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BARR

Technical Memorandum

To: Alex Smith, Enbridge Energy
From: Ryan Erickson and Noelle Scelina
Subject: Superior Terminal Historical Contamination – Line 14 and Line 61 Area Pipeline Enhancement Infrastructure Excavation Activity
Date: January 13, 2017
Project: 49161286

This document summarizes the field screening, analytical sampling, and waste management assistance performed by Barr in response to the discovery of historically contaminated soil encountered during excavation activities near Pipelines 14 and 61 (Lines 14 and 61) at the Enbridge Superior Terminal in Superior, Wisconsin (Figure 1).

Background

Excavation and pipeline replacement activities were conducted along a Terminal road near Line 14 and Line 61 infrastructure as part of the Superior Terminal Enhancement Project (Project) in 2014 and 2015. In this area, hydrocarbon contaminated soil was encountered by excavation contractors in in four locations (*Excavation 1*, *Excavation 2*, *Excavation 3, Excavation 4*) during this Project (Figure 1). Enbridge was notified and the nearby infrastructure was assessed for an active release. No active release was identified; therefore, Enbridge inferred that the contamination was historical. The contractors continued their excavation activities and excavated soil with evidence of hydrocarbon contamination was transported to the Terminal soil management area for characterization and off-site management.

Enbridge requested that Barr assist with environmental assessment and waste management tasks using methods described in the *Field Activities* section of *Superior Terminal Pipeline Enhancement Project Environmental Oversight Technical Memorandum.* The site specific activities and results are summarized below.

Environmental Activities and Results

Barr was onsite on multiple occasions during project activities between November of 2014 and August of 2015 to assess the environmental site conditions as they were encountered. The excavation and soil sampling locations are shown on Figure 1 and the field screening logs for the completed excavations are included in Attachment A. The analytical sampling results are summarized in Table 1 and the laboratory reports are included in Attachment B.

Excavation 1

Barr was onsite to document the conditions of *Excavation 1* on August 5 and 6 of 2014. Excavation 1 is on the southeast side of a Line 61 manifold complex (Photo 1). The final excavation approximately was 30

feet long by 2 feet wide and up to 3.5 feet deep (Photo 2). Soil observed in the final excavation sidewalls and base consisted of sandy gravel fill and sandy clay.

Soil samples collected from the sidewalls of the final excavation had headspace readings below 2 parts per million (ppm) and no other evidence of residual soil contamination, such as odor, discoloration or sheen, were identified. A hydrocarbon sheen was observed on water within the excavation over a small 6 inch by 1 foot diameter area. Based on the field screening results and field observations, no analytical soil sample was collected.

Excavation 2

Barr was onsite to document the conditions of *Excavation 2* on September 11 and November 8 and 15 of 2014. *Excavation 2* consisted of two stormwater culvert trenches beneath the Terminal road. The November 8, 2014 field event documented conditions in the new culvert installation trench (Photos 3 and 4). The November 15, 2014 field event documented conditions in the historical culvert removal trench (Photo 5). Each trench was approximately 40 feet long by 6 feet wide by 5 feet deep. Soil in the excavation extents consisted of clay and sand fill.

In the culvert installation trench (Attachment A – 11/8/2014), the highest detected sidewall soil sample headspace reading was 1.5 ppm and no other evidence of hydrocarbon soil contamination such as odor, discoloration, or sheen were identified except for on the west end of the trench where it intersected the historical culvert. Soil with historical contamination was identified in parts of the western half of the historical culvert removal trench (Attachment A – 11/15/2014). The contaminated soil had headspace readings up to 90.6 ppm, a hydrocarbon odor, and orange discoloration. Hydrocarbon contaminated soil was not identified in the eastern half of the trench.

Barr collected two analytical samples (*Culvert-S-1* and *Culvert-S-2)* from the excavation sidewalls on November 15, 2014 to document residual contamination (Figure 1; Attachment A). Samples were sent to Legend technical Services in St. Paul, Minnesota for laboratory analysis of petroleum volatile organic compounds (PVOC) and naphthalene.

Analyte concentrations were detected in both samples; however, the concentrations were below Wisconsin Department of Natural Resources (WDNR) industrial direct contact residual contaminant levels (RCL's) and passed the Cumulative Hazard Index criteria. *Culvert-S-1* analyte concentrations were below WDNR groundwater RCLs for sample. *Culvert-S-*2 analyte concentrations exceeded WDNR groundwater RCLs for multiple parameters as shown in Table 1.

Excavation 3

Barr was onsite to document the conditions of *Excavation 3* on March 6, 9, and 10 of 2015. *Excavation 3* was a pipeline tie-in excavation located in a storm water ditch on the north side of the Terminal road

(Photo 6; Figure 1). The final excavation was approximately 40 feet long by 32 feet wide by 10 feet deep and the soil observed in the sidewalls and bottom consisted of clay.

A small volume of free-product (less than 1-gallon) and contaminated soil was observed by contractors near the pipeline during excavation activities. Most observed hydrocarbon contamination was removed during excavation activities. Barr field screened the final excavation (Attachment A – 3/10/2015) and identified residual hydrocarbon contaminated soil with a headspace reading of 601 ppm and a trace amount of product in the northeast sidewall beneath the pipeline (Photo 7). No evidence of hydrocarbon contamination was identified in the other excavation field screening samples.

Barr collected one analytical samples (*LN61-S-1*) from beneath the northeast end of the pipeline on March 10, 2015 to document residual contamination (Figure 1). The sample was sent to Legend Technical Services for laboratory analysis of PVOC and naphthalene.

Concentrations of each analyzed parameter were detected; however, the concentrations were below WDNR industrial direct contact RCLs and passed the Cumulative Hazard Index criteria. Analyte concentrations did exceed WDNR groundwater RCLs for all of the parameters except ethyl benzene and toluene as shown in Table 1.

Excavation 4

Barr was onsite to document the conditions of *Excavation 4* on August 17 and 18 of 2015. *Excavation 4* was located around valves 22V-FV21 and 222-V-PV21 in the storm water ditch north of the Terminal road (Photo 8; Figure 1). The final excavation was approximately 15 feet long by 10 feet wide by 7 feet deep and the soil in the sidewalls consisted of clay (Photo 9).

Excavation contractors reported seeing a sheen on water within the excavation. Barr field screened soil from the final excavation sidewalls in the direct contact zone (0 - 4.5 feet below ground surface) and the headspace readings were 0.0 ppm and no other evidence of hydrocarbon contaminated soil such as odor, discoloration, or sheen were identified in the screening samples. Deeper samples could not be collected due to the steep excavation sidewalls. A slight rainbow hydrocarbon sheen was observed on water within the excavation.

Barr collected one analytical sample (*Tank21-S-1*) from the excavation sidewall on August 18, 2015 to document final environmental site conditions (Figure 1). The sample was sent to ALS Environmental in Holland, Michigan for laboratory analysis of PVOC and naphthalene.

All analyte concentrations were below method detection limits as shown in Table 1.

TABLE 1: Analytical Soil Sample Results *(all analyte concentrations in mg/kg)*

Sample ID	Sample Date	Sample Depth (feet)	1,2,4-Trimethyl benzene	1,3,5-Trimethyl benzene	Benzene	Ethyl benzene	Toluene	Total Xylenes	Naphthalene
Groundwater RCLs	*underlined*		*1.3821*	*1.3821*	*0.0051*	*1.57*	*1.1072*	*3.96*	*0.6582*
Industrial DC RCLs	*No exceedances*		*219*	*182*	*7.41*	*37*	*818*	*260*	*26*
Excavation 2									
Culvert-S-1	11/15/2014	2	**0.27**	**0.27**	<0.0036	**0.022**	<0.0051	**0.14**	**0.29**
Culvert-S-2	11/15/2014	4	**21**	**27**	**0.17**	**0.55**	<0.0047	**11**	**12**
Excavation 3									
LN61-S-1	3/10/2015	9	**5.3**	**3.4**	**3**	**1.1**	**0.31**	**15**	**3.1**
Excavation 4									
Tank 21-S-1	8/18/2015	2	<0.014	<0.015	<0.015	<0.014	<0.014	<0.043	<0.016

BOLD = Analyte detections
Underlined = Analyte detections exceeding WDNR groundwater RCLs.

The project scope and presence of terminal infrastructure limited the additional remedial excavation of contaminated soil. The excavations were backfilled upon completion of the Project work with fill that had no identified contamination.

Historical Release Information

Barr reviewed the WDNR Bureau of Remediation and Redevelopment Tracking System (BRRTS) database in the vicinity of the above Project excavations. A Pump House 14 release (BRRTS# 0216176579) was identified approximately 100 feet east of the *Excavation 2* trenches that may be associated with observed impacts. However, historical release details and documentation associated with the release was not available on the BRRTS website. Other historical BRRTS sites were not identified near the other excavations. Based on the contaminated soils proximity to Terminal pipeline infrastructure and the lack of an identified ongoing release, it is likely that the contamination is associated with unreported historical releases.

Waste Management

Contaminated soil was managed off-site as described in the *Waste Management* section of the *Superior Terminal Pipeline Enhancement Project Environmental Oversight Technical Memorandum.* Contaminated water in the excavation was removed with a hydrovacuum truck, solidified with the excavated soil slurry, and managed as a solid at an off-site landfill facility.

