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 not 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		
Beaster	Karl		Enbridge Energy, Limited Partnership (Responsible Party)		
Mailing Address			City	State	ZIP Code
11 East Superior Street - Suite 125			Duluth	MN	55802
Phone # (include area code)	Fax # (include area code)		Email		
(715) 718-1040			karl.beaster@enbridge.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:

The property is owned by Tri-State Holdings LLC, an Enbridge affiliate

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

☐ Select if same as requester

Contact Last Name	First	MI	Organization/ Business Name		
Beaster	Karl		Enbridge Energy, Limited Partnership (Responsible Party)		
Mailing Address			City	State	ZIP Code
11 East Superior Street - Suite 125			Duluth	MN	55802
Phone # (include area code)	Fax # (include area code)		Email		
(715) 718-1040			karl.beaster@enbridge.com		

Environmental Consultant (if applicable)

Contact Last Name	First	MI	Organization/ Business Name		
Huff	Tim		WSP USA Inc.		
Mailing Address			City	State	ZIP Code
5957 McKee Road, Suite 7			Madison	WI	53719
Phone # (include area code)	Fax # (include area code)		Email		
(314) 206-4212			tim.huff@wsp.com		

Property Owner (if different from requester)

Contact Last Name	First	MI	Organization/ Business Name		
			Tri-State Holdings LLC		
Mailing Address			City	State	ZIP Code
11 East Superior Street, Suite 125			Duluth	MN	55802
Phone # (include area code)	Fax # (include area code)		Email		

Section 2. Property Information

Property Name			FID No. (if known)
Enbridge Line 13 Blackhawk Valve			
BRRTS No. (if known)	Parcel Identification Number		
02-28-586199	016-0514-0824-003		
Street Address	City	State	ZIP Code
Blackhawk Island Road	Fort Atkinson	WI	53538

County	Municipality where the Property is located	Property is composed of:	Property Size Acres
Jefferson	(●) City ( ) Town ( ) Village of Fort Atkinson	(●) Single tax parcel ( ) Multiple tax parcels	68

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.**
- [x] 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 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: Remedial Action Options Report

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: _____
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

05/24/2022
Date Signed

Senior Environmental Advisor
Title

(715) 718-1040
Telephone Number (include area code)

Section 8. DNR Contacts and Addresses for Request Submittals

Send or deliver one paper copy and one electronic copy on a compact disk of the completed request, supporting materials, and fee to the region where the property is located to the address below. Contact a DNR regional brownfields specialist with any questions about this form or a specific situation involving a contaminated property. For electronic document submittal requirements see: http://dnr.wi.gov/files/PDF/pubs/rr/RR690.pdf.

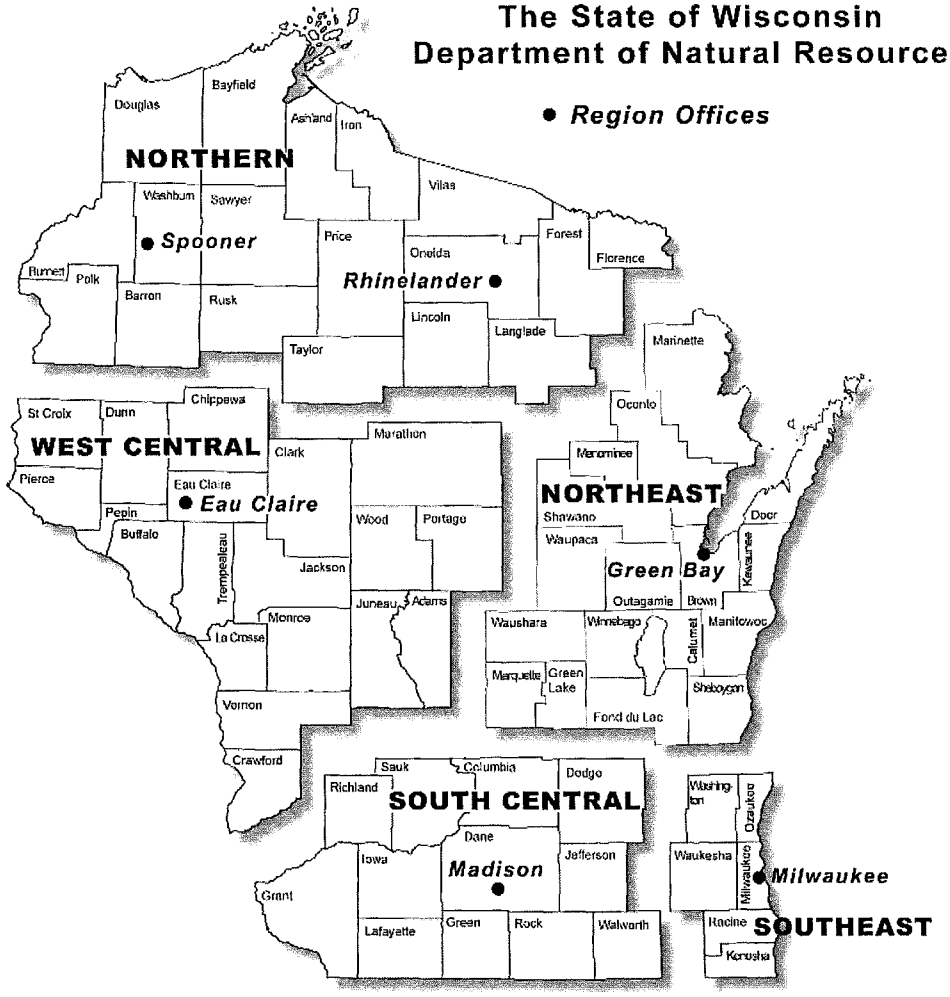
DNR NORTHERN REGION
Attn: RR Program Assistant
Department of Natural Resources
223 E Steinfest Rd Antigo, WI 54409

DNR NORTHEAST REGION
Attn: RR Program Assistant
Department of Natural Resources
2984 Shawano Avenue
Green Bay WI 54313

DNR SOUTH CENTRAL REGION
Attn: RR Program Assistant
Department of Natural Resources
3911 Fish Hatchery Road
Fitchburg WI 53711

DNR SOUTHEAST REGION
Attn: RR Program Assistant
Department of Natural Resources
2300 North Martin Luther King Drive
Milwaukee WI 53212

DNR WEST CENTRAL REGION
Attn: RR Program Assistant
Department of Natural Resources
1300 Clairemont Ave.
Eau Claire WI 54702



Note: These are the Remediation and Redevelopment Program's designated regions. Other DNR program regional boundaries may be different.

DNR Use Only			
Date Received	Date Assigned	BRRTS Activity Code	BRRTS No. (if used)
DNR Reviewer	Comments		
Fee Enclosed? ◯ Yes ◯ No	Fee Amount $	Date Additional Information Requested	Date Requested for DNR Response Letter
Date Approved	Final Determination		

Signature

05/24/2022
Date Signed

Senior Environmental Advisor
Title

(715) 718-1040
Telephone Number (include area code)

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Attn: RR Program Assistant
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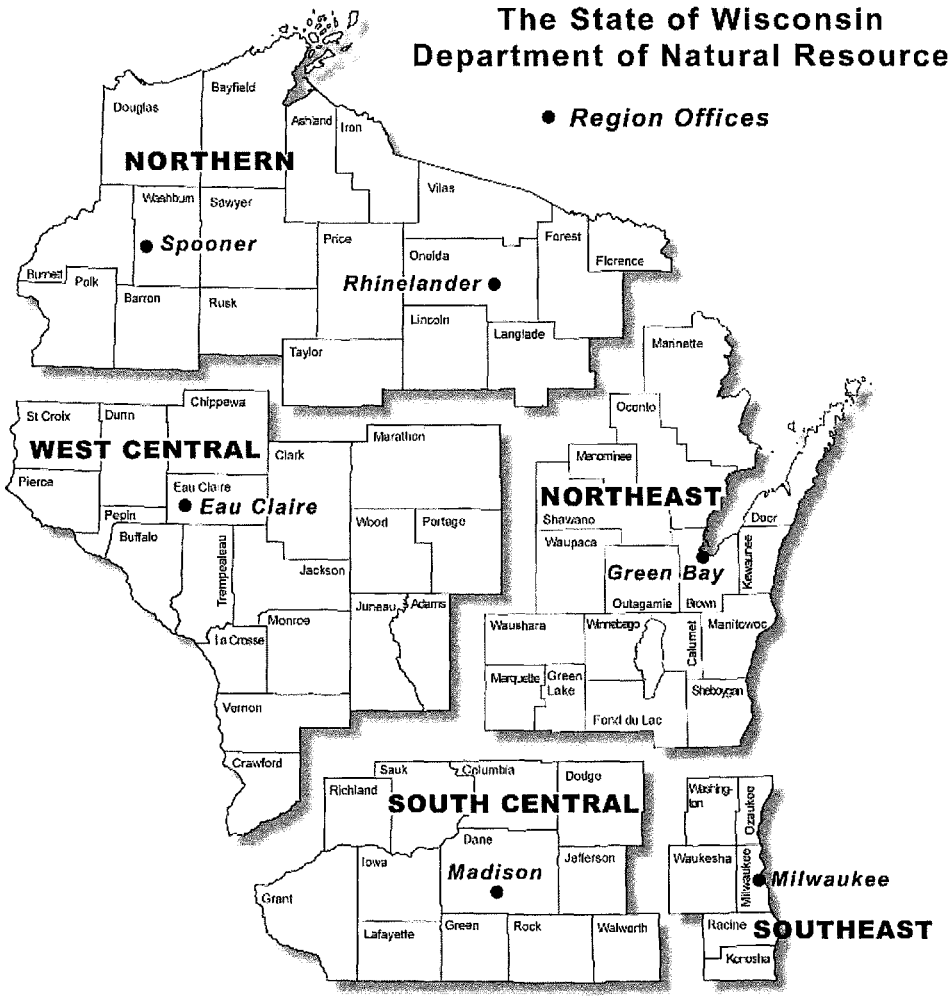
Fitchburg WI 53711

DNR SOUTHEAST REGION
Attn: RR Program Assistant
Department of Natural Resources
2300 North Martin Luther King Drive
Milwaukee WI 53212

DNR WEST CENTRAL REGION
Attn: RR Program Assistant
Department of Natural Resources
1300 Clairemont Ave.
Eau Claire WI 54702



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DNR Use Only			
Date Received	Date Assigned	BRRTS Activity Code	BRRTS No. (if used)
DNR Reviewer	Comments		
Fee Enclosed? ◯ Yes ◯ No	Fee Amount $	Date Additional Information Requested	Date Requested for DNR Response Letter
Date Approved	Final Determination		

ENBRIDGE LINE 13 MP 312 VALVE SITE (BRRTS# 02-28-586199)

REMEDIAL ACTION OPTIONS REPORT

ENBRIDGE ENERGY, LIMITED PARTNERSHIP

PROJECT NO.: 31401967.705B
DATE: MAY 2022

WSP USA, INC.
5957 MCKEE ROAD, SUITE 7
MADISON, WI 53719

WSP.COM

CERTIFICATION

Remedial Action Options Report
Enbridge Line 13 MP 312 Valve Site
Blackhawk Island Road
Fort Atkinson, Wisconsin
BRRTS Number: 02-28-586199

I, Craig R. Anderson, 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.

Craig Anderson, PE
Practice Leader, Wisconsin PE #35076-6

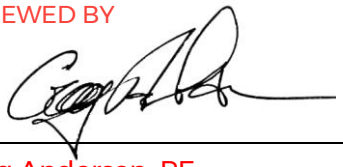
5/19/2022
Date

SIGNATURES

PREPARED BY

Eric Wesseldyke
Senior Consultant, Environmental Engineer

REVIEWED BY



Craig Anderson, PE
Practice Leader

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EXECUTIVE SUMMARY

On behalf of Enbridge, WSP USA Inc. (WSP) evaluated several Remedial Action Options (RAOs) to address impacts to soil and groundwater identified at the Line 13 Milepost 312 Valve Site, located near the intersection of Blackhawk Island Road and Wesphal Lane, Jefferson County, Wisconsin. Following an initial screening, WSP conducted a further comparison of eight RAOs: Natural Source Zone Depletion (NSZD), Monitored Natural Attenuation (MNA), Excavation, Skimming/Free Product Recovery, Air Sparge/Soil Vapor Extraction (AS/SVE), Biosparge/Bioventing, In-Situ Injections of Oxygen Emitting Compounds, and Groundwater Pump-and-Treat.

Based on an evaluation of the technical and economic feasibility of each RAO at the Site, a Remedial Action (RA) sequence of free product recovery, SVE, and MNA was selected to address the mobile free product, residual free product and soil impacts, and groundwater impacts, respectively. Free product recovery has already been operating at the site as the interim action as described in the Interim Action Construction Completion Report, dated November 11, 2021 (WSP 2021) and the Interim Action Construction Completion Report Addendum, dated January 5, 2022 (WSP 2022a); therefore, it is low-cost to continue operation. Although SVE is anticipated to be an effective soil remedy, an SVE pilot test will need to be conducted at the Site to develop design parameters for a full-scale SVE system. Also, groundwater sampling is being conducted to evaluate the potential of the Site for MNA. If the results of the groundwater sampling indicate that MNA is not an effective RA at the Site, AS is likely to be implemented as a contingency RA.

1 INTRODUCTION

On behalf of Enbridge Energy, Limited Partnership (Enbridge), WSP USA, Inc. (WSP) has prepared this Remedial Action Options Report (RAOR) for the Enbridge Line 13, Mile Post (MP) 312 Valve Site near Fort Atkinson, Wisconsin (Site). Soil and groundwater assessment and remediation are being conducted at the Site under the oversight of the Wisconsin Department of Natural Resources (WDNR) Remediation and Redevelopment Program (Bureau for Remediation and Redevelopment Tracking System (BRRTS) Number: 02-28-586199).

