

From: [Nick Larabel](#)
To: [Sager, John E - DNR](#)
Subject: RE: Superior Terminal Line 5 Booster; BRRTS #:0216577298 (Manifold Corridor)
Date: Thursday, November 9, 2023 2:37:48 PM
Attachments: [image007.png](#)
[11072023_SUP Line 5 Booster Memo.pdf](#)

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Hi John,

Please find attached the Technical Memo prepared by Barr for the Line 5 Booster project completed at the Superior Terminal. In summary, petroleum impacts (sheen, discoloration, odor) in the Line 5 Booster maintenance project excavation were identified in September 2023 which is located within the Manifold Corridor area (BRRTS# 0216577298) that was granted Closure with Continuing Obligations by the WDNR on March 10, 2022. The Manifold Corridor area is part of the Enbridge Energy-Superior Terminal Facility-Wide agreement (BRRTS# 1616560657).

No active release was identified during the work. Soil with evidence of historical petroleum impacts that was removed from the excavation was managed at a landfill. The soil with residual impacts in the final excavation had analyte concentrations below laboratory method detection limits and/or the WDNR Industrial Groundwater Residual Contaminant Level (RCL) and Direct Contact RCL concentrations and NR720 standards. And, clean fill was used to backfill the excavation.

Based on the location of the Line 5 Booster excavation, field screening and sampling results, and ongoing facility environmental monitoring activities, we believe the petroleum impacts were associated with the historical Manifold Corridor area (BRRTS# 0216577298) and that there is no apparent risk to human health and the environment. Based on this, we believe that this response site should be closed with a no further action status and with no Continuing Obligations.

I'll have Barr upload the document through WDNR BRRTS online system.

If you have any questions, please let me know.

Nick

Nicholas B. Larabel, PG, CPG
Sr. Environment Advisor, Environment Remediation

ENBRIDGE
TEL: 269-330-3872
455 Leggitt Road, Marshall, MI 49068

[enbridge.com](#)
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From: Sager, John E - DNR <John.Sager@wisconsin.gov>
Sent: Monday, October 16, 2023 3:59 PM
To: Nick Larabel <nick.larabel@enbridge.com>
Cc: Karl Beaster <Karl.Beaster@enbridge.com>
Subject: [External] RE: Superior Terminal Line 5 Booster; BRRTS #:0216577298 (Manifold Corridor)

CAUTION! EXTERNAL SENDER

Were you expecting this email? TAKE A CLOSER LOOK. Is the sender legitimate?
DO NOT click links or open attachments unless you are 100% sure that the email is safe.

Nick,

Thank you for the telephone call this morning. I double checked the process laid out for the for transfer of an ERP site to the facility wide and I forgot that we include RP letter language in the letter from the DNR to Enbridge at the time the site is transferred to the facility wide site. I took the letter I sent Friday out of the que for BRRTS tracking and you can disregard the RP letter. Again, the standard DNR responsible party language will be included in the transfer letter. I apologize for any confusion.

I am still discussing internally how we transfer new sites in areas of known contamination (a closed or transferred site). For the Manifold 213 site it appears you did follow the Barr flowchart. I want to talk this over with my supervisor, Chris Saari, tomorrow to see if we want to modify the method these notifications are tracked. The way it is done according to the flowchart there is no way to easily track that you made a notification and there is no concurrence from the DNR that no additional action is necessary. I will give you a call later this week to discuss.

We are committed to service excellence.

Visit our survey at <http://dnr.wi.gov/customersurvey> to evaluate how I did.

John Sager

Hydrogeologist – Remediation and Redevelopment Program
Wisconsin Department of Natural Resources
1701 N. 4th St.
Superior, WI 54880
Phone: (715) 919-7239
john.sager@wisconsin.gov



dnr.wi.gov



From: Sager, John E - DNR

Sent: Friday, October 13, 2023 1:37 PM

To: Karl Beaster <Karl.Beaster@enbridge.com>; Nick Larabel <nick.larabel@enbridge.com>

Subject: RE: Superior Terminal Line 5 Booster; BRRTS #:0216577298 (Manifold Corridor)

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John Sager

Hydrogeologist – Remediation and Redevelopment Program
Wisconsin Department of Natural Resources
1701 N. 4th St.
Superior, WI 54880
Phone: (715) 919-7239
john.sager@wisconsin.gov



dnr.wi.gov



From: Nick Larabel <nick.larabel@enbridge.com>

Sent: Friday, September 29, 2023 2:14 PM

To: Sager, John E - DNR <John.Sager@wisconsin.gov>

Subject: RE: Superior Terminal Line 5 Booster; BRRTS #:0216577298 (Manifold Corridor)

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Sorry about that, forgot to add when. Discovered/confirmed on 9/28.

From: Sager, John E - DNR <John.Sager@wisconsin.gov>
Sent: Friday, September 29, 2023 2:45 PM
To: Nick Larabel <nick.larabel@enbridge.com>
Subject: [External] RE: Superior Terminal Line 5 Booster; BRRTS #:0216577298 (Manifold Corridor)

CAUTION! EXTERNAL SENDER

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Thanks Nick. When were the impacts discovered?

We are committed to service excellence.

Visit our survey at <http://dnr.wi.gov/customersurvey> to evaluate how I did.

John Sager
Hydrogeologist – Remediation and Redevelopment Program
Wisconsin Department of Natural Resources
1701 N. 4th St.
Superior, WI 54880
Phone: (715) 919-7239
john.sager@wisconsin.gov



From: Nick Larabel <nick.larabel@enbridge.com>
Sent: Friday, September 29, 2023 9:13 AM
To: Sager, John E - DNR <John.Sager@wisconsin.gov>
Subject: FW: Superior Terminal Line 5 Booster; BRRTS #:0216577298 (Manifold Corridor)
Karl and Nick,

Attached is a responsible party letter for the Line 5 Booster Pump. The DNR understands you have retained Barr to complete the investigation of the site and prepare a technical memo for transfer into the facility wide ERP site. Please let me know if you have any questions.

**CAUTION: This email originated from outside the organization.
Do not click links or open attachments unless you recognize the sender and know the content is safe.**

Hi John,

Historical petroleum impacts were encountered in a Booster Pump 5 maintenance excavation within the terminal just east of the office (see below). The site was inspected by Enbridge and no active release was identified. Petroleum impacted water was present in the excavation bottom. Soil from the excavation sidewalls was field screened and a pocket of soil with an odor, discoloration and headspace of up to 34.8 ppm was identified in the southwest corner under the booster

pump infrastructure. PVOC + naphthalene analytical samples were collected from soil screening points with headspace reading exceeding 10 ppm.

When reviewing the existing files, the site falls within the previously identified FW Manifold Corridor area that was closed with continuing obligations (BRRTS 02-16-577298 – purple outline below) and near a site where similar groundwater conditions were previously observed (BRRTS# 02-16-577548; closed 9/1/2016). All soil and water with evidence of potential impacts that is removed from the excavation will be managed at an offsite facility.

I'm having our consultant, Barr assist with field work and they will collect the required field screening and analytical from the final excavation extents. Upon project completion, Barr will draft a short memo documenting the assessment and Enbridge's response actions. This memo will be provided to the WNDR for review and the site specific Manifold Corridor area Facility-wide report will be updated, as needed, the next time the Superior Terminal FW package is updated.



Booster pump 5 excavation (red polygon) east of terminal office and within the Manifold Corridor BRRTS Area (purple polygon).

Thanks,

Nick

Nicholas B. Larabel, PG, CPG

Environment Advisor, LP US Environment Remediation

—

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455 Leggitt Road, Marshall, MI 49068

enbridge.com

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Technical Memorandum

To: Nick Larabel, Enbridge Energy
From: Kaitlin Montz and Ryan Erickson
Subject: Enbridge Terminal – Line 5 Booster Response
WDNR BRRTS #'s: 0216577298 (Manifold Corridor); 1616560657 (Terminal Facility-wide)
Site Coordinates: 46.68894°, -92.05814° (NAD83)
Barr Project: 49161092.12 003 004
Date: November 7, 2023

This memorandum summarizes the environmental response activities performed by Barr Engineering (Barr) at the request of Enbridge Energy (Enbridge) following the discovery of historical petroleum impacts in the Line 5 booster project excavation at the Enbridge Superior Terminal (Terminal) in Superior, Wisconsin (Figure 1) in September 2023.

Project Background

On September 28, 2023, Enbridge encountered apparent petroleum impacts (sheen, discoloration, odor) in the Line 5 booster maintenance project excavation (hereafter referred to as the site). Upon discovery, excavation activities were halted, and the site was inspected by Enbridge and no active release source was identified. Based on the field observations and site information described below, the impacts were considered historical. Enbridge Environment was notified, and Environment requested that Barr complete the following:

- review historical records of releases near the site,
- assist with the off-site management coordination of soil with suspected impacts,
- field screen and sample soil from the excavation extents to document the soil conditions, and
- prepare a memorandum summarizing the response actions and the excavation conditions upon the completion of project activities.