Receptor Survey

The closest groundwater monitoring wells are *MW-6* and *MW-6B* located approximately 500 feet southwest of *Excavation 1* and wells *MW-20A* and *MW-20B* located approximately 600 feet east of *Excavation 2*. In 2015, PVOC and naphthalene analyte concentrations in these wells were below method detection limits as shown in the *Superior Terminal Pipeline Enhancement Project Environmental Oversight Technical Memorandum.*

In each excavation location, the residual impacts are below the ground surface and above the water table; therefore, no nearby surface water receptors are deemed to be at risk.

The closest structures are Tank 21 to the northwest, which has no human occupancy, two pump houses (one to the northeast and one to the southwest), and two buildings associated with the power station to the southeast. The pump houses and power station buildings have limited human occupancy, lack basements, buried storm water lines or other subsurface vapor entry points. No other potential vapor receptors were identified within 100 feet of the excavations.

Conclusion

Soil with historical hydrocarbon contamination was identified and excavated during the Line 14 and 61 Pipeline Enhancement projects. The excavated contaminated soil was managed at an approved landfill facility. Contaminated soil that could not be excavated due to the project scope and the presence of Terminal infrastructure had analyte concentrations below the WDNR industrial direct contact RCL's and passed the WDNR Cumulative Hazard Index criteria. Analyte concentrations did exceed WDNR Groundwater criteria for some analytes; however, groundwater monitoring at the Superior Terminal is conducted on a facility wide basis as part of the hydrogeologic performance standard established in the WDNR *Site Investigation and Response Action Plan (SI/RAP)* (2014). The presence of clean backfill, above ground infrastructure, and employee-awareness will help prevent direct contact exposure.

Because no definitive source for the historically contaminated soil was identified and residual contamination remains with analyte concentrations that are below the direct contact RCL's but above groundwater RCL's, the WDNR will likely add the site to the pending Terminal-wide GIS registry. Barr believes that no further remedial or investigative actions will be requested by the WDNR for this site at this time.

Attachments:

Site Photos	1 through 9
Figure 1	Site Layout
Attachment A	Enbridge Site Investigation Field Sampling and Screening Logs
Attachment B	Excavation Sample Laboratory Reports

Site Photos

Excavation 1

Photo 1

Photo 2

Photo 1: *Excavation 1*. Photo taken facing north on August 5, 2014.
Photo 2: *Excavation 1*. Photo taken facing northeast on August 6, 2014.

Excavation 2

Photo 3

Photo 4

Photo 3: Culvert installation trench. Photo taken facing east on November 8, 2014.
Photo 4: Culvert installation trench. The west end of the historical culvert is visible in the trench sidewall in the center of the photo. Photo taken facing southeast on November 8, 2014.

Photo 5: Culvert removal trench. The historical culvert is visible near the bottom of the vertical hydrovacuum truck metal hose in the bottom left corner of the photo. Photo taken facing southeast on November 15, 2014.

Excavation 3

Photo 6

Photo 7

Photo 6: *Excavation 3*. Photo taken facing west on March 10, 2015.
Photo 7: Northeast end of *Excavation 3*. Photo taken facing north on March 10, 2015.

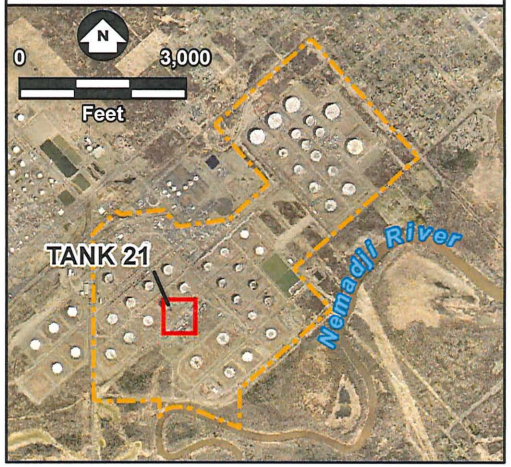
Excavation 4

Photo 8

Photo 9

Photo 8: Excavation 4. Photo taken facing west on August 18, 2015.
Photo 9: Excavation 4. Photo taken facing southwest on August 18, 2015.

ENBRIDGE SUPERIOR TERMINAL



- Historical Release Location
- Analytical Sample Locations
- Excavation Extents
- Pipeline Infrastructure
- Terminal Property Boundary

N

0 80 160

Feet
1 Inch = 80 Feet

Douglas County Imagery Circa May, 2016

Figure 1

SITE LAYOUT
LINE14/ LINE 61 ENHANCEMENT
SUPERIOR TERMINAL
Enbridge Energy, L.P.
Superior, Wisconsin

ENBRIDGE

Attachment A

Site Investigation Field Sampling and Screening Logs

Excavation 1 - Final Excavation

SITE INVESTIGATION FIELD SAMPLING AND SCREENING LOG

Location: *Milepost or Facility* Enbridge Terminal - Line 61

Equipment used: PID *-ionization detector with* 10.6 *eV lamp*

Background Headspace: 0.0 ppm

Date: 8/6/14

Sampler: HEW

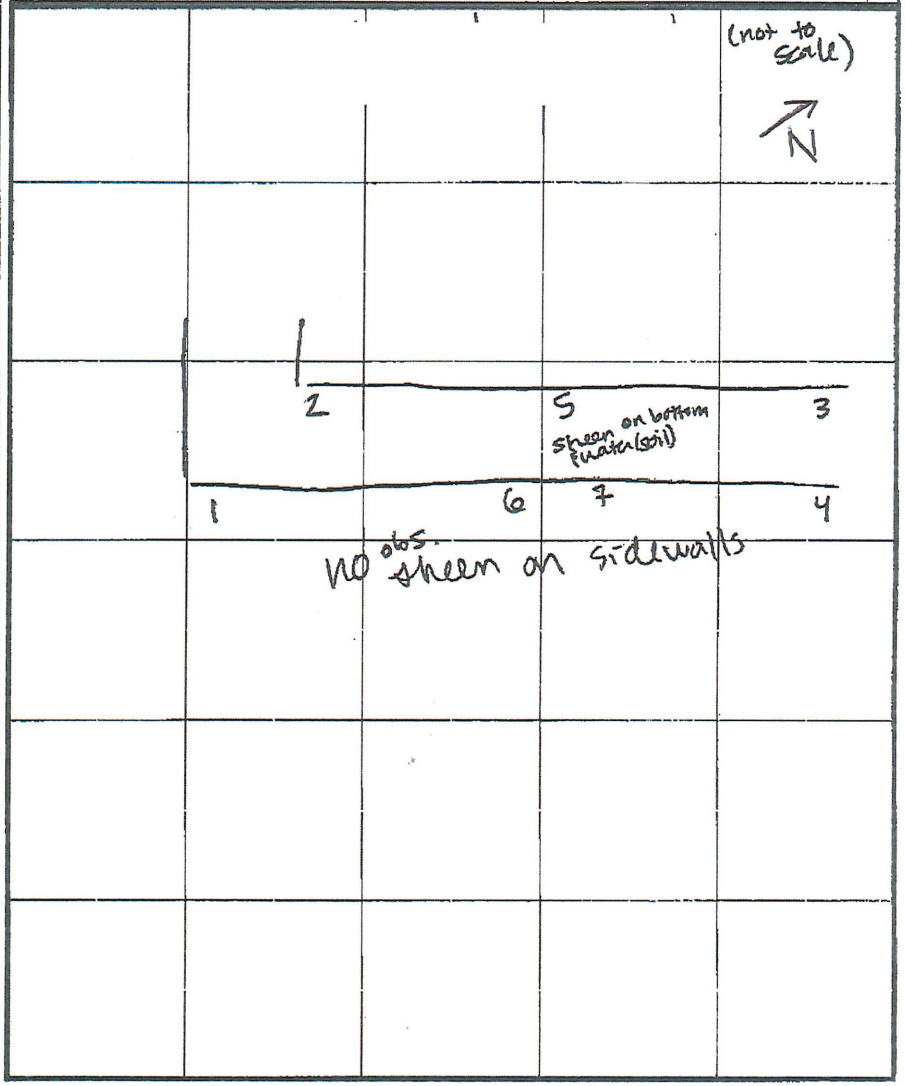
Calibration Time: 12:15

Sample Nomenclature *(Location - sample type - #):* _____

Soil Sample Types: R = *Removed Sample* ; S = *Sidewall Sample* ; B = *Bottom Sample* ; Stockpile = *Stockpile Sample*

Sample ID	Depth (FT)	Time (military)	Soil Type (USCS)	Color/ Discolor	Odor/ Sheen	Headspace Reading (ppm)
Example: Stockpile-1	4	16:30	CL	Reddish brown	Petroleum/ Rainbow	275
Sidewall-1	1	12:45	sandy gravel	brown	none/none	0.0
Sidewall-2	0.5		sandy gravel			1.1
Sidewall-3	3		sandy CL			0.5
Sidewall-4	3		sandy CL			0.2
Sidewall-5	3		sandy CL			0.5
Sidewall-6	3		sandy CL			0.5
Sidewall-7	3		sandy CL			0.3

SITE SKETCH: north is up; excavation extents & depths, impacted areas, sample locations, borings, wells, structures, utilities, natural features... 1 inch/grid = FEET