Enbridge submitted to the WDNR a Supplemental Site Investigation (SSI) Report on March 16, 2022, summarizing the results of the additional Site investigation and interim actions conducted in 2021 and January 2022. WSP has prepared this report in accordance with Wisconsin Administrative Code (WAC) Chapter NR 722 requirements to evaluate multiple remedial action options (RAOs) and select the RAO most appropriate for this Site.

2 BACKGROUND INFORMATION

2.1 SITE INFORMATION

The Site is located near the southeastern corner of Blackhawk Island Road and Westphal Lane, Jefferson, County, Wisconsin, and is situated approximately 1,000 feet east of Wisconsin State Highway 26 (Figure 2-1). According to the United States Geological Survey (USGS) Fort Atkinson Wisconsin 7.5-Minute Quadrangle map (USGS, 2018), the Site is located in NW ¼, SW ¼, Section 8, Township 5 North, Range 14 East. The Site lies in a portion of a parcel identified as Tax Parcel ID: 016-0514-0824-003.

Table 2-1 – Site Information

Facility:	Enbridge Line 13 MP 312 Valve Site Blackhawk Island Road Fort Atkinson, Wisconsin
Coordinates:	WTM91: 611849 meters, 271475 meters Latitude:42.9104°N Longitude:88.8747°W
BRRTS Number:	02-28-586199
Generator EPA ID:	WIR000177691
FID Number:	128136140
Generator Status:	Small Quantity Short Term Generator
Responsible Party:	Enbridge Energy, Limited Partnership 11 East Superior Street Suite 125 Duluth, MN 55802
Contact:	Mr. Karl F. Beaster, P.G.
Telephone:	(715) 718-1040
Email:	Karl.Beaster@enbridge.com
Consultant:	WSP USA, Inc. 5957 McKee Road, Suite 7 Madison, WI 53719
Laboratory:	Pace Analytical Services, LLC 1241 Bellevue Street Green Bay, WI 54302 WDNR Certification #: 405132750

2.2 SITE DESCRIPTION

The Enbridge Line 13 MP 312 Valve Site consists of a small, approximately 5,000-square foot fenced area with two small valve control buildings and four underground pipelines with associated valves (Lines 6A, 14, 13, and 61) and aboveground valve control structures (Figure 2-2). The remainder of the parcel on which the Site is located is used for agricultural purposes. Enbridge (dba Tri-State Holdings LLC) currently owns the parcel where the Site is located.

The predominant land uses in the vicinity of the Site are farming and residential. A residential dwelling (MacLeod Residence) is located approximately 300 feet north of the Site. Another residential home is located approximately 400 feet southwest of the Site. Other residential and farm buildings are located approximately 600 feet south and approximately 1,200 feet east of the Site.

2.2.1 CLIMATE

Fort Atkinson has a continental climate characterized by cold winters and mild to hot summers. Average temperature of the warmest month (July) is approximately 73°F, and the average temperature in January, the coldest month, is 20°F. Annual precipitation is approximately 35 inches, and spring and summer are typically the wettest seasons. Average snowfall is approximately 38 inches annually.

2.2.2 SITE TOPOGRAPHY

According to the USGS Fort Atkinson, Wisconsin 7.5-Minute Quadrangle map (USGS 2018), the Site is located in the NW ¼ of the SW ¼ of Section 8, T5N R14E, City of Fort Atkinson, Jefferson County, Wisconsin and has an approximate elevation of 810 feet above sea level. The Site is on the side of a small hill that slopes to the north, east and west.

2.2.3 SURFACE WATER

The surface water body nearest the Site is a manmade pond located approximately 600 feet to the northeast. The Rock River is located approximately 2,000 feet to the east and 3,500 feet to the south of the Site. Wet, marshy areas are located approximately 2,000 feet east and 2,000 feet west of the Site. Lake Koshkonong is located approximately two miles southwest of the Site.

2.2.4 GEOLOGIC SETTING

The geologic setting of Jefferson County, Wisconsin consists of surficial, unconsolidated Quaternary glacial deposits overlying predominantly Ordovician sedimentary bedrock formations. At the Site, the unconsolidated glacial deposits consist of silty clay and silty sand units from ground surface to as deep as 10 to 20 feet below ground surface (feet bgs), underlain by fine- to coarse-grained sand with varying amounts of gravel to at least 80 feet bgs. Several thin, discontinuous lenses of silty sand with gravel or sandy silt with gravel were identified between 40 and 55 feet bgs in the boreholes for several deep monitoring wells.

Bedrock was not encountered during the Site investigation. Bedrock underlying the Site has been interpreted to be St. Peter Sandstone (Borman and Trotta, 1975) at a depth of approximately 300 feet bgs. Well construction reports obtained from the WDNR well database for potable wells in the vicinity of the Site indicated interbedded sand, gravel, and clay extend to a depth of over 250 feet bgs. Sandstone bedrock was encountered at a depth of 263 feet bgs at one potable well location approximately 900 feet north of the Site.

2.2.5 HYDROGEOLOGIC SETTING

Aquifers in Jefferson County, Wisconsin include water-bearing zones in the glacial sand and gravel deposits as well as bedrock aquifers in the underlying Ordovician Galena-Platteville Formations and sandstone aquifers in the Ordovician St. Peter Sandstone and Prairie Du Chien Group (Boreman and Trotta, 1975). In the vicinity of the Site, the glacial sand and gravel aquifer is approximately 300 feet thick with probable well yields of more than 1,000 gallons per minute (gpm). The underlying bedrock aquifers are also capable of yielding sufficient water to supply private water wells and municipal and industrial wells. The sandstone aquifer is the principal source for municipal and industrial water supply wells with probable well yields as high as 2,000 gpm (Boreman and Trotta, 1975).

At the Site, groundwater is encountered at depths between approximately 15 and 30 feet bgs. The water table at the Site is flat (0.0002 foot per foot horizontal hydraulic gradient), with less than 0.2 feet of elevation change across the monitoring well network. Between September 2020, when the original monitoring wells were installed, and January 2022, the groundwater elevations have varied by less than 1.1 feet at individual monitoring wells. The groundwater flow direction is toward the southeast, toward the Rock River.

2.2.6 GROUNDWATER USE

The Interim Action and Site Investigation Report (IASIR), dated January 28, 2021 (AECOM 2021a), included well record information for potable wells in the vicinity of the Site, which were included in the WDNR Well Records online database. Ten private potable wells were identified within 1,200 feet of the Site. Eight additional wells installed prior to 1988 were identified to be located within the same Township, Range and Section as the Site. Specific addresses or coordinates of those wells were not included in the WDNR Well Records due to their dates of installation.

In March and April 2021, Enbridge contacted property owners in the vicinity of the Site in connection with an Enbridge-led potable well sampling event conducted between April 1 and 15, 2021. Additional potable wells were identified within approximately 1,500 feet of the Site, as shown on Figure 2-3. For the 11 potable wells located within 1,500 feet of the Site with WDNR Well Records, the well depths vary between 57 and 93 feet bgs, and each of the wells was constructed with a 3-foot screened interval in a lithologic unit described on the Well Record as sand and gravel.

2.3 SITE HISTORY

2.3.1 2019 INCIDENT DESCRIPTION AND INITIAL RESPONSE

On April 26, 2019 during a routine Site inspection by an Enbridge employee, the employee's personal gas monitor alarmed. As outlined in the IASIR, Enbridge and its contractors conducted response activities to identify the source of the release and remediate the adjacent soil impacts. Enbridge identified the source of the release as a leaking component on the valve for Line 13, which transports diluent.

Enbridge and its contractors completed soil gas screening using a photoionization detector (PID) and soil gas sampling on May 3-4, 2019 to identify the potential source of the release and conducted three excavation events (May 15-17, July 30-August 2, and October 9, 2019) to remediate the soil impacts to the extent feasible. Soil samples collected at the completion of the final excavation activities indicated that some soil impacted by the diluent remained in the sidewalls of the final excavation. However, additional excavation to remove this impacted soil was deemed not feasible due to existing Site infrastructure.

On July 21, 2020, one soil boring (B-1/TW-01) was advanced near the release location to a depth of approximately 35 feet bgs to collect soil and groundwater samples for laboratory analysis to further assess the remaining impacts. The laboratory results from those samples were received on July 30, 2020 and indicated the benzene concentrations exceeded the WDNR Generic Residual Contaminant Level (RCL) for the soil-to-groundwater pathway in the soil, and the Wisconsin Administrative

Code (WAC) Chapter NR 140 Enforcement Standard (ES) in the groundwater. The results were reported to the WDNR on July 31, 2020, and WDNR issued a responsible party (RP) letter to Enbridge on August 3, 2020.

2.3.2 2020 GROUNDWATER INVESTIGATION

Enbridge contracted with AECOM to conduct a Site Investigation to identify the extent of the impact of the diluent release to soil and groundwater. The results from that Site Investigation were included in the IASIR and are summarized below. From August 27 to September 14, 2020, AECOM and its contractor advanced 27 soil borings ranging in depth from 20 to 30 feet bgs. One soil sample was collected from each soil boring and analyzed for gasoline range organics (GRO), benzene, toluene, ethylbenzene, and total xylenes (BTEX), 1,2,4-trimethylbenzene (1,2,4-TMB), 1,3,5-trimethylbenzene (1,3,5-TMB), and methyl-tert butyl ether (MTBE) using the WDNR GRO Method.

Temporary monitoring wells were installed in each of the 27 soil borings. Water level measurements were collected from the temporary monitoring wells to estimate the groundwater flow direction and water samples for laboratory analysis were collected from each temporary monitoring well. The water samples were analyzed for GRO, BTEX, 1,2,4-TMB, 1,3,5-TMB, and MTBE using the WDNR GRO Method. After collecting the water samples, the contractor removed the temporary monitoring wells and filled the boreholes with bentonite chips.

Eight monitoring wells (MW-01-32 through MW-08-27) were installed with completion depths ranging from 24.9 to 31.9 feet bgs in accordance with Chapter NR 141, WAC. AECOM conducted quarterly groundwater sampling events in October 2020 and January 2021 and submitted the samples to Pace Analytical of Green Bay, WI (Pace) for laboratory analysis of volatile organic compounds (VOCs) using SW 846 Method 8260. One water sample was collected from a residential well on the MacLeod property and submitted to Pace for laboratory analysis of GRO and BTEX (WI MOD GRO Method). The locations of the monitoring wells are shown in Figure 2-2. Monitoring well names have been revised to include a depth modifier (e.g. MW-01-32; bottom of screened interval at 32 feet bgs).

The laboratory results from the soil samples collected outside the fenced area indicated no GRO or VOCs at concentrations above laboratory method detection limits (MDLs). However, the laboratory results from B-1 indicated the presence of benzene at concentrations above the WDNR RCL within the fenced area.

Groundwater samples from 20 of the 28 temporary monitoring wells exhibited GRO and BTEX at concentrations above laboratory method detection limits (MDLs). The concentrations of benzene ranged from 0.46 micrograms per liter (µg/L) in the sample from SB-22 to 5,600 µg/L in the sample from TW-01, which was collected near the Line 13 valve. The concentration of benzene exceeded the WDNR Enforcement Standard (ES) of 5 µg/L in samples from SB-3, TW-01, SB-5, SB-8, SB-7, SB-15, SB-9, SB-10 and SB-1 (in order of decreasing concentration). The concentration of toluene also exceeded the ES of 800 µg/L in the sample from TW-01.

The laboratory analytical results from the October 2020 and January 2021 groundwater sampling events from monitoring wells MW-01-32 through MW-08-27 indicated the concentrations of benzene and toluene exceeded the ES in both samples from MW-01-32, and concentrations of trichloroethene (TCE) exceeded the Section NR 140.10, WAC, Prevention Action Level (PAL) in the both samples from MW-06-30. The results from both sampling events indicated that no VOCs were detected at concentrations above the laboratory MDLs in any other monitoring wells. The laboratory results from the October 2020 sample collected at the MacLeod property potable well did not contain GRO or BTEX at concentrations above the laboratory MDLs.

2.3.3 2021 SUPPLEMENTAL SITE INVESTIGATION AND INTERIM ACTION

Between April 1, 2021, and January 26, 2022, Enbridge completed a Supplemental Site Investigation (SSI) at the Site. The results of the SSI were included in the Supplemental Site Investigation Report, dated March 16, 2022 (WSP 2022). The SSI included a soil investigation and groundwater investigation to expand upon the initial site investigation completed in 2020. The soil investigation consisted of 33 in-situ high-resolution site characterization (HRSC) soil borings; two pipeline bedding soil samples, and 30 direct-push soil confirmation borings with collection and analysis of 103 soil samples. The groundwater investigation consisted of vertical groundwater profiling at two locations; installation, development, and surveying of 15 new monitoring wells; monthly or quarterly monitoring well sampling between April 2021 and April 2022, in-situ hydraulic

conductivity (i.e. slug testing) at six locations, and 4 quarterly sampling events of 17 potable wells between April and March 2022. Potable well sampling results were provided to individual property owners, and all sampling results were provided to the WDNR in a series of submittals.

The HRSC phase of the soil investigation indicated potential non-aqueous phase liquid (NAPL) between 24 to 27 feet bgs in the vicinity of the Line 13 valve. At several HRSC borings, potential NAPL was also observed between approximately 10 and 15 feet bgs indicative of a potentially, more weathered, residual NAPL in the vadose zone near the Line 13 valve. The lateral extent of potential NAPL in the interval 24 to 27 feet bgs was delineated by in the outermost HRSC borings.

The soil confirmation sampling identified a limited area near the Line 13 valve with benzene at a concentration above the non-industrial direct contact RCL. This was associated with the soil sample from 16 to 17 feet bgs at boring IS-13, which contained benzene at 4,500 micrograms per kilogram (µg/kg), above the non-industrial direct contact RCL of 1,600 µg/kg but below the industrial RCL of 7,070 µg/kg. No other compounds were detected at concentrations above the direct contact RCLs. A total of 47 samples contained benzene at a concentration above the groundwater pathway RCL of 5.1 µg/kg. The area with benzene soil concentrations above the groundwater pathway RCL was generally centered on the Line 13 valve and extended from as shallow as 5 feet bgs to the water table at approximately 24 feet bgs. The area of benzene impact varied between approximately 5,000 square feet (ft^2) in the shallowest interval above 10 feet bgs and 18,000 ft^2 in the deepest interval from 20 to 24 feet bgs.