A review of historical release documentation for this location identified that the site is within the Manifold Corridor area Bureau for Remediation and Redevelopment Tracking System (BRRTS; BRRTS# 0216577298) site that was granted Closure with Continuing Obligations by the Wisconsin Department of Natural Resources (WDNR) on March 10, 2022 (WDNR, 2022). The Manifold Corridor area is part of the Enbridge Energy-Superior Terminal Facility-Wide agreement (BRRTS# 1616560657) that facilitates the tracking and reporting of historical impacts encountered at the facility.

On September 28, 2023, Enbridge notified the WDNR of the discovery of the historical impacts via email (Attachment A).

Field Methods and Results

On September 28, 2023, Barr was on site to assess conditions in the project excavation (Photos 1 and 2; Figure 2) and collect waste characterization samples.

Barr field screened and sampled the excavation sidewalls to document environmental conditions per the WDNR-approved *Site Investigation and Response Action Plan (SI/RAP; 2014)*. The final excavation was up to approximately 15 feet long (northwest to southeast) by up to 30 feet wide (northeast to southwest) by

To: Nick Larabel, Enbridge Energy
Subject: Enbridge Terminal – Line 5 Booster Response
BRRTS #s: 0216577298 (Manifold Corridor); 1616560657 (Terminal Facility-wide)
Date: November 7, 2023
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up to 6 feet deep. Soil consisted mostly of clay with sand fill around some buried infrastructure. Groundwater in the excavation was managed with a hydrovacuum truck excavator as part of the ongoing work but water was observed in the excavation at approximately 5.5 feet below ground surface (bgs; Photo 2).

Barr collected eighteen field screening soil samples from the excavation sidewalls and bottom (Photos 1 and 2; Attachment B). The soil samples were tested for the presence of organic vapors using a 10.6eV photoionization detector (PID) and inspected for the presence of other potential indicators of petroleum impacts such as odor, discoloration and sheen. Field screening results are summarized below:

- No soil with evidence of petroleum impacts (odor, sheen, headspace > 10 parts per million (ppm)) was identified in the north or east ends of the excavation.
- Soil with petroleum impacts, as described below, was identified in the southwestern end of the excavation. Residual impacts were mostly present below 2 feet bgs, near and to the west of the pipeline.
- Two of eighteen field screening samples collected from the final excavation extents had headspace readings above 10 ppm (S11 @ 5.5ft bgs = 34.6ppm; S12 @ 2ft bgs = 12.2ppm) and a petroleum odor, discoloration, and sheen (Photo 3).
- A petroleum sheen was also observed on excavation water (Photo 4) in the southwestern end of the excavation.

Analytical soil confirmation samples *FB5-S-1* and *FB5-S-2* were collected from the southwestern end of the excavation where impacted soil had been identified during the final excavation extent (Figure 2; Attachment B). The samples were submitted to Pace Analytical Services in Duluth, MN for analysis of petroleum volatile organic compounds (PVOCs) and naphthalene. The analyte concentrations were below the laboratory method detection limits and/or the WDNR Industrial Groundwater Residual Contaminant Level (RCL) and Direct Contact RCL concentrations. The sample results are summarized in Table 1 and the laboratory report is provided in Attachment C.

Upon completion of the project activities, the excavation was backfilled with clean fill.

Receptor Survey

No direct contact risks were identified based on the field observations and screening by the project team, the analytical soil sample results, and the use of clean fill material in backfilling the excavation. No impacts to surface water were identified during the project, and there is little risk of future surface water impacts based on field observations, distance to surface water receptors, and the use of clean backfill. No groundwater risks were identified based on the results of the analytical samples collected from the excavation and based on the results of the annual facility-wide groundwater monitoring program. Specifically, the groundwater pathway at the Superior Terminal is addressed on a facility-wide basis through the established hydrogeologic performance standard approved by the WDNR, i.e., Enbridge samples the Terminal groundwater monitoring well network (Figure 3) on an annual basis and provides the data to the WDNR. The nearest downgradient monitoring well is MW-20A, located approximately 1,000 feet to the south. No vapor receptors were identified; the nearest structure (approximately 5 feet northeast of the excavation) is slab-on-grade with no basement and limited human occupancy. Further, Terminal employees are required to wear four-gas detectors that would alert them to a potentially hazardous atmosphere.

To: Nick Larabel, Enbridge Energy
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BRRTS #'s: 0216577298 (Manifold Corridor); 1616560657 (Terminal Facility-wide)
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Material Management

During the project activities, hydrovac slurry soil with evidence of petroleum impacts was managed in hydrovac slurry management roll-off containers in the terminal Soil Management Area (SMA) and solidified for off-site disposal. Barr collected representative soil sample *FB5-Stockpile-1* for laboratory analysis at Pace of benzene, toluene, ethylbenzene, xylenes (BTEX) and diesel range organics (DRO). The soil was approved at the VONCO V landfill in Duluth, Minnesota under waste profile 23-087-I. The waste profile approval letter and the laboratory report are provided in Attachment D.

Conclusions

Petroleum-impacted soil was identified in the Line 5 Booster maintenance excavation in September 2023. The excavation was located within the Manifold Corridor area (BRRTS# 0216577298) that is part of the Terminal Facility-wide site (BRRTS# 1616560657). The impacted soil was only identified in the southwestern end of the excavation at a depth below approximately 2 feet bgs in a location immediately below and adjacent to Enbridge infrastructure. Analytical soil samples collected from this area had analyte concentrations below the laboratory method detection limits and/or the WDNR Industrial Groundwater RCL and Direct Contact RCL concentrations.

Based on the location of the Line 5 Booster excavation, field screening and sampling results, and ongoing facility environmental monitoring activities, we believe the petroleum impacts were associated with the historical Manifold Corridor area (BRRTS# 0216577298) and that there is no apparent risk to human health and the environment. Based on this, Barr believes that no additional investigation actions will be required and that this file can be closed.

Certification

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

 , Professional Geologist (1446-13)
Signature and Title

11/7/2023
DATE

To: Nick Larabel, Enbridge Energy
Subject: Enbridge Terminal – Line 5 Booster Response
BRRTS #'s: 0216577298 (Manifold Corridor); 1616560657 (Terminal Facility-wide)
Date: November 7, 2023
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References

Barr, 2014, *Site Investigation and Response Action Plan Enbridge, Energy Superior Terminal (Facility-Wide)*. Prepared for Enbridge Energy, July 2014.

WDNR, 2022. *Reported Contamination at 2800 E 21st St., Superior, Wisconsin; DNR BRRTS Activity Name: Enbridge Terminal – Manifold Corridor; DNR BRRTS Activity #: 02-16-577298; DNR Facility-Wide BRRTS Activity #: 16-16-560657; DNR FID #: 816010580*. WDNR site closure with continuing obligations letter sent to Enbridge Energy, March 10, 2022.

Attachments:

Site Photos	1 through 4
Table 1	Soil Analytical Data Summary
Figure 1	Site Location
Figure 2	Site Layout
Figure 3	Receptor Survey
Attachment A	WDNR Site Notification
Attachment B	Site Investigation Field Sampling and Screening Log
Attachment C	Laboratory Report for Excavation Soil Samples
Attachment D	Material Management Documentation

To: Nick Larabel, Enbridge Energy
Subject: Enbridge Terminal – Line 5 Booster Response
BRRIS #'s: 0216577298 (Manifold Corridor); 1616560657 (Terminal Facility-wide)
Date: November 7, 2023
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Site Photos



Photo 1



Photo 2

Photo 1: Line 5 Booster excavation. Photo taken facing southeast on September 28, 2023.

Photo 2: Line 5 Booster excavation. Photo taken facing southwest on September 28, 2023.



Photo 3



Photo 4

Photo 3: Discolored soil in the Line 5 Booster excavation. Photo taken facing northeast on September 28, 2023.

Photo 4: Close-up photo of petroleum sheen on excavation water in Line 5 Booster excavation. Photo taken on September 28, 2023.

Table 1
Soil Analytical Data Summary
Superior Terminal Line 5 Booster Pump
Enbridge Energy Inc.

