Pace).

⁽²⁾ The sample collected from the treated ballast material of cell #23 was not likely representative of treated material.

Appendix G Pre-Treatment Arsenic SPLP Test Result Estimates

CAPPED AREA



TREATMENT AREA, HORIZONTAL LIMITS AT BASE OF EXCAVATION



PRE-REMEDIATION GEOPROBE SAMPLE (2009/2010)

ARSENIC > 1,000 mg/kg
ARSENIC < 1,000 mg/kg

ARSENIC < 1,000 mg/kg

B-SERIES = MARSH (8-12 FT)
B-SERIES = BALLAST (15-30 FT)

- 1. BASE MAP IMAGERY FROM KEWAUNEE COUNTY, 2010.
- 2. GREYED OUT SECTION OF THE FENCE WAS REMOVED AND REPLACED TO PROVIDE ACCESS TO TREATMENT AREA IN THE MARSH.



WISCONSIN DEPARTMENT OF NATURAL RESOURCES **KEWAUNEE MARSH**

PRE-TREATMENT SOURCE AREA SAMPLE LOCATIONS

DRAWN BY:	PAPEZ J	SCALE:	PROJ. NO.	186467-003
CHECKED BY:	WALTER M	AS NOTED	FILE NO.	186467.004.G1.mxd
APPROVED BY:	SELLWOOD A	DATE PRINTED:		FIGURE 0.4
DATE:	MARCH 2012			FIGURE G-1



708 Heartland Trail Suite 3000 Madison, WI 53717 Phone: 608.826.3600 Fax: 608.826.3941 www.trcsolutions.com

Appendix G
Kewaunee Marsh Pre-Treatment Arsenic SPLP Leaching Test Result Estimates

С	ELL		AS	SOCIATED TRANSI	ECT SAMPLE(S)		
NUMBER	MEDIA	NAME	BORING LOG SUMMARY (ft)	DEPTH (ft)	TOTAL ARSENIC CONC (mg/kg)	AVG. TOTAL ARSENIC CONC. (mg/kg)	ESTIMATED TCLP AS CONC. ⁽¹⁾ (mg/L)
1		NA					
2	Peat	M5A	Peat 0 - 6.5	0 - 2 2 - 4 4 - 6	20.8 1090 3000	1370	8.4
3	Peat	M5B	Peat 0 - 7.5	0 - 2 2 - 4 4 - 6 6 - 8	1460 400 4350 4300	2628	22
4		NA		Ü	1000		
5		NA					
6	Peat	M5D	Peat 0 - 8.5	0 - 5 5 <i>-</i> 7	4960 7300	6130	61
7	Peat	M5C	Peat 0 - 7.5	0 - 2.5 2.5 - 5.0 5.0 - 7.5	3070 5060 4080	4070	38
8	Peat	M5B	Peat 0 - 7.5	0 - 2 2 - 4 4 - 6 6 - 8	1460 400 4350 4300	2628	22
9		NA					
10	Peat	M4D	Peat 0 - 7.5	0 - 5 5 - 7	1850 4770	3310	30
11		NA					
12		NA					
13		NA					
14		NA					
15		NA					
16		NA					
17		NA					
18	Peat	M3D	Peat 0 - 7	0 - 2 2 - 4 4 - 6	2310 3800 2450	2853	25
19	Peat	M2C	Peat 0 - 8.5	0 - 2.5 2.5 - 5.0 5.0 - 7.5	1510 4510 11400	5807	57

Appendix G (continued) Kewaunee Marsh Pre-Treatment Arsenic SPLP Leaching Test Result Estimates

C	ELL		AS	SOCIATED TRANSE	CT SAMPLE(S)		
NUMBER	MEDIA	NAME	BORING LOG SUMMARY (ft)	DEPTH (ft)	TOTAL ARSENIC CONC (mg/kg)	AVG. TOTAL ARSENIC CONC. (mg/kg)	ESTIMATED TCLP AS CONC. ⁽¹⁾ (mg/L)
				0 - 2	454		
20	Peat	M2D	Peat 0 - 7	2 - 4	5120	2421	20
20	Feat	IVIZU	Peal 0 - 7	4 - 6	1930	2421	20
				6 - 8	2180		
			Clean ballast 0 - 5.	6 - 8	1030		
		B2D	Contaminated ballast	8 - 10	1420		
		DZD	5 - 14.	10 - 12	798		
	Ballast		5 - 14.	12 - 14	533	1094	5.4
21			Clean ballast 0 - 5.	6 - 8	538		
۷۱		B3D	Contaminated ballast	8 - 10	2130		
			5 - 12.5.	10 - 12	1210		
		B3D	Peat 12.5 - 14	12 - 14	2030		
	Peat	B2D	Peat 14 - 17.5	14 - 15	2820	2060	16
		DZD	1 eat 14 - 17.5	15 - 17.5	1330		
			Clean ballast 0 - 5.	6 - 8	538		
22	Ballast	B3D	Contaminated ballast	8 - 10	2130	1293	7.6
22			5 - 12.5.	10 - 12	1210		
	Peat	B3D	Peat 12.5 - 14	12 - 14	2030	2030	16
			0, , , , , , , ,	4 - 6	2880		
	D. II. (B00	Clean ballast 0 - 5.	6 - 8	996	1051	40
23	Ballast	B2C	Contaminated ballast	8 - 10	1470	1654	12
			5 - 12.	10 - 12	1270		
	Peat	B2C	Peat 12 - 14.5	12 - 14	9050	9050	93
				4 - 6	3830		
	D-II4	DOD	Clean ballast 0 - 5.	6 - 8	309	4404	0.0
24	Ballast	B2B	Contaminated ballast	8 - 10	343	1181	6.3
			5 - 12.	10 - 12	240		
	Peat	B2B	Peat 12 - 15	12 - 14	140	140	NA
	Doot	MOD		0 - 2.5	4500	0050	
	Peat	M2B	Peat 0 - 5	2.5 - 5	13200	8850	91
26		NA					

Footnotes:

= Sample not collected during investigation within the limits of the treatment cell.

⁽¹⁾ Total arsenic converted to SPLP arsenic using the equation shown on Figure 2 in Appendix G. SPLP arsenic (mg/L) = 0.011(total arsenic[mg/kg])-6.6576, when total arsenic concentrations are greater than 1,000 mg/kg.



TRC Environmental Corporation 708 Heartland Trail, Suite 3000 Madison, WI 53717

Main 608.826.3600 Fax 608.826.3941

Memorandum

From: Bob Stanforth, Ph.D.

Subject: 2011 Baseline Monitoring – Colloid and Long-Term Stability Evaluation

Kewaunee Marsh Source Area Remediation

Date: January 2012

Project No.: 186467.0000.0000.000003

Background

The arsenic source area in Kewaunee Marsh was remediated in October 2011 and baseline performance monitoring was completed in November 2011 using 16 site monitoring wells. The arsenic results of the water analysis were much higher than expected for the wells constructed in or near the treatment area. These include MW11-1, MW11-2 and MW11-3 completed in the peat, and nested wells MW11-1i and MW11-3i completed in the underlying silt. The results for the wells in question are presented below in Table 1.

Table 1
2011 Baseline Water Monitoring Results

			CONDUCTIVITY	ARSENIC	CALCIUM	IRON	SULFATE
WELL	COLOR	рН	μmhos/cm		mç	g/L	
Wells in Pe	at Material						
MM11-1	Light yellow	6.41	6,462	304	590	112	3,340
MW11-2	Light yellow	6.88	5,322	108	429	165	3,120
MW11-3	Light yellow	7.12	2,197	360	285	1.28	<2
Wells in Or	ganic Silt						
MW11-1i	Light gray	6.99	1,209	121	128	3.94	124
MW11-3i	Clear	7.12	1,299	153	154	3.70	15.9

Treated Material

Water collected from MW11-1 and MW11-2 is from area that was treated, as indicated both by their location and by the high sulfate and calcium concentrations in the water. Both sulfate and calcium are contributed to the water by the treatment process (sulfate from the ferrous sulfate and calcium from the limestone). The presence of the calcium and sulfate indicate that the marsh material has been treated and the high arsenic numbers are not the results of incomplete treatment. Based on all the previous treatability results and on the SPLP tests on treated material collected during the remediation, there is no reason to believe that the arsenic stabilization would not be successful. Two possible explanations for the high arsenic levels are evaluated below.

Colloid Evaluation

Based on all the previous treatability results and on the SPLP tests on treated cell material during the remediation, there is no reason to believe that the treatment would not be successful. However, iron concentrations are also much higher than would be expected in the water, and this provides a possible explanation for the high arsenic levels. Most likely, the high arsenic concentrations are due to colloidal ferric hydroxide or ferric arsenate solids which may be passing through the 0.45μ filter used to differentiate dissolved and particulate metals and is being measured as "dissolved" iron. Iron hydroxide solids often occur in the colloidal size range, and can pass through the filter.

As mentioned, the iron concentrations in the water are unexpectedly high. At the pH values of the samples, the dissolved iron concentrations under oxic conditions where ferric iron is the stable form should be very low – much less than 1 mg/L. The presence of such high iron concentrations – in the 100 mg/L range – suggests that the iron is not truly dissolved. While ferrous iron is more soluble than ferric iron, these concentrations are above what would be expected for ferrous iron in the presence of carbonate. A calculation of the theoretical ferrous iron concentration in water under these conditions illustrates the point. Since the treatment process involved the addition of calcium carbonate, the carbonate concentration in the water will be controlled by the dissolved calcium concentration, as shown from the following dissolution reaction for limestone.

$$CaCO_3 \leftrightarrow Ca^{2+} + CO_3^{2-}$$

 $K_{sp, CaCO_3} = [Ca^{2+}][CO_3^{2-}] = 5 \times 10^{-9}$

The ferrous iron concentration, in turn will be controlled by the precipitation of ferrous carbonate, as follows:

$$FeCO_3 \leftrightarrow Fe^{2+} + CO^{2-}$$
 $K_{spFeCO3} = [Fe^{2+}][CO_3^{2-}] = 2 \times 10^{-11}$

The concentrations for all three species (calcium, ferrous iron and carbonate) are described by their respective solubility constants (K_{sp}). Since there is solid calcium carbonate present in the treated material, the concentrations of both calcium and carbonate will be controlled by the dissolution of the limestone. The carbonate concentration is the same for both solubility equations, which means that we can calculate the theoretical ferrous iron concentrations from the K_{sp} s and the calcium concentration, as follows:

$$\begin{split} [Fe^{2+}][CO_3^{2-}] \ / \ [Ca^{2+}][CO_3^{2-}] &= K_{spFeCO_3} \ / \ K_{sp,\ CaCO_3} \end{split}$$

$$(\ [Fe^{2+}][CO_3^{2-}] \) \ / \ (\ [Ca^{2+}][CO_3^{2-}] \) &= 2 \times 10^{-11} \ / \ 5 \times 10^{-9} \\ [Fe^{2+}] \ / \ [Ca^{2+}] &= 4 \times 10^{-3} \\ [Fe^{2+}] &= 4 \times 10^{-3} \ (\ [Ca^{2+}]) \end{split}$$

In the presence of 500 mg/L calcium (or 0.0125 M Ca²⁺), the dissolved iron concentration in the water should be

$$0.0125 \times 4 \times 10^{-3} = 5 \times 10^{-5} M$$
, or 2.8 mg/L

Iron concentrations are orders of magnitude higher than the theoretical solubility value, indicating that it is unlikely that the iron concentrations are due to dissolved ferrous iron in the water.

Thus the most likely explanation for the high iron concentrations is that particulate ferric iron particles are passing through the filter, and these carry arsenic with them.

Long Term Stability Evaluation

Stabilization of arsenic using ferric iron can be reversed if the iron is reduced to the ferrous oxidation state. Thus, an alternative explanation for the elevated arsenic concentrations in the treated hot spot area could be that the iron has been reduced. However, this explanation does not appear likely for several reasons.

- 1. As discussed above, ferrous iron is not soluble in the water to the concentrations observed due to the presence of carbonate from the limestone.
- 2. To reduce that much iron (100 mg/L or more) would require a significant amount of reducing agent. While the organics in the marsh will favor reducing conditions over time, the organics are stable at this point (since they have been in the marsh for an extended time period and the readily reduced material has already reacted), and it is highly doubtful that they would react this quickly.
- 3. Ferrous iron oxidizes very quickly at the pH values observed in the sample once it is exposed to air. Acid is generated during this oxidation process. If the iron were in the

- ferrous oxidation state, one would expect that some of the iron would oxidize during sampling using a bailer and the pH would drop. In contrast, the pH values are where they are expected to be following treatment, and there is no suggestion that ferrous iron oxidation has occurred.
- 4. Iron reduction was not observed in the treatability testing completed for the site in 2010, including samples that were incubated under conditions that should have encouraged reduction if it were going to occur. These samples from the 2010 treatability study were stored in anaerobic conditions in the lab, and analyzed for SPLP arsenic in January 2012 to evaluate the potential for iron reduction. The results from the 2010 treatability study, including the analysis from January 2012, are summarized below in Table 2. The results from the bench scale test suggest that even after two years reaction time, iron reduction is not observed, and the SPLP arsenic concentrations are near or below detection and consistent with the level of stabilization seen in at the time of original treatment in 2010.

Table 2
Results of Long-term Stability Treatability Study Results

		SCREEN	ING SPLP
	SAMPLE	рН	As, mg/L
Ballast			
Untreated	d	8.91	13
Treated	Immediate	6.56	<0.013
	10 Day	7.46	<0.013
	1 month	7.63	<0.013
	3 month	7.74	<0.013
	7 month	7.8	0.020
	23 months	7.7	0.020
Peat Und	ler Ballast		
Untreated	t	8.36	11
Treated	Immediate	6.71	<0.013
	10 Day	7.31	<0.013
	1 month	7.44	<0.013
	3 month	7.54	<0.013
	7 month	7.4	0.025
	23 months	7.7	0.02

Table 2
Results of Long-term Stability Treatability Study Results

		SCREENII	NG SPLP
	SAMPLE	рН	As, mg/L
Peat in M	larsh		
Untreated	d	8.33	18
Treated	Immediate	5.70	<0.013
	10 Day	6.93	<0.013
	1 month	6.97	<0.013
	3 month	7.45	<0.013
	7 month	7.1	0.033
	23 months	7.5	0.02
Organic	Silt in Marsh		
Untreated	b	8.76	2.5
Treated	Immediate	7.21	<0.013
	10 Day	7.46	<0.013
	1 month	7.56	<0.013
	3 month	7.77	<0.013
	7 month	7.65	0.022
	23 months	7.7	<0.013

Notes

Treatability study methods are described in the Hot Spot Investigation and Remedial Options Analysis Report (RMT, 2010).

Conclusions

The most likely explanation describing the elevated arsenic concentrations in MW11-1 and MW11-2, is that arsenic is not truly dissolved (and mobile), but rather is associated with finely divided iron particles that have passed through the filter. If this is the explanation, then the high arsenic levels noted in the water samples are not mobile at the site. The colloids do not travel very far in most groundwater and certainly would not be transported far in the marsh given the slow groundwater flow. Further, the colloidal concentrations should decrease over time as the colloids settle out, and the concentrations should be much lower in future sampling events.

Table 1

December 2009/March 2010 Hotspot Geoprobe Investigation
Compositional Arsenic Results - Soil Sampling
Kewaunee Marsh, Kewaunee, Wisconsin

