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October 31, 2019

Mr. Kevin McNight
Wisconsin Department of Natural Resources
625 E County Road Y, Suite 700
Oshkosh, WI 54901

Subject: Remedial Action Options Report Transmittal
Tecumseh Products Company (Former) – Chromium Line
1604 Michigan Avenue, New Holstein, WI 53061
BRRTS: #02-08-363333

Dear Mr. McNight:

As requested by the Department, enclosed is the Remedial Action Options Report (RAOR) for the Tecumseh Products Company (Former) – Chromium Line in New Holstein, WI for your review and approval. TRC Environmental Corporation (TRC) prepared this RAOR on behalf of Tecumseh in response to the Department's request.

Also enclosed are Form 4400-237 and a check with the Wis. Admin. Code NR 749 review fee for $1,050. The RAOR was submitted electronically via the RR Program Submittal Portal.

If you have any questions, please contact me at (312) 800-5910 or via email at charvey@trccompanies.com.

Sincerely,

Chris Harvey, P.E.
Principal

Enclosure: RAOR
DNR Form 4400-237
Review Fee Check for $1,050

cc: Mr. Jason Smith/Tecumseh Products Co. – Paris, TN (electronic copy)
Mr. Curtis Toll/Greenberg Traurig, LLP – Philadelphia, PA (electronic copy)
Mr. Ron Bock/TRC – Irvine, CA (electronic copy)
Ms. Victoria Stovall/WDNR – Milwaukee, WI (Review Fee)

State of Wisconsin
Department of Natural Resources
PO Box 7921, Madison WI 53707-7921
dnr.wi.gov

Technical Assistance, Environmental Liability Clarification or Post-Closure Modification Request

Form 4400-237 (R 12/18)

Notice: Use this form to request **a written response (on agency letterhead)** from the Department of Natural Resources (DNR) regarding technical assistance, a post-closure change to a site, a specialized agreement or liability clarification for Property with known or suspected environmental contamination. A fee will be required as is authorized by s. 292.55, Wis. Stats., and NR 749, Wis. Adm. Code., unless noted in the instructions below. Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records law [ss. 19.31 - 19.39, Wis. Stats.].

Definitions

"Property" refers to the subject Property that is perceived to have been or has been impacted by the discharge of hazardous substances.

"Liability Clarification" refers to a written determination by the Department provided in response to a request made on this form. The response clarifies whether a person is or may become liable for the environmental contamination of a Property, as provided in s. 292.55, Wis. Stats.

"Technical Assistance" refers to the Department's assistance or comments on the planning and implementation of an environmental investigation or environmental cleanup on a Property in response to a request made on this form as provided in s. 292.55, Wis. Stats.

"Post-closure modification" refers to changes to Property boundaries and/or continuing obligations for Properties or sites that received closure letters for which continuing obligations have been applied or where contamination remains. Many, but not all, of these sites are included on the GIS Registry layer of RR Sites Map to provide public notice of residual contamination and continuing obligations.

Select the Correct Form

This from should be used to request the following from the DNR:

- Technical Assistance
- Liability Clarification
- Post-Closure Modifications
- Specialized Agreements (tax cancellation, negotiated agreements, etc.)

Do <u>not</u> use this form if one of the following applies:

- Request for an **off-site liability exemption or clarification** for Property that has been or is perceived to be contaminated by one or more hazardous substances that originated on another Property containing the source of the contamination. Use DNR's Off-Site Liability Exemption and Liability Clarification Application Form 4400-201.
- Submittal of an Environmental Assessment for the **Lender Liability Exemption**, s 292.21, Wis. Stats., **if no response or review by DNR is requested**. Use the Lender Liability Exemption Environmental Assessment Tracking Form 4400-196.
- Request for an **exemption to develop on a historic fill site** or licensed landfill. Use DNR's Form 4400-226 or 4400-226A.
- **Request for closure** for Property where the investigation and cleanup actions are completed. Use DNR's Case Closure - GIS Registry Form 4400-202.

All forms, publications and additional information are available on the internet at: dnr.wi.gov/topic/Brownfields/Pubs.html.

Instructions

1. Complete sections 1, 2, 6 and 7 for all requests. Be sure to provide adequate and complete information.
2. Select the type of assistance requested: Section 3 for technical assistance or post-closure modifications, Section 4 for a written determination or clarification of environmental liabilities; or Section 5 for a specialized agreement.
3. Include the fee payment that is listed in Section 3, 4, or 5, unless you are a "Voluntary Party" enrolled in the Voluntary Party Liability Exemption Program **and** the questions in Section 2 direct otherwise. Information on to whom and where to send the fee is found in Section 8 of this form.
4. Send the completed request, supporting materials and the fee to the appropriate DNR regional office where the Property is located. See the map on the last page of this form. A paper copy of the signed form and all reports and supporting materials shall be sent with an electronic copy of the form and supporting materials on a compact disk. For electronic document submittal requirements see: http://dnr.wi.gov/files/PDF/pubs/rr/RR690.pdf"

The time required for DNR's determination varies depending on the complexity of the site, and the clarity and completeness of the request and supporting documentation.

Section 1. Contact and Recipient Information

Requester Information

This is the person requesting technical assistance or a post-closure modification review, that his or her liability be clarified or a specialized agreement and is identified as the requester in Section 7. DNR will address its response letter to this person.

Last Name	First	MI	Organization/ Business Name		
Smith	Jason		Tecumseh Products Company		
Mailing Address			**City**	**State**	**ZIP Code**
2700 West Wood Street			Paris	TN	38242
Phone # (include area code)	**Fax # (include area code)**		**Email**		
(731) 644-8127	(731) 644-8156		jason.smith@tecumseh.com		

The requester listed above: (select all that apply)

- ☐ Is currently the owner
- ☐ Is considering selling the Property
- ☐ Is renting or leasing the Property
- ☐ Is considering acquiring the Property
- ☐ Is a lender with a mortgagee interest in the Property
- ☒ Other. Explain the status of the Property with respect to the applicant:

Responsible Party

Contact Information (to be contacted with questions about this request)

☐ Select if same as requester

Contact Last Name	First	MI	Organization/ Business Name		
Harvey	Chris	D	TRC Environmental Corporation		
Mailing Address			**City**	**State**	**ZIP Code**
230 West Monroe St., Suite 630			Chicago	IL	60606
Phone # (include area code)	**Fax # (include area code)**		**Email**		
(312) 578-0870	(312) 578-0877		charvey@trccompanies.com		

Environmental Consultant (if applicable)

Contact Last Name	First	MI	Organization/ Business Name		
Harvey	Chris	D	TRC Environmental Corporation		
Mailing Address			**City**	**State**	**ZIP Code**
230 West Monroe St., Suite 630			Chicago	IL	60606
Phone # (include area code)	**Fax # (include area code)**		**Email**		
(312) 578-0870	(312) 578-0877		charvey@trccompanies.com		

Property Owner (if different from requester)

Contact Last Name	First	MI	Organization/ Business Name		
Langenfeld	Casey		City of New Holstein		
Mailing Address			**City**	**State**	**ZIP Code**
2110 Washington St.			New Holstein	WI	53061
Phone # (include area code)	**Fax # (include area code)**		**Email**		
(920) 898-5766	(920) 898-5879		clangenfeld@wppienergy.org		

Section 2. Property Information

Property Name				FID No. (if known)
Tecumseh Products Co. (former) - Chromium Line				
BRRTS No. (if known)	Parcel Identification Number			
02-08-363333	18919, 18569, 18921, 18646, 18465, 18450, 18568			
Street Address	City		State	ZIP Code
1604 Michigan Avenue	New Holstein		WI	53061
County	Municipality where the Property is located	Property is composed of:		Property Size Acres
Calumet	(●) City ( ) Town ( ) Village of New Holstein	( ) Single tax parcel (●) Multiple tax parcels		38

1. Is a response needed by a specific date? (e.g., Property closing date) Note: Most requests are completed within 60 days. Please plan accordingly.

   (●) No ( ) Yes

   Date requested by: ________________

   Reason:

   ____

2. Is the "Requester" enrolled as a Voluntary Party in the Voluntary Party Liability Exemption (VPLE) program?

   (●) No. **Include the fee that is required for your request in Section 3, 4 or 5.**

   ( ) Yes. **Do not include a separate fee.** This request will be billed separately through the VPLE Program.

Fill out the information in Section 3, 4 or 5 which corresponds with the type of request:
Section 3. Technical Assistance or Post-Closure Modifications;
Section 4. Liability Clarification; or Section 5. Specialized Agreement.

Section 3. Request for Technical Assistance or Post-Closure Modification

Select the type of technical assistance requested: **[Numbers in brackets are for WI DNR Use]**

- ☐ No Further Action Letter (NFA) (Immediate Actions) - NR 708.09, [183] - **Include a fee of $350.** Use for a written response to an immediate action after a discharge of a hazardous substance occurs. Generally, these are for a one-time spill event.
- ☐ Review of Site Investigation Work Plan - NR 716.09, [135] - **Include a fee of $700.**
- ☐ Review of Site Investigation Report - NR 716.15, [137] - **Include a fee of $1050.**
- ☐ Approval of a Site-Specific Soil Cleanup Standard - NR 720.10 or 12, [67] - **Include a fee of $1050.**
- ☒ Review of a Remedial Action Options Report - NR 722.13, [143] - **Include a fee of $1050.**
- ☐ Review of a Remedial Action Design Report - NR 724.09, [148] - **Include a fee of $1050.**
- ☐ Review of a Remedial Action Documentation Report - NR 724.15, [152] - **Include a fee of $350**
- ☐ Review of a Long-term Monitoring Plan - NR 724.17, [25] - **Include a fee of $425.**
- ☐ Review of an Operation and Maintenance Plan - NR 724.13, [192] - **Include a fee of $425.**

Other Technical Assistance - s. 292.55, Wis. Stats. [97] (For request to build on an abandoned landfill use Form 4400-226)

- ☐ Schedule a Technical Assistance Meeting - **Include a fee of $700.**
- ☐ Hazardous Waste Determination - **Include a fee of $700.**
- ☐ Other Technical Assistance - **Include a fee of $700.** Explain your request in an attachment.

Post-Closure Modifications - NR 727, [181]

- ☐ Post-Closure Modifications: Modification to Property boundaries and/or continuing obligations of a closed site or Property; sites may be on the GIS Registry. This also includes removal of a site or Property from the GIS Registry. **Include a fee of $1050, and:**
  - ☐ Include a fee of $300 for sites with residual soil contamination; and
  - ☐ Include a fee of $350 for sites with residual groundwater contamination, monitoring wells or for vapor intrusion continuing obligations.

  Attach a description of the changes you are proposing, and documentation as to why the changes are needed (if the change to a Property, site or continuing obligation will result in revised maps, maintenance plans or photographs, those documents may be submitted later in the approval process, on a case-by-case basis).

Skip Sections 4 and 5 if the technical assistance you are requesting is listed above and complete Sections 6 and 7 of this form.

Section 4. Request for Liability Clarification

Select the type of liability clarification requested. Use the available space given or attach information, explanations, or specific questions that you need answered in DNR's reply. Complete Sections 6 and 7 of this form. **[Numbers in brackets are for DNR Use]**

☐ "Lender" liability exemption clarification - s. 292.21, Wis. Stats. [686]

- **Include a fee of $700.**

Provide the following documentation:

(1) ownership status of the real Property, and/or the personal Property and fixtures;

(2) an environmental assessment, in accordance with s. 292.21, Wis. Stats.;

(3) the date the environmental assessment was conducted by the lender;

(4) the date of the Property acquisition; for foreclosure actions, include a copy of the signed and dated court order confirming the sheriff's sale.

(5) documentation showing how the Property was acquired and the steps followed under the appropriate state statutes.

(6) a copy of the Property deed with the correct legal description; and,

(7) the Lender Liability Exemption Environmental Assessment Tracking Form (Form 4400-196).

(8) If no sampling was done, please provide reasoning as to why it was **not** conducted. Include this either in the accompanying environmental assessment or as an attachment to this form, and cite language in s. 292. 21(1)(c)2.,h.-i., Wis. Stats.:

h. The collection and analysis of representative samples of soil or other materials in the ground that are suspected of being contaminated based on observations made during a visual inspection of the real Property or based on aerial photographs, or other information available to the lender, including stained or discolored soil or other materials in the ground and including soil or materials in the ground in areas with dead or distressed vegetation. The collection and analysis shall identify contaminants in the soil or other materials in the ground and shall quantify concentrations.

i. The collection and analysis of representative samples of unknown wastes or potentially hazardous substances found on the real Property and the determination of concentrations of hazardous waste and hazardous substances found in tanks, drums or other containers or in piles or lagoons on the real Property.

☐ "Representative" liability exemption clarification (e.g. trustees, receivers, etc.) - s. 292.21, Wis. Stats. [686]

- **Include a fee of $700.**

Provide the following documentation:

(1) ownership status of the Property;

(2) the date of Property acquisition by the representative;

(3) the means by which the Property was acquired;

(4) documentation that the representative has no beneficial interest in any entity that owns, possesses, or controls the Property;

(5) documentation that the representative has not caused any discharge of a hazardous substance on the Property; and

(6) a copy of the Property deed with the correct legal description.

☐ Clarification of local governmental unit (LGU) liability exemption at sites with: (select all that apply)

☐ hazardous substances spills - s. 292.11(9)(e), Wis. Stats. [649];

☐ Perceived environmental contamination - [649];

☐ hazardous waste - s. 292.24 (2), Wis. Stats. [649]; and/or

☐ solid waste - s. 292.23 (2), Wis. Stats. [649].

- **Include a fee of $700, a summary of the environmental liability clarification being requested, and the following:**

(1) clear supporting documentation showing the acquisition method used, and the steps followed under the appropriate state statute(s).

(2) current and proposed ownership status of the Property;

(3) date and means by which the Property was acquired by the LGU, where applicable;

(4) a map and the ¼, ¼ section location of the Property;

(5) summary of current uses of the Property;

(6) intended or potential use(s) of the Property;

(7) descriptions of other investigations that have taken place on the Property; and

(8) (for solid waste clarifications) a summary of the license history of the facility.

Section 4. Request for Liability Clarification (cont.)

☐ Lease liability clarification - s. 292.55, Wis. Stats. [646]

❖ **Include a fee of $700 for a single Property, or $1400 for multiple Properties and the information listed below:**

(1) a copy of the proposed lease;

(2) the name of the current owner of the Property and the person who will lease the Property;

(3) a description of the lease holder's association with any persons who have possession, control, or caused a discharge of a hazardous substance on the Property;

(4) map(s) showing the Property location and any suspected or known sources of contamination detected on the Property;

(5) a description of the intended use of the Property by the lease holder, with reference to the maps to indicate which areas will be used. Explain how the use will not interfere with any future investigation or cleanup at the Property; and

(6) all reports or investigations (e.g. Phase I and Phase II Environmental Assessments and/or Site Investigation Reports conducted under s. NR 716, Wis. Adm. Code) that identify areas of the Property where a discharge has occurred.

General or other environmental liability clarification - s. 292.55, Wis. Stats. [682] - Explain your request below.

❖ **Include a fee of $700 and an adequate summary of relevant environmental work to date.**

☐ No Action Required (NAR) - NR 716.05, [682]

❖ **Include a fee of $700.**

Use where an environmental discharge has or has not occurred, and applicant wants a DNR determination that no further assessment or clean-up work is required. Usually this is requested after a Phase I and Phase II environmental assessment has been conducted; the assessment reports should be submitted with this form. This is not a closure letter.

☐ Clarify the liability associated with a "closed" Property - s. 292.55, Wis. Stats. [682]

❖ **Include a fee of $700.**

- Include a copy of any closure documents if a state agency other than DNR approved the closure.

Use this space or attach additional sheets to provide necessary information, explanations or specific questions to be answered by the DNR.

Section 5. Request for a Specialized Agreement

Select the type of agreement needed. Include the appropriate draft agreements and supporting materials. Complete Sections 6 and 7 of this form. More information and model draft agreements are available at: dnr.wi.gov/topic/Brownfields/lgu.html#tabx4.

☐ Tax cancellation agreement - s. 75.105(2)(d), Wis. Stats. [654]

❖ **Include a fee of $700, and the information listed below:**

(1) Phase I and II Environmental Site Assessment Reports,

(2) a copy of the Property deed with the correct legal description.

☐ Agreement for assignment of tax foreclosure judgement - s.75.106, Wis. Stats. [666]

❖ **Include a fee of $700, and the information listed below:**

(1) Phase I and II Environmental Site Assessment Reports,

(2) a copy of the Property deed with the correct legal description.

☐ Negotiated agreement - Enforceable contract for non-emergency remediation - s. 292.11(7)(d) and (e), Wis. Stats. [630]

❖ **Include a fee of $1400, and the information listed below:**

(1) a draft schedule for remediation; and,

(2) the name, mailing address, phone and email for each party to the agreement.

Section 6. Other Information Submitted

Identify all materials that are included with this request.

Send both a paper copy of the signed form and all reports and supporting materials, and an electronic copy of the form and all reports, including Environmental Site Assessment Reports, and supporting materials on a compact disk.

Include one copy of any document from any state agency files that you want the Department to review as part of this request. The person submitting this request is responsible for contacting other state agencies to obtain appropriate reports or information.

- ☐ Phase I Environmental Site Assessment Report - Date: ______
- ☐ Phase II Environmental Site Assessment Report - Date: ______
- ☐ Legal Description of Property (required for all liability requests and specialized agreements)
- ☐ Map of the Property (required for all liability requests and specialized agreements)

Analytical results of the following sampled media: Select all that apply and include date of collection.

☐ Groundwater ☐ Soil ☐ Sediment ☐ Other medium - Describe: ______

Date of Collection: ______

- ☐ A copy of the closure letter and submittal materials
- ☐ Draft tax cancellation agreement
- ☐ Draft agreement for assignment of tax foreclosure judgment
- ☐ Other report(s) or information - Describe: ______

For Property with newly identified discharges of hazardous substances only: Has a notification of a discharge of a hazardous substance been sent to the DNR as required by s. NR 706.05(1)(b), Wis. Adm. Code?

○ Yes - Date (if known): ______
○ No

Note: The Notification for Hazardous Substance Discharge (non-emergency) form is available at: dnr.wi.gov/files/PDF/forms/4400/4400-225.pdf.

Section 7. Certification by the Person who completed this form

☐ I am the person submitting this request (requester)

☒ I prepared this request for: Tecumseh Products Company
Requester Name

I certify that I am familiar with the information submitted on this request, and that the information on and included with this request is true, accurate and complete to the best of my knowledge. I also certify I have the legal authority and the applicant's permission to make this request.

[signature]
Signature

10/31/2019
Date Signed

Principal
Title

312-578-0870
Telephone Number (include area code)

Remedial Action Options Report

Tecumseh Products
Former Plating Line

New Holstein, Wisconsin

Activity No. 02-08-363333, FID 408020690

October 31, 2019

Prepared by:

TRC Environmental Corporation

230 West Monroe, Suite 630

Chicago, Illinois 60606

Remedial Action Options Report

Tecumseh Products
Former Plating Line

New Holstein, Wisconsin

Activity No. 02-08-363333, FID 408020690

Prepared by:
TRC Environmental Corporation
230 West Monroe, Suite 630
Chicago, Illinois 60606

TRC Project No. 107927.0200

October 31, 2019

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EXECUTIVE SUMMARY

TRC Environmental Corporation (TRC), on behalf of Tecumseh Products Company (TPC), has prepared this Remedial Action Options Report (RAOR) in response to the Wisconsin Department of Natural Resources (WDNR) letter dated July 10, 2019, which directed its preparation and submittal. The purpose of the RAOR is to evaluate remedial options and to establish the preferred alternative, or combination of alternatives, for completing remediation of residual chromium contamination associated with the former plating line area (hereafter also referred to as the "Site") that was located within the former TPC facility ("Facility") in New Holstein, WI (Figure 1). The remedial options were evaluated based on their capacity to restore the environment, to the extent practicable, within a reasonable period of time and to minimize the harmful effects of the contamination to the air, land, or waters of the state (NR 722.07)(3)(a). Upon completion of the remedial activities recommended in this report, including any post-remedial monitoring necessary to verify that residual contaminants are stable and/or decreasing and no longer pose a threat to human health or the environment, then TRC/TPC will pursue a formal case closure from the WDNR.

Prior soil and groundwater investigations completed at the Site confirmed the presence of residual subsurface chromium contamination beneath the floor of the Facility. Remedial actions have included demolition and removal of the plating equipment, limited soil excavation and disposal of chromium-impacted soils and continued Monitored Natural Attenuation (MNA) of the residual groundwater plume as approved by WDNR and consistent with the Soil Performance Standard (SPS) proposed for the Site. The SPS consists of 1) an institutional control recorded against the property restricting the use of the Site to industrial use and prohibiting any groundwater use; 2) an engineered barrier or cap over the Site (in this case the existing building foundation) to prevent surface water infiltration; and 3) establishment of a long term Maintenance Plan for the proper management of the cap.

For the past ten years, groundwater monitoring has been completed to evaluate the effectiveness of MNA as the final step in the remedial process. Initially, the groundwater monitoring results were promising and indicated groundwater concentrations were stable and decreasing and the proposed SPS would be protective of human health and the environment (TRC, 2015a). In recent years, however, there have been sporadic increases of chromium concentrations in groundwater at discrete locations within the source area that resulted in the WDNR request for the RAOR.

TRC evaluated several remedial options to address the residual hexavalent chromium impacts. Remedial options were assessed based on the following criteria: long-term effectiveness, short-term effectiveness, implementability, restoration time frame, and economic feasibility. Additionally, based upon recent discussions and collaboration between the City of New Holsten (the "City") and Tecumseh, we learned that the City is desirous of demolishing the buildings on the property and bringing the Site back into productive re-use while respecting the institutional and engineering controls that are to remain. Therefore, TRC's evaluation also includes the consideration that the Facility is likely to be demolished and subsequently redeveloped by the City during 2020 and therefore sequencing of the building demolition, remedy implementation and protection of the existing foundation/cap must be integrated into remedial evaluation and selection. As a result, the timing/sequencing of the demolition was incorporated into the preferred alternative to make best use of the accessibility and enhanced safety benefits of conducting the remediation after the Site structure is demolished.

Based on these evaluation criteria, TRC proposes the following remedy selection and implementation program:

1. Demolition by the City of the buildings at the Facility while maintaining existing wells and the existing floors/foundations;
2. Upon completion of the demolition of the Facility structures, TRC is recommending In-Situ Chemical Reduction (ISCR) and soil mixing to remediate the residual chromium groundwater plume and underlying potential source areas present beneath the former plating line. In the source area, TRC proposes to inject additives (reducing agents) to reduce mobile chromate in groundwater to an insoluble form;
3. Following the implementation of the ISCR injection program, TRC will demobilize and the City will fill in the pits and cap the foundation floor areas;
4. TRC will utilize MNA as the final step of the remediation process after the ISCR implementation.

1.0 SITE INFORMATION

The Facility is currently designated as an open Environmental Repair Program (ERP) site (Activity No. 02-08-363333; FID 408020690) by the WDNR. The substance of concern is listed as hexavalent chromium (Cr (VI)) without co-contamination. The ERP classification dates to September 24, 2002.

Owner:	City of New Holstein formerly Heus Manufacturing (Heus) and formerly Tecumseh Products Company (TPC)
Project Name:	Tecumseh Products Former Plating Line, New Holstein, Wisconsin
Site Address:	1604 Michigan Avenue, Calumet County, Wisconsin
Respondents Contact/Phone:	S. Jason Smith Tecumseh Products Company 2700 West Wood Street Paris, TN 38242 731-644-8127
Consultant Contact/Phone:	Chris Harvey, PE TRC Environmental Corporation 230 West Monroe, Suite 630 Chicago, IL 60606 312-578-0870, ext. 1910

This document follows the guidelines as presented in WAC NR 722.13. The document presents TRC's evaluation of the current issues that have impacted the Site and our proposed remedies to address the source of the contamination as well as impacts to groundwater.

1.1 Certifications

I, Chris Harvey, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Principal 34186-006

Signature, title and P.E. number

WISCONSIN CHRISTOPHER D. HARVEY E-34186-006 CHICAGO IL PROFESSIONAL ENGINEER

P.E. stamp

I, John Rice, hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03 (1), Wis. Adm. Code, am registered in accordance with the requirements of ch. GHSS 2, Wis. Adm. Code, or licensed in accordance with the requirements of ch. GHSS 3, Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Hydrogeologist 10-28-2019

Signature and title Date

WISCONSIN JOHN M. RICE PH-20 MADISON WIS. PROFESSIONAL HYDROLOGIST

1.2 Document Organization

This document is organized into five sections.

- Section 1.0, Executive Summary, contains the purpose of the document, a history and description of the Site and an overview of the document organization.
- Section 2.0, Summary of the geologic and hydrogeologic characteristics based upon site investigations.
- Section 3.0, Identification of Remedial Action Options and Evaluation.
- Section 4.0, Selected Remedial Action.
- Section 5.0, References.

1.3 Facility and Site Location

The Site is located along the southwest part of the manufacturing plant at 1604 Michigan Avenue in New Holstein, Calumet County, Wisconsin (Figure 2). The Facility is located in the northeast portion of New Holstein, in Section 10, Township 17 North, Range 20 East. The Facility was formerly owned by TPC and Heus. The Facility was a small engine manufacturing plant that previously operated a plating line in the southwest corner of the building. The former plating line ceased operation during the 1970s. No active operations are being undertaken at the Facility. The City of New Holstein took ownership of the property in 2017.

In November 2014, the following use restrictions were recorded to the property:

- Digging, excavating or grading of any land surface, including but not limited to any activity which would remove or modify the existing barriers or covers;
- Constructing or reconstructing a well; and
- Using or occupying the property for office or residential purposes without constructing or otherwise implementing all necessary and appropriate remedial devices necessary to protection human health and the environment from residual contamination, including vapor barriers.

The Facility is situated on the east flank of a shallow valley that trends roughly to the northwest and leads to a low-lying area approximately 2,500 feet northwest of the plant building. The surrounding areas consist of mixed commercial (south and west), residential (east), and agricultural (north).

2.0 BACKGROUND

Several investigations have been completed at the Site. Previous site investigations (URS 2002; New Fields 2004; TRC 2006 and 2009) delineated the extent of soil impact beneath the plant building where the former plating line was located, and in soils outside the building. In addition, these investigations determined the direction of groundwater flow, assessed the concentration and distribution of dissolved chromium species (total, Cr(VI), and Cr(III)), and evaluated the presence of typical plating-related metals and cyanide. During the investigations and groundwater monitoring, total dissolved chromium consisted of predominantly dissolved hexavalent chromium and future sampling would focus on the total dissolved chromium, as approved by WDNR (WDNR, 2013).

For the past ten years, groundwater monitoring has been completed to evaluate the effectiveness of MNA as the final step in the remedial process as approved by the WDNR in letter dated December 2, 2008. A Case Closure Request was submitted to WDNR on May 25, 2015, indicated groundwater concentrations were stable and decreasing and the proposed Soil Performance Standard (SPS) would be protective of human health and the environment (TRC, 2015a). The SPS consisted of an institutional control for industrial use, no use of groundwater, a cap and a Maintenance Plan for the proper management of the existing cap. WDNR rejected the case closure request due to concerns about chromium concentrations in the source area (WDNR, 2015). WDNR also requested additional groundwater monitoring and additional evaluation of remediation action (WDNR, 2015). TRC responded to WDNR with a work plan, which proposed additional groundwater monitoring, and determined that the preferred remedy was MNA (TRC, 2015b).

Beginning in 2016, only the plume monitoring wells that exceeded the ES point-of-compliance for total dissolved chromium (>100 µg/L) were being monitored. These monitoring wells included MW-A, MW-B, MW-E, MW-8, TEC-3, and TEC-4. At the request of WDNR, beginning in April 2017, the groundwater sampling events included the six plume monitoring wells, three additional monitoring wells (TEC-1, NH-2, NH-26), and three additional groundwater sample analyses (dissolved hexavalent chromium, ferrous iron, and total organic carbon [TOC]). The additional analyses were included to assess the geochemical composition of the subsurface materials with respect to MNA.

A Groundwater Monitoring Report, which summarized the above analyses, was submitted to the WDNR on June 21, 2017. The report concluded that 1) the contaminant plume remains stable and has not shown any migration from previous sampling events, 2) the groundwater impacts do not pose a threat to human health or the environment, and 3) that natural attenuation continues to control the migration of chromium impacts and is still a viable remedy for the site (TRC, 2017a). An additional Groundwater Monitoring Plan was submitted to the WDNR on July 11, 2017. According to the plan, TRC proposed to perform a groundwater sampling event in 2019 on monitoring wells MW-E, TEC-3, TEC-4, MW-8, NH-26, MW-A, and MW-B (TRC, 2017b). Lead concentrations were below the ES in 2014.

The WDNR responded with a letter on August 22, 2017 approving the long-term monitoring plan with the following notable stipulations.

- Monitoring well NH-7 had to be added to the monitoring schedule.
- Monitoring wells MW-5, TEC-1, MW-24, and MW-F (at a minimum) should be sampled in the final sampling event prior to submittal of a case closure request.
- If groundwater contaminant trends in source area wells (TEC-3, TEC-4, and NH-26) do not allow for case closure after the 2019 sampling event, evaluation of additional remedial alternatives will need to be conducted to facilitate site closure.

In March 2019, TRC completed the groundwater monitoring event and submitted the 2019 Groundwater Monitoring Event. Total dissolved Cr exceeded the WDNR Enforcement Standard (ES) and the Preventative Action Limit (PAL) established in Chapter NR 140, Groundwater Quality, of the Wisconsin Administrative Code (WAC) in two monitoring wells (MW-B and MW-5). Seven monitoring wells exceeded the ES in 2019 (MW-A, MW-E, TEC-1, TEC-3, TEC-4, NH-7 and NH-26). The report concluded that 1) the contaminant plume remains stable and has not shown any migration from previous sampling events, 2) the groundwater impacts do not pose a threat to human health or the environment, and 3) that natural attenuation continues to control the migration of chromium impacts and is still a viable remedy for the site (TRC, 2019). WDNR responded with a letter, dated July 10, 2019, and directed TRC to prepare and submit a RAOR.

TRC and TPC has learned that the City of New Holstein will be undergoing redevelopment activities on the Site, including demolition of the building structures. The City of New Holstein intends to leave the building floor and to fill in concrete pits with flowable fill or concrete slurry to maintain the existing cap. According to the City of New Holstein, the target date to start the building demolition process is Spring 2020 with demolition activities starting in Fall 2020.

2.1 Regional and Site Geology

New Holstein is located within the Eastern Ridges and Low Lands Province of Wisconsin. Regional geology in the vicinity of New Holstein consists of unconsolidated glacial deposits overlying Silurian and Ordovician aged sedimentary bedrock. The contact between the bedrock and the overlying glacial deposits represents an unconformity and an erosional surface. Glacial deposits consist of unstratified clay, silt, sand, gravel, and boulders deposited as a ground moraine.

The municipal water supply for the City of New Holstein extracts groundwater from the underlying Niagara, New Richmond, and St. Peter formations. Well logs for New Holstein City wells 1, 2, and 3 indicate that the upper most bedrock unit consists of the Niagara Dolomite. The Niagara Dolomite was encountered in City Well 1 to a depth of 410 feet, in City Well 2 to a depth of 480 feet, and in City Well 3 to a depth of 450 feet. The Niagara Dolomite overlies interbedded shales and dolomites of the upper Ordovician-aged Richmond Formation. The Richmond Formation overlies the middle Ordovician aged St. Peter Sandstone. The top of the St. Peter

Sandstone was encountered at a depth of 881 feet in City Well 1, but not encountered in City wells 2 and 3, which were terminated at depths of 492 and 450 feet, respectively.

Unconsolidated deposits overlying the bedrock include silty clay and silt units with interbedded thin silty sand seams. Soil from surface to 3 feet below ground surface (bgs) is characterized by various dark, sandy fill material with various cinders and slag near the railroad. Soil greater than 3 feet bgs is clay or silty, sandy clay (glacial till).

The uppermost bedrock unit was encountered in the TEC-1A boring at a depth of 43 feet below ground surface. Dolomite was recovered in the rock core collected between 43 and 48 feet below ground surface in the TEC-1A boring. This uppermost bedrock unit consists of a fine-grained crystalline dolomite, with several vugs, and incipient fractures that are moderately to totally healed. The bedrock is slightly weathered, but a highly weathered zone was encountered between 45 and 46.5 feet.

2.2 Groundwater Flow

Groundwater was encountered in the unconsolidated glacial deposits ranging from 1.54 feet below ground surface (bgs) at MW-8 to 8.61 feet bgs at MW-H in March 2019. Water level measurements indicate that the overall direction of shallow groundwater flow at the Site is to the west-northwest, which is consistent with the ground surface topography of the Site and adjacent areas and confirms previous sampling events that have been undertaken at the Site. Static water levels measured were used to prepare potentiometric surface maps for this unit. Groundwater elevations measured for the unconsolidated aquifer are shown on Figure 3. Depth to water and groundwater elevations are summarized in Table 1.

In-situ hydraulic conductivity tests performed during the August 2002 site investigation were used to measure the hydraulic conductivity of the unconsolidated glacial deposits and the uppermost bedrock unit. Hydraulic conductivity estimates for the unconsolidated deposits are consistent with the range of hydraulic conductivities associated with silty material (Freeze, 1979). Measured values ranged from 1.73 x 10-5 cm/sec at TEC-1 to 6.09 x 10-5 cm/sec at MW-8. The measured hydraulic conductivity for TEC-1A is 7.16 x 10-5 cm/sec, which is also within the range of hydraulic conductivities for limestone and dolomite. Measured hydraulic conductivity values at each well location yielded a geometric mean of 3.83 x 10-5cm/sec.

Based on March 2019 groundwater elevations, the hydraulic gradient is approximately 0.019 feet/feet. Utilizing the geometric mean hydraulic conductivity of 3.83 x 10^{-5} cm/sec (7.54 x 10^{-5} ft/min), the hydraulic gradient of 0.019 feet/feet, and assuming an effective aquifer porosity of 30%, the average liner groundwater flow velocity is approximately 6.88 x 10^{-3} feet/day, or 2.5 feet/year.

2.3 Remediation Activities

The Site has undergone source area and remedial actions. When plating operations ceased, the plating equipment and operations were demolished and removed. Specific dates of removing the former plating line equipment is not available.

In August 2010, the United States Environmental Protection Agency (USPEA) completed a site assessment to document current site conditions and collect samples of remaining manufacturing and production materials that remained within the Facility. The assessment included the collection of soil samples just outside of the former Facility, in the area near the former chromium plating line. Analytical results indicated soil boring TE-S02-080410 (S02) at 0-1 foot bgs had a TCLP chromium concentration (28.6 mg/L) above the toxicity characteristic of 5 mg/L.

TRC conducted a limited chromium soil excavation on September 13, 2011 around soil boring S02. The excavation removed approximately 7.4 cubic yards of soil (approximately 2 feet deep). The excavated soil was transported to and disposed at the Envirite of Illinois facility in Harvey, Illinois. TRC collected confirmation soil samples PB-1 and PB-2 from the north and west walls of the excavation to assess the lateral extent of chromium impacts, and confirmation soil sample PB-3 was collected from the floor of the excavation to assess the vertical extent of impacts. The results from soil boring GP-13 were utilized as the sample for the south wall. Results of the confirmation soil samples were below RCLs and indicated no additional excavation activities were warranted in the area of S02. The excavation was backfilled with clean gravel. The soil excavation limits and the confirmation soil samples are depicted on Figure 4. The soil results are shown in Table 2. The soil excavation was documented in a letter to WDNR, dated September 30, 2011.

Based on groundwater monitoring results and WDNR recommendations (WDNR, 2008), groundwater impacts were addressed with MNA.

2.4 Soil

Residual chromium impacts in unsaturated soil that exceed the RCLs remain on-Site and are limited to the source area around the former chromium plating line as illustrated on Figure 4. The residual impacts are capped by the existing asphalt pavement and building foundation and roof.

Though not associated with the former plating line, residual lead impacts in unsaturated soil were detected above the industrial RCL in the upper 2 feet of soil at MW-G. The lead detected at MW-G is on the former Fanin Oil Property and is not believed to be associated with past operations at the former manufacturing Facility. The extent of lead impacts is shown on Figure 4.

Though not associated with the former plating line, residual arsenic impacts in the unsaturated soil were detected above the industrial RCL at NH-60. The arsenic detected at NH-60 is beneath the existing concrete slab and is not believed to be associated with past operations at the former manufacturing facility. The extent of arsenic impacts is shown on Figure 4.

Soil analytical results are summarized in Table 2.

2.5 Groundwater

On March 21, 2019, TRC completed a groundwater gauging and sampling event at the former Tecumseh chromium line remediation area. Chromium is the contaminant of concern (COC). Lead was not detected above the ES in 2014. Groundwater sampling was completed at monitoring wells MW-E, TEC-3, TEC-4, MW-8, NH-7, NH-26, MW-A, and MW-B. In addition, TRC also sampled MW-5, TEC-1 and MW-F in anticipation of being a final groundwater sampling event for submittal of case closure. TRC had intended to sample MW-24 as well, but this monitoring well was destroyed.

The groundwater analytical results are summarized in Table 3. The distribution of total dissolved chromium in groundwater is shown on Figure 5. The monitoring wells with total dissolved chromium exceeding the ES are shown on Figure 5.

Total dissolved chromium concentrations exceeded the ES in 7 of the 11 monitoring wells in March 2019 (MW-A, MW-E, TEC-1, TEC-3, TEC-4, NH-7 and NH-26). Monitoring wells MW-B and MW-5 exceeded the PAL in March 2019, but not the ES. The remaining two monitoring wells MW-F and MW-8 were below the ES and PAL.

As reported in the May 25, 2019, *Groundwater Monitoring Report*, in order to assess the current subsurface conditions of the Site, an evaluation of the dissolved chromium concentration trends has been completed. The extent of the total dissolved chromium has generally receded over time. The northern extent of dissolved chromium is likely not related to migration; dissolved chromium was likely there beforehand. The trend analysis charts were completed on monitoring wells which exceeded the ES. The trend analysis charts are provided in Attachment A. Based on these charts, which track dissolved chromium verses time, the following significant points can be made.

Source area monitoring well TEC-4 has remained stable through the last three groundwater sampling events. The overall concentrations of chromium have decreased compared to the 2011 and 2016 results. The high dissolved chromium concentration received during the April 22, 2016 groundwater sampling event appears to be an anomaly. Except for the April 2016 sampling event, concentrations have generally fluctuated between 10,000 µg/L and 30,000 µg/L.

Dissolved chromium concentrations in source area monitoring well TEC-3 shows a decreasing trend since 2015. Dissolved chromium concentrations in NH-26 show a significant decrease since the last sampling event in 2017.

Dissolved chromium concentrations in down-gradient monitoring wells MW-E and MW-A have had significantly lower concentrations from their maximum concentrations of the last three groundwater sampling events (MW-E maximum concentration 1,290 µg/L in 2014; MW-A maximum concentration 4,100 µg/L in 2007). Dissolved chromium concentrations in down-gradient monitoring well TEC-1 have continued to decline since 2010. The dissolved chromium concentrations in these three monitoring wells has dropped significantly over time from the maximum concentrations which were greater than 1,200 µg/L.

Dissolved chromium concentrations in down-gradient monitoring well NH-7 do not show a definitive trend. The concentration increased during the 2019 groundwater sampling event; however, these concentrations are still relatively low. Monitoring well NH-7 is near to and upgradient of MW-24 and NH-10, both of which have historical chromium results below the PAL and ES.

Based on geochemical results, there is no obvious difference between the geochemistry of the source area as compared to down-gradient.

Based on the evaluation of recent groundwater data, the overall extent of the dissolved contaminant plume remains generally stable compared with previous sampling events. Additionally, monitoring wells MW-B, MW-5, and MW-8 now lie outside of the impacted area above the ES indicating that the dissolved chromium has receded over time near the source area. These results confirm that natural attenuation continues to be effective in controlling and mitigating the migration of residual chromium impacts to groundwater and remains a viable remedy for the site and that no further evaluation of remedial alternatives is necessary.

The groundwater impacts do not pose a threat to human health or the environment. Moreover, there is a deed restriction recorded to the property limiting certain activities and uses that further acts to protect human health and the environment.

2.6 Additional Investigation and Analyses

TRC has collected additional analyses to determine the potential for the soil and groundwater to be remediated utilizing in-situ chemical reduction, as well as other treatment technologies. TRC evaluated the groundwater for the following parameters: pH, temperature, specific conductivity, oxygen reduction potential (ORP), and dissolved oxygen (DO). The levels of these were consistent with the hydrogeological characteristics of the area. The March 2019 results are presented in Attachment B.

In May 2007, TRC collected additional samples of both soil and groundwater to determine chromium, manganese, lead, cation exchange capacity, grain size, pH, total organic carbon, sulfates, nitrogen/nitrate, calcium, iron, magnesium, and chloride. These results are presented in Table 5. These analyses indicated that both the soil and groundwater matrices were amenable to a wide range of treatment technologies that would meet the clean-up standards. These analyses have enabled TRC to evaluate multiple remedial action options that are both technically and economically feasible.

None of the results from these field tests, as well as the laboratory analyses, would disqualify any of the remedial alternatives that TRC is evaluating.

3.0 IDENTIFICATION OF REMEDIAL ACTION OPTIONS

3.1 Remedial Action Objectives

Remedial action objectives were established for the purpose of evaluating remedial action options. The general objectives are removal of the source of contamination, reduction in overall levels of contamination in the groundwater, and reduction of risks to human health and the environment. Specific screening levels for the Site include the NR 720 industrial direct contact RCL of 6.36 mg/kg for hexavalent chromium and the NR 140 ES of 100 µg/l for total chromium. Based on TRC's experience at chromium-contaminated sites and a review of available technologies, potential remedial action options were identified for further screening to address the remedial action objectives. In this section, TRC identifies and evaluates a range of remedial action options, which in various combinations of the indicated technologies would address the indicated pathways and satisfy the WDNR requirements.

3.2 Evaluation Criteria

The evaluation criteria identified in NR 722.07 (4) are outlined below.

- **Long-term effectiveness:** reduction of toxicity and mobility in the long-term period.
- **Short-term effectiveness:** impacts on public health, safety and welfare, and the environment during construction and implementation.
- **Implementability:** technical and administrative feasibility of a remedy, including the availability of materials and services to implement a particular option.
- **Restoration time frame:** time frame needed to achieve remedial goals.
- **Economic feasibility:** cost-effectiveness of a remedy with regard to the project objectives. The costs include the estimated capital costs and annual operation and maintenance costs.

In addition, the planned Facility redevelopment and the demolition of the Facility building structure was factored into the preferred alternative and how the next steps must be integrated with the demolition activities.

3.3 Remedial Action Options

The location of these remedial options are being considered would encompass a portion of the Site that is currently designated as an open ERP Site (Activity No. 02-08-363333; FID 408020690). Refer to Table 4 for a comparison of evaluation criteria between remedial options.

3.3.1 In-Situ Chemical Reduction

Description

ISCR involves the introduction of a reducing agent into the subsurface to chemically reduce contaminants, converting hazardous contaminants to non-hazardous or less toxic compounds. Chromate can be effectively immobilized by reducing from Cr(VI) to the Cr(III) oxidation state. Cr(III) then precipitates as a solid hydroxide that is stable in groundwater with pH greater than 5 to 6 and a redox potential of less than 500 to 600 mV. Potential ISCR amendments for CR(VI) include ferrous sulfate, thiosulfate, metabisulfite, calcium polysulfide, zero valent iron (ZVI), or a variety of organics to either directly reduce Cr(VI) or stimulate the microbes in the subsurface to create reducing conditions. Reducing amendments would be injected evenly throughout the source area, causing a chemical reaction to reduce the Cr(VI) to a more stable and less toxic form of Cr(III) and cause precipitation of the chromium. Conversion of Cr(III) back to Cr(VI) is not expected at the Site, as extremely acidic conditions (pH less than 3.5) would be required.

Shallow groundwater beneath the site is in an oxic state, allowing contaminants such as Cr(VI) to be potentially mobile. The ISCR amendments would change the aquifer from an oxidizing environment to a reducing environment. The altered subsurface environment would chemically act upon the Cr(VI) species, reducing it to Cr(III), which would then precipitate from the groundwater as an immobile chromium hydroxide species.

Evaluation

ISCR has achieved the clean-up levels required under WAC, Chapter NR 140, Groundwater Quality, Chapter NR 720, Soil Cleanup Standards, and applicable references therein at contaminated sites with similar contamination levels and soil characteristics as the Site. This remedial option requires the approval (authorization by administrative rule, written letter of authorization, or issuance of a permit) by the WDNR under WAC Chapter NR 815 Injection Wells. There are no local or federal licenses, permits or approvals that are required for this option. This method has been evaluated as it relates to technical feasibility and economic feasibility and meets the criteria established in the code. The implementation of this remedy would be safer, easier and more economical without the deteriorated building structure in place. The expected capital costs and long-term monitoring costs to implement this remedy would be moderate**.** Costs would include a baseline groundwater monitoring event; a Site-specific pilot/bench study of ISCR amendments; installation of injection borings; ISCR amendment chemicals; one injection event; one potential reinjection event; and four post-remediation groundwater monitoring events.

Screening Decision

This remedy has been selected to remediate the dissolved contamination plume due to its ability to meet the project objectives to effectively reduce groundwater contaminant concentrations. This method will remove a significant portion of the saturated source area contamination beneath the Site.

3.3.2 Phytoremediation

Description

Phytoremediation is a process that uses plants to remove, stabilize, or destroy contaminants in the subsurface, as ionic, or non-particulate, metals are removed from the soil and groundwater by plant roots. Phytoremediation is a technically and economically viable remediation alternative when properly designed and managed, used in combination with other remediation technologies, and applied where site conditions are best suited for this remedy.

The most commonly used flora in phytoremediation projects are poplar trees due to their high growth rate. In addition, poplar trees draw large amounts of water from an aquifer relative to other plant species. This would reduce the total amount of water flowing through the contaminated portion of the aquifer, thereby reducing the amount of chromium potentially flushed out of the aquifer.

The trees would provide hydraulic control of the groundwater, and Cr(VI) would be converted to Cr(III) in the reducing environment surrounding the roots, known as the rhizosphere. As the groundwater is pulled towards the tree, the high-density bacterial populations in the rhizosphere would mitigate the Cr(VI) through immobilization or chemical reduction to CR(III). Cr(VI) not converted in the root zone would be taken up by the tree and converted to Cr(III) by biochemical mechanisms within the tree matrix and either sequestered or discharged through the roots.

Evaluation

Phytoremediation has achieved the clean-up levels required under WAC, Chapter NR 140, Groundwater Quality, Chapter NR 720, Soil Cleanup Standards, and applicable references therein at contaminated sites with similar contamination levels and soil characteristics as the Site. However, the technology could not be implemented within the source area below the building due to the limited locations in which the tree species could be planted. There are no local, state, or federal licenses, permits or approvals that are required for this option. This method has been evaluated as it relates to technical feasibility and economic feasibility and meets the criteria established in the code. The implementation of this remedy would be hindered by the planned redevelopment of the Facility. The expected capital costs and long-term monitoring costs to implement this remedy would be moderate. Costs would include limited excavation and off-site disposal of soil from planting areas; poplar planting; monitoring, maintenance, and potential replanting of poplars; and groundwater monitoring and reporting for contaminants of concern and natural attenuation parameters for a minimum of one year (4 quarterly sampling events).

Screening Decision

This remedial option has been eliminated from consideration due to the extremely compact site conditions, limited areas where trees could be planted, and inability to remediate the source area.

3.3.3 Groundwater Pump and Treat

Description

Pump and treat (P&T) remediation of groundwater contaminated with Cr(VI) would involve injecting water and solvents into the ground to flush the plume of contamination downgradient to an extraction well. The contaminated water would then be pumped to the surface and treated to remove the Cr(VI). Following treatment, the clean water would be re-injected into the ground. Residuals from the treatment process would be disposed at a facility licensed to accept this waste.

Evaluation

Groundwater P&T has achieved the clean-up levels required under WAC, Chapter NR 140, Groundwater Quality, Chapter NR 720, Soil Cleanup Standards, and applicable references therein at contaminated sites with similar contamination levels and soil characteristics as the Site. The technology could be implemented within the footprint of the Site to remove the source material. There are no local or federal licenses, permits or approvals that are required for this option. However, the WDNR approves the re-injection of pumped and treated water as defined in WAC NR 815. This method has been evaluated as it relates to technical feasibility and economic feasibility and meets the criteria established in the code. The implementation of this remedy would be safer, easier and more economical without the deteriorated building structure in place. The expected capital costs and long-term monitoring costs to implement this remedy would be high. Costs would include a baseline groundwater monitoring event; a Site-specific pilot/bench study of solvents used to flush the plume; solvent chemicals; installation of injection/withdrawal wells; installation of the P&T system; continued operation and maintenance of the P&T system; off-site disposal of treatment residuals; and long-term groundwater monitoring.

Screening Decision

This remedy has been eliminated from consideration due to the high cost, limited treatment effectiveness, the concrete cap, and long-term operation required to achieve clean-up standards.

3.3.4 Permeable Reactive Barriers

Description

A permeable reactive barrier (PRB) is a zone of reactive material that extends below the water table to intercept the contaminated groundwater and degrade or remove contaminants as groundwater flows through the barrier. PRBs are placed downgradient of the source area and perpendicular to groundwater flow to intercept the migration of contamination. The most common barrier utilized in treating chromium contaminated soil and groundwater is ZVI. ZVI is a reactive metal that reduces the Cr(VI) to Cr(III) by precipitating the chromium into a solid-phase hydroxide, making the chromium less toxic and immobile. Depending on the material used for the PRB, its reactivity can decrease with time or lose permeability with the deposit of chromium precipitates, thus reducing treatment effectiveness.

Evaluation

PRBs have achieved the clean-up levels required under WAC, Chapter NR 140, Groundwater Quality, Chapter NR 720, Soil Cleanup Standards, and applicable references therein at contaminated sites with similar contamination levels and soil characteristics as the Site. However, the locations to install the PRB would be limited. PRB installation within the footprint of the Facility is more feasible when the deteriorated structures are demolished. The technology could be implemented downgradient of the Facility to the southwest but would be limited by the narrow strip of land to the east of the property line and potential structural stability and work constraints near the Canadian National Railroad. This method has been evaluated as it relates to technical feasibility and economic feasibility and meets the criteria established in the code. The expected capital costs and long-term monitoring costs to implement this remedy would be high**.** Costs would include a baseline groundwater monitoring event; a Site-specific bench/pilot study of PRB amendments; excavation and off-site disposal of soil from PRB trench; potential shoring or geotechnical monitoring of Facility and/or railroad during construction; PRB amendment chemicals; PRB construction; site restoration; potential replacement of PRB due to decreased effectiveness over time; and groundwater monitoring and reporting for contaminants of concern and natural attenuation parameters for a minimum of one year (4 quarterly sampling events).

Screening Decision

This remedial option has been eliminated from consideration due to the inability to address source area contamination beneath the Facility and the technical difficulty of installing the PRB adjacent to the Canadian National Railroad.

3.3.5 Excavation and Off-Site Disposal

Description

Excavation and off-site disposal provides reductions of the chromium contamination through physical removal of the contaminated media. This remedial alternative would include excavation of the shallow unsaturated source area contamination below the former plating lines. Excavated soils would be transported and disposed at an off-site licensed disposal facility. Excavations would be backfilled with imported fill and surface covers replaced.

Evaluation

Excavation and off-site disposal has achieved the clean-up levels required under WAC, Chapter NR 140, Groundwater Quality, Chapter NR 720, Soil Cleanup Standards, and applicable references therein at contaminated sites with similar contamination levels and soil characteristics at the Site. The remedy could be implemented within the building footprint below the two former plating lines (Northern Former Plating Line and Former Plating Line) to remove the source material. Because the excavated soil quantity would exceed 2,200 lbs., classification as a Large Quantity Generator of hazardous waste would likely be required, per 40 CFR 262. The implementation of this remedy would be safer, easier and more economical without the deteriorated building structure in place. This method has been evaluated as it relates to technical feasibility and economic feasibility and meets the criteria established in the code. The expected capital costs and long-term monitoring costs to implement this remedy would be high. Costs would include a baseline groundwater monitoring event; administrative actions for Large Quantity Generator classification (e.g., contingency plans, training); excavation of unsaturated soil from the former plating lines; soil transport and disposal at a licensed hazardous waste landfill or treatment facility; potential shoring or geotechnical monitoring of facility and/or railroad during construction; imported backfill; site restoration; and groundwater monitoring and reporting for contaminants of concern and natural attenuation parameters for a minimum of one years (4 quarterly sampling events).

Screening Decision

This remedial option has been eliminated from consideration due to its administrative difficulty in implementation and high cost. Per NR 661.23, the maximum concentration for the toxicity characteristic leaching potential (TCLP) for chromium is 5.0 mg/L. No samples collected from within the former plating lines were analyzed for TCLP chromium. However, one sample collected to the west of the Facility (TE-S02) was analyzed for TCLP chromium and exceeded the TCLP standard. Total chromium concentrations below the former plating lines areas are similar, so soils excavated from both plating line areas will likely be categorized as hazardous waste and require disposal at a regulated hazardous waste landfill or treatment facility. The excavated soil quantity would exceed 2,200 lbs., necessitating compliance with federal hazardous waste regulations for Large Quantity Generators, per 40 CFR 262.

3.3.6 Soil Mixing

Description

Soil mixing involves the introduction of a reducing agent into the subsurface to chemically reduce contaminants, converting hazardous contaminants to non-hazardous or less toxic compounds. Chromate can be effectively treated by the reduction from Cr(VI) to the Cr(III) oxidation state. Potential soil mixing amendments for CR(VI) include ferrous sulfate, thiosulfate, metabisulfite, calcium polysulfide, ZVI, or a variety of organics to either directly reduce Cr(VI) or stimulate the microbes in the subsurface to create reducing conditions. Reducing amendments would be mixed throughout the unsaturated source areas, causing a chemical reaction to reduce the Cr(VI) to a more stable and less toxic form of Cr(III). Conversion of Cr(III) back to Cr(VI) is not expected at the Site, as extremely acidic conditions (pH less than 3.5) would be required.

Evaluation

Soil mixing has achieved the clean-up levels required under WAC, Chapter NR 140, Groundwater Quality, Chapter NR 720, Soil Cleanup Standards, and applicable references therein at contaminated sites with similar contamination levels and soil characteristics as the Site. The remedy could be implemented within the building footprint below the two former plating lines to remove the source material. There are no local, state, or federal licenses, permits or approvals that are required for this option. The implementation of this remedy would be safer, easier and more economical without the deteriorated building structure in place. This method has been evaluated as it relates to technical feasibility and economic feasibility and meets the criteria established in the code. The expected capital costs and long-term monitoring costs to implement this remedy would be moderate. Costs would include a baseline groundwater monitoring event; a Site-specific pilot/bench study of soil mixing amendments; site preparations (e.g., slab removal); soil mixing amendment chemicals; one soil mixing event; site restoration (e.g., slab replacement); and three post-remediation groundwater monitoring events.

Screening Decision

This remedial option is selected for the unsaturated soil source areas underlying the two former plating lines due to its ability to meet the project objectives to remove the source of contamination. This method will treat a significant portion of the unsaturated source area contamination beneath the former Tecumseh facility.

3.3.7 Monitored Natural Attenuation

Description

MNA allows the physical, chemical, and biological processes that, under favorable conditions, act without human intervention to reduce the concentration, toxicity, and/or mobility of the chromium. Sorption and reduction reactions are the most common MNA processes that reduce Cr(VI) contamination. For natural attenuation to be a viable option, sampling would be required to demonstrate that the contaminants in groundwater remain stable to decreasing.

Evaluation

MNA has achieved the clean-up levels required under WAC, Chapter NR 140, Groundwater Quality, Chapter NR 720, Soil Cleanup Standards, and applicable references therein at contaminated sites with similar contamination levels and soil characteristics as the Site. The remedy could be implemented within the building footprint to remove the source material, at areas outside of the building boundary, as well as potential off-site impacted locations. There are no local, state, or federal licenses, permits or approvals that are required for this option. This method has been evaluated as it relates to technical feasibility and economic feasibility and meets the criteria established in the code. The expected capital costs and long-term monitoring costs to implement this remedy would be low. Costs would include groundwater monitoring and reporting for contaminants of concern and natural attenuation parameters for a minimum of one year (4 quarterly sampling events).

Screening Decision

This remedial option is selected, in conjunction with active remediation conducted in the source area beneath the former plating lines, to address residual contamination within portions of the Site where chromium concentrations do not exceed cleanup standards.

3.4 Remedial Options Screening Summary

Table 4 examines each remedial option in accordance with the evaluation criteria as identified in NR 722.07(4). The ratings are qualitative and are reflective of the type and level of contamination present in both the soil and groundwater and the ability of the remedial options to achieve the relevant standards for the Site. Screening levels include the NR 720 industrial direct contact RCL of 6.36 mg/kg for hexavalent chromium and the NR 140 ES of 100 µg/l for total chromium. The remedial options proposed have been implemented at numerous sites and have achieved cleanup standards that are similar to those developed in NR 140.10. The remedial options that TRC has selected for further evaluation have the greatest success for achieving the clean-up goals for the Site.

4.0 SELECTED REMEDIAL ACTION OPTION

4.1 Description of Selected Remedial Option

TRC proposes to implement soil mixing to remediate the Cr(VI) in the unconsolidated portion of the source areas. ISCR will remediate the dissolved Cr(VI) in the groundwater within the source area. In addition, TRC would utilize MNA to actively monitor the effectiveness of the remedial actions and address areas in which active remediation was impractical. The proposed remedial option will address both potential leaching of chromium from soil to groundwater and dissolved phase chromium within the groundwater.

This remedy has been selected due to its ability to meet the project objectives to protect groundwater from residual soil sources and from residual groundwater sources. In addition, this remedy will remove a significant portion of the residual impacts beneath the building since the building may be demolished in 2020, pending approvals and funding. The selected remedy would have been significantly limited within the building due to structures and other obstructions and potential safety issues. This remedy has been evaluated as it relates to technical feasibility and economic feasibility and meets the criteria established in the code. The combination of these technologies will allow TRC to aggressively remediate the groundwater while reaching the residual impacts beneath the building.

Soil mixing will be implemented in the unsaturated soil source areas underlying the two former plating lines. Both unsaturated soil treatment areas will extend to six feet bgs—the approximate depth of the groundwater table. The treatment area for the southern Former Plating Line area will stop at approximately 6 feet from the Facility wall in order to create a 1:1 slope to maintain structural integrity of the building. Approximately 84 tons (56 CY) will be treated within the Northern Former Plating Line, while approximately 278 tons (185 CY) will be treated within the Former Plating Line. In total, approximately 362 tons (241 CY) will be treated within the unconsolidated chromium source areas. Potential soil mixing amendments for CR(VI) include ferrous sulfate, thiosulfate, metabisulfite, calcium polysulfide, ZVI, or a variety of organics to either directly reduce Cr(VI) or stimulate the microbes in the subsurface to create reducing conditions. The amendments will be mixed throughout the unsaturated soil treatment areas using a soil blender or a backhoe bucket.

In the saturated portion of the source area, TRC proposes to inject an ISCR amendment to reduce mobile chromium in groundwater to an insoluble form. The additives would convert the unconfined aquifer from an oxidizing environment to a reducing environment, thus lowering the toxicity and limiting mobility of the chromium. The altered subsurface environment would reduce the Cr(VI) species to Cr(III), which would then precipitate from the groundwater as a immobile chromium hydroxide species. Through this process, Cr(VI) would be reduced to a less toxic form and immobilized.

Based upon a treatability study, the appropriate amendment mixture would be injected through the borings into the contaminant plume. A grid of injection borings would be installed throughout the dissolved contaminant plume. The grid would include approximately 160 injection borings spaced at 12 foot intervals and extend approximately 100 feet east to west by 120 feet north to south. The target treatment depth would be approximately 25 feet thick (elevation of 925 feet above mean sea level [amsl] to 900 feet amsl) with ISCR amendments injected at four depth intervals within each boring.

TRC will utilize MNA to address areas where soil mixing and ISCR is impractical, and after the initial goals of the active remedial actions are achieved.

4.2 Proposed Schedule

Based upon recent discussions and collaboration between the City and Tecumseh, the City intends to demolish the buildings on the property and bring the Site back into productive re-use while respecting the institutional and engineering controls that are to remain. According to the City, the target date to start the building demolition process is Spring 2020 with demolition activities starting in Fall 2020. The timing/sequencing of the demolition was incorporated into the preferred alternative to make best use of the accessibility and enhanced safety benefits of conducting the remediation after the Site structures are demolished. TRC proposes the following remedy implementation schedule:

1. Demolition by the City of the buildings at the Facility while maintaining existing wells and the existing floors/foundations;
2. Upon completion of the demolition of the Facility structures, implement ISCR and soil mixing to remediate the residual chromium groundwater plume and underlying potential source areas present beneath the former plating line. In the source area, inject additives (reducing agents) to reduce mobile chromate in groundwater to an insoluble form;
3. Following the implementation of the ISCR injection program, the City will fill in the pits and cap the foundation floor areas;
4. Utilize MNA as the final step of the remediation process after the ISCR implementation.

The schedule to implement remediation accounts for the City demolition activities and milestones/tasks such as development and WDNR review of a Remedial Action Work Plan, pilot/bench scale study to determine preferred soil mixing and ISCR amendments, approval (authorization by administrative rule, written letter of authorization, or issuance of a permit) by the WDNR under WAC Chapter NR 815 Injection Wells, material acquisition, and field coordination. An additional 12-18 months is estimated to achieve performance standards and closure encompassing time allotted for chemical reactions and resulting concentration reductions within both the unsaturated and saturated subsurface.

4.3 Estimate of Total Cost

A preliminary estimate of the total cost required to implement the selected remedial action is $275,000. The total cost estimate includes all costs to implement the remedial action option listed in S. NR 722.07(4) (b) 1.

4.4 Performance Measurement

Relevant screening levels include the NR 720 industrial direct contact RCL of 6.36 mg/kg for hexavalent chromium and the NR 140 ES of 100 µg/l for total chromium. Performance evaluation of the selected remedies will be based on analysis of groundwater trends at existing Site monitoring wells.

4.5 Management of Treatment Residuals

Treatment residuals will not be generated by the remedial actions implemented at the Site. Limited investigation-derived waste materials will be generated during installation and sampling of groundwater monitoring wells.

4.6 Sustainability of Remedial Option

Per Wisconsin Code NR 722.09 (2m), the following sustainability criteria are evaluated for the selected remedial action.

- **Total energy use** – The selected remedial option requires limited total energy, as long-term operation of an active treatment system is not necessary. Energy use is limited to transport of equipment and materials to the Site, exhaust from backhoe/soil blender during soil mixing activities, exhaust from geoprobe during injection drilling activities, and field vehicle use. To minimize exhaust from these vehicles, equipment/materials will be obtained from nearby vendors and idling will be minimized, to the extent practicable.

- **Generation of air pollutants** – The selected remedial option will generate very limited quantities of air pollutants, which are limited to transport of equipment and materials to the Site, exhaust from backhoe/soil blender during soil mixing activities, exhaust from geoprobe during injection drilling activities, and field vehicle use. To minimize exhaust from these vehicles, equipment/materials will be obtained from nearby vendors and idling will be minimized, to the extent practicable.

- **Water use and impacts to water resources** – The selected remedial option requires very limited quantities of water for injection amendment mixtures and decontamination of equipment. Decontamination fluids will be minimized to the extent practicable to limit water use.

- **Future land use and enhancement of ecosystems** – Due to the industrial nature of the property, limited exposed soil or natural habitat is present at the Site. Care will be taken to minimize soil disturbance during any work within the limited vegetated areas to the southwest of the facility.

- **Reducing, reusing, and recycling materials and wastes** – Non-single use sampling equipment will be reused, where practical, to reduce waste. Recyclable field materials will be segregated from general refuse and managed by the appropriate recycling facility.
- **Optimizing sustainable management practices during long-term care and stewardship** – Active remediation of the source area minimizes the duration and activities required for long-term management. Potential sustainable management practices to be implemented include use of electronic field recording systems, electronic submittals where appropriate, and minimized travel distances for future site visits.

5.0 REFERENCES

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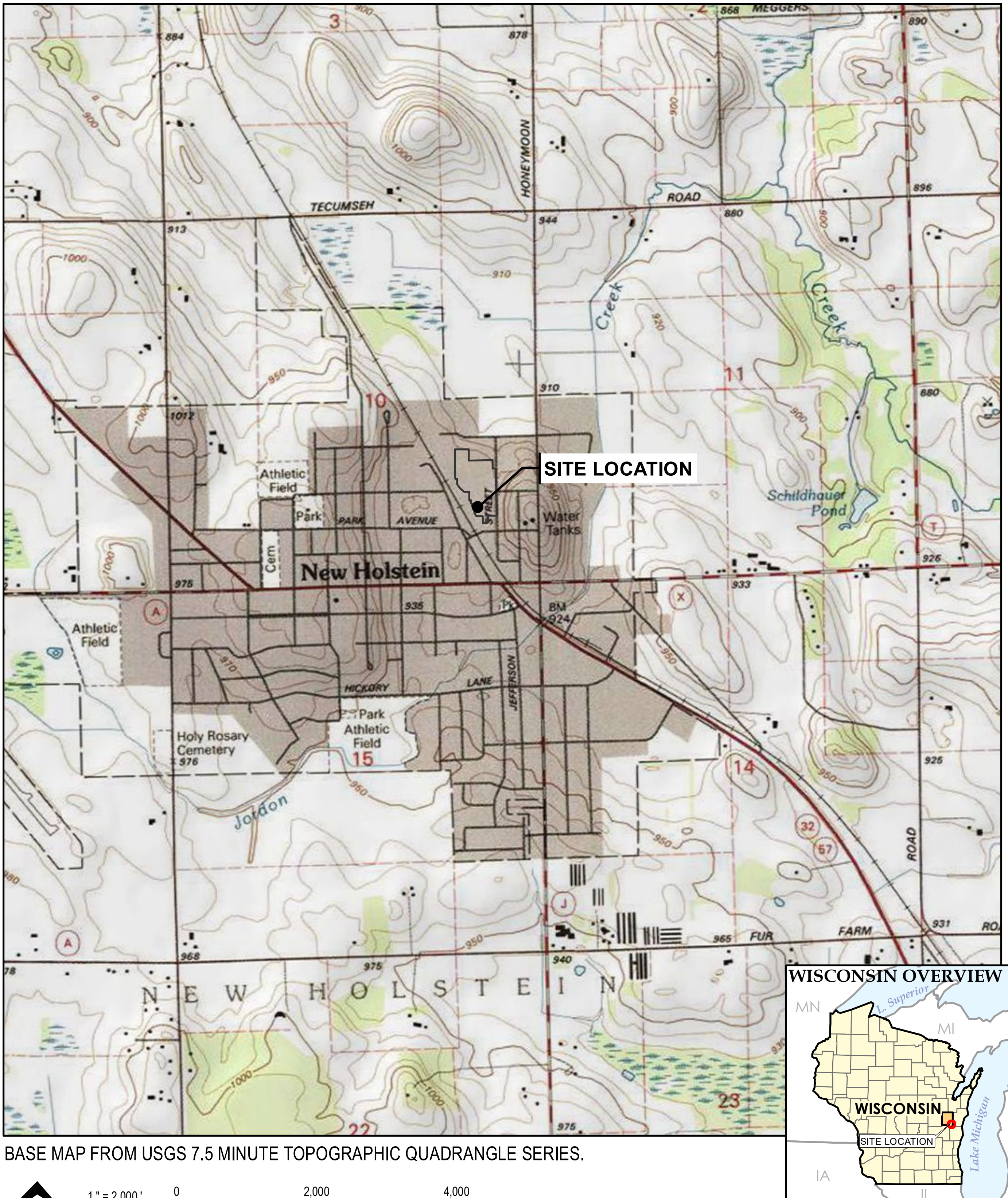
FIGURES

TRC - GIS



BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

N

1 " = 2,000 '
1:24,000

0 2,000 4,000 FEET

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BRRTS #02-08-363333
TECUMSEH PRODUCTS CO. (FORMER) - CHROMIUM LINE
NEW HOLSTEIN, WISCONSIN

FIGURE 1
SITE LOCATION MAP

DRAWN BY:	J. PAPEZ
APPROVED BY:	C. HARVEY
PROJECT NO:	107927-200-9300
FILE NO.	107927-200-013slm.mxd
DATE:	OCTOBER 2019

Saved By: RSUEMNICHT on 10/28/2019, 11:55:34 AM

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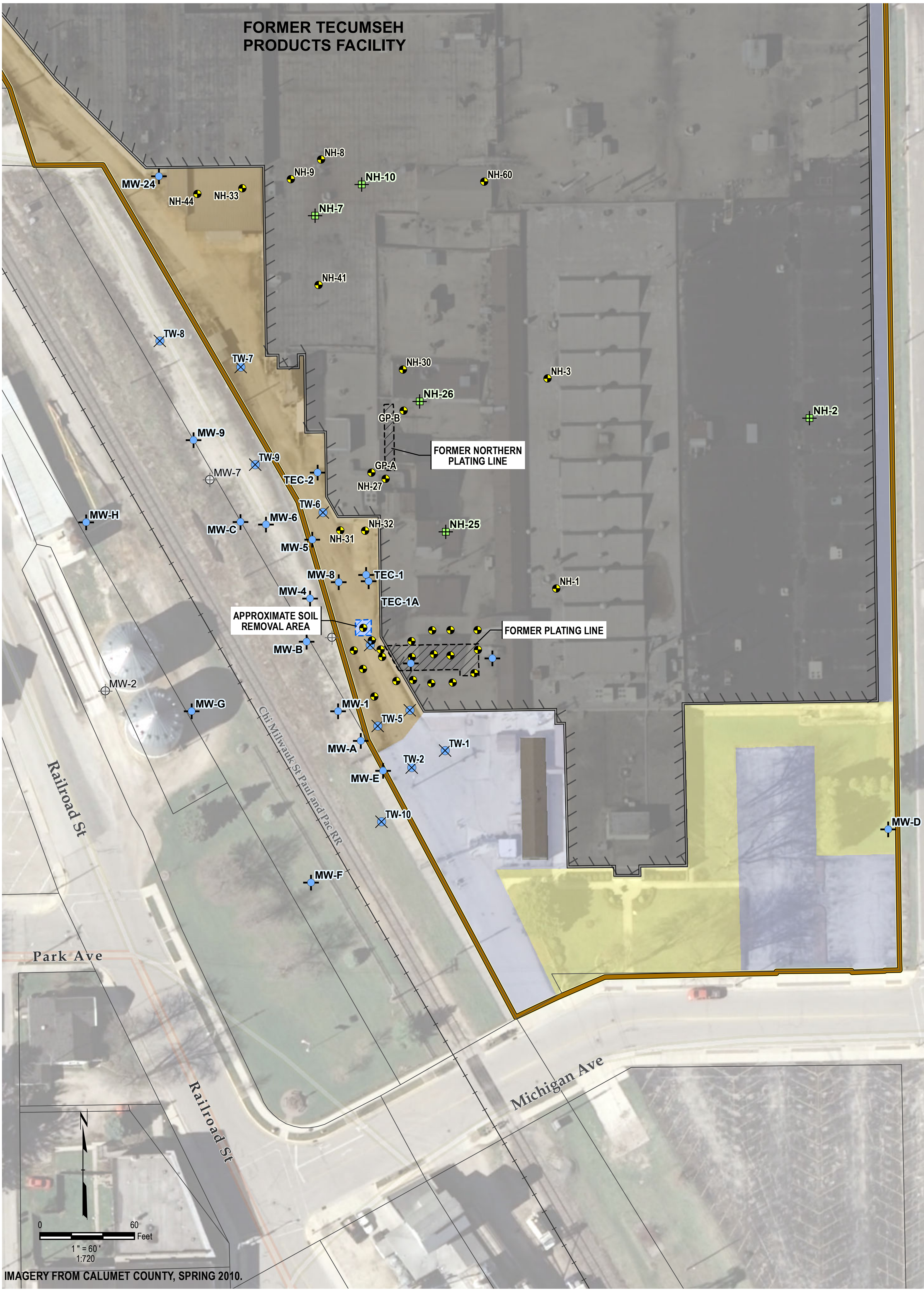

LEGEND

- PARCEL BOUNDARY
- MONITORING WELL (TRC)
- MONITORING WELL (R.E. LEE)
- SOIL BORING
- TEMP WELL/BORING (2003 NEWFIELDS)
- MONITORING WELL - DESTROYED/MISSING

CAP COVER TYPES

- EXISTING BUILDING CAP (STRUCTURAL IMPEDIMENT)
- GRASS CAP
- GRAVEL/GRASS CAP
- PAVEMENT CAP
- BUILDING
- SOIL EXCAVATION AREA (CLEAN BACKFILL)

PROJECT: **BRRTS #02-08-363333**
TECUMSEH PRODUCTS CO. (FORMER) - CHROMIUM LINE
NEW HOLSTEIN, WISCONSIN

SHEET TITLE: **SITE MAP**

DRAWN BY: J. PAPEZ	SCALE:	PROJ. NO.	107927-200-9300
CHECKED BY: C. HARVEY	1: 720	FILE NO.	107927-200-014.mxd
APPROVED BY: C. HARVEY	DATE PRINTED:	**FIGURE 2**	
DATE: OCTOBER 2019			

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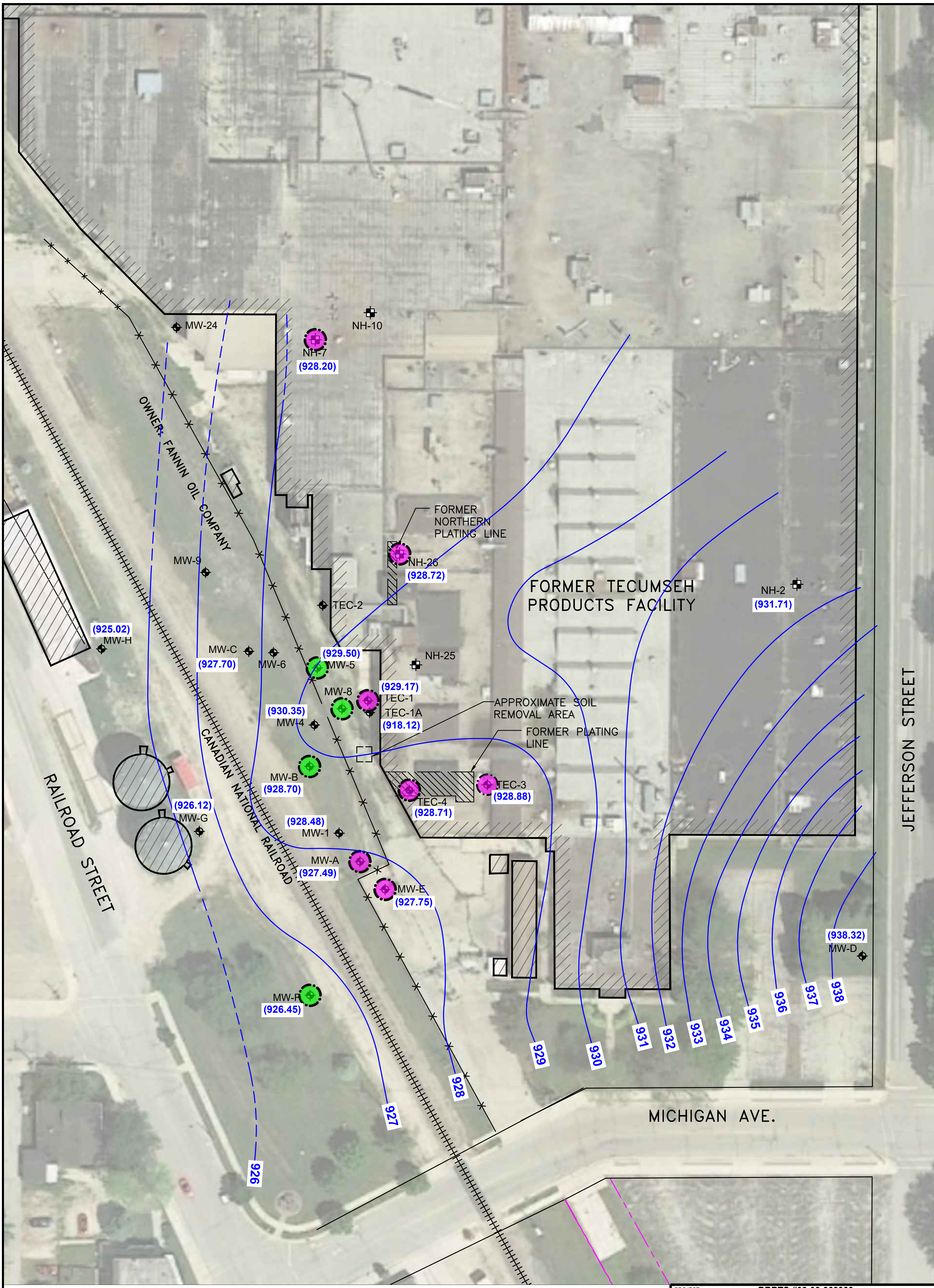
PLOT DATA

Drawing Name:	S:\PROJECTS\Tecumseh\Chromium Line Project - 107927\107927-15(CR LINE).dwg				
Operator Name:	ALBERTS, SCOTT	File Size:	0.69 Mb	Attached Xref's:	
Drawing Size:	11x17	Plot Date:	August 13, 2019	Attached Images:	Tecumseh aerials;
Layout:	FIGURE 3	Plot Time:	9:02 PM		



LEGEND:

- MONITORING WELL LOCATION
- MONITORING WELL INSTALLED BY ROBERT E. LEE & ASSOCIATES IN 2012
- RAILROAD TRACKS
- FENCE
- (926.45) GROUNDWATER ELEVATION - MARCH 2019
- GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER ELEVATION CONTOUR - ESTIMATED
- TOTAL CHROMIUM BELOW ENFORCEMENT STANDARD
- TOTAL CHROMIUM ABOVE ENFORCEMENT STANDARD
- WELLS SAMPLED IN 2019.

NOTE: MW-24 WAS FOUND TO BE DESTROYED DURING THE MARCH 2019 GROUNDWATER EVENT

N

0 60 120

SCALE IN FEET

PROJECT: **BRRTS #02-08-363333**

TECUMSEH PRODUCTS CO. (FORMER) - CHROMIUM LINE

NEW HOLSTEIN, WISCONSIN

TITLE:

GROUNDWATER ISOCONCENTRATION MAP - MARCH 2019

DRAWN BY:	S.ALBERTS	SCALE:	PROJ. NO.	107927
CHECKED BY:	T.GOMOLL	AS SHOWN	FILE NO.	107927-15(CR LINE).dwg
APPROVED BY:	C.HARVEY	DATE PRINTED:	**FIGURE 3**	
DATE:	APRIL 2019			

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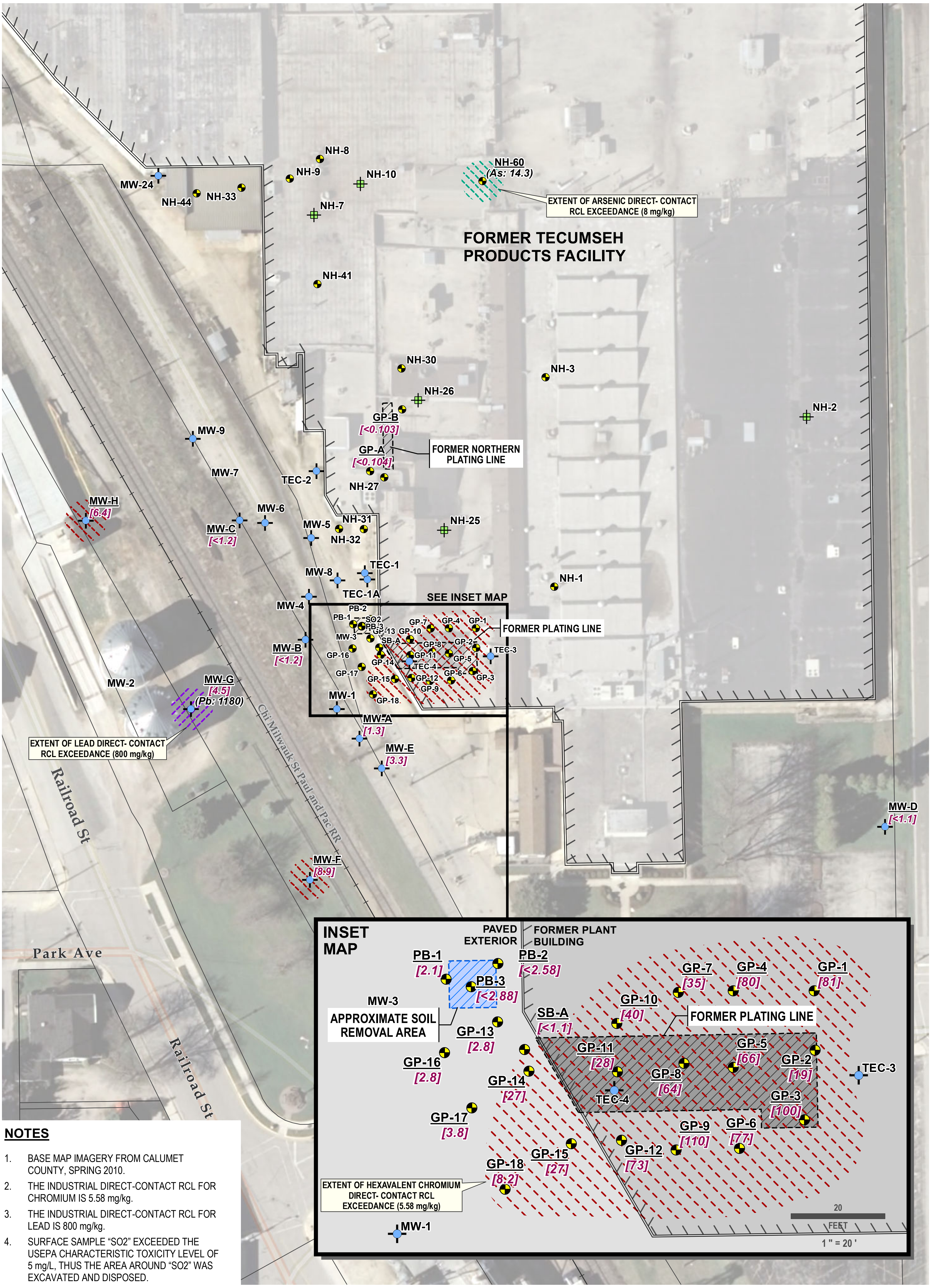

NOTES

1. BASE MAP IMAGERY FROM CALUMET COUNTY, SPRING 2010.
2. THE INDUSTRIAL DIRECT-CONTACT RCL FOR CHROMIUM IS 5.58 mg/kg.
3. THE INDUSTRIAL DIRECT-CONTACT RCL FOR LEAD IS 800 mg/kg.
4. SURFACE SAMPLE "SO2" EXCEEDED THE USEPA CHARACTERISTIC TOXICITY LEVEL OF 5 mg/L, THUS THE AREA AROUND "SO2" WAS EXCAVATED AND DISPOSED.

LEGEND

- PARCEL BOUNDARY
- BUILDING

SAMPLE LOCATIONS

- MONITORING WELL (TRC)
- MONITORING WELL (R.E. LEE)
- SOIL BORING

[6.4] HEXAVALENT CHROMIUM CONCENTRATION IN UNSATURATED SOIL (mg/kg)

(As: 14.3) OTHER PARAMETER EXCEEDING RCL

SOIL EXCAVATION AREA (CLEAN BACKFILL)

APPROXIMATE EXTENT OF SOIL EXCEEDING DIRECT-CONTACT RCL FOR CHROMIUM

APPROX. EXTENT OF SOIL EXCEEDING DIRECT CONTACT RCL FOR LEAD

APPROX. EXTENT OF SOIL EXCEEDING DIRECT CONTACT RCL FOR ARSENIC

0 60 Feet

1 " = 60 '

1:720

PROJECT:	BRRTS #02-08-363333 TECUMSEH PRODUCTS CO. (FORMER) - CHROMIUM LINE NEW HOLSTEIN, WISCONSIN		
SHEET TITLE:	SOIL MAP		
DRAWN BY: J. PAPEZ	SCALE:	PROJ. NO.	107927-200-9300
CHECKED BY: C. HARVEY	1: 720	FILE NO.	107927-200-015.mxd
APPROVED BY: C. HARVEY	DATE PRINTED:		FIGURE 4
DATE: OCTOBER 2019			

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Saved By: RSUEMNICHT on 10/28/2019, 11:56:12 AM
Path: E:\Tecumseh\NH_CrLine\2014_107927_200\107927-200-015.mxd

Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet (Foot US)
Map Rotation: 0

TRC - GIS

PLOT DATA
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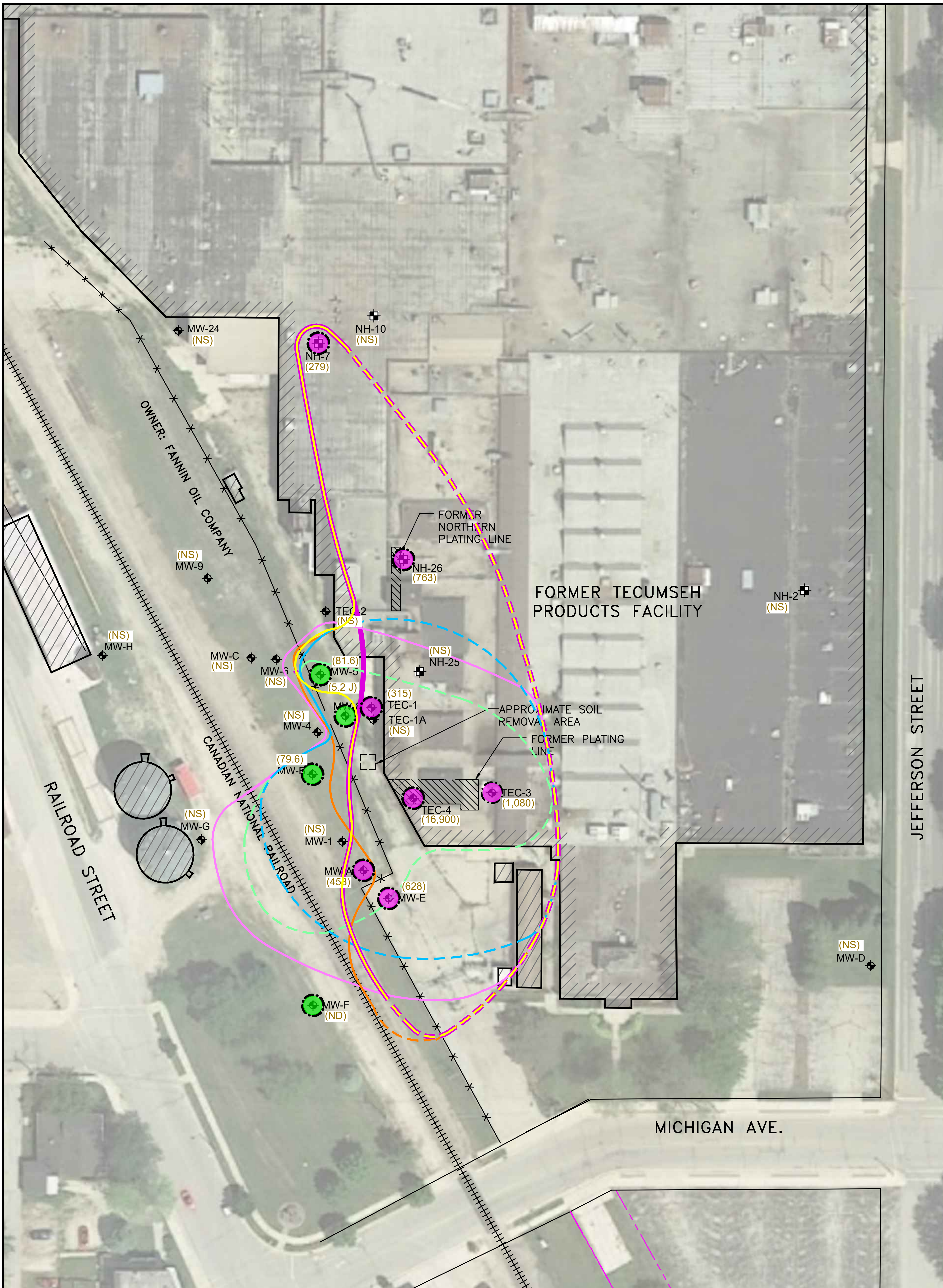
Operator Name: ALBERTS, SCOTT — File Size: 0.91 Mb — Attached Xref's:
Drawing Size: 11x17 — Plot Date: August 13, 2019 — Attached Images: Tecumseh aerials;
Layout: FIGURE 5 — Plot Time: 9:00 PM



LEGEND:

- MONITORING WELL LOCATION
- MONITORING WELL INSTALLED BY ROBERT E. LEE & ASSOCIATES IN 2012
- RAILROAD TRACKS
- FENCE
- (65) TOTAL DISSOLVED CHROMIUM (ug/L) - MARCH 2019
- (NS) NOT SAMPLED
- (ND) CHROMIUM NOT DETECTED
- TOTAL CHROMIUM BELOW ENFORCEMENT STANDARD
- TOTAL CHROMIUM ABOVE ENFORCEMENT STANDARD

ENFORCEMENT STANDARD POINT-OF-COMPLIANCE FOR TOTAL DISSOLVED CHROMIUM (100 ug/L) BY YEAR DASHED WHERE INFERRED

- 2019
- 2017
- 2014
- 2009
- 2005
- 2003/2002

NOTES:

1. SAMPLES COLLECTED MARCH 2019.
2. TEC-1A IS A DEEP WELL.

0 60 120
SCALE IN FEET

N

PROJECT: BRRTS #02-08-363333
TECUMSEH PRODUCTS CO. (FORMER) - CHROMIUM LINE
NEW HOLSTEIN, WISCONSIN

TITLE:
GROUNDWATER ISOCONCENTRATION MAP BY YEAR

DRAWN BY: S.ALBERTS	SCALE: AS SHOWN	PROJ. NO.	107927
CHECKED BY: T.GOMOLL		FILE NO.	107927-16(CR LINE).dwg
APPROVED BY: C.HARVEY	DATE PRINTED:	FIGURE 5	
DATE: APRIL 2019			

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TABLES

Table 1. Groundwater Level Data

Location	Top of Casing (TOC) Elevation (ft MSL)	June 8, 2009		September 23, 2009		December 28 & 29, 2009		March 29 & 30, 2010		March 18 & 19, 2011		May 15, 2012		June 20 & 21, 2013		August 18, 2014		April 22, 2016		September 7, 2016		April 26, 2017		March 21, 2019	
		Depth To Water Below TOC	Water Level Elevation	Depth To Water Below TOC	Water Level Elevation	Depth To Water Below TOC	Water Level Elevation	Depth To Water Below TOC	Water Level Elevation	Depth To Water Below TOC	Water Level Elevation	Depth To Water Below TOC	Water Level Elevation	Depth To Water Below TOC	Water Level Elevation	Depth To Water Below TOC	Water Level Elevation	Depth To Water Below TOC	Water Level Elevation	Depth To Water Below TOC	Water Level Elevation	Depth To Water Below TOC	Water Level Elevation	Depth To Water Below TOC	Water Level Elevation
MW-1	932.60	6.13	926.47	8.80	923.80	3.71	928.89	4.98	927.62	4.92	927.68	2.77	929.83	5.13	927.47	6.80	925.80	4.53	928.07	2.97	929.63	--	--	4.12	928.48
NH-2	935.34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.68	931.66	4.01	931.33	3.65	931.69	3.82	931.52	3.63	931.71
MW-4	932.24	4.32	927.92	7.55	924.69	2.56	929.68	3.77	928.47	3.56	928.68	2.67	929.57	4.08	928.16	5.62	926.62	3.36	928.88	3.03	929.21	--	--	--	--
MW-5	931.81	4.30	927.51	7.24	924.57	3.10	928.71	3.27	928.54	2.99	928.82	2.39	929.42	3.70	928.11	4.89	926.92	2.87	928.94	3.35	928.46	--	--	2.81	929.00
MW-6	931.90	5.23	926.67	8.45	923.45	3.17	928.73	3.72	928.18	3.46	928.44	2.85	929.05	4.28	927.62	5.91	925.99	3.19	928.71	3.69	928.21	--	--	--	--
NH-7	935.42	Well installed in 2012		Well installed in 2012		Well installed in 2012		Well installed in 2012		Well installed in 2012		Well installed in 2012		8.64	926.78	9.14	926.28	7.77	927.65	8.13	927.29	--	--	7.22	928.20
MW-8	931.89	4.07	927.82	6.73	925.16	2.99	928.90	3.33	928.56	3.11	928.78	2.63	929.26	3.63	928.26	4.74	927.15	2.91	928.98	2.42	929.47	2.33	929.56	1.54	930.35
MW-9	931.54	7.04	924.50	10.65	920.89	4.71	926.83	4.58	926.96	--	--	--	--	--	--	--	--	3.96	927.58	4.99	926.55	--		--	--
NH-10	935.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9.24	926.13	8.23	927.14	8.59	926.78	--	--	7.80	927.57
NH-25	934.65	Well installed in 2012		Well installed in 2012		Well installed in 2012		Well installed in 2012		Well installed in 2012		Well installed in 2012		6.34	928.31	6.73	927.92	5.83	928.82	5.49	929.16	--	--	4.97	929.68
MW-24	931.07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7.58	923.49	4.94	926.13	6.21	924.86	--	--	Destroyed	
NH-26	934.76	Well installed in 2012		Well installed in 2012		Well installed in 2012		Well installed in 2012		Well installed in 2012		Well installed in 2012		6.76	928.00	6.99	927.77	6.24	928.52	NA*	934.76	5.73	929.03	6.04	928.72
MW-A	932.83	6.78	926.05	9.38	923.45	4.79	928.04	5.62	927.21	5.57	927.26	4.47	928.36	5.72	927.11	7.33	925.50	5.23	927.60	4.56	928.27	3.92	928.91	5.34	927.49
MW-B	932.58	5.69	926.89	8.60	923.98	3.00	929.58	4.40	928.18	4.22	928.36	3.11	929.47	4.58	928.00	6.31	926.27	3.95	928.63	3.57	929.01	2.69	929.89	3.88	928.70
MW-C	931.89	5.88	926.01	9.24	922.65	3.29	928.60	3.86	928.03	3.64	928.25	2.59	929.30	4.57	927.32	6.35	925.54	3.26	928.63	3.63	928.26	--	--	4.19	927.70
MW-D	941.90	5.81	936.09	9.96	931.94	5.18	936.72	4.04	937.86	--	--	--	--	--	--	--	--	3.86	938.04	6.59	935.31	--	--	3.58	938.32
MW-E	933.31	7.28	926.03	9.81	923.50	6.20	927.11	6.43	926.88	6.33	926.98	5.32	927.99	6.44	926.87	7.98	925.33	6.01	927.30	5.60	927.71	4.92	928.39	6.16	927.15
MW-F	933.83	8.52	925.31	10.93	922.90	7.31	926.52	7.53	926.30	7.52	926.31	6.71	927.12	7.76	926.07	9.02	924.81	7.21	926.62	7.41	926.42	--	--	7.38	926.45
MW-G	934.37	7.52	926.85	10.66	923.71	7.02	927.35	7.28	927.09	7.21	927.16	5.98	928.39	7.68	926.69	9.29	925.08	7.11	927.26	5.89	928.48	--	--	8.25	926.12
MW-H	933.63	8.81	924.82	12.40	921.23	9.06	924.57	8.45	925.18	--	--	--	--	--	--	--	--	7.88	925.75	7.19	926.44	--	--	8.61	925.02
TEC-1	932.51	4.20	928.31	6.67	925.84	3.69	928.82	3.89	928.62	3.46	929.05	3.14	929.37	4.08	928.43	4.95	927.56	3.54	928.97	4.29	928.22	3.29	929.22	3.34	929.17
TEC-1A	932.02	14.29	917.73	18.37	913.65	14.66	917.36	13.58	918.44	13.42	918.60	13.17	918.85	14.18	917.84	15.76	916.26	13.60	918.42	15.17	916.85	--	--	13.90	918.12
TEC-2	931.90	4.67	927.23	7.47	924.43	3.55	928.35	3.68	928.22	3.40	928.50	2.90	929.00	3.97	927.93	4.86	927.04	3.30	928.60	NA*	931.90	--	--	2.98	928.92
TEC-3	934.62	6.94	927.68	9.07	925.55	6.51	928.11	6.20	928.42	5.94	928.68	5.38	929.24	6.23	928.39	6.88	927.74	5.90	928.72	5.78	928.84	5.31	929.31	5.74	928.88
TEC-4	934.50	7.15	927.35	9.64	924.86	6.12	928.38	6.33	928.17	5.98	928.52	5.35	929.15	6.40	928.10	7.43	927.07	5.76	928.74	5.23	929.27	4.88	929.62	5.79	928.71

MSL - Mean Sea Level
NA* Well underwater and could not be measured

Table 2. Soil Analytical Results

Sample ID	GP-1	GP-1	GP-2	GP-3	GP-3	GP-4	GP-4	GP-5	GP-5	GP-6
Sample Depth (ft)*	**3-5**	**7-9**	**3-5**	**3-5**	**7-9**	**1-3**	**3-5**	**1-3**	**5-7**	**3-5**
Sample Date	**9/1/2003**	**9/1/2003**	**9/1/2003**	**9/1/2003**	**9/1/2003**	**9/1/2003**	**9/1/2003**	**9/1/2003**	**9/1/2003**	**9/1/2003**
Data Source	**New Fields**	**New Fields**	**New Fields**	**New Fields**	**New Fields**	**New Fields**	**New Fields**	**New Fields**	**New Fields**	**New Fields**
Year of Source Report	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**
Metals (mg/kg)										
Arsenic	--	--	--	--	--	--	--	--	--	--
Chromium	870	29	600	830	19	86	1,100	2,300	2,200	690
Chromium (VI)[1]	**81**	**6.6**	**19**	**100**	**12**	**33**	**80**	**55**	**66**	**77**
Chromium (III)[2]	789	22.4	581	730	7	53	1,020	2,245	2,134	613
Lead	--	--	--	--	--	--	--	--	--	--

Notes:

Soil depths are measured in feet below ground surface (bgs).
All results shown in milligrams per kilogram (mg/kg)

-- = Compound not analyzed
Bold = Exceeds the industrial direct contact RCL
1 = Residual contaminant level (RCL) is for hexavalent chromium. As such, this RCL is not applicable for total chromium.
2 = Trivalent chromium is the difference between total chromium and hexavalent chromium concentrations.
3 = The arsenic concentrations of 8 mg/kg represents the background threshold concentration for arsenic in Wisconsin soils

RCLs from NR 720

Compound	Industrial
Chromium (total)	-
Chromium (VI)	5.58
Chromium (III)	100,000
Lead	800
Arsenic[3]	8

Table 2. Soil Analytical Results

Sample ID	GP-6	GP-7	GP-7	GP-8	GP-8	GP-9	GP-10	GP-10	GP-10	GP-11
Sample Depth (ft)	7-9	1-3	5-7	1-3	7-9	1-3	1-3	5-7	5-7	3-5
Sample Date	9/1/2003	9/1/2003	9/1/2003	9/1/2003	9/1/2003	9/1/2003	9/1/2003	9/1/2003	9/1/2003	9/1/2003
Data Source	New Fields	New Fields	New Fields	New Fields	New Fields	New Fields	New Fields	New Fields	New Fields	New Fields
Year of Source Report	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004
Metals (mg/kg)										
Arsenic	--	--	--	--	--	--	--	--	--	--
Chromium	36	89	170	1,400	92.0	260	56	200	200	220
Chromium (VI)1	**6**	**35**	**34**	**64**	**21**	**110**	**14**	**40**	**40**	**28**
Chromium (III)2	30	54	136	1,336	71	150	42	160	160	192
Lead	--	--	--	--	--	--	--	--	--	--

Notes:

Soil depths are measured in feet below ground surface (bgs).
All results shown in milligrams per kilogram (mg/kg)

-- = Compound not analyzed
Bold = Exceeds the industrial direct contact RCL
1 = Residual contaminant level (RCL) is for hexavalent chromium. As such, this RCL is not applicable for total chromium.
2 = Trivalent chromium is the difference between total chromium and hexavalent chromium concentrations.
3 = The arsenic concentrations of 8 mg/kg represents the background threshold concentration for arsenic in Wisconsin soils

RCLs from NR 720

Compound	Industrial
Chromium (total)	-
Chromium (VI)	5.58
Chromium (III)	100,000
Lead	800
Arsenic[3]	8

Table 2. Soil Analytical Results

Sample ID	GP-11	GP-12	GP-12	GP-14	GP-15	GP-15	GP-18	MW-F	MW-F
Sample Depth (ft)	**7-9**	**1-3**	**5-7**	**1-3**	**1-3**	**3-5**	**3-5**	**0-2**	**2-4**
Sample Date	**9/1/2003**	**9/1/2003**	**9/1/2003**	**9/1/2003**	**9/1/2003**	**9/1/2003**	**9/1/2003**	**6/1/2009**	**6/1/2009**
Data Source	**New Fields**	**New Fields**	**New Fields**	**New Fields**	**New Fields**	**New Fields**	**New Fields**	**TRC**	**TRC**
Year of Source Report	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**	**2009**	**2009**
Metals (mg/kg)									
Arsenic	--	--	--	--	--	--	--	--	--
Chromium	66	5,100	160	250	440	130	480	12.2	23.8
Chromium (VI)1	**7.0**	**73**	**25**	**27**	**27**	**17**	**8.2**	**7.3**	**8**
Chromium (III)2	59	5,027	135	223	413	113	471.8	--	--
Lead	--	--	--	--	--	--	--	74.3	10

Notes:

Soil depths are measured in feet below ground surface (bgs).
All results shown in milligrams per kilogram (mg/kg

-- = Compound not analyzed

Bold = Exceeds the industrial direct contact RCL

1 = Residual contaminant level (RCL) is for hexavalent chromium. As such, this RCL is not applicable for total chromium.

2 = Trivalent chromium is the difference between total chromium and hexavalent chromium concentrations.

3 = The arsenic concentrations of 8 mg/kg represents the background threshold concentration for arsenic in Wisconsin soils

RCLs from NR 720

Compound	Industrial
Chromium (total)	-
Chromium (VI)	5.58
Chromium (III)	100,000
Lead	800
Arsenic[3]	8

Table 2. Soil Analytical Results

Sample ID	MW-F	MW-G	MW-H	NH-SB-GP60	NH-SB-GP60
Sample Depth (ft)	**4-6**	**0-2**	**0-2**	**0-4'**	**4-6'**
Sample Date	**6/1/2009**	**6/1/2009**	**6/1/2009**	**3/12/2012**	**3/12/2012**
Data Source	**TRC**	**TRC**	**TRC**	**REL**	**REL**
Year of Source Report	**2009**	**2009**	**2009**	**2012**	**2012**
Metals (mg/kg)					
Arsenic	**--**	**--**	**--**	**14.3**	**8.5**
Chromium	20.7	15.5	25.5	23.1	20.2
Chromium (VI)1	**8.9**	<2.8	**6.4**	**--**	**--**
Chromium (III)2	--	--	--	--	--
Lead	14.1	**1,180**	27	171	116

Notes:

Soil depths are measured in feet below ground surface (bgs).
All results shown in milligrams per kilogram (mg/kg

-- = Compound not analyzed
Bold = Exceeds the industrial direct contact RCL
1 = Residual contaminant level (RCL) is for hexavalent chromium. As such, this RCL is not applicable for total chromium.
2 = Trivalent chromium is the difference between total chromium and hexavalent chromium concentrations.
3 = The arsenic concentrations of 8 mg/kg represents the background threshold concentration for arsenic in Wisconsin soils

RCLs from NR 720

Compound	Industrial
Chromium (total)	-
Chromium (VI)	5.58
Chromium (III)	100,000
Lead	800
Arsenic[3]	8

Table 3. Groundwater Analytical Results - Dissolved Cr Pb

WELL ID	Date Sampled	DISSOLVED METALS				UNDISSOLVED METALS	
		Hexavalent Chromium (CrVI)	**Total Chromium[1]**	**Trivalent Chromium[2] (CrIII)**	**Lead**	**Ferrous Iron**	**Total Organic Carbon**
		(µg/L)	**(µg/L)**	**(µg/L)**	**(µg/L)**	**(µg/L)**	**(µg/L)**
NR 140 STANDARD	**PAL**	--	10	--	1.5	150	--
	ES	--	100	--	15	300	--
TW-1	8/13/2002	5.0	3.6	NM	--	--	--
TW-2	8/13/2002	24	*33*	8.7	--	--	--
TW-3	8/13/2002	130	***110***	NM	--	--	--
TW-4	8/13/2002	7,900	***8,200***	NM	--	--	--
TW-5	8/13/2002	700	***640***	NM	--	--	--
TW-6	8/13/2002	5	1 U	NM	--	--	--
TW-7	8/13/2002	6.3	1 U	NM	--	--	--
TW-8	8/13/2002	6.3	1.9	NM	--	--	--
TW-9	8/13/2002	8.9	0.44 U	NM	--	--	--
TW-10	8/13/2002	3.6 U	1.3 U	NM	--	--	--
MW-1	8/13/2002	1,900	***1,700***	NM	--	--	--
	11/16/2005	4,600	***4,900***	300	--	--	--
	5/24/2007	2,800	***2,800***	NM	*0.24*	--	--
	6/9/2009	680	***738***	58 J	*1.7* J	--	--
	9/24/2009	1,700	***1,660***	200 U	3.3 J	--	--
	12/28/2009	3.90 U	9.2	9.2 J	*2.2* J	--	--
	3/29/2010	5.3	*57.6*	52.3	*2.2* J	--	--
	5/18/2011	50	*54.1*	4.1	--	--	--
	5/15/2012	4.4 J	*16.1*	11.7 J	--	--	--
	6/21/2013	33	*54.9*	NM	*2.3* J	--	--
	8/19/2014	--	4.1 J	--	*3* U	--	--
MW-2	8/13/2002	3.6 U	2.3	3.6 U	--	--	--
	11/16/2005	5.0 U	2.8	NM	--	--	--
NH-2	4/24/2012	--	<2.4	--	<1.4	--	--
	8/19/2014	--	2.1 J	--	*3* J	--	--
	4/26/2017	<3.9	3.7 J	NM	NM	<28	3,400
MW-3	8/13/2002	1,900	***1,700***	NM	--	--	--
MW-4	8/13/2002	3.7	0.44 U	NM	--	--	--
	11/15/2005	5.0 U	2.0	NM	--	--	--
	5/24/2007	3.4 U	0.63	NM	0.26	--	--
	6/9/2009	3.9 U	1.3 J	NM	*2.2* J	--	--
	9/24/2009	3.9 U	0.39 U	3.9 U	1.3	--	--
	12/28/2009	3.9 U	1.2 J	3.9 U	1.3	--	--
	3/29/2010	3.9 U	0.82 J	3.9 U	1.4 J	--	--
	5/18/2011	3.9 U	1.6 J	3.9 U	--	--	--
	5/15/2012	3.9 U	2.4 U	3.9 U	--	--	--
	6/20/2013	3.4 U	1.2 U	3.9 U	1.2 U	--	--
	8/19/2014	--	2.1 U	NM	*3* U	--	--

Notes:

ES = NR140 Enforcement Standard
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ITALICIZE = Detection over NR140 PAL Limit
BOLD = Detection over NR140 ES Limit
U = Analyte not detected at or above reporting limit
J = Estimated value. Analyte detected at a level less than the reporting limit and greater than or equal to the detection limit.
"--" = Analyte was not sampled during sampling round
NM Not measured/calculated, due to Cr(VI) result greater than total Cr result.
1 = PAL and ES values are for total chromium. As such, these values are not applicable for hexavalent chromium.
2 = Trivalent chromium is the difference between total chromium and hexavalent chromium concentrations.

Table 3. Groundwater Analytical Results - Dissolved Cr Pb

WELL ID	DATE SAMPLED	DISSOLVED METALS				UNDISSOLVED METALS	
		HEXAVALENT CHROMIUM (CrVI)	TOTAL CHROMIUM[1]	TRIVALENT CHROMIUM[2] (CrIII)	Lead	Ferrous Iron	Total Organic Carbon
	UNITS	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
NR 140 STANDARD	PAL	--	10	--	1.5	--	-
	ES	--	*100*	--	15	--	-
MW-5	8/13/2002	380	***390***	180 U	NM	--	--
	11/16/2005	330	***270***	NM	NM	--	--
	5/24/2007	1,100	***910***	NM	0.19	--	--
	6/9/2009	950	***938***	9.8 U	*3.2* J	--	--
	9/24/2009	3400	***3,510***	110	*2.6* J	--	--
	12/29/2009	240	***240***	3.9 U	*1.5* J	--	--
	3/30/2010	210	***202***	3.9 U	*2* J	--	--
	5/19/2011	140	***134***	NM	NM	--	--
	5/15/2012	350	***339***	NM	NM	--	--
	6/20/2013	290	***313***	NM	1.2 U	--	--
	8/18/2014	NM	***318***	--	*3* U	--	--
	3/21/2019	--	*81.6*	--	--	--	--
MW-6	8/13/2002	8.9	0.56 U	NM	NM	--	--
	11/15/2005	45	*65*	20	NM	--	--
	5/24/2007	3.4 U	2.6	NM	0.07	--	--
	6/9/2009	3.9 U	0.39 U	3.9	*2.6* J	--	--
	9/24/2009	3.9 U	5.0	5.0	*2* J	--	--
	12/28/2009	3.9 U	0.48 J	3.9	1.3 U	--	--
	3/29/2010	3.9 U	0.39 U	3.9	*2.3* J	--	--
	5/18/2011	3.9 U	1.2 J	3.9	NM	--	--
	5/15/2012	3.9 U	2.4 U	3.9	NM	--	--
	6/20/2013	3.4 U	1.2 U	NM	1.2 U	--	--
	8/19/2014	NM	2.1 U	NM	*3* U	--	--
NH-7	4/24/2012	NM	***261***	NM	*1.7* J	--	--
	6/20/2013	110	***111***	NM	1.2 U	--	--
	8/19/2014	NM	***114***	NM	*3* U	--	--
	3/21/2019	--	***279***	--	--	--	--
MW-8	8/13/2002	3,100	***3,200***	720 U	NM	--	--
	11/16/2005	3,000	***2,900***	NM	NM	--	--
	5/24/2007	1,900	***1,600***	NM	0.09	--	--
	6/9/2009	7,300	***8,730***	1400	*2.9* J	--	--
	9/24/2009	8,200	***8,470***	270	*2.6* J	--	--
	12/29/2009	5100	***5,150***	50 J	*1.9* J	--	--
	3/29/2010	1,900	***1,720***	180	*2.3* J	--	--
	5/19/2011	320	***330***	10	NM	--	--
	5/15/2012	3,100	***2,940***	NM	NM	--	--
	6/20/2013	860	***844***	NM	*1.8* J	--	--
	8/18/2014	NM	***1,320***	NM	*3* U	--	--
	4/22/2016	NM	*46.7*	NM	NM	--	--
	9/7/2016	NM	***725***	NM	NM	--	--
	4/26/2017	<3.9	<2.5	NM	NM	<28	4,500
	3/21/2019	--	5.2 J	--	--	--	--

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"--" = Analyte was not sampled during sampling round

NM Not measured/calculated, due to Cr(VI) result greater than total Cr result.

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2 = Trivalent chromium is the difference between total chromium and hexavalent chromium concentrations.

Table 3. Groundwater Analytical Results - Dissolved Cr Pb

WELL ID	DATE SAMPLED	DISSOLVED METALS				UNDISSOLVED METALS	
		HEXAVALENT CHROMIUM (CrVI)	TOTAL CHROMIUM[1]	TRIVALENT CHROMIUM[2] (CrIII)	Lead	Ferrous Iron	Total Organic Carbon
	UNITS	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
NR 140 STANDARD	PAL	--	10	--	1.5	--	-
	ES	--	100	--	15	--	-
MW-9	8/13/2002	3.6 U	0.44 U	3.6	NM	--	--
	11/15/2005	5.0 U	1.7	NM	*1.8*	--	--
	5/24/2007	5.4	0.44	NM	0.06	--	--
	6/9/2009	3.9 U	0.39 U	3.9 U	*2.2* J	--	--
	9/24/2009	3.9 U	0.39 U	3.9 U	*2.1* J	--	--
	12/28/2009	3.9 U	0.39 U	3.9 U	*1.7* J	--	--
	3/29/2010	3.9 U	4.9 J	4.9 J	*2.4* J	--	--
NH-10	4/23/2012	NM	4.1 J	NM	*1.9* J	--	--
	8/19/2014	NM	2.1 U	NM	*3* U	--	--
MW-24	8/19/2014	NM	3.7 J	NM	*3* U	--	--
NH-25	4/23/2012	NM	***1,220***	NM	*1.6* J	--	--
	6/20/2013	3,100	***3,330***	NM	*2.8* J	--	--
	8/19/2014	NM	***895***	--	3 U	--	--
NH-26	4/23/2012	--	***470***	--	<1.4	--	--
	6/20/2013	480	***510***	NM	1.2 U	--	--
	8/19/2014	--	***284***	--	3 U	--	--
	4/26/2017	1,500	***1,400***	NM	NM	<28	7,400
	3/21/2019	--	***763***	--	--	--	--
MW-A	5/24/2007	4,000	***4,100***	100	***27.0***	--	--
	6/8/2009	1,500	***1,510***	20 U	*2.1* J	--	--
	9/24/2009	3,600	***3,710***	110	*1.5* J	--	--
	12/28/2009	1,900	***1,870***	20 U	*2.1* J	--	--
	3/29/2010	1,500	***1,390***	110	*2.3* J	--	--
	5/18/2011	590	***594***	4	--	--	--
	5/15/2012	440	***417***	NM	--	--	--
	6/21/2013	520	***484***	NM	*2.3* J	--	--
	8/19/2014	--	*18.1*	--	*3*	--	--
	4/22/2016	--	***307***	--	--	--	--
	9/7/2016	NM	*60.1*	NM	NM	--	--
	4/26/2017	330	***295***	NM	NM	<28	5,800
	3/21/2019	--	***458***	--	--	--	--
MW-B	5/24/2007	910	***780***	NM	0.044 U	--	--
	6/9/2009	570	***533***	20 U	*2.2* J	--	--
	9/24/2009	1,300	***1,200***	100 U	*1.6* J	--	--
	12/28/2009	740	***649***	20 U	*2.4* J	--	--
	3/29/2010	270	***263***	20 U	*2.2* J	--	--
	5/18/2011	68	*64*	NM	--	--	--
	5/15/2012	5.5 J	*10.2*	4.7 J	--	--	--
	6/20/2013	74	*73.8*	NM	1.2 U	--	--
	8/19/2014	--	*47.1*	--	*3* U	--	--
	4/22/2016	NM	*20.1*	NM	NM	--	--
	9/7/2016	NM	***585***	NM	NM	--	--
	4/26/2017	<3.9	4.7 J	NM	NM	<28	910
	3/21/2019	--	*79.6*	--	--	--	--

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Table 3. Groundwater Analytical Results - Dissolved Cr Pb

WELL ID	DATE SAMPLED	DISSOLVED METALS								UNDISSOLVED METALS			
		HEXAVALENT CHROMIUM (CrVI)		TOTAL CHROMIUM[1]		TRIVALENT CHROMIUM[2] (CrIII)		Lead		Ferrous Iron		Total Organic Carbon	
	UNITS	(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
NR 140 STANDARD	PAL	--		10		--		1.5		--			
	ES	--		100		--		15					
MW-C	5/24/2007	3.4	U	1.3		NM		0.07		--		--	
	6/9/2009	3.9	U	1.1	J	3.9	U	*2.4*	J	--		--	
	9/24/2009	3.9	U	0.39	U	3.9	U	*4.1*	J	--		--	
	12/28/2009	3.9	U	4.5	J	4.5	J	*1.9*	J	--		--	
	3/29/2010	3.9	U	4.2	J	4.2	J	1.4	J	--		--	
	5/18/2011	3.9	U	2.3	J	3.9	U	--		--		--	
	5/15/2012	3.9	U	2.4	U	3.9	U	--		--		--	
	6/20/2013	3.4	U	1.2	U	NM		1.2	U	--		--	
	8/19/2014	--		2.1	U	--		*3*	U	--		--	
MW-D	5/25/2007	3.4	U	1.9		NM		0.1		--		--	
	6/9/2009	3.9	U	2.4	J	3.9	U	*1.7*	J	--		--	
	9/24/2009	3.9	U	0.42	J	3.9	U	*3*	J	--		--	
	12/29/2009	3.9	U	1.9	J	3.9	U	*2.5*	J	--		--	
	3/29/2010	3.9	U	1.0	J	3.9	U	1.4	J	--		--	
MW-E	6/9/2009	290		**268**		3.9	U	*2*	J	--		--	
	9/24/2009	340		**353**		20	U	*2*	J	--		--	
	12/29/2009	870		**814**		39	U	*3.9*	J	--		--	
	3/30/2010	890		**808**		39	U	*1.9*	J	--		--	
	5/19/2011	1,000		**963**		NM		--		--		--	
	5/15/2012	1,000		**920**		NM		--		--		--	
	6/20/2013	1,200		**1,150**		NM		*2.9*	J	--		--	
	8/19/2014	--		**1,290**		--		*3*	U	--		--	
	4/22/2016	NM		***594***		NM		NM		--		--	
	9/7/2016	NM		***507***		NM		NM		--		--	
	4/26/2017	550		***533***		NM		NM		<28		6,200	
	3/21/2019	--		**628**		--		--		--		--	
MW-F	6/8/2009	3.9	U	0.46	J	3.9	U	*2.2*	J	--		--	
	9/23/2009	3.9	U	0.39	U	3.9	U	*2.4*	J	--		--	
	12/28/2009	3.9	U	1.8	J	3.9	U	*1.6*	J	--		--	
	3/29/2010	3.9	U	1.4	J	3.9	U	*2.2*	J	--		--	
	5/18/2011	3.9	U	1.7	J	3.9	U	--		--		--	
	5/15/2012	3.9	U	2.4	U	3.9	U	--		--		--	
	6/21/2013	3.9	U	1.2	U	NM		1.2	U	--		--	
	8/19/2014	3.9	U	2.1	U	--		3	U	--		--	
	3/21/2019	--		2.5	U	--		--		--		--	
MW-G	6/8/2009	3.9	U	0.7	J	3.9	U	1.3		--		--	
	9/23/2009	3.9	U	0.39	U	3.9	U	*4.9*	J	--		--	
	12/28/2009	3.9	U	0.39	J	3.9	U	*1.9*	J	--		--	
	3/29/2010	3.9	U	0.39	U	3.9	U	*3*	J	--		--	
	5/18/2011	3.9	U	1.1	J	3.9	U	--		--		--	
	5/15/2012	3.9	U	2.4	U	3.9	U	--		--		--	
	6/21/2013	3.4	U	1.2	U	NM		*3.1*	J	--		--	
	8/19/2014	--		2.1	U	--		3	U	--		--	

Notes:

ES = NR140 Enforcement Standard
PAL = NR140 Preventative Action Limit
ITALICIZE = Detection over NR140 PAL Limit
BOLD = Detection over NR140 ES Limit
U = Analyte not detected at or above reporting limit
J = Estimated value. Analyte detected at a level less than the reporting limit and greater than or equal to the detection limit.
"--" = Analyte was not sampled during sampling round
NM Not measured/calculated, due to Cr(VI) result greater than total Cr result.
1 = PAL and ES values are for total chromium. As such, these values are not applicable for hexavalent chromium.
2 = Trivalent chormium is the difference between total chromium and hexavalent chromium concentrations.

Table 3. Groundwater Analytical Results - Dissolved Cr Pb

WELL ID	DATE SAMPLED	DISSOLVED METALS				UNDISSOLVED METALS	
		HEXAVALENT CHROMIUM (CrVI)	TOTAL CHROMIUM[1]	TRIVALENT CHROMIUM[2] (CrIII)	Lead	Ferrous Iron	Total Organic Carbon
	UNITS	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
NR 140 STANDARD	PAL	--	10	--	1.5	--	-
	ES	--	100	--	15	--	-
MW-H	6/8/2009	3.9 U	0.89 J	3.9 U	1.3	--	--
	9/23/2009	3.9 U	3.9 U	3.9 U	*2.1* J	--	--
	12/28/2009	3.9 U	3.9 U	3.9 U	*2.7* J	--	--
	3/29/2010	3.9 U	3.9 U	3.9 U	*1.6* J	--	--
TEC-1	8/13/2002	500	**490**	NM	--	--	--
	11/16/2005	4,300	**3,800**	NM	*1.9*	--	--
	5/23/2007	790	**670**	NM	***20***	--	--
	6/10/2009	11,400	**12,000**	600 J	*3.5* J	--	--
	9/24/2009	3,000	**3,120**	120	*3.8* J	--	--
	12/29/2009	7,900	**7,430**	200 U	*3.3* J	--	--
	3/30/2010	6,700	**6,710**	200 U	*3.3* J	--	--
	5/19/2011	2,400	**2,620**	220	--	--	--
	5/15/2012	2,300	**2,190**	NM	--	--	--
	6/20/2013	2,300	**2,250**	NM	*4.3* J	--	--
	8/18/2014	--	**1,250**	--	*3* U	--	--
	4/26/2017	650	***598***	NM	NM	<28	2,100
	3/21/2019	--	**315**	--	--	--	--
TEC-1A	8/13/2002	14	0.52 U	NM	--	--	--
	3/6/2006	5.0 U	2.8	NM	--	--	--
	5/23/2007	3.4 U	0.43 U	NM	0.07	--	--
	6/9/2009	14 J	*22.6*	9 J	*2.2* J	--	--
	9/24/2009	3.9 U	1.1 J	3.9 U	*2.1* J	--	--
	12/29/2009	3.9 U	4.3 J	4.3 J	*2* J	--	--
	3/29/2010	3.9 U	5.1	5.1	*1.5* J	--	--
	5/19/2011	32	38.7	6.7	--	--	--
	5/15/2012	3.9 U	8.2	8.2	--	--	--
	6/20/2013	3.4 U	1.2 U	NM	1.2 U	--	--
	8/18/2014	--	2.1 U	--	*3* U	--	--
TEC-2	8/13/2002	16	0.44 U	NM	--	--	--
	11/16/2005	5.0 U	0.78	NM	--	--	--
	5/24/2007	3.4 U	0.94	--	0.13	--	--
	6/9/2009	3.9 U	1.2 J	3.9 U	*2.5* J	--	--
	9/24/2009	3.9 U	0.68 J	3.9 U	*3.1* J	--	--
	12/29/2009	3.9 U	1.1 J	3.9 U	*3.2* J	--	--
	3/30/2010	3.9 U	2.7 J	3.9 U	*2.3* J	--	--
	5/19/2011	3.9 U	1.3 J	3.9 U	--	--	--
	5/15/2012	3.9 U	2.4 U	3.9 U	--	--	--
	6/20/2013	3.4 U	1.2 U	NM	*2.8* J	--	--
	8/18/2014	--	2.1 U	--	*3.0* U	--	--

Notes:

ES = NR140 Enforcement Standard
PAL = NR140 Preventative Action Limit
ITALICIZE = Detection over NR140 PAL Limit
BOLD = Detection over NR140 ES Limit
U = Analyte not detected at or above reporting limit
J = Estimated value. Analyte detected at a level less than the reporting limit and greater than or equal to the detection limit.
"--" = Analyte was not sampled during sampling round
NM Not measured/calculated, due to Cr(VI) result greater than total Cr result.
1 = PAL and ES values are for total chromium. As such, these values are not applicable for hexavalent chromium.
2 = Trivalent chromium is the difference between total chromium and hexavalent chromium concentrations.

Table 3. Groundwater Analytical Results - Dissolved Cr Pb

WELL ID	DATE SAMPLED	DISSOLVED METALS HEXAVALENT	TOTAL	TRIVALENT	Lead	UNDISSOLVED METALS Ferrous Iron	Total Organic
	UNITS	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
NR 140 STANDARD	PAL	--	10	--	1.5	--	-
	ES	--	100	--	15	--	-
TEC-3	9/23/2003	270	***310***	40	--	--	--
	11/16/2005	540	***490***	NM	--	--	--
	5/24/2007	1,000	***910***	NM	0.17	--	--
	6/10/2009	400	***789***	390	*3.5* J	--	--
	9/24/2009	99	***99***	20 U	*1.8* J	--	--
	12/29/2009	190	***201***	11 J	*2.2* J	--	--
	3/30/2010	470	***445***	20 U	1.3 J	--	--
	5/19/2011	580	***585***	5	--	--	--
	5/15/2012	250	***227***	NM	--	--	--
	6/20/2013	1,200	***1,260***	NM	1.2 U	--	--
	8/19/2014	--	***2,100***	--	*3* U	--	--
	4/22/2016	NM	***5,650***	NM	NM	--	--
	9/7/2016	NM	***2,820***	NM	NM	--	--
	4/26/2017	5,300	***5,040***	NM	NM	<28	5,800
	3/21/2019	--	***1,080***	--	--	--	--
TEC-4	9/23/2003	1,200	***1,300***	100	--	--	--
	11/16/2005	2,800	***2,700***	NM	0.40 U	--	--
	5/24/2007	4,800	***4,000***	NM	0.06	--	--
	6/10/2009	13,300	***12,500***	200 U	*2.3* J	--	--
	9/24/2009	5,500	***5,220***	500 U	*2.3* J	--	--
	12/29/2009	5,200	***5,360***	160 J	*3* J	--	--
	3/30/2010	14,300	***12,900***	390 U	*2.5* J	--	--
	5/19/2011	29,000	***29,200***	200	--	--	--
	5/15/2012	21,300	***20,300***	NM	--	--	--
	6/20/2013	33,600	***32,200***	NM	*14* U	--	--
	8/19/2014	--	***6,880***	--	*3* U	--	--
	4/22/2016	NM	***65,100***	NM	NM	--	--
	9/7/2016	NM	***33,100***	NM	NM	--	--
	4/26/2017	16,200	***15,400***	NM	NM	<28	13,400
	3/21/2019	--	***16,900***	--	--	--	--

Notes:

ES = NR140 Enforcement Standard
PAL = NR140 Preventative Action Limit
ITALICIZE = Detection over NR140 PAL Limit
BOLD = Detection over NR140 ES Limit
U = Analyte not detected at or above reporting limit
J = Estimated value. Analyte detected at a level less than the reporting limit and greater than or equal to the detection limit.
"--" = Analyte was not sampled during sampling round
NM Not measured/calculated, due to Cr(VI) result greater than total Cr result.
1 = PAL and ES values are for total chromium. As such, these values are not applicable for hexavalent chromium.
2 = Trivalent chromium is the difference between total chromium and hexavalent chromium concentrations.

Table 3A. Groundwater Analytical Results - Other Inorganics

WELL ID	Date Sampled	Arsenic	Barium	Cadmium	Mercury	Selenium	Silver	Cyanide
	UNITS	**(µg/L)**	**(µg/L)**	**(µg/L)**	**(µg/L)**	**(µg/L)**	**(µg/L)**	**(µg/L)**
NR 140 STANDARD	**PAL**	1	400	0.5	0.2	10	10	0.04
	ES	10	2000	5	2	50	50	0.2
NH-2	4/24/2012	<4.7	160	0.39 J	<0.10	<5.8	<2.3	--
NH-7	4/24/2012	<4.7	122	<0.39	<0.10	<5.8	<2.3	--
NH-10	4/23/2012	<4.7	198	*0.54* J	<0.10	<5.8	<2.3	--
NH-25	4/23/2012	<4.7	181	*0.54* J	<0.10	<5.8	<2.3	--
NH-26	4/23/2012	<4.7	156	<0.39	<0.10	<5.8	<2.3	--
MW-9	11/15/2005	0.93	160	<0.40	<0.026	<4.0	<0.40	<0.0037
TEC-1	11/15/2005	<0.40	110	<0.40	<0.026	<4.0	<0.40	<0.0037
TEC-4	11/15/2005	0.43	67	<0.40	<0.026	<4.0	<0.40	<0.0037

Notes:

RCRA= Resource Conservation and Recovery Act

ES = NR140 Enforcement Standard

PAL = NR140 Preventative Action Limit

ITALICIZE = Detection over NR140 PAL Limit

BOLD = Detection over NR140 ES Limit

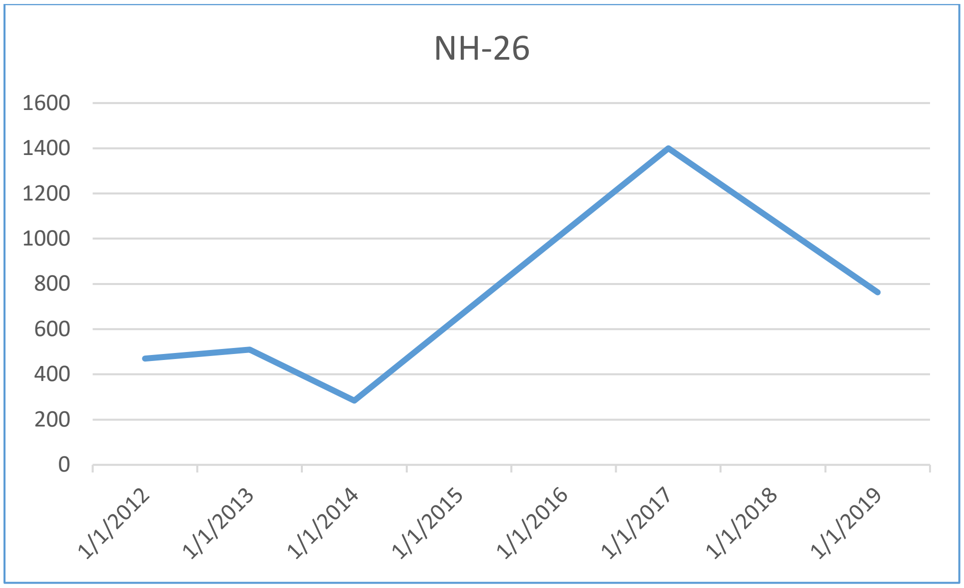
Table 4. Evaluation Criteria Between Remedial Options

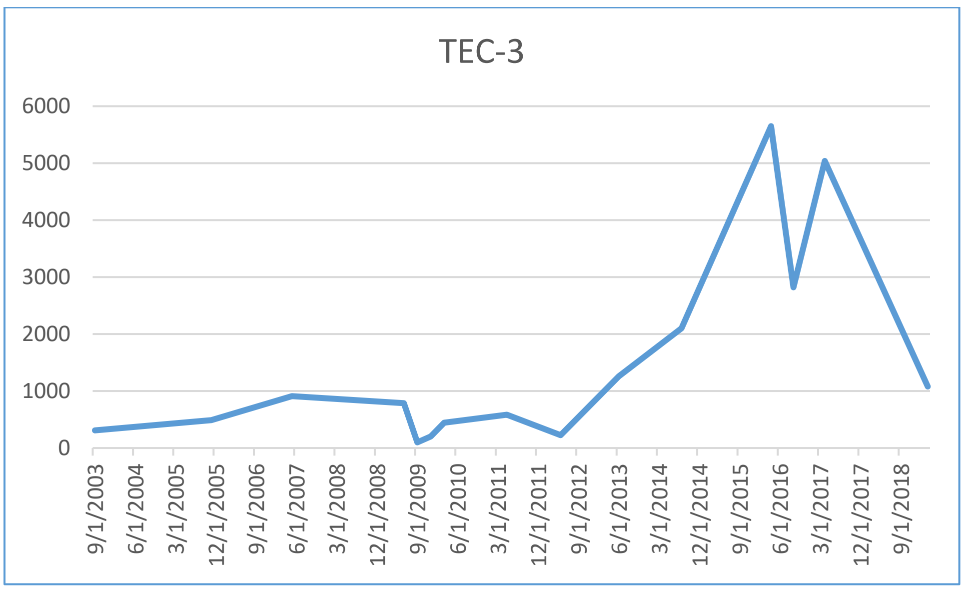
CRITERIA		IN-SITU CHEMICAL REDUCTION	PHYTOREMEDIATION	GROUNDWATER PUMP AND TREAT	PERMEABLE REACTIVE BARRIER	EXCAVATION AND OFF-SITE DISPOSAL	SOIL MIXING	MONITORED NATURAL ATTENUATION
LONG-TERM EFFECTIVENESS		(+) Achieves downgradient remedial objectives in the long-term. (+) Achieves source area remedial objectives in the long-term. (-) Precipitates may cause eventual clogging of aquifer pore spaces.	(+) Achieves downgradient remedial objectives in the long-term. (-) Does not directly address source area contamination; relies on long-term flushing of source area contamination through phytoremediation transect. (+) There is no apparent toxicity concern to the trees based on historical groundwater concentrations.	(+) Achieves downgradient remedial objectives in the long-term. (-) Does not directly address source area contamination; relies on long-term flushing of source area contamination through P&T. (-) Treatment effectiveness will diminish over time as aquifer concentrations decrease.	(+) Achieves downgradient remedial objectives in the long-term. (-) Does not directly address source area contamination; relies on long-term flushing of source area contamination through PRB. (-) Barrier may lose its reactivity or permeability with precipitate deposits.	(+) Achieves downgradient remedial objectives in the long-term. (+) Achieves source area remedial objectives in the long-term.	(+) Achieves downgradient remedial objectives in the long-term. (+) Achieves source area remedial objectives in the long-term.	(-) Unlikely to achieve remedial objectives in the long-term unless combined with an active remedial option. (-) Engineering and/or institutional controls would be necessary to ensure long-term protection. (+) Addresses low contaminant concentrations that active remedial technologies may not efficiently treat.
SHORT-TERM EFFECTIVENESS		(+) Immediate chemical change of contaminant results in significant short-term concentration reductions.	(-) Limited short-term effectiveness due to reliance on migration of contaminants through aquifer. (-) Cannot be implemented in the source area.	(-) Limited short-term effectiveness due to reliance on migration of contaminants through aquifer. (+) High concentration areas are removed first.	(-) Limited short-term effectiveness due to reliance on migration of contaminants through aquifer. (-) Cannot be implemented in the source area.	(+) Removal of contaminated media results in significant short-term concentration reductions.	(+) Immediate chemical change of contaminant results in significant short-term concentration reductions.	(-) Source area concentrations are higher than the capacity of the aquifer to naturally reduce them in the short term.
IMPLEMENTABILITY		(+) Technology is readily available and well understood. (+) Fairly easy to implement installation of borings and injection of treatment chemicals. (+) Safer and easier without existing deteriorated structure in place.	(+) Technology is readily available and well understood. (+) Fairly easy to implement installation of trees. (-) Limited space available to install trees. (-) Not implementable for source area within facility footprint. (-) Implementation hindered by planned redevelopment.	(+) Technology is readily available and well understood. (+) Fairly easy to implement installation of injection/extraction wells. (+) Safer and easier without existing deteriorated structure in place. (-) Moderately difficult to implement P&T system. (-) Regulatory approval required for re-injection of pumped and treated water.	(+) Technology is readily available and well understood. (+) More feasible without existing deteriorated structure in place. (-) Difficult to implement due to structural stability concerns of the deteriorated facility structure and proximity to Canadian National Railroad. (-) Not implementable for source area within facility footprint.	(+) Technology is readily available and well understood. (+) Safer and easier without existing deteriorated structure in place. (-) Difficult to implement due to extensive regulatory requirements of Large Quantity Generators of hazardous waste.	(+) Technology is readily available and well understood. (+) Fairly easy to implement soil mixing activities. (+) Safer and easier without existing deteriorated structure in place.	(+) Technology is readily available and well understood. (+) No implementation except for potential addition of monitoring wells.
RESTORATION TIME FRAME		(+) Active remediation within the source area results in short timeline required to achieve remedial goals.	(-) Moderate timeline due to reliance on migration of contaminants through treatment zone. (+) Trees will slightly increase contaminant migration through aquifer. (-) Future potential use of the property could be impacted if continued O&M of trees is required.	(-) Moderate timeline due to reliance on migration of contaminants through aquifer. (+) Active pumping will significantly increase contaminant migration through aquifer. (-) Future potential use of the property could be impacted if long-term continued operation of P&T system is required.	(-) Moderate timeline due to reliance on migration of contaminants through treatment zone. (-) Future potential use of the property could be impacted if PRB replacement is required.	(+) Active remediation within the source area results in short timeline required to achieve remedial goals.	(+) Active remediation within the source area results in short timeline required to achieve remedial goals.	(-) Passive remediation results in longest timeline required to achieve remedial goals. (-) Timeline for achievement of remedial goals must not exceed time for contaminants to migrate off-site.
ECONOMIC FEASIBLITY		(+) Moderate capital costs for borings and injection events. (+) Low O&M costs due to fast remediation timeline.	(+) Moderate capital costs for tree planting. (+) Moderate O&M costs for tree maintenance and potential replacement.	(+) Moderate capital costs for well and system installation. (-) High O&M costs due to long-term operation of system.	(-) High capital costs for PRB installation and disposal of contaminated soil. (-) High O&M cost for likely PRB replacement.	(+) High capital costs for excavation and disposal of contaminated soil as hazardous waste. (+) Low O&M costs due to fast remediation timeline.	(+) Moderate capital costs for soil mixing event. (+) Low O&M costs due to fast remediation timeline.	(+) No capital costs. (+) Low O&M cost.

ATTACHMENT A
TREND ANALYSIS CHARTS

Attachment A – Trend Analysis Charts

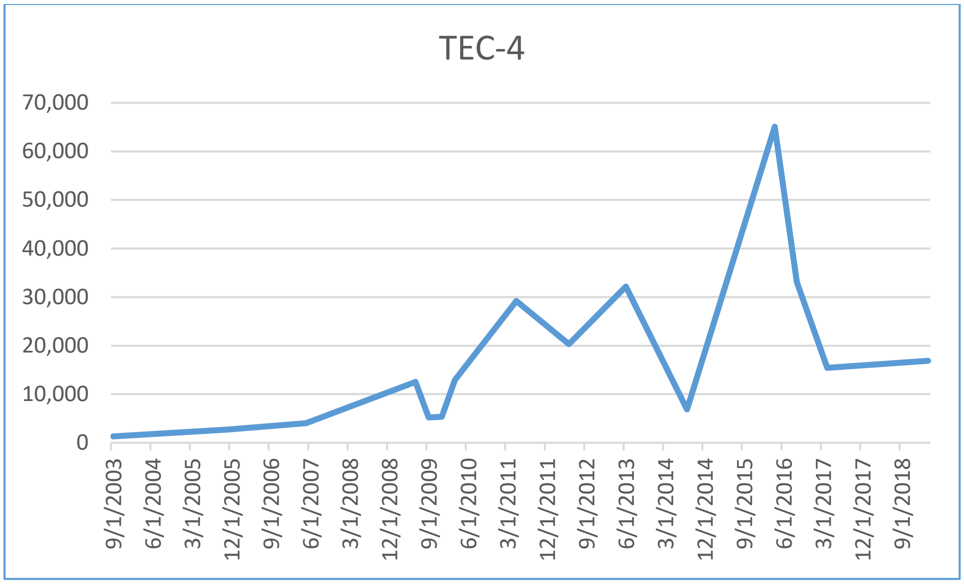
Source Area Monitoring Wells



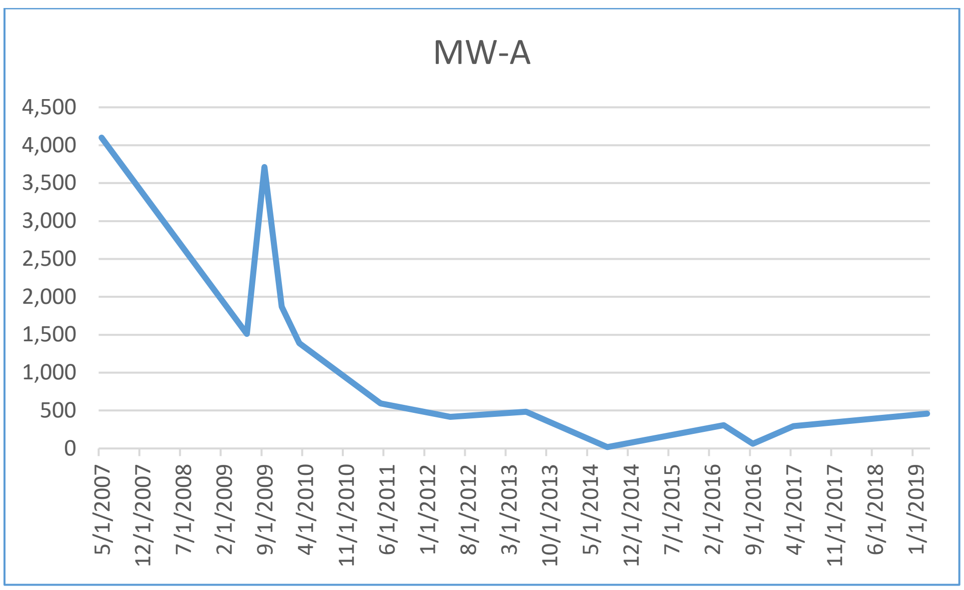


Trends depict sample date verses chromium concentration in micrograms per liter (ug/L)

Attachment A – Trend Analysis Charts

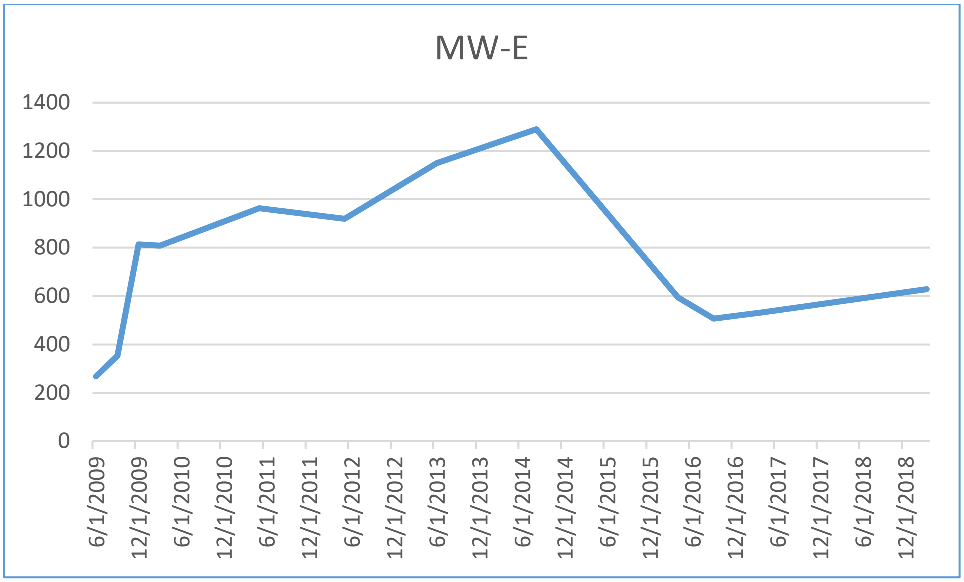


Down-gradient - Southwest

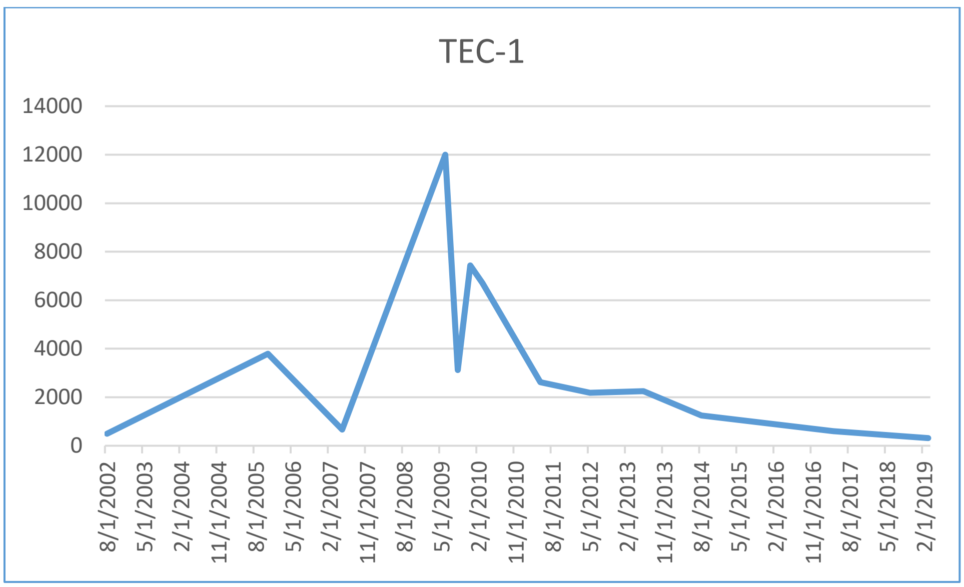


Trends depict sample date verses chromium concentration in micrograms per liter (ug/L)

Attachment A – Trend Analysis Charts



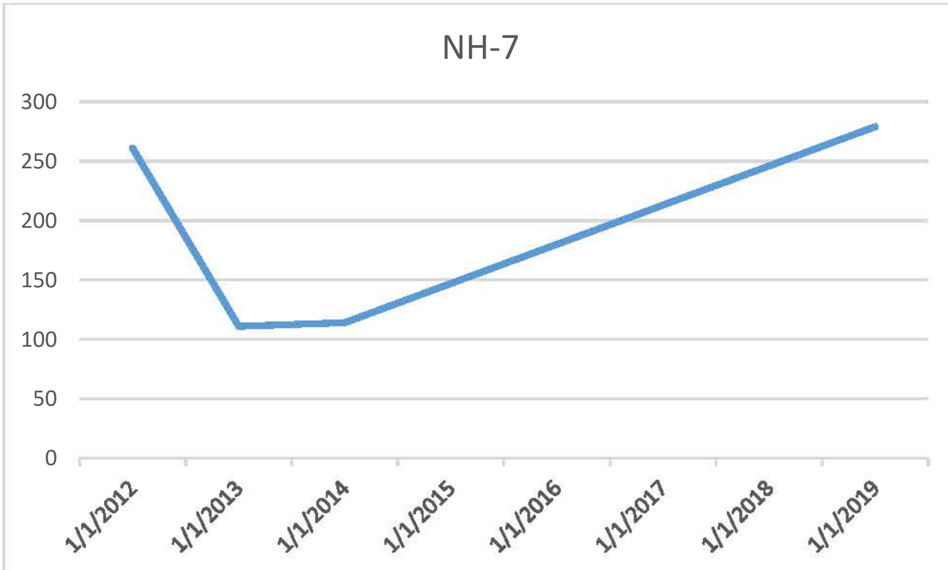
Down-gradient – West



Trends depict sample date verses chromium concentration in micrograms per liter (ug/L)

Attachment A – Trend Analysis Charts

Down-gradient - Northwest



Trends depict sample date verses chromium concentration in micrograms per liter (ug/L)

ATTACHMENT B
MARCH 2019 FIELD PARAMETERS

TRC	Well	TEC-3
	Date	3/21/2019
	Location	New Holstein, WI
	Site	Tecumseh / HARP

Static Depth to Water (ft)	5.74	Sample Collection Time	0915
Total Purge Volume (gal)		Purge Method	Peristaltic Pump
Total Depth (ft)		Sample Method	Low-Flow Through Flow Cell
Screen Depth Interval (ft)		Water Description	Clear, no odor
LNAPL (in)	—	Sampling Personnel	AJ / TG

Time (min)	Volume Purged (L)	Flow Rate (L/min)	Depth to Water (ft)	Drawdown (ft)	pH (SU) (±0.1 units)	Temp (°C) (± 3%)	Conductivity (mS/cm) (±3%)	[redacted]	ORP (mV) (±10 mV)	Dissolved Oxygen (mg/L) (±10%)	Turbidity (NTUs) (±10% for >1)
0854		100	5.83	0.09	7.18	6.02	0.855		190	3.61	8.1
0858			5.86	0.12	7.22	6.00	0.840		195	3.93	7.1
0902			5.86	0.12	7.29	5.89	0.848		204	3.78	6.1
0906			5.86	0.12	7.29	5.67	0.858		208	3.90	5.0
0910			5.86	0.12	7.29	5.49	0.861		212	3.96	4.5
Stable											

Form Date:

TRC	Well	TEC-4
	Date	3/21/2019
	Location	New Holstein, WI
	Site	Tecumseh / HARP

Static Depth to Water (ft)	5.75	Sample Collection Time	1120
Total Purge Volume (gal)		Purge Method	Peristaltic Pump
Total Depth (ft)		Sample Method	Low-Flow Through Flow Cell
Screen Depth Interval (ft)		Water Description	Clear, no odor
LNAPL (in)	—	Sampling Personnel	AJ / TG

Time (min)	Volume Purged (L)	Flow Rate (L/min)	Depth to Water (ft)	Drawdown (ft)	pH (SU) (±0.1 units)	Temp (°C) (± 3%)	Conductivity (mS/cm) (±3%)	[redacted]	ORP (mV) (±10 mV)	Dissolved Oxygen (mg/L) (±10%)	Turbidity (NTUs) (±10% for >1)
1057	0.5	0.100	5.86	0.11	7.43	3.11	1.10		278	9.75	2.6
1101		0.100	5.86	0.11	7.36	3.30	1.10		281	9.73	2.6
1105		0.100	5.87	0.12	7.30	3.57	1.09		283	9.89	2.9
1109		0.100	5.87	0.12	7.28	3.70	1.09		284	9.89	2.7
1113		0.100	5.87	0.12	7.27	3.78	1.08		285	9.91	2.3
Stable											

Form Date:

TRC	Well	NH-26
	Date	3/21/2019
	Location	New Holstein, WI
	Site	Tecumseh / HARP

Static Depth to Water (ft)	6.04	Sample Collection Time	1200
Total Purge Volume (gal)		Purge Method	Peristaltic Pump
Total Depth (ft)		Sample Method	Low-Flow Through Flow Cell
Screen Depth Interval (ft)		Water Description	Clear, no odor
LNAPL (in)	–	Sampling Personnel	AJ / TG

Time (min)	Volume Purged (L)	Flow Rate (L/min)	Depth to Water (ft)	Drawdown (ft)	pH (SU) (±0.1 units)	Temp (°C) (± 3%)	Conductivity (mS/cm) (±3%)	[redacted]	ORP (mV) (±10 mV)	Dissolved Oxygen (mg/L) (±10%)	Turbidity (NTUs) (±10% for >1)
1132	0.50	0.100	6.11	0.07	7.42	3.34	1.01		283	5.52	2.4
1136		0.100	6.11	0.07	7.39	3.61	1.00		280	5.35	1.9
1140		0.100	6.11	0.07	7.36	3.69	1.00		279	5.36	1.4
1144		0.100	6.11	0.07	7.32	3.78	0.998		279	5.36	1.5
1148		0.100	6.11	0.07	7.31	3.83	0.999		278	5.37	1.8
Stable											

Form Date:

TRC

		Well	MW-E
		Date	3/21/2019
		Location	New Holstein, WI
		Site	Tecumseh / HARP
Static Depth to Water (ft)	6.16	Sample Collection Time	~~1348~~ 1351
Total Purge Volume (gal)		Purge Method	Peristaltic Pump
Total Depth (ft)		Sample Method	Low-Flow Through Flow Cell
Screen Depth Interval (ft)		Water Description	Clear, no odor
LNAPL (in)	—	Sampling Personnel	AJ / TG

Time (min)	Volume Purged (L)	Flow Rate (L/min)	Depth to Water (ft)	Drawdown (ft)	pH (SU) (±0.1 units)	Temp (°C) (± 3%)	Conductivity (mS/cm) (±3%)	[redacted]	ORP (mV) (±10 mV)	Dissolved Oxygen (mg/L) (±10%)	Turbidity (NTUs) (±10% for >1)
1323	0.50	0.10	6.24	0.08	7.42	3.22	0.897		291	4.19	31.8
1327		0.10	6.27	0.11	7.32	4.07	0.870		288	3.86	15.9
1331		0.10	6.28	0.12	7.30	4.33	0.863		279	4.17	15.3
1335		0.10	6.28	0.12	7.28	4.65	0.860		271	4.15	10.2
1339		0.10	6.28	0.12	7.26	4.92	0.862		262	4.12	6.9
1343		0.10	6.28		7.26	5.26	0.855		249	4.12	4.8
1347			6.28		7.26	5.20	0.858		243	4.20	4.3
1351					7.26	5.24	0.851		239	4.19	3.5

Form Date:

TRC

Well	TEC-1 (DUP-1)
Date	3/21/2019
Location	New Holstein, WI
Site	Tecumseh / HARP

Static Depth to Water (ft)	3.22	Sample Collection Time	1435
Total Purge Volume (gal)		Purge Method	Peristaltic Pump
Total Depth (ft)		Sample Method	Low-Flow Through Flow Cell
Screen Depth Interval (ft)		Water Description	Clear, no odor
LNAPL (in)	—	Sampling Personnel	AJ / TG

Time (min)	Volume Purged (L)	Flow Rate (L/min)	Depth to Water (ft)	Drawdown (ft)	pH (SU) (±0.1 units)	Temp (°C) (± 3%)	Conductivity (mS/cm) (±3%)	[redacted]	ORP (mV) (±10 mV)	Dissolved Oxygen (mg/L) (±10%)	Turbidity (NTUs) (±10% for >1)
1405	0.50	0.10	3.58	0.36	7.98	5.96	0.394		246	7.09	8.9
1409		0.10	3.62	0.40	7.99	5.78	0.395		235	7.03	10.1
1413		0.10	3.68	0.46	7.96	5.68	0.392		236	7.04	7.8
1417		0.10	3.69	0.47	7.93	5.61	0.390		238	7.03	6.9
1421		0.10	3.71	0.49	7.95	5.66	0.389		239	7.02	7.5
Stable											

Form Date:

TRC	Well	MW-8
	Date	3/21/2019
	Location	New Holstein, WI
	Site	Tecumseh / HARP

Static Depth to Water (ft)	1.54	Sample Collection Time	1456
Total Purge Volume (gal)		Purge Method	Peristaltic Pump
Total Depth (ft)		Sample Method	Low-Flow Through Flow Cell
Screen Depth Interval (ft)		Water Description	clear
LNAPL (in)	—	Sampling Personnel	AJ / TG

Time (min)	Volume Purged (L)	Flow Rate (L/min)	Depth to Water (ft)	Drawdown (ft)	pH (SU) (±0.1 units)	Temp (°C) (± 3%)	Conductivity (mS/cm) (±3%)	[redacted]	ORP (mV) (±10 mV)	Dissolved Oxygen (mg/L) (±10%)	Turbidity (NTUs) (±10% for >1)
1440			1.88		7.65	6.36	0.351		252	4.49	7.6
1444			1.85		7.52	6.51	0.345		250	4.23	9.1
1448			1.85		7.45	6.49	0.340		246	4.15	7.8
1452			1.85		7.37	6.67	0.336		242	4.10	9.2
1456			1.85		7.35	6.70	0.328		237	4.06	9.0

TRC	Well	MW-5
	Date	3/21/2019
	Location	New Holstein, WI
	Site	Tecumseh / HARP

Static Depth to Water (ft)	2.81	Sample Collection Time	1522
Total Purge Volume (gal)		Purge Method	Peristaltic Pump
Total Depth (ft)		Sample Method	Low-Flow Through Flow Cell
Screen Depth Interval (ft)		Water Description	
LNAPL (in)	—	Sampling Personnel	AJ / TG

Time (min)	Volume Purged (L)	Flow Rate (L/min)	Depth to Water (ft)	Drawdown (ft)	pH (SU) (±0.1 units)	Temp (°C) (± 3%)	Conductivity (mS/cm) (±3%)	[redacted]	ORP (mV) (±10 mV)	Dissolved Oxygen (mg/L) (±10%)	Turbidity (NTUs) (±10% for >1)
1506			2.66		7.23	5.70	0.553		255	4.14	2.4
1510			2.63		7.18	6.17	0.543		247	3.76	1.4
1514			2.62		7.11	6.31	0.533		239	3.65	1.9
1518			2.61		7.14	6.22	0.511		228	3.61	1.6
1522			2.61		7.12	6.10	0.499		218	3.95	3.0

TRC

Well	NH-7
Date	3/21/19
Location	New Holstein, WI
Site	Tecumseh / HARP

Static Depth to Water (ft)	7.22	Sample Collection Time	1605
Total Purge Volume (gal)		Purge Method	Peristaltic Pump
Total Depth (ft)		Sample Method	Low-Flow Through Flow Cell
Screen Depth Interval (ft)		Water Description	
LNAPL (in)	—	Sampling Personnel	AJ / TG

Time (min)	Volume Purged (L)	Flow Rate (L/min)	Depth to Water (ft)	Drawdown (ft)	pH (SU) (±0.1 units)	Temp (°C) (± 3%)	Conductivity (mS/cm) (±3%)	[redacted]	ORP (mV) (±10 mV)	Dissolved Oxygen (mg/L) (±10%)	Turbidity (NTUs) (±10% for >1)
1540	0.50	0.16	7.36	0.14	7.15	7.25	0.844		272	8.50	15.4
1544		0.16	7.39	0.17	7.27	7.31	0.810		265	8.25	11.9
1548		0.10	7.39	0.17	7.26	7.36	0.821		265	7.90	13.4
1552		0.10	7.39	0.17	7.26	7.42	0.837		266	7.78	17.9
1556		0.18	7.39	0.17	7.26	6.96	0.834		267	8.07	16.6
stable											

Form Date:

TRC	Well	MW-F (MS/MSD)	
	Date	3/21/2019	
	Location	New Holstein, WI	
	Site	Tecumseh / HARP	
Static Depth to Water (ft)	7.38	Sample Collection Time	1700
Total Purge Volume (gal)		Purge Method	Peristaltic Pump
Total Depth (ft)		Sample Method	Low-Flow Through Flow Cell
Screen Depth Interval (ft)		Water Description	
LNAPL (in)	–	Sampling Personnel	AJ / TG

Time (min)	Volume Purged (L)	Flow Rate (L/min)	Depth to Water (ft)	Drawdown (ft)	pH (SU) (±0.1 units)	Temp (°C) (± 3%)	Conductivity (mS/cm) (±3%)	[redacted]	ORP (mV) (±10 mV)	Dissolved Oxygen (mg/L) (±10%)	Turbidity (NTUs) (±10% for >1)
1634	0.50	0.15	7.57	0.19	7.35	6.93	0.935		269	5.33	12.3
1638		0.15	7.66	0.28	7.31	6.67	0.937		262	5.05	12.4
1642		0.15	7.74	0.36	7.22	6.56	0.901		259	5.23	13.2
1646		0.15	7.82	0.44	7.18	6.52	0.838		257	5.56	9.2
1650		0.15	7.89	0.51	7.15	6.45	0.783		257	5.84	5.6
stable											

Form Date:

TRC		Well	MW-A
		Date	3/21/2019
		Location	New Holstein, WI
		Site	Tecumseh / HARP
Static Depth to Water (ft)	5.34	Sample Collection Time	1725
Total Purge Volume (gal)		Purge Method	Peristaltic Pump
Total Depth (ft)		Sample Method	Low-Flow Through Flow Cell
Screen Depth Interval (ft)		Water Description	Clear, no odor
LNAPL (in)	—	Sampling Personnel	AJ / TG

Time (min)	Volume Purged (L)	Flow Rate (L/min)	Depth to Water (ft)	Drawdown (ft)	pH (SU) (±0.1 units)	Temp (°C) (± 3%)	Conductivity (mS/cm) (±3%)	[redacted]	ORP (mV) (±10 mV)	Dissolved Oxygen (mg/L) (±10%)	Turbidity (NTUs) (±10% for >1)
1702	0.50	0.15	5.53	1.19	7.07	7.54	0.909		285	3.63	115
1706		0.15	5.55	1.21	7.15	7.25	0.828		277	3.84	49.4
1710		0.15	5.62	1.28	7.21	7.11	0.617		271	6.01	20.0
1714		0.15	5.64	1.30	7.24	6.98	0.546		270	7.17	14.7
1718		0.15	5.64	1.30	7.23	7.22	0.531		271	6.82	13.0
1722		0.15	5.64	1.30	7.21	7.28	0.532		273	6.69	10.9

Form Date:

TRC

Well	MW-B
Date	3/20/2019
Location	New Holstein, WI
Site	Tecumseh / HARP

Static Depth to Water (ft)	3.88	Sample Collection Time	1800
Total Purge Volume (gal)		Purge Method	Peristaltic Pump
Total Depth (ft)		Sample Method	Low-Flow Through Flow Cell
Screen Depth Interval (ft)		Water Description	
LNAPL (in)	—	Sampling Personnel	AJ / TG

Time (min)	Volume Purged (L)	Flow Rate (L/min)	Depth to Water (ft)	Drawdown (ft)	pH (SU) (±0.1 units)	Temp (°C) (± 3%)	Conductivity (mS/cm) (±3%)	[redacted]	ORP (mV) (±10 mV)	Dissolved Oxygen (mg/L) (±10%)	Turbidity (NTUs) (±10% for >1)
1732			4.11		7.37	6.77	0.508	[redacted]	283	7.50	115
1736			4.16		7.40	6.50	0.509	[redacted]	282	7.35	53.9
1740			4.18		7.39	6.23	0.508	[redacted]	283	7.37	35.8
1744			4.19		7.41	6.28	0.507	[redacted]	284	7.16	13.4
1748			4.21		7.40	6.29	0.509	[redacted]	285	7.02	10.3
1752			4.22		7.39	6.26	0.510	[redacted]	286	6.93	5.5
1756			4.23		7.39	6.26	0.512	[redacted]	287	6.83	3.7
								[redacted]			

Form Date:

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