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

Site Investigation Sample Results Notification

Form 4400-249 (R 03/14)

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Notice: This form may be used to comply with the requirements of s. NR 716.14 (2), Wis. Adm. Code; however, use of this form is not required. An alternate format may be used. The rule requires that notification be provided to 1) property owners when someone else is conducting the sampling, 2) to occupants of property belonging to the responsible person, and 3) to owners and occupants of property that does not belong to the responsible person but has been affected by contamination arising on his or her property. Notification is required within 10 business days of receiving the sample results. Personal information collected will be used for program administration and may be provided to requesters to the extent required by Wisconsin's Open Records law [ss. 19.31-19.39, Wis. Stats.].

NOTE: Under s. NR 716.14, Wis. Adm. Code, the responsible party must also submit sample results and other required information to the DNR. We recommend that copies of the sample results notifications be included with that submittal, along with all attachments. Using the same format used for data presentation for a closure request may be helpful to all parties. See s. NR 716.14, Wis. Adm. Code for the full list of information to be submitted to the DNR.

Notification of Property Owners and Occupants:

This notification form has been provided to you in order to provide the results of environmental sampling that has been conducted on property that you own or occupy. Samples were collected in accordance with the methods identified in the site investigation work plan, in accordance with s. NR. 716.09 and 716.13, Wis. Adm. Code. This sampling was conducted as a result of contamination originating at the following location.

Site Information								
Site Name						DNF	R ID # (BRRTS #))
Enbridge Line 13 Blac	khawk Valve					02-	28-586199	
Address				City		Stat	e ZIP Code	
Blackhawk Island Roa	d			Fort Atkins	son	W	I 53538	
Responsible Party								
The person(s) responsible	e for completing t	this enviro	nmental inve	stigation is:				
Property Owner								
Enbridge Energy, Limit	ted Partnership	(Respon	sible Party		Tri-Stat		LC (property ov	vner)
Address				City			e ZIP Code	
11 East Superior Street	- Suite 125			Duluth		M		
Contact Person							er (include area co 5) 718-1040	ode)
Karl Beaster, P.G.						(/1	3) /10-10-0	
Person or company that of	collected samples	S						
WSP USA Inc.								
Sample Results (Resul	ts Attached)							
Reason for Sampling:	Routine	Oth	ner (define) S	SVE Pilot Test	Work Plan			
The contaminants that ha	ve been identifie In S e		me on prope In Ground		n or occupy includ	le:		
Contaminant	Yes	No	Yes	No				
Gasoline	$\overline{\bigcirc}$	$\overline{\bigcirc}$	$\overline{\bigcirc}$	\bigcirc	This sampling	event included	sampling of a	\neg
Diesel or Fuel Oil		O	O	\bigcirc	drinking water		camping or a	
Solvents	\circ	\circ	\circ	\bigcirc		Yes No)	
Heavy Metals		\circ		\bigcirc	If yes, the sam	pled drinking w	ater well had	
Pesticides	\circ	\circ	\bigcirc	\bigcirc	detectable con	taminants.		
Other: diluent liquid	ledot	\bigcirc	lacktriangle	\bigcirc		Yes O No)	
		Contamin	ants in Vap	or				
	<u>-</u>	Ye		<u>01 </u>				
Indoor Air			$\overline{\bigcirc}$					
Sub-slab			\circ					
Exterior Soil Gas		$\overline{}$	\cap					

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Attached are:

- A map that shows the locations from which samples were collected. (The map needs to meet the requirements of s. NR 716.15 (4), Wis. Adm. Code.)
- A data table with specific contaminant levels at each sample location and whether or not the sample results exceed state standards.
- A copy of the laboratory results.

Contact Information

caroline.rice@wisconsin.gov

You are not identified as the person that is responsible for this contamination. However, your cooperation is important. Property owners may become legally responsible for contamination if they do not allow access to the person that is responsible so that person may complete the environmental investigation and clean up activities.