The lateral delineation of benzene to concentrations below the groundwater pathway RCL was completed to a depth of 15 feet bgs. For deeper sample intervals from 15 to 20 feet bgs and 20 to 24 feet bgs intervals, benzene concentrations were delineated to the north, east, and south, but remained above the groundwater pathway RCL on the west of the Site by the property line along Blackhawk Island Road where soil borings were not advanced due to the presence of underground and overhead utilities and limitations for access to collect soil samples within the Blackhawk Island Road right-of-way.

The groundwater investigation and quarterly monitoring defined the lateral and vertical extent of petroleum volatile organic compound (PVOC)-impacted groundwater. The highest PVOC concentrations occurred in samples collected from monitoring well MW-01-32, which is approximately 50 feet from the Line 13 valve on the downgradient (southeast) side, and where benzene, ethylbenzene, toluene, and total xylenes occur at concentrations above the ES, PAL, and/or Vapor Risk Screening Levels (VRSL). From six historical sampling events at this location, average concentrations were approximately 21,000 µg/l (benzene), 200 µg/l (ethylbenzene), 9,000 µg/l (toluene), and 650 µg/l (total xylenes). Free product (NAPL) has not been identified at MW-01-32. Groundwater samples from six additional monitoring wells have contained benzene at concentrations above the ES or PAL (MW-01-63, MW-05-30, MW-06-32, MW-10-32, MW-11-32, and MW-14-31). Only two locations (MW-01-32 and MW-14-31) have contained benzene at a concentration above the VRSL. The area with benzene concentrations above the PAL of 0.5 µg/l is generally centered on the Line 13 valve, extending to the northeast, northwest, and southwest approximately 150 feet, and extending to the southeast in the downgradient direction approximately 330 feet.

No PVOCs were detected at concentrations above the ES, PAL, or VRSL in the samples from 16 of 23 monitoring wells, including all 11 of the perimeter wells screened at the water table and 5 of the 6 deeper wells screened between 45 and 63 feet bgs. The extent of PVOCs in groundwater is laterally delineated, and, with the exception of the estimated benzene detection in one sample among the three historical samples at MW-01-63, is also delineated vertically.

TCE was detected in groundwater samples from two locations at concentrations above the ES (5.0 µg/l), PAL (0.5 µg/l), or VRSL (5.0 µg/l). TCE was detected in samples from monitoring well MW-06-32 at concentrations ranging from 0.53 (estimated) to 1.9 µg/l. TCE was also detected in samples from monitoring well MW-06-60 at concentrations ranging from 11.3 to 15.0 µg/l. TCE is not a component of the released diluent at the Site.

No site-related VOCs have been detected in the potable well samples collected during three quarterly rounds of sampling completed between April 2021 and March 2022.

The release volume estimate was revised based on the results of the SSI and Interim Action product recovery activities. The revised estimate was developed using impacted vadose zone or aquifer volume, representative soil or groundwater concentration, estimated free product saturation, and estimated free product volume for soil and groundwater impacts. The free product volume near water table was estimated using a vertical equilibrium model and included a minimum and maximum estimate. The revised total release volume minimum estimate is 3,336 gallons (79 barrels [bbls]) and the maximum estimate is 7,937 gallons (189 bbls).

In addition, Enbridge completed Interim Action free product recovery activities at the Site between June 21 and November 29, 2021. Interim Action free product recovery consisted initially of manual free product recovery followed by installation and operation of an automated free product recovery system. The free product recovery activities removed approximately 741 gallons (17.6 bbls) of diluent associated with the release. Approximately 1,232 gallons (29 bbls) were recovered during the 2019 soil excavation and 2021 Interim Action free product recovery.

2.3.4 REGULATORY STATUS OF THE SITE

As described above, Wisconsin DNR issued a RP letter to Enbridge regarding the Site on August 3, 2020. Currently, the Site is enrolled in the BRRTS as Site #02-28-586199 and is considered an open Site.

3 EXISTING CHEMICALS OF CONCERN

3.1 SOIL

Soil sampling conducted during the 2019 initial response and soil excavation identified BTEX in soil at concentrations above the WDNR RCLs for the groundwater pathway and benzene and ethylbenzene in soil at concentrations above the WDNR RCLs for the non-industrial direct contact pathway. One soil sample contained benzene at a concentration above the industrial direct contact pathway. Based on the excavation floor and sidewall sampling results, impacted soil was removed during subsequent phases of excavation, with the exception of some soil that could not be removed due to the existing Site infrastructure.

The results of the 2021 SSI soil investigation identified a limited area near the Line 13 valve with benzene at a concentration above the non-industrial direct contact RCL. This was associated with the soil sample from 16 to 17 feet bgs at boring IS-13, which contained benzene at 4,500 µg/kg, above the non-industrial direct contact RCL of 1,600 µg/kg, but below the industrial RCL of 7,070 µg/kg. No other compounds were detected at concentrations above the direct contact RCLs.

Among the BTEX constituents detected during the 2021 SSI soil investigation at concentrations above the groundwater pathway RCLs, benzene had the most widespread distribution. Among 94 primary soil samples, benzene was detected in 52 samples at concentrations ranging from 4.2 to 4,500 µg/kg. A total of 47 of the 52 samples contained benzene at a concentration above the groundwater pathway RCL of 5.1 µg/kg. The area with benzene soil concentrations above the groundwater pathway RCL was generally centered on the Line 13 valve and extended from as shallow as 5 feet bgs to the water table at approximately 24 feet bgs. Figures 3-1 through 3-4 present the benzene soil sampling results for different depth intervals.

For the depth intervals presented in Figures 3-1 through 3-4, the area of benzene impact varied between approximately 5,000 square feet (ft^2) in the shallowest interval above 10 feet bgs and 18,000 ft^2 in the deepest interval from 20 to 24 feet bgs.

The lateral delineation of benzene to concentrations below the groundwater pathway RCL was completed for the less than 10 feet bgs and 10 to 15 feet bgs intervals. For the 15 to 20 feet bgs and 20 to 24 feet bgs intervals, benzene concentrations were delineated to the north, east, and south, but remained above the groundwater pathway RCL on the west of the Site by the property line along Blackhawk Island Road. Due to the presence of underground and overhead utilities and limitations for access to collect soil samples within the Blackhawk Island Road right-of-way, additional soil samples were not collected west of the Site property line during the soil investigation. During the subsequent installation of monitoring well MW-17-20 (located west of Blackhawk Island Road), PID soil screening results were at background levels from ground surface to the water table. MW-17-20 was sampled in December of 2021 and January of 2022 and in both events, BTEX was not detected at concentrations above the laboratory's method detection limits.

The samples from IS-2 (16 to 17 feet bgs) and IS-13 (16 to 17 feet bgs), located very close to the Line 13 valve (approximately 10 feet south and 15 feet west of the valve) contained the highest VOC concentrations among the soil samples, including toluene and total xylenes at concentrations above the groundwater pathway RCLs and several compounds that do not have groundwater pathway RCLs (e.g. 1,2,4-trimethylbenzene and cyclohexane). Total VOCs concentrations in these two samples were 28,398 µg/kg and 74,140 µg/kg, respectively.

3.2 FREE PRODUCT/LNAPL

The HRSC investigation and remediation well installation completed in June 2021 identified the presence of free product at the Site. The UVOST response at many HRSC borings indicated potential free product at 24 to 27 feet bgs, with the most prominent response observed at HRSC borings closest to the Line 13 valve (e.g. IS-01, IS-02, IS-03, and IS-04). Shallower intervals typically exhibited only a background UVOST response. At several HRSC borings, a minor response was observed from approximately 10 to 15 feet bgs, which indicated a potentially more weathered residual free product in the vadose zone near the Line 13 valve (e.g. IS-07, IS-13).

The lateral extent of potential free product in the interval 24 to 27 feet bgs was delineated by the lack of a UVOST response in the outermost HRSC borings. Figure 3-5 depicts the lateral extent of free product based on the UVOST response, an irregularly shaped area measuring approximately 120 feet by 80 feet (approximately 6,000 ft^2).

The presence of free product was subsequently confirmed by measurements in the remediation wells installed around the Line 13 valve following the soil investigation. Of the 11 remediation wells, 9 contain free product. Initial free product thickness measured in June 2021 was approximately 2 feet. At the end of November 2021, following Interim Action free product recovery, product thickness had decreased to between approximately 0.5 and 1 feet in most remediation wells, but increased to approximately 1.5 feet in January 2022 when groundwater elevations were lower. Remediation wells RW-10 and RW-11 have not exhibited measurable free product. Figure 3-6 depicts the free product thickness measured in the remediation wells, an area measuring approximately 60 feet by 40 feet (approximately 2,500 ft^2).

3.3 GROUNDWATER

Groundwater sampling conducted during the 2020 Site investigation at temporary wells TW-1 (B-1) and SB-1 through SB-27 identified an area of VOC- and GRO-impacted shallow groundwater at the water table in the vicinity of the Line 13 valve and extending downgradient to the southeast approximately 225 feet. The results of the 2021 and 2022 SSI groundwater investigation and quarterly monitoring defined the lateral and vertical extent of petroleum VOC (PVOC)-impacted groundwater.

PVOCS

The highest PVOC concentrations occurred in samples collected from MW-01-32, which is adjacent to the Line 13 valve on the downgradient (southeast) side, and where BTEX occurs at concentrations above the WDNR ES, PAL, and/or VRSL. From six historical sampling events at this location, average concentrations were approximately 21,000 µg/l (benzene), 200 µg/l (ethylbenzene), 9,000 µg/l (toluene), and 650 µg/l (total xylenes). Free product has not been identified at MW-01-32. Groundwater samples from six additional monitoring wells have contained benzene at concentrations above the ES or PAL (MW-01-63, MW-05-30, MW-06-32, MW-10-32, MW-11-32, and MW-14-31. Only two locations (MW-01-32 and MW-14-31) have contained benzene at a concentration above the VRSL.

Figures 3-7 and 3-8 show the groundwater sampling analytical results for benzene in map view. The area with benzene concentrations above the PAL of 0.5 µg/l is generally centered on the Line 13 valve, extending to the northeast, northwest, and southwest approximately 150 feet, and extending to the southeast in the downgradient direction approximately 330 feet. The downgradient extent of benzene at concentrations above the PAL increased between the 2020 Site investigation and the 2021-2022 SSI with the appearance of benzene in the samples from downgradient monitoring wells MW-05-30 and MW-06-32 in mid-2021.

At the MW-01 location, groundwater profiling results indicate that benzene concentrations ranging from 82 to 262 µg/l (above the ES, PAL, and VRSL) occur from 35 to 50 feet bgs. From 50 to 63 feet bgs, benzene concentrations decreased to between 2 and 3.6 µg/l. Benzene was detected in one sample collected from MW-01-63 at an estimated concentration of 0.80 µg/l.

No PVOCs were detected at concentrations above the ES, PAL, or VRSL in the samples from 16 of 23 monitoring wells, including all 11 of the perimeter wells screened at the water table and 5 of the 6 deeper wells screened between 45 and 63 feet bgs. The extent of PVOCs in groundwater is laterally delineated, and, with the exception of the estimated benzene detection in one sample among the three historical samples at MW-01-63, is also delineated vertically. No site-related VOCs have been detected in the potable well samples collected during three quarterly rounds of sampling completed between April and November 2021.

4 REMEDIAL ACTION OPTIONS

4.1 REMEDIATION OBJECTIVES

The remedial objectives (RO) identified in this report are the following:

1. Remove mobile and residual free product from the soil to the maximum extent practicable;
2. Reduce soil concentrations of PVOCs in the source zone to below the applicable RCLs; and
3. Reduce groundwater concentrations of PVOCs in the investigation area to below the applicable ESs, PALs, and VRSLs.

Table 4-1 below lists the specific RCL, ES, PAL, and VRSL for each compound of concern that was detected above one of the regulatory criteria in the SSI Report.

Table 4-1 – Specific ROs for compounds of concern

Compound of Concern	Most restrictive RCL (ug/kg)	ES (ug/L)	PAL (ug/L)	Residential VRSL (ug/L)
Benzene	5.1	5	0.5	27.2
Ethylbenzene	1,570	700	140	69.2
Toluene	1,107	800	160	35,500
Xylenes	3,960	2,000	400	766
n-Hexane	Not Established	Not Established	Not Established	16.6
Methyl-tert-butyl ether	27.0	60	12	7,270

4.2 DESCRIPTION OF REMEDIAL TECHNOLOGIES

To achieve these remediation objectives, WSP conducted an initial screening of available remediation methods to identify which may be applicable to free product, soil, and groundwater at the Site. Following the initial screening, a further comparison was conducted of the following eight technologies:

- Natural Source Zone Depletion (NSZD);
- Monitored Natural Attenuation (MNA);
- Excavation;
- Skimming/Free Product Recovery;
- Air Sparge/Soil-Vapor Extraction (AS/SVE);
- Biosparge/Bioventing;
- In-Situ Enhanced Bioremediation (Oxygen Emitting Compound); and,
- Pump-and-Treat.

These remediation technologies have been compared based on their technical and economic feasibility, along with whether the remedial technology is likely to achieve the ROs listed above. Further discussion of each of the remedial technologies is presented below.

4.2.1 NATURAL SOURCE ZONE DEPLETION

Natural source zone depletion (NSZD) is the combination of biological and physical processes that naturally degrade the free product in the soil and groundwater via biodegradaton, volatilization, and dissolution. When implemented as a remediation strategy, NSZD is monitored by measuring various environmental parameters around the source zone to evaluate the rate of naturally occurring degradation of the free product.