			Trans	ect B1					Transect	B2				Transect	B3				Transect M	12				Transect N	//3				Transect N	14				Transect N	15	
		_			oisture			_	Depth	Moistur				Depth	Moisture			_		Moisture			_		Moisture				Depth	Moisture			_	-	Moisture	
Transect A	ID	Date	(ft bg	s)	(%)	(mg/kg)	B2-A	10-Dec-09	9 0-2 2-4 4-6 6-8 8-10 10-12 12-14	4.3 3 6.3 12.9 12.6 17.6 24.2	3.8 2.2 30.9 27.9 1.6 2.4 7.1	3 2 9 5 J	ID Date	(ft bgs)	(%)	(mg/kg)		Date 17-Mar-10	0-2.5' 2.5-5.0' 5.0-7.5' 7.5-10.0'	43.9 63.1 79.5 66.5	(mg/kg) 13.6 107 67 63.9	ID	Date	(ft bgs)	(%)	(mg/kg)	ID	Date	(ft bgs)	(%)	(mg/kg)	M-5A	Date 17-Mar-10	0-2.0' 2-4.0' 4-6.0' 6-8.0' 8-10.0'	48.8 69.7 82.5 76.4 61.9	20.8 1090 3000 590 3.9 J
Transect B							B2-B	10-Dec-09	14-15	56.2 3.3 5.8 7.4 15.1 14 15.5 54.9 50.6	2.9. 9.5 527 383 309 343 240 140 8.7	J 5 7 6 0 9 3 0					M-2B	17-Mar-10	0-2.5' 2.5-5.0' 5.0-7.5' 7.5-10.0'	41.4 79.4 51.4 22.8	4500 13200 834 2100											M-5B	17-Mar-10	0-2.0' 2.0-4.0' 4.0-6.0' 6.0-8.0' 8.0-10.0'	82 50.5 82 84.1 67.5	1460 400 4350 4300 91.6
Transect C							B2-C	10-Dec-09	19-20 9 0-2 2-4 4-6 6-8 8-10 10-12 12-14	18 3.9 4.9 5.6 15 8.7 13.3 72.6	2.8 332 804 288 996 147 127 905	3 2 4 60 6 70 70					M-2C	17-Mar-10	0-2.5' 2.5-5.0' 5.0-7.5' 7.5-10.0'	47 38.4 74.4 82.3	1510 4510 11400 9950											M-5C	17-Mar-10	0-2.5' 2.5-5.0' 5.0-7.5' 7.5-10.0'	75.2 85.2 82.3 79.3	3070 5060 4080 1780
Transect D	B-1D	10-Dec-0	9 0-2 2-4 4-6 6-8 8-10 10-1 12-1 15-1 19-2) 2 4	14.7 12.8 20.2 25.5 75.9 80.8 53.4 54.3 16.2	7.1 105 719 1850 2160 1070 151 86.4 4.6	B2-D	10-Dec-09	14-20 9 0-2 2-4 4-6 6-8 8-10 10-12 12-14 14-15 15-17.5 17.5-20 20-25		708 4.3 3.3 4.1 103 142 798 533 282 133 81.8	B B B B B B B B B B B B B B B B B B B	- 3D 10-Dec-09	0 -2 2-4 4-6 6-8 8-10 10-12 12-14 14-16	46.5 8.5 13.5 11.8 17.5 18.4 77.3 59.4	408 11.8 14.9 538 2130 1210 2030 759	M-2D	10-Dec-09	0-2 2-4 4-6 6-8 8-10	19.5 71.1 78.6 81.1 67.4	454 5120 1930 2180 633	M-3D	10-Dec-09	0-2 2-4 4-6 6-8 8-10	56.5 82.3 78.8 75.7 67.1	2310 3800 2450 1610 654	M-4D	10-Dec-09	0-5 5-7 6-10	53.5 84.5 67.9	1850 4770 628	M-5D	10-Dec-09	0-5 5-7 6-10	77.7 87.9 68.8	4960 7300 500
Transect E	B-1E	10-Dec-0	9 0-2 2-4 4-6 6-8 8-10 10-1 12-1 14-1 16-1) 2 4 6	8.6 17.8 18 23.2 77.5 63.3 77.1 58 53.6 21.5	2.8 35.4 49.9 232 932 294 341 6.2 3.4J 2.7	B2-E	10-Dec-09		2.6 4.2 6.2 14.6 13.1 10.1	2.6 1.5, 112 100 107 87. 322 86.9	B B J 2 2 7 7 1 1 4 5 5	:- 3E 10-Dec-0§	0 -2 2-4 4-6 6-8 8-10 10-12 12-14 14-16 16-20 20-25	8.9 9.9 17.3 17.4 14 66.8 79 61.7 53 15.4	2.9 23.2 330 249 151 927 582 63.1 11.7 2.9	M-2E	17-Mar-10	0-2.5' 2.5-5.0' 5.0-7.5' 7.5-10.0'	48.3 59.6 55 77.4	734 1720 906 1400											M-5E	17-Mar-10	0-2.0' 2.0-4.0' 4.0-6.0' 6.0-8.0' 8.0-10.0' 10.0-12.0' 12-14' 14-15'	70.3 82.6 87.9 83.8 60.7 60.1 64.1 20.1	269 215 46.6 9.8 J 2.7 J 40.3 8.1 3.1
Transect F							B-2F	10-Dec-09	9 0-2 2-4 4-6 6-8 8-10 10-12 12-13.8 13.8-15 15-16 16-20 23-25 25-30	76 67 37.6 7.8	4.1 1.8 21.6 68.1 10.4 16 4.8 37.9 2.6 1.9	J 8 1 4 8 J 5 J J					M-2F	17-Mar-10	0-2.5' 2.5-5.0' 5.0-7.5' 7.5-10.0'	53.6 78.7 77.2 78.1	109 M0 664 407 54.7											M-5F	17-Mar-10	0-2.5' 2.5-5.0' 5.0-7.5' 7.5-10.0'	51.7 77.7 86 76.7	98.2 1300 1260 111

Table 1 (continued) December 2009/March 2010 Hotspot Geoprobe Investigation Compositional Arsenic Results - Soil Sampling Kewaunee Marsh, Kewaunee, Wisconsin

				Transe	ect M6						Transect	: М7					Tran	sect Ma	R				Trai	nsect M	e, Wiscons				Transect I	VI10				Transect	M11				Transect	M12	
	-			Dept	n Mo	oisture	As				Depth	Mois	sture	As			De	pth l	Moisture	As			De	epth I	Moisture	As			Depth	Moisture	As	1		Depth	Moisture	e As			Depth	Moistur	e As
	11	D	Date	(ft bg	s)	(%)	(mg/kg) ID	D	ate	(ft bgs)	(9	%)	(mg/kg)	ID	Date	(ft l	bgs)	(%)	(mg/kg)	ID	Date	(ft	bgs)	(%)	(mg/kg)	ID	Date	(ft bgs)	(%)	(mg/kg)	ID	Date	(ft bgs)	(%)	(mg/kg)	ID	Date	(ft bgs)	(%)	(mg/kg)
Transect A																																									
Transect B																																									
Transect C																																									
Transect D																																									
Transect E	M-	6E 17	7-Mar-10	0-4.0 4-6.0 6-8.0	r - 7	77.2 78.2 88.2	895 1910 2020		≣ 17-N	1ar-10	0-2.0' 2-4.0' 4-6.0' 6-8.0'	48 83	42 8.4 3.2 6.8	15.1 277 1260 478	M-8E	17-Mar-	4-	4.0' 6.0' 8.0'	61.8 60.5 87.8	311 24.4 12.9 J																					
Transect F																					M-9F	: 17-Mar-	4.0		70 67.8 86.3	348 452 82.1	M-10F 1	7-Mar-10	0 0-4.0' 4-6' 6-8.0'	59.3 69.3 86.3	357 589 52.7	M-11F	17-Mar-10	0 0-2.0' 2.0-4.0' 4.0-6.0' 6.0-8.0' 8.0-10.0' 10.0-12.0	86 87.7	106 549 160 27.5 62.9 3.3 JB		: 17-Mar-1	4.0-6.0	58.3 84.7 74.9	313

Notes

1. Sample data presented in the grid orientation shown on Figure 2.

J = Estimated concentrations above the detection limit and below the reporting limit

B = Analyte was detected in the associated method blank

M0 = Matrix spike recover and/or matrix spike duplicate recovery was outside laboratory control limits

BOLD = Arsenic concentration greater than 1,000 mg/kg, which corresponds to the material that has been classified as "hot spot" based on its potential to be hazardous (TCLP > 5 mg/L).

Prepared By: A. Goergen 12/29/09, A. Sellwood 4/5/10 Checked By: A. Sellwood 12/30/09, T. O'Connell 5/12/10

State of Wisconsin Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			Ro	watershed/W Remediation/		nent \square	Waste M	-	ement								
														Pag		01`	2
	ty/Project waune						License/f	^p ermit	/Monitor	ing N	umber	•	Boring	Numb	er B1	n	
				of crew chief (first, last) a	nd Firm		Date Dril	ling S	tarted		D	ate Drilli	ng Cor	npleted			ing Method
	sty Ha																
	-Site E			tal Services DNR Well ID No.	Common	Well Name	Final Star		7/2009 Jer Leve	1	Surfa	ce Elevat	12/7/2	2009	Bo		eoprobe Diameter
	inclue ii	C11 7 10	•		Common	TO TO THE TOTAL TO	1		MSL	•	C) th Tu	586.01		4SL			inches
	Grid Or	igin		stimated: () or Bor			La	···········	o	t	15	Local C	orid Lo				
State	Plane 1/4	of		,967 N, 2,616,443		C/N , R	Long		0	(J†		Feet				Feet W
Facili				County		[0	County Co		Civil To	wn/C	ity/ or	Village	7 001				
			·	Kewaunee			31	1	Kewa	unee							т
Sar	nple		***************************************										Soil	Prope	erties		
	1. &	nts	100	!	ock Descrip							VC					
ype ype	h At	Cou	E	!	ologic Orig :h Major Ur			s	ic	สมา	QI.	ress	urc	-77	city		nemts
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Eac	ii major oi	111		USC	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
CS	60	771	- -	SAND (SP), with	gravel, n	nedium gra	ined,	ر			<u> </u>	108	2.0		<u>a</u>		- M
DIVERSE TODS CONSENIO FOR	60 48		2 - 3 - 4 - 5 - 7 - 8 - 10	SANDY CLAY (0 brown 10YR 5/3, Large rock from 6 CLAY (CL), with 5YR 5/2, moist, so PEAT, with organ mass), dark brown	CL), with moist, so sand, red oft.	trace grav ft. eet bgs. ldish gray	el, brown	SP CL CL									
MI UNM			 12						37 31								
5 I herel	oy certif	y that t	·	rmation on this form is tr	ue and corre	ect to the best	of my kn	owled:									
I herel	ure						Γ, Inc.							······································		Tel: (608-831-4444
Š							leartland T	rail N	4adison,	WI 53	3717						508-831-3334

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in 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 this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

***************************************	ng Numi	ber	B1I	Use only as an attachment to Form 4400-1	22.	· T	·	T	· · · · · · · · · · · · · · · · · · ·	0 1	Pag		of	2
Saı	mple	[Prope	erties		
	Length Att. & Recovered (in)	nts	Joo.	Soil/Rock Description					ive	Moisture Content				v _i
oer ype	h At	Con	E	And Geologic Origin For	S	ic	l m		ress	ure		sity		1cmt
Number and Type	eco.	Blow Counts	Depth In Feet	Each Major Unit	USC	raph	Well Diagram	PID/FID	omp	loist	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
Z #	77 ~	<u>m</u>	Ω		-	Graphic 12 Log	× 0		0 %	≥ 0	2.7	교표	<u> </u>	W 0
			_	ORGANIC SILT (OL) with shells and		-	43							
			-13	ORGANIC SILT (OL), with shells and trace organics, dark greenish gray GLEY1 4/1, moist, soft.		2								
			-	4/1, moist, soft.		-6-								
			- 14			6								
:														
4 CS	60 42		15 				/ leie							
CS	42		-		OL									
			—16			7	-							
			 17			20	1							
<	is .		- 17			10	1							
			_ 18			7								
						-6-								
			- 19	CDAVEL WITH CAND CWO and trans	<u> </u>									
			E	GRAVEL WITH SAND (GW), and trace fines, small to large, subangular, coarse to medium grained sand, light red brown 2.5YR 7/3, wet.	GW	o \								
			20	medium grained sand, light red brown		2								
				E.O.B at 20 feet bgs.										
				E.O.D at 20 feet ogs.										
9														
4(22)														
GDT														
2003.														
S S S														
× ×												Ì		
4R. GR														
0 0 0														
38 07.														
36 196														
WDNR SBL 1998 07201DNR.GPJ WI DNR 2003.GDT 4/22/10														A
αw												-		2

SOIL BORING LOG INFORMATION

Rev. 7-98 Form 4400-122

			Ro	ule To: Watershed/W Remediation/	astewater 🔲 Redevelopment 🗍	Waste N	-	ement								
													Pag		of	2
	y/Proje					License/F	ermit/	/Monito	ring Ni	ımber		Boring	Numb	эт В 1	ra .	
	vaune z Drille			f crew chief (first, last) as	nd Firm	Date Dril	ling S	tarted		Da	te Drilli	ng Con	pleted	DI		ing Method
	sty Ha	-		,			-					<u> </u>	•			•
On-	-Site E	invirc		tal Services	T			/2009				12/7/2	:009			eoprobe
WI Ui	nique W	/ell No	•	DNR Well ID No.	Common Well Name	Final Stat		ter Levo MSL	:1		e Elevat 586.0]		121	Во		Diameter inches
Local	Grid O	rigin	[] (es	timated: []) or Bor	I ing Location ⊠	<u> </u>					Local C				2.1	menes
	Plane			,946 N, 2,616,456		Lat		<u> </u>								ΠE
	1/4	oľ	1.	/4 of Section ,	T N, R	Long		0			**15	Feet	\Box s			Feet [] W
Facilit	y ID			County Kewaunee		County Cod 31	ie.	Civil To Kewa		ty/ or '	Village					
Sar	nple	<u> </u>	1	Ixewatinee		J 3.	~~~~~	IXCVV	unce	T	1	Soil	Prope	erties		
	-			Soil/R	ock Description						 					
•>	in. S	unts	Fee		ologic Origin For					•	Sive					lts
ber Lype	th A	Ş	h iii		h Major Unit		CS	hic	тап	FID	pres	sture	<u> </u>	licity x	0)/ imen
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet		·		S O	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
CCS 2	60 21 60 24			SANDY CLAY (6 2.5YR 6/3, moist, PEAT, with organ	CL), light red browi	n	SP CL									
3 CS I herel Signat	-	y that (mation on this form is tr	ue and correct to the best		owled	2 24 2 24 2 24 2 24 2 24 2 24 2 24 2 24							Tol: /	508-831-4444
-					TC1AT :	r , me. leartland T	rail N	4adison.	WI 53	3717						508-831-3334

Boring Number B1E Use only as an attachment to Form 4400-122.	Page 2 of 2
Sample	Soil Properties
Number And Type Length Att. & Recovered (in) Blow Counts Blow Counts Blow Counts Compressive Strength Moisture Content Liquid Limit Plasticity Index P 200 RQD/ Comments	
ORGANIC SILT (OL), with shells and trace organics, dark greenish gray GLEY1 41, moist, soft. SANDY CLAY (CL), with gravel, fine to needium grained, reddish brown SYR 5/3, very wet, soft. GRAVEL WITH SAND (GW), and trace fines, small to large, subangular, coarse to medium grained sand, light red brown 2.5YR 7/3, wet. E.O.B at 20 feet bgs.	

SOIL BORING LOG INFORMATION

Rev. 7-98 Form 4400-122

			Ro	oute To:	Watershed/W Remediation	/astewater /Redevelopment	Waste Other	_	ement								
													•	Pa	_	of	2
	ly/Proje waune						License/	Permit/	/Monite	ring N	umbe	;) [*]	Boring	, Numb	er B2	Δ	
				f crew ch	ief (first, last) a	nd Firm	Date Dr	illing S	tarted		1	Date Dril	ing Cor	npleted			ling Method
	sty Ha -Site E		onmen	tal Serv	rices			12/8	3/2009	ı			12/8/	2009		G	eoprobe
	nique W				Vell ID No.	Common Well Name	Final Sta			el	Surf	ace Eleva			Во		Diameter
Local	Grid O	rigin	[] (c	stimated:) or Box	ring Location		Feet l			<u> </u>	587.0	Feet N Grid Lo			2.1	inches
	Plane	118111			2,616,416		L	at	0			- 5000	0110 50		J		Ов
-5 70	1/4	of		/4 of Sec		T N, R	Lon		°	· · · · · · · · · · · · · · · · · · ·				ı 🗀 s			Feet [] W
Facili	y ID				County Kewaunce		County Co	ode	Kew			r Village					
Sai	nple		T	<u></u>				1	T	T	T		Soil	Prop	erties		
	3 (E	v,	5	4	Soil/R	lock Description						o					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Fect			cologic Origin For ch Major Unit		USCS	Graphic Log	Well	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	60 39 60 45		- 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 10	yellov staine Ballas Black bgs. As ab brown	w brown 101 and material are st. stained material are st. stained material are st. ove, with class 5/3. O(SP), with	gravel, medium g YR 4/4, moist. Bla t 6.5 - 6.7 feet bgs erial from 6.5 - 6.3 ay, moist to wet, re- trace gravel, med ish brown 10YR 5	8 feet ed	SP		A control of the cont							
l herel	y certif	y that	the info	rmation o	n this form is tr	rue and correct to the b	est of my ki	nowled	ge.		,		, , , , , , , , , , , , , , , , , , , ,				
Signat	tire				······································	Firm RA	AT Inc	······································						_		Tol. /	608-831-4444

07201DNR,GPJ WI DNR 2003,GDT 4/22/10 744 Heartland Trail Madison, WI 53717 Fax: 608-831-3334

SOIL BORING LOG INFORMATION SUPPLEMENT Form 4400-122A

	ıg Num	ber	B2/	Use only as an attachment to Form 4400-	122.			· ·	,		Pa		of	2
Sar	nple I			0.00							Prop	erties	1	-
	tt. &	ınts	Feet	Soil/Rock Description And Geologic Origin For					ive					V)
ber Jype	th A	Ö	n In	Each Major Unit	S	hic	an an	91:	gth	ture snt	p	CILY		non
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Jack Major Office	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid	Plasticity Index	P 200	RQD/ Comments
					SP				1					
			- ,,	PEAT, with organics (wood and root mass), dark brown 10YR 3/2, moist, soft.		71.7	1							
			— 13 -	mass), dark brown 10YR 3/2, moist, soft.		77.7								
			14			1, 11,								
					ļ		ļ							
			15	ORGANIC SILT (OL), with shells and trace organics, dark greenish gray GLEY1 /4/1, moist, soft.	Ol.,	<i>-</i>								
				\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\										
				E.O.B. at 15 feet bgs.										
												:		
20														
4/22/														
SDT														
2003.														
I DNR														
Α A														
ONR.G														
372011														
988 (;												
SBI.														
WDNR SBL 1998 07201DNR.GPJ WI DNR 2003.GDT 4/22/10														6
,	•	'	,			: [- 1	ı	1	1		1	- 1	•

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			Re	watershed/W Remediation/			Waste I Other	***	ement								
														Pag		of	2
	ty/Projecty waune						License/I	² ermit/	'Monito	ring Nu	ımbe	r	Boring	Numb	er B2	R	
				f crew chief (first, last) a	nd Firm		Date Dri	lling S	tarted	······································	1.	Date Drilli	ng Con	pleted	اعرا		ling Method
	sty Ha		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	tal Services				12/9	/2009				12/8/2	מחמ			eoprobe
WLU	nique W	ell No		DNR Well ID No.	Common We	ell Name	Final Sta			:	Surfa	ice Elevat		2009	Во		Diameter
								Feet l	MSL			587.0 1				2.1	inches
	Grid Or Plane	rigin		stimated: 🔲) or Bor -,007 N, 2,616,427			La	1	o			Local C	irid Loc				[······] (D
State	1/4	of`		1/4 of Section ,	T N, F		Long	<u>}</u>	0	1			Feet	□ N □ S			Feet W
Facili	ty ID			County			County Co	de				r Village					
	mple		T	Kewaunee			31	<u> </u>	Kewa	unce	Ţ		Soil	Prope	etioe		<u> </u>
Jai				Soil/P	ock Descripti	on.		:					3011	Торс	11:05		
4)	Length Att. & Recovered (in)	Blow Counts	Depth In Fect	1	ologic Origin							Compressive Strength					2
aber Type	Length Att. Recovered (ပိ	l di	1	h Major Unit			CS	ohic	l lam	PID/FID	ngth	sture	.ee.	Plasticity Index	0) men
Number and Type	Leng	Blov	Dep					Sn	Graphic Log	Well Diagram	PIO	Compress Strength	Moisture Content	Liquid Limit	Plastic Index	P 200	RQD/ Comments
T CS	60 30		-	SAND (SP), with	gravel, me	dium gra	nined,									••••••	
C. U	.,,,		1	small to large, sub brown 10YR 5/4,	angular gra moist.	avei, yeii	lowish										
8	ř s		- '	,													
7			F ₂														
			-3														ĺ
3			4														
2	60		5														
2 CS	30																
			-6					SP									
			-														
			7														
			 										:				
			- 8														
													•				
			9	As above, with cla	ıy, moist to	wet.								·			
22/10																	
[₩] 3 5 CS	60 15		10]		
6.GD	1.2		- -														
R 200			1 l 														
WI DNR 2003.GDT 4/22/10 \(\infty\) \(\sum_{\infty}\)			 12					*****									
e I herel	by certif	y that	<u> </u>	rmation on this form is tr	ue and correct	to the bes	t of my kn	owled	1 ge.		1						
Go I herel	ture	-					T, Inc.		· · ·				····			Tel- /	508-831-4444
0720							leartland	rail N	4adison,	W1 53	717						508-831-3334