Excavation 2 - Culvert Installation Final Excavation

SITE INVESTIGATION FIELD SAMPLING AND SCREENING LOG

Location: *Milepost or Facility* Superior Terminal Pipeline Enhancement - Line 61 Road Culvert

Equipment used: PID *-ionization detector with* 11.7 *eV lamp* Background Headspace: 0.0 ppm

Sample Nomenclature *(Location - sample type - #):* _____

Soil Sample Types: **R** = *Removed Sample* ; **S** = *Sidewall Sample* ; **B** = *Bottom Sample* ; **Stockpile** = *Stockpile Sample*

Date: 11/3/14

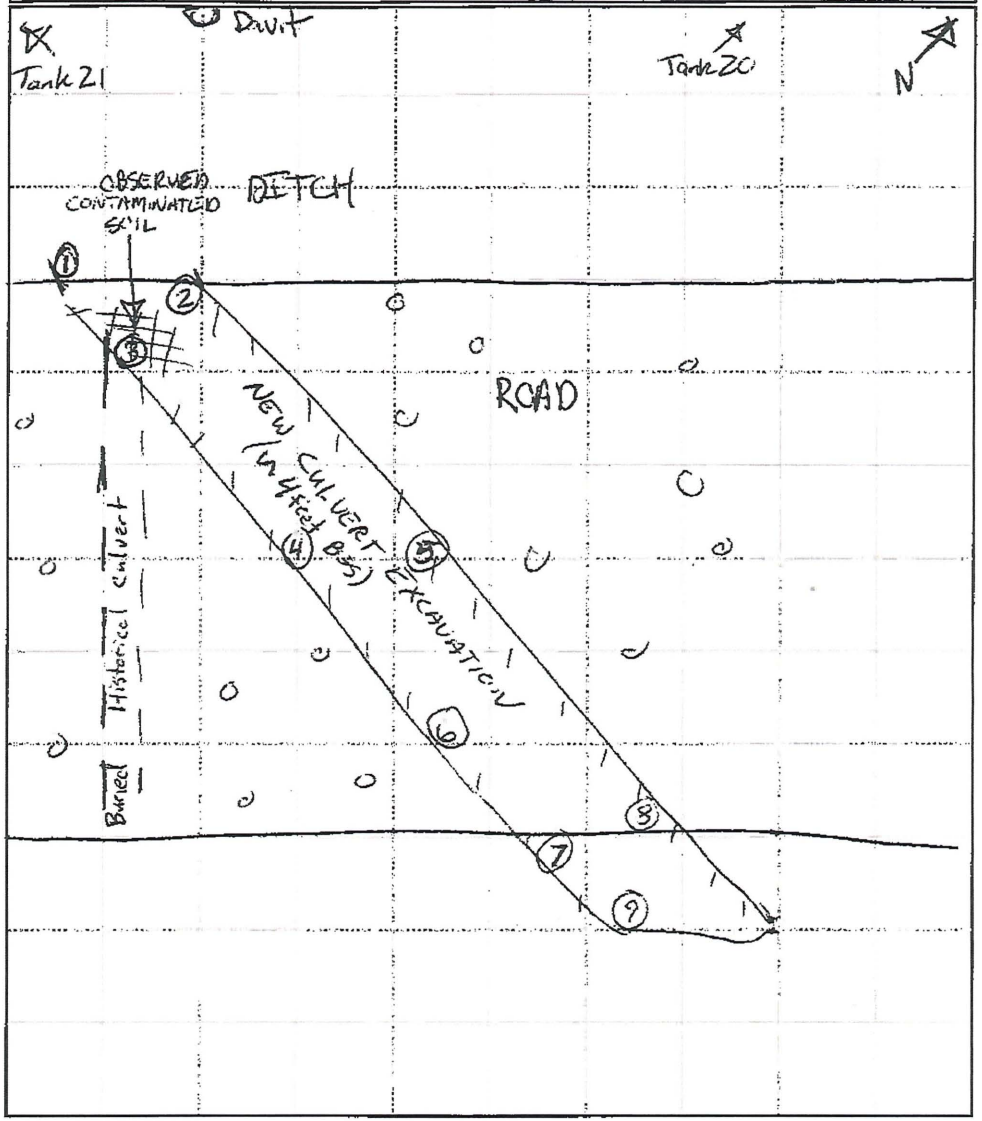
Sampler: RCE

Calibration Time: 930

BARR

Sample ID	Depth (FT)	Time (military)	Soil Type (USCS)	Color/ Discolor	Odor/ Sheen	Headspace Reading (ppm)
Example TK99-S-1	4	16:30	CL	Reddish brown	Petroleum/ Rainbow	275
S-1	2	945	CL	~~Reddish Brown~~ NC	N/N	0.0
S-2	2					0.1
S-3	2					1.4
S-4	2					0.3
S-5	2					0.0
S-6	2					0.0
S-7	2					0.0
S-8	2					0.6
S-9	2	1015				0.0

SITE SKETCH: *north is up; excavation extents & depths, impacted areas, sample locations, borings, wells, structures, utilities, natural features...* ***1 inch/grid =*** 10 ***FEET***



Excavation 2 - Culvert Removal Final Excavation

SITE INVESTIGATION FIELD SAMPLING AND SCREENING LOG

Location: *Milepost or Facility* Superior Terminal Pipeline Enhancement - Line 6 Road culvert

Equipment used: PID *-ionization detector with* 11.7 *eV lamp*

Background Headspace: 0.0 ppm

Date: 11/15/14

Sampler: REE

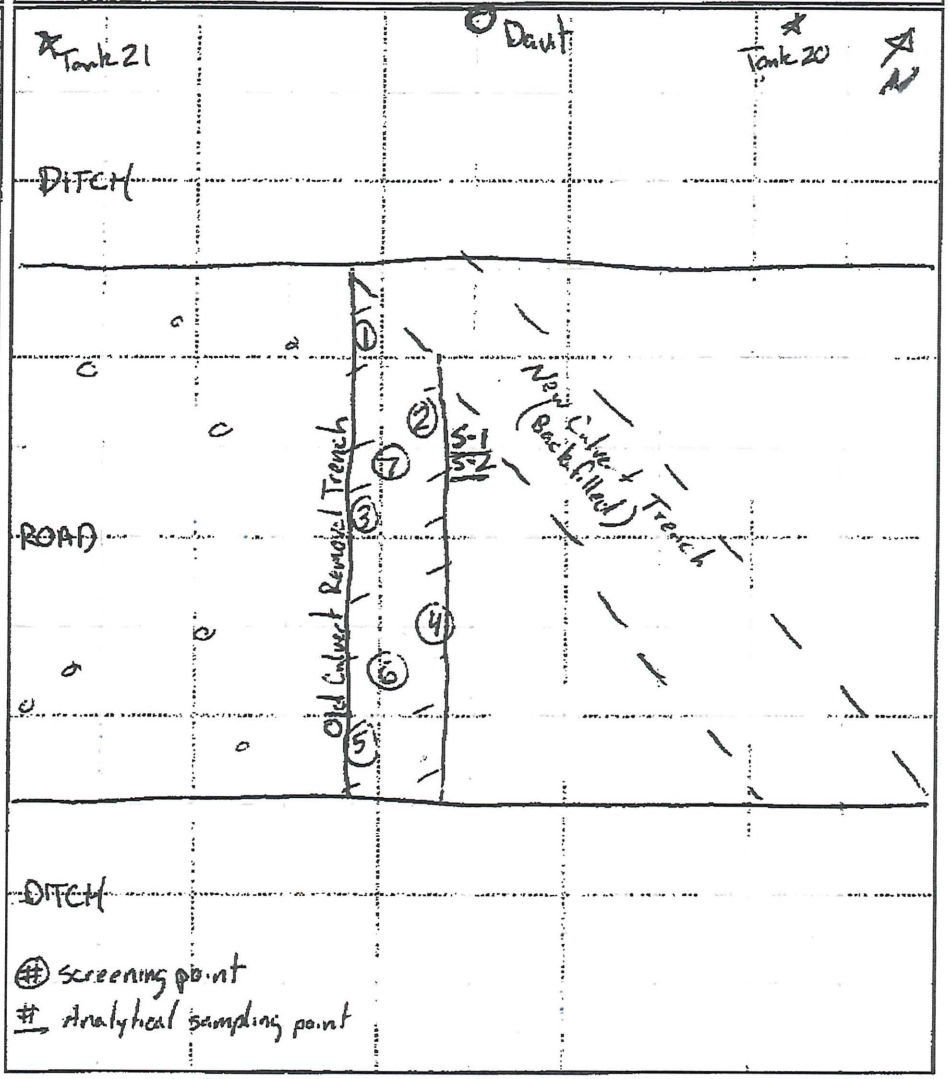
Calibration Time: 930

Sample Nomenclature *(Location - sample type - #)*: _____

Soil Sample Types: R = *Removed Sample* ; S = *Sidewall Sample* ; B = *Bottom Sample* ; **Stockpile** = *Stockpile Sample*