		Location	FB5-S-1	FB5-S-2
		Date	9/28/2023	9/28/2023
		Depth	2 ft	5.5 ft
Parameter	Wisconsin Groundwater RCLs, DF=2	Wisconsin Not to Exceed Direct Contact Industrial RCLs		
Last Updated	12/01/2018	12/01/2018		
Exceedance Key	No Exceedances	No Exceedances		
General Parameters				
% Moisture			4.4	23.8
Volatile Organic Compounds				
1,2,4-Trimethylbenzene	1.3787 (1)	219	< 0.0150 U	< 0.0221 U
1,3,5-Trimethylbenzene	1.3787 (1)	182	< 0.0145 U	< 0.0214 U
Benzene	0.0051	7.07	< 0.0070 U	< 0.0103 U
Ethyl benzene	1.57	35.4	< 0.0174 U	< 0.0256 U
Methyl tertiary butyl ether (MTBE)	0.027	282	< 0.0151 U	< 0.0223 U
Naphthalene	0.6582	24.1	< 0.0147 U	< 0.0217 U
Toluene	1.1072	818	< 0.0120 U	0.0178 J
Xylene, total	3.96	260	< 0.0294 U	< 0.0433 U

Note:

All values in mg/kg unless otherwise noted

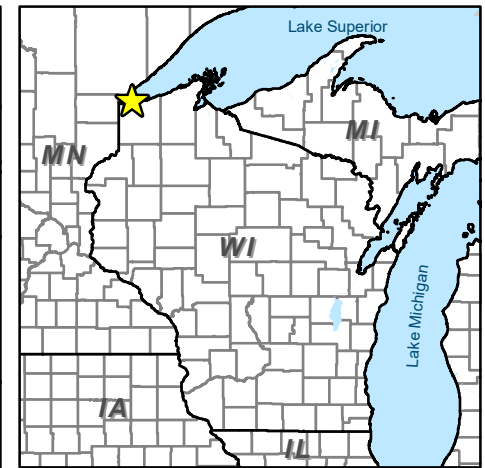
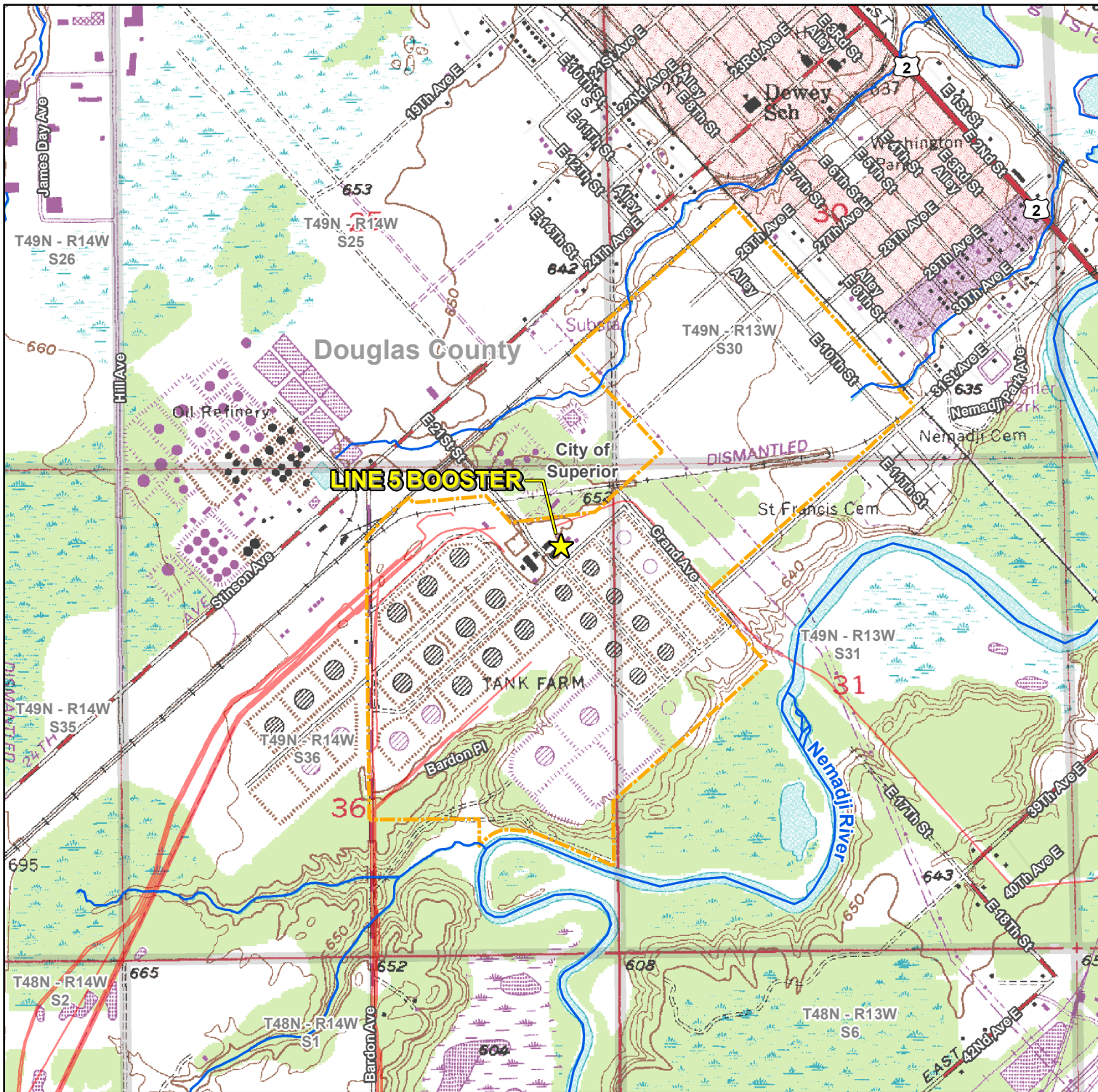
Data Footnotes and Qualifiers





Barr Standard Footnotes and Qualifiers

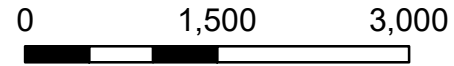
J	Estimated detected value. Either certain QC criteria were not met or the concentration is between the laboratory's detection and quantitation limits.
U	The analyte was analyzed for, but was not detected.

Wisconsin Groundwater RCLs, DF=2

(1)	Representing the criteria for combined Trimethylbenzenes.
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-  Site Location
-  Enbridge Pipelines
-  Terminal Property Boundary
-  Watercourses

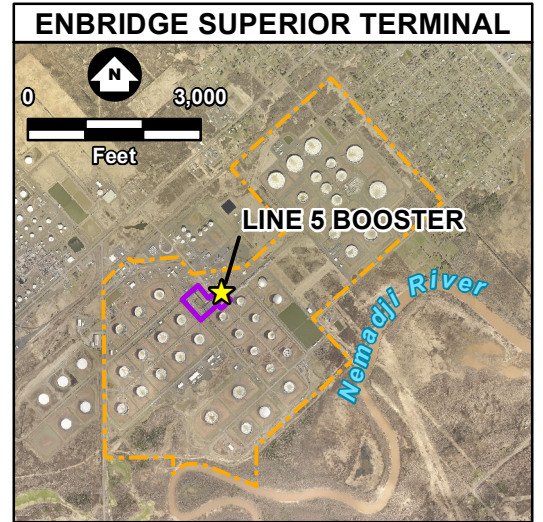


Feet
 1 Inch = 1,500 Feet
 Figure 1

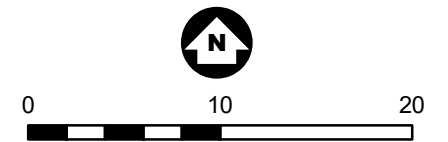
SITE LOCATION
LINE 5 BOOSTER EXCAVATION
SUPERIOR TERMINAL
 Enbridge Energy, L.P.
 Superior, Wisconsin



Barr Footer: ArcGIS 10.9.1, 2023-10-06 08:41 File: I:\Client\Enbridge_Energy\Work_Orders\Terminal_Permitting\49161092\Maps\Reports\2023_09_Line5_Booster\Figure 2_L5_Booster_Site_Layout.mxd User: del



- Site Location
- Sample Locations
- Excavation Extent
- Facility-Wide BRRTS# 0216577298 - Manifold Corridor
- Pipeline Infrastructure
- Terminal Property Boundary



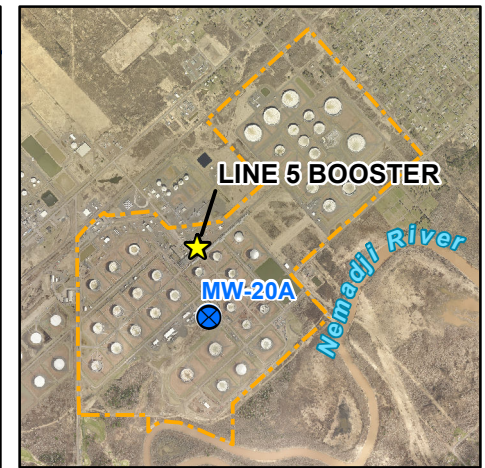
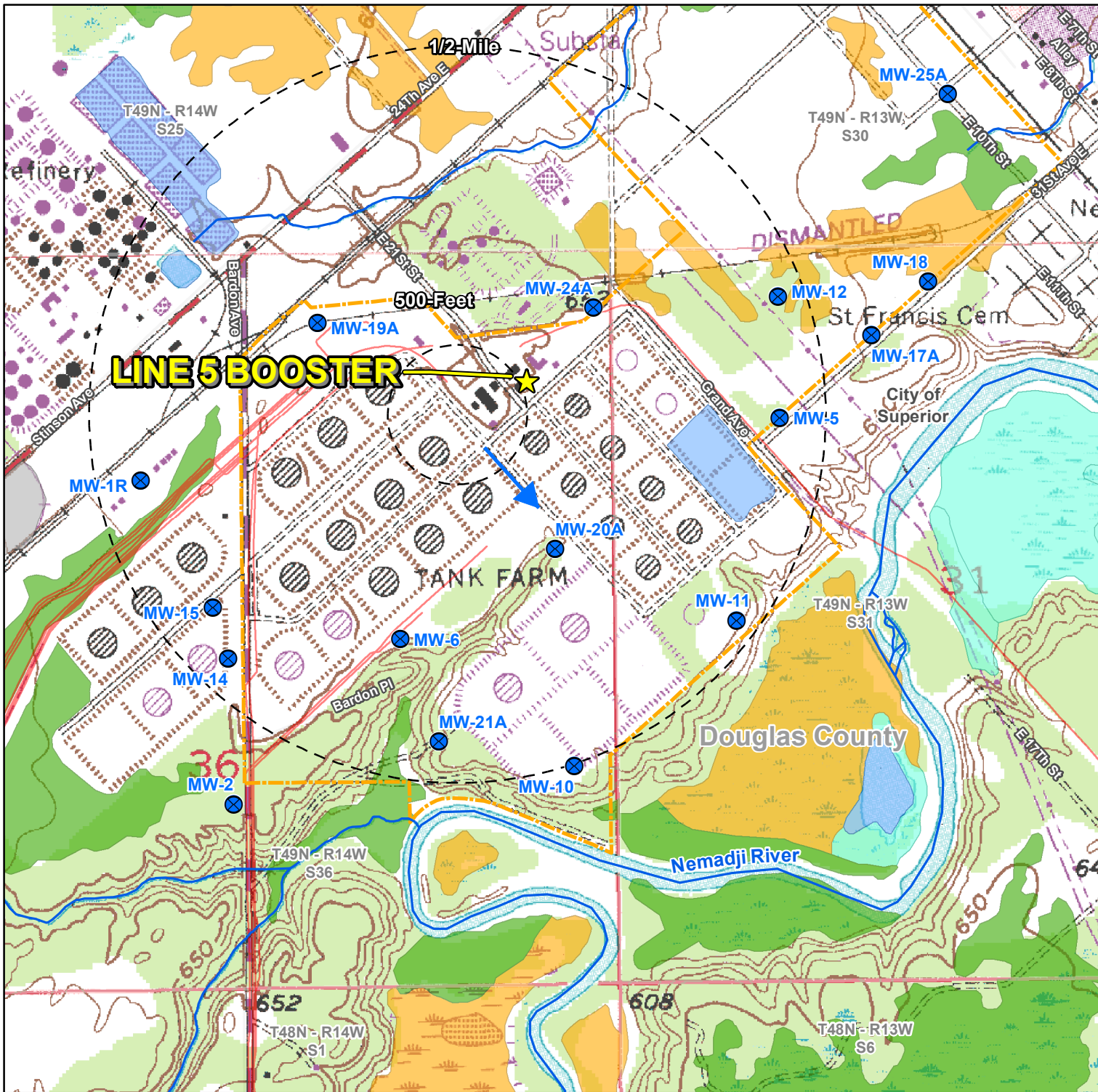
1 Inch = 10 Feet

Nearmap Imagery Circa May, 2023

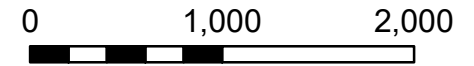
Figure 2

SITE LAYOUT
LINE 5 BOOSTER EXCAVATION
SUPERIOR TERMINAL
 Enbridge Energy, L.P.
 Superior, Wisconsin





- Site Location
 - Enbridge Monitoring Well
 - Groundwater Flow Direction
 - Receptor Buffers
 - Enbridge Pipelines
 - Terminal Property Boundary
 - Watercourses
- Wisconsin Wetland Inventory**
- Emergent/wet meadow
 - Filled/drained wetland
 - Forested
 - Open Water
 - Scrub/Shrub



Feet

1 Inch = 1,000 Feet

Figure 3

**RECEPTOR SURVEY
LINE 5 BOOSTER EXCAVATION
SUPERIOR TERMINAL**
Enbridge Energy, L.P.
Superior, Wisconsin



Attachment A
WDNR Site Notification

From: [Ryan E. Erickson](#)
To: [Nick Larabel](#)
Cc: [Kaitlin M. Montz](#)
Subject: FW: Superior Terminal Line 5 Booster; BRRTS #:0216577298 (Manifold Corridor)
Date: Thursday, September 28, 2023 2:15:37 PM
Attachments: [image001.png](#)

Hi John,

Historical petroleum impacts were encountered in a Booster Pump 5 maintenance excavation within the terminal just east of the office (see below). The site was inspected by Enbridge and no active release was identified. Petroleum impacted water was present in the excavation bottom. Soil from the excavation sidewalls was field screened and a pocket of soil with an odor, discoloration and headspace of up to 34.8 was identified in the southwest corner under the booster pump infrastructure. PVOC + naphthalene analytical samples were collected from soil screening points with headspace reading exceeding 10 ppm.

When reviewing the existing files, the site falls within the previously identified FW Manifold Corridor area that was closed with continuing obligations (BRRTS 02-16-577298 – purple outline below) and near a site where similar groundwater conditions were previously observed (BRRTS# 02-16-577548; closed 9/1/2016). All soil and water with evidence of potential impacts that is removed from the excavation will be managed at an offsite facility.

I'm having our consultant, Barr assist with field work and they will collect the required field screening and analytical from the final excavation extents. Upon project completion, Barr will draft a short memo documenting the assessment and Enbridge's response actions. This memo will be provided to the WNDR for review and the site specific Manifold Corridor area Facility-wide report will be updated, as needed, the next time the Superior Terminal FW package is updated.



Booster pump 5 excavation (red polygon) east of terminal office and within the Manifold Corridor BRRTS Area (purple polygon).

Thanks,

Nick

Nicholas B. Larabel, PG, CPG

Environment Advisor, LP US Environment Remediation

—

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455 Leggitt Road, Marshall, MI 49068

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Attachment B

Site Investigation Field Sampling and Screening Log

Attachment C

Laboratory Report for Excavation Soil Samples



October 11, 2023

Jim Taraldsen
Barr Engineering Company
325 S Lake Ave
Duluth, MN 55802

RE: Project: 49161092.12 300 004 L5 Booster
Pace Project No.: 10670727

Dear Jim Taraldsen:

Enclosed are the analytical results for sample(s) received by the laboratory on September 29, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Minneapolis

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

Sincerely,

Martha Hansen
martha.hansen@pacelabs.com
(612)607-6451
Project Manager

Enclosures

cc: Barr DM, Barr Engineering
Accounts Payable, Barr Engineering



REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.



CERTIFICATIONS

Project: 49161092.12 300 004 L5 Booster

Pace Project No.: 10670727

Pace Analytical Services, LLC - Minneapolis MN

1700 Elm Street SE, Minneapolis, MN 55414

A2LA Certification #: 2926.01

Alabama Certification #: 40770

Alaska Contaminated Sites Certification #: 17-009

Alaska DW Certification #: MN00064

Arizona Certification #: AZ0014

Arkansas DW Certification #: MN00064

Arkansas WW Certification #: 88-0680

California Certification #: 2929

Colorado Certification #: MN00064

Connecticut Certification #: PH-0256

EPA Region 8 Tribal Water Systems+Wyoming DW

Certification #: via MN 027-053-137

Florida Certification #: E87605

Georgia Certification #: 959

GMP+ Certification #: GMP050884

Hawaii Certification #: MN00064

Idaho Certification #: MN00064

Illinois Certification #: 200011

Indiana Certification #: C-MN-01

Iowa Certification #: 368

Kansas Certification #: E-10167

Kentucky DW Certification #: 90062

Kentucky WW Certification #: 90062

Louisiana DEQ Certification #: AI-03086

Louisiana DW Certification #: MN00064

Maine Certification #: MN00064

Maryland Certification #: 322

Michigan Certification #: 9909

Minnesota Certification #: 027-053-137

Minnesota Dept of Ag Approval: via MN 027-053-137

Minnesota Petrofund Registration #: 1240

Mississippi Certification #: MN00064

Missouri Certification #: 10100

Montana Certification #: CERT0092

Nebraska Certification #: NE-OS-18-06

Nevada Certification #: MN00064

New Hampshire Certification #: 2081

New Jersey Certification #: MN002

New York Certification #: 11647

North Carolina DW Certification #: 27700

North Carolina WW Certification #: 530

North Dakota Certification (A2LA) #: R-036

North Dakota Certification (MN) #: R-036

Ohio DW Certification #: 41244

Ohio VAP Certification (1700) #: CL101

Oklahoma Certification #: 9507

Oregon Primary Certification #: MN300001

Oregon Secondary Certification #: MN200001

Pennsylvania Certification #: 68-00563

Puerto Rico Certification #: MN00064

South Carolina Certification #: 74003001

Tennessee Certification #: TN02818

Texas Certification #: T104704192

Utah Certification #: MN00064

Vermont Certification #: VT-027053137

Virginia Certification #: 460163

Washington Certification #: C486

West Virginia DEP Certification #: 382

West Virginia DW Certification #: 9952 C

Wisconsin Certification #: 999407970

Wyoming UST Certification #: via A2LA 2926.01

USDA Permit #: P330-19-00208

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: 49161092.12 300 004 L5 Booster
Pace Project No.: 10670727

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10670727001	FB5-S-1	Solid	09/28/23 14:10	09/29/23 18:30
10670727002	FB5-S-2	Solid	09/28/23 14:15	09/29/23 18:30