	ıg Numl	ber	B21	Use only as an attachment to Form 4400-	122.	··•	···	·····	·			age 2		2
Sai	mple									Γ	Pro	perties	7	
	n. & d (in)	ımts	Feet	Soil/Rock Description And Geologic Origin For					ive					v.
ber ype	th A	Con	n n	Each Major Unit	S	nic .	am	01:	oress	turc	70	city		, nem
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet		usc	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture	Liquid	Plasticity Index	P 200	RQD/ Comments
				PEAT, with organics (wood and root mass), dark brown 10YR 3/2, moist, soft.	1=-	77. 7	-	1 -						
			- - 13	mass), dark brown 10YR 3/2, moist, soft.		7 7 7	1							
			E 13			7 77								
			14			71 1	-							
			_			2 34								
4	60		_ 15	ORGANIC SILT (OL), with shells and		77.77	1							
4 CS	60			trace organics, dark greenish gray GLEY1		- G	4					-		
			16	4/1, moist, soft.		-G								
			- 17											
Š			- ' /		OL	-6								
			18			-0-	}							
							1							
			19	SANDY CLAY (CL) with gravel medium		77								
			 -	SANDY CLAY (CL), with gravel, medium grained, red brown gray 5YR 5/2, moist.	CL									
			20	E.O.B. at 20 feet bgs.	 	/. /.								
												-		
														:
27.10														
2/7														
3.GDJ														
IR 200														
á M														
CGP3														
NO10														
8 0724														
193														
WDNR SBL 1998 07201DNR.GPJ WI DNR 2003.GDT 4/22/10														
WE														8

07201DNR.GPJ WI DNR 2003,GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			<u>R</u>	oute To:		Wastewater [] n/Redevelopment []]	Waste I Other	-	ement								
						,									Pag	ge 1	of	2
	ly/Proje							License/I	Permit	Monito	ring N	ımber		Boring	Numb	er Cr		
	waune g Drilled			of crew ch	ief (first, last)	and Firm		Date Dri	lling S	tarted		Da	te Drilli	ng Cor	nnleted	B2		ing Method
Du	- sty Ha	rvey							-					-	·			
	-Site I: nique W			tal Serv	vices Veil ID No.	Common Well Na	11373	Final Sta		/2009		Surfac	e Elevai	12/8/2	2009	Bo		eoprobe Diameter
WIO	nique w	'CH INC	J.	DIXIC	WCH ID NO.	COMMON WENT IN	HIC		ric wa Feet l		1		587.0 l		ASL	150		inches
	Grid O	rigin				oring Location 🛛		La	+	0	1	н	Local (irid Lo		······································		
State	Plane 1/4	οſ		,989 IN, 1/4 of Sec	2,616,440	DE S/C/N T N, R		Long		0		11		Feet	N □ S □ .			Feet D W
Facili		<u> </u>		(County	1.,,1,	- 1	County Co	de	Civil T			Village					
	1.	ı			Kewaunee			31	1	Kewa	unce	1	F	Coll	Prope	ution		<u> </u>
Sai	nple				Çail/	Rock Description								3011	Prope	aties		
	Length Att. & Recovered (in)	unts	Depth In Feet			Geologic Origin For							sive					str
Number and Type	Length Att. Recovered (Blow Counts	49			ach Major Unit			C S	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	ig ig	Plasticity Index	200	RQD/ Comments
and	·	Blo	<u> </u>						s n	Grap Log	Well	PID	Con	Mo.	Liquid Limit	Plastic Index	P 2(<u> </u>
CS CS	60 30 60 48		2 - 3 - 4 - 5 - 5 - 5	small		n gravel, medium bangular gravel, , moist.			SP									
3 CS	60 60			stiff. SANI small yellov CLAY stiff. GRAY	O (SP), with to medium vish brown Y (CL), red VEL (GP), medium gr	brown 5YR 5/3, n gravel, medium, subangular grav 10YR 5/4, moist brown 5YR 5/3, with sand, medic rained, light brow	n grandel,	ined,	CL SP CL GP									
			-12	SANI	O (SP), with	ı gravel, medium			SP	0 0							***********	
		y that	the info	rmation o	n this form is	true and correct to the			iowled	ge.	**********	***************************************	······	······································	······································	······································		***************************************
Signa	AHC.					3		l', Inc. cartland "	Frail N	//Adison	WL53	8717						608-831-4444 608-831-3334

	ng Numl	oer	B20	Use only as an attachment to Form 4400-	22.	·		T		~ '''	Pag		of	2
Saı	nple									Soil	Prope	erties		
	t. &	nts	cet.	Soil/Rock Description					ivc					s
ype ype	h At	Cou	i.	And Geologic Origin For Each Major Unit	S	. <u>2</u>	un	Ω.	oress gth	urc	70	city	_	ncint
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Each Wajor One	usc	Graphic Cog	Well Diagram	PID/FID	Omp	Moisture Content	Liquid	Plasticity Index	P 200	RQD: Comments
∠ α	,i 12.		-	grained, small to medium subangular to	 _ _			Li-	100,	2. 0		1000		
				round gravel, brown 10YR 5/3, very wet.		77 7 7 77								
			13 	PEAT, with organics (wood and root mass), dark brown 10YR 3/2, moist, soft.		7 77 7								
			- 14			711/7	4							
			E			1 11								
.5	60		- 15	ORGANIC SILT (OL), with shells and trace organics, dark greenish gray GLEY1										
4 CS	60 30			4/1, moist, soft.		=======================================								
			16 			6						:		:
			E		OL									
			17			-C-								
			18			-5-								
			- 10			7 -6) -C-	.] 							
			19	CITTM CTAY (CTAY (CTAY) with and and		7C								
				SILTY CLAY (CL-ML), with sand, red brown 5YR 5/3, moist, stiff.	CL-MI									
			- 20	E.O.B. at 20 feet bgs.	ļ									
							-							
710														
4122														
GDT														
3 2003														
NO NO														
CPJ V														
DNR														
0720														
1998														
WDNR SBL 1998 07201DNR.GPJ WI DNR 2003.GDT 4/22/10														
MDI			1											10

07201DNR,GPJ WI DNR 2003,GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			<u>R</u> c	oute To:		/astewater /Redevelopment		Waste i	_	ement										
		. 3.1							×								Pag		of	2
	y/Projec waune							License/I	Permit	Monito	ring N	kum	ber		Boring	3 Nui	noc	er B2]	D	
				f crew c	chief (first, last) a	nd Firm		Date Dri	lling S	tarted			Date	e Drilli	ng Co	mplei	led			ing Method
	sty Ha																			
	-Site E nique W		onmen		rvices Well ID No.	Common Well Nam		Final Sta		/2009		Te	·Ēsas	Elevat	12/7/	200	9	lb.		eoprobe Diameter
WIO	nque w	CHINC).	DINK	Well ID No.	Common wen Nan	ne		nc wa Feet l		21	Su		87.0 l		MSI	,	150		inches
Local	Grid Or	igin			l: []) or Boi					0				Local C						
State	Plane			-	N, 2,616,452			La									N			ΩЕ
Facilit	1/4	of		/4 of Sc	County	T N, R		Long	do.	Civil T		Situr		illaga	Fee	1 []	S]	Feet [] W
racini	y ID				Kewaunee			Ounty Co H	de	Kewa			Oi v	таве						
Sar	nple				1				·····	1					Soil	Pro	pe	rties	-	
	7		- 5		Soil/R	tock Description									1					
ပ	4:1. e	Blow Counts	Depth In Fect		And Go	eologic Origin For						_	_	SSİVC	6			>:		str
Number and Type	gth, over	» C	1 4		Eac	ch Major Unit			CS	Graphic Log	Well	2	PID/FID	npre ngth	Moisture	pin	ا پيا	Plasticity Index	9	RQD/ Comments
and	Length Att. & Recovered (in)	οlε	Det						Sn		Well	<u> </u>		Compressive Strength	§ 5	Liquid	٤	Plastic Index	P 200	RQD/ Comm
T CS	60 36		_	SAN	VD (SP), with	gravel, medium	grai	ined,		. 0 0										
	5					/R 4/4, moist. Bl t 6.5 - 6.7 feet bg				0.00										
:			ļ. '	Ball			,			0.0										
			-2							0 0 4										
			- ~							, 0.9										
			<u>-</u> 3							0 0 0								ĺ		
	-		-							0 0								İ	ĺ	
			E_4						SP	000			ĺ							
			-							0 0			1				ŀ	:		
			F ₋₅							0.00										
CS	60 42		F.							9.6									ļ	
			E							0.00										
			-							0.0										
á).			- -7							0.00										
is a			- '							0 0										
			-8		\mathbf{Y} (CL), brow	vnish red 5YR 4/	/4, n	noist,	CL											
			È "	.flos r	JD 7SPT with	gravel, medium	orai	ned /		0 0						-				
			<u> </u>	brow	vn 10YR 5/3,	moist.	<u> </u>	neu,		0.00										
			-							00			ŀ							
-			F-10						SP	0 0 0										
3 CS	60 48		-						Ol	0.0							Ī			
]							000										
8			F '							0 9										
			12							0.00										
I hereb	y certif	y that		rmation	on this form is to	rue and correct to the	best	of my kn	owled:	л 20.	L		1		L	٠				
Signat								, lnc.						· · · · ·				~~~~~~~~	Tale	608-831-4444
								, 1110. cartland 1	rail N	ladison	. WI 5	371	7							608-831-3334

~	ig Numl	ber	B2I	Use only as an attachment to Form 4400-1	22.	·	·	·			Pag		oľ	2
Saı	nple										Prope	erties		
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	uscs	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid	Plasticity Index	P 200	RQD/ Comments
WDNR SBL 1896 07201DNR.GPJ WI DNR 2003.GDT 4/22/10	60 54	BIA	- 13 - 14 - 15 - 16 - 17 - 18	PEAT, with organics (wood and root mass), dark brown 10YR 3/2, moist, soft. SAND (SW), medium grained, light yellow brown 10YR 6/4, moist. PEAT, with organics (wood and root mass), dark brown 10YR 3/2, moist, soft. ORGANIC SILT (OL), with shells and trace organics, dark greenish gray GLEY1 4/1, moist, soft. GRAVEL WITH CLAY AND SAND (GW-GC), small to large gravel, medium to coarse grained, red-brown gray 5YR 5/3, wet. GRAVEL WITH SAND (GW), and clay, small to large gravel, sub-angular, medium to coarse grained, light red brown 2.5YR 7/3, wet. E.O.B. at 25 feet bgs.	SP				Co	MC Co		Pla Inc	P 2	RC Co
WDNR SE														12

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

	Ro	watershed/Wastewate Remediation/Redevelo		Waste i	-	ement								
											Pag		of	2
Facility/Project No.				License/l	⁾ ermit/	Monitor	ing Nu	mber		Boring	Numb	er B2	E	
		f crew chief (first, last) and Firm		Date Dri	lling St	arted		Dat	e Drilli	ng Con	pleted	1.72		ling Method
Dusty Harve On-Site Envi	y ironmen	tal Services			12/7	/2009				12/7/2	2009		G	eoprobe
WI Unique Well?			n Well Name	Final Sta	tic Wa Feet I				Elevat 587.0 1		ACI	Во	rehole	Diameter inches
Local Grid Origin		stimated: (1) or Boring Loca		- h	••••••	¢ VIOL			Local C		ation		<u> </u>	menes
State Plane 1/4 of		,954 N, 2,616,467 E S /4 of Section , T	S/C/N N, R	Long		0	(Feet	□ N		ı	☐ E Feet ☐ W
Facility ID	·····	County Kewaunee	(County Co		Civil To Kewa		y/ or \	/illage					
Sample		Rewaunce		31	l	Newa	unce		Ţ	Soil	Prope	erties		
.t. &: J (in)	-cet	Soil/Rock Desc	•						ıve		•		/	100
Number and Type Length Att. & Recovered (in) Blow Counts	Depth In Feet	And Geologie O Each Major	_		uscs	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
2 60 CS 36	-1 -2 -3 -4 -5 -6	SAND (SP), with gravel, small to large gravel, yell 6/6, moist. Ballast.	ow brown 1	0YR [*]	SP Ca.J	<i>777</i>								
3 CS 60 60		moderately stiff. Ballast SAND (SP), with gravel, grained, small to large grabrown 10YR 6/6, moist, I As above, medium graine 10YR 5/2, very wet.	avel, yellow Ballast.		SP									
I hereby certify the	at the info	mation on this form is true and co	165		owledg	ge.								***************************************
Signature				Γ, Inc. leartland T	rail M	ladison,	WI 53	717						508-831-4444 508-831-3334
result in forfeiture	of betwee	Thapters 281, 283, 289, 291, 292, 201 S10 and S25,000, or imprisonment intended to be be used for any of the state of the	ent for up to on-	e vear, den	ending	on the	prograi	n and	conduct	involv	ed. Per	rsonally	identil	fiable

Boring Number	B2E	Use only as an attachment to Form 4400-1	22.	·			,		Pa		of	2
Sample								Soil	Prop	erties	I	
Number and Type Length Att. & Recovered (in) Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	uscs	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid	Plasticity Index	P 200	RQD/ Comments
WDNR SBL 1998 07201DNR.GPJ WI DNR 2003.GDT 4/22/10 \$\text{C}\$ + \$\text{S}\$ \$\text{Number and Ty}\$ and Ty \$\text{C}\$ = \$\text{C}\$ \$\text{Rccove}\$ Rccove \$\text{Blow C}\$ \$\text{Blow C}\$	13 - 13 - 15 - 16 - 17 - 18 - 19 - 20 - 21 - 22 - 23 - 24 - 25	PEAT, with organics (wood and root mass), dark brown 10YR 3/2, moist, soft. ORGANIC SILT (OL), with shells and trace organics, dark greenish gray GLEY1 4/1, moist, soft. SANDY CLAY (CL), dark red gray 2.5YR 4/2, moist, soft. SAND (SP), with trace small gravel and fines, very fine grained, red brown 5YR 5/3, very wet. SANDY CLAY (CL), fine to medium grained, reddish brown 5YR 5/3, very wet, 1 soft. GRAVEL WITH SAND (GW), and trace fines, small to large, subangular, coarse to medium grained sand, light red brown 2.5YR 7/3, wet. E.O.B at 25 feet bgs.	SC	CAN	Well	FIGURE 14/CITE	Compr	Moistu Conten	Liquid	Phastici	P 200	RQD/ Comm
1998 07												
WDNR &												14

07201DNR.GPJ WI DNR 2003.GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			Ro	ute To:	Watershed/V Remediation			Waste Other	_	ement								
															Pag	ge 1	of	2
	ty/Projec			· · · · · ·	•			License/	Permit	/Monito	ring N	umbei		Boring	, Numb	er B2		
	waune g Drilled			ferew ch	icf (first, last) a	ınd Firm		Date Dri	lling S	tarted	-	D	ate Drill	ing Cor	npleted			ling Method
Du	sty Ha	rvey		tal Cam	ui a a a				10/7	7/2009				12/7/2	2000			eoprobe
	nique W			tal Serv	Vell ID No.	Common	Well Name	Final Sta				Surfa	ce Eleva		2009	Во		Diameter -
1 1	C.31 O.		(m) /	1	(m)) D-	1	57		Feet :	MSL			587.0				2.1	inches
	Grid Or Plane	igin) or Bo 2,616,488		on ⊠ C/N	La	11	0	1	11	Locard	Grid Lo		!		Е
rs '1'	1/4	of	1	/4 of Sec		T N	√, R	Lon	<u>g</u>	0			17:11	Feet	S			Feet 🗍 W
Facili	ıy ID			1	County Kewaunce			County Co	ode	Kewa			Village					
Sar	nple										T	T		Soil	Propo	erties		
	(in)	ts	cet			Rock Descri	•						ပွ					
er.	λ Att. cred	Coun	i F			eologic Orig			S	.2	E	9	ressiv	ıre		aity	 	cnts
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet		Ea	ch Major Ui	nil		usc	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture	Liquid	Plasticity Index	P 200	RQD/ Comments
CS	60	<u> </u>		SANI	D (SP), with	gravel, n	nedium gr	ained,	1-	000		124	10 %			<u> </u>	Lú-,	
2 CS	60 27		-3 4 5 6 7 8 7	As ab	n-yellow 10 nove, fine to im gravel, w R 4/1, wet. E	medium į	grained, sı	nall to	SP									
3 CS	60 60		10 11 11 12	As ab	ove, very w	et.												
		y that	the info	rnation o	n this form is t		r		owled	ge.								***************************************
Signat	ure							T, Inc. Heartland	Frail N	⁄adison,	, WI 53	3717						508-831-4444 508-831-3334

	g Numi nple	ber	B2I	Use only as an attachment to Form 4400-	122.		1	T			So	il I	Ра Ргор	ge 2 ertie:		of	2
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well	PID/FID	Compressive	Strength	Moisture	Content	Liquid Limit	Plasticity	Index	P 200	RQD/ Comments
4 CS	60 60		- 13 - 14 - 15 - 16 - 17	PEAT, with visible organics, very dark brown 10YR 2/2, moist, soft. ORGANIC SILT (OL), with shells and trace organics, dark greenish gray GLEY1 4/1, moist, soft.	SP OL.												
5 CS	60 60		19 20 21 22	CLAY (CL), with sand, very fine grained, dark grayish red 2.5YR 4/2, moist, moderately stiff.	CL												
6 CS	60 60		- 24 - 25 - 26 - 27 - 27 - 28 - 29 - 30	GRAVEL WITH SAND (GW), and trace fines, small to large, subangular, coarse to medium grained sand, light red brown 2.5YR 7/3, wet.	GW										AND THE PROPERTY OF THE PROPER		
																	16