Option for written exemption: You have the option of requesting a written liability exemption from the DNR for contamination that originated on another property, or on property that you lease. To do this, you must present an adequate environmental assessment of your property and pay a \$700 fee for review of this information. If you are interested in this option, please see DNR publication # RR 589, "When Contamination Crosses a Property Line - Rights and Responsibilities of Property Owners", available at: dnr.wi.gov/files/PDF/pubs/rr/rr589.pdf.

Please address questions regarding this notification, or requests for additional information to the contact person listed above, or to one

of the following contacts:	rung uns nouncation	, or reques	is for additional line	illiation to ti	ic contact pers	ori iist	cu above, or t	.0 0110
Environmental Consultant								
Company Name		Contact P	erson Last Name		First Name			
WSP USA Inc.		Huff			Tim			
Address			City			State	ZIP Code	
5957 McKee Road, Suite 7			Madison			WI	53719)
Phone # (inc. area code) (314) 206-4212	Email tim.huff@wsp.cor	n	•					
Select which agency: Natur	al Resources	O Agricul	Iture, Trade and Cor	nsumer Prot	ection			
State of Wisconsin Departme	ent of Natural Res	ources						
Contact Person Last Name Rice			First Name Caroline				# (inc. area 6 508) 219-218	
Address			City			State	ZIP Code	
3911 Fish Hatchery Rd			Fitchburg			WI	53711	
Email								



ENBRIDGE LINE 13 MP 312 VALVE SITE (BRRTS# 02-28-586199) SOIL VAPOR EXTRACTION PILOT TEST WORK PLAN

ENBRIDGE ENERGY, LIMITED PARTNERSHIP

PROJECT NO.: 31401967.705B DATE: JULY 2022

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

WSP.COM

CERTIFICATION

Soil Vapor Extraction Pilot Test Work Plan 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

7/7/2022 Date

SIGNATURES

PREPARED BY

Eric Wesseldyke

Senior Consultant, Environmental Engineer

REVIEWED BY

Craig Anderson, PE Practice Leader



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FIGURES

FIGURE 1 SVE PILOT TEST POINTS

FIGURE 2 CONCEPTUAL TEST PROCESS AND

EQUIPMENT DESIGN

1 INTRODUCTION

On behalf of Enbridge Energy, Limited Partnership (Enbridge), WSP USA, Inc. (WSP) has prepared this Soil Vapor Extraction (SVE) Pilot Test Work Plan 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).

1.1 SVE PILOT TEST RATIONALE

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 then submitted a Remedial Action Options Report (RAOR) on May 19, 2022, in accordance with Wisconsin Administrative Code (WAC) Chapter NR 722 requirements, evaluating multiple remedial action options (RAOs) and selecting the RAO most appropriate for this Site. The RAOR identified SVE as the active RAO most appropriate for remediating residual product and soil impacts at the Site. WSP has prepared this SVE Pilot Test Work Plan to collect site-specific data needed to design and implement a full-scale SVE system at the Site.

1.2 SITE GEOLOGY AND HYDROGEOLOGY

Section 2.2 of the SSI Report provides a detailed summary of the Site's setting, including the topography, geology, hydrogeology, and groundwater use. The surficial geology of the Site consists of silty clay and silty sand units from the 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.

1.3 SVE PILOT TEST TECHNICAL APPROACH AND OBJECTIVES

The primary objective for the SVE pilot test is to determine the feasibility and efficiency of removing petroleum volatile organic compounds (PVOCs) from the soil vapor using SVE. SVE involves applying vacuum to the subsurface to promote the flow of soil vapor toward dedicated extraction wells, which capture the vapor-phase PVOCs and removes them from the subsurface for subsequent treatment. Critical evaluation and full-scale design parameters that will be determined from the pilot test include:

- Vapor flow characteristics within the unsaturated unconsolidated soils
- Applied vacuum to vapor flow rate relationship
- Achievable soil vapor PVOC mass extraction rates
- Achievable vapor extraction radius of influence
- Determination of other site-specific conditions that may affect the design and cost of a full-scale SVE system.