Biodegradation produces gasses such as methane and carbon dioxide (CO_2), which can be measured near the source zone to evaluate the effectiveness of the NSZD processes in the vadose zone. In the saturated zone, the rate of biodegradation can be estimated by measuring the concentrations of electron donors and acceptors in upstream and downstream wells. Specifically, a sampling program measuring the methane gradient in subsurface vapor points and CO_2 flux at the ground surface will need to be established to evaluate the site-specific rate of NSZD. The sampling program would include collecting samples at multiple locations within the source zone multiple times to provide a more accurate picture of the rates of biodegradation.

Similarly, the rate of dissolution can be estimated by measuring the concentration of the dissolved-phase petroleum compounds both upstream and downstream of the source zone and calculating an estimated rate of the free product dissolution into the groundwater.

NSZD may be appropriate at sites where there are no off-site impacts, and natural conditions lead the free product to break down relatively rapidly. However, the laboratory analysis required to assess the rate of NSZD, specifically measuring CO_2 flux at the ground surface, can be as expensive as running an active remediation system over time.

ITRC guidance (ITRC 2018) indicates that NSZD in similar geologic settings can potentially achieve a free product degradation rate of 1,500 gallons per acre per year. Under this degradation rate, the remaining free product at the Site (approximately 6,700 gallons remaining based on the maximum estimated free product volume [SSI Report, WSP 2022b) over an area of approximately 6,000 ft^2; 0.138 acres) may take more than 30 years to degrade using only NSZD without an active RAO. Furthermore, achieving the soil cleanup criteria cannot be guaranteed, and there are likely to still be groundwater impacts exceeding ES and PAL standards until the source zone has been sufficiently depleted.

NSZD will not require any additional permits or the use of non-renewable energy to implement.

4.2.2 MONITORED NATURAL ATTENUATION

Monitored Natural Attenuation (MNA) is a combination of physical and biological processes that passively reduce the concentration, toxicity, or mobility of contaminants in groundwater without human intervention. Biodegradation of petroleum hydrocarbons requires the transfer of electrons from the hydrocarbons (electron donor) to an electron acceptor, such as dissolved oxygen, nitrate, or sulfate, resulting in an oxidation-reduction reaction. In general, there is a characteristic sequence in which biodegradation by organisms occurs, relating to a sequence of the greatest amount of energy released to the least. Aerobic respiration, or utilization of dissolved oxygen as an electron acceptor, occurs first. When oxygen is depleted due to biodegradation, the following sequence of anaerobic biodegradation is expected: nitrate reduction, manganese-reduction, iron-reduction, sulfate-reduction, and methanogenesis (EPA 2017).

To evaluate Site-specific MNA biodegradation processes and the long-term feasibility of MNA at the Site, six monitoring wells (MW-02-25, MW-17-20, MW-01-32, MW-14-31, MW-10-32, and MW-06-32) will be sampled quarterly using low-flow sampling methods for the following MNA parameters

- Nitrate-nitrite as Nitrogen (EPA Method 353.2),
- total alkalinity as CaCO3 (EPA Method 310.2),
- Sulfate (EPA Method 300.0),
- Total and Dissolved Iron and Manganese (EPA Method 6020), and

— Dissolved Carbon Dioxide and Methane (EPA Method RSK-175)

Samples will be collected for MNA parameters concurrently with the ongoing groundwater monitoring events, beginning in April 2022. The results of these sample analyses will be used to evaluate redox conditions and evidence of MNA.

In general, MNA is an effective method of reducing the concentration of dissolved petroleum compounds in groundwater, particularly as a final, polishing stage of treatment after active remediation has reached asymptotic conditions. In particular, MNA is likely to be an effective groundwater remedy at this Site because BTEX compounds tend to biodegrade under most subsurface conditions (WDNR, 2014). However, it is not likely to be an effective RAO until after the mobile and residual free product in the soil near the source area has been addressed using other RAOs. Following the removal of the mobile and residual free product in the soil near the source, the data that has been collected will be used to evaluate MNA as a final groundwater remedy.

MNA is an economically feasible treatment method. MNA does not require active amendments to the soil or groundwater or the operation of treatment equipment. Therefore, there are no permits required to implement the remedy. Similarly, it is a sustainable, low-cost approach because it merely requires ongoing groundwater sampling until the concentrations of PVOCs in the groundwater have been reduced below the relevant standards and will not require any additional non-renewable energy to implement.

4.2.3 EXCAVATION

Excavation involves physically removing petroleum-impacted soil from the Site using mechanical equipment. The excavated soil would be temporarily stockpiled at the Site in a lined containment cell, and then be transported off Site for disposal at a permitted landfill. Clean fill would be imported to backfill the excavation. Excavation would be conducted in the source area where mobile and residual free product were identified via UVOST analysis and Interim Action product recovery activities.

Where feasible, excavation quickly removes petroleum mass and residual free product from the soil above the groundwater table. However, it would not be effective at removing residual free product in the soil below the groundwater table. Additionally, it is unlikely to achieve groundwater cleanup criteria.

The accessible impacted soil was excavated in May through October 2019 during the initial response activities. Continued excavation beyond what has already been removed risks damage to the existing site infrastructure by undermining the buried pipelines and valve structures. Therefore, continued excavation is unlikely to achieve further progress toward the ROs at this Site.

No permits would be required to conduct the excavation. Where technically feasible, excavation tends to be a high-cost option in the short term, but effective at reducing ongoing costs in the longer term. However, excavation is not an appropriate method at this Site because of the depth of residual soil impacts and the risk to existing pipeline and building infrastructure.

4.2.4 SKIMMING/FREE PRODUCT RECOVERY

Skimming/free product recovery consists of collecting mobile free product from onsite remediation wells while minimizing the amount of water extracted from the wells. As described in the SSI Report (WSP, 2022), free product recovery was implemented at this Site as an interim action in nine remediation wells (RWs), starting in June 2021. The manual free product recovery was replaced with an automated product recovery system which operated in eight of the wells from September 7 to November 29, 2021 and recovered approximately 522 gallons of free product during that time. The automated product recovery system was restarted on March 31, 2022, to continue free product recovery.

Based on the initial light non-aqueous phase liquid (LNAPL) transmissivity testing conducted at three of the RWs, free product recovery was viable at the Site. The rate of free product recovery decreased during the period of operation from approximately 8.5 gallons per day in the first week to approximately 1.8 gallons per day, indicating that the amount of mobile free product in the subsurface is decreasing. It is likely that the free product recovery system will have removed the amount of mobile free product that is feasible by the third quarter of 2022.

Free product recovery is effective at removing mobile free product from the vadose zone in the soil. However, it is not effective at removing residual free product and soil impacts, and it does not address the concentration of petroleum compounds in the groundwater. Free product recovery also does not require any specific permits to continue implementation.

Free product recovery uses a small amount of non-renewable energy to power the air compressor for the product recovery pumps. The free product recovery system uses renewable energy (solar) to operate the individual pump controllers for each well. Additionally, the process generates free product that is stored in above-ground plastic totes prior to being transported off-site for re-injection into the Enbridge pipeline system. Some groundwater is also produced in the process, which is characterized and transported off site for disposal.

4.2.5 AIR SPARGE/SOIL VAPOR EXTRACTION

Air Sparge (AS) involves injecting air below the groundwater table to volatilize dissolved-phase petroleum. Soil Vapor Extraction (SVE) involves applying vacuum to an extraction point to extract residual petroleum from soil in the vapor phase. SVE may also induce air flow through the unsaturated soil pore space, increasing the oxygen content of these areas and thereby potentially stimulating aerobic biodegradation of petroleum hydrocarbons in the vadose zone. An AS pilot test will be necessary to generate site-specific data for design of a full-scale AS system.

The Site's surficial geology of sandy silt and sand is well-suited to the use of SVE. Additionally, the product of concern (diluent) is highly volatile, which will make SVE a likely and effective active remedy at the Site. An SVE system could utilize the remediation wells that have already been installed at the Site (RW-1 through RW-11), with additional wells as needed. However, an SVE pilot test will be necessary to generate site-specific data for design of a full-scale SVE system, as well as to evaluate the concentrations of the compounds of concern in the effluent discharge.

Implementing AS/SVE would require a large amount of non-renewable energy, including installation of dedicated AS and possibly additional SVE wells, equipment transport and installation, electrical usage for vacuum and air injection equipment, and routine operation and maintenance (O&M) visits. The operation can be optimized by first implementing SVE without AS until the soil impacts have been substantially remediated. The effectiveness of SVE is measured by determining the vapor flow rate from the subsurface and collecting periodic vapor samples to measure the mass of product being removed by the system. However, by an active approach, SVE can often remediate the soil impacts in 3 to 5 years. A combined AS/SVE system is likely to reduce concentrations of the contaminants of concern in both soil and groundwater and may be able to achieve the ROs for the Site.

SVE at this Site may require obtaining a construction permit under NR 406 and an operation permit under NR 407 for air emissions. SVE at this Site is likely to require treatment (granular activated carbon [GAC], oxidizer, or similar) to reduce the concentrations of the petroleum compounds in the exhaust to comply with the permit standards. The appropriate treatment for the process will be identified following the results of a pilot test. Under NR 406.04(1)(m)3 and NR 407.03(1)(sm)3, pilot testing a negative pressure venting system is exempt from the construction and operating permits, provided that it evacuates less than 150,000 standard cubic feet (scf) of air.

4.2.6 BIOSPARGE/BIOVENTING

Biosparge involves the injection of compressed air below the groundwater table at a lower flow rate than used in Air Sparge. Instead of physically stripping the volatile compounds from the groundwater, biosparge is used to introduce oxygen to the groundwater to enhance biodegradation of the dissolved-phase petroleum compounds. Similarly, Bioventing involves introducing air/oxygen into the vadose zone to enhance the biodegradation of the free product and residual impacts in the soil. Bioventing can occur using either injection or extraction wells. When using extraction wells, the process is similar to SVE, but at a lower flow rate.

Biosparge and bioventing have been demonstrated to be effective at removing biodegradable compounds from groundwater and soil, respectively. Particularly, biosparge/bioventing may be preferred when the contaminants of concern are from heavier products such as diesel or jet fuel; lighter products like gasoline tend to be removed more quickly via SVE (EPA 2017).

Implementing biosparge/bioventing will require a large amount of non-renewable energy including installation of dedicated injection or extraction wells, equipment transport and installation, electrical usage for vacuum and air injection equipment, and routine O&M visits. Although it will use less energy per day for ongoing vacuum and injection equipment than AS/SVE, biosparge/bioventing is likely to take longer than AS/SVE to achieve the remediation objectives. Furthermore, biosparge/bioventing may have difficulty achieving the remediation objectives (EPA 2017).

Similar to AS/SVE, bioventing at this Site via extraction wells may require obtaining a construction permit under NR 406 and an operation permit under NR 407 for air emissions. Bioventing may also require treatment (GAC, oxidizer, or similar) to reduce the concentrations of the petroleum compounds in the exhaust to comply with the permit standards.

4.2.7 IN-SITU INJECTIONS – OXYGEN EMITTING COMPOUND

In-situ injections involve introducing soil and groundwater amendments to the saturated zone to remediate dissolved phase petroleum compounds in the groundwater. The compounds of concern at this Site are biodegradable in an aerobic environment; therefore, the selected injection amendment would be an oxygen-emitting compound. This compound would be injected at multiple locations within the extents of the groundwater plume using direct push (e.g. Geoprobe) technology. Following the injection of the oxygen-emitting compound, the effectiveness of the remedy would be measured by ongoing groundwater sampling, including sampling for MNA parameters as outlined in Section 4.2.2.

Implementing in-situ injections will require using non-renewable energy to operate the direct push equipment and injection pumps. Additionally, in-situ injections require more soil borings to implement than a similar air sparge or biosparge system over the same area. Each soil boring introduces risk to the buried petroleum pipelines or other underground infrastructure at the Site. Further evaluation will also be necessary prior to implementing in-situ injections of oxygen-emitting compounds to evaluate their potential for corrosion of the buried pipelines.

Implementing an in-situ injection program will also require an Underground Injection Control (UIC) permit for Class V injections. Wisconsin manages its own UIC program, and the regulations are located in Chapter NR 815. Per NR 815, Class V injection wells may be installed if approved by the Wisconsin DNR.

In-situ injections have a relatively high initial cost of implementation, and the injections may need to be repeated multiple times to achieve the ROs. In-situ injections are appropriate on sites where MNA is also an option – after the free product in the source zone has been remediated and where the groundwater plume of the compounds of concern has been delineated and contained within the subject property. Additionally, the ongoing monitoring of this remediation method is similar to that of MNA, measuring the petroleum compound concentrations over time along with several MNA parameters at select wells to evaluate the performance of the oxygen emitting compound.

4.2.8 GROUNDWATER PUMP AND TREAT

Groundwater pump and treat entails extracting petroleum-impacted groundwater via a recovery well network and directing extracted groundwater through a treatment system to remove dissolved-phase petroleum compounds. The treated groundwater would then be either re-injected into the ground or would be discharged at a surface location. The recovery well network could be installed using a transect arrangement along the downstream edge of the plume or as a grid within the groundwater plume, with a treatment system constructed on site.

Information gathered during the SSI (WSP, 2022) demonstrated that the shallow aquifer had a relatively high horizontal hydraulic conductivity (330 ft/day), which is consistent with sandy surficial geology observed in the area and a flat horizontal hydraulic gradient. This allows each well to have a wide radius of influence for a given flow rate. Specific design for well spacing and placement will require an aquifer test and an evaluation of the most appropriate treatment method of the groundwater to remove the dissolved phase petroleum compounds, either by air stripping, GAC, or similar methods.

Discharge of treated groundwater requires coverage under the Wisconsin Pollutant Discharge Elimination System (WPDES) general permit for Contaminated Groundwater from Remedial Action Operations (WI-0046566-7). Coverage under the general permit requires development of a Discharge Management Plan and regular sampling to monitor the effluent for petroleum compounds and other water quality parameters.