Sample ID	Depth (FT)	Time (military)	Soil Type (USCS)	Color/ Discolor	Odor/ Sheen	Headspace Reading (ppm)
Example: TK99-S-1	4	16:30	CL	Reddish brown	Petroleum/ Rainbow	275
S-1	2	945	CL	Reddish Brown (RB)	N/-	3.6
S-2	3	|	SP/CL	Brown/orange stain	Petroleum/	90.6
S-3	2	|	SP/CL	Brown/-	Petroleum/-	26.9
S-4	2	|	CL	RB/-	N/-	0.1
S-5	3	|	CL	RB/-	N/-	0.0
B-6	4	↓	CL	RB/-	N/-	6.0
B-7	5	1000	CL	RB/-	N/-	5.3
ANALYTICAL SAMPLES						
Culvert-S-1	2	1000	CL	RB	N/-	-
Culvert-S-2	4	1005	SP	Brown	Petroleum/-	-

SITE SKETCH: north is up; excavation extents & depths, impacted areas, sample locations, borings, wells, structures, utilities, natural features... *1 inch/grid =* 10 FEET



Excavation 3 - Final Excavation

SITE INVESTIGATION FIELD SAMPLING AND SCREENING LOG

Location: *Milepost or Facility* Enbridge Superior Terminal / Line 61 Tie-In

Equipment used: Photo -*ionization detector with* 11.7 *eV lamp* Background Headspace: 0.0 ppm

Date: 3/10/15

Sampler: Rex

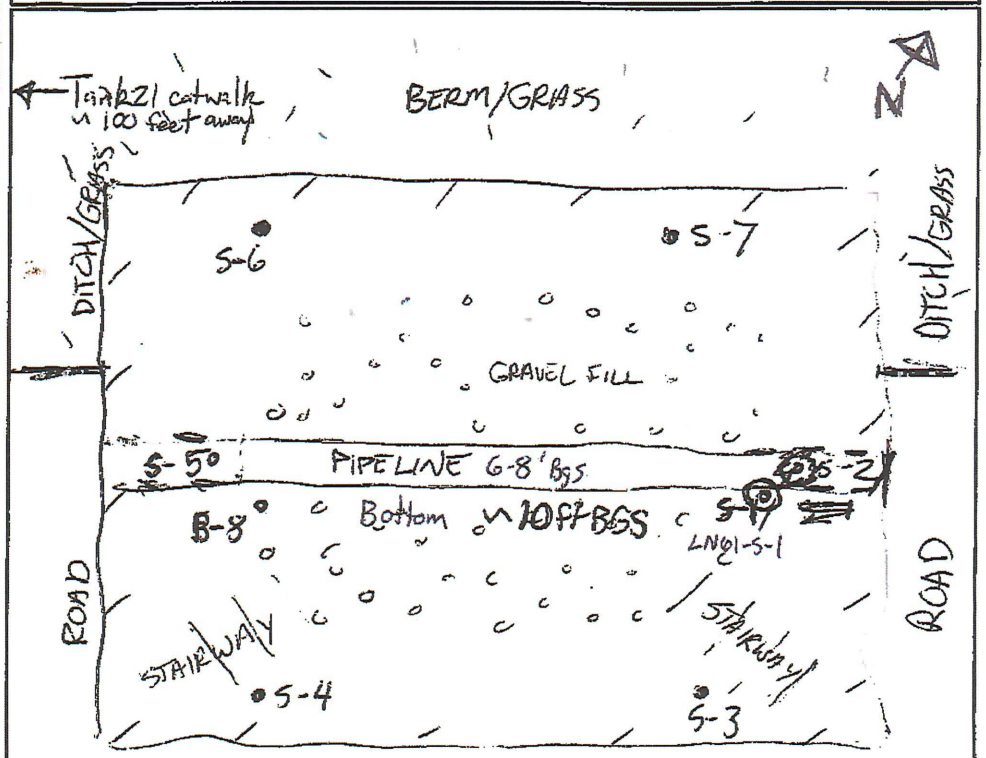
Calibration Time: 2000

Sample Nomenclature *(Location - sample type - #)*: _____

Soil Sample Types: **R** = *Removed Sample* ; **S** = *Sidewall Sample* ; **B** = *Bottom Sample* ; **Stockpile** = *Stockpile Sample*

Sample ID	Depth (FT)	Time (military)	Soil Type (USCS)	Color/ Discolor	Odor/ Sheen	Headspace Reading (ppm)
Example: TK99-S-1	4	16:30	CL	Reddish brown	Petroleum/ Rainbow	275
S-1	9	230	CL	Reddish Brown	Strong Petrol/ Product	604+
S-2	3	"	"	"	N/A	0.3
S-3	3	"	"	"	"	0.1
S-4	3	"	"	"	"	8.5
S-5	3	"	"	"	"	0.0
S-6	2	"	"	"	"	0.0
S-7	2	300	"	"	"	0.0
B-8	10	300	"	"	"	3.8
Analytical sample						
LNG1-S-1	9	300	PVOC + Naphthalene			

SITE SKETCH: north is up; excavation extents & depths, impacted areas, sample locations, borings, wells, structures, utilities, natural features... *1 inch/grid =* 10 *FEET*



● SCREENING POINT

○ ANALYTICAL SAMPLE

GRAVEL

GRASS

- Excavation contractors observed contamination within approximately 1 foot of the pipeline, trace amounts of product beneath pipeline

Excavation 4 - Final Excavation

SITE INVESTIGATION FIELD SAMPLING AND SCREENING LOG

Location: *Milepost or Facility* Valve South of Tank 21 (hydrovac excavation) Line 61

Equipment used: Photo *-ionization detector with* 11.7 *eV lamp* Background Headspace: 0.0 ppm

Date: 8-18-15

Sample Nomenclature *(Location - sample type - #):* _____

Sampler: NRS2

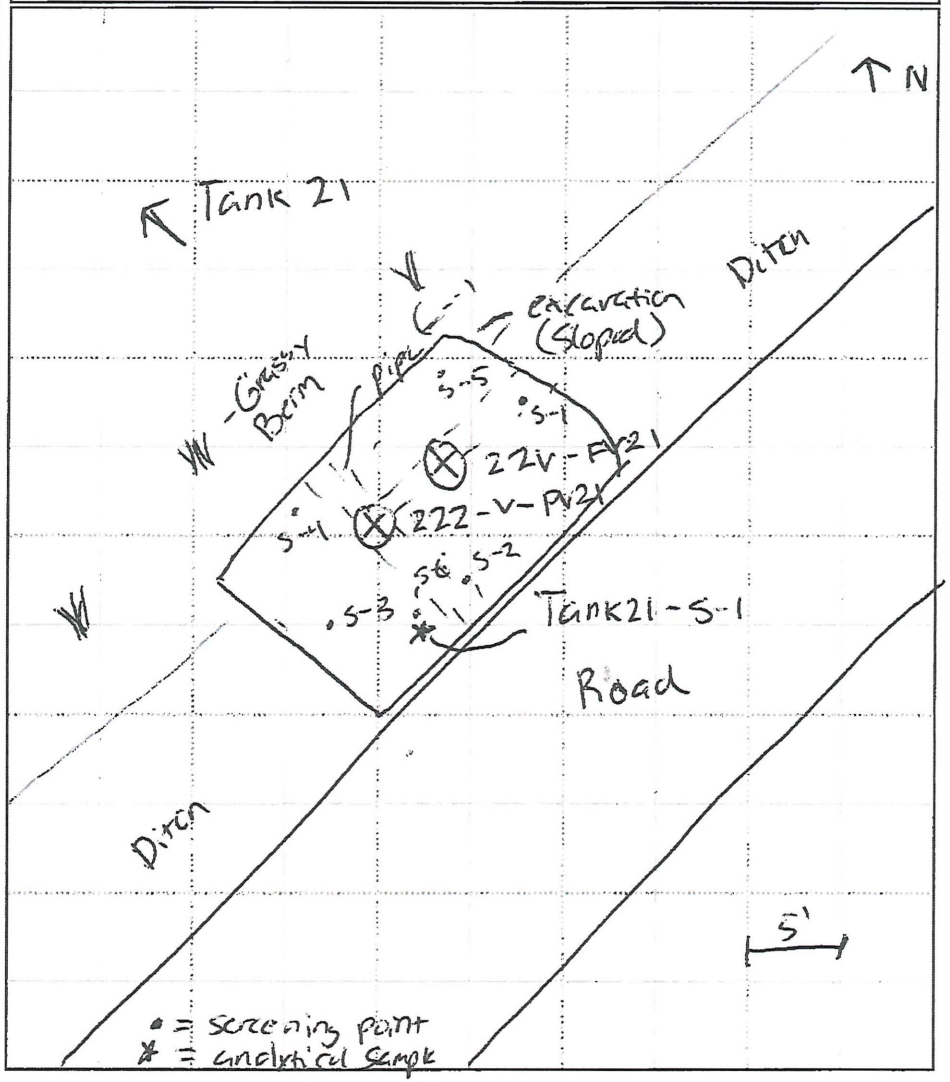
Soil Sample Types: **R** = *Removed Sample* ; **S** = *Sidewall Sample* ; **B** = *Bottom Sample* ; **Stockpile** = *Stockpile Sample*

Calibration Time: 1025

BARR

Sample ID	Depth (FT)	Time (military)	Soil Type (USCS)	Color/ Discolor	Odor/ Sheen	Headspace Reading (ppm)
Example: TK99-S-1	4	16:30	CL	Reddish brown	Petroleum/ Rainbow	275
S-1	1	1020	CL	Reddish Brown	none/none	0.0
S-2	3'	"	"	"	"	0.0
S-3	2'	"	"	"	"	0.0
S-4	1.5	"	"	"	"	0.0
S-5	2.5	"	"	"	"	0.0
S-6	4.5	"	"	"	"	0.0
Tank21-S-1	2	1030	CL	Reddish Brown	none/none	0.0

SITE SKETCH: north is up; excavation extents & depths, impacted areas, sample locations, borings, wells, structures, utilities, natural features... *1 inch/grid =* 10 *FEET*



Coordinates 46.6355762, -92.0600579

Excavation ~ 15' (NE-SW) x 10' (NW-SE) x 7' deep.

analytical sample

Attachment B

Excavation Sample Laboratory Reports

LEGEND
Technical Services, Inc.
www.legend-group.com

88 Empire Drive
St Paul, MN 55103
Tel: 651-642-1150
Fax: 651-642-1239

December 02, 2014

Mr. James E. Taraldsen
Barr Engineering Co.
4700 W 77th St
Minneapolis, MN 55435

Work Order Number: 1405248
RE: 49161286

Enclosed are the results of analyses for samples received by the laboratory on 11/18/14. If you have any questions concerning this report, please feel free to contact me.