2 SVE PILOT TEST WELLS AND EQUIPMENT

2.1 GENERAL

The following sections describe the wells, equipment, and instrumentation that will be used during the SVE pilot test. Figure 1 presents a layout of the pilot test wells and Figure 2 provides a conceptual process flow diagram of the proposed pilot test system. While this work plan attempts to outline the best technical approach for the pilot test, the wells, equipment, and instrumentation specified below are subject to change in the field to adapt to unanticipated site conditions or events.

2.2 PILOT TEST EXTRACTION WELL AND MONITORING POINTS

WSP selected the pilot test area near Remediation Well RW-07, which is located within 10 feet of the Line 13 valve. As described in Section 3.2 of the SSI Report, the measured Ultra-Violet Optical Screening Tool (UVOST) response indicated a residual product layer greater than three feet thick near the water table in the vicinity of RW-07 (Figure 2). After installation of RW-7 in June 2021, measured free product thickness in the well was approximately two feet. As a result of product recovery activities and seasonal changes in groundwater elevation, the measured free product thickness in RW-7 in April through June 2022 was less than 0.2 feet. In addition to residual product accumulation near the water table, vadose zone soil sampling results at soil borings in the vicinity of RW-7 indicated shallow soil impacts at depths between approximately 9 and 22 feet below ground surface (bgs) with elevated PVOC concentrations in the interval between approximately 15 and 17 feet bgs.

2.2.1 PILOT TEST EXTRACTION WELL

WSP proposes to use RW-07 as the extraction well for the SVE pilot test. RW-07 is screened from 17 to 32 feet bgs, with a static water level of approximately 25 feet bgs, providing approximately 8 feet of exposed screen in the lower vadose zone where residual product is observed.

2.2.2 MONITORING POINTS

Subsurface vacuum influence will be monitored via existing and new monitoring points located at incremental distances from the SVE pilot test well. The vacuum will be monitored at the existing remediation and monitoring wells at distances ranging from approximately 15 feet to 60 feet from the vapor extraction well, RW-07. The existing remediation and monitoring wells are screened at a depth intersecting the static water table. Three additional vacuum monitoring points (VMPs) are proposed adjacent to existing remediation wells RW-06, RW-09, and RW-11 to evaluate the vertical vacuum influence in the subsurface at varying distances from the extraction well. The proposed monitoring points are shown in Figure 1 and are summarized in Table 2-1 below

Table 2-1: SVE Vapor Monitoring Points

MONITORING POINT	APPROXIMATE DISTANCE	SCREEN INTERVAL	STATUS
RW-06	14.6 ft	17 to 32 ft bgs	Existing
VMP-06	14.4 ft	7 to 10 ft bgs	Proposed
RW-05	17.7 ft	17 to 32 ft bgs	Existing
RW-09	20.6 ft	17 to 32 ft bgs	Existing
VMP-09	20.4 ft	7 to 10 ft bgs	Proposed
RW-03	26.3 ft	17 to 32 ft bgs	Existing
RW-01	33.2 ft	17 to 32 ft bgs	Existing
RW-11	43.6 ft	17 to 32 ft bgs	Existing
VMP-11	43.8 ft	7 to 10 ft bgs	Proposed
MW-01-32	51.4 ft	22 to 32 ft bgs	Existing
MW-14-31	59.6 ft	21 to 31 ft bgs	Existing

2.3 SVE EQUIPMENT

WSP will rent a pre-assembled trailer-mounted SVE equipment skid from a local remediation equipment vendor to perform the SVE pilot test. The skid will be equipped with a 7.5 horsepower FPZ K08-MS regenerative blower (or equivalent) capable of producing up to 381 cubic feet per minute of airflow and 68 inches of water column vacuum. The equipment skid will also contain ancillary SVE equipment including the following:

- 82-gallon vapor liquid separator (VLS) for capturing water vapor entrained within the vapor stream
- Dilution air intake for optimizing the performance of the vacuum pump and adjusting the applied vacuum to the extraction well
- Particulate air filter to remove dust and debris from the vapor stream before entering the vacuum pump
- Electrical control panel with process logic to automatically shut-down the system in the event of an alarm condition (i.e., high water level in the VLS)
- Vapor transfer hose and fittings to connect the SVE equipment to the extraction wellhead.