A large amount of non-renewable energy would be required for implementing a groundwater pump and treat system, including installation of dedicated recovery wells, equipment transport and installation, electrical usage for liquid extraction equipment and building heat, and routine O&M visits. Additionally, the system would generate waste, such as spend GAC media or air stripping contact media that would need to be managed on site, characterized, and disposed of regularly. Furthermore, achieving the groundwater cleanup levels cannot be guaranteed.

5 SELECTED REMEDIAL ACTION (RA)

5.1 RATIONALE FOR SELECTING RA

In order to select the most appropriate RA for the site, the following factors were considered:

1. Protection of potential nearby receptors;
2. Effectiveness at achieving ROs;
3. Timeline for achieving ROs;
4. Sustainability of the RO/use of renewable energy;
5. Technical feasibility of implementation; and,
6. Economic feasibility/cost of implementation.

To achieve the ROs outlined in Section 4.1, a combination of skimming/free product recovery, SVE, and MNA is proposed. The free product recovery is economically feasible because the system has already been installed at locations where mobile free product was observed during the SSI, and it has already been implemented and operating. Free product recovery will remove mobile product from the source zone, which will reduce the risk of the source zone expanding from free product migration. However, free product recovery will not be effective at removing residual product or directly addressing soil and groundwater impacts.

SVE is proposed as the RA to address residual free product and reduce soil concentrations of contaminants of concern to below the applicable RCL. The diluent product of concern is highly volatile, and the surficial geology of the Site contains silty sand and fine- and coarse-grained sand in vadose zone immediately above the groundwater. These site conditions indicate that SVE is likely to be a cost-effective treatment method. Implementing SVE will also reduce the source zone impacts and mitigate the risk of the groundwater plume expanding.

After the residual free product in the source zone has been removed to the extent practicable via free product recovery and SVE, the proposed RA for the groundwater impacts is MNA. The primary compounds of concern have been demonstrated to degrade naturally over time and the groundwater plume has been delineated. Ongoing groundwater sampling at the Site will be used to verify that the groundwater plume is not expanding. Additional sampling for MNA parameters will also allow for the monitoring of the rate of biodegradation of the compounds and evaluate whether another RA should be implemented in the future. MNA does not require the installation of additional wells for compressed air injection or an expensive injection program of soil amendments. If the groundwater sampling indicates that MNA is not providing sufficient reduction in the groundwater plume, AS may be implemented as a contingency RA.

5.2 PROPOSED IMPLEMENTATION SCHEDULE

Free product recovery was implemented as an interim action beginning in June 2021 with manual product recovery, and progressing to an automated product recovery system from September through November 2021. The system was temporarily shut down for the winter on November 29, 2021, and it was restarted on March 31, 2022. Automated free product recovery is scheduled to continue until it becomes ineffective at removing product, which is anticipated to occur in 2022.

To begin the design process for the SVE implementation, an SVE Pilot Test Work Plan will be developed and submitted to WDNR for review in June 2022, and the SVE pilot test is anticipated to be conducted in the third quarter of 2022. Following the results of the SVE pilot test, the final design of the SVE system is anticipated to be completed in the fourth quarter of 2022, with system installation during the first and second quarter of 2023. SVE is anticipated to operate for approximately two years. However, the SVE system may be operated for a longer or shorter period, depending on the measured mass removal rates.

Groundwater sampling to evaluate MNA was started in April 2022 and is scheduled to continue quarterly throughout the operation of the free product recovery and SVE systems. Following the shutdown of the SVE system, it is anticipated that

groundwater sampling for MNA will continue until groundwater PVOC concentrations decrease to below their respective ES, PAL, and VRSL criteria or until site closure with continuing obligations can be achieved.

5.3 ESTIMATE OF COST TO IMPLEMENT RA

Although the final design of the SVE system and the timeframe to complete MNA sampling is unknown until pilot tests have been conducted and the MNA parameters have been analyzed, the anticipated cost to complete these activities is approximately $2,000,000 over the next four years.

5.4 ESTIMATED TIMEFRAME TO ACHIEVE REMEDIAL GOALS

Based on the proposed implementation schedule, it is estimated that the mobile free product will be removed to the extent practicable by the third quarter of 2022. It is also estimated that the residual free product will be removed to the extent practicable via SVE by the end of 2025, and the soil concentrations at that time are also likely to be below applicable RCLs. The rate of MNA is unknown until after additional data is collected during the groundwater sampling events, but the groundwater parameters are estimated to be below their regulatory criteria by the end of 2025 or demonstrated to be stable and support a site closure with continuing obligations by the end of 2025.

5.5 SUSTAINABLE REMEDIAL ACTION

The selected RA of free product recovery, SVE, and MNA has been evaluated for several sustainability considerations in accordance with Chapter NR 722.09(2m). A summary of the analysis is given below.

The energy used for operating the product recovery system consists of electrical power from the local energy company to operate the air compressor. The electricity is a combination of non-renewable and renewable energy as generated by the local energy company. The controllers for the pump timing use rechargeable batteries supplied with power by solar panels installed on the fence above them. No air pollutants are generated at the site from the operation of the compressor. Some non-renewable energy is used for the trucks for transporting the free product and groundwater off Site for re-use in the Enbridge system and disposal, respectively. To the maximum extent practicable, recovered free product is being re-used to minimize waste.

Operating the SVE system also uses a large amount of electrical power from the local energy company, which is a combination of renewable and non-renewable energy sources. The SVE system will be designed and operated to minimize the amount of condensate generated, which will also minimize the amount of off-site waste disposal necessary. The effluent treatment system will be designed to reduce air emissions to the extent practicable to comply with permit conditions.

SVE system operation and MNA do not require any additional water use or importing any water. Similarly, these remediation methods are not anticipated to affect nearby water resources. The MNA remedy for groundwater was selected in part because it also allows the land above the groundwater plume to be used for agriculture and allow for continued plant growth. Installation and maintenance of active injection wells and associated infrastructure would disrupt the surface vegetation more than would occur from groundwater sampling alone.

5.6 PERFORMANCE EVALUATION CRITERIA

Each stage of the Remedial Action has specific evaluation criteria that will be used to evaluate its performance. As the free product recovery continues, the volume of free product recovered is measured in a storage tank maintained on site. Also, the estimate LNAPL transmissivity at each remediation well will be measured periodically as the free product recovery continues. An LNAPL transmissivity value of 0.8 ft^2/day is generally considered a threshold below which free product recover is no longer effective. If the LNAPL transmissivity at a given well is less than 0.8 ft^2/day, that well will be

discontinued from the free product recovery system. After all the wells exhibit an LNAPL transmissivity less than 0.8 ft^2/day, or the SVE system has been installed and begins operation, the free product recovery system will be decommissioned.

The primary performance criteria of the SVE system will be calculations of mass removal and effluent discharge for air permitting. To evaluate these criteria, flow sensors will be installed for each SVE extraction well as well as a combined flow sensor near the vacuum blower. This will allow for balancing flow among the extraction wells and measuring the overall flow rate. Air samples of the extracted soil vapor will be collected upstream of the blower to estimate the concentration of PVOCs in the extracted soil vapor, which will be used to calculate the mass removal rate of the PVOCs from the source zone. Additional air samples will be collected downstream of the effluent treatment system (if needed) to monitor compliance with air permit conditions. When the mass removal calculations indicate that the system has reached asymptotic conditions and soil confirmation sampling confirms achievement of soil RCLs, the SVE system will be shut down and remediation will progress to MNA for groundwater parameters.

MNA performance will be monitored by collecting quarterly groundwater samples from all the monitoring wells for PVOCs, as well as collecting additional MNA parameters listed in Section 4.2.2 from six monitoring wells to evaluate the rate of MNA occurring within the groundwater plume.

5.7 MANAGEMENT OF TREATMENT RESIDUALS

Free product recovery generates free product and some groundwater that is containerized on site within 275-gallon plastic totes. To the extent practicable, the free product is returned to the Enbridge pipeline system for re-use. The groundwater generated during the process is sampled for waste characterization parameters and transported off Site for disposal in accordance with state and local regulations. The Site is currently registered as a Small Quantity Generator (SQG) of hazardous waste with generator EPA ID number WIR000177691 and FID number 128136140.

SVE has the potential to generate condensate water and spent effluent treatment media (GAC or similar). Any condensate water and effluent treatment media generated will be containerized on site and sampled for waste characterization prior to being transported off Site for disposal in accordance with state and local regulations.

The groundwater sampling associated with MNA generates purge water from the wells. The purge water from locations which historically have contained PVOCs will also be containerized on site and characterized for waste disposal prior to being transported off Site for disposal in accordance with state and local regulations.

6 REFERENCES

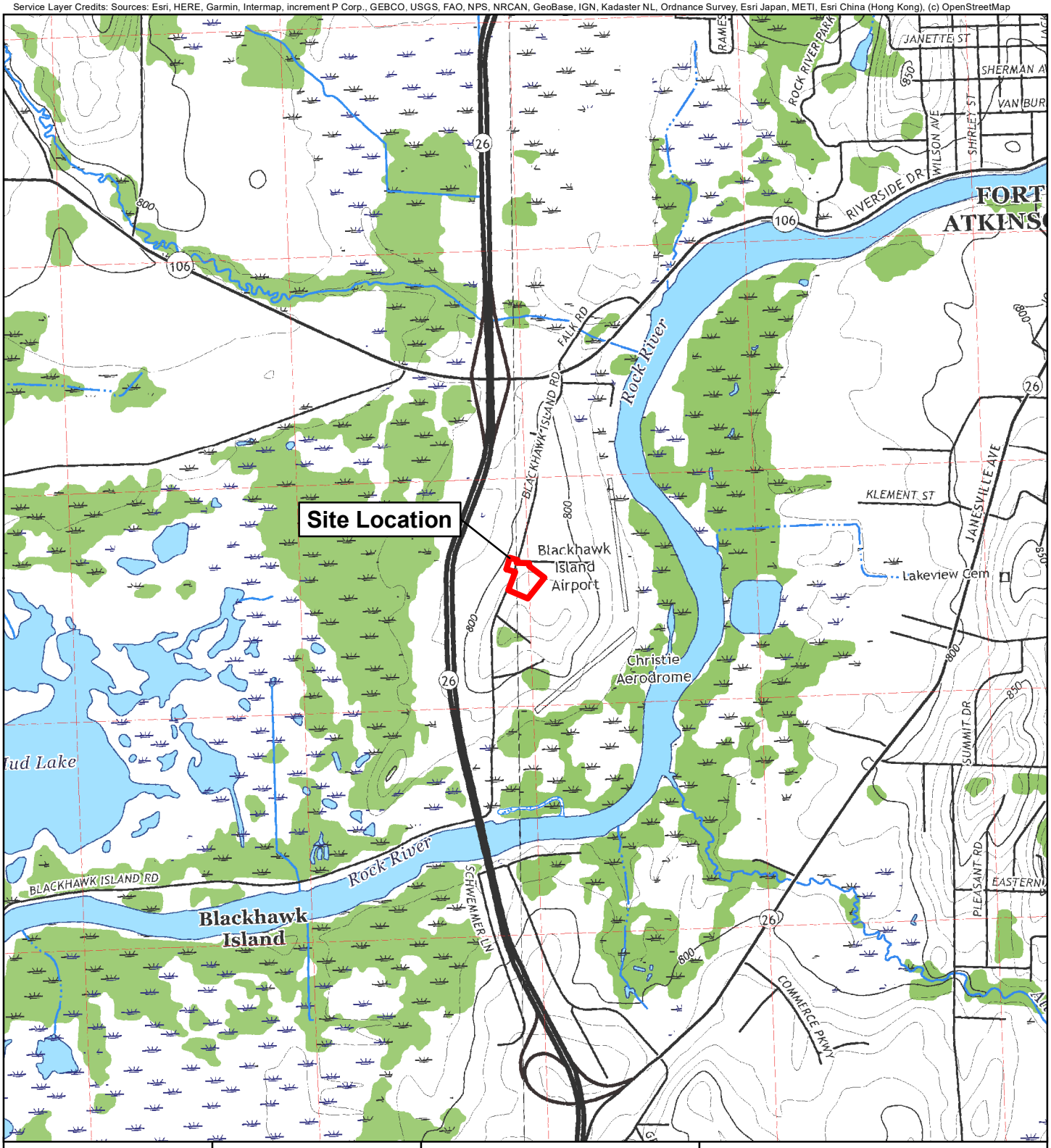
- AECOM, 2021. Interim Action and Site Investigation Report, Line 13 Mile Post 312 (MP 312) Valve Site, Blackhawk Island Road, Fort Atkinson, Wisconsin. January 28
- Borman, R.G. and L.C. Trotta, 1975. Ground-Water Resources and Geology of Jefferson County, Wisconsin. Wisconsin Geological and Natural History Survey Information Circular No. 33
- EPA. 2017. How To Evaluate Alternative Cleanup Technologies For Underground Storage Tank Sites: A Guide for Corrective Action Plan Reviewers. Land and Emergency Management. EPA 510-B-17-003 October.
- Interstate Technology & Regulatory Council (ITRC). 2018. Light Non-Aqueous Phase Liquid (LNAPL) Site Management: LCSM Evolution, Decision Process, and Remedial Technologies, Appendix B. LNAPL-3.
- U.S. Geological Survey, 2018. Fort Atkinson, Wisconsin. 7.5-Minute Series Topographic Quadrangle. Scale 1:24,000.
- WDNR, 2014. Guidance on Natural Attenuation for Petroleum Releases. January
- WSP, 2021. Interim Action Construction Completion Report. Enbridge Line 13 MP 312 Valve Site (BRRTS # 02-28-586199). November 11.
- WSP, 2022a. Interim Action Construction Completion Report Addendum. Enbridge Line 13 MP 312 Valve Site (BRRTS # 02-28-586199). January 5.
- WSP, 2022b. Supplemental Site Investigation Report. Enbridge Line 13 MP 312 Valve Site (BRRTS # 02-28-586199). March 16.