Results are not blank corrected unless noted within the report. Additionally, all QC results meet requirements unless noted.

All samples will be retained by Legend Technical Services, Inc., unless consumed in the analysis, at ambient conditions for 30 days from the date of this report and then discarded unless other arrangements are made. All samples were received in acceptable condition unless otherwise noted.

WI Accreditation #998022410

Prepared by,
LEGEND TECHNICAL SERVICES, INC

Bach Pham
Client Manager II
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LEGEND
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88 Empire Drive
St Paul, MN 55103
Tel: 651-642-1150
Fax: 651-642-1239

Barr Engineering Co.	Project:	49161286	
4700 W 77th St	Project Number:	49161286.00 004 001	Work Order #: 1405248
Minneapolis, MN 55435	Project Manager:	Mr. James E. Taraldsen	Date Reported: 12/02/14

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Culvert-S-1_2-2	1405248-01	Soil	11/15/14 10:00	11/18/14 12:00
Culvert-S-2_4-4	1405248-02	Soil	11/15/14 10:05	11/18/14 12:00

Shipping Container Information

Default Cooler Temperature (°C): 0.7

Received on ice: Yes
Temperature blank was present
Received on ice pack: No
Received on melt water: No
Ambient: No
Acceptable (IH/ISO only): No
Custody seals: Yes

Case Narrative:

The dry weight correction and dilution applies to the sample result, MDL, and RL.

Ethylbenzene was present in the method blank between the MDL and RL for the BTEX analysis.

LEGEND Technical Services, Inc.
www.legend-group.com

88 Empire Drive
St Paul, MN 55103
Tel: 651-642-1150
Fax: 651-642-1239

Barr Engineering Co.	Project:	49161286	
4700 W 77th St	Project Number:	49161286.00 004 001	Work Order #: 1405248
Minneapolis, MN 55435	Project Manager:	Mr. James E. Taraldsen	Date Reported: 12/02/14

WI(95) GRO/8015D
Legend Technical Services, Inc.

Analyte	Result	RL	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Culvert-S-1_2-2 (1405248-01) Soil Sampled: 11/15/14 10:00 Received: 11/18/14 12:00										
1,2,4-Trimethylbenzene	**0.27**	0.031	0.0033	mg/kg dry	1	B4K1907	11/19/14	11/19/14	WI(95) GRO	
1,3,5-Trimethylbenzene	**0.29**	0.031	0.0077	mg/kg dry	1	"	"	"	"	
Benzene	<0.0036	0.031	0.0036	mg/kg dry	1	"	"	"	"	
Ethylbenzene	**0.022**	0.031	0.0079	mg/kg dry	1	"	"	"	"	B-01, J
Naphthalene	**0.29**	0.62	0.027	mg/kg dry	1	"	"	"	"	J
Toluene	<0.0051	0.031	0.0051	mg/kg dry	1	"	"	"	"	
Xylenes (total)	**0.14**	0.093	0.018	mg/kg dry	1	"	"	"	"	
Surrogate: 4-Fluorochlorobenzene	*103*			*80-150 %*		"	"	"	"	
Culvert-S-2_4-4 (1405248-02) Soil Sampled: 11/15/14 10:05 Received: 11/18/14 12:00										
1,2,4-Trimethylbenzene	**21**	0.29	0.031	mg/kg dry	10	B4K1907	11/19/14	11/19/14	WI(95) GRO	
1,3,5-Trimethylbenzene	**27**	0.29	0.072	mg/kg dry	10	"	"	"	"	
Benzene	**0.17**	0.029	0.0034	mg/kg dry	1	"	"	11/19/14	"	
Ethylbenzene	**0.55**	0.029	0.0074	mg/kg dry	1	"	"	"	"	
Naphthalene	**12**	0.58	0.025	mg/kg dry	1	"	"	"	"	
Toluene	<0.0047	0.029	0.0047	mg/kg dry	1	"	"	"	"	
Xylenes (total)	**11**	0.087	0.016	mg/kg dry	1	"	"	"	"	
Surrogate: 4-Fluorochlorobenzene	*126*			*80-150 %*		"	"	*11/19/14*	"	

LEGEND
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www.legend-group.com

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Fax: 651-642-1239

Barr Engineering Co.	Project:	49161286	
4700 W 77th St	Project Number:	49161286.00 004 001	Work Order #: 1405248
Minneapolis, MN 55435	Project Manager:	Mr. James E. Taraldsen	Date Reported: 12/02/14

PERCENT SOLIDS
Legend Technical Services, Inc.

Analyte	Result	RL	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Culvert-S-1_2-2 (1405248-01) Soil	**Sampled: 11/15/14 10:00**			**Received: 11/18/14 12:00**						
% Solids	**81**			%	1	B4K2409	11/24/14	11/24/14	% calculation	
Culvert-S-2_4-4 (1405248-02) Soil	**Sampled: 11/15/14 10:05**			**Received: 11/18/14 12:00**						
% Solids	**98**			%	1	B4K2409	11/24/14	11/24/14	% calculation	

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Fax: 651-642-1239

Barr Engineering Co.	Project:	49161286	
4700 W 77th St	Project Number:	49161286.00 004 001	Work Order #: 1405248
Minneapolis, MN 55435	Project Manager:	Mr. James E. Taraldsen	Date Reported: 12/02/14

WI(95) GRO/8015D - Quality Control
Legend Technical Services, Inc.

Analyte	Result	RL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	%RPD	%RPD Limit	Notes
Batch B4K1907 - EPA 5035 Soil (Purge and Trap)											
Blank (B4K1907-BLK1)					Prepared & Analyzed: 11/19/14						
1,2,4-Trimethylbenzene	< 0.0027	0.025	0.0027	mg/kg wet							
1,3,5-Trimethylbenzene	< 0.0062	0.025	0.0062	mg/kg wet							
Benzene	< 0.0029	0.025	0.0029	mg/kg wet							
Ethylbenzene	0.0102	0.025	0.0064	mg/kg wet							B-02, J
Naphthalene	< 0.022	0.50	0.022	mg/kg wet							
Toluene	< 0.0041	0.025	0.0041	mg/kg wet							
Xylenes (total)	< 0.014	0.075	0.014	mg/kg wet							
Surrogate: 4-Fluorochlorobenzene	*23.7*			*ug/L*	*25.0*		*95.0*	*80-150*			
LCS (B4K1907-BS1)					Prepared & Analyzed: 11/19/14						
1,2,4-Trimethylbenzene	94.0			ug/L	100		94.0	80-120			
1,3,5-Trimethylbenzene	91.0			ug/L	100		91.0	80-120			
Benzene	98.9			ug/L	100		98.9	80-120			
Ethylbenzene	99.4			ug/L	100		99.4	80-120			
Naphthalene	99.6			ug/L	100		99.6	80-120			
Toluene	99.7			ug/L	100		99.7	80-120			
Xylenes (total)	301			ug/L	300		100	80-120			
Surrogate: 4-Fluorochlorobenzene	*24.0*			*ug/L*	*25.0*		*96.0*	*80-150*			
LCS Dup (B4K1907-BSD1)					Prepared: 11/19/14 Analyzed: 11/20/14						
1,2,4-Trimethylbenzene	96.0			ug/L	100		96.0	80-120	2.04	20	
1,3,5-Trimethylbenzene	90.8			ug/L	100		90.8	80-120	0.231	20	
Benzene	98.4			ug/L	100		98.4	80-120	0.564	20	
Ethylbenzene	97.1			ug/L	100		97.1	80-120	2.29	20	
Naphthalene	99.9			ug/L	100		99.9	80-120	0.301	20	
Toluene	98.5			ug/L	100		98.5	80-120	1.25	20	
Xylenes (total)	294			ug/L	300		97.9	80-120	2.34	20	
Surrogate: 4-Fluorochlorobenzene	*24.2*			*ug/L*	*25.0*		*96.6*	*80-150*			
Matrix Spike (B4K1907-MS1)	**Source: 1405248-01**				Prepared: 11/19/14 Analyzed: 11/20/14						
1,2,4-Trimethylbenzene	117			ug/L	100	4.44	112	80-120			
1,3,5-Trimethylbenzene	111			ug/L	100	4.67	106	80-120			
Benzene	97.8			ug/L	100	<	97.8	80-120			
Ethylbenzene	98.2			ug/L	100	0.359	97.8	80-120			
Naphthalene	121			ug/L	100	4.77	116	80-120			
Toluene	96.3			ug/L	100	<	96.3	80-120			
Xylenes (total)	299			ug/L	300	2.26	99.0	80-120			
Surrogate: 4-Fluorochlorobenzene	*23.9*			*ug/L*	*25.0*		*95.8*	*80-150*			

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Barr Engineering Co.	Project:	49161286	
4700 W 77th St	Project Number:	49161286.00 004 001	Work Order #: 1405248
Minneapolis, MN 55435	Project Manager:	Mr. James E. Taraldsen	Date Reported: 12/02/14

PERCENT SOLIDS - Quality Control
Legend Technical Services, Inc.