07201DNR.GPJ WLDNR 2003.GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			<u>Rc</u>	ute To:	Watershed/W Remediation			Wast Other	-	gement								
															Pag		of	2
	y/Projec							Licens	e/Permi	l/Monito	ring N	umbei	*	Boring	Numb		~	
	vaune															B3]		
			Name o	I crew c	hief (first, last) a	nd Firm		Date D	rilling S	started		D	ate Drill	ing Coi	npleted		Drill	ing Method
	sty Har Site E		\11137@11	tal Ser	nione				12/	7/2009				12/7/	2000		G	eoprobe
	ique W				Well ID No.	Common	Well Name	Final S		ater Leve		Surfa	ce Eleva		2007	Во		Diameter
										MSL			586.0		ASL			inches
Local	Grid Or	igin	{e:	stimated	: 🔲) or Bo	ring Locati	on 🛛			0				Grid Lo			***************************************	
State	Plane		243	,979 N	I, 2,616,460	E s	/C/N	I	.at						\square N			ΠE
	1/4	of	l	/4 of Sc		Υ	N, R		ng	· · · · · · · · · · · · · · · · · · ·				Fee				Feet 🗍 W
Facilit	y ID				County			County C	Code	1		-	Village					
			·		Kewaunee			31	1	Kewa	aunee	;					•••••	
Sar	nple													Soil	Prope	erties	************	
	જ (દ	S	77		Soil/F	Rock Desci	iption						و		1		ļ	
. ပွ	Length Att. & Recovered (in)	Blow Counts	Depth In Feet		And G	eologic Ori	gin For				۳.		SSIV	٥		20		nts
구	gth	Š	=		Eac	ch Major U	Jnit		CS	phic		PID/FID	ngtl	Stur	bid i	irci X	- <u>0</u>) mine
Number and Type	Length Att. & Recovered (in	Blo	Оср						U.S	Graphic	Well	8	Compressive Strength	Moisture Content	Liquid	Plasticity Index	P 200	RQD/ Comments
	60		ļ.,	TOP	SOIL.					7								
CS	48		-	SAN	ID (SP), with	gravel.	medium g	rained.	- 	9		Š						
			-1		vn-yellów 10'					0.0								
			-							0 0								
			-2							, 0 0							!	
										8.00								
:			-3							0.0								
			- "						SP	0 00								
			-							0 0								
			E-4							0 0								
			-							0.0								
2	60		<u>-</u> 5							0 0								
CS	57		-							0.0								
			F-6	CAN	IDY CLAY (CT V	diam ami			- 3 -								
			E	oan Tredd	ish brown 5Y	CL), 1110 'R 5/3 n	utum gran mist	ica,	LCL	1//								
4			-7		VEL (GP), v				GP GP									
31 g			-	Imedi	ium, coarse g	rained, b	rown-yell	ow	/ / CL									
			-	\10Y	R 6/6, moist.		_											
			8		ĬĎŸĊĹĂŸ(CL), bro	wn 10YR	5/3,	/	00								
				1	st, soft.		,			D 0					Value			
			9 	SAN	ID (SP), with	gravel,	medium gi	ramed,		0.0								
				mois	e angular grav	ei, brow	TOYKS	73,		0 6								
3	60		-10	111013	· · ·				SP	0 00								
3 CS	57		-							0.9								
ě			-11							0.00								
•										, 0 0								
			12							0.00								
1 3					and the Control					1	L			1	I	Lİ		
I heret Signat		y mat	me mio	mation	on this form is to	ue and cor	1		cnowled	ige.				•••••	*************			
aignat	urc							AT, Inc. Heartland	l Trail	Madison	, WI 5.	3717						508-831-4444 508-831-3334

SOIL BORING LOG INFORMATION SUPPLEMENT Form 4400-122A

	ng Numi	ber	B3I	Use only as an attachment to Form 4400-	122.	4	,		1			ge 2	of	2
<u>Saı</u>	nple									Soil	Prope	erties		
	% (ii)	ıts	ટ	Soil/Rock Description					vc					
er (be	1 Au	Com	- E	And Geologic Origin For	S	j.	E .	Ω	ressi	21.0	_	žį.		icmts
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Each Major Unit	uscs	raph	Well Diagram	PID/FID	Compressive Strength	Moisture	Liquid	Plasticity Index	P 200	RQD/ Comments
<i>Z</i> . 8	7 %	<u> </u>	ļ <u>ā</u>			(दुंश Graphic	<u>≯</u>	<u>a.</u>	03	ΣŬ	122	<u> </u>	α_	<u> </u>
				TOTA CT	SP	0.000								
			- 13	PEAT, with visible organics, very dark brown 10YR 2/2, moist, soft.		4 14								
			E	0,0,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		77. 7	/冒							
			14			11/2								
			-	ORGANIC SILT (OL), with shells and trace organics, dark greenish gray GLEY1 4/1, moist, soft.		=								:
A	12		- 15	4/1, moist, soft.	OL									
4 CS	12 12		Ē			1								
	1		16	E.O.B. at 16 feet bgs.		2-0								
				E.O.B. at 10 leet ogs.										
22/10														
4//														
3.603														
3 200														
NO.														
ā.														
NR.G														
72015]									
98 07														
편 호														
WDNR SBL 1996 07201DNR.GPJ WI DNR 2003.GDT 4/22/10														10
QM														18

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			<u>Rc</u>	watershed/Wastewater Remediation/Redevelop	ment []	Waste f	-	ement								
Pacili	ty/Proje	et Man	170			License/I) _{ormair}	Manita	ring No	مدادي	ur.	Boring	Pag		of	2
	waune					LICCISCI	CHIRV	TVIOLITO	iing ivu	ши	·I	BOLLING	Mario	B3	E	
				f crew chief (first, last) and Firm		Date Dri	ling S	tarted		Ε	Date Drill	ng Cor	npleted			ling Method
On		Envir	onmen	tal Services				//2009				12/7/2	2009		1	eoprobe
WLU	nique W	/ell No),	DNR Well ID No. Common	Well Name	Final Sta			el .	Surfa	ace Eleva		401	Во		Diameter
Local	Grid Oi	rioin 	[] [es	stimated:) or Boring Location	on 🛛	<u> </u>	reet I	MSL			586.0	Feet N Grid Lo			2.1	inches
	Plane				C/N	La		···			- 20201	311(1 12()				Оε
	1/4	of	- 1	/4 of Section , T 1	√, R	Long		·		1	-	Feet	\Box s		-	Feet W
Facili	ty ID			County		County Co	de			ly/ o	r Village					
).	!	1	Kewaunee		31		Kewa	unee			0. 1	1)		·····	T
Sai	nple											5011	Prope	erues		
	ال. گاران آنا	nts	133	Soil/Rock Descri	-						ive					
ype	h At	Con	In	And Geologic Ori Each Major U	-		Ś	ic	am	Ω	ress	urc		city)cmt
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Each Major O	HIL		SC	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	200	RQD/ Comments
Z. 8	60	<u>m</u>		SAND (SP), with small gr	avel fine)	0 7	×Ω	۵,	S C	20	111	P 7	요	<u> </u>
T CS	48		-	grained, yellow brown 10		ist.										
(4)	£		-1													
			-													
:			2													
							SP									
			-3												į	
			-													
			4												i	
			-												ı	
2	60		-5	CLAY (CL), brown 7.5YF	2.4/6 moist	eoft	 CL	7//							ı	
CS	48		-	SAND (SP), with small gr			_ \.L								, }	
			<u>-</u> 6	grained, yellow brown 10)	ZR 6/6, moi	ist.										
			-				SP									
			F-7													
			-	CLAY (CL), brown 7.5YR	2 4/6 moist	eoft	CL	///								
			-8	SAND (SP), with trace gra		1										
			-	medium grained, yellow b	rown 10YF	₹ 6/2,										
			9	very wet.			SP									
						T CONTRACTOR AND A CONT										
3	60		_10	PEAT, with visible organic	ce very dar			77 77								
3 CS	39		-	brown 10YR 2/2, moist, so		IX.		2 22								
			-11					21 21								
			-					4 11								
	1		-12					77 77								
l herel		y that	the info	rmation on this form is true and con	rect to the best	of my kn	owledg	ge.								
Signat	ure					r, Inc.									Tel: (
3 CS I herel						leartland T	rail N	1adison.	WI 53	717						508-831-3334

Boring Number	B3E	Use only as an attachment to Form 4400-1	22.	,					Pag		of	2
Sample								Soil	Prope	erties		
Number and Type Length Att. & Recovered (in) Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	uscs	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid	Plasticity Index	P 200	RQD/ Comments
WDNR SBL 1996 07201 DNR 2003.GDT 4/22/10 4 CS 45 9 CS 48 8 R 99 8 R 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	13 -14 -15 -16 -17 -18 -19 -20 -21 -22 -22 -23 -24 -25 -	ORGANIC SILT (OL), with shells and trace organics, dark greenish gray GLEY1 4/1, moist, soft. SILTY CLAY (CL-ML), dark grayish red \(\frac{2.5YR}{2.5YR} \) 4/2, moist, soft. GRAVEL WITH SAND (GW), and clay, small to large, subangular, coarse to medium grained sand, light red brown 2.5YR 7/3, wet. As above, trace fines.	OL CL-MI		M D	Id .	3				Ь	
WDNR SBL 1998							77///277					20

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			<u>R</u> c	oute To: Watershed/Wastewater Remediation/Redevelop		Waste l	-	ement								
													Pa	ge 1	of	1
	ty/Proje					License/I	^o ermi <i>u</i>	/Monito	ring Nu	mber		Boring	Numb			
	waune			of crew chief (first, last) and Firm		1515	ii			LIS	. 15 11				10F	
	-	-	name o	or crew cater (tirst, tast) and rith		Date Dri	lling S	tarted		1)8	ite Drilli	ng Con	npieted		ווזכו	ling Method
On-	ni Kap -Site E nique W	Enviro		tal Services DNR Well ID No.	Well Name	Final Sta		1/2010		Surfac	e Elevat	3/17/2	2010	D.		eoprobe Diameter
****	inque i	CII I VO	,.	DIVIC NON ID NO.	i wearvanse	1	Feet l		'		582.0 J		ASI.	150		inches
	Grid O	rigin		stimated:) or Boring Locati		La		0		*1	Local C					
State	Plane 1/4	of			/C/N N, R	Long		0	,	"		Eoot				☐ E Feet ☐ W
Facili				County		County Co		Civil To	own/Cit	y/ or	l Village	1 (()	ں ب			t cct (_3 W
				Kewaunee		31		Kewa	unee							
Sar	nple											Soil	Prope	erties	,	
	(ii) %	ts	न्	Soil/Rock Descr	ription						o					
ے 2	Att	uno.	F	And Geologic Ori	gin For		S		ء	\cap	SSSiv	و		<u>ئ</u>		shire
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Each Major U	Init		SCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	200	RQD/ Comments
Z ä	2 S	ă	lå				É	Grap	Well Diagr	E .	Str	⊻్ర	35	Pla Fig	P 2	2 2
l CS	48 24		-	PEAT, dark brown to blace moist, soft.	ck (10YR)	3/2),		7 77 77 77	ĺ							
			-1	11101011, 00111				37 3						ĺ		
			-					2 24				•				
			-2					쇼 전								
								7 77								
			-3					44 4								
			-					77 77 77 77								
2			- 4					4 34								
2 CS	48 24							77 7								
			- -5					2 12								
			-					77 77								
			- 6					4 24								
			-					77 77 77 77								
1			-7					77 77								
			-					2 12								
1			8	THE THE PARTY OF T				21/ 21								
				E.O.B. at 8 feet bgs.												
									THE PERSON NAMED IN COLUMN							
	v certif	y (hat t	the info	rmation on this form is true and cor	rect to the bee	a of my kny	whote				11	1				
Signat		,		The state of the state and cor	Lest	T, Inc.		······································		·					10.1.2	
I hereb					1/1/1/	1, mc. Jeartland T	rail M	ladison,	WI 537	17						508-831-4444 508-831-3334

07201DNR.GPJ WI DNR 2003.GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			<u>Rc</u>		Watershed/W Remediation/	'astewater Redevelopment		Waste M	-	ement								
Facili	ty/Proje	ct Man	00				11	.icense/F	Pormit/	Monito	ripo Ni	malage	1	Boring	Paş Numb		of	2
	waune						1	J(CC115C/ E	CITIEU	WICHILLO	ing ix	maci		DOME	rvarno	M1	1F	
				Ccrew chief	(first, last) a	nd Firm	E	Date Dril	ling St	arted		Da	te Drilli	ng Cor	npleted			ing Method
On		Enviro		tal Servic						/2010				3/17/2	2010			eoprobe
WLU	nique W	'ell No).	DNR We	II ID No.	Common Well Nar	me F	inal Stat			:1		e Elevat		40X	Во		Diameter
Local	Grid Oı	igin	[] (es	stimated:	1) or Bor	ing Location 🖂			Feet I	·			583,0 1 Local C				۷.1	inches
	Plane				2,616,948			Lat	-	·		II			□N			□ 6
	1/4	of		/4 of Section		T N, R		Long		· · · · · · · · · · · · · · · · · · ·	1			Peet	□ S		1	Feet 🗍 W
Facili				- 1	unty ewaunee		31	unty Coo	de	Civil To Kewa		ty/ or	Village					
Sar	nple													Soil	Prope	erties		
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet		And Ge	ock Description cologic Origin For th Major Unit			SCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	200	RQD/ Comments
CS es	48	<u> </u>	-	PEAT,	dark brow	n to black (10Y	R 3/2	2),	2	11/11		<u>a</u> .	S	20	1 1	<u>a</u> =	С.	<u> </u>
2 CS	48 30		- 2 - 3 - 4 - 5 - 6	Styrofoa	/e, no long am cap ma	er frozen - wet. terial present												
3 CS	48 48			ORGA!	NIC SILT	' (OL), with she yl 4/1), moist, s	ells, d	ark	OL							7000-1000-1000-1000-1000-1000-1000-1000		
		y that	the info	rmation on t	his form is tr	ue and correct to the	e best o	f my kno	owledg	ge.						1.		
Signat	ure						RMT,	Inc. utland T	rail M	ladison.	WI 53	717						08-831-4444 08-831-3334

Boring Number	r M1	1F Use only as an attachment to Form 440	0-122.						Paş		oſ	2
Sample								Soil	Prope	erties		
(in)	nts	Soil/Rock Description					.ve					vo.
er ype h Att	Cour In F	And Geologic Origin For	S	ic	am	Q	ressi	ure		city		nents
Number and Type Length Att. & Recovered (in)	Blow Counts Depth In Feet	Each Major Unit	uscs	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
S b Number and Type		No recovery from 12 - 16 feet bgs. Drillers reported very soft material.	+-	7-		Ω,	0 %	~ 0		<u> </u>		
CS 0		reported very soft material.		G								
	- 13			2-7]							
	_ 14		OL									
	15			-6]							
	-			2								
	16	E.O.B. at 16 feet bgs		- inhardana	1							
											;	
	:											
5/10												
4/22												
3.601												
JR 200												
WI DW							:					
3.GPJ												
101DN												
98 072					- I							
BL 195												
WDNR SBL 1998 07201DNR.GPJ WI DNR 2003.GDT 4/22/10												22
8	1		1	1				l				23

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

	<u>R</u> c	oute To: Watershed/W Remediation/	astewater Redevelopment	Waste it	-	ement								
											Pag		οľ	1
Facility/Project N				License/f	ermit/	Monito	ring Nu	mbe	r	Boring	Numb		25	
Kewaunee M		f crew chief (first, last) a	ALTS:	Date Dril	Lar C			- Ir	Notes Physiali		l.at a. 1	M1		in Mathal
Toni Kapugi		i crew chief (first, fast) at	io rim	Date Dri	iing Si	апеа		1.	ate Drilli	ng Cor	apicted		ווזכו	ing Method
On-Site Envi	ironmen					/2010				3/17/2	2010			eoprobe
WI Unique Well 1	No.	DNR Well ID No.	Common Well Name	Final Sta			1 5	Surfe	ice Elevat			Во		Diameter
Local Grid Origin	[] (e:	 stimated: □) or Bor	ing Location M		Feet 1	VISL_			582.0 I				2.1	inches
State Plane		,953 N, 2,617,062		Lat		o			- Local C	ind sox	.anon			ОЕ
1/4 of		/4 of Section ,	T N, R	Long		0	1			Feet				Feet W
Facility ID		County		County Co		Civil To	own/Cit	y/ oı	Village					
		Kewaunee		31		Kewa	unce		·····	~~~				
Sample										Soil	Prope	rties	,	
સ (ii) જ	्र इ	Soil/R	ock Description						ပ					
A Att.	n Fe	And Ge	ologic Origin For				-	_	SSiv	ပ		۶.		nts
Number and Type Length Att. & Recovered (in)	Depth in Feet	Eac	h Major Unit		SCS	phic	gran	PID/FID	Compressive Strength	stur	uid it	i ici	9)/ ame
Number and Type Length At Recovered	Ded				S O	Graphic Log	Well Diagram	ΔI	Compress Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 48 CS 9.6		PEAT, dark brow	n to black (10YR 3	3/2),		71 71							***************************************	
C3 9.0	-	moist, soft.				5 7.0								
	-					27 77								
Y.						77 77 7 77								
	- 2					7 77								
	-					77 77								
	-3					1/ 1/								
	-					11/11								
2 48	4	A multiple of				12 34						ĺ		
2 48 CS 30		As above, wet.				24 24								
	- 5					2 22								
	-					쓰 쓰								
	-6					7 77								
	- '					77 77								
	~ " ~												:	
	'7 	ORGANIC SILT	(OL), with shells,	dark	OL.									
A .	8	greenish gray (gley	,		Oin							l		
	0	E.O.B. at 8 feet bg	S.											
												[
01 (222)														
9														
100000 V200														
I hereby certify the	nt the infor	rmation on this form is tru	e and correct to the bes	t of my kno	owledg	e.								
Signature			Firm RM	T, Inc.				·····	•••••••••••••••••••••••••••••••••••••••			······································	Tel· 6	08-831-4444
I hereby certify the				leartland T	rail M	ladison,	WI 537	717						08-831-3334