7 ACRONYM LIST

AMSL	above mean sea level
AS	air sparge
Bbls	barrels
BGS	below ground surface
BTEX	benzene, toluene, ethylbenzene, xylenes
DO	dissolved oxygen
DOT	Department of Transportation
EPA	Environmental Protection Agency
ES	Enforcement Standard
GAC	granular activated carbon
GRO	gasoline range organics
HRSC	high-resolution site characterization
IASIR	Interim Action and Site Investigation Report
IDW	investigation-derived waste
LNAPL	light non-aqueous phase liquid
MNA	monitored natural attenuation
MTBE	methyl-tert butyl ether
NAPL	non-aqueous phase liquid
NSZD	Natural Source Zone Depletion
O&M	operations & maintenance
PAL	Preventative Action Limit
PVOC	petroleum volatile organic compound
RA	Remedial Action
RAO	Remedial Action Option
RCL	Residual Contaminant Level
RO	Remedial Objective
RP	Responsible Party
RR	Remediation & Redevelopment
RW	remediation well
Scf	standard cubic feet
SSI	Supplemental Site Investigation
SVE	soil vapor extraction
TCE	trichloroethene

UIC	Underground Injection Control
USGS	U.S. Geological Survey
UVOST	ultra-violet optical screening tool
UWN	Unique Well Number
VOC	volatile organic compound
VRSL	Vapor Risk Screening Level
WAC	Wisconsin Administrative Code
WDNR	Wisconsin Department of Natural Resources
WPDES	Wisconsin Pollutant Discharge Elimination System

FIGURES



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Project #:	31401967.705

Map Location

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Source: USGS US Topo 7.5-minute maps for Busseyville and Fort Atkinson, WI 2018

FIGURE 2-1
SITE LOCATION MAP

FORT ATKINSON VALVE STATION
LINE 13 MP 312

ENBRIDGE ENERGY
LIMITED PARTNERSHIP

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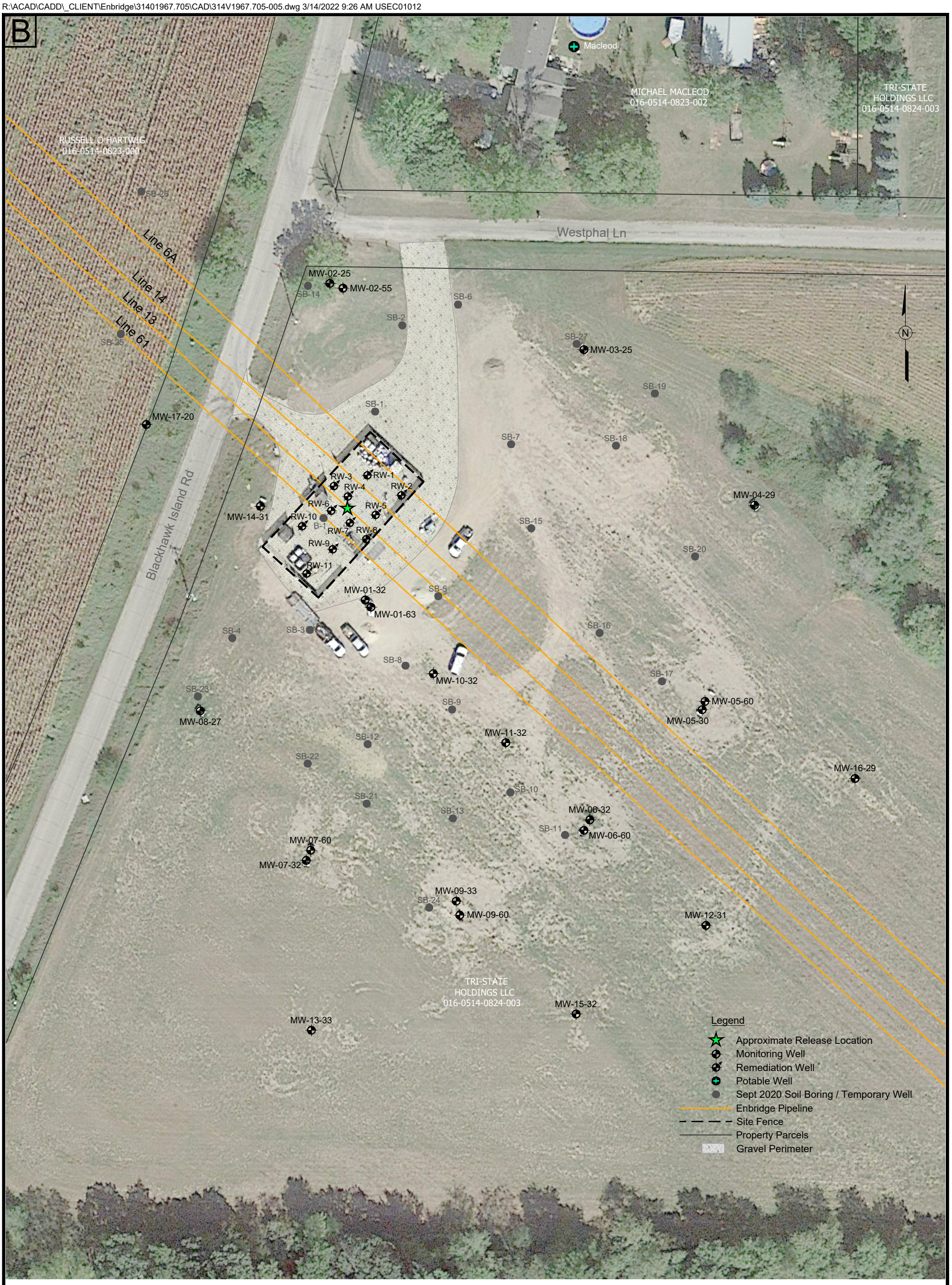

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SCALE IN FEET

ENBRIDGE

FIGURE 2–2

MONITORING WELL AND
REMEDIATION WELL LOCATIONS

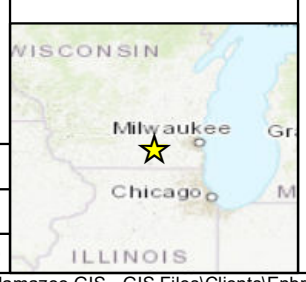
LINE 13 MP 312 VALVE SITE
FORT ATKINSON, WISCONSIN

PREPARED FOR
ENBRIDGE ENERGY LIMITED PARTNERSHIP

Drawn By: EGC
Checked:
Approved: TAH 1/21/2022
DWG Name: 314V1967.705–005

Drawn:	WSP 4/25/2022
Approved:	WSP 4/25/2022
Project #:	31401967.705

Map Location



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Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet

Legend

- Line 13 Valve
- Potable Well (WDNR Unique Well Number, if known)
- Monitoring Wells
- Enbridge Pipeline
- 1,500-ft radius from L13 MP312 Valve Site
- Site Fence
- Property Parcels

FIGURE 2-3
POTABLE WELL LOCATIONS

LINE 13 MP 312 VALVE SITE
FORT ATKINSON, WISCONSIN

ENBRIDGE ENERGY
LIMITED PARTNERSHIP

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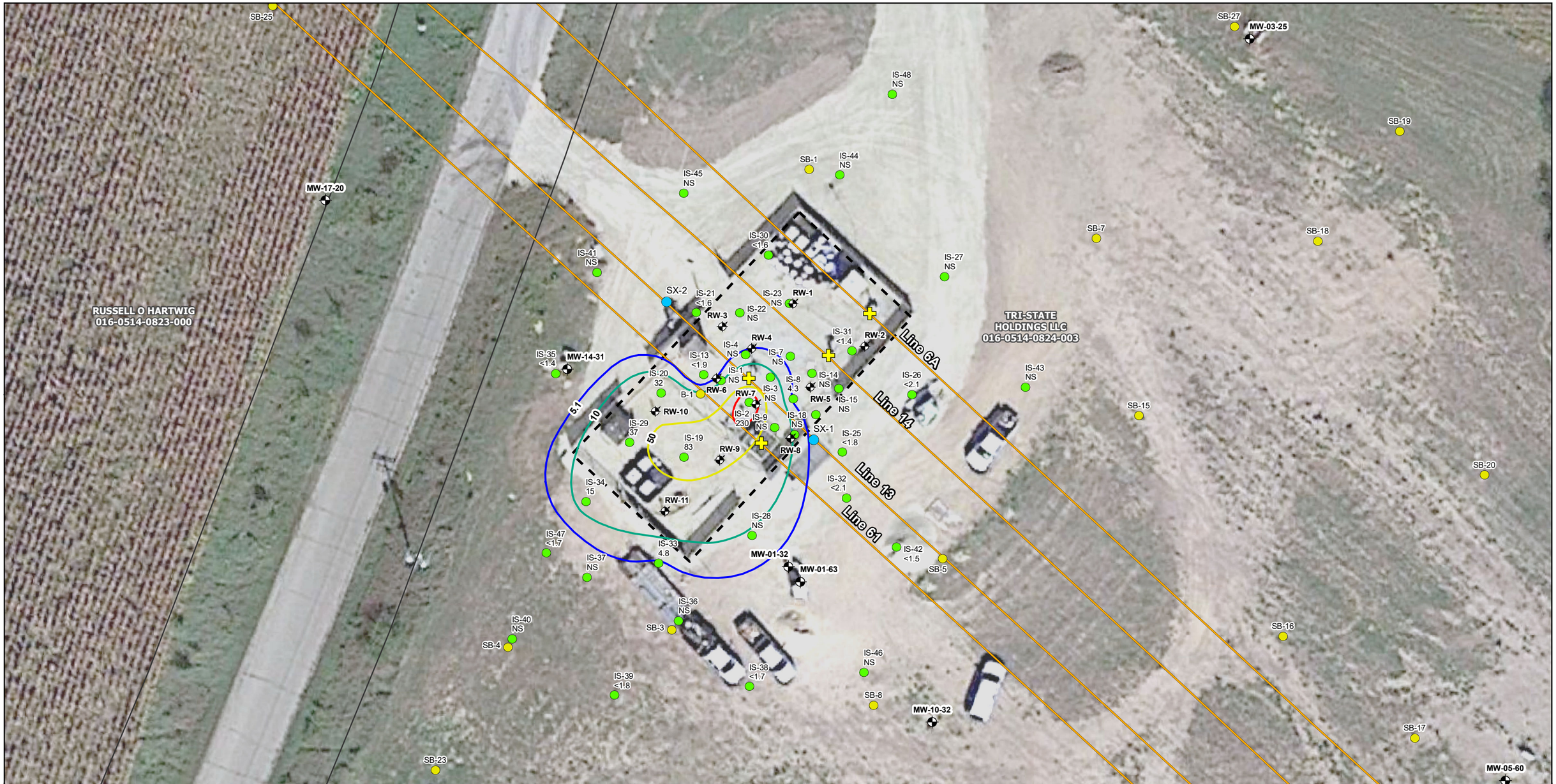

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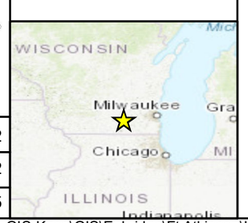
Map Location



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Legend

- Pipeline Valve
- Remediation Well
- June 2021 Pipeline Bedding Soil Sample
- June 2021 Soil Boring
- July/Sept 2020 Soil Boring/Temporary Well
- Existing Monitoring Well
- Enbridge Pipeline
- Site Fence
- Property Parcels

Soil Benzene Isocontour (ppb)

- 5.1
- 10
- 50
- 100

Notes:
All concentrations are in micrograms per kilogram.
Generic RCL for Groundwater Pathway is 5.1 micrograms per kilogram.

NS = not sampled

FIGURE 3-1

SOIL SAMPLING ANALYTICAL RESULTS FOR BENZENE (0-10 FEET BGS)

LINE 13 MP 312 VALVE SITE
FORT ATKINSON, WISCONSIN

ENBRIDGE ENERGY
LIMITED PARTNERSHIP

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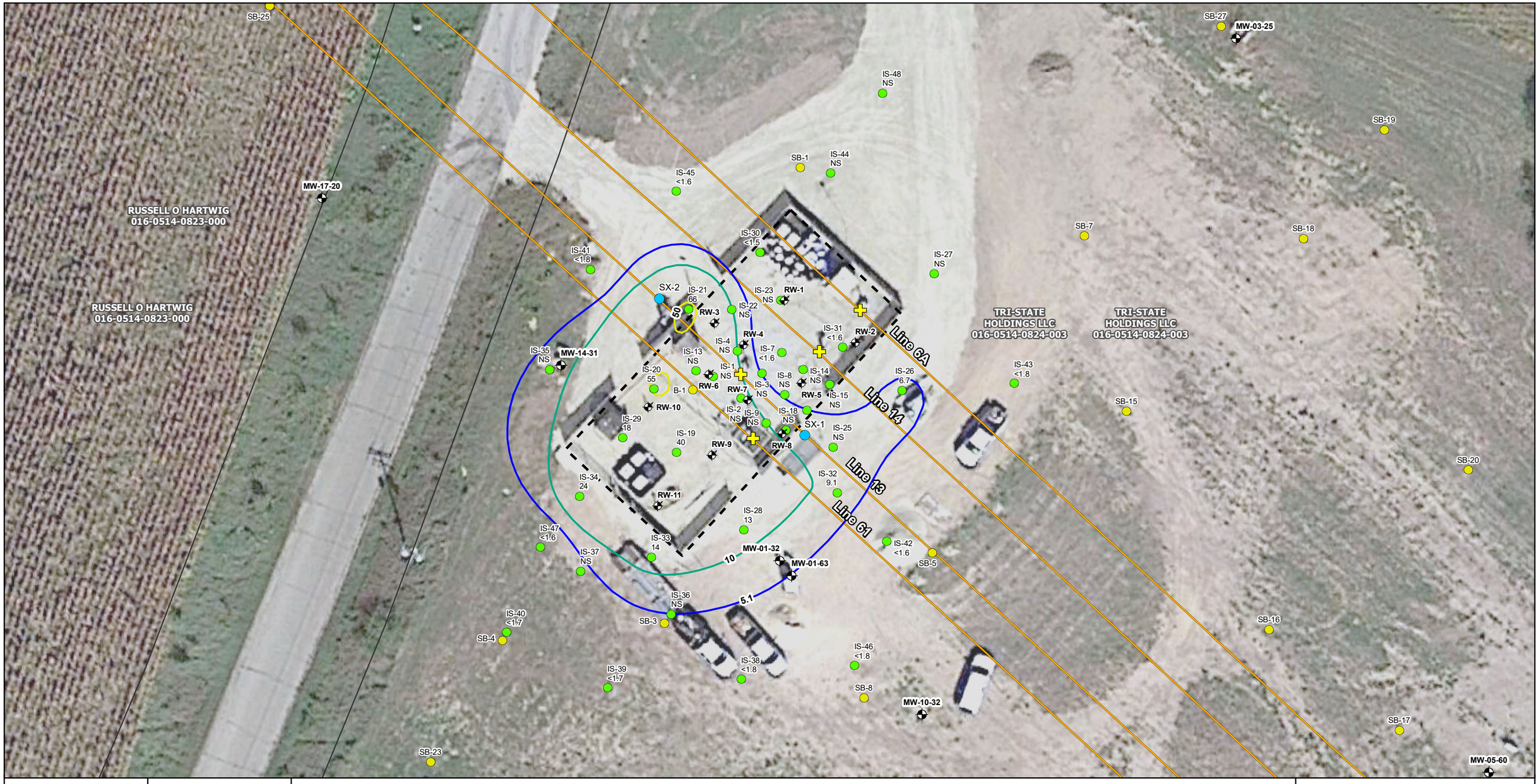

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Project #:	31401967.705

Map Location

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Coordinate System: NAD 1983
StatePlane Wisconsin South FIPS
4803 Feet

Legend

- Pipeline Valve
- Remediation Well
- June 2021 Pipeline Bedding Soil Sample
- June 2021 Soil Boring
- July/Sept 2020 Soil Boring/Temporary Well
- Existing Monitoring Well
- Enbridge Pipeline
- Site Fence
- Property Parcels

Soil Benzene Isocontour (ppb)

- 5.1
- 10
- 50

Notes:
All concentrations are in micrograms per kilogram.
Generic RCL for Groundwater Pathway is 5.1 micrograms per kilogram.

NS = not sampled

FIGURE 3-2

SOIL SAMPLING ANALYTICAL RESULTS FOR BENZENE (10-15 FEET BGS)

LINE 13 MP 312 VALVE SITE
FORT ATKINSON, WISCONSIN

ENBRIDGE ENERGY
LIMITED PARTNERSHIP

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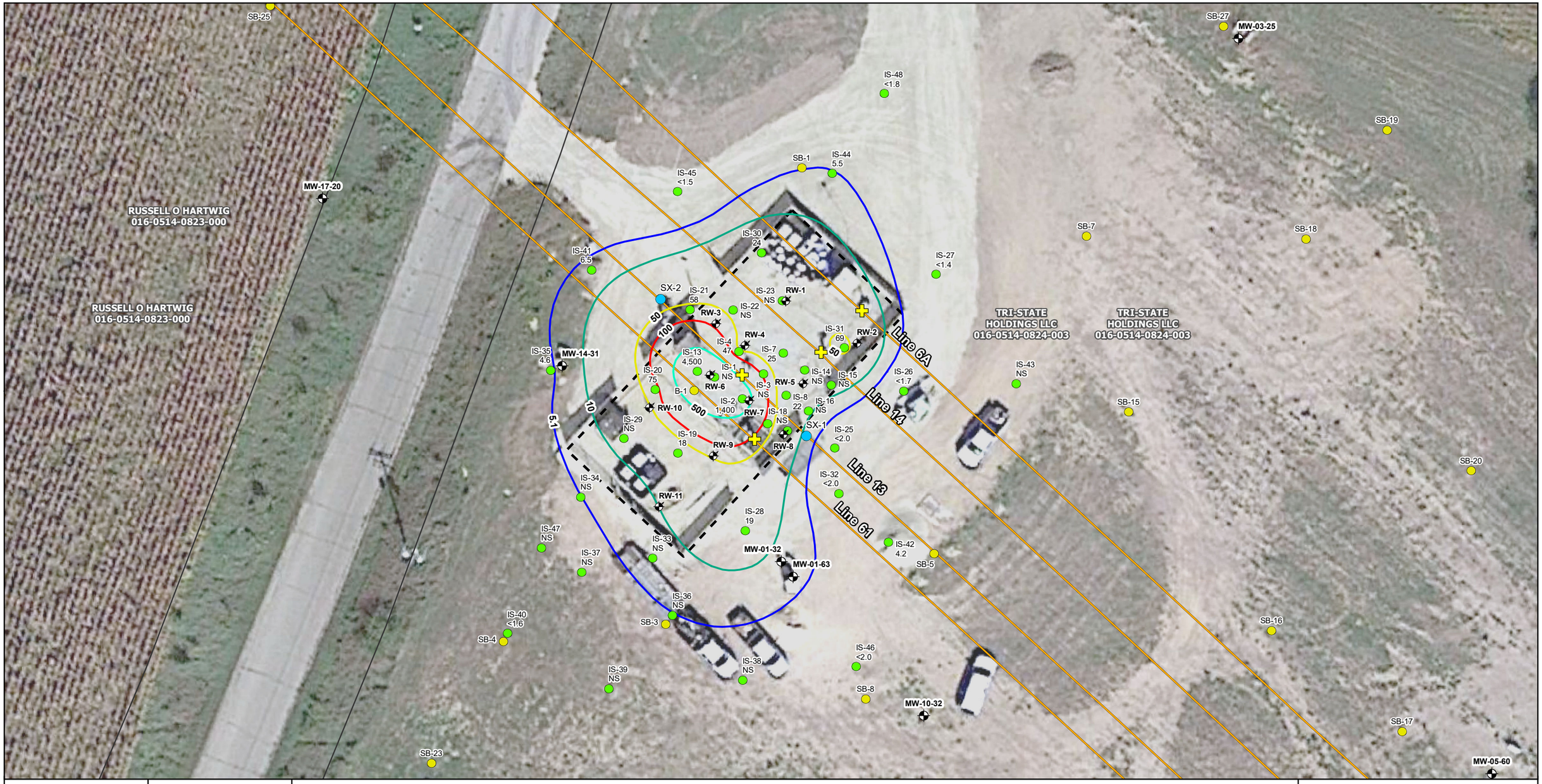

Map Location

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Project #:	31401967.705

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Coordinate System: NAD 1983
StatePlane Wisconsin South FIPS
4803 Feet

Legend

- Pipeline Valve
- Remediation Well
- June 2021 Pipeline Bedding Soil Sample
- June 2021 Soil Boring
- July/Sept 2020 Soil Boring/Temporary Well
- Existing Monitoring Well
- Enbridge Pipeline
- Site Fence
- Property Parcels

Soil Benzene Isocontour (ppb)

- 5.1
- 10
- 50
- 100
- 500

Notes:
All concentrations are in micrograms per kilogram.
Generic RCL for Groundwater Pathway is 5.1 micrograms per kilogram.

NS = not sampled

FIGURE 3-3

SOIL SAMPLING ANALYTICAL RESULTS FOR BENZENE (15-20 FEET BGS)

LINE 13 MP 312 VALVE SITE
FORT ATKINSON, WISCONSIN

ENBRIDGE ENERGY
LIMITED PARTNERSHIP

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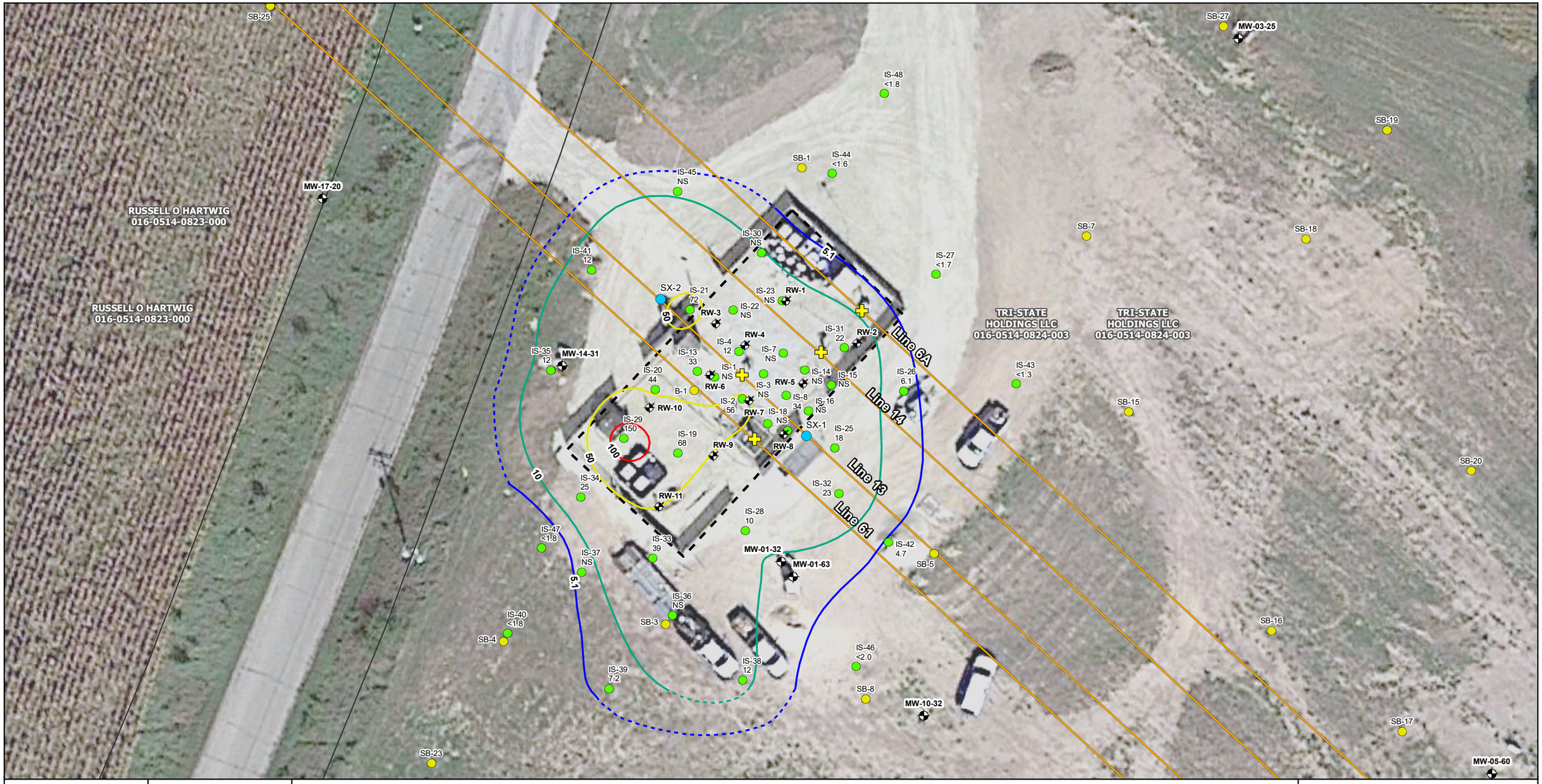

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Project #:	31401967.705

Map Location

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Coordinate System: NAD 1983
StatePlane Wisconsin South FIPS
4803 Feet

Legend

- Pipeline Valve
- Remediation Well
- June 2021 Pipeline Bedding Soil Sample
- June 2021 Soil Boring
- July/Sept 2020 Soil Boring/Temporary Well
- Existing Monitoring Well
- Enbridge Pipeline
- Site Fence
- Property Parcels

Soil Benzene Isocontour (ppb) - Dashed where Inferred

- 5.1
- 10
- 50
- 100

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Notes:
All concentrations are in micrograms per kilogram.
Generic RCL for Groundwater Pathway is 5.1 micrograms per kilogram.