Analyte	Result	RL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	%RPD	%RPD Limit	Notes
Batch B4K2409 - General Preparation											
Duplicate (B4K2409-DUP1)		**Source: 1405285-01**			Prepared & Analyzed: 11/24/14						
% Solids	63.0			%		64.0			1.57	20	
Duplicate (B4K2409-DUP2)		**Source: 1405298-04**			Prepared & Analyzed: 11/24/14						
% Solids	79.0			%		78.0			1.27	20	

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Barr Engineering Co.	Project:	49161286	
4700 W 77th St	Project Number:	49161286.00 004 001	Work Order #: 1405248
Minneapolis, MN 55435	Project Manager:	Mr. James E. Taraldsen	Date Reported: 12/02/14

Notes and Definitions

J	Parameter was present between the MDL and RL and should be considered an estimated value
B-02	Target analyte was present in the method blank between the MDL and RL.
B-01	Analyte was present in the method blank. Sample result is less than or equal to 10 times the blank concentration.
<	Less than value listed
dry	Sample results reported on a dry weight basis
NA	Not applicable. The %RPD is not calculated from values less than the reporting limit.
MDL	Method Detection Limit
RL	Reporting Limit
RPD	Relative Percent Difference
LCS	Laboratory Control Spike = Blank Spike (BS) = Laboratory Fortified Blank (LFB)
MS	Matrix Spike = Laboratory Fortified Matrix (LFM)

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March 19, 2015

Mr. James E. Taraldsen
Barr Engineering Co.
4700 W 77th St
Minneapolis, MN 55435

Work Order Number: 1500873
RE: 49161286

Enclosed are the results of analyses for samples received by the laboratory on 03/11/15. If you have any questions concerning this report, please feel free to contact me.

Results are not blank corrected unless noted within the report. Additionally, all QC results meet requirements unless noted.

All samples will be retained by Legend Technical Services, Inc., unless consumed in the analysis, at ambient conditions for 30 days from the date of this report and then discarded unless other arrangements are made. All samples were received in acceptable condition unless otherwise noted.

WI Accreditation #998022410

Prepared by,
LEGEND TECHNICAL SERVICES, INC

Bach Pham
Client Manager II
bpham@legend-group.com

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Barr Engineering Co.	Project: 49161286	
4700 W 77th St	Project Number: 49161286	Work Order #: 1500873
Minneapolis, MN 55435	Project Manager: Mr. James E. Taraldsen	Date Reported: 03/19/15

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
LN61-S-1_9-9	1500873-01	Soil	03/10/15 15:00	03/11/15 09:35

Shipping Container Information

Default Cooler Temperature (°C): 3.2

Received on ice: Yes
Temperature blank was present
Received on ice pack: No
Received on melt water: No
Ambient: No
Acceptable (IH/ISO only): No
Custody seals: No

Case Narrative:

The dry weight correction and dilution applies to the sample result, MDL, and RL.

Ethylbenzene was present in the method blank between the MDL and RL for the BTEX analysis.

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Barr Engineering Co.	Project:	49161286	
4700 W 77th St	Project Number:	49161286	Work Order #: 1500873
Minneapolis, MN 55435	Project Manager:	Mr. James E. Taraldsen	Date Reported: 03/19/15

WI(95) GRO/8015D
Legend Technical Services, Inc.

Analyte	Result	RL	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
LN61-S-1_9-9 (1500873-01) Soil	**Sampled: 03/10/15 15:00**		**Received: 03/11/15 9:35**							
1,2,4-Trimethylbenzene	**5.3**	0.037	0.0040	mg/kg dry	1	B5C1103	03/11/15	03/11/15	WI(95) GRO	
1,3,5-Trimethylbenzene	**3.4**	0.037	0.0091	mg/kg dry	1	"	"	"	"	
Benzene	**3.0**	0.037	0.0043	mg/kg dry	1	"	"	"	"	
Ethylbenzene	**1.1**	0.037	0.0094	mg/kg dry	1	"	"	"	"	
Naphthalene	**3.1**	0.74	0.032	mg/kg dry	1	"	"	"	"	
Toluene	**0.31**	0.037	0.0060	mg/kg dry	1	"	"	"	"	
Xylenes (total)	**15**	0.11	0.021	mg/kg dry	1	"	"	"	"	
Surrogate: 4-Fluorochlorobenzene	*116*			*80-150 %*		"	"	"	"	

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Barr Engineering Co.	Project: 49161286	
4700 W 77th St	Project Number: 49161286	Work Order #: 1500873
Minneapolis, MN 55435	Project Manager: Mr. James E. Taraldsen	Date Reported: 03/19/15

PERCENT SOLIDS
Legend Technical Services, Inc.

Analyte	Result	RL	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
LN61-S-1_9-9 (1500873-01) Soil	**Sampled: 03/10/15 15:00**		**Received: 03/11/15 9:35**							
% Solids	**68**			%	1	B5C1206	03/12/15	03/12/15	% calculation	

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Barr Engineering Co.	Project: 49161286	
4700 W 77th St	Project Number: 49161286	Work Order #: 1500873
Minneapolis, MN 55435	Project Manager: Mr. James E. Taraldsen	Date Reported: 03/19/15

WI(95) GRO/8015D - Quality Control
Legend Technical Services, Inc.

Analyte	Result	RL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	%RPD	%RPD Limit	Notes
Batch B5C1103 - EPA 5035 Soil (Purge and Trap)											
Blank (B5C1103-BLK1)					Prepared & Analyzed: 03/11/15						
1,2,4-Trimethylbenzene	< 0.0027	0.025	0.0027	mg/kg wet							
1,3,5-Trimethylbenzene	< 0.0062	0.025	0.0062	mg/kg wet							
Benzene	< 0.0029	0.025	0.0029	mg/kg wet							
Ethylbenzene	0.0169	0.025	0.0064	mg/kg wet							B-02, J
Naphthalene	< 0.022	0.50	0.022	mg/kg wet							
Toluene	< 0.0041	0.025	0.0041	mg/kg wet							
Xylenes (total)	< 0.014	0.075	0.014	mg/kg wet							
Surrogate: 4-Fluorochlorobenzene	*22.9*			*ug/L*	*25.0*		*91.8*	*80-150*			
LCS (B5C1103-BS1)					Prepared & Analyzed: 03/11/15						
1,2,4-Trimethylbenzene	95.7			ug/L	100		95.7	80-120			
1,3,5-Trimethylbenzene	95.2			ug/L	100		95.2	80-120			
Benzene	96.1			ug/L	100		96.1	80-120			
Ethylbenzene	100			ug/L	100		100	80-120			
Naphthalene	84.9			ug/L	100		84.9	80-120			
Toluene	98.2			ug/L	100		98.2	80-120			
Xylenes (total)	295			ug/L	300		98.4	80-120			
Surrogate: 4-Fluorochlorobenzene	*25.7*			*ug/L*	*25.0*		*103*	*80-150*			
LCS Dup (B5C1103-BSD1)					Prepared & Analyzed: 03/11/15						
1,2,4-Trimethylbenzene	99.2			ug/L	100		99.2	80-120	3.60	20	
1,3,5-Trimethylbenzene	98.8			ug/L	100		98.8	80-120	3.72	20	
Benzene	103			ug/L	100		103	80-120	6.91	20	
Ethylbenzene	106			ug/L	100		106	80-120	5.63	20	
Naphthalene	85.5			ug/L	100		85.5	80-120	0.721	20	
Toluene	105			ug/L	100		105	80-120	6.91	20	
Xylenes (total)	319			ug/L	300		106	80-120	7.79	20	
Surrogate: 4-Fluorochlorobenzene	*25.1*			*ug/L*	*25.0*		*100*	*80-150*			
Matrix Spike (B5C1103-MS1)	**Source: 1500848-01**				Prepared & Analyzed: 03/11/15						
1,2,4-Trimethylbenzene	98.8			ug/L	100	0.924	97.8	80-120			
1,3,5-Trimethylbenzene	93.5			ug/L	100	<	93.5	80-120			
Benzene	94.2			ug/L	100	<	94.2	80-120			
Ethylbenzene	98.9			ug/L	100	0.611	98.3	80-120			
Naphthalene	96.3			ug/L	100	0.149	96.1	80-120			
Toluene	97.1			ug/L	100	<	97.1	80-120			
Xylenes (total)	294			ug/L	300	0.612	97.8	80-120			
Surrogate: 4-Fluorochlorobenzene	*25.2*			*ug/L*	*25.0*		*101*	*80-150*			

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Barr Engineering Co.	Project:	49161286	
4700 W 77th St	Project Number:	49161286	Work Order #: 1500873
Minneapolis, MN 55435	Project Manager:	Mr. James E. Taraldsen	Date Reported: 03/19/15

PERCENT SOLIDS - Quality Control
Legend Technical Services, Inc.