07201DNR.GPJ WI DNR 2003.GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			R		astewater [] Redevelopment []	Waste M		ement								
												,	Pag		of	1
	ty/Projec					License/F	Permit/	Monito	ring N	ambei	•	Boring	Numb) A	
	waune			of crew chief (first, last) a	nd Firm	Date Dril	line St	arted		П	ate Drill	ing Cor	moleted	M2		ling Method
	ıi Kap	-	rvairie (or even emer (mat, mat) a		Date Dit		an too			acc Bim		приссос			5
			onmer	ntal Services			3/17	/2010				3/17/	2010			eoprobe
WLU	nique W	'ell No	١.	DNR Well ID No.	Common Well Name	Final Stat			el	Surfa	ce Eleva		•••••	Во		Diameter
]	Feet I	MSL_			584.0				2.1	inches
	Grid Or Plane	rigin		stimated: (1) or Bor 4,040 N, 2,616,437		Lat		o	1	11	Local	and Lo				fring his
Siate	1/4	οť		1/4 of Section ,	T N.R	Long		0	1	(1		Foo:	Λ □ S □ ι			☐ E Feet □ W
Facili		01		County		County Cou		Civil Te		ity/ or	Village					1001 () 11
	_			Kewaunee		31		Kewa		•						
Sai	nple			,								Soil	Propo	erties		
************	J 2		-	Soil/R	ock Description											
4)	od (i	muts	Fec		ologic Origin For						sive					SIE
ğğ.	tth /	ပိ	l ln		h Major Unit		C S	hic	ram	EB	pres	Sture	.p	icit) X	٥), imer
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet		-		S O	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
L CS	60			TOPSOIL/CAP	MATERIAL.			71. 71.			1	1	mud pand			
2 CS	60 30		- 2 - 3 - 4 - 5 - 6 - 7 - 8	wet, soft.	ight brown, wet. In to black (10YR 3 (OL), with shells yl 4/1), wet, soft.		√ <u>SP</u> OL									
l here	by certif	y that	the info	ormation on this form is tr	ue and correct to the bes	st of my kn	owieds	ge.	I	ـــــلـ			1	<u> </u>		1
Signa					Firm RM	T, Inc. Heartland T			, W1 51	3717						608-831-4444 608-831-3334

State of Wisconsin
Department of Natural Resources

07201DNR.GPJ WI DNR 2003.GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			<u>Rc</u>		Wastewater n/Redevelopment	Waste i Other	-	ement					Pag	re 1	oľ	1
Facility/Pr	oject l	Nam	e			License/l	Permit/	'Monito	ring Nu	umbe	r	Boring	Numb	,	01	
Kewau														M2		
=		-	Name o	f crew chief (first, last)	and Firm	Date Dri	lling S	tarted		D	ate Drilli	ng Cor	apleted		Dril	ling Method
	e En	viro		tal Services	To WWW	77. 10.		/2010		0.0		3/17/2	2010	In.		eoprobe Diameter
WI Unique	e Well	I No.		DNR Well ID No.	Common Well Name		uc wa Feet l		el	Suria	ice Elevai 584.0		1SI	130		inches
Local Grid		in		stimated: []) or Bo		I	1 000	0	l		Local C					1110110.5
State Plan				,017 N, 2,616,449			t		,							ДΕ
Facility ID	1/4 of			/4 of Section , County	T N, R	Long County Co		Civil T	own/Ci	i{v/ oı	· · Village	Feet	□s	~~~~~~	·	Feet [] W
				Kewaunee		31			aunec	•						
Sample	3											Soil	Prope	erties		
Number and Type Length Att. &	Recovered (in)	Blow Counts	Depth In Feet	And C	Rock Description Geologic Origin For ach Major Unit		uscs	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
2 60 CS 30	0		- 2 - 3 - 4 - 5 - 7 - 7	PEAT, dark browet, soft. ORGANIC SIL greenish gray (gland GRAVEL (SP), gravel, wet, soft.	DED SAND (SP), light brown, wet. wn to black (10YR) T (OL), with shell eyl 4/1), wet, soft. DED SAND WIT medium grained, so wn to black (10YR) bgs.	3/2), H mall /	SP OL									
I hereby ce	rtify t	hat th	he info	rmation on this form is	true and correct to the b	est of my kn	owled	<u>1</u>	L	L					***************************************	<u> </u>
Signature					Firm RN	AT, Inc.			W1 53	2717						608-831-4444 608-831-3334

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Pacility Project Name				<u>R</u>		fastewater Redevelopment	Waste l Other	_	ement								
Revaulnee Marsh Bonng brilling Name of crew chief (first, last) and Firm Date Drilling Started Date Drilling Completed Date Drilling Compl								···········								of	1
Date Drilling Started Date Drilling Completed Drilling Completed Drilling Method Tonk (Apply) Drilling Method Tonk							License/I	ermit/	'Monito	ring Nu	ımber	r	Boring	g Numb		20	
Tonit Kapugi					of crew chief (first_last) a	nd Firm	Date Dri	Hing S	larted		lD	ate Drilli	no Coi	noleted	1V12		ling Method
On-Site Environmental Services					ever eviler (villa), index, in		listic is.					51111		1.1770104			ang meana
Sample S	On	-Site E	ìnviro											2010			
Local Grid Origin County	WIU	nique W	'ell No),	DNR Well ID No.	Common Well Name	1			ol .	Surfa			4.45.5	Во		
Sample	Local	Ceid O	inin "	<u> </u>	otionstade 🖂 V ou Boo	ing Location NZ		Feet I	MSL							2.1	inches
Feet			igni				La	1	U		11	Locare	JHQ 1O		:		fil e
County C			of				Lons)	o .				Feet				
Sample Soil Properties Soil Properties	Facili	ty ID		***************************************	······································	·			Civil T	own/Ci	ty/ or	Village	<u>.</u>			·····	***************************************
Soil/Rock Description And Geologic Origin For Each Major Unit Soil/Rock Description And Geologic Origin For Each Major Unit And Geologic Origin For Each Major Unit And Geologic Origin For Each Major Unit And Geologic Origin For Each Major Unit And Geologic Origin For Each Major Unit And Geologic Origin For Each Major Unit And Geologic Origin For Each Major Unit And Geologic Origin For Each Major Unit And Geologic Origin For Each Major Unit And Geologic Origin For Each Major Unit And Geologic Origin For Each Major Unit And Geologic Origin For Each Major Unit And Geologic Origin For Each Major Unit And Geologic Origin For Each Major Unit And Geologic Or					Kewaunee		31		Kewa	unee		·	•				
PEAT, dark brown to black (10YR 3/2), wet, soft. POORLY GRADED SAND (SP), medium grained, light yellow brown, wet. PEAT, dark brown to black (10YR 3/2), wet, soft. POORLY GRADED SAND (SP), medium grained, light yellow brown, wet. PEAT, dark brown to black (10YR 3/2), wet, soft. ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.	Sar												Soil	Propo	erties	·	
PEAT, dark brown to black (10YR 3/2), wet, soft. POORLY GRADED SAND (SP), (medium grained, light yellow brown, wet. PEAT, dark brown to black (10YR 3/2), wet, soft. ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.		સુ (ii)	ts	ğ	Soil/R	ock Description						ပ္					
PEAT, dark brown to black (10YR 3/2), wet, soft. POORLY GRADED SAND (SP), (medium grained, light yellow brown, wet. PEAT, dark brown to black (10YR 3/2), wet, soft. ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.	ر اد	Att	uno	II Fe	And Ge	ologic Origin For						ssiv	ب		25		nts
PEAT, dark brown to black (10YR 3/2), wet, soft. POORLY GRADED SAND (SP), (medium grained, light yellow brown, wet. PEAT, dark brown to black (10YR 3/2), wet, soft. ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.	mbe Tyj	ngth Sove) K	l fig	Eac	h Major Unit		C	phi 2	III gran	/FII	npre engt	istur	uid	stici	90	2 m
PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. POORLY GRADED SAND (SP), medium grained, light yellow brown, wet. PEAT, dark brown to black (10YR 3/2), wet, soft. ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.	and Z	Lei Reg	<u> </u>	ا ا				sn	5 3	y \ Dia	JI4	Cor	\$ ⊙	Lig II	Pla	P 2	\ \text{S} \ \text{S}
POORLY GRADED SAND (SP), POORLY GRADED SAND (SP), medium grained, light yellow brown, wet. PEAT, dark brown to black (IOYR 3/2), wet, soft. ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.	l CS			F		n to black (10YR	3/2),		77 77								
POORLY GRADED SAND (SP), medium grained, light yellow brown, wet. PEAT, dark brown to black (10YR 3/2), wet, soft. ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.		30		-	wet, soft.				1								
POORLY GRADED SAND (SP), medium grained, light yellow brown, wet. PEAT, dark brown to black (10YR 3/2), wet, soft. ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.				-					1 .								
POORLY GRADED SAND (SP), medium grained, light yellow brown, wet. PEAT, dark brown to black (10YR 3/2), wet, soft. ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.				-					1								
POORLY GRADED SAND (SP), The state of the s				2					1								
POORLY GRADED SAND (SP), Imedium grained, light yellow brown, wet. PEAT, dark brown to black (10YR 3/2), wet, soft. ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.				E					i								
POORLY GRADED SAND (SP), medium grained, light yellow brown, wet. PEAT, dark brown to black (10YR 3/2), wet, soft. ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.				3					4 14								
POORLY GRADED SAND (SP), medium grained, light yellow brown, wet. PEAT, dark brown to black (10YR 3/2), wet, soft. ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.	8			E					1								
POORLY GRADED SAND (SP), medium grained, light yellow brown, wet. PEAT, dark brown to black (10YR 3/2), wet, soft. ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.				-4					1			-					
ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.				_	POORLY GRAD	DED SAND (SP)		- <u>-</u> -									
PEAT, dark brown to black (10YR 3/2), wet, soft. ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.	2	60		<u>-</u> 5	medium grained, l	ight yellow brown	i, wet. \int_{1}^{r}		!								
ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.	CS			-	PEAT, dark brow				1								
ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.				-6	wet, soft.				1 1								
ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.				-													
ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.				7													
ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.				-					1								
ORGANIC SILT (OL), with shells, dark geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.	Į.			- 8					12 34								
geenish gray (gley1 4/1), wet, soft. E.O.B. at 10 feet bgs.									坐坐								
E.O.B. at 10 feet bgs.	3.			()	ORGANIC SILT	' (OL), with shells	s, dark										
E.C.D. at 10 feet ogs.	0			 	geeman gray (giey	1 4/1), wei, soit.		OL	-5							,	
E.C.D. at 10 feet ogs.	1,22/1			10	***************************************				2 G			411					
				'	E.O.B. at 10 feet 1	bgs.	ļ										
	33.GE																
	X X																İ
	Z S																
Signature Firm RMT, Inc. 744 Heartland Trail Madison, WI 53717 Fax: 608-831-4444		1	(15	On the C	manation as details			1	1					<u></u>			<u> </u>
RMT, Inc. Tel: 608-831-4444 744 Heartland Trail Madison, WI 53717 Fax: 608-831-3334	Sional		y mat t	me mo	mation on this form is tr		·····	owiedg	 								····
	2.5.19					1 10,11.		rail N	ladison	W153	717						

SOIL BORING LOG INFORMATION

Form 4400-122

Facility/Project Na Kewaunee M				License/P	ermit/	Monitor	ing Nu	mber		Boring	Paş Numb		of D	
Boring Drilled By:	Name o	f crew chief (first, last) and F	irm	Date Dril	ling S	arted		Dat	e Drilli	ng Cor	pleted		Drill	ing Method
Dusty Harvey On-Site Envir	onmen				12/8	/2009				12/8/2	2009			eoprobe
WI Unique Well N	o.	DNR Well ID No. Co	mmon Well Name	Final Stat		ter Leve MSL	1 5		Elevat 84,0]		dSL.	Во		Diameter inches
Local Grid Origin		stimated: (1) or Boring		Lat		0	·		Local C		eation	_		
State Plane 1/4 of		,983 N, 2,616,473 E /4 of Section , T	S/C/N N, R	Long		0		1)		Feet				E Feet 🗀 W
Facility ID		County	(County Coc		Civil To		y/ or \	/illage		**********			
Sample		Kewaunee		31		Kewa	unee			Soil	Prope	erties		
Number and Type Length Att. & Recovered (in) Blow Counts	Depth in Feet	And Geolog	Description gic Origin For Iajor Unit	***************************************	SCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	200	RQD/ Comments
2 60 CS 51	-1 -2 -3 -4578 9 10	ORGANICS. PEAT, with organics mass), dark brown 10 ORGANIC SILT (Oltrace organics, dark g 4/1, moist, soft.	DYR 3/2, moist, :	soft.	OL.		M Di		SS SS SS SS SS SS SS SS SS SS SS SS SS	N N		I I	α.	ž Č
									7.00.00.00.00.00.00.00.00.00.00.00.00.00					
I hereby certify the	t the info	rmation on this form is true a	and correct to the bes	t of my kn	owled	ge.			I	L	L	l		<u> </u>
Signature				T, Inc. Teartland T				717						608-831-444 608-831-333

07201DNR.GPJ WIDNR 2003,GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			R		Watershed/Wa Remediation/I	stewater Redevelopment [Waste N	_	ement									
Fooilit	y/Projec	ot Man	20					License/I	Zomnist	Monito	rina Ni	داددد	ar.	Boni		Pag Numbe		of	<u> </u>
	yaune vaune							Lacense	emm <i>v</i>	IVIOIIIIO	ring ixi	шю	er	DOLL	Bg i	Numbe	т М2	E	
Boring	g Drillec	1 Ву:		of crew chief	(first, last) an	d Firm		Date Dri	lling St	arted			Date Dri	lling C	om	pleted	171		ing Method
On-		nviro		ntal Service		C W B V	,	5' 10.		/2010			e	3/17	//2	010	115		eoprobe
WLO	iique W	eii No) .	DNK Wei	HD No.	Common Well N	ame	Final Sta	ne wa Feet I		i	Sur	face Elev 584.(NA	121	130		Diameter inches
Local	Grid Or	igin	[] (c	stimated:]) or Bori	ng Location 🛛	·····							Grid I				. ا بش	mones
State	Plane	•			2,616,485 1			La	·		·					□N			ΠE
	1/4	of		1/4 of Section		T N, R		Long		·						□s			Feet [] W
Facilit	y ID			Cou	-		1	ounty Co	de			ity/ c	or Villag	3					
Can			7	Ke	ewaunee			31		Kewa	iunee	T		C o	: 1: 1	Dusias			<u> </u>
Sai	nple												ļ	750	11 1	Prope	rues		
	ر. ها (ji)	als	100			ck Description							νc						
rs db	r Ati	Com	In F			logic Origin For			S	. <u>2</u>	E	2	ressi	<u> </u>	=		<u>\$</u>		icmts
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet		Eacl	Major Unit			SC	Graphic Log	Well Diagram	תום/תום	Compressive	Moisture	nte:	Liquid	Plasticity Index	200	RQD/ Comments
ZĦ	7 %	<u>B</u>	ļă	2023 4 673	1 1 1	. 11 1 (10)	um a	(0)	\supset	7 7 T	žΩ	٥		ดี 🗵 เ	3	ב ב	2.5	Δ.	% C
CS	60 24		Ē	wet, soft		to black (10)	Y K 3/	(2),		2 24									
			-1	1,401, 301						77 71									
			-							4 34					İ				
			- 2							77 77									
E			- 2							1, 11,									
			_							77 77									
			- 3							7 77									
										711 711									
			-4							7 77									
			-							77 77					l				
2	60		5							2 22					ŀ				
2 CS	36		E							71. 71					ļ				
	-		-6							7 77									
			. "							77 77									
			7							2 22									
										7 7 7.									
			 -			ED SAND (S		7	<u>SP</u>	77.77									
			- 8			ght brown, wo		<i>i</i>		4 14									
			E			to black (10)	YR 3/	(2),		11/11							•		
			9	wet, soft	l.					4 14									
			-							77 77									
i.			-10	ORGA	NIC SILT	(OL), with sl	nells,	dark /	OL.	2== 52									
				greenish	gray (gley	1 4/1), wet, so		/											
				E.O.B. a	at 10 feet b	gs.													
				!															
l bossi	N comit	v (lso)	tha infa	Junantian on d	hio forms in to	e and correct to the		of multi-	ا داسا			<u> </u>				1			
Signat		y mat	are mit	n maron on t	ms tutti is iru				owiedg	 						***********		······	
Brial								`, Inc. cartland T	rail M	ladison	WL53	3717							508-831-4444 508-831-3334