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SAMPLE ANALYTE COUNT

Project: 49161092.12 300 004 L5 Booster
Pace Project No.: 10670727

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10670727001	FB5-S-1	ASTM D2974	JDL	1	PASI-M
		EPA 8260D	SB2	11	PASI-M
10670727002	FB5-S-2	ASTM D2974	JDL	1	PASI-M
		EPA 8260D	SB2	11	PASI-M

PASI-M = Pace Analytical Services - Minneapolis

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ANALYTICAL RESULTS

Project: 49161092.12 300 004 L5 Booster

Pace Project No.: 10670727

Sample: FB5-S-1 Lab ID: 10670727001 Collected: 09/28/23 14:10 Received: 09/29/23 18:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	4.4	%	0.10	0.10	1		10/09/23 11:25		N2
8260D MSV UST	Analytical Method: EPA 8260D Preparation Method: EPA 5035/5030B Pace Analytical Services - Minneapolis								
Benzene	<7.0	ug/kg	20.7	7.0	1	10/04/23 10:28	10/04/23 13:15	71-43-2	
Ethylbenzene	<17.4	ug/kg	51.8	17.4	1	10/04/23 10:28	10/04/23 13:15	100-41-4	
Methyl-tert-butyl ether	<15.1	ug/kg	51.8	15.1	1	10/04/23 10:28	10/04/23 13:15	1634-04-4	
Naphthalene	<14.7	ug/kg	207	14.7	1	10/04/23 10:28	10/04/23 13:15	91-20-3	
Toluene	<12.0	ug/kg	51.8	12.0	1	10/04/23 10:28	10/04/23 13:15	108-88-3	
1,2,4-Trimethylbenzene	<15.0	ug/kg	51.8	15.0	1	10/04/23 10:28	10/04/23 13:15	95-63-6	
1,3,5-Trimethylbenzene	<14.5	ug/kg	51.8	14.5	1	10/04/23 10:28	10/04/23 13:15	108-67-8	
Xylene (Total)	<29.4	ug/kg	155	29.4	1	10/04/23 10:28	10/04/23 13:15	1330-20-7	
Surrogates									
4-Bromofluorobenzene (S)	110	%	75-125		1	10/04/23 10:28	10/04/23 13:15	460-00-4	
Toluene-d8 (S)	101	%	75-125		1	10/04/23 10:28	10/04/23 13:15	2037-26-5	
1,2-Dichlorobenzene-d4 (S)	97	%	75-125		1	10/04/23 10:28	10/04/23 13:15	2199-69-1	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 49161092.12 300 004 L5 Booster

Pace Project No.: 10670727

Sample: **FB5-S-2** Lab ID: **10670727002** Collected: 09/28/23 14:15 Received: 09/29/23 18:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Dry Weight / %M by ASTM D2974									
Analytical Method: ASTM D2974									
Pace Analytical Services - Minneapolis									
Percent Moisture	23.8	%	0.10	0.10	1		10/09/23 11:26		N2
8260D MSV UST									
Analytical Method: EPA 8260D Preparation Method: EPA 5035/5030B									
Pace Analytical Services - Minneapolis									
Benzene	<10.3	ug/kg	30.5	10.3	1	10/04/23 10:28	10/04/23 14:47	71-43-2	
Ethylbenzene	<25.6	ug/kg	76.3	25.6	1	10/04/23 10:28	10/04/23 14:47	100-41-4	
Methyl-tert-butyl ether	<22.3	ug/kg	76.3	22.3	1	10/04/23 10:28	10/04/23 14:47	1634-04-4	
Naphthalene	<21.7	ug/kg	305	21.7	1	10/04/23 10:28	10/04/23 14:47	91-20-3	
Toluene	17.8J	ug/kg	76.3	17.7	1	10/04/23 10:28	10/04/23 14:47	108-88-3	
1,2,4-Trimethylbenzene	<22.1	ug/kg	76.3	22.1	1	10/04/23 10:28	10/04/23 14:47	95-63-6	
1,3,5-Trimethylbenzene	<21.4	ug/kg	76.3	21.4	1	10/04/23 10:28	10/04/23 14:47	108-67-8	
Xylene (Total)	<43.3	ug/kg	229	43.3	1	10/04/23 10:28	10/04/23 14:47	1330-20-7	
Surrogates									
4-Bromofluorobenzene (S)	110	%	75-125		1	10/04/23 10:28	10/04/23 14:47	460-00-4	
Toluene-d8 (S)	101	%	75-125		1	10/04/23 10:28	10/04/23 14:47	2037-26-5	
1,2-Dichlorobenzene-d4 (S)	96	%	75-125		1	10/04/23 10:28	10/04/23 14:47	2199-69-1	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 49161092.12 300 004 L5 Booster

Pace Project No.: 10670727

QC Batch: 910537

Analysis Method: ASTM D2974

QC Batch Method: ASTM D2974

Analysis Description: Dry Weight / %M by ASTM D2974

Laboratory: Pace Analytical Services - Minneapolis

Associated Lab Samples: 10670727001, 10670727002

SAMPLE DUPLICATE: 4793228

Parameter	Units	10671542001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	15.4	13.8	11	30	N2

SAMPLE DUPLICATE: 4793229

Parameter	Units	10671064002 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	17.8	16.8	5	30	N2

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 49161092.12 300 004 L5 Booster

Pace Project No.: 10670727

QC Batch:	909731	Analysis Method:	EPA 8260D
QC Batch Method:	EPA 5035/5030B	Analysis Description:	8260D MSV UST
		Laboratory:	Pace Analytical Services - Minneapolis

Associated Lab Samples: 10670727001, 10670727002

METHOD BLANK: 4789011 Matrix: Solid

Associated Lab Samples: 10670727001, 10670727002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/kg	<14.5	50.0	10/04/23 12:14	
1,3,5-Trimethylbenzene	ug/kg	<14.0	50.0	10/04/23 12:14	
Benzene	ug/kg	<6.7	20.0	10/04/23 12:14	
Ethylbenzene	ug/kg	<16.8	50.0	10/04/23 12:14	
Methyl-tert-butyl ether	ug/kg	<14.6	50.0	10/04/23 12:14	
Naphthalene	ug/kg	<14.2	200	10/04/23 12:14	
Toluene	ug/kg	<11.6	50.0	10/04/23 12:14	
Xylene (Total)	ug/kg	<28.4	150	10/04/23 12:14	
1,2-Dichlorobenzene-d4 (S)	%	96	75-125	10/04/23 12:14	
4-Bromofluorobenzene (S)	%	107	75-125	10/04/23 12:14	
Toluene-d8 (S)	%	101	75-125	10/04/23 12:14	

LABORATORY CONTROL SAMPLE: 4789012

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/kg	1000	1060	106	75-134	
1,3,5-Trimethylbenzene	ug/kg	1000	1020	102	75-132	
Benzene	ug/kg	1000	1100	110	72-125	
Ethylbenzene	ug/kg	1000	1030	103	75-130	
Methyl-tert-butyl ether	ug/kg	1000	1200	120	70-125	
Naphthalene	ug/kg	1000	1030	103	71-141	
Toluene	ug/kg	1000	1010	101	75-125	
Xylene (Total)	ug/kg	3000	3190	106	75-126	
1,2-Dichlorobenzene-d4 (S)	%			102	75-125	
4-Bromofluorobenzene (S)	%			104	75-125	
Toluene-d8 (S)	%			100	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4789014 4789015

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		10670765010 Result	Spike Conc.	Spike Conc.	MS Result						
1,2,4-Trimethylbenzene	ug/kg	ND	1290	1290	1380	1300	106	99	61-135	6	30
1,3,5-Trimethylbenzene	ug/kg	ND	1290	1290	1340	1260	103	98	65-133	6	30
Benzene	ug/kg	ND	1290	1290	1420	1380	110	106	66-125	3	30
Ethylbenzene	ug/kg	ND	1290	1290	1330	1290	103	99	70-130	3	30
Methyl-tert-butyl ether	ug/kg	ND	1290	1290	1490	1450	115	112	67-125	2	30
Naphthalene	ug/kg	ND	1290	1290	1350	1310	104	101	30-150	3	30

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QUALITY CONTROL DATA

Project: 49161092.12 300 004 L5 Booster

Pace Project No.: 10670727

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4789014 4789015												
Parameter	Units	10670765010		MS		MSD		MS		MSD		
		Result	Conc.	Spike	Conc.	Result	Result	% Rec	% Rec	Limits	Max	
										RPD	RPD	Qual
Toluene	ug/kg	ND	1290	1290	1370	1300	106	101	69-125	5	30	
Xylene (Total)	ug/kg	ND	3890	3890	4120	3980	106	102	68-129	4	30	
1,2-Dichlorobenzene-d4 (S)	%						104	103	75-125			
4-Bromofluorobenzene (S)	%						103	104	75-125			
Toluene-d8 (S)	%						101	101	75-125			

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: 49161092.12 300 004 L5 Booster

Pace Project No.: 10670727

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above LOD.

J - Estimated concentration at or above the LOD and below the LOQ.

LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.

LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.