A portable diesel generator set will also be rented by WSP to provide a temporary source of electricity to the SVE skid for the duration of the test.

2.4 VAPOR TREATMENT AND PERMITTING

Extracted soil vapor will pass through two vapor-phase granular activated carbon (GAC) units, connected in series, to remove PVOCs before discharging to the atmosphere. To confirm treatment of the extracted vapor, WSP will monitor the SVE emissions real-time using a photoionization detector (PID). Emissions vapor samples will also be collected for laboratory analysis to evaluate the GAC treatment efficiency. The pilot test is anticipated to evacuate less than 150,000 standard cubic feet (scf) of air. Therefore, Under NR 406.04(1)(m)3 and NR 407.03(1)(sm)3 the pilot test will be exempt from air permitting requirements.

2.5 PILOT TEST INSTRUMENTATION

Instrumentation to be used during the pilot test will include vacuum and flow indicators at the locations illustrated in Figure 2. Extracted soil vapor VOC concentrations will be monitored with a PID. PVOC concentrations in the extracted soil vapor will also be evaluated quantitatively using laboratory analytical methods. A discussion of soil vapor sample collection and analysis is presented in Section 3.2.

3 PILOT TEST PROCEDURES

3.1 GENERAL

A vacuum will be applied to RW-07 using the set-up described in Section 2.0. Subsurface vacuum levels will be measured from the monitoring points to estimate the effective vacuum radius of influence (ROI). During the SVE test, samples will be collected from the extracted soil vapor for PVOC analysis to determine a PVOC mass removal rate. As discussed below, the SVE test will be performed in two phases (stepped-rate and constant-rate) to evaluate the site-specific vacuum response of the subsurface.

3.1.1 SVE STEPPED-RATE TEST

The SVE stepped-rate test consists of applying incremental vacuum levels on the SVE well and measuring the stabilized vapor flow rate and induced subsurface vacuum corresponding to the applied vacuum the extraction well. The purpose of the stepped-rate test is to determine the optimum vacuum level and vapor extraction rate that removes the greatest mass of contaminants per unit volume and to define the relationship between applied vacuum and ROI. A stepped-rate test will be performed on RW-07.

WSP anticipates using a minimum of three incremental steps lasting at least 30 minutes each. The last step of the test will be the maximum achievable vacuum. Regulating the vacuum and vapor flow rate at the extraction well will be accomplished by manually adjusting a throttling valve on the extraction piping header and adjusting a fresh air dilution valve at the inlet to the vacuum pump (Figure 2).

Each step in the test will begin when the wellhead vacuum and vapor flow rate measurements equilibrate to within 10 percent. During each of the incremental steps, vacuum levels at the extraction well and each of the monitoring points will be measured and recorded on field data sheets. In addition, PVOC concentrations in the vapor exhaust and at the wellheads will be monitored in the field using a PID during each of the incremental steps. From this data, WSP will determine the optimum vacuum level/flow rate to be used during the constant-rate test.

3.1.2 SVE CONSTANT-RATE TEST

The constant-rate test will consist of inducing the optimum vacuum level/flow rate on the SVE wells, as determined during the stepped-rate test, for a continuous period of up to 24 hours. After the optimum vacuum and flow rate has been identified during the stepped-rate test, the total duration of the constant-rate test will be calculated to keep the total evacuated volume of air to less than 150,000 scf. The purpose of the constant-rate test is to monitor the effects of longer-term vapor extraction, such as increases in vapor extraction rate and changes in PVOC concentrations due to reduction in soil moisture content. The constant-rate test will also determine the effective ROI, which can be defined as the area surrounding a vapor extraction well in which vapor flow is effectively achieved. The constant-rate test will be performed at RW-07.

During the constant-rate test, field personnel will measure the vapor extraction wellhead vacuum and flow rate at the SVE well and the vacuum level at each of the monitoring points. These measurements will be collected at a maximum interval of every eight hours, depending on the variability of measurements observed during the first few hours of the test. In addition, hourly PID readings will be taken from the extraction wellhead and post-GAC discharge stream during the first few hours of the test. The frequency of these readings will decrease as the vapor concentrations stabilize. All data and measurements will be recorded on data sheets. Samples of the extracted vapor will be collected during these tests as described in Section 3.2.

3.2 SOIL VAPOR SAMPLE COLLECTION AND ANALYSIS

PVOC concentrations in the extracted soil vapor will be analyzed in real-time using a PID and also quantitatively using laboratory analytical methods. During the stepped-rate SVE test, PVOC concentrations from the extraction wellhead and GAC-treated discharge will be measured using the PID. These PID readings will be used to determine in the field which vacuum/flow rate setting extracts the greatest total PVOC mass and will be used to identify the optimum vacuum-flow rate setting for the constant-rate SVE test. PID readings of the extracted soil vapor during the constant-rate test will also be used to measure variations in mass removal over time.

Samples will be collected from a sample port located on the SVE wellhead for quantitative laboratory analysis of PVOCs. Vapor samples will be collected using 1-liter Summa TM -equivalent canisters and analyzed by ALS Environmental of Simi Valley, California, for:

U.S. Environmental Protection Agency (US EPA) Air Analysis Method TO-15 for PVOCs (benzene, ethylbenzene, toluene, xylenes, cyclohexane, n-hexane, methylcyclohexane, and methyl-tert butyl ether [MTBE]).

At a minimum, vapor samples will be collected at the following times during the test at RW-07:

- Start of the SVE constant-rate test
- Halfway through the SVE constant-rate test
- End of the SVE constant-rate test

Vapor sample analytical results will be used in combination with measured vapor flow rates, to determine the VOC mass removal rate during the constant rate test. The mass removal rate will allow for mass recovery estimates for a full-scale SVE system and will provide design criteria necessary to specify proper vapor treatment equipment for a full-scale system.

3.3 MANAGEMENT OF TREATMENT RESIDUALS

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 Site is currently registered as a Small Quantity Generator (SQG) of hazardous waste with generator EPA ID number WIR000177691 and FID number 128136140.

4 DATA EVALUATION AND REPORTING

Following completion of the pilot test and evaluation of the data, a letter report will be prepared and submitted to the WDNR that summarizes the pilot test results. Based on the findings presented in the pilot test report, a full-scale design report will then be prepared and submitted to the WDNR, if appropriate.

5 PILOT TEST SCHEDULE

With WDNR approval, WSP anticipates initiating the SVE pilot test activities in the third quarter of 2022; however, this timeframe is subject to change pending subcontractor and equipment availability. WSP estimates the following time requirements to complete the pilot test activities:

- 1 day to install pilot test vapor monitoring points
- 1/2 day for equipment delivery, set-up, and leak testing
- 1 day for stepped-rate testing
- 2 days for constant-rate testing
- 1/2 day for equipment breakdown and cleanup

WSP estimates the pilot test summary report can be finalized within 30 days after receipt of the vapor sample laboratory analytical results, or approximately 45 days after completion of the pilot test field activities.

6 REFERENCES

- WSP, 2022a. Supplemental Site Investigation Report. Enbridge Line 13 MP 312 Valve Site (BRRTS # 02-28-586199). March 16.
- WSP, 2022b. Remedial Action Options Report. Enbridge Line 13 MP 312 Valve Site (BRRTS # 02-28-586199). May 19.

7 ACRONYM LIST

BGS below ground surface

BRRTS Bureau for Remediation and Redevelopment Tracking System

EPA Environmental Protection Agency

GAC granular activated carbon

MP Milepost

MW Monitoring Well

O&M operations & maintenance

PID photoionization detector

PVOC petroleum volatile organic compound

RAO remedial action option

RAOR Remedial Action Options Report

ROI radius of influence RW remediation well scf standard cubic feet

SSI Supplemental Site Investigation

SVE soil vapor extraction

UVOST ultra-violet optical screening tool

VMP vapor monitoring point
VOC volatile organic compound

WAC Wisconsin Administrative Code

WDNR Wisconsin Department of Natural Resources

FIGURES