07201DNR.GPJ WLDNR 2003.GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			Ro	oute To:		astewater Redevelopment		Waste Modern	_	ement								
						•									Pag	2e 1	oſ	1
Facilit	y/Projec	t Nan	ne					License/I	²cımit/	Monitor	ring Ni	ımber		Boring	Numb	er		
	vaune											In	4 15 211			M2		L. Xfadaad
			Name c	f crew ch	nief (first, last) a	nd Firm		Date Dri	lling St	arted		D	ate Drill	ing Coi	mpieted		Driii	ing Method
On-	ni Kap Site E	ugı İnviro	onmen	tal Serv	vices				3/17	/2010				3/17/	2010		Ge	eoprobe
	iique W				Well ID No.	Common Well Na	ine	Final Sta			:1		ce Eleva			Во		Diameter
									Feet I	MSL			584.0				2.1	inches
Local State	Grid Or	igin			□) or Bor , 2,616,511	ing Location 🔯 E S/C/N		La	t	0	1		Local (oria La	cation \[\begin{align*} \text{ \textsize} \\ \text{ \ \text{ \text{ \text{ \text{ \text{ \text{ \text{ \text{ \text{ \	r		Ε
June	1/4	oſ		,5-15 14 1/4 of Sec		T N, R		Long	2	0		11		Fee	ı 🗌 S		l	Fect W
Facilit					County			County Co				-	Village					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
				,	Kewaunee			31	·	Kewa	nunee	1			- X3			
San	nple													Soil	Prop	erties	********	
	Length Att. & Recovered (in)	its	i i			ock Description							l s		ŀ			
۲, کو	Att	mo	In F			ologic Origin For			S	<u>.</u>	 		ressi	21. 1		ity		cnts
Number and Type	Length Att. Recovered (Blow Counts	Depth In Feet		Eac	h Major Unit			SC	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture	Liquid	Plasticity Index	200	RQD/ Comments
ă Ř		B	<u> å</u>	15.73	on 1 1 t	. 11 1 (10)	711 7	(2)		27.7	βã	I I) is	ZŬ	==	LE E	Δ.	<u> ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~</u>
CS S	60 35		Ē	PEA wet,		n to black (10)	YK 3	12),		1, 11,	1							
			- 1	,,,,,	5011.					11, 1	4							
				500				,,,,, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	- SP -	1, 34	1							
			2	n POO	IKLY GKAI um orained	DED SAND (S light brown, we	<i>¥),</i> el.	ſ	- 21 -	<u> </u>								
N.			E			n to black (10)		(72),		17 717								
7.			-3	wet,		`		,,		70 7	1							
Ç.			_							24 77								
			-4							4 34	1							
			- `							77. 7	ļ							
Š			F -5							2 24								
2 CS	60 38.4		F							71 7	4							
			-6							1, 34								
			- "							77. 7	1							
			F 7						•	77.7								
			 							2 27								
			-8							77 7	}							
V			- 0							1, 11,								
			F .	ORC	GANIC SILT	Γ (OL), with sh	iells,	dark		4]							
ì			F-9	greer	nish gray (gle	yì 4/1), soft, w	et.		OL		1							
			F 10							1-3								
			10	E.O.	B. at 10 feet	bgs.							1					
Lhard	hy costi	L	عدن مراد	l	on this form is to	rue and correct to the	he be	a of my b	iowład	ge.				l	1	1	<u> </u>	1
Signal		y mal	the III)	JIII BUOII	OH BHS TOTALIS U				ion ica	5 ⁰ .							45.1	ZAO 021 3333
Urgital								T, Inc. Teartland	Trail 1	Madison	n. WL 5	3717						608-831-4444 608-831-3334

State of Wisconsin	
Department of Natural Resources	

07201DNR.GPJ WI DNR 2003.GDT 4/22/10

SOIL BORING LOG INFORMATION

3.4400_122 Rev

Department of Natural Nesotirees				1	U(11) 44	()()-12Z			IΛC	Y. 7-20	
Route To: Watershed/Wastewater	Waste N	-	ement								
Remediation/Redevelopment	Other	LJ						Pas	, 1	oſ	1
Facility/Project Name	License/P	'ermit/	Monitor	ring Nu	mber		Boring	Numb	er.		1
Kewaunee Marsh Boring Drilled By: Name of crew chief (first, last) and Firm	Date Dril	lino St	arted		Dat	e Drillii	ne Con	onleted	M3		ing Method
Dusty Harvey	Buic Biii	5 01	ui iod								
On-Site Environmental Services WI Unique Well No. DNR Well ID No. Common Well Name	Final Stat		/2009	.1	Surface	: Elevat	12/8/2	2009	Ro		eoprobe Diameter
	[Feet N		1		83.0 F		ASL.	Во		inches
Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒ State Plane 243,995 N, 2,616,487 E S/C/N	Lat		0	'	u	Local G	irid Lo		,		
1/4 of 1/4 of Section , T N, R	Long			,	.,,		Feet]	Feet W
1	County Coo 31	le	Civil To Kewa		ty/ or \	/illage					
Sample	<i></i>	j	IXCWA	idilee			Soil	Prope	erties		
ರ್ಷ (ر ر					
And Geologic Origin For		S	i.	m	ΩI	ressiv	urc		ity		nents
Number and Type Teach Major Unit Soil/Rock Description And Geologic Origin For Each Major Unit Each Major Unit		nsc	Graphic Log	Vell Diagr:	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
PEAT, with organics (wood and root			7.7. 7.3	ı		3,	-		,		
cs 24 mass), dark brown 10YR 3/2, moist,	soft.		77 77 7 77								
			4 14								
-2			77 77 77 77								
-			77 77								
-3											
-4			2 22								
			77 77								
2 60 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5			77. 77. 7. 77.							a a second	
CS 36			1, 11,								
			77 77 77 77								
ORGANIC SILT (OL), with shells as			24 64								
trace organics, dark greenish gray GI	LEY1		2-3								
8 4/1, moist, soft.		OL	ZG								
<u> </u>											
E.O.B. at 10 feet bgs.											
I hereby certify that the information on this form is true and correct to the bes	······	owledg	ge.								
	T, Inc. Heartland T	rail M	1adison	WL 53	717						508-831-4444 508-831-3334

07201DNR.GPJ WI DNR 2003.GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122

			Ro	nute To: Watershed/W Remediation/	astewater Redevelopment	Waste l	_	ement								
													Pag		of	1
	y/Projec					License/	Permit/	Monito	ring Nu	imber		Boring	Numbe	er M4	n	
	vaune Drillee			f crew chief (first, last) a	nd Firm	Date Dri	lling St	arted		D	ate Drilli	ng Con	npleted	1714		ling Method
	sty Ha	•	,, , ,				_									-
On-	Site E	Enviro		tal Services	16. 30.00	Final Sta		/2009		CF.	ce Elevat	12/8/2	2009	1120		eoprobe Diameter
WLUI	iique W	eli No		DNR Well ID No.	Common Well Name	1	nc wa Feet l		;)		583.0 l		4SL	130		inches
	Grid Or	rigin		stimated: []) or Bor				0		u	Local C			i		
State	Plane			,003 N, 2,616,502		La		٥	 I	11		Б				D E
Facilit	1/4 v ID	of	l	/4 of Section ,	T N, R	Long County Co		Civil T	own/Ci	ty/ or	 Village	reel	L 3			Feet W
	<i>y</i>			Kewaunee		31		Kewa								
Sar	nple					•						Soil	Prope	rties		
	કુ (iii)	(S	50	Soil/R	ock Description						မွ					
ne z	Att	uno	In Fc	!	cologic Origin For		S	ပ	<u>ء</u>	9	essi	21 7		ÿ		cints
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Eac	ch Major Unit		SC	raph	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid	Plasticity Index	200	RQD/ Comments
Zg	<u>13 ≈</u>	m	ļ <u>Ā</u>	PEAT, with organ	vice (wood and roc		=	G Graphic	×Ω	<u> </u>	0.8	≥ 0	نہ نہ		Δ.	<u> </u>
CS CS	6		-	mass), dark brown	nes (wood and roc n 10YR 3/2, moist	, soft.		4 14								
			-1					47 9								
			E					77 77 77 77						j		
			- 2					2 34								
			E					77. 7								
			3 -					4 34								
			Ε,					7 77 77 7								
			-4					77. 7								
			5					1, 14								
2 CS	60 54		-					70 7								
			6					1, 11,								
			- "					7 77 7								
			7					71 7								
			-	ORGANIC SILT	(OL) with challe			12 1/2								
			<u>-</u> 8	trace organics, da				-G	•							
			-	4/1, moist, soft.			OL		1							
			9				01.7	6								
			-													
			10	E.O.B. at 10 feet	ogs.		<u> </u>	4-4-4								
2					-											
												1				
S. I. boro	N corti	L	Ila info	I mation on this form is t	me and correct to the b	oct of my le	100/10/1		<u> </u>	Ц		1	<u> </u>		<u> </u>	
Signa		ry trait	THE IIII	THRUOR OF THIS FORM IS U			iowica	<u>.</u>	······						771.	AU6 631 4411
3					1 1/1	AT, Inc. Heartland	Trail N	//adison	, WI 5:	3717						608-831-4444 608-831-3334

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in 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 this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent. result in forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct more information, including where the completed form 32

07201DNR.GPJ WI DNR 2003.GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			<u>Rc</u>	oute To:	Watershed/Waters	nstewater Redevelopment		ste Ma er 🔲	•	ment									
- ".n								70							~···			of	1
	y/Projec						Licen	se/Per	mil/f	Monitor	ang Nu	ımb	er		Boring	Numl	oer M.	5 A	
	vauned Drilled			f crew cl	hief (first, last) ar	d Firm	Date	Drillin	ng Sta	arted		7	Date	Drilli	ng Cor	npletec			ing Method
Tor	ii Kapi	ugi						2	// 7	0010) / 1 T / 1	3010			
	Site E			tal Ser	VICES Well ID No.	Common Well Name	Final			/2010 er Leve	1	Sur	Face	Elevat	3/17/2	2010	R		eoprobe Diameter
WIOI	nque w	CH INC).	DIVIN	Well ID No.	Common Well Name	, i mai			ASL	,,	oui.			Peet N	ASL			inches
Local	Grid Or	igin	[] (e:	stimated:	or Bori	ng Location 🛛	<u> </u>			0					rid Lo				
State				-	, 2,616,488			Lat _											
Facilit	1/4	oſ_	1	/4 of Sec	ction , County	T N, R	County	ong		Civil To		11//	 N: 3/i	Папе	Feet		S		Feet 🛄 W
raciii	y ii				Kewaunee		31	Couc	- 1	Kewa		-) V 1	nage					
Sar	nple		1	[······							Ţ			Soil	Prop	erties	***************************************	
	3 (5)	(0	- N		Soil/Re	ock Description								6)					
63	\11. c	unts	Fee			ologic Origin For					_			SSIV	o		>		ınts
Typ	gth /	Blow Counts	Depth In Feet		Eac	ı Major Unit			CS	phic	l gran	מוש/מומ	11.3/	Compressive Strength	stur	pi .	Plasticity Index	200	RQD/ Comments
Number and Type	Length Att. & Recovered (in)	Blo	Dep						SO	Graphic Log	Well Diagram	2	5	Sp.	Moisture Content	Liquid	Plastic Index	P 2(S S
l CS	60 30					n to black (10YR	3/2),		******	11 11									
CS	30		_	wet,	soft.					77 77 7 77									
			E 1							7 77 73 77									
			<u></u>							77 77									
			2							1, 11,									
			E							77 77									
			- 3							4 14								:	
	·		-							77 77						ľ			
			4							1, 11,									
			-							40 71				İ					
2	60		-5							4 54									
ĆS	55		E							77 77									
			-6							77 77 7 77									
			E	7.57		708													
			- 7	ORC	iANIC SILT	(OL), with shell /1 4/1), wet, soft.	is, dark												
			-	green	man gray (gro.	, 1 -1/1, 1101, 5011.	•												
			8							5									
			-					1	OL										
			F ₀																
			-9 -																7
_			10	E.O.	B. at 10 feet b	gs.													
													and the same						
													- CALLANDERS						
											L	<u> </u>				<u></u>	<u></u>	<u> </u>	
		y that	the info	rmation	on this form is tr	ie and correct to the b	est of my	y knov	vledg	ge.									
Signat	ure						MT, Inc		ii M	Indicas	\M1 5	2717	7						608-831-4444 608-831-3334

07201DNR,GPJ WI DNR 2003,GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			<u>Rc</u>			/astewater /Redevelopment	Waste f	•	ement								
														Paş		of	1
	y/Projec						License/I	Permit/	Monito	ring Nu	mber		Boring	Numb			
	vaune Drille			f crew chief (first	. last) a	nd Firm	Date Dri	lling St	arted		ID:	ite Drilli	ng Con	mleted	<u>M5</u>		ing Method
Tor	ni Kap	ugi			,,								_				_
On-	Site E	Enviro		tal Services			12' 1.0'		/2010		Ci C		3/17/2	2010	(6)		eoprobe
WI UI	iique W	ell No).	DNR Well ID	No.	Common Well Name		uc wa Feet l		:1		e Elevat 582.0 I		4SI	130		Diameter inches
Local	Grid Or	igin				ing Location 🛛			0			Local C					mones
State	Plane			,048 N, 2,61	6,501	E S/C/N		t		,				□ N			□ E
Facilit	1/4	oľ		/4 of Section County	,	T N, R	Long County Co	3	Civil To			Villaga	Feet	□ s			Feet W
racini	у по			Kewai	inee		31	ue	Kewa		ty/ Oi	vinage					
Sar	nple		Τ	1220.00					T		••••		Soil	Prope	erties		
		10			Soil/R	lock Description											
ف ف	Att. c	unts	Fce			eologic Origin For						SSIVE	6)		>.		ats
nber Typ	Length Att. Recovered (Blow Counts	Depth In Feet		Eac	ch Major Unit		CS	phic	Well Diagram	PID/FID	npre	Moisture Content	pid it	Plasticity Index	200	RQD/ Comments
Number and Type	Length Att. & Recovered (in)	Blo	Dep					US	Graphic Log	Well Diagr	PID	Compressive Strength	No No	Liquid	Plastic Index	P 2(\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
l CS	60 26.4		Ľ		c brow	n to black (10YR	3/2),		77 77								
(.3	20.4		-	wet, soft.					77 77 77 77								
			- '						7 77								
			E _ 2						77 77								
									4 14								
			3						71/ 71								
			-		ap ma	iterial observed at	3 feet		77 77								
			-4	bgs.					12 112								
			- '						31, 31								
			F ₋₅						1, 11,								
CS :	60 55		-						27 77								
			E-6						7 77								
			 - "						77 77								
			7						<u> </u>								
			- '						1, 11,								
			-8	ORGANIC	SILT	Γ (OL), with shells	s,										
			-	greemsn gra	iy (gie	yl 4/1), wet, soft.											
			- 9					OL									
			-						20								
			- 10	~~~													
				E.O.B. at 10) feet l	bgs.											
																•	
l herel	y certif	y that	the info	rmation on this fo	orm is t	rue and correct to the b	est of my kn	owled	ge.			,					
Signat						72%	AT, Inc.			 						Tel· (508-831-4444
							Heartland 1	Proil A	Andison	W/1 53	717						508-831-3334