NS = not sampled

FIGURE 3-4

SOIL SAMPLING ANALYTICAL RESULTS FOR BENZENE (20-24 FEET BGS)

LINE 13 MP 312 VALVE SITE
FORT ATKINSON, WISCONSIN

ENBRIDGE ENERGY
LIMITED PARTNERSHIP

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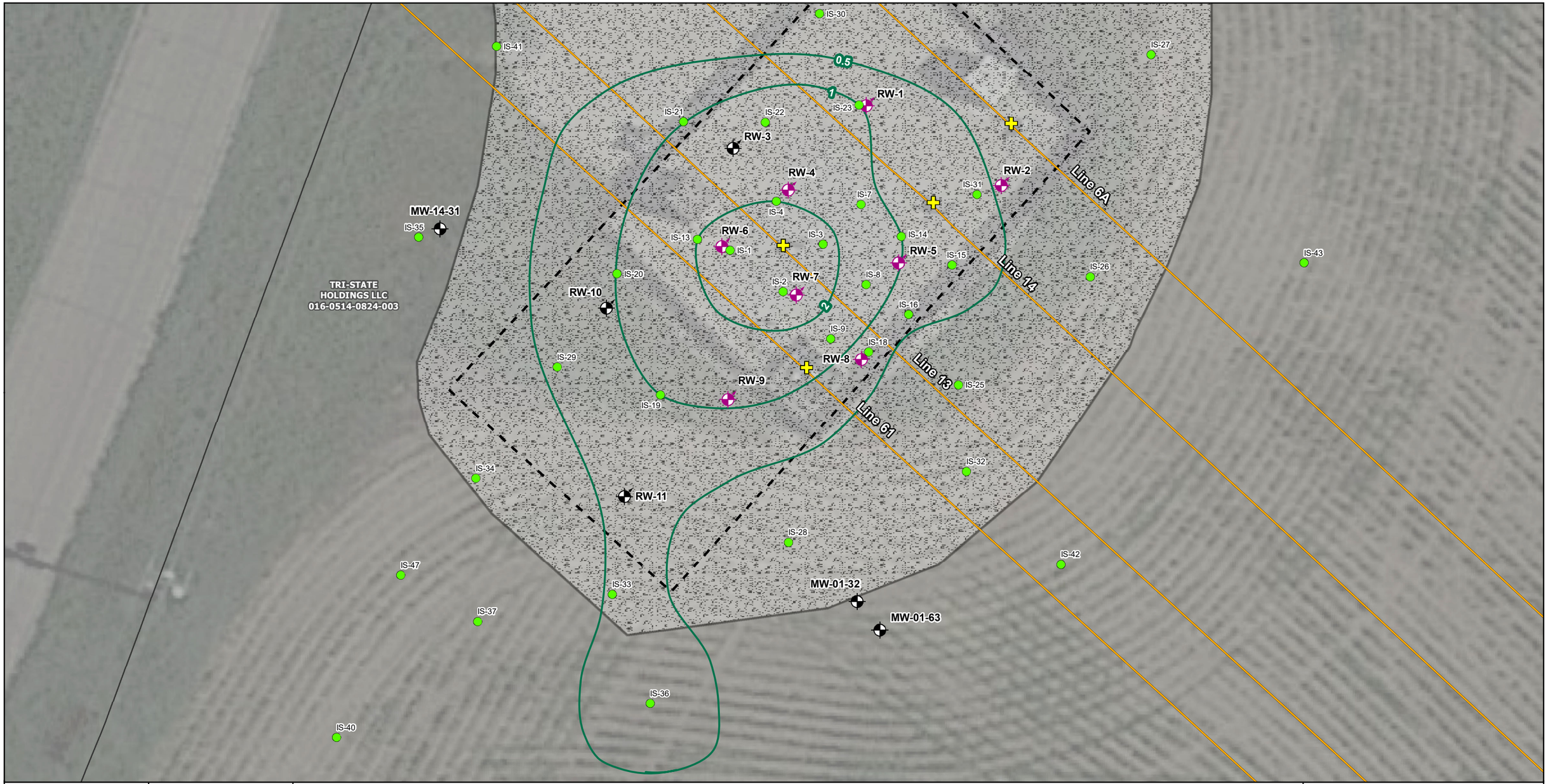

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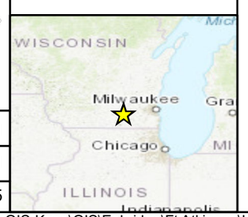

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Feet

Coordinate System: NAD 1983
StatePlane Wisconsin South FIPS
4803 Feet

Legend

- Remediation Well
- Remediation Well with Product Recovery Pump
- Existing Monitoring Well
- June 2021 Soil Boring
- Pipeline Valve
- June 2021 UVOST Response Approximate Thickness for Interval 24-30' bgs
- Enbridge Pipeline (Below Grade)
- Gravel Perimeter
- Site Fence
- Property Parcels

Note 1: June 2021 UVOST response thickness is estimate of vertical interval near water table with UVOST response indicative of free product. See geologic cross-sections for examples.

FIGURE 3-5
PRODUCT THICKNESS MEASUREMENTS - UVOST RESPONSE

LINE 13 MP 312 VALVE SITE
FORT ATKINSON, WISCONSIN

ENBRIDGE ENERGY
LIMITED PARTNERSHIP

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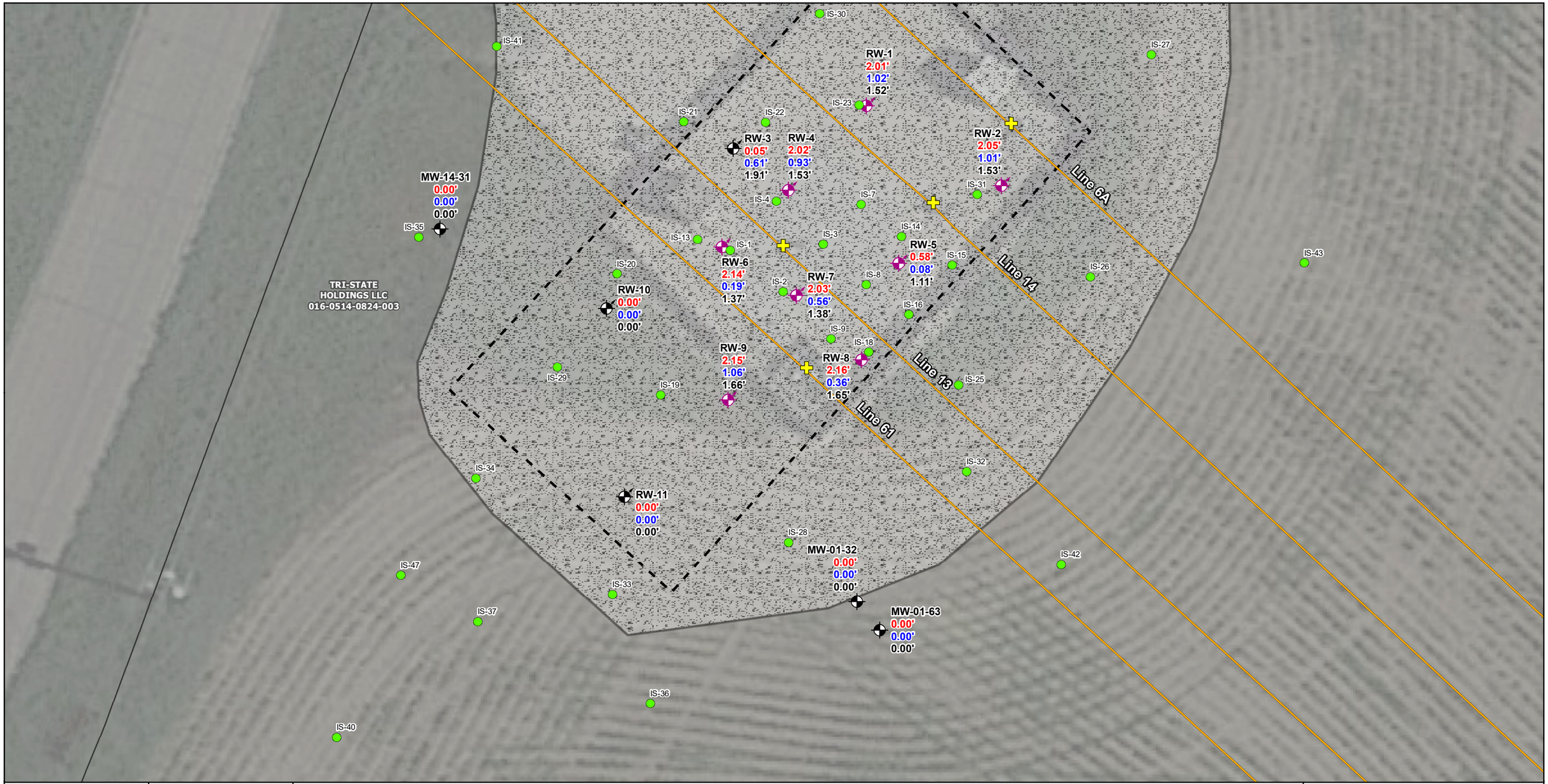

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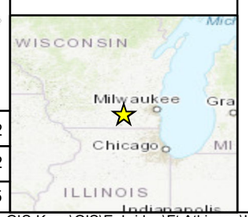

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Project #:	31401967.705

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Feet

Coordinate System: NAD 1983
StatePlane Wisconsin South FIPS
4803 Feet

Legend

- Remediation Well
- Remediation Well with Product Recovery Pump
- Existing Monitoring Well
- 2.15' June 21, 2021 Product Thickness
- 1.06' Nov 30, 2021 Product Thickness
- 1.16' January 24, 2022 Product Thickness
- June 2021 Soil Boring
- Pipeline Valve
- Enbridge Pipeline (Below Grade)
- Gravel Perimeter
- Site Fence
- Property Parcels

Note 1: Product thickness is based on gauging conducted on June 21, 2021 (top number), November 30, 2021 (middle number), and January 24, 2022 (bottom number).

Note 2: RW-10, RW-11, MW-01-63, and MW-14-31 first gauged in August 2021. Middle number posted for monitoring wells is from October 26, 2021.

FIGURE 3-6
PRODUCT THICKNESS MEASUREMENTS

LINE 13 MP 312 VALVE SITE
FORT ATKINSON, WISCONSIN

ENBRIDGE ENERGY
LIMITED PARTNERSHIP

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B

Macleod

MICHAEL MACLEOD
016-0514-0823-002

TRI-STATE
HOLDINGS LLC
016-0514-0824-003

RUSSELL O HARTWIG
016-0514-0823-000

Westphal Ln

Blackhawk Island Rd

Line 6A
Line 14
Line 13
Line 61

SB-26 <0.40
SB-25 <0.40
MW-17-20 <0.30
MW-02-25 <0.30
MW-02-55 <0.30
SB-14 <0.40
SB-6 <0.40
SB-2 <0.40
SB-27 <0.40
MW-03-25 <0.30
SB-19 <0.40
SB-1 16
SB-7 68
SB-18 2.6
MW-14-31 402
RW-1
RW-2
RW-3
RW-4
RW-5
RW-6
RW-7
RW-8
RW-9
RW-10
RW-11
B-1 270
MW-04-29 <0.30
SB-15 6.9
SB-20 <0.40
10,000 ug/L
MW-01-32 18,900
MW-01-63 0.41 J
SB-5 8,800
1,000 ug/L
SB-3 5,600
SB-4 <0.40
SB-16 <0.40
SB-8 800
MW-10-32 15.3
SB-17 <0.40
MW-05-60 <0.30
MW-05-30 2.0
SB-23 <0.40
MW-08-27 <0.30
SB-9 6.1
5 ug/L
SB-12 2.2
MW-11-32 2.0
SB-22 0.46
MW-16-29 <0.30
>0.5 ug/L
SB-21 <0.40
SB-10 26
SB-13 3.2
MW-06-32 5.6
SB-11 <0.40
MW-06-60 <0.30
MW-07-60 <0.30
MW-07-32 <0.30
MW-09-33 <0.30
SB-24 <0.40
MW-09-60 <0.30
MW-12-31 <0.30
TRI-STATE
HOLDINGS LLC
016-0514-0824-003
MW-15-32 <0.30
MW-13-33 <0.30

Legend

- Approximate Release Location
- Monitoring Well
- Remediation Well
- Potable Well
- Sept 2020 Soil Boring / Temporary Well
- Enbridge Pipeline
- Site Fence
- Property Parcels
- Groundwater Flow Direction
- Benzene Isoconcentration Contours (ug/l)
- Gravel Perimeter

Note:
Benzene isoconcentration contours developed using Oct-Dec 2021 monitoring well sampling results. 2020 temporary well results provided for reference.

THE ORIGINAL VERSION OF THIS DRAWING IS IN COLOR. BLACK AND WHITE COPIES MAY NOT ACCURATELY DEPICT CERTAIN INFORMATION.

0 60 120
SCALE IN FEET

ENBRIDGE

FIGURE 3–7

GROUNDWATER SAMPLING ANALYTICAL RESULTS FOR BENZENE (OCTOBER 2021)

LINE 13 MP 312 VALVE SITE
FORT ATKINSON, WISCONSIN

PREPARED FOR
ENBRIDGE ENERGY LIMITED PARTNERSHIP

Drawn By: EGC
Checked: MG 2/15/2022
Approved: TAH 2/15/2022
DWG Name: 314V1967.705-014

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Macleod

MICHAEL MACLEOD
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RUSSELL O HARTWIG
016-0514-0823-000

Westphal Ln

Blackhawk Island Rd

Line 6A
Line 14
Line 13
Line 61

SB-26 <0.40
SB-25 <0.40
MW-17-20 <0.30
MW-14-31 169
SB-14 <0.40
MW-02-25 <0.30
MW-02-55 <0.30
SB-6 <0.40
SB-2 <0.40
SB-27 <0.40
MW-03-25 <0.30
SB-19 <0.40
SB-1 16
SB-7 68
SB-18 2.6
MW-04-29 <0.30
SB-15 6.9
SB-20 <0.40
RW-1
RW-2
RW-3
RW-4
RW-5
RW-6
RW-7
RW-8
RW-9
RW-10
RW-11
B-1 270
MW-01-32 20,700
MW-01-63 <0.30
SB-3 5,600
SB-5 2,600
SB-4 <0.40
SB-16 <0.40
SB-8 800
MW-10-32 19.9
SB-9 6.1
SB-17 <0.40
MW-05-60 <0.30
MW-05-30 1.9
SB-23 <0.40
MW-08-27 <0.30
SB-12 2.2
MW-11-32 1.8
SB-22 0.46
MW-16-29 <0.30
SB-10 26
SB-21 <0.40
SB-13 3.2
MW-06-32 4.7
SB-11 <0.40
MW-06-60 <0.30
MW-07-60 <0.30
MW-07-32 <0.30
MW-09-33 <0.30
SB-24 <0.40
MW-09-60 <0.30
MW-12-31 <0.30
MW-15-32 <0.30
MW-13-33 <0.30

>0.5 ug/L
5 ug/L
1,000 ug/L
10,000 ug/L

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Legend

- Approximate Release Location
- Monitoring Well
- Remediation Well
- Potable Well
- Sept 2020 Soil Boring / Temporary Well
- Enbridge Pipeline
- Site Fence
- Property Parcels
- Groundwater Flow Direction
- Benzene Isoconcentration Contours (ug/l)
- Gravel Perimeter

Note:
Benzene isoconcentration contours developed using January 2022 monitoring well sampling results. 2020 temporary well results provided for reference.

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0 60 120
SCALE IN FEET

ENBRIDGE

FIGURE 3–8

GROUNDWATER SAMPLING ANALYTICAL RESULTS FOR BENZENE (JANUARY 2022)

LINE 13 MP 312 VALVE SITE
FORT ATKINSON, WISCONSIN

PREPARED FOR
ENBRIDGE ENERGY LIMITED PARTNERSHIP

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