DL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected at or above the adjusted LOD.

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

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

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

N2 The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 49161092.12 300 004 L5 Booster

Pace Project No.: 10670727

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10670727001	FB5-S-1	ASTM D2974	910537		
10670727002	FB5-S-2	ASTM D2974	910537		
10670727001	FB5-S-1	EPA 5035/5030B	909731	EPA 8260D	910006
10670727002	FB5-S-2	EPA 5035/5030B	909731	EPA 8260D	910006

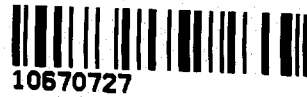
REPORT OF LABORATORY ANALYSIS

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Barr Engineering Co. Chain of Custody

WO#: 10670727



Sample Origination State

CO MI MN MO ND TX UT WI Other:

10670727

COC Number: **No 589499**

COC 1 of 1

REPORT TO	INVOICE TO
Company: <u>Barr Engineering Co.</u>	Company: <u>Barr</u>
Address: <u>325 S. Lehn Ave</u>	Address:
Address: <u>Duluth, MN 55802</u>	Address:
Name: <u>Ryan Erickson</u>	Name:
email: <u>verickson@barr.com</u>	email:
Copy to: <u>BarrDM@barr.com</u>	P.O. <u>✓</u>
Project Name: <u>LS Boost Pump</u>	Barr Project No: <u>49161092.12 300 004</u>

Matrix Code:	Preservative Code:
GW = Groundwater	A = None
SW = Surface Water	B = HCl
WW = Waste Water	C = HNO ₃
DW = Drinking Water	D = H ₂ SO ₄
S = Soil/Solid	E = NaOH
SD = Sediment	F = MeOH
O = Other	G = NaHSO ₄
	H = Na ₂ S ₂ O ₃
	I = Ascorbic Acid
	J = Zn Acetate
	K = Other

Location	Sample Depth			Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix Code	Perform MS/MSD Y / N	Total Number Of Containers	PDOC + Naphthalene % Solids
	Start	Stop	Unit (m./ft. or in.)						
1. <u>FBS-S-1</u>	<u>2</u>	<u>2</u>	<u>ft</u>	<u>09/28/2023</u>	<u>1410</u>	<u>S</u>	<u>N</u>	<u>3</u>	<u>X</u>
2. <u>FBS-S-2</u>	<u>5.5</u>	<u>5.5</u>	<u>ft</u>	<u>09/28/2023</u>	<u>1415</u>	<u>S</u>	<u>N</u>	<u>3</u>	<u>X</u>
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									

<u>Preservative Code</u>	<u>001</u>
<u>Field Filtered Y/N</u>	<u>02</u>

BARR USE ONLY

Sampled by: KMJ3

Barr Proj. Manager: REE

Barr DQ Manager: JET

Lab Name: Pac

Lab Location: Minneapolis, MN

Relinquished by: [Signature]

On Ice? N

Date: 9/29/23

Time: 12:22

Relinquished by: [Signature]

On Ice? N

Date: 9/29/23

Time: 12:22

Samples Shipped VIA: Ground Courier Air Carrier

Sampler Other: _____

Lab WO: _____

Received by: [Signature]

Date: 9/29

Time: 12:17:22

Received by: [Signature]

Date: 9-29-23

Time: 1830 3.3

Air Bill Number: _____

Temperature on Receipt (°C): 2.8

Custody Seal Intact? Y N None

Requested Due Date:

Standard Turn Around Time

Rush _____ (mm/dd/yyyy)

Effective Date: 4/14/2023

Sample Condition: Upon Receipt
 Client Name: Barr Engineering

Project #: **WO#: 10670727**
 PM: MKH Due Date: 10/16/23
 CLIENT: BARR

Courier: FedEx UPS USPS Client
 Pace SpeeDee Commercial

See Exceptions
 ENV-FRM-MIN4-0142

Tracking Number: _____

Custody Seal on Cooler/Box Present? Yes No Seals Intact? Yes No
 Packing Material: Bubble Wrap Bubble Bags None Other
 Thermometer: T1 (0461) T2 (0436) T3 (0459) T4 (0402) T5 (0178)
 T6 (0235) T7 (0042) T8 (0775) T9(0727) 01339252/1710
 Biological Tissue Frozen? Yes No N/A
 Temp Blank? Yes No
 Type of Ice: Wet Blue Dry None
 Melted

Did Samples Originate in West Virginia? Yes No
 Were All Container Temps Taken? Yes No N/A
 Temp should be above freezing to 6 °C Cooler temp Read w/Temp Blank: 2.8 °C
 Average Corrected Temp (no temp blank only): _____ °C
 Correction Factor: True Cooler Temp Corrected w/temp blank: 2.8 °C
 See Exceptions ENV-FRM-MIN4-0142 1 Container

USDA Regulated Soil: (N/A, water sample/other: _____)
 Date/Initials of Person Examining Contents: MKH 9-20-23
 Did samples originate in a quarantine zone within the United States: AL, AR, AZ CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX, or VA (check maps)? Yes No
 Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? Yes No

If Yes to either question, fill out a Regulated Soil Checklist (ENV-FRM-MIN4-0154) and include with SCUR/COC paperwork.

Location (Check one): <input type="checkbox"/> Duluth <input checked="" type="checkbox"/> Minneapolis <input type="checkbox"/> Virginia	COMMENTS
Chain of Custody Present and Filled Out? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	1.
Chain of Custody Relinquished? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	2.
Sampler Name and/or Signature on COC? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3.
Samples Arrived within Hold Time? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	4. If fecal: <input type="checkbox"/> <8 hrs <input type="checkbox"/> >8 hr, <24 <input type="checkbox"/> No
Short Hold Time Analysis (<72 hr)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. <input type="checkbox"/> Fecal Coliform <input type="checkbox"/> HPC <input type="checkbox"/> Total Coliform/E.coli <input type="checkbox"/> BOD/cBOD <input type="checkbox"/> Hex Chrom <input type="checkbox"/> Turbidity <input type="checkbox"/> Nitrate <input type="checkbox"/> Nitrite <input type="checkbox"/> Orthophos <input type="checkbox"/> Other _____
Rush Turn Around Time Requested? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6.
Sufficient Sample Volume? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	7.
Correct Containers Used? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	8.
-Pace Containers Used? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Containers Intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.
Field Filtered Volume Received for Dissolved Tests? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	10. Is sediment visible in the dissolved container? <input type="checkbox"/> Yes <input type="checkbox"/> No
Is sufficient information available to reconcile the samples to the COC? Matrix: <input type="checkbox"/> Water <input checked="" type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other	11. If no, write ID/Date/Time of container below: <input type="checkbox"/> See Exceptions ENV-FRM-MIN4-0142
All containers needing acid/base preservation have been checked? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	12. Sample # <input type="checkbox"/> NaOH <input type="checkbox"/> HNO3 <input type="checkbox"/> H2SO4 <input type="checkbox"/> Zinc Acetate
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO3, H2SO4, <2pH, NaOH >9 Sulfide, NaOH >10 Cyanide) <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Positive for Residual Chlorine? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> See Exceptions ENV-FRM-MIN4-0142
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxins/PFAS (*If adding preservative to a container, it must be added to associated field and equipment blanks--verify with PM first.) <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	pH Paper Lot # Residual Chlorine 0-6 Roll 0-6 Strip 0-14 Strip
Headspace in Methyl Mercury Container? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13.
Extra labels present on soil VOA or WIDRO containers? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	14. <input type="checkbox"/> See Exceptions ENV-FRM-MIN4-0142
Headspace in VOA Vials (greater than 6mm)? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
3 Trip Blanks Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	15.
Trip Blank Custody Seals Present? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Pace Trip Blank Lot # (if purchased): _____

CLIENT NOTIFICATION/RESOLUTION
 Person Contacted: _____ Date/Time: _____
 Comments/Resolution: _____
 Project Manager Review: [Signature] Date: 10/2/23

NOTE: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e., out of hold, incorrect preservative, out of temp, incorrect containers).
 Labeled By: [Signature] Line: 1

Attachment D
Material Management Documentation



VONCO V Duluth, LLC
1100 West Gary Street
Duluth, MN 55808

VONCOUSA.com
Office: 218.626.3830
Fax: 218.626.4874

October 6, 2023

Enbridge Energy
Nick Larabel
PO Box 1411
Houston, TX 77251

RE: Profile 23-087-I/ Impacted Soil (Superior Terminal)

Nick,

Please be advised that the above described waste material is acceptable for **500/yards** for disposal at the Vonco V Waste Management Campus Facility in Duluth, MN. The waste material is acceptable per Vonco V (SW-536) Minnesota Pollution Control Agency Industrial Solid Waste Management Plan.

The referenced waste must maintain consistency with what was originally submitted on the waste profile. Vonco V Waste Management Campus must be contacted immediately for any changes in material composition or process generation as further testing and analysis may apply. The term of the approval is 3 years and will expire on 8\03\2025.

Additionally, acceptance is subject to the following conditions:

- **The material will be absent of free liquids and must meet the paint filter test.**
- A signed waste manifest with the correct profile number shall accompany each load delivered to The Vonco V Waste Management Campus.
- All hauling will be in compliance with the Federal and State D.O.T regulations.

Thank you for choosing Vonco V Waste Management Campus. We appreciate your business. If you have any questions or concerns, please feel free to contact me at: (612)-221-0785.

We look forward to working with you,

A handwritten signature in black ink, appearing to read 'Chris Guillemette'.

Vonco V, LLC
Vice President





October 05, 2023

Jim Taraldsen
Barr Engineering Company
325 S Lake Ave
Duluth, MN 55802

RE: Project: 49161092.12 300 004 L5 Booster-Revised Report
Pace Project No.: 10670690

Dear Jim Taraldsen:

Enclosed are the analytical results for sample(s) received by the laboratory on September 29, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Minneapolis

This report was revised on October 5, 2023, to update the project name.

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

Sincerely,

Martha Hansen
martha.hansen@pacelabs.com
(612)607-6451
Project Manager

Enclosures

cc: Barr DM, Barr Engineering
Accounts Payable, Barr Engineering



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: 49161092.12 300 004 L5 Booster-Revised Report

Pace Project No.: 10670690

Pace Analytical Services, LLC - Minneapolis MN

1700 Elm Street SE, Minneapolis, MN 55414

A2LA Certification #: 2926.01

Alabama Certification #: 40770

Alaska Contaminated Sites Certification #: 17-009

Alaska DW Certification #: MN00064

Arizona Certification #: AZ0014

Arkansas DW Certification #: MN00064

Arkansas WW Certification #: 88-0680

California Certification #: 2929

Colorado Certification #: MN00064

Connecticut Certification #: PH-0256

EPA Region 8 Tribal Water Systems+Wyoming DW

Certification #: via MN 027-053-137

Florida Certification #: E87605

Georgia Certification #: 959

GMP+ Certification #: GMP050884

Hawaii Certification #: MN00064

Idaho Certification #: MN00064

Illinois Certification #: 200011

Indiana Certification #: C-MN-01

Iowa Certification #: 368

Kansas Certification #: E-10167

Kentucky DW Certification #: 90062

Kentucky WW Certification #: 90062

Louisiana DEQ Certification #: AI-03086

Louisiana DW Certification #: MN00064

Maine Certification #: MN00064

Maryland Certification #: 322

Michigan Certification #: 9909

Minnesota Certification #: 027-053-137

Minnesota Dept of Ag Approval: via MN 027-053-137

Minnesota Petrofund Registration #: 1240

Mississippi Certification #: MN00064

Missouri Certification #: 10100

Montana Certification #: CERT0092

Nebraska Certification #: NE-OS-18-06

Nevada Certification #: MN00064

New Hampshire Certification #: 2081

New Jersey Certification #: MN002

New York Certification #: 11647

North Carolina DW Certification #: 27700

North Carolina WW Certification #: 530

North Dakota Certification (A2LA) #: R-036

North Dakota Certification (MN) #: R-036

Ohio DW Certification #: 41244

Ohio VAP Certification (1700) #: CL101

Oklahoma Certification #: 9507

Oregon Primary Certification #: MN300001

Oregon Secondary Certification #: MN200001

Pennsylvania Certification #: 68-00563

Puerto Rico Certification #: MN00064

South Carolina Certification #: 74003001

Tennessee Certification #: TN02818

Texas Certification #: T104704192

Utah Certification #: MN00064

Vermont Certification #: VT-027053137

Virginia Certification #: 460163

Washington Certification #: C486

West Virginia DEP Certification #: 382

West Virginia DW Certification #: 9952 C

Wisconsin Certification #: 999407970

Wyoming UST Certification #: via A2LA 2926.01

USDA Permit #: P330-19-00208

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: 49161092.12 300 004 L5 Booster-Revised Report
Pace Project No.: 10670690

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10670690001	FB5-Stockpile-1	Solid	09/28/23 14:20	09/29/23 18:30

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: 49161092.12 300 004 L5 Booster-Revised Report
Pace Project No.: 10670690

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10670690001	FB5-Stockpile-1	WI MOD DRO	TT2	2	PASI-M
		ASTM D2974	JDL	1	PASI-M
		EPA 8260D	SB2	7	PASI-M

PASI-M = Pace Analytical Services - Minneapolis

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 49161092.12 300 004 L5 Booster-Revised Report

Pace Project No.: 10670690

Sample: **FB5-Stockpile-1** Lab ID: **10670690001** Collected: 09/28/23 14:20 Received: 09/29/23 18:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
WIDRO GCS									
Analytical Method: WI MOD DRO Preparation Method: WI MOD DRO									
Pace Analytical Services - Minneapolis									
WDRO C10-C28	79.9	mg/kg	9.0	3.4	1	10/02/23 14:18	10/04/23 13:06		T6
Surrogates									
n-Triacontane (S)	94	%	50-150		1	10/02/23 14:18	10/04/23 13:06		
Dry Weight / %M by ASTM D2974									
Analytical Method: ASTM D2974									
Pace Analytical Services - Minneapolis									
Percent Moisture	25.3	%	0.10	0.10	1		10/03/23 10:45		N2
8260D MSV UST									
Analytical Method: EPA 8260D Preparation Method: EPA 5035/5030B									
Pace Analytical Services - Minneapolis									
Benzene	<10.1	ug/kg	30.0	10.1	1	10/02/23 12:51	10/02/23 17:54	71-43-2	
Ethylbenzene	<25.2	ug/kg	75.0	25.2	1	10/02/23 12:51	10/02/23 17:54	100-41-4	
Toluene	20.0J	ug/kg	75.0	17.4	1	10/02/23 12:51	10/02/23 17:54	108-88-3	
Xylene (Total)	<42.6	ug/kg	225	42.6	1	10/02/23 12:51	10/02/23 17:54	1330-20-7	
Surrogates									
4-Bromofluorobenzene (S)	104	%	75-125		1	10/02/23 12:51	10/02/23 17:54	460-00-4	
Toluene-d8 (S)	100	%	75-125		1	10/02/23 12:51	10/02/23 17:54	2037-26-5	
1,2-Dichlorobenzene-d4 (S)	98	%	75-125		1	10/02/23 12:51	10/02/23 17:54	2199-69-1	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 49161092.12 300 004 L5 Booster-Revised Report

Pace Project No.: 10670690

QC Batch: 909386

Analysis Method: ASTM D2974

QC Batch Method: ASTM D2974

Analysis Description: Dry Weight / %M by ASTM D2974

Laboratory: Pace Analytical Services - Minneapolis

Associated Lab Samples: 10670690001

SAMPLE DUPLICATE: 4787763

Parameter	Units	10670690001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	25.3	23.4	8	30	N2

SAMPLE DUPLICATE: 4787764

Parameter	Units	10669730008 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	17.1	19.2	12	30	N2

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: 49161092.12 300 004 L5 Booster-Revised Report

Pace Project No.: 10670690

QC Batch:	909227	Analysis Method:	EPA 8260D
QC Batch Method:	EPA 5035/5030B	Analysis Description:	8260D MSV UST
		Laboratory:	Pace Analytical Services - Minneapolis

Associated Lab Samples: 10670690001

METHOD BLANK: 4786988 Matrix: Solid

Associated Lab Samples: 10670690001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Benzene	ug/kg	<6.7	20.0	10/02/23 17:23	
Ethylbenzene	ug/kg	<16.8	50.0	10/02/23 17:23	
Toluene	ug/kg	<11.6	50.0	10/02/23 17:23	
Xylene (Total)	ug/kg	<28.4	150	10/02/23 17:23	
1,2-Dichlorobenzene-d4 (S)	%	96	75-125	10/02/23 17:23	
4-Bromofluorobenzene (S)	%	108	75-125	10/02/23 17:23	
Toluene-d8 (S)	%	99	75-125	10/02/23 17:23	

LABORATORY CONTROL SAMPLE: 4786989

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Benzene	ug/kg	1000	1160	116	72-125	
Ethylbenzene	ug/kg	1000	1090	109	75-130	
Toluene	ug/kg	1000	1080	108	75-125	
Xylene (Total)	ug/kg	3000	3300	110	75-126	
1,2-Dichlorobenzene-d4 (S)	%			101	75-125	
4-Bromofluorobenzene (S)	%			102	75-125	
Toluene-d8 (S)	%			99	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4787002 4787003

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		10670690001 Result	Spike Conc.	Spike Conc.	Result						
Benzene	ug/kg	<10.1	1500	1500	1640	1560	109	104	66-125	5	30
Ethylbenzene	ug/kg	<25.2	1500	1500	1570	1510	105	101	70-130	4	30
Toluene	ug/kg	20.0J	1500	1500	1560	1480	102	97	69-125	5	30
Xylene (Total)	ug/kg	<42.6	4500	4500	4840	4760	108	106	68-129	2	30
1,2-Dichlorobenzene-d4 (S)	%						104	101	75-125		
4-Bromofluorobenzene (S)	%						100	102	75-125		
Toluene-d8 (S)	%						99	98	75-125		

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 49161092.12 300 004 L5 Booster-Revised Report

Pace Project No.: 10670690

QC Batch: 909309	Analysis Method: WI MOD DRO
QC Batch Method: WI MOD DRO	Analysis Description: WIDRO GCS
	Laboratory: Pace Analytical Services - Minneapolis

Associated Lab Samples: 10670690001

METHOD BLANK: 4787372 Matrix: Solid

Associated Lab Samples: 10670690001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
WDRO C10-C28	mg/kg	<3.7	10.0	10/04/23 12:45	
n-Triacontane (S)	%.	87	50-150	10/04/23 12:45	

LABORATORY CONTROL SAMPLE & LCSD: 4787373 4787374

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
WDRO C10-C28	mg/kg	80	78.6	72.5	98	91	70-120	8	20	
n-Triacontane (S)	%.				101	92	50-150			

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: 49161092.12 300 004 L5 Booster-Revised Report

Pace Project No.: 10670690

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above LOD.

J - Estimated concentration at or above the LOD and below the LOQ.

LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.

LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.

DL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected at or above the adjusted LOD.

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

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

TNI - The NELAC Institute.

BATCH QUALIFIERS

Batch: 909531

[M5] A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

ANALYTE QUALIFIERS

N2 The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

T6 High boiling point hydrocarbons are present in the sample.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 49161092.12 300 004 L5 Booster-Revised Report
Pace Project No.: 10670690

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10670690001	FB5-Stockpile-1	WI MOD DRO	909309	WI MOD DRO	909531
10670690001	FB5-Stockpile-1	ASTM D2974	909386		
10670690001	FB5-Stockpile-1	EPA 5035/5030B	909227	EPA 8260D	909514

REPORT OF LABORATORY ANALYSIS

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Barr Engineering Co. Chain of Custody

Sample Origination State

CO MI MN MO ND TX UT WI Other: _____

REPORT TO	INVOICE TO
Company: <u>Barr Engineering Co.</u>	Company: <u>Barr</u>
Address: <u>325 S. Lake Ave</u>	Address: _____
Address: <u>Duluth, MN 55802</u>	Address: _____
Name: <u>Ryan Erickson</u>	Name: _____
email: <u>rickson@barr.com</u>	email: _____
Copy to: <u>BarrDM@barr.com</u>	P.O. _____
Project Name: <u>L5 Booster Pump</u>	Barr Project No: <u>49161092.12 300 004</u>

Perform MS/MSD Y / N	Analysis Requested		COC Number: No 589500
	Water	Soil	COC <u>1</u> of <u>1</u>
			Matrix Code: _____ Preservative Code: _____

WO#: 10670690



I = Ascorbic Acid
J = Zn Acetate
K = Other

Location	Sample Depth			Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix Code	Perform MS/MSD Y / N	Total Number of Containers	DRO	W	Meth	BTEX	% Solids
	Start	Stop	Unit (m./ft. or in.)										
1. <u>FBS - Stockpile-1</u>	_____	_____	_____	<u>09/28/23</u>	<u>1420</u>	<u>5</u>	<u>N</u>	<u>4</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													

Preservative Code	<u>ASAP TAT OUI</u>
Field Filtered Y/N	

BARR USE ONLY

Sampled by: KMJ3

Barr Proj. Manager: REE

Barr DQ Manager: JET

Lab Name: Pace

Lab Location: Minneapolis, MN

Relinquished by: <u>Kate King</u>	On Ice? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Date: <u>9/29/23</u>	Time: <u>12:21</u>	Received by: <u>Jane H. ...</u>	Date: <u>9/29/23</u>	Time: <u>12:21</u>
Relinquished by: <u>Barr H. ...</u>	On Ice? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Date: <u>9/29</u>	Time: <u>12:22</u>	Received by: <u>...</u>	Date: <u>9-29-23</u>	Time: <u>183030</u>
Samples Shipped Via: <input type="checkbox"/> Ground Courier <input type="checkbox"/> Air Carrier	Air Bill Number: _____		Requested Due Date: <input type="checkbox"/> Standard Turn Around Time <input checked="" type="checkbox"/> Rush <u>ASAP</u> (mm/dd/yyyy)			
Lab WO: _____	Temperature on Receipt (°C): <u>5.2</u>		Custody Seal Intact? <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> None			

H:RLGSTDFORMS/Chain of Custody Form 2015 RLG Rev. 01/30/2020

Effective Date: 4/14/2023

Sample Condition Upon Receipt
 Client Name: Barr Eng

Project #: **WO# : 10670690**
 PM: MKH Due Date: 10/16/23
 CLIENT: BARR

Courier: FedEx UPS USPS Client
 Pace Speedee Commercial
 See Exceptions
 Tracking Number: _____ ENV-FRM-MIN4-0142

Custody Seal on Cooler/Box Present? Yes No Seals Intact? Yes No
 Packing Material: Bubble Wrap Bubble Bags None Other
 Thermometer: T1 (0461) T2 (0436) T3 (0459) T4 (0402) T5 (0178)
 T6 (0235) T7 (0042) T8 (0775) T9(0727) 01339252/1710
 Biological Tissue Frozen? Yes No N/A
 Temp Blank? Yes No
 Type of Ice: Wet Blue Dry None
 Melted

Did Samples Originate in West Virginia? Yes No Were All Container Temps Taken? Yes No N/A
 Temp should be above freezing to 6 °C Cooler temp Read w/Temp Blank: 4.8 °C
 Correction Factor: 1.04 Cooler Temp Corrected w/temp blank: 9.2 °C
 Average Corrected Temp (no temp blank only): _____ °C
 See Exceptions ENV-FRM-MIN4-0142 1 Container

USDA Regulated Soil: (N/A, water sample/other: _____)
 Date/Initials of Person Examining Contents: NV 9/29/23
 Did samples originate in a quarantine zone within the United States: AL, AR, AZ CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX, or VA (check maps)? Yes No
 Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? Yes No

If Yes to either question, fill out a Regulated Soil Checklist (ENV-FRM-MIN4-0154) and include with SCUR/COC paperwork.

Location (Check one): <input type="checkbox"/> Duluth <input checked="" type="checkbox"/> Minneapolis <input type="checkbox"/> Virginia	COMMENTS
Chain of Custody Present and Filled Out? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	1.
Chain of Custody Relinquished? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	2.
Sampler Name and/or Signature on COC? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3.
Samples Arrived within Hold Time? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	4. If fecal: <input type="checkbox"/> <8 hrs <input type="checkbox"/> >8 hr, <24 <input type="checkbox"/> No
Short Hold Time Analysis (<72 hr)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. <input type="checkbox"/> Fecal Coliform <input type="checkbox"/> HPC <input type="checkbox"/> Total Coliform/E.coli <input type="checkbox"/> BOD/cBOD <input type="checkbox"/> Hex Chrom <input type="checkbox"/> Turbidity <input type="checkbox"/> Nitrate <input type="checkbox"/> Nitrite <input type="checkbox"/> Orthophos <input type="checkbox"/> Other _____
Rush Turn Around Time Requested? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	6.
Sufficient Sample Volume? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	7.
Correct Containers Used? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	8.
-Pace Containers Used? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Containers Intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.
Field Filtered Volume Received for Dissolved Tests? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	10. Is sediment visible in the dissolved container? <input type="checkbox"/> Yes <input type="checkbox"/> No
Is sufficient information available to reconcile the samples to the COC? Matrix: <input type="checkbox"/> Water <input checked="" type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other	11. If no, write ID/Date/Time of container below: <input type="checkbox"/> See Exceptions ENV-FRM-MIN4-0142
All containers needing acid/base preservation have been checked? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	12. Sample # <input type="checkbox"/> NaOH <input type="checkbox"/> HNO3 <input type="checkbox"/> H2SO4 <input type="checkbox"/> Zinc Acetate
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO3, H2SO4, <2pH, NaOH >9 Sulfide, NaOH >10 Cyanide)	Positive for Residual Chlorine? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> See Exceptions ENV-FRM-MIN4-0142
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxins/PFAS (*If adding preservative to a container, it must be added to associated field and equipment blanks--verify with PM first.)	
Headspace in Methyl Mercury Container? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	pH Paper Lot # Residual Chlorine 0-6 Roll 0-6 Strip 0-14 Strip
Extra labels present on soil VOA or WIDRO containers? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	13.
Headspace in VOA Vials (greater than 6mm)? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14. <input type="checkbox"/> See Exceptions ENV-FRM-MIN4-0142
3 Trip Blanks Present? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	15. Pace Trip Blank Lot # (if purchased): _____
Trip Blank Custody Seals Present? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	

CLIENT NOTIFICATION/RESOLUTION
 Person Contacted: Jim Taraldsen Date/Time: 10/2/23
 Comments/Resolution: Lab approved 2 business day TAT.
 Project Manager Review: [Signature] Date: 10/2/23

NOTE: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e., out of hold, incorrect preservative, out of temp, incorrect containers).
 Labeled By: NV Line: [Signature]

Date : 04-OCT-2023 13:06

Client ID: FB5-Stockpile-1

Sample Info: 10670690001

Volume Injected (uL): 1.0

Column phase: DB-5-US23330007

Instrument: 10gcs9.i

Operator: TT2

Column diameter: 0,32