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			<u>R</u> c	oute To: Watershed/Wa Remediation/I	istewater Redevelopment	Waste M	_	ement								
												~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Pag	•	of	1
	y/Projec vaune					License/P	ermit/	Monito	ring Nt	ımber		Boring	Numb	er M5	iC	
Boring	g Drilleo	3 Ву:		forew chief (first, last) an	d Firm	Date Dril	ling St	arted		Dat	e Drilli	ng Con	npleted		Drill	ing Method
	ni Kap Site E		onmen	tal Services			3/17	/2010				3/17/2	2010			eoprobe
WI Uı	ique W	'ell No	······································	DNR Well ID No.	Common Well Name	Final Stat	ic Wa Feet I		el		Elevat [82,0]		1SI	Во		Diameter inches
	Grid Oı	rigin		stimated: 🗌 ) or Bori		- <del></del>		0 V1OT	1		Local (				2.1	menes
State	Plane 1/4	οſ		-,033 N, 2,616,512 ) 1/4 of Section ,	E S/C/N T N, R	Lat Long		0	1	\$1		Feet			1	☐ E Feet □ W
Facilit		01		County		County Coc			own/Ci	ty/ or \	/illage					
Sar	nple			Kewaunee		31		Kewa	aunee			Soil	Propo	erties	·	
	~~~~~	S	15	Soil/Re	ock Description						ى ن	1				
۳ 5 ع	Att.	ount	In Fe	1	ologic Origin For		S	J	E	Q	cssiv	2 -		ity (i.y		cmts
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Eacl	h Major Unit		SC	(2 Graphic	Wcll Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid	Plasticity Index	Р 200	RQD/ Comments
Z ≅ CS	60	<u> </u>	<u> </u>	PEAT, dark brow	n to black (10YR 3	5/2),			> <u> </u>	Д.	S	20		Δ	<u>ρ.</u>	<u>R</u> U
CS ,	26		-	wet, soft.	·			77 7 7 77								
								7 77								
			2					77 7		:						
			_					77.77								
			3					1, 11,								
			-	Styrofoam cap ma	terial present at 3.5	feet		77 7								
			4	bgs.				77.77								
			- 5					1 11/								
CS CS	60 28		E					777	1							
			-6					77. 7								
			-					4 77								
			-7					7 77	1							
			-8					71 7								
			- 0	ORGANIC SILT greenish gray (gle	(OL), with shells,	,										
			9	greenish gray (gre	y1 4/1), wet, soit.		OL									
710			-					6_								
4/22/10			-10	E.O.B. at 10 feet b	ogs.		***************************************	7-5								
W! DNR 2003.GDT																
4R 200																:
										<u></u>						
	•	fy that	the info	ormation on this form is tr		st of my kn	owled	ge.								
Signal	ture					T, Inc. Heartland T	Senil A	Andico	, \X/I ¢	1717						608-831-4444 608-831-3334
m	,		·····	Ol								012/2010	, D. 1	1102 Ca C		
ಹ್ರ result	in forfe	iture o	f betwe	Chapters 281, 283, 289, 2 en \$10 and \$25,000, or in	nprisonment for up to or	ıe year, deş	pendin	g on the	e progra	un and	conduc	t invol	ved. Po	ersonall	y identi	ifiable
inform Should	nation o I be sen	on this it.	form is	not intended to be be used	I for any other purpose.	NOTE: S	ee inst	truction	s for m	ore infe	ormatio	n, inclu	iding w	here the	e comp	leted form 35
>	5011	-														المساول

State of Wisconsin

SOIL BORING LOG INFORMATION

Department of Natural Resources								Form 4400-122 Rev. 7-98										
Route To: Watershed/Wastewater							Waste Management											
				Remediation/			Other											
														Pag	re 1	of	1	
Facili	ty/Proje	et Nan	10				License/I	^{>} ermit/	Monito	ring Nu	nber		Boring	Numbe	er			
	waune										M5D							
	_		Name o	f crew chief (first, last) a		Date Dri	lling S	larted		Dat	le Drilli	ng Con	npleted		Drilling Method			
	sty Ha -Site F		ານນາຂນ	tal Services				12/8	/2009				12/8/2	2009		Gr	eoprobe	
	nique W			DNR Well ID No.	Common \	Well Name	Final Sta	tic Water Level			Surface	e Elevat				Borehole Diamete		
	•							Feet l	MSL			82.0 1				2.1 inches		
	Grid O	igin		stimated: (1) or Bor			1 10				ţ1	Local C	irid Lo					
State	Plane	•	244,013 N, 2,616,521 E S/G							*1		D			Feet W			
Facili	1/4 tv ID	ol		/4 of Section , County	T N	, R	Long County Co		Civil T	own/Cit	v/ or \	/illage	reet	□s	***************************************		reet (j_w	
1 (1011)	.,			Kewaunee			31		Kewa		-							
Sai	mple		1				[T				Soil Properties						
***************************************			-	Soil/R	otion													
	od (i	unts	Fce	i	eologic Orig							Sive			٠,.		ats	
ber Typ(over	v Co	= = = = = = = = = = = = = = = = = = =	i	h Major Un			CS	Shic	gram	PID/FID	ngth	sture	nid H	Plasticity Index	9)/ miei	
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet					n s	Graphic Log	Well Diagram	PID	Compressive Strength	Moisture Content	Liquid Limit	Plastic Index	P 200	RQD/ Comments	
1	60			PEAT, with organ				 	7. 7.									
CS	12		 	mass), dark brown	soft.		2 22											
			- 1						77 7									
			-						27. 77									
			-2						2 12									
			E						77 7									
			-3						4 14									
			_						77. 7									
			-4						1/2 1/4									
									77 7									
2	60		- 5						4 34									
ČS	48		-						7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7									
			6						77 7							:		
			_						2 34									
			7						71/ 7									
			-						2 12									
			8						77 7									
			-						<u> </u>									
			9	ORGANIC SILT trace organics, dar	(OL), wit	h shells a	nd EV1									:		
			- 1	4/1, moist, soft.	ik gieenis	ai giay Ci	JE I I	OL	7-6									
4/22/10			10						-G									
			10															
33.GE																		
7 200 200																		
WI DNR 2003.GDT																		
		, ,	1	l distribution of the state of				L	<u></u>	Ll		1	J					
or:		y that	the info	rmation on this form is tr		173		iowled;	ge.									
Signa	aui C						T, Inc.	Pest N	Andias	13/3 52	717						508-831-4444 508-831-3334	
Q	····					744 1	Heartland 1	nan N	racison	, WE 33	111					rax: (No-001-0034	

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may gresult in forfeiture of between \$10 and \$25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable ginformation on this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

07201DNR.GPJ WI DNR 2003.GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Remortation/Redevelopment				Ro	ute To:	Watershed/W			Waste I	_	ement									
						Kemediation	кеаечеюри	ieni 🗀	Other	لــا						n.	1	o.c	2	
MSE	acilit	y/Projec	et Nan	1C		·····			License/I	oermit/	Monitor	ring Nu	ımber		Boring		er		<u> </u>	
Tonic Rapusi	Kewaunee Marsh																		En a A Seeb. 1	
On-Site Environmental Services March Marc	-		-	Name of	crew chi	iel (first, last) a	nd Firm		Date Dri	lling St	arted		1Ja	ate Drilling Completed					Drilling Method	
Sample South Flame South	On-	Site E	nvirc																	
Cocal Gord Origin Costineact D or Boring Location Mark Lang Local Gord Location Local Gord Locat	WI Un	ique W	ell No		DNR W	Vell ID No.	Common V	Vell Name	1											
The control of the			igin						<u>.</u>						2,1 11101100					
Sample Sample Soil/Rock Description And Geologic Origin For Each Major Unit Soil From Its Transport of Soil Properties Soil/Rock Description And Geologic Origin For Each Major Unit Soil Soil From Its Transport of Soil From Its Transport	State		- (*						- 1			11	□ N Foot □ C				E E			
Sample Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Soil/Rock Description And Goologic Origin For Each Major Unit Each Ma	Facilit		Ol .	1	~~~~		J IN,		<u> </u>			own/Ci	ty/ or \	Village	ree	3		rect L.J. W		
Soi/Rock Description And Geologic Origin For Each Major Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit Soi/Paid Unit						Kewaunee			31											
PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PAGENIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PAGENIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, s	San	, , , , , , , , , , , , , , , , , , , 													Soil	Prop	erties	***************************************		
PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PAGENIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PAGENIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, s		1. & } (in)	nts	ect			_							ive					50	
PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PAGENIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PAGENIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, s	ber ype	th At	Con	l In I							lic li	ram	FED	press	fure	. <u> </u>	icity	0	ment	
PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PAGENIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, soft. PAGENIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. PEAT, dark brown to black (10YR 3/2), wet, s	Vum and T	Leng	Blow	Deptl		*****				S	Grap Log	Well	PID/	Com	Mois	Liqu	Plast	P 20(RQD	
Thereby certify that the information on this form is true and correct to the best of my knowledge. Signature August	1	60		_			n to black	c (10YR :	3/2),		<u> 京</u>					1				
Thereby certify that the information on this form is true and correct to the best of my knowledge. Part	CS	30		-	wet, s	oft.					ł .									
Thereby certify that the information on this form is true and correct to the best of my knowledge. Signature Substitute Substitute Signature				- '							1									
Thereby certify that the information on this form is true and correct to the best of my knowledge. Tet: 608-831-444				L ₂							1									
2 60 CS 60 For a series of the content of the content of the best of my knowledge. Signature Tet: 608-831-444				-							1									
2 60				-3						1										
ORGANIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. ORGANIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. OL OL Tet: 608-831-444				-							1									
ORGANIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. ORGANIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. OL Tel: 608-831-444				4							1									
ORGANIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. ORGANIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. OL OL Tel: 608-831-444				E							1									
ORGANIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. ORGANIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. OL OL OL Tel: 608-831-444	2			<u>-</u> 5							1	,								
ORGANIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. ORGANIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. OL Thereby certify that the information on this form is true and correct to the best of my knowledge. Signature Firm RMT, Inc. Tel: 608-831-444	CS			-							-									
ORGANIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. OL OL Thereby certify that the information on this form is true and correct to the best of my knowledge. Signature Firm RMT, Inc. Tel: 608-831-444				-6							71 7	4								
ORGANIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. OL OL OL OL OL OL OL Tel: 608-831-444				-							ł									
ORGANIC SILT (OL), with shells, dark greenish gray (gley1 4/1), wet, soft. OL OL OL OL OL OL OL OL OL O				7							-									
3 60 CS 60				Ε.	ŌRG	ANIC SIL	Γ (OL), w	ith shells	, dark											
OL CS 60 - 10 CS 60 - 11 CS 60				- 8	green	ish gray (gle	eyl 4/1), v	vet, soft.												
OL CS 60 - 10 CS 60 - 11 CS 60	3 CS			- 0							25									
3 60				-							50	}								
Signature Good Goo				-10						OL	10									
I hereby certify that the information on this form is true and correct to the best of my knowledge. Signature Firm RMT, Inc. Tel: 608-831-444				-								1								
Thereby certify that the information on this form is true and correct to the best of my knowledge. Signature Firm RMT, Inc. Tel: 608-831-444				-11							5									
Thereby certify that the information on this form is true and correct to the best of my knowledge. Signature Firm RMT, Inc. Tel: 608-831-444				-							G									
Signature Firm RMT, Inc. Tel: 608-831-444		1		12								<u> </u>		<u> </u>	<u> </u>					
- KIVII., INC.		-	fy that	the info	rmation o	n this form is t			st of my ki	nowled	ge.		,							
	Signat	ure						1014		Frail N	/adison	. W15	3717							

Borin	g Numb	er.	M5]	E Use only as an attachment to Form 4400-1	22.						Pa		of I	2
San	nple									Soil	Propo	erties		
	Length Att. & Recovered (in)	Į.	55	Soil/Rock Description					۸۵					
r pe	Att	onn	표	And Geologic Origin For	S	. <u>.</u>	E E	Ω	ressi	ırc 11		áji		icnts
Number and Type	ngth	Blow Counts	Depth In Feet	Each Major Unit	uscs	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid	Plasticity Index	P 200	RQD/ Comments
Z w	2 %	B			⊃	Grap	≥ ∆	Id	O W	ΣÖ	<u> </u>	正点	۵.	<u> </u>
			<u>-</u>											
			_13		OL		(
			-			6	}							
			14	SANDY LEAN CLAY WITH GRAVEL										
			_	(CL), medium grained sand, small to medium gravel, redish brown gray (2.5YR 4/2), wet, moderately stiff.	CL GP									
			- 15 -	1 (4/2), wet, moderately stiff.	. GP	1								
			[POORLY GRADED GRAVEL (GP),										
			16	POORLY GRADED GRAVEL (GP), with clay, small to medium gravel, redish brown gray (2.5YR 4/2), wet.										
				E.O.B. at 15 feet bgs.										
			-							}				
]
122/10														
003.GF														
NR 20														
o W														
R.GPJ														
010 010 010 010														
8 072														
3L 199														
WDNR SBL 1998 07201DNR.GPJ W! DNR 2003.GDT 4/22/10														38
QW QW	1						1					ļ		

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122

Rev. 7-98

			<u>Rc</u>	watershed/Wastew Remediation/Rede		Waste M Other	_	ement								
15.1.35	/0:					License/I	Paulasi (1	Manita	Sixer Nice	nalsar	-	Boring	Pag		oľ	1
Kev	y/Projec vaune	e Ma	rsh			License/i	'erna <i>o</i>	ivionitoi	ing ivu					M5		
			Name o	f crew chief (first, last) and Fi	'm	Date Dril	ling St	arted		Dat	ie Drilli	ng Con	npleted		Drill	ing Method
On-		inviro		tal Services		3/17/2010						3/17/2010				eoprobe
WI Uı	nque W	eli No		DNR Well ID No. Con	nnon Well Name	Final Sta	ic Wa Feet I		1 :		c Elevat 582.0]		4SL	Во		Diameter inches
	Grid O	rigin		stimated: (1) or Boring L		Lai		0			Local (cation			
State	Plane 1/4	oſ		,975 N, 2,616,552 E /4 of Section , T	S/C/N N, R	Long		0		tí		Feet				□ E Feet □ W
Facilit				County	-	County Co	de	Civil To Kewa		ty/ or \	/illage			~		
Sar	nple			Kewaunee		31		Newa	шнее		T	Soil	Propo	erties		
		s,	ਹ	Soil/Rock I	Description						ပ္					
pe pe	Att.	Count	In Fe	And Geologi			S	٥	E E	Ω	ressiv	ıre ıt		ity		icnts
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Fect	Each Ma	jor Unit		SC	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	60	<u> </u>	-	PEAT, dark brown to	black (10YR 3	3/2),		77 77	N 4	Ω-	S	20		<u>a =</u>	<u> </u>	80
CS	30		-	wet, soft				77 77 77 77								
			- 1					7 77								
			- 2					71 7								
33			-	Styrofoam cap materia	d precent at 2.5	feet		77 77								
			3	bgs.	n prosont at 2	7 1001		1 11								
•			-					77 77								
			<u>-</u> 4					77 77								
			- 5					7 77								
CS	60 60		-					7 77 77								
			-6					77 77								
Ά.			-					4 14								
			<u>-</u> 7					77 77								
			- 8		The same twee was aren arrest arrest arrest			77.77								
		:	- "	ORGANIC SILT (O gray (gley1 4/1), wet,	L), dark greeni soft	ish										
			()	gray (grey rand), wet,	30111		OL	-6								
015			-					6								
4,22,10			-10	E.O.B. at 10 feet bgs.				<u>"" ""</u>								
3.GD																
WI DNR 2003.GDT																
																!
I herel	•	fy that	the info	ormation on this form is true an		st of my kr	owled	ge.								
Signal	ture					T, Inc. Heartland	Frail A	Andicon	W1.57	1717						608-831-4444 608-831-3334
ω ω	iane i :	(1 *	ا المد	Chapters 201 202 200 201 2	·····						man 1.2	an/}	n. 125.11	uvo to C		
ಹ್ಡ result	in forfe	iture o	fbetwe	Chapters 281, 283, 289, 291, 2 en \$10 and \$25,000, or imprise	onment for up to o	ne year, de	pendin	g on the	progra	ım and	conduc	t invol	ved. Po	ersonall	y ident	ifiable
inforn S should	nation o	n this	form is	not intended to be be used for	any other purpose.	NOTE: S	lee inst	ructions	s for m	ore info	ormatio	n, inclu	ding w	here the	e comp	leted form
s moun	5011															i) i

State of Wisconsin Department of Natural Resources

07201DNR.GPJ WIDNR 2003.GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			Ro	ute To:	Watershed/W Remediation/			Waste N	-	ement								
															Pag	ge 1	of	1
	y/Projec						·····	License/I	ermit/	Monito	ring Nu	ımber		Boring	Numbe	Ž1.	***********	
	waune			f crew c	hief (first, last) ar	nd Firm		Date Dril	ling St	arted		Dat	te Drilli	ng Con	M6E Drilling			ing Method
	ni Kap		rume o	i cion c	mer (mac, mar) an	A 1 1110			8 🗸						9			
On-	-Site E	nviro		tal Ser				10		/2010				3/17/2	2010	155		eoprobe
WI Ui	nique W	'ell No).	DNR	Well ID No.	Common W	Vell Name	Final Sta	uc Wat Feet I		:l 		e Elevat 582.0 l		AST.	Bo		Diameter inches
Local	Grid Or	igin	(c:	timated:	: []) or Bor	Ling Location		1	i cci i	0	l		Local C					menes
	Plane	•			1, 2,616,581			La			<u></u>				\square N			ΩЕ
15	1/4	oſ]	/4 of Se		T N,		Long County Co		<u> </u>			7illogo	Feet	\Box s		······	Feet 🗌 W
Facilit	ly ID				County Kewaunee			31	ue	Kewa			vinage					
Sar	nple					····						Ţ	Ţ	Soil	Prope	erties		
************	when the same of the same of	s	5		Soil/R	ock Descript	tion						U					
့်ပ	Au.	aunc	1 Fec		And Ge	ologic Origi	n For				_		SSIV	ပ		S		nts
Number and Type	gth	Blow Counts	Depth In Feet		Eac	h Major Uni	it		CS	iphic 3	Wcll Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	200	RQD/ Comments
Nu and	Length Att. & Recovered (in)	Blo	Dep						SD	Graphic Log	Well	PIE	St. Co.	S S	Liquid	Plastic Index	<u>م</u>	8.0
CS	48 14.4		_		T, dark brow	n to black	t (10YR 3	3/2),		7 77								
			<u></u>	wet,	SOIL.					31/ 31								
			-							2 22								
			-2							77 77								
			-							2 14								
			-3							77 77								
										36 31								
,	.10		-4							1, 11,								
2 CS	48 24		_							77 77	1							
			-5							7 77								
			_							77 77	ĺ				!			
			-6							77.77	ļ							
			-							12 11/2								
			- 7							77 77								
			-							1, 11,								
			-8	ORG	GANIC SILT	`(OL), w	ith shells,	, dark _f	COL									
					nish gray (gle		noist, soft	·										
				E.O.	B. at 8 feet by	ţs.												
																		ACCULATION A ARMENT
																4.000.000.000		in account
				<u> </u>			·····				<u> </u>			L	L		***********	<u> </u>
		y that	the info	rmation	on this form is tr				owled;	gc.								
Signa	uic					1		T, Inc. Heartland 1	Frail N	/ladison	, WI 51	3717						608-831-4444 608-831-3334

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in 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 this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin Department of Natural Resources

07201DNR.GPJ WI DNR 2003.GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-

			Ro	oute To:		/astewater /Redevelopment	Waste Other	: Manag	ement								
														Pag		of	1
	ty/Proje						License	/Permit/	'Monito	ring N	umber		Boring	Numb		, T	
	waune			f crove ch	iief (first, last) a	ard Firm	Date D	rilling S	tarted	····	ΙD	ate Drilli	na Con	naleted	M7		ing Method
	ni Kap	-	Name	i cicw cii	ner (mar, iast) e	aro i iiii	Date D	iiiiiig 3	iai (Cti		10.	ate Dim	ng con	ipicica			ing steniod
On	-Site E	invir		tal Serv	ices/			3/17	/2010				3/17/2	2010			eoprobe
WLU	nique W	'ell N	0.	DNR \	Well ID No.	Common Well Nam	e Final St			el		ce Elevat			Во		Diameter
Local	Grid Oi	ciaía		etimoted:) or Bo	ring Location 🛛		Feet l	MSL			582.0 I [Local C				2.1	inches
	Plane	ugui			2,616,623		L	at	·	1		Locare	31 (C 1.50)		ı		□ Е
	1/4	of		/4 of Sec	tion ,	T N, R	Loi		·	·		ĺ	Feet				Feet 🗍 W
Facili	ty ID				County		County C	ode				Village					
Sa	nple				Kewaunee		31		Kewa	aunee T	 		Soil.	Prope	artice		T
Sai					Caller	Rock Description						ļ		1100	Tues	,	
	Length Att. & Recovered (in)	ants	Depth In Feet			cologic Origin For						Compressive Strength					23
ber Fype	th A	Ŝ	E			ch Major Unit		CS	hic	ram	FID	pres	ture ent	. E.	icity	0	men
Number and Type	Ceng	Blow Counts	Dcpt			J		n S (Graphic Log	Well Diagram	PID/FID	Com	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD: Comments
1	48		-			vn to black (10YR	2 3/2),	-	71 7								
CS	24		-	wet, s	soft.				4 14								
			- 1						7 77								
									11/1								
			-2						2 24								
			F ,						41 7	1							
			-3						4 77								
			 -						4. 7.	1							
2 CS	48 24		4						77 77 7 77								
	۷4		-						12 212								
			<u>-5</u>						77 7								
			-						1, 11,								
			- 6						77 7	1							
			7						77. 77								-
			ļ '						4 14	1							
			-8	***************************************	PAN-2004 AT F PAR-18-18-18-18-18-18-18-18-18-18-18-18-18-				11/1								
				E.O.E	3. at 8 feet b	gs.											
I here	by certif	y that	the infa	rmation o	on this form is t	rue and correct to the l	oest of my k	nowled	ge.		1	·					
Signa						Line	MT, Inc.		***************************************						***************************************	Tel: (508-831-4444
							4 Heartland	Trail N	4adison	. WL51	3717						508-831-3334

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in 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 this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin Department of Natural Resources

07201DNR.GPJ WI DNR 2003.GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

			Ro	ute To:		/astewater Redevelopment	Waste I Other	_	ement								
					кетепанов	Redevelopment	Other							D	1	of	1
Facilit	y/Projec	ct Nan	ne				License/I	ermit/	Monito	ring N	ımber		Boring	Pag Numbe		O1	1
	vaune														M8		
	g Drilleo ni Kap		Name o	Ferew ch	icf (first, last) a	nd Firm	Date Drilling Started Date Dr						Drilling Completed				ing Method
On-	Site E	invirc		tal Serv					/2010				3/17/2010				eoprobe
WI Ui	nique W	ell No	-	DNR V	Vell ID No.	Common Well Name	1 1						Elevation Bor 2.0 Feet MSL				Diameter
Local	Grid Oi	rigin	(es	timated:) or Bo	ing Location 🛛						Local C				۷. ا	inches
State	Plane	•	244	,004 N,	2,616,670	E S/C/N		1		<u>.</u>			ΠN				ОЕ
Facilit	1/4	οſ	1	/4 of Sect	tion , County	T N, R	Long County Co		° Civil T			/illage	Feet	□ s			Feet 🗍 W
i aciiii	<i>y</i> 110			i	Kewaunee		31	1	Kewa		.(57 01)	rmage					
Sar	nple						<u></u>						Soil	Prope	rties		
	(ii)	ts	Ş		Soil/R	tock Description						٥,					
r. De	Au.	Coun	In Fo			eologic Origin For		S	ာ	٤	Q	cssiv	5 +		ity		cmts
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet		Eac	ch Major Unit		SC	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plastícity Index	P 200	RQD/ Comments
Ź \$	고 조 48	<u>m</u>	ă	DIFA	r dark brow	n to black (10YR	3/2)	<u> </u>	<u> </u>	<u>≯ ∆</u>	죠	ŬĞ	ΣŬ		E E	<u> </u>	<u> </u>
CS	22.5			moist,		THO DIACK (TOTAL	5/2),		2 2.2								
			I 						41 91								
			-						77 77 7 77								
			-2						2 32								
			- ,						77 7								
			-3						2 32								
			4						77 77 77 77								
2 CS	48 43.2		- "	As ab	ove, wet.				77 71								
			E 5						7 77								
									77 77								
			-6						77 77 7 77								
			-						12 11/2								
			7						71 71								
									77 77 7 77								
			8	E.O.B	3. at 8 feet b				<u> </u>								
															ĺ		
															Ì		
	l																
									<u> </u>		<u> </u>						
		y that (he info	mation o	n this form is t	ue and correct to the bo	est of my kn	owledy	ge.								
Signat	ure					Firm RN 744	IT, Inc. Heartland	rail M	1adison	. WI 53	3717						508-831-4444 508-831-3334

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in 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 this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

WI DNR 2003.GDT 4/22/10

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98 Waste Management Watershed/Wastewater Route To: Remediation/Redevelopment Other 1 οſ Page License/Permit/Monitoring Number Boring Number Facility/Project Name M9F Kewaunee Marsh Date Drilling Completed Drilling Method Boring Drilled By: Name of crew chief (first, last) and Firm Date Drilling Started Geoprobe 3/17/2010 3/17/2010 On-Site Environmental Services Borehole Diameter WI Unique Well No. DNR Well ID No. Common Well Name Final Static Water Level Surface Elevation 2.1 inches Feet MSL 582.0 Feet MSL Local Grid Location (estimated:) or Boring Location Local Grid Origin Lat 243,969 N, 2,616,703 E S/C/N State Plane \square E Feet [] W Feet S 1/4 of 1/4 of Section Long County Code Civil Town/City/ or Village Facility ID County 31 Kewaunee Kewaunee Soil Properties Sample Length Att. & Recovered (in) Soil/Rock Description Compressive Strength Depth In Feet Blow Counts And Geologic Origin For Comments Plasticity Index Number and Type Moisture PID/FID SCS Diagram Content Graphic Liquid Limit Each Major Unit Well 10g 177 l CS PEAT, dark brown to black (10YR 3/2), 48 14.4 4 34 wet, soft. 77 7 Cap material present from 1-1.3 feet bgs. 4 34 77 7 - 2 4 34 711 71 3 4 34 11/1 1, 11, -4 48 As above very wet from 4-6.5 feet bgs. 41, 1 43.2 4 14 - 5 11/11 2 24 6 12 1 4 14 7 717 7 1, 11, 11, 1 - 8 E.O.B. at 8 feet bgs. Thereby certify that the information on this form is true and correct to the best of my knowledge.

Signature RMT, Inc. Tel: 608-831-4444 744 Heartland Trail Madison, WI 53717 Fax: 608-831-3334

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in 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 this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

Appendix H Memo: 2011 Baseline Monitoring – Colloid and Long-Term Stability Evaluation



TRC Environmental Corporation 708 Heartland Trail, Suite 3000 Madison, WI 53717

Main 608.826.3600 Fax 608.826.3941

Memorandum

From: Bob Stanforth, Ph.D.

Subject: 2011 Baseline Monitoring – Colloid and Long-Term Stability Evaluation

Kewaunee Marsh Source Area Remediation

Date: January 2012

Project No.: 186467.0000.0000.000003

Background

The arsenic source area in Kewaunee Marsh was remediated in October 2011 and baseline performance monitoring was completed in November 2011 using 16 site monitoring wells. The arsenic results of the water analysis were much higher than expected for the wells constructed in or near the treatment area. These include MW11-1, MW11-2 and MW11-3 completed in the peat, and nested wells MW11-1i and MW11-3i completed in the underlying silt. The results for the wells in question are presented below in Table 1.

Table 1
2011 Baseline Water Monitoring Results

			CONDUCTIVITY	ARSENIC	CALCIUM	IRON	SULFATE		
WELL	COLOR	mç	g/L						
Wells in Peat Material									
MM11-1	Light yellow	6.41	6,462	304	590	112	3,340		
MW11-2	Light yellow	6.88	5,322	108	429	165	3,120		
MW11-3	Light yellow	7.12	2,197	360	285	1.28	<2		
Wells in Or	ganic Silt								
MW11-1i	Light gray	6.99	1,209	121	128	3.94	124		
MW11-3i	Clear	7.12	1,299	153	154	3.70	15.9		

Treated Material

Water collected from MW11-1 and MW11-2 is from area that was treated, as indicated both by their location and by the high sulfate and calcium concentrations in the water. Both sulfate and calcium are contributed to the water by the treatment process (sulfate from the ferrous sulfate and calcium from the limestone). The presence of the calcium and sulfate indicate that the marsh material has been treated and the high arsenic numbers are not the results of incomplete treatment. Based on all the previous treatability results and on the SPLP tests on treated material collected during the remediation, there is no reason to believe that the arsenic stabilization would not be successful. Two possible explanations for the high arsenic levels are evaluated below.

Colloid Evaluation

Based on all the previous treatability results and on the SPLP tests on treated cell material during the remediation, there is no reason to believe that the treatment would not be successful. However, iron concentrations are also much higher than would be expected in the water, and this provides a possible explanation for the high arsenic levels. Most likely, the high arsenic concentrations are due to colloidal ferric hydroxide or ferric arsenate solids which may be passing through the 0.45μ filter used to differentiate dissolved and particulate metals and is being measured as "dissolved" iron. Iron hydroxide solids often occur in the colloidal size range, and can pass through the filter.

As mentioned, the iron concentrations in the water are unexpectedly high. At the pH values of the samples, the dissolved iron concentrations under oxic conditions where ferric iron is the stable form should be very low – much less than 1 mg/L. The presence of such high iron concentrations – in the 100 mg/L range – suggests that the iron is not truly dissolved. While ferrous iron is more soluble than ferric iron, these concentrations are above what would be expected for ferrous iron in the presence of carbonate. A calculation of the theoretical ferrous iron concentration in water under these conditions illustrates the point. Since the treatment process involved the addition of calcium carbonate, the carbonate concentration in the water will be controlled by the dissolved calcium concentration, as shown from the following dissolution reaction for limestone.

$$CaCO_3 \leftrightarrow Ca^{2+} + CO_3^{2-}$$

 $K_{sp, CaCO_3} = [Ca^{2+}][CO_3^{2-}] = 5 \times 10^{-9}$

The ferrous iron concentration, in turn will be controlled by the precipitation of ferrous carbonate, as follows:

$$FeCO_3 \leftrightarrow Fe^{2+} + CO^{2-}$$
 $K_{spFeCO3} = [Fe^{2+}][CO_3^{2-}] = 2 \times 10^{-11}$

The concentrations for all three species (calcium, ferrous iron and carbonate) are described by their respective solubility constants (K_{sp}). Since there is solid calcium carbonate present in the treated material, the concentrations of both calcium and carbonate will be controlled by the dissolution of the limestone. The carbonate concentration is the same for both solubility equations, which means that we can calculate the theoretical ferrous iron concentrations from the K_{sp} s and the calcium concentration, as follows:

$$\begin{split} [Fe^{2+}][CO_3^{2-}] \ / \ [Ca^{2+}][CO_3^{2-}] &= K_{spFeCO_3} \ / \ K_{sp,\ CaCO_3} \end{split}$$

$$(\ [Fe^{2+}][CO_3^{2-}] \) \ / \ (\ [Ca^{2+}][CO_3^{2-}] \) &= 2 \times 10^{-11} \ / \ 5 \times 10^{-9} \\ [Fe^{2+}] \ / \ [Ca^{2+}] &= 4 \times 10^{-3} \\ [Fe^{2+}] &= 4 \times 10^{-3} \ (\ [Ca^{2+}]) \end{split}$$

In the presence of 500 mg/L calcium (or 0.0125 M Ca²⁺), the dissolved iron concentration in the water should be

$$0.0125 \times 4 \times 10^{-3} = 5 \times 10^{-5} M$$
, or 2.8 mg/L

Iron concentrations are orders of magnitude higher than the theoretical solubility value, indicating that it is unlikely that the iron concentrations are due to dissolved ferrous iron in the water.

Thus the most likely explanation for the high iron concentrations is that particulate ferric iron particles are passing through the filter, and these carry arsenic with them.

Long Term Stability Evaluation

Stabilization of arsenic using ferric iron can be reversed if the iron is reduced to the ferrous oxidation state. Thus, an alternative explanation for the elevated arsenic concentrations in the treated hot spot area could be that the iron has been reduced. However, this explanation does not appear likely for several reasons.

- 1. As discussed above, ferrous iron is not soluble in the water to the concentrations observed due to the presence of carbonate from the limestone.
- 2. To reduce that much iron (100 mg/L or more) would require a significant amount of reducing agent. While the organics in the marsh will favor reducing conditions over time, the organics are stable at this point (since they have been in the marsh for an extended time period and the readily reduced material has already reacted), and it is highly doubtful that they would react this quickly.
- 3. Ferrous iron oxidizes very quickly at the pH values observed in the sample once it is exposed to air. Acid is generated during this oxidation process. If the iron were in the

- ferrous oxidation state, one would expect that some of the iron would oxidize during sampling using a bailer and the pH would drop. In contrast, the pH values are where they are expected to be following treatment, and there is no suggestion that ferrous iron oxidation has occurred.
- 4. Iron reduction was not observed in the treatability testing completed for the site in 2010, including samples that were incubated under conditions that should have encouraged reduction if it were going to occur. These samples from the 2010 treatability study were stored in anaerobic conditions in the lab, and analyzed for SPLP arsenic in January 2012 to evaluate the potential for iron reduction. The results from the 2010 treatability study, including the analysis from January 2012, are summarized below in Table 2. The results from the bench scale test suggest that even after two years reaction time, iron reduction is not observed, and the SPLP arsenic concentrations are near or below detection and consistent with the level of stabilization seen in at the time of original treatment in 2010.

Table 2
Results of Long-term Stability Treatability Study Results

		SCREENI	NG SPLP
	SAMPLE	рН	As, mg/L
Ballast			
Untreated	d	8.91	13
Treated	Immediate	6.56	<0.013
	10 Day	7.46	<0.013
	1 month	7.63	<0.013
	3 month	7.74	<0.013
	7 month	7.8	0.020
	23 months	7.7	0.020
Peat Und	ler Ballast		
Untreated	d	8.36	11
Treated	Immediate	6.71	<0.013
	10 Day	7.31	<0.013
	1 month	7.44	<0.013
	3 month	7.54	<0.013
	7 month	7.4	0.025
	23 months	7.7	0.02

Table 2
Results of Long-term Stability Treatability Study Results

		SCREENII	NG SPLP
	SAMPLE	рН	As, mg/L
Peat in N	larsh		
Untreated	d	8.33	18
Treated	Immediate	5.70	<0.013
	10 Day	6.93	<0.013
	1 month	6.97	<0.013
	3 month	7.45	<0.013
	7 month	7.1	0.033
	23 months	7.5	0.02
Organic	Silt in Marsh		
Untreated	b	8.76	2.5
Treated	Immediate	7.21	<0.013
	10 Day	7.46	<0.013
	1 month	7.56	<0.013
	3 month	7.77	<0.013
	7 month	7.65	0.022
	23 months	7.7	<0.013

Notes

Treatability study methods are described in the Hot Spot Investigation and Remedial Options Analysis Report (RMT, 2010).

Conclusions

The most likely explanation describing the elevated arsenic concentrations in MW11-1 and MW11-2, is that arsenic is not truly dissolved (and mobile), but rather is associated with finely divided iron particles that have passed through the filter. If this is the explanation, then the high arsenic levels noted in the water samples are not mobile at the site. The colloids do not travel very far in most groundwater and certainly would not be transported far in the marsh given the slow groundwater flow. Further, the colloidal concentrations should decrease over time as the colloids settle out, and the concentrations should be much lower in future sampling events.

Appendix I Proposed Spring 2012 Sampling Methods

Appendix I Proposed Water Sampling Methods – Spring 2012 Evaluation Kewaunee Marsh – Kewaunee, Wisconsin

Purpose

To evaluate if the elevated arsenic concentrations in the water in the treatment area are associated with colloidal particles, and determine if changes are needed in the sampling protocol to obtain representative samples of the dissolved phase arsenic concentrations at the Kewaunee Marsh.

Low Flow Sampling Evaluation

Evaluate options for low flow water collection methods to minimize disturbance of groundwater during sampling. The low hydraulic conductivity and slow recovery of the water in wells at the Kewaunee marsh may require that modified low flow sampling methods be used. TRC proposes evaluating the three general methods described below during the Spring 2012 sampling event. In all cases water levels will need to be monitored closely, using a water level indicator, in order to maintain adequate well volume prior to sampling. The methods listed below would be evaluated such that a low flow sampling protocol could be developed for the site.

- 1. Low flow sampling using a peristaltic pump and flow through cell. Collect sample using standard low flow sampling protocol, but allow for adjustment in pumping rates and frequency of parameter readings due to low well volume yields.
- 2. **Well volume purge and low flow sampling combination**. Remove initial stagnant well volume, or until well goes dry. Once the well has recovered, perform low flow stabilization/sampling using a peristaltic pump and flow through cell.
- 3. **Low flow sampling using a peristaltic pump and submerged meter probes**. Collect sample using low flow sampling protocol, but set meter down the well with sample tubing placed just above the meter. This method would allow for a significantly slower pump rates. Decontamination of the meter would be required between each well.

Filter Size Evaluation

Evaluate effect filter size has on the concentration of arsenic in water to determine if elevated arsenic concentrations are associated with colloidal particles (typical colloid size ranges from 0.001 and 1 micron). The methods listed below would be evaluated such that a modified filtration process could be developed for water sampling protocol at the site.

1. **Use a 0.20 micron field filter.** In addition to the current 0.45 micron field filtering process, samples would be run through a 0.20 micron filter after the 0.45 micron.

1

2. **Use laboratory filters less than 0.20 micron.** A 0.20 micron filter is the smallest filter size that can be applied in the field. Smaller filters (e.g. 0.02 micron) can be used in the laboratory following passing of a sample through a field filter. A subset of samples would be field filtered at the site and then subjected to further laboratory filtering prior to analysis for arsenic.

Sampling Plan

A systematic sampling approach is recommended to isolate components of the water sampling at Kewaunee Marsh that may be contributing to the measurement of elevated arsenic concentrations in the treatment area, and to determine modifications to the sampling protocol, if any, that would be recommended for water sampling at Kewaunee Marsh. The sampling program summarized below could be completed as part of the semi-annual performance monitoring program for the in situ treatment, or could be completed as an interim sampling event. All water samples would be analyzed for arsenic and iron.

FLOW METHOD	FILTER SAMPLING METHOD	SUGGESTED MONITORING WELLS	PURPOSE
Bailer (Current Method)	Field Filter: 0.45 µm	MW11-1 (treated) MW11-3 (untreated, high arsenic) MW04-9 (untreated, low arsenic)	Establish control conditions for current method
Bailer (1)	Field Filter: 0.2 µm Lab Filter: 0.02 µm	MW11-1 MW11-3 MW04-9	Determine effect of filter size on arsenic concentration without altering flow method
Low Flow 1 Low Flow 2 Low Flow 3	No Sample ⁽²⁾	MW11-2 MW11-3i MW02-3 (or any well not sampled)	Evaluate feasibility of suggested low flow methods on typical wells and select one method to use for sample collection
Selected Low Flow Method	Field Filter: 0.45 µm	MW11-1 (treated) MW11-3 (untreated, high arsenic) MW04-9 (untreated, low arsenic)	Determine effect flow method on arsenic concentration without altering filter size
Selected Low Flow Method ⁽¹⁾	Field Filter: 0.2 µm Lab Filter: 0.02 µm	MW11-1 MW11-3 MW04-9	Determine effect of combination of flow method and filter size on arsenic concentration

Notes

2

¹⁾ The samples from smaller filter sizes should be collected in series following the 0.45 µm filters using the suggested flow method.

No sample to be collected for laboratory analysis during evaluation of low flow sampling method.