Analyte	Result	RL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	%RPD	%RPD Limit	Notes
Batch B5C1206 - General Preparation											
Duplicate (B5C1206-DUP1)		**Source: 1500880-01**			Prepared & Analyzed: 03/12/15						
% Solids	77.0			%		75.0			2.63	20	

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Barr Engineering Co.	Project:	49161286	
4700 W 77th St	Project Number:	49161286	Work Order #: 1500873
Minneapolis, MN 55435	Project Manager:	Mr. James E. Taraldsen	Date Reported: 03/19/15

Notes and Definitions

J	Parameter was present between the MDL and RL and should be considered an estimated value
B-02	Target analyte was present in the method blank between the MDL and RL.
<	Less than value listed
dry	Sample results reported on a dry weight basis
NA	Not applicable. The %RPD is not calculated from values less than the reporting limit.
MDL	Method Detection Limit
RL	Reporting Limit
RPD	Relative Percent Difference
LCS	Laboratory Control Spike = Blank Spike (BS) = Laboratory Fortified Blank (LFB)
MS	Matrix Spike = Laboratory Fortified Matrix (LFM)

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BARR

Chain of Custody

4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

1500873

Project Number: 49161286

Project Name: Enbridge Pipeline Enhancement - Line 61 TierIA

Sample Origination State: WI (use two letter postal state abbreviation)

COC Number: № 44764

Number of Containers/Preservative

COC 1 of 1

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Type: Grab	Type: Comp.	Type: QC	Water: VOCs - HCl #1	Water: SVOC - Unpreserved #2	Water: Dissolved Metals - HNO3 #3	Water: Total Metals - HNO3 #3	Water: General - Unpreserved #3	Water: Diesel Range Organics (DRO) - H2SO4 #4	Water: Nutrients (TP) - H2SO4 #4	Soil: VOCs - Cored MeOH #1	Soil: GRO, BTEX, Stored MeOH #1	Soil: DRO - Iced, unpreserved	Soil: Metals - Unpreserved	Soil: SVOC - Unpreserved #2	Soil: 4 oz. Soils - plastic seal, unpres.	Total Number Of Containers	Project Manager: REE Project QC Contact: JET Sampled by: REE Laboratory: Legend
1. LN61-S-1	9	9	FT	03/10/2015	1500		X	X															11	2	PAC + NAPHTHALENE - 8021 MOD.
2.																									
3.																									STANDARD TAT
4.																									
5.																									
6.																									
7.																									
8.																									
9.																									
10.																									

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
	Y	3/10/15	1615			
Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
	Y				3/11/15	925

Samples Shipped VIA: ☐ Air Freight ☒ Federal Express ☐ Sampler ☐ Other

Air Bill Numbers: 3 1 2

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

H:\RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09\01\08

25-Aug-2015

Ryan Erickson
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

Re: **Enbridge - Tank 21 (49161253.30)** Work Order: **15081087**

Dear Ryan,

ALS Environmental received 2 samples on 20-Aug-2015 for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Sample results are compliant with NELAP standard requirements and QC results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 12.

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

Sincerely,

Electronically approved by: Tom Beamish

Tom Beamish
Client Services Coordinator

Certificate No: WI: 399084510

Report of Laboratory Analysis

ALS Group USA, Corp

Date: 25-Aug-15

Client: Barr Engineering Company
Project: Enbridge - Tank 21 (49161253.30)
Work Order: **15081087**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
15081087-01	Tank 21-S-1	Soil		08/18/15 10:30	08/20/15 09:00	☐
15081087-02	Trip Blank	Soil		08/18/15	08/20/15 09:00	☐

ALS Group USA, Corp

Date: 25-Aug-15

Client: Barr Engineering Company
Project: Enbridge - Tank 21 (49161253.30)
WorkOrder: **15081087**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and PQL, sample results may exhibit background or reagent contamination at the observed level.

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
% of sample	Percent of Sample
µg/Kg	Micrograms per Kilogram
µg/Kg-dry	Micrograms per Kilogram Dry Weight

ALS Group USA, Corp

Date: 25-Aug-15

Client:	Barr Engineering Company
Project:	Enbridge - Tank 21 (49161253.30)
Work Order:	15081087

Case Narrative

Samples for the above noted Work Order were received on 08/20/15. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

With the following exceptions, all sample analyses achieved analytical criteria.

Volatile Organics:
No deviations or anomalies were noted.

Wet Chemistry:
No deviations or anomalies were noted.

ALS Group USA, Corp

Date: *25-Aug-15*

Client: Barr Engineering Company
Project: Enbridge - Tank 21 (49161253.30)
Sample ID: Tank 21-S-1
Collection Date: 08/18/15 10:30 AM

Work Order: 15081087
Lab ID: 15081087-01
Matrix: SOIL

Analyses	Result	Qual	MDL	PQL	Units	Dilution Factor	Date Analyzed
VOLATILE ORGANIC COMPOUNDS		Method: **SW8260B**			Prep: SW5035 / 8/20/15		Analyst: **AK**
1,2,4-Trimethylbenzene	ND		14	37	µg/Kg-dry	1	08/22/15 06:59
1,3,5-Trimethylbenzene	ND		15	37	µg/Kg-dry	1	08/22/15 06:59
Benzene	ND		15	37	µg/Kg-dry	1	08/22/15 06:59
Ethylbenzene	ND		14	37	µg/Kg-dry	1	08/22/15 06:59
m,p-Xylene	ND		28	74	µg/Kg-dry	1	08/22/15 06:59
Naphthalene	ND		16	120	µg/Kg-dry	1	08/22/15 06:59
o-Xylene	ND		16	37	µg/Kg-dry	1	08/22/15 06:59
Toluene	ND		14	37	µg/Kg-dry	1	08/22/15 06:59
Xylenes, Total	ND		43	110	µg/Kg-dry	1	08/22/15 06:59
Surr: 1,2-Dichloroethane-d4	*97.7*			*70-130*	*%REC*	1	08/22/15 06:59
Surr: 4-Bromofluorobenzene	*96.6*			*70-130*	*%REC*	1	08/22/15 06:59
Surr: Dibromofluoromethane	*97.7*			*70-130*	*%REC*	1	08/22/15 06:59
Surr: Toluene-d8	*98.3*			*70-130*	*%REC*	1	08/22/15 06:59
MOISTURE		Method: **E160.3M**					Analyst: **EVB**
Moisture	**19**		**0.025**	**0.050**	**% of sample**	1	08/21/15 14:45

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: *25-Aug-15*

Client: Barr Engineering Company
Project: Enbridge - Tank 21 (49161253.30)
Sample ID: Trip Blank
Collection Date: 08/18/15

Work Order: 15081087
Lab ID: 15081087-02
Matrix: SOIL

Analyses	Result	Qual	MDL	PQL	Units	Dilution Factor	Date Analyzed
VOLATILE ORGANIC COMPOUNDS		Method: **SW8260B**			Prep: SW5035 / 8/20/15		Analyst: **AK**
1,2,4-Trimethylbenzene	ND		11	30	µg/Kg	1	08/22/15 07:23
1,3,5-Trimethylbenzene	ND		12	30	µg/Kg	1	08/22/15 07:23
Benzene	ND		12	30	µg/Kg	1	08/22/15 07:23
Ethylbenzene	ND		11	30	µg/Kg	1	08/22/15 07:23
m,p-Xylene	ND		23	60	µg/Kg	1	08/22/15 07:23
Naphthalene	ND		13	100	µg/Kg	1	08/22/15 07:23
o-Xylene	ND		13	30	µg/Kg	1	08/22/15 07:23
Toluene	ND		11	30	µg/Kg	1	08/22/15 07:23
Xylenes, Total	ND		35	90	µg/Kg	1	08/22/15 07:23
Surr: 1,2-Dichloroethane-d4	*95.4*			*70-130*	*%REC*	1	08/22/15 07:23
Surr: 4-Bromofluorobenzene	*108*			*70-130*	*%REC*	1	08/22/15 07:23
Surr: Dibromofluoromethane	*96.6*			*70-130*	*%REC*	1	08/22/15 07:23
Surr: Toluene-d8	*99.8*			*70-130*	*%REC*	1	08/22/15 07:23

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: 25-Aug-15

Client: Barr Engineering Company

Work Order: 15081087

Project: Enbridge - Tank 21 (49161253.30)

QC BATCH REPORT

Batch ID: **75058** Instrument ID **VMS9** Method: **SW8260B**

MBLK Sample ID: **MBLK-75058-75058** Units: **µg/Kg** Analysis Date: **08/20/15 04:43 PM**

Client ID: Run ID: **VMS9_150820A** SeqNo: **3426777** Prep Date: **08/20/15** DF: **1**

Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,2,4-Trimethylbenzene	ND	11	30								
1,3,5-Trimethylbenzene	ND	12	30								
Benzene	ND	12	30								
Ethylbenzene	ND	11	30								
m,p-Xylene	ND	23	60								
Naphthalene	ND	13	100								
o-Xylene	ND	13	30								
Toluene	ND	11	30								
Xylenes, Total	ND	35	90								
Surr: 1,2-Dichloroethane-d4	*933*	0	0	*1000*	0	*93.3*	*70-130*	0			
Surr: 4-Bromofluorobenzene	*914.5*	0	0	*1000*	0	*91.4*	*70-130*	0			
Surr: Dibromofluoromethane	*907.5*	0	0	*1000*	0	*90.8*	*70-130*	0			
Surr: Toluene-d8	*975.5*	0	0	*1000*	0	*97.6*	*70-130*	0			

LCS Sample ID: **LCS-75058-75058** Units: **µg/Kg** Analysis Date: **08/20/15 03:01 PM**

Client ID: Run ID: **VMS9_150820A** SeqNo: **3426775** Prep Date: **08/20/15** DF: **1**

Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,2,4-Trimethylbenzene	1029	11	30	1000	0	103	65-135	0			
1,3,5-Trimethylbenzene	1072	12	30	1000	0	107	65-135	0			
Benzene	993.5	12	30	1000	0	99.4	75-125	0			
Ethylbenzene	992	11	30	1000	0	99.2	75-125	0			
m,p-Xylene	2036	23	60	2000	0	102	80-125	0			
Naphthalene	962	13	100	1000	0	96.2	40-140	0			
o-Xylene	992.5	13	30	1000	0	99.2	75-125	0			
Toluene	1016	11	30	1000	0	102	70-125	0			
Xylenes, Total	3029	35	90	3000	0	101	75-125	0			
Surr: 1,2-Dichloroethane-d4	*924*	0	0	*1000*	0	*92.4*	*70-130*	0			
Surr: 4-Bromofluorobenzene	*1059*	0	0	*1000*	0	*106*	*70-130*	0			
Surr: Dibromofluoromethane	*917.5*	0	0	*1000*	0	*91.8*	*70-130*	0			
Surr: Toluene-d8	*1010*	0	0	*1000*	0	*101*	*70-130*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 15081087
Project: Enbridge - Tank 21 (49161253.30)

QC BATCH REPORT

Batch ID: **75058** Instrument ID **VMS9** Method: **SW8260B**

MS Sample ID: **15081076-09A MS** Units: **µg/Kg** Analysis Date: **08/25/15 12:06 PM**
Client ID: Run ID: **VMS9_150824A** SeqNo: **3430710** Prep Date: **08/20/15** DF: **1**

Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,2,4-Trimethylbenzene	1180	25	34	1132	0	104	65-135	0			
1,3,5-Trimethylbenzene	1180	14	34	1132	0	104	65-135	0			
Benzene	1145	14	34	1132	0	101	75-125	0			
Ethylbenzene	1175	13	34	1132	0	104	75-125	0			
m,p-Xylene	2299	26	68	2264	0	102	80-125	0			
Naphthalene	1064	15	110	1132	0	94	40-140	0			
o-Xylene	1121	14	34	1132	0	99	75-125	0			
Toluene	1146	13	34	1132	0	101	70-125	0			
Xylenes, Total	3420	40	100	3397	0	101	75-125	0			
Surr: 1,2-Dichloroethane-d4	*1104*	0	0	*1132*	0	*97.5*	*70-130*	0			
Surr: 4-Bromofluorobenzene	*1213*	0	0	*1132*	0	*107*	*70-130*	0			
Surr: Dibromofluoromethane	*1082*	0	0	*1132*	0	*95.6*	*70-130*	0			
Surr: Toluene-d8	*1151*	0	0	*1132*	0	*102*	*70-130*	0			

MSD Sample ID: **15081076-09A MSD** Units: **µg/Kg** Analysis Date: **08/25/15 12:32 PM**
Client ID: Run ID: **VMS9_150824A** SeqNo: **3430711** Prep Date: **08/20/15** DF: **1**

Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,2,4-Trimethylbenzene	1138	25	34	1132	0	101	65-135	1180	3.61	30	
1,3,5-Trimethylbenzene	1166	14	34	1132	0	103	65-135	1180	1.16	30	
Benzene	1094	14	34	1132	0	96.6	75-125	1145	4.5	30	
Ethylbenzene	1115	13	34	1132	0	98.5	75-125	1175	5.19	30	
m,p-Xylene	2265	26	68	2264	0	100	80-125	2299	1.51	30	
Naphthalene	1027	15	110	1132	0	90.7	40-140	1064	3.57	30	
o-Xylene	1094	14	34	1132	0	96.6	75-125	1121	2.4	30	
Toluene	1132	13	34	1132	0	100	70-125	1146	1.19	30	
Xylenes, Total	3359	40	100	3397	0	98.9	75-125	3420	1.8	30	
Surr: 1,2-Dichloroethane-d4	*1104*	0	0	*1132*	0	*97.6*	*70-130*	1104	*0.0513*	*30*	
Surr: 4-Bromofluorobenzene	*1201*	0	0	*1132*	0	*106*	*70-130*	1213	*0.985*	*30*	
Surr: Dibromofluoromethane	*1097*	0	0	*1132*	0	*96.8*	*70-130*	1082	*1.3*	*30*	
Surr: Toluene-d8	*1157*	0	0	*1132*	0	*102*	*70-130*	1151	*0.491*	*30*	

The following samples were analyzed in this batch: 15081087-01A 15081087-02A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Barr Engineering Company
Work Order: 15081087
Project: Enbridge - Tank 21 (49161253.30)

QC BATCH REPORT

Batch ID: **R170180** Instrument ID **MOIST** Method: **E160.3M**

MBLK Sample ID: **WBLKS-R170180** Units: **% of sample** Analysis Date: **08/21/15 02:45 PM**
Client ID: Run ID: **MOIST_150821A** SeqNo: **3428821** Prep Date: DF: **1**

Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	ND	0.025	0.050								

LCS Sample ID: **LCS-R170180** Units: **% of sample** Analysis Date: **08/21/15 02:45 PM**
Client ID: Run ID: **MOIST_150821A** SeqNo: **3428820** Prep Date: DF: **1**

Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	100	0.025	0.050	100	0	100	99.5-100.5	0			

DUP Sample ID: **15081099-01B DUP** Units: **% of sample** Analysis Date: **08/21/15 02:45 PM**
Client ID: Run ID: **MOIST_150821A** SeqNo: **3428807** Prep Date: DF: **1**

Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	6.58	0.025	0.050	0	0	0		6.17	6.43	20	

DUP Sample ID: **15081123-01A DUP** Units: **% of sample** Analysis Date: **08/21/15 02:45 PM**
Client ID: Run ID: **MOIST_150821A** SeqNo: **3428814** Prep Date: DF: **1**

Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	7.1	0.025	0.050	0	0	0		7.08	0.282	20	

The following samples were analyzed in this batch: 15081087-01B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

1508108 1

Chain of Custody

BARR
4700 West 77th Street
Minneapolis, MN 55435-4803
(952) 832-2600

COC 1 of 1

Project Number: 49161253.30 001 001

Project Name: Enbridge - Tank 21

Sample Origination State WI (use two letter postal state abbreviation)

COC Number: № 44725

Project Manager: REE

Project QC Contact: JET

Sampled by: NRS2

Laboratory: ALS Holland

Location	Start Depth	Stop Depth	Depth Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix: Water	Matrix: Soil	Matrix:	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative: Water: VOCs (HCl) #1	SVOCs (unpreserved) #2	Dissolved Metals (HNO_3)	Total Metals (HNO_3)	General (unpreserved) #3	Diesel Range Organics (HCl)	Nutrients (H_2SO_4) #4				Soil: VOCs (tared MeOH) #1	GRO, BTEX (tared MeOH) #1	DRO (tared unpreserved)	Metals (unpreserved)	SVOCs (unpreserved) #2	% Solids (plastic vial, unpres.)	PVOC - MTBE + naphthalene	Total Number Of Containers	
1. Tank 21 S1	—	—	2'	08/18/15	1030		X		X																	1	2	3	PVOC - MTBE + naphthalene
2. Trip Blank	—	—	—	—	—						X																1		
3. Temp Blank	—	—	—	—	—						X																		
4.																													
5.																													Standard TAT
6.																													
7.																													
8.																													
9.																													
10.																													

Common Parameter/Container - Preservation Key

#1 - Volatile Organics = BTEX, GRO, TPH, 8260 Full List
#2 - Semivolatile Organics = PAHs, PCP, Dioxins, 8270 Full List, Herbicide/Pesticide/PCBs
#3 - General = pH, Chloride, Fluoride, Alkalinity, TSS, TDS, TS, Sulfate
#4 - Nutrients = COD, TOC, Phenols, Ammonia Nitrogen, TKN

Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
[signature]	(Y) N	8/18/15	16:30			
Relinquished By:	On Ice?	Date	Time	Received by:	Date	Time
	Y (N)			[signature] Leonard	8/20/15	9:00

Samples Shipped VIA: ☐ Air Freight ☑ Federal Express ☐ Sampler ☐ Other: _____

Air Bill Number:

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy; Pink - Lab Coordinator

12°C

H:\RLG\STDFORMS\Chain Of Custody Form 2009 RLG Rev. 09\01\09

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

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ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **BARRENG-MN** Date/Time Received: **20-Aug-15 09:00**

Work Order: **15081087** Received by: **NML**

Checklist completed by Diane Shaw (eSignature) 20-Aug-15 (Date) Reviewed by: Tom Bramish (eSignature) 20-Aug-15 (Date)

Matrices: Soil
Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	1.2/1.2 c	SR2	
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	8/20/2015 1:36:45 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction: