

February 28, 2024

Mr. John Sager
Wisconsin Department of Natural Resources
1701 North 4th Street
Superior, WI 54880

**Re: 2023 Remediation Progress Report for Murphy Oil Tank 70 Release Site
Superior Refining Company LLC Refinery, Superior, WI
WDNR BRRTS# 02-16-223154
Facility ID: 816009590**

Dear John:

On behalf of Superior Refining Company LLC (SRC), Barr Engineering Co. (Barr) is submitting this remediation progress report for the Murphy Oil Tank 70 Basin release site (Tank 70) at the SRC refinery in Superior, Wisconsin. Periodic site progress reporting to the Wisconsin Department of Natural Resources (WDNR) is required pursuant to ss. NR 700.11(1) and 724.13(3), Wisconsin Administrative Code. This report summarizes monitoring activities conducted at the site in 2023.

1 Facility and Site Background Information

Figure 1 shows the location of Tank 70 within the refinery boundaries, the approximate property boundary of the refinery, and areas surrounding the refinery. The Tank 70 site is located in the SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 25, Township 49 North, Range 14 West, Superior Township of Douglas County, Wisconsin.

The closest surface water to Tank 70 is Newton Creek, located approximately 2,000 feet east of the Tank 70 basin (Figure 1). The basin is located in the central area of the refinery which is relatively flat.

Figure 2 presents the site layout and monitoring locations. The ground surface of the Tank 70 basin is unpaved. Beneath an impermeable liner installed in June 2003 (described in the following section), the basin is underlain by native clay. The average depth to groundwater in the Tank 70 monitoring wells ranges from 1 to 4 feet below ground surface (bgs) depending on time of year. The regional groundwater flow direction below the refinery and across the Tank 70 site is expected to be toward the east (Figure 2).

As presented in the April 2014 Gannett Fleming, Inc. (GF) *Final Memorandum of Agreement, Site Investigation and Remedial Action Plan* (GF, 2014) for the refinery site, the hydraulic conductivity of the native clay underlying the refinery is on the order of 1×10^{-7} centimeters per second (cm/sec). Assuming a horizontal hydraulic gradient of 0.003 feet per foot eastward and an effective porosity of 0.06, the estimated horizontal groundwater flow velocity at the refinery is approximately 0.01 foot per year (ft/yr) (GF, 2014).

In October 2011, Calumet Superior, LLC (Calumet) acquired the refinery from Murphy Oil. In November 2017, Husky Superior Refining Holding Corp. (Husky Superior) purchased Calumet and changed its legal name to Superior Refining Company LLC (SRC). In January 2021, Husky and Cenovus merged to become Cenovus Energy Inc. (Cenovus); however, the refinery is still referred to as SRC.

2 Tank 70 Basin Release Site Investigation and Remediation Summary (February 1999-October 2022)

A release of about 200 gallons of *platformate* (gasoline blend stock) within the Tank 70 basin was reported to the WDNR on February 25, 1999. The release occurred when a bleeder valve cracked at the ground surface due to frost heave. In immediate response to the release, Murphy Oil personnel shoveled and drummed the stained snow, and a small amount of water was applied to float the gasoline. The water/gasoline mixture was vacuumed and sent through the refinery's No. 1 American Petroleum Institute (API) oil/water separator. Separated oil was stored for use at the refinery and the water was treated at the on-site wastewater treatment plant (WWTP). When the snow melted in the spring, water in the basin was also vacuumed and sent through the No. 1 API oil/water separator and WWTP.

In January 2002, all liquid product (*platformate*) was removed from Tank 70 to conduct an API 653 tank inspection. An access hatch was removed to allow workers access to the inside of the tank. On January 7, 2002, a fire occurred inside Tank 70 as the tank was being cleaned. Murphy Oil personnel used a mixture of water and foam to put out the fire, which took approximately two hours. The water and foam that were used to put out the fire ran out the open access hatch into the bermed Tank 70 basin. Some of the water/foam mixture was pumped into the adjacent Tank 71 basin, which is lined with a plastic membrane. Because of the extremely cold temperatures at the time of the fire and other activities associated with the fire that needed to be completed, Murphy Oil was not able to immediately remove all the water/foam mixture from the Tank 70 and Tank 71 basins.

Sampling conducted after both the 1999 and 2002 releases defined the estimated extent of *platformate*-impacted soil. Summaries of the soil investigations and analytical results are provided in a GF October 26, 2010, closure request to the WDNR. In addition, after removing the tank that was destroyed by fire in January 2002 and prior to installing the new tank in the basin, Murphy Oil installed an impermeable liner in the Tank 70 basin in June 2003. Prior to the installation of the liner, soil in the Tank 70 basin was graded flat, a layer of cobbles was laid down and leveled, followed by 0.5 foot of sand. The liner is 60-mil high density polyethylene (HDPE) and was covered with 1.5 feet of clay fill. The 1.5 feet layer of clay protects the liner from exposure to weather extremes, maintenance vehicles, and personnel. This clay layer and liner serve as a permanent engineered barrier that eliminates direct-contact and meets the performance standard criteria in NR 720.08. This liner also minimizes future soil- to-groundwater contaminant migration (GF, 2020).

Multiple phases of investigation have been completed at the site including soil borings and test pits and the installation of monitoring wells, monitoring points, test pits, test pit sumps, and recovery sumps

(Figure 2). Currently, long-term groundwater monitoring is being conducted at the site as well as product gauging and passive recovery. This report presents monitoring and product gauging data for 2023.

Research conducted by the API and published in a 2004 document titled, "*API Interactive LNAPL Guide, Version 2.0*", found that periodic manual removal of product is most appropriate for low permeability aquifers (hydraulic conductivity $< 1 \times 10^{-5}$ cm/sec). The hydraulic conductivity of the native clay underlying the refinery is on the order of 1×10^{-7} cm/sec, as described in the previous section of this letter report.

Based on the recommendations included in the API Interactive LNAPL Guide document, product has been manually bailed when observed in a monitoring well. The API Interactive LNAPL Guide also states that product preferentially accumulates in wells when the potentiometric surface is low. This occurs because, as the potentiometric surface drops, product that remains above the water level will drain downward into the well. As the potentiometric surface rises, the product becomes submerged and trapped in the soil pores and subsequently will not accumulate in the well. In general, this appears to be the case in the Tank 70 site wells that have had measurable product. To take advantage of this apparent pattern, the wells located in the basin were purged dry following each depth to product or groundwater measurement event to promote the accumulation of product (GF, 2020).

Using this approach from November 1999 to May 2009, a total of 262 liters (approximately 70 gallons) of product was recovered. Most of the free product ($>92\%$) was recovered from MP-1/T70, MP-4/T70, MW-1/T70, and MW-2/T70. Historically free product has only been found in MW-1R/T70 (2006), MW-2/T70 (2006), MW-4/T70 (2004), and MW-7/T70 (2007). Recovered product was sent through the refinery's No.1 API oil/water separator and stored for refinery use. Water from the separator and groundwater recovered from monitoring locations was treated in the refinery's on-site WWTP.

In addition to bailing free product, 1.5-inch-diameter, petroleum-absorbent socks were installed in select wells and monitoring points. These socks passively absorbed any free product that collected in the well. The absorbent socks were regularly inspected and replaced, as necessary.

In October 2010, GF submitted a closure request to the WDNR on behalf of Murphy Oil, summarized as follows:

- There is an engineered cap in place to prevent direct contact and limit infiltration.
- Summaries of the historical free product measurements and volume of product recovered were included and documented that product had been recovered to the extent practicable.
- The residual groundwater contamination is not likely to migrate beyond the immediate vicinity of the Tank 70 basin, based on the relatively low (i.e., approximately 0.01 ft/yr) horizontal groundwater flow velocity in the native clay.
- The site would be registered on the WDNR's Geographic Information System (GIS) database of sites where residual soil and groundwater contamination remains.

In August 2011, supplemental soil and groundwater data from outside the Tank 70 basin were collected and submitted to the WDNR, as requested, in support of the October 2010 closure request. However, on September 9, 2011, the WDNR denied site closure and requested additional groundwater monitoring to show stable or decreasing trends. Subsequent annual or semiannual groundwater monitoring has occurred at Tank 70, and this monitoring data has been submitted to the WDNR on a routine basis with the most recent report submitted in March 2023 (Barr, 2023).

3 Remedial and Monitoring Activities in 2023

Since the most recent remediation progress report was submitted to the WDNR on March 2, 2023 (Barr, 2023), work at Tank 70 has included the gauging of water and product levels in site monitoring wells, monitoring points, and a test pit, and the collection of groundwater samples from five monitoring wells.

The Tank 70 basin monitoring network currently includes, MW-2R/T70 and MW-3/T70 through MW-6/T70; monitoring points MP-1/T70 through MP-4/T70; and test pit sump TP-1/T70, as shown on Figure 2. Note that:

- Test pits TP-2/T70 and TP-5/T70 were backfilled in June 2000.
- MW-1/T70 and MW-2/T70 were abandoned in November 2007 and replaced by MW-1R/T70 and MW-2R/T70, respectively.
- MW-7/T70 and MW-1R/T70 were abandoned in 2022.

Year-round access to monitoring wells, monitoring points, and the test pit at the site is not practical because of relatively shallow groundwater, cold weather, and snow. When conditions allow access, water and product levels are monitored monthly. If product is encountered, the product is removed and sent through the refinery's No. 1 API oil/water separator and stored for refinery use.

Monitoring wells are gauged, purged and sampled in spring and fall (April/May and September/October). The monitoring wells, monitoring points and test pit TP-1/T70 were checked for the presence of free product and, if encountered, the product was removed from the well, point, or pit by bailing. Monitoring and gauging activities conducted in 2023 are summarized below and fluid levels are summarized in Table 1. Cumulative groundwater analytical results from the five monitoring wells are summarized on Table 2.

3.1 Groundwater Levels

During this reporting period, the depth to groundwater was measured during each purging and sampling event. The depth to water measurements are summarized on Table 1. Groundwater levels in the wells are either influenced by groundwater recharge associated with local surface/melt water in the spring or typically do not have sufficient time to reach static levels after they are purged dry later in the year. Consequently, a groundwater contour map representing static conditions for the Tank 70 site has not

been created. However, the regional groundwater flow direction in the vicinity of the Tank 70 site is to the east (GF, 2014) (Figure 2).

3.2 Product Recovery

During the reporting period, measurable product was not encountered in the monitoring wells, monitoring points, or test pit TP-1/T70 (Table 1). As established in the 2019 report (GF, 2020), if free product is not observed during the April/May gauging event, the wells, points, and test pit are then checked quarterly (rather than monthly) through the October sampling event.

SRC will continue to check for free product quarterly, but for all practical purposes, free product likely has been recovered to the extent practical from the Tank 70 basin.

3.3 Groundwater Sampling and Results

Groundwater samples were collected by Barr and Insight Environmental (Insight) field staff during May and October 2023. Each well was purged dry twice and allowed to recover for at least 14 days between purge events and prior to the collection of the groundwater samples. Routine sampling of monitoring wells MW-2R/T70 through MW-6/T70 was conducted on May 30, 2023, and October 16, 2023. Field staff used new one-time-use polyethylene disposable bailers with new nylon rope to collect each groundwater sample. The May 2023 and October 2023 groundwater samples were sent to Pace in Minneapolis, Minnesota (Wisconsin laboratory certification #999407970); samples were analyzed for petroleum volatile organic compounds (PVOCs) and naphthalene using Method 8260B. The PVOC analyte list consisted of benzene, toluene, ethylbenzene, and xylenes (BTEX); 1,2,4- and 1,3,5-trimethylbenzene (TMB) and methyl-tert-butyl-ether (MTBE).

Table 2 presents the analytical results of the groundwater samples compared to the NR 140 Preventative Action Limits (PAL) and Enforcement Standards (ES). The TMB results presented on Table 2 are a sum of the concentrations for 1,2,4-TMB and 1,3,5-TMB. As shown in Table 2:

- Samples from four of the five monitoring wells (MW-2/T70, MW-3/T70, MW-4/T70, MW-6/T70) collected in May and/or October 2023 contained one or more PVOCs at concentrations equal to or greater than NR 140 ES. Monitoring well MW-5/T70 had no PVOC concentrations exceeding an ES.
- Historically, at least one PVOC compound has been present at a concentration at or above its applicable ES in each well. The recent exception is monitoring well MW-5/T70 where there have been no PVOC concentrations that have exceeded an ES since 2017.
- Because of the removal of accumulated free product over the years, benzene, toluene, ethylbenzene and xylene (BTEX) concentrations in all wells except MW-3/T70 have been stable or decreasing. For example, Figure 3 through Figure 9 present graphs of the historical analytical BTEX results for wells with current or historical ES exceedances including MW-1R/T70, MW-

2R/T70, MW-3/T70, MW-4/T70, MW-5/T70, MW-6/T70, and MW-7/T70 respectively. The best-fit exponential trend lines were generated using a scatter plot chart. Note that the plotted data for MW-1R/T70, MW-2R/T70, MW-4/T70, and MW-7/T70, only includes the time since measurable free product was last encountered (2006, 2006, 2004, and 2007, respectively). As shown on Figure 3, Figure 4, and Figure 6 through Figure 9, dissolved-phase concentrations of BTEX in monitoring wells MW-1R/T70, MW-2R/T70, MW-4/T70, MW-5/T70, MW-6/T70, and MW-7/T70 have followed a downward trend. As shown on Figure 5 dissolved-phase BTEX concentrations in monitoring well MW-3/T70 shows a downward trend for analyte toluene but a slight upward trend for benzene, ethylbenzene, and xylenes.

- Historically, MW-1R/T70 and MW-7/T70 were the two downgradient monitoring wells in the Tank 70 basin. Because their PVC casings were damaged and surface water infiltration was present, MW-1R/T70 was last sampled in fall 2017 and MW-7/T70 was last sampled in spring 2015. Both monitoring wells were subsequently abandoned in fall 2022. Both MW-1R/T70 and MW-7/T70 had shown a downward trend for dissolved-phase BTEX concentrations for 9 years and 7 years, respectively (Figure 3 and Figure 9), and therefore replacement wells have not been installed.

Attachment A provides copies of the laboratory reports and chain of custody records for the groundwater samples collected in May and October 2023.

4 Future Work

SRC's work plan for 2024 is as follows:

- Continue to check for, and if present, manually bail free product from the remaining five monitoring wells (MW-2R/T70 through MW-6/T70), the four monitoring points (MP-1/T70 through MP-4/T70), and the test pit sump TP-1/T70 during each sampling event as conditions allow. If free product is observed in the spring, then wells, points, and test pit sump will be checked/bailed monthly. If free product is not observed, then wells, points, and sump will be checked/bailed quarterly.
- If product is observed in TP-1/T70, the sump will be pumped out using an on-site vacuum truck. The purged/pumped product/water will be separated and stored or sent through the refinery's No. 1 API oil/water separator and on-site WWTP as described above.
- Collect biannual (spring and fall) groundwater samples from the five monitoring wells and have the samples analyzed for PVOCs and naphthalene by a Wisconsin-certified laboratory using EPA Method 8260B. Each monitoring well will be purged dry twice and allowed to recover for at least 14 days, prior to the collection of samples.
- Document the recovery of any free product, and present analytical results of the 2024 groundwater samples in a remediation progress report to the WDNR by the end of the first quarter of 2025. If free product is not encountered in any of the wells, monitoring points, or sump

in 2024, and the BTEX concentrations continue to show a decreasing trend, a site closure request may be prepared for WDNR review and approval.

- Continue to monitor the increasing BTEX trends at MW-3/T70 and determine if additional remedial activities are necessary or if future downgradient sampling or trend analysis is needed.

If you have any questions or need additional information, please reach out to Joseph Pearson at SRC (joseph.pearson@cenovus.com) or me (lcarney@barr.com).

Sincerely,



Lynette M. Carney
Project Manager

cc: Joseph Pearson (SRC)

Tables

Table 1	2023 Fluid Level Monitoring Data
Table 2	Groundwater Analytical Results for Detected Compounds

Figures

Figure 1	Site Location Map
Figure 2	Tank 70 Area Site Layout
Figure 3	Historical BTEX Groundwater Concentrations Tank 70 Basin MW-1R/T70
Figure 4	Historical BTEX Groundwater Concentrations Tank 70 Basin MW-2R/T70
Figure 5	Historical BTEX Groundwater Concentrations Tank 70 Basin MW-3/T70
Figure 6	Historical BTEX Groundwater Concentrations Tank 70 Basin MW-4/T70
Figure 7	Historical BTEX Groundwater Concentrations Tank 70 Basin MW-5/T70
Figure 8	Historical BTEX Groundwater Concentrations Tank 70 Basin MW-6/T70
Figure 9	Historical BTEX Groundwater Concentrations Tank 70 Basin MW-7/T70

Attachments

Attachment A	Pace Analytical Laboratory Reports
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References

Barr Engineering Co., 2023. *2022 Remediation Progress Report for Murphy Oil Tank 70 Release Site Superior Refining Company LLC Refinery, Superior, WI, WDNR BRRTS# 02-16-223154, Facility ID: 816009590*. March 2, 2023.

Gannett Fleming, Inc. (GF), 2014. *Final Memorandum of Agreement, Site Investigation and Remedial Action Plan, Superior Refinery, Superior, Wisconsin, WDNR BRRTS# 02-16-559511*. April 2014.

GF, 2020. *2019 Remediation Progress Report for Tank 70 Release Site, Superior Refining Company LLC Refinery, Superior, WI, WDNR BRRTS# 02-16-223154 and Facility ID: 816009590*. January 28, 2020.

CERTIFICATION

"I, Lynette M. Carney, 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 Chapters NR 700 to 726, Wis. Adm. Code."



Lynette M. Carney, PG
Reg #: 1138

February 28, 2024

Date

Tables

Table 1
2023 Fluid Level Monitoring Data
Tank 70 Release Site (1)
Superior Refining Company LLC
Superior, Wisconsin

Date	MP-1/T70		MP-2/T70		MP-3/T70		MP-4/T70		MW-2R/T70		MW-3/T70		MW-4/T70		MW-5/T70		MW-6/T70		TP-1/T70		Comments/ Footnotes
	DTP	DTW	DTP	DTW	DTP	DTW	DTP	DTW	DTP	DTW	DTP	DTW	DTP	DTW	DTP	DTW	DTP	DTW	DTP	DTW	
	Depth to Fluid from Top of Casing (feet)																				
05/03/23	--	5.30	--	6.00	--	5.30	--	5.67	--	2.35	--	4.43	--	5.84	--	3.85	--	4.00	--	4.40	(2)
05/17/23	--	5.25	--	6.00	--	5.50	--	5.87	--	2.45	--	4.62	--	4.65	--	4.13	--	4.54	--	4.40	(2)
05/30/23	--	5.25	--	6.00	--	5.49	--	5.50	--	5.41	--	4.75	--	5.49	--	4.16	--	4.47	--	4.45	(3)
07/19/23	--	5.10	--	5.32	--	4.99	--	5.62	--	2.82	--	4.48	--	5.56	--	4.17	--	5.50	--	4.33	(4)
09/21/23	--	5.16	--	5.95	--	5.24	--	5.61	--	2.79	--	4.58	--	5.02	--	4.16	--	4.19	--	4.57	(2)
10/03/23	--	5.00	--	5.72	--	5.00	--	5.43	--	2.58	--	7.15	--	4.82	--	3.80	--	3.61	--	4.73	(2)
10/16/23	--	5.10	--	5.64	--	5.38	--	5.56	--	3.15	--	4.60	--	4.83	--	4.50	--	4.00	--	4.45	(3)

NOTES:

DTP = Depth to product in feet.

DTW = Depth to water in feet.

nm = Not measured.

-- = Not applicable/no free product.

FOOTNOTES:

(1) Table does not include data from MW-5/T70 when that well was gauged for Environmental Repair Program (ERP) monitoring or MW-1R/T70 and MW-7/T70 as they were sealed in 2022.

(2) Bailed the monitoring wells (MWs) dry in preparation for sampling.

(3) Sampled the MWs (see Table 2 for summary of analytical results).

(4) Free product check.

Table 2
Groundwater Analytical Results for Detected Compounds
Tank 70 Release Site
Superior Refining Company LLC
Superior, Wisconsin

Well ID	Substance Concentration (µg/l) and Results Qualifier (if any)									
	GRO	Benzene	Ethylbenzene	Toluene	Xylenes	TMBs	MTBE	Isopropylbenzene	Naphthalene	n-Propylbenzene
NR 140 PAL	NS	0.5	140	160	400	96	12	NS	10	NS
NR 140 ES	NS	5	700	800	2,000	480	60	NS	100	NS
MW-1/T70 from 09/09/99 through 11/15/07 and its replacement MW-1R/T70 since 05/27/08										
9/9/1999	115000	25900	4390	33800	16600	3720	< 1,500	na	na	na
12/9/1999	115000	23100	2730	30500	17280	3584	< 150	na	na	na
3/9/2000	87000	25000	2400	31000	14000	3130	< 160	na	na	na
6/14/2000	120000	28000	3300	43000	21000	4040	< 94	na	na	na
6/7/2002	130000	31000	2600	33000	16100	3030	< 35	55 J	450	240 J
9/12/2002	110000	29000	2600	34000	17700	3920	< 86	na	810	na
9/30/2004	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
5/26/2005	167000	25100	5510	50300	32800	10970	< 150	na	848	na
11/9/2005	108000	38200	2130	46000	13890	1578	< 300	na	< 800	na
5/10/2006	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
11/16/2006	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
5/27/2008	103000	31000	1750	31500	13910	2657	< 15.0	na	475	na
11/24/2008	96400	26400	2060	28100	15790	3592	< 150	na	753 J	na
5/27/2009	115000	32900	2930	33600	18510	3555	< 60.0	na	669	na
10/25/2011	na	28100	1970	24200	13040	2003 J	< 500	na	< 1000	na
5/16/2012	na	26300	2360	23000	14890	2882	< 122	na	< 178	na
8/21/2013	na	24850	2545	22250	16885	3524.5 J	< 123	na	668 J	na
10/21/2014	na	13600	983	10500	9390	2032	< 48.5	na	348	na
6/23/2015	na	14600	1500	14300	12770	2397	< 21.8	na	418 J	na
10/6/2015	na	10400	570	8130	8750	1904	< 21.8	na	< 312	na
5/24/2016	na	30800	1670	20700	13870	2668	< 21.8	na	380 J	na
10/5/2016	na	12400	106 J	8630	8450	1280	< 21.8	na	< 312	na
5/17/2017	na	30400	2020	21100	14280	2269	< 34.8	na	599 J	na
10/25/2017	na	22000	1410	13900	11420	2275	< 34.8	na	< 500	na
6/12/2018	Starting 06/12/18, well not sampled due to PVC casing damage and surface water infiltration									
9/20/2022	Monitoring well MW-1R/T70 abandoned on September 20, 2022.									
MW-2/T70 from 09/12/02 through 11/16/06 and its replacement MW-2R/T70 since 05/27/08										
9/12/2002	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
9/30/2004	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
5/26/2005	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
11/9/2005	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
5/10/2006	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
11/16/2006	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
5/27/2008	160000	37900	3920	56000	26540	4431	< 15.0	na	777	na
11/24/2008	140000	31100	3900	46200	24045	5245	< 150	na	1055 J	na
5/27/2009	148000	32400	4210	51100	26605	4935	< 75.0	na	966.5	na
10/25/2011	na	23600	2700	38100	20590	3270 J	< 500	na	< 1000	na
5/16/2012	na	23200	3210	37300	23890	5420	< 122	na	445 J	na
8/21/2013	na	20800	5410	41200	44100	19330	< 98.7	na	3950	na
10/21/2014	na	17300	2280	25800	19110	4280	< 97.0	na	776	na
6/23/2015	na	15900	2130	25200	21480	4483	< 43.6	na	743 J	na
10/6/2015	na	15200	1600	24100	17850	4002	< 43.6	na	< 625	na
5/24/2016	na	22000	2150	29500	19980	3918	< 43.6	na	< 625	na
10/5/2016	na	19200	1480	25700	18670	3086	< 43.6	na	< 625	na
5/16/2017	na	23000	2510	31500	23540	4044	< 43.6	na	< 625	na
10/25/2017	na	19800	2250	28400	21060	3678	< 43.6	na	< 625	na
6/12/2018	na	16300	2000	24400	21700	4410	< 43.6	na	< 625	na
10/9/2018	na	14400	1850	20900	21540	4919	< 311	na	575 J	na
5/21/2019	na	5650	875	9910	19720	5990	< 249	na	766 J	na
10/9/2019	na	11800	1310	15700	18610	5400	< 249	na	919 J	na
5/27/2020	na	19100	2310	25600	19900	4026	< 249	na	692 J	na
10/6/2020	na	18500	1970	23000	23900	4720 a	< 0.12	na	888 J	na
5/24/2021	na	15700	1870	19600	17700	3558	< 226	na	755 J	na
10/5/2021	na	13500	970	15000	15000	3321	< 18.1	na	685	na
5/25/2022	na	16600	2260	23100	17600	3566	< 12.6	na	665	na
10/11/2022	na	17100	1490	19900	18400	4297	< 25.2	na	685	na
5/30/2023	na	18500	2110	20300	19200	4242	< 25.2	na	827	na
10/16/2023	na	18300	1680	21400	18100	3928	< 25.2	na	637	na

Table 2
Groundwater Analytical Results for Detected Compounds
Tank 70 Release Site
Superior Refining Company LLC
Superior, Wisconsin

Well ID	Substance Concentration (µg/l) and Results Qualifier (if any)									
	GRO	Benzene	Ethyl-benzene	Toluene	Xylenes	TMBs	MTBE	Isopropyl-benzene	Naphthalene	n-Propyl-benzene
NR 140 PAL	NS	0.5	140	160	400	96	12	NS	10	NS
NR 140 ES	NS	5	700	800	2,000	480	60	NS	100	NS
MW-3/T70										
9/12/2002	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
9/30/2004	1400	400	66	3.2	143	87	< 0.90	na	14	na
5/26/2005	5970	1200	61.7	884	1412	274.3	< 15.0	< 15.5	47.3	< 15.0
11/9/2005	665	129	13.8	< 6.00	44	13	< 6.00	na	< 16.0	na
5/10/2006	< 10,000	500	102.0	636	823	231.7	< 0.300	na	27.5	na
11/16/2006	< 50.0	< 0.31	< 0.500	< 0.300	< 0.920	< 0.710	< 0.300	na	< 0.800	na
5/23/2007	< 50.0	< 0.31	< 0.500	0.948 J	1.90 J	< 0.710	< 0.300	na	2.51 J	na
11/15/2007	< 50.0	< 0.31	< 0.500	< 0.300	< 0.920	< 0.710	< 0.300	na	0.975 J	na
5/27/2008	151	14.2	3.57	5.44	15.62	4.06	< 0.300	na	< 0.800	na
11/24/2008	< 50.0	2.73	0.998 J	< 0.300	< 0.920	1.12	< 0.300	na	< 0.800	na
5/27/2009	252	38.2	11.8	3.5	40.9	19.16	1.76 J	na	1.86 J	na
10/25/2011	na	2040	444	154	2536	899	< 50.0	na	189 J	na
5/16/2012	na	2080	483	295	2494	761	< 12.2	na	33.7 J	na
8/21/2013	na	186	31.4	6.7	198.3	75.6	< 0.99	na	8.0 J	na
10/21/2014	na	273	7.2	6.0	436	149.1	< 1.2	na	8.9	na
6/23/2015	na	2.8	< 0.50	< 0.50	3.63 J	< 3.8	< 0.17	na	< 2.50	na
10/6/2015	na	4.0	0.70 J	< 0.50	< 1.77 J	< 1.28 J	< 0.17	na	< 2.50	na
5/24/2016	na	748	44.5	12.2	522	218.4	< 1.7	na	< 25.0	na
10/5/2016	na	< 0.50	< 0.50	< 0.50	< 1.50	< 1.00	< 0.17	na	< 2.50	na
5/17/2017	na	56.1	< 0.50	0.78 J	22.6	8.42 J	< 0.17	na	3.2 J	na
10/25/2017	na	0.83 J	< 0.50	< 0.50	2.20 J	< 1.12 J	108	na	< 2.5	na
6/12/2018	na	441	9.5 J	12.5	299.7	95.8	< 1.7	na	< 25.0	na
10/9/2018	na	32.5	4.1	0.50 J	55.8	36.6	< 1.2	na	5.1	na
5/21/2019	na	270	22.2	7.1	265.8	104.9	< 1.2	na	15.7	na
10/9/2019	na	364	31.2	3.0 J	210.1	105.3 J	< 3.1	na	24.8	na
5/27/2020	na	821	179	23.0	592	252.1	< 1.2	na	46.5	na
10/6/2020	na	365	31.2	3.1	206	98.0	< 0.12	na	21.8	na
5/24/2021	na	352	25.0 J-	7.2	273	115.0	< 1.1	na	17.7	na
10/5/2021	na	601 H	85.7 J-	6.3	282 J-	149 a	< 0.36	na	31.3	na
5/25/2022	na	478	58.0 J	6.5	281	135	< 0.13	na	26.4	na
10/11/2022	na	188	17.2	0.85 J	69.8	26.9 a	< 0.25	na	10.9	na
5/30/2023	na	509	84.9	8.3	286	155	< 0.13	na	24.0	na
10/16/2023	na	41.0	5.6	0.22 J	21.7	13.5	< 0.13	na	1.8	na
MW-4/T70										
9/12/2002	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
9/30/2004	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
5/26/2005	234000	23400	4280	49300	35130	9800	< 600	< 620	1810	820
11/9/2005	145000	28900	4640	50300	47400	11850	< 75.0	na	1060	na
5/10/2006	88350	23600	2505	39700	25550	5805	< 150	na	750 J	na
11/16/2006	116000	22900	2420	40900	25130	4970	< 75.0	na	979	na
5/23/2007	129000	24300	2080	37600	24630	5160	< 75.0	na	1040	na
11/15/2007	110000	19800	1770	29000	22290	5200	< 150	na	1380	na
5/27/2008	127000	27100	2320	38800	26540	5270	< 150	na	777 J	na
11/24/2008	104000	22000	1800	30500	22890	5810	< 150	na	1150 J	na
5/27/2009	123000	27200	2750	38900	24340	4820	440	na	808	na
10/25/2011	na	20300	2110	37100	25290	5160	< 500	na	< 1000	na
5/16/2012	na	21700	1720	30500	21400	5100	< 122	na	279 J	na
8/21/2013	na	21300	1800	31200	23170	5790 J	< 123	na	997 J	na
10/21/2014	na	15300	1140	21000	18090	3863	< 97.0	na	751	na
6/23/2015	na	6210	615	9580	10030	2067	< 17.4	na	497 J	na
10/6/2015	na	10700	1500	17600	17470	3190	< 17.4	na	515	na
5/24/2016	na	14700	2160	20700	23200	4118	< 17.4	na	712	na
10/5/2016	na	10600	1520	15700	18360	3446	< 17.4	na	686	na
5/17/2017	na	16700	1750	25900	21540	3906	< 21.8	na	584 J	na
10/25/2017	na	11100	954	13600	11720	2148	< 34.8	na	< 500	na
6/12/2018	na	12200	1560	15900	21550	4152	< 17.4	na	681	na
10/9/2018	na	17400	1810	23200	24230	4283	< 125	na	609	na
5/21/2019	na	16200	1860	18300	22430	4430	< 12.5	na	923	na
10/9/2019	na	16400	1600	20000	20810	4221	< 249	na	847 J	na
5/27/2020	na	12000	1380	15400	19400	3814	< 249	na	724 J	na
10/6/2020	na	17500	1820	21800	26300	4630 a	< 0.12	na	869 J	na
5/24/2021	na	10200	926	10000	16000	3020	< 113	na	563	na
10/5/2021	na	12800	880	12100	20000	3646	< 3.2 H	na	853	na
5/25/2022	na	16800	1310	19700	17100	3208	< 25.2	na	650	na
10/11/2022	na	15200	1350	17700	21200	4137	< 25.2	na	738	na
5/30/2023	na	14700	1320	16000	19000	3827	< 25.2	na	738	na
10/16/2023	na	16300	1350	18700	21000	4022	< 25.2	na	662	na

Table 2
Groundwater Analytical Results for Detected Compounds
Tank 70 Release Site
Superior Refining Company LLC
Superior, Wisconsin

Well ID	Substance Concentration (µg/l) and Results Qualifier (if any)									
	GRO	Benzene	Ethyl-benzene	Toluene	Xylenes	TMBs	MTBE	Isopropyl-benzene	Naphthalene	n-Propyl-benzene
NR 140 PAL	NS	0.5	140	160	400	96	12	NS	10	NS
NR 140 ES	NS	5	700	800	2,000	480	60	NS	100	NS
MW-5/T70										
9/12/2002	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
9/30/2004	1600	6.1	11	17	78	35	< 0.61	0.62 J	78	< 0.81
5/26/2005	1530	4.75	3.05	17.8	66.4	26.43	< 0.3	na	72.3	na
11/9/2005	1810	7.81	3.01	25.2	120.2	174	< 0.3	na	85	na
5/10/2006	1620	5.87	8.73	18.9	78.3	109.9	< 0.300	na	47.3	na
11/16/2006	1560	6.89	2.55	18.1	87.5	52.1	< 0.300	na	72.2	na
5/23/2007	1270	4.54	24.5	15.0	65.1	48.3	< 0.300	na	68.1	na
11/15/2007	1150	6.78	< 2.50	12.0	57.7	37.4	< 1.50	na	57.0	na
5/27/2008	1120	8.79	22.5	18.4	76.8	36.1	< 1.50	na	60.6	na
11/24/2008	1190	6.84 J	17.2	15.0	84.6	51.6	< 1.50	na	101	na
5/27/2009	1930	7.69	59.1	24.3	120.0	65.7	< 0.300	na	112	na
10/25/2011	na	9.13	78.8	30.4	143.0	80.8	< 0.50	na	148	na
5/16/2012	na	10.4	58.2	25.9	107.5	62.7	< 0.61	na	129	na
8/21/2013	na	8.7	80.8	31.5	143.4	80.1	< 0.49	na	198	na
10/21/2014	na	0.91 J	< 0.39	1.0	7.4 J	< 1.52	< 0.48	na	3.4	na
6/23/2015	na	2.6	17.4	8.1	41.3	23.7	< 0.17	na	48.6	na
10/6/2015	na	1.6	0.59 J	< 0.50	11.3	3.1	< 0.17	na	10.9	na
5/24/2016	na	4.9	20.7	11.3	46.9	25.8	< 0.17	na	61.4	na
10/5/2016	na	3.4	3.2	7.5	41.0	16.9	< 0.17	na	42.2	na
5/16/2017	na	1.7	8.8	4.1	20.4	10.7	< 0.17	na	20.4	na
10/25/2017	na	179	9.9	1.6	136.8	56.8	< 0.17	na	17.9	na
6/12/2018	na	2.0	10.5	5.7	30.7	14.3	< 0.35	na	32.4	na
10/9/2018	na	4.3	0.66 J	0.51 J	4.08 J	< 1.97 J	< 1.2	na	2.5 J	na
5/21/2019	na	< 0.25	< 0.22	< 0.17	< 0.73	< 1.71	< 1.2	na	< 1.2	na
10/9/2019	na	1.3	0.85 J	2.1 J	11.1	5.2 J	< 1.2	na	14.8	na
5/27/2020	na	< 0.25	< 0.32	< 0.27	< 1.5	< 1.71	< 1.2	na	< 1.2	na
10/6/2020	na	1.7	3.9	3.4	16.7	20.5 a	< 0.12	na	35.1 J+	na
5/24/2021	na	< 0.30	< 0.33	< 0.29	< 1.0	< 0.81	< 1.1	na	< 1.1	na
10/5/2021	na	< 0.12	0.13 J	0.28 J	0.67	< 0.22	< 0.18	na	0.42 J	na
5/25/2022	na	0.12 J	0.14 J	0.26 J	0.56 J	0.24 a	< 0.13	na	0.46 J	na
10/11/2022	na	0.93 J	2.3	1.9	7.7	3.4 a	< 0.13	na	10.2	na
5/30/2023	na	2.8	15.6	6.0	29.1	15.8	< 0.13	na	31.7	na
10/16/2023	na	0.90 J	< 0.11	0.25 J	4.1	1.3 a	< 0.13	na	4.1	na
MW-6/T70										
9/12/2002	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
9/30/2004	9700	1200	58	140	3400	850	< 6.1	< 5.9	26	< 8.1
5/26/2005	21600	5490	52	3620	5150	1287	< 15.0	na	< 40.0	na
11/9/2005	18600	5240	258	4150	5460	1296	< 30.0	na	192	na
5/10/2006	34600	14900	399	17900	9570	1719	< 60.0	na	< 160	na
11/16/2006	59100	13800	659	16500	13000	2904	< 75.0	na	< 200	na
5/23/2007	35700	8730	< 125	8020	7450	2166	< 75.0	na	295 J	na
11/15/2007	21100	4040	335	4150	4060	1012	< 30.0	na	248 J	na
5/27/2008	50100	13400	960	14100	9870	1882	< 30.0	na	250 J	na
11/24/2008	2520	337	28.7	341	617	189	< 3.00	na	30.1	na
5/27/2009	27400	4600	629	4780	6890	1820	59.4 J	na	229	na
10/25/2011	na	7420	763	2410	8750	2460	< 50.0	na	251 J	na
5/16/2012	na	1600	260	660	1935	620	< 6.1	na	49.9 J	na
8/21/2013	na	3990	393	313	2650	774	< 9.9	na	114	na
10/21/2014	na	2630	16.0 J	126	2126	579	< 9.7	na	85.9	na
6/23/2015	na	537	6.3	33.4	160.9	57.7	< 0.87	na	14.5 J	na
10/6/2015	na	84.1	4.6	6.4	101.7	25.0	< 0.17	na	4.0 J	na
5/24/2016	na	1270	69.7	158	1158	295.5	< 1.7	na	41.9 J	na
10/5/2016	na	147	8.1	9.1	211.3	54.8	< 0.17	na	11.4	na
5/16/2017	na	2380	394	191	2407	647	< 8.7	na	< 125	na
10/25/2017	na	350	4.0 J	12.0	276.4	88.6	< 0.70	na	12.5 J	na
6/12/2018	na	42.3	< 0.50	2.3	66.0	13.0	< 0.17	na	3.0 J	na
10/9/2018	na	235	16.2	8.2	164.6	30.4	< 1.2	na	2.8 J	na
5/21/2019	na	666	54.0	36.3	239.0	71.4	< 2.5	na	11.3	na
10/9/2019	na	271	23.6	7.1 J	181.7	74.4	< 2.5	na	13.8	na
5/27/2020	na	387	43.5	15.0	134	77.1	< 1.2	na	13.4	na
10/6/2020	na	128	6.7	3.1	121	38.6 a	< 0.12	na	6.8 J+	na
5/24/2021	na	89.3	9.7	3.3	27.2	17.4	< 1.1	na	2.9 J	na
10/5/2021	na	175	14.6	5.6	55.4	28.6	< 0.18	na	6.9	na
5/25/2022	na	5790	951	182	3870	1285	< 0.13	na	204	na
10/11/2022	na	258	6.9	12.8	187	93.1	< 0.25	na	14.9	na
5/30/2023	na	3350	531	165	2200	843	< 0.25	na	138	na
10/16/2023	na	16.8	1.8	0.58 J	25.7	2.95 a	< 0.13	na	0.36 J	na

Table 2
Groundwater Analytical Results for Detected Compounds
Tank 70 Release Site
Superior Refining Company LLC
Superior, Wisconsin

Well ID	Substance Concentration (µg/l) and Results Qualifier (if any)									
	GRO	Benzene	Ethyl-benzene	Toluene	Xylenes	TMBs	MTBE	Isopropyl-benzene	Naphthalene	n-Propyl-benzene
NR 140 PAL	NS	0.5	140	160	400	96	12	NS	10	NS
NR 140 ES	NS	5	700	800	2,000	480	60	NS	100	NS
MW-7/T70										
9/12/2002	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
9/30/2004	120000	29000	2900	36000	18800	3600	< 120	< 130	560	240 J
5/26/2005	144000	26400	3640	40600	24370	6440	< 150	na	4430	na
11/9/2005	104000	31000	3100	44400	21950	3661	< 150	na	500	na
5/10/2006	105000	29900	2420	34700	17580	3613	< 60.0	na	836	na
11/16/2006	111000	30700	2420	38150	17525	2634	< 150	na	< 400	na
5/23/2007	127500	31350	3170	41050	20880	4460	< 150	na	996.5 J	na
11/15/2007	FP	FP	FP	FP	FP	FP	FP	FP	FP	FP
5/27/2008	153000	38700	3470	53800	26310	4810	< 150	na	809 J	na
11/24/2008	123000	28300	2740	36100	22150	5200	< 150	na	1100 J	na
5/27/2009	115000	31200	3130	32200	21500	4410	< 75.0	na	682	na
10/25/2011	na	27600	2320	22500	17750	7270	< 500	na	1100 J	na
5/16/2012	na	26300	2460	21900	18620	5360	< 122	na	459 J	na
8/21/2013	na	24900	2450	18200	16860	5030 J	< 123	na	753 J	na
10/21/2014	na	21000	1930	21000	15100	3023	< 60.6	na	501	na
6/23/2015	na	17000	1570	19300	13650	2573	< 34.8	na	< 500	na
10/6/2015	Starting 10/06/15, well not sampled due to PVC casing damage and surface water infiltration									
9/20/2022	Monitoring well MW-7/T70 abandoned on September 20, 2022.									

NOTES:

Results are in micrograms per liter (µg/l) or parts per billion (ppb).

Detected concentrations at or above an applicable NR 140 PAL are in **bold** font; those at or above an NR 140 ES are in *italicized* font.

Prior to 2020, duplicate sample results were averaged for statistical analysis/plotting, per Dec 2013 ITRC guidance.

Samples collected from most wells were analyzed for VOCs at least once; all other samples analyzed for GRO/PVOCs and naphthalene or PVOCs and naphthalene. In addition, MW-1/T70 was sampled for dissolved lead on 09/09/99 (6.25 ppb) and 12/09/99 (<1.0 ppb).

a = Estimated value, calculated using some or all values that are estimates.

H = Recommended sample preservation, extraction or analysis holding time was exceeded.

FP = Free product, well not sampled.

GRO = Gasoline range organics.

J (Pre 2020) = Estimated concentration below laboratory quantitation level.

J (Post 2020) = Estimated detected value. Either certain QC criteria were not met or the concentration is between the laboratory's detection and quantitation limits.

J+ = The result is an estimated quantity and may be biased high.

J- = The result is an estimated quantity and may be biased low.

MTBE = Methyl tert butyl ether.

na = Not analyzed.

NI = Not installed.

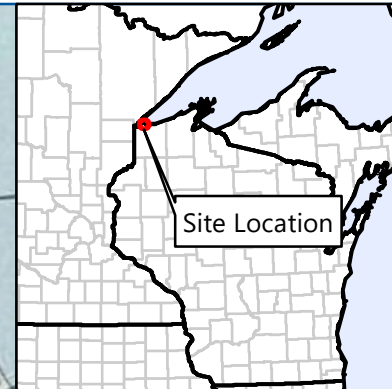
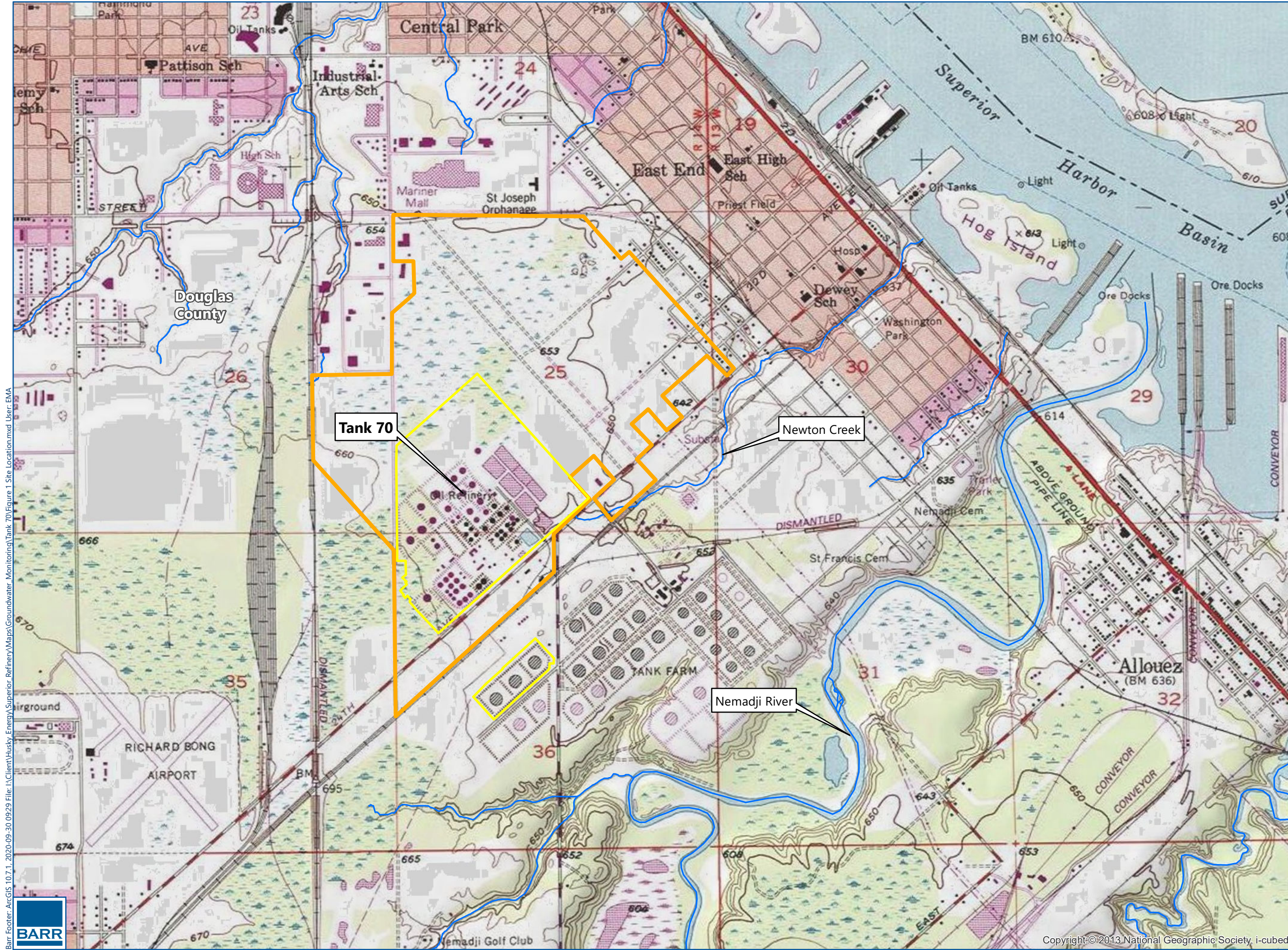
NR 140 ES = Wisconsin Administrative Code NR 140 Enforcement Standard; 7/1/2015.

NR 140 PAL = Wisconsin Administrative Code NR 140 Preventive Action Limit; 7/1/2015.

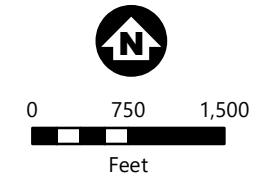
NS = No standard.

TMBs = Sum of 1,2,4-Trimethylbenzene and 1,3,5-Trimethylbenzene.

Figures



- Approximate SRC Property Boundaries for Contiguous Operations
- Approximate Fenceline Boundaries for Refining-Related Activities

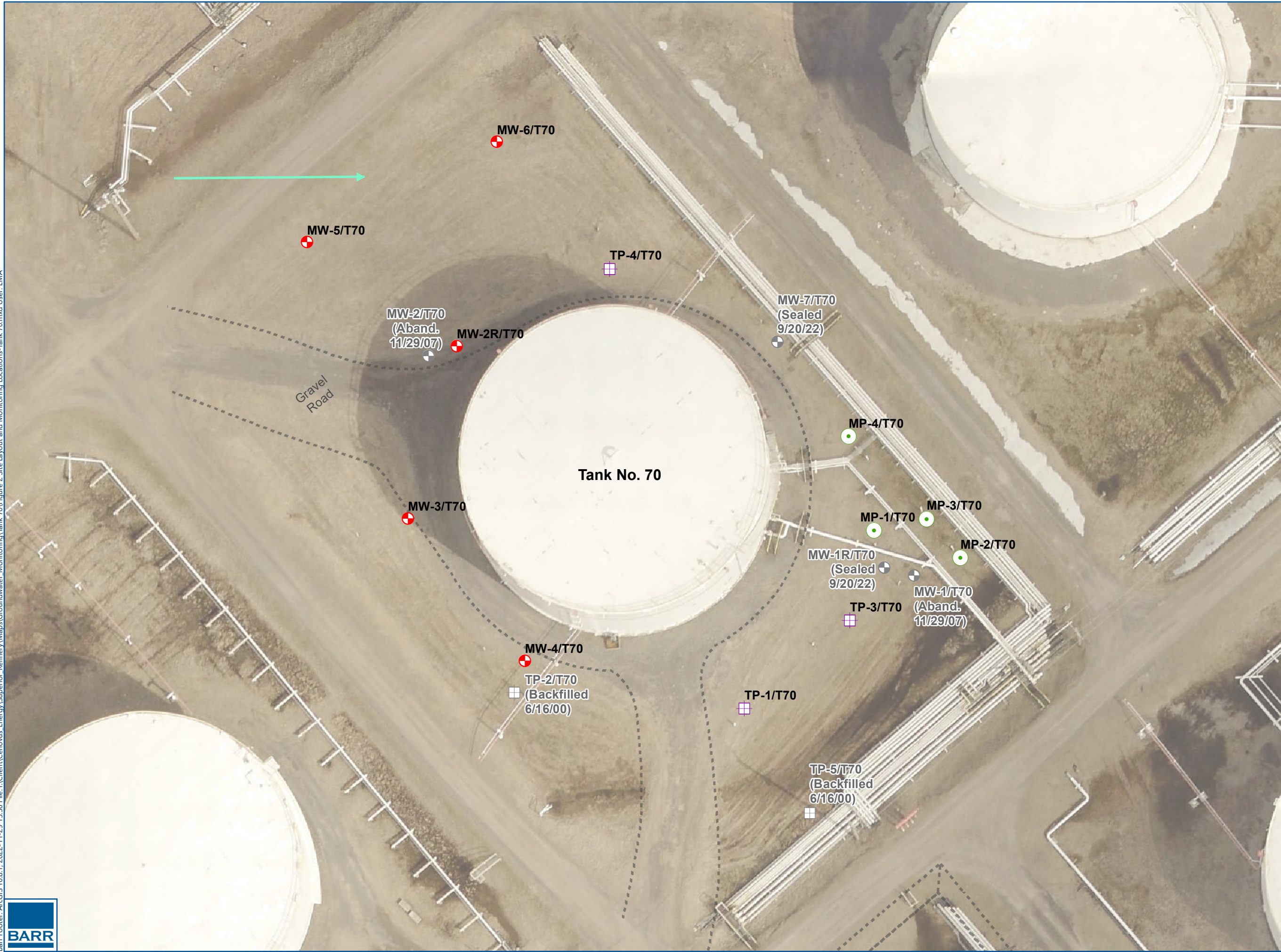


SITE LOCATION
 Superior Refining
 Company LLC (SRC)
 Superior, WI
FIGURE 1

Barr Footer: ArcGIS 10.7.1, 2020-09-30 09:29 File: I:\Client\Husky Energy\Superior Refinery\Maps\Groundwater_Monitoring\Tank 70\Figure 1 Site Location.mxd User: EMA



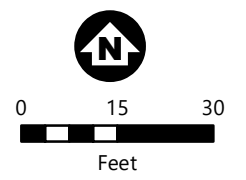
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- ⊕ Monitoring Well
MW-1/T-70 installed 1999.
MW-2/T70, MW-3/T70,
MW-4/T70 installed 2003.
MW-5/T70, MW-6/T70,
MW-7/T70 installed 2004.
MW-1R/T70 and MW-2R/
T70 installed 2007.
- ⊞ Test Pit
- ⊙ Monitoring Point
(July 2001)
- General Direction of
Groundwater Flow

- Notes:
1. Gray shaded wells/test pits have been abandoned, back-filled, or are not locatable.
 2. Site layout and sample locations are based on field measurements by Twin Ports Testing and are to be considered approximate; site not surveyed.
 3. Sumps installed in Test Pits TP-1, TP-3, and TP-4 in June 2000. Each sump is 8 feet deep and consists of 6" diameter PVC with 4 feet of slotted PVC screen.
 4. Each monitoring point is 7 feet deep and consists of PVC with 3 feet of 4" diameter slotted PVC screen.
 5. Impermeable liner with clay layer cap installed in Tank 70 basin, June 2003.

Source: Gannett Fleming. Sample locations are based on field measurements made by Gannett Fleming and are approximate. Locations were not surveyed.

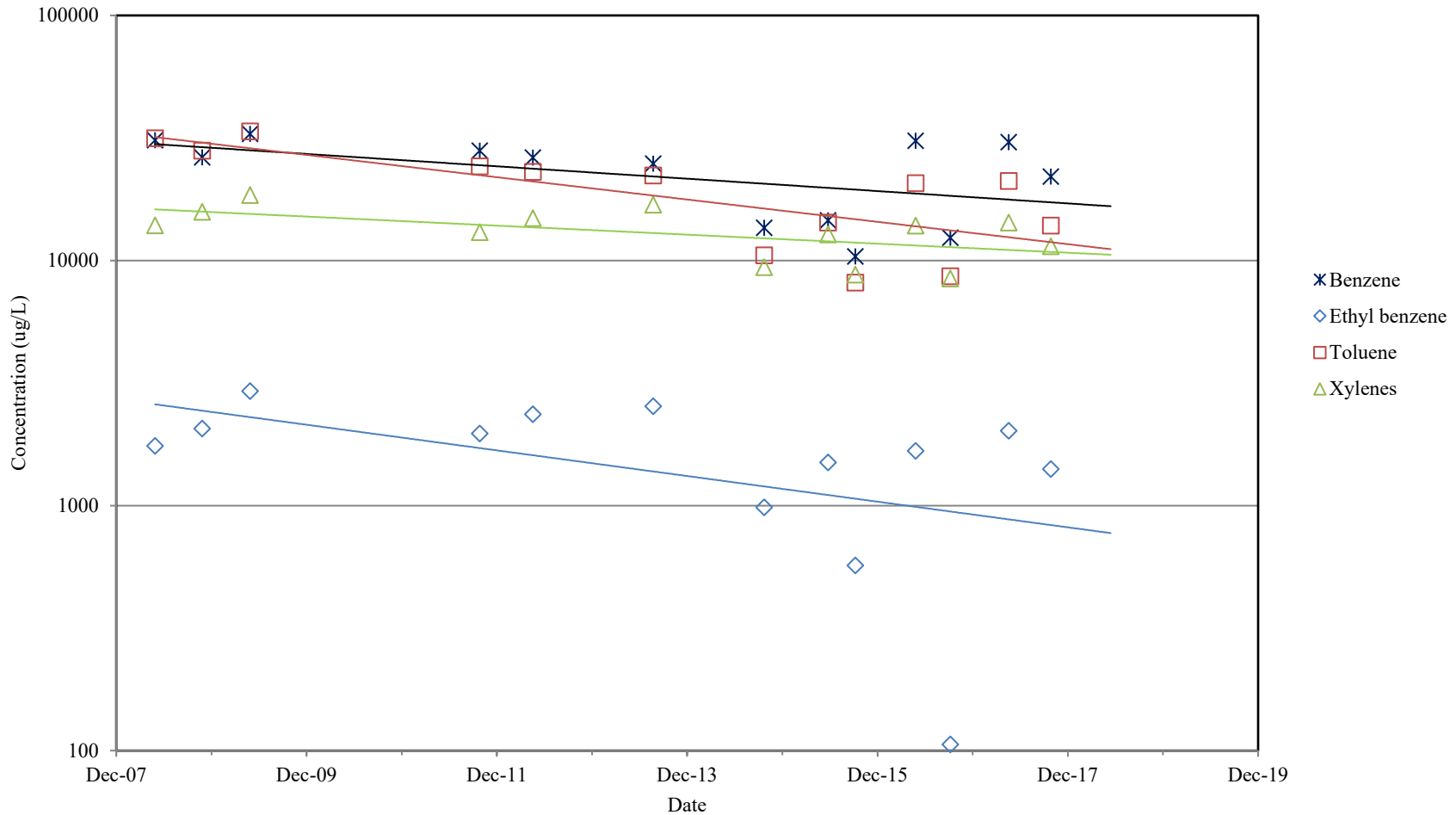


1 inch = 30 feet

TANK 70 SITE LAYOUT & MONITORING LOCATIONS
Superior Refining
Company LLC (SRC)
Superior, WI
FIGURE 2



FIGURE 3



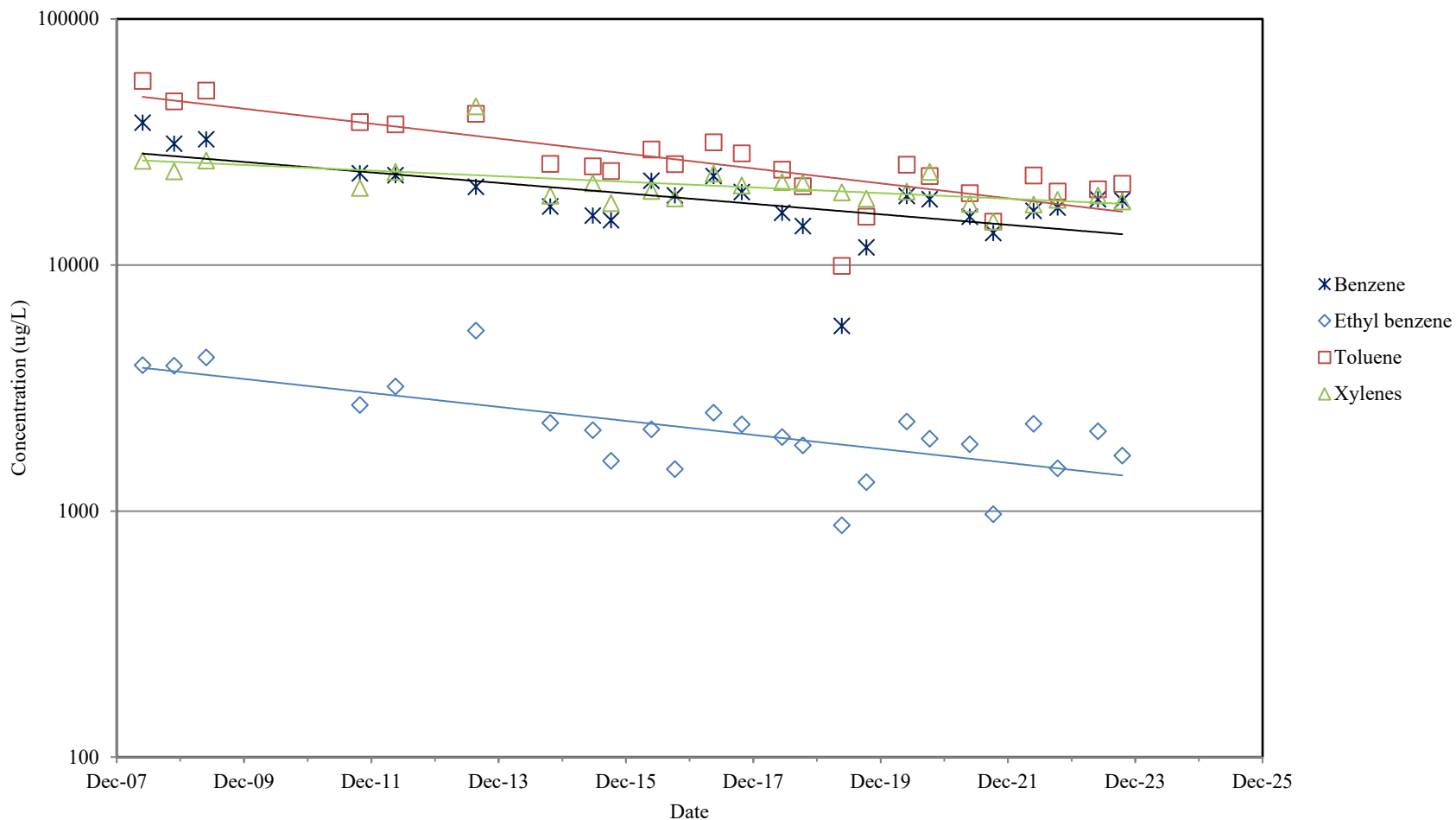
Note: Best-fit exponential trend lines generated using Excel and non-detect concentrations (if any) plotted at detection limit.

HISTORICAL BTEX GROUNDWATER CONCENTRATIONS TANK 70 BASIN MW-1R/T70

SUPERIOR REFINING COMPANY LLC
 SUPERIOR, WISCONSIN

*Plotted data only includes the time since measurable free product was most recently encountered.
 Monitoring well was abandoned on Fall 2022.

FIGURE 4



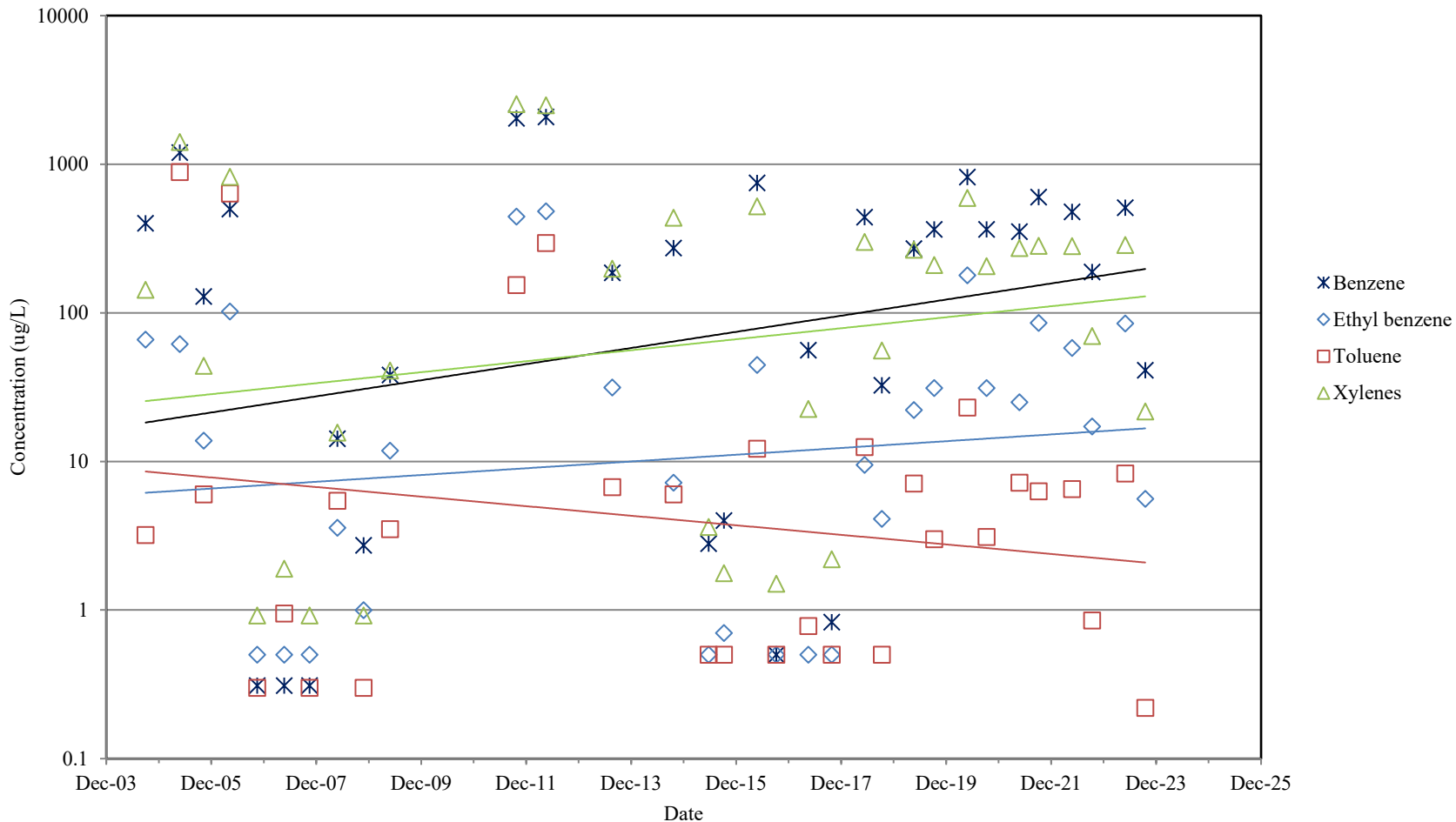
Note: Best-fit exponential trend lines generated using Excel and non-detect concentrations (if any) plotted at detection limit.

HISTORICAL BTEX GROUNDWATER CONCENTRATIONS TANK 70 BASIN MW-2R/T70

SUPERIOR REFINING COMPANY LLC
SUPERIOR, WISCONSIN

*Plotted data only includes the time since measurable free product was most recently encountered.

FIGURE 5

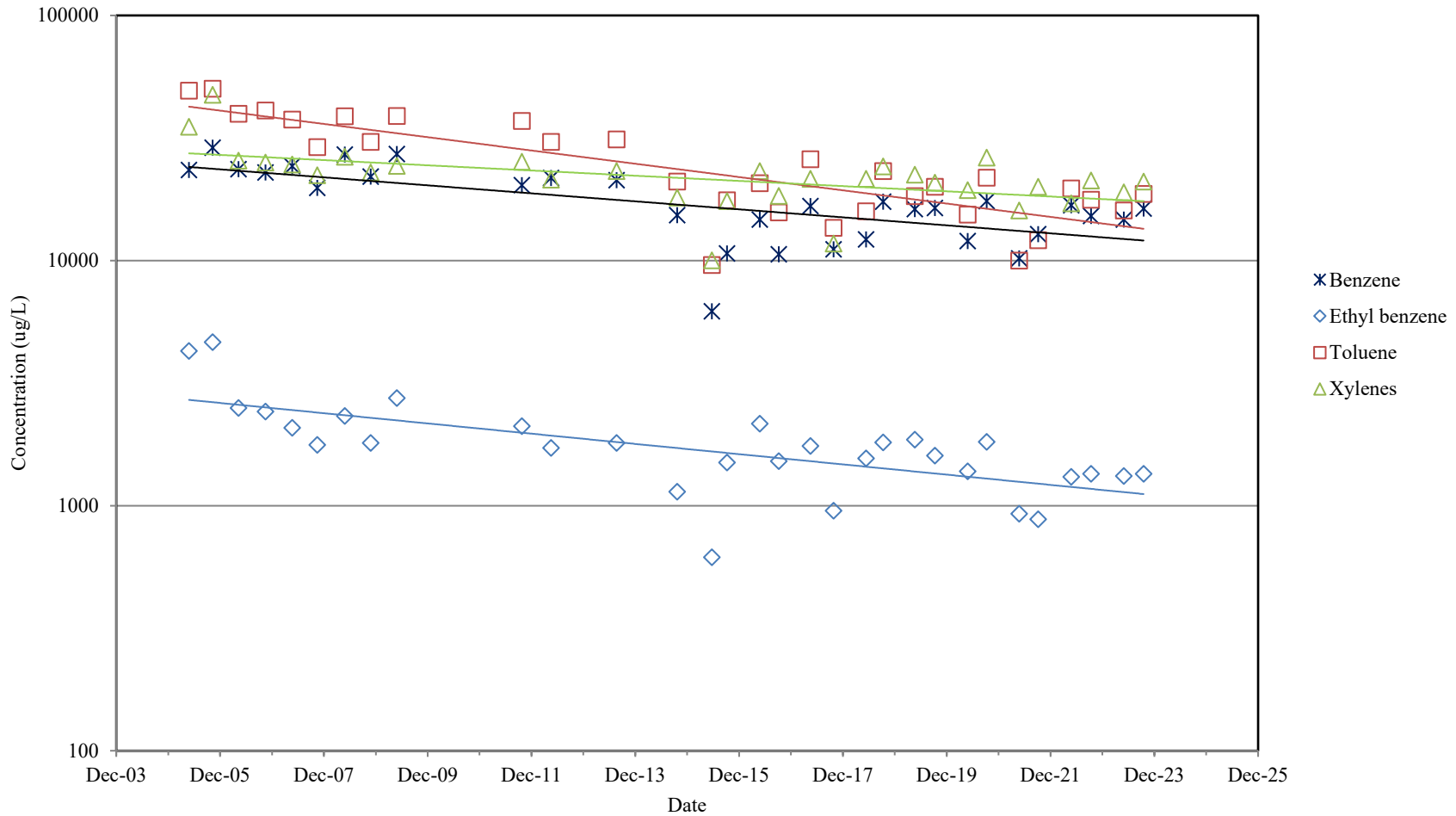


Note: Best-fit exponential trend lines generated using Excel and non-detect concentrations (if any) plotted at detection limit.

HISTORICAL BTEX GROUNDWATER CONCENTRATIONS TANK 70 BASIN MW-3/T70

SUPERIOR REFINING COMPANY LLC
SUPERIOR, WISCONSIN

FIGURE 6



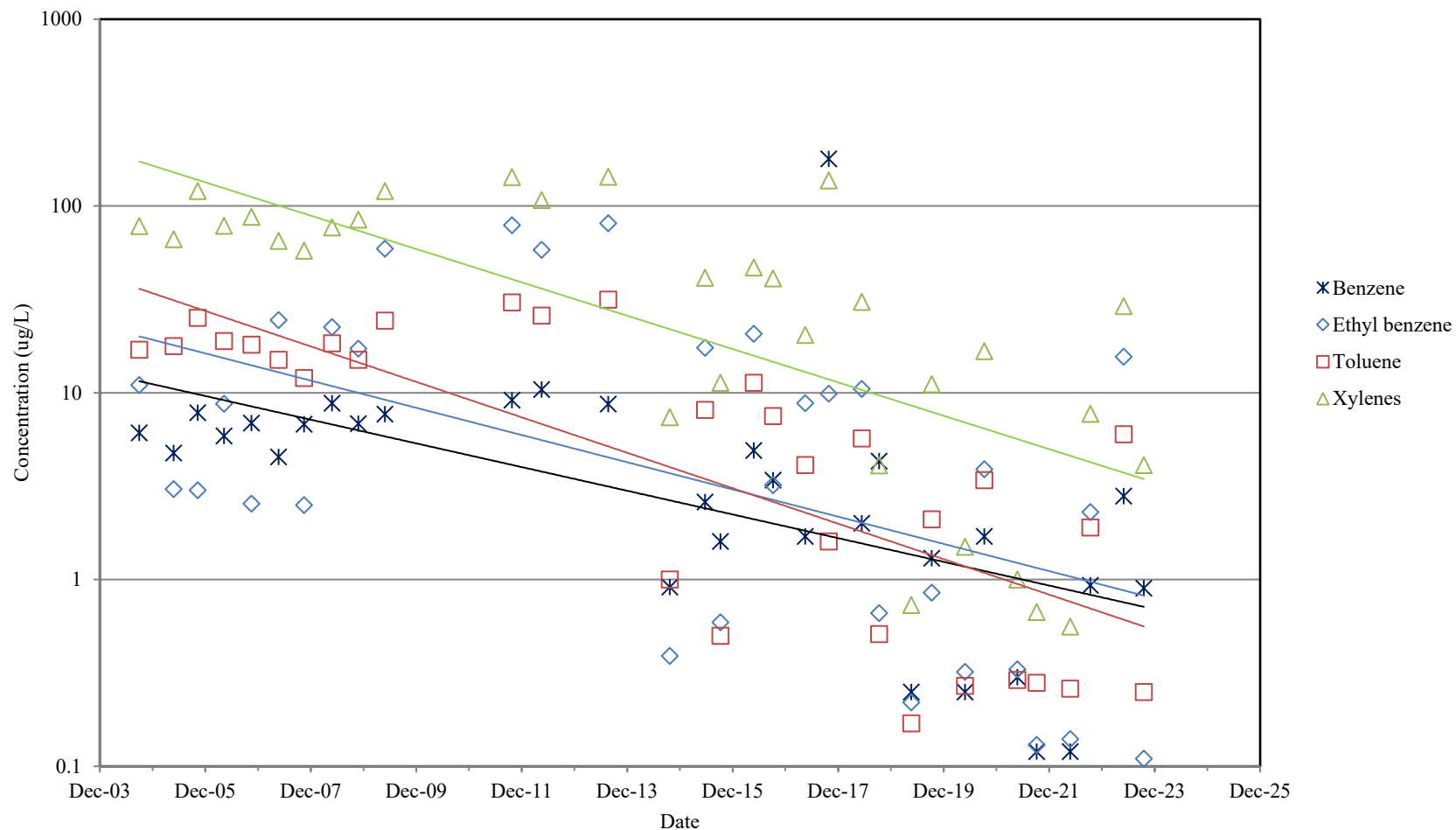
Note: Best-fit exponential trend lines generated using Excel and non-detect concentrations (if any) plotted at detection limit.

HISTORICAL BTEX GROUNDWATER CONCENTRATIONS TANK 70 BASIN MW-4/T70

SUPERIOR REFINING COMPANY LLC
SUPERIOR, WISCONSIN

*Plotted data only includes the time since measurable free product was most recently encountered.

FIGURE 7

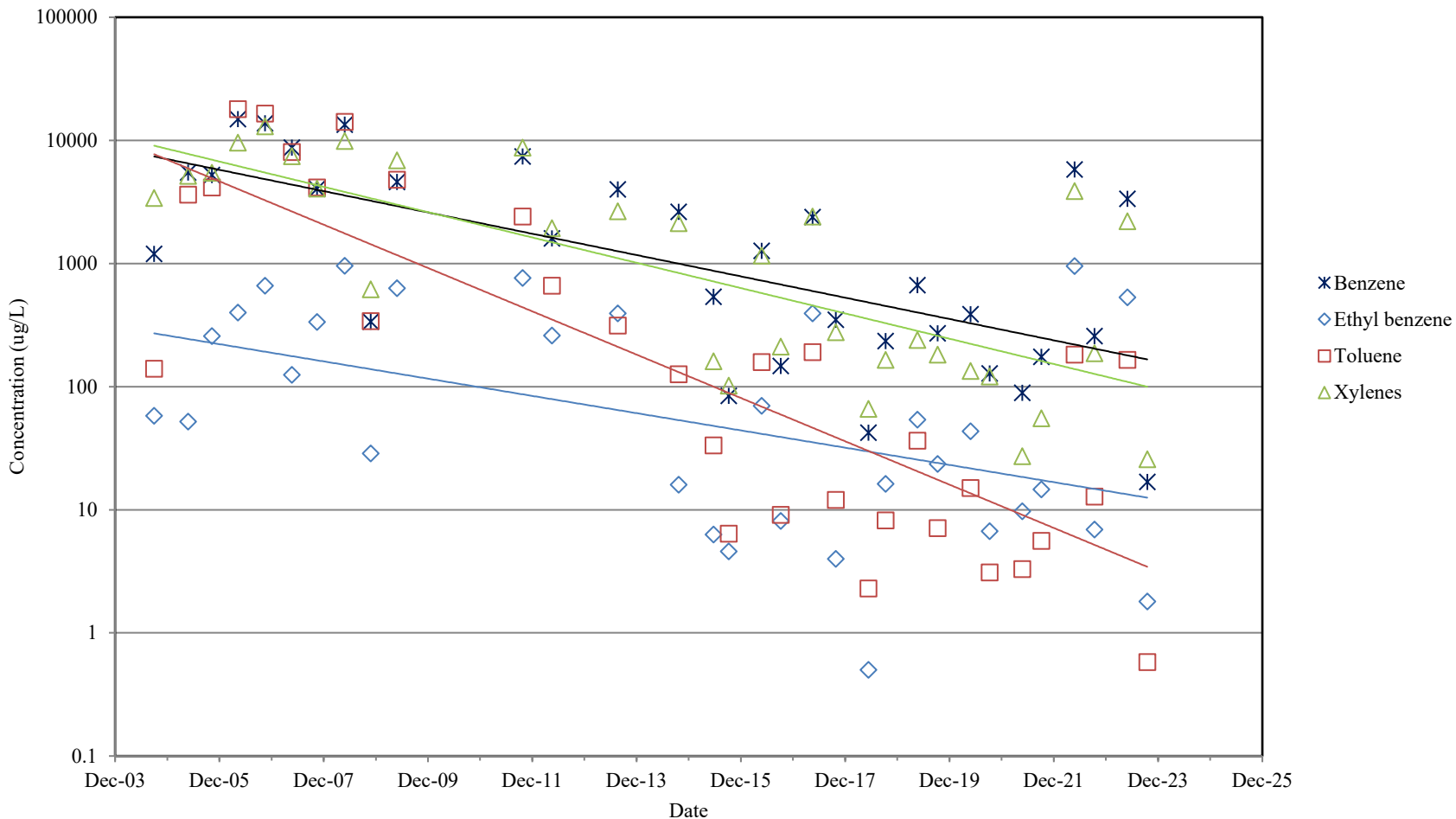


Note: Best-fit exponential trend lines generated using Excel and non-detect concentrations (if any) plotted at detection limit.

HISTORICAL BTEX GROUNDWATER CONCENTRATIONS TANK 70 BASIN MW-5/T70

SUPERIOR REFINING COMPANY LLC
SUPERIOR, WISCONSIN

FIGURE 8

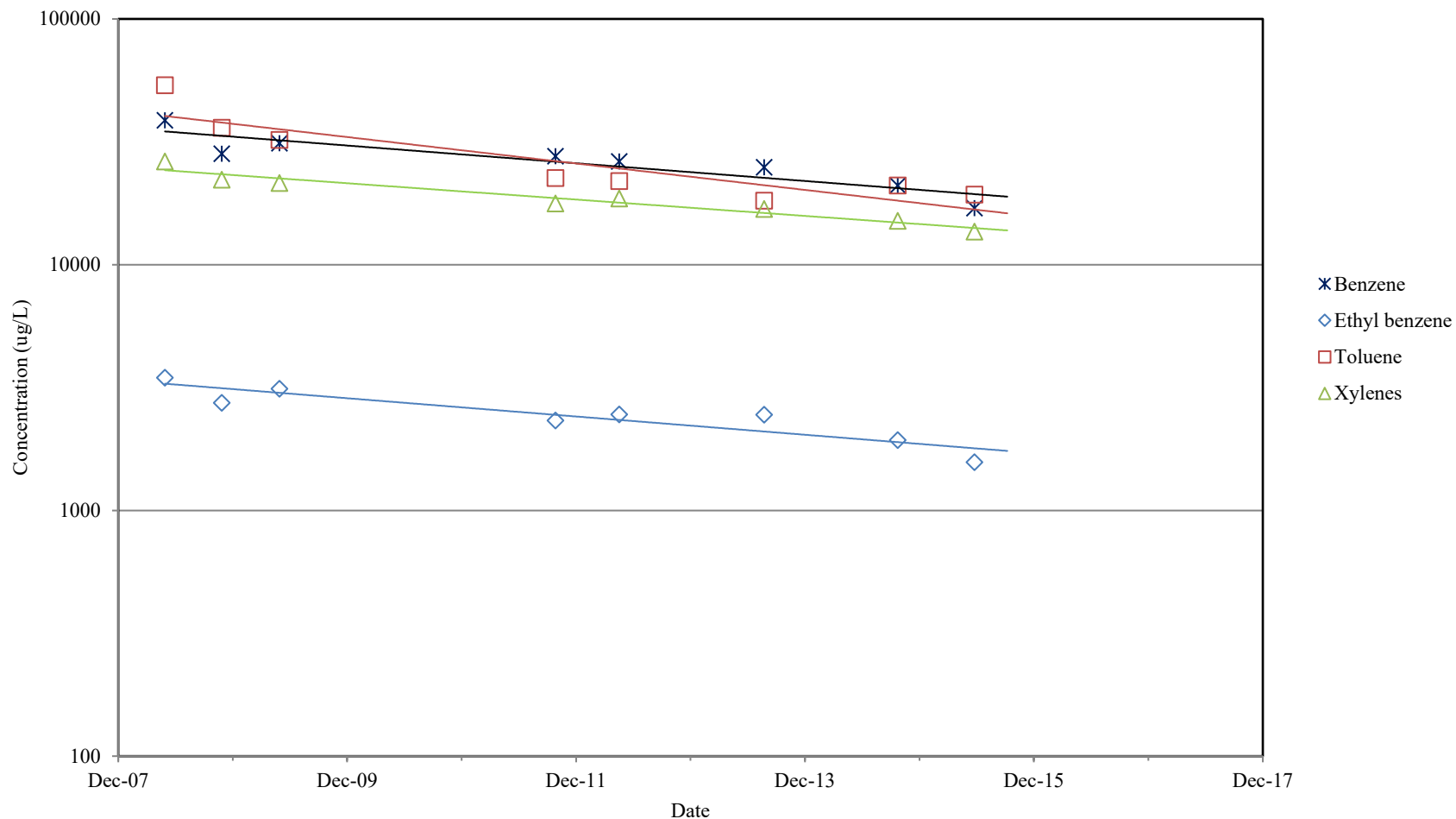


Note: Best-fit exponential trend lines generated using Excel and non-detect concentrations (if any) plotted at detection limit.

HISTORICAL BTEX GROUNDWATER CONCENTRATIONS TANK 70 BASIN MW-6/T70

SUPERIOR REFINING COMPANY LLC
SUPERIOR, WISCONSIN

FIGURE 9



Note: Best-fit exponential trend lines generated using Excel and non-detect concentrations (if any) plotted at detection limit.

HISTORICAL BTEX GROUNDWATER CONCENTRATIONS TANK 70 BASIN MW-7/T70

SUPERIOR REFINING COMPANY LLC
SUPERIOR, WISCONSIN

*Plotted data only includes the time since measurable free product was most recently encountered.
Monitoring well was abandoned on Fall 2022.

Attachments

Attachment A

Pace Analytical Laboratory Reports

June 07, 2023

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

RE: Project: 49161494.03 100 102 SRC GWTK70
Pace Project No.: 10655602

Dear Jim Taraldsen:

Enclosed are the analytical results for sample(s) received by the laboratory on June 01, 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

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CERTIFICATIONS

Project: 49161494.03 100 102 SRC GWTK70

Pace Project No.: 10655602

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: 49161494.03 100 102 SRC GWTK70

Pace Project No.: 10655602

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10655602001	MW-2R/T70	Water	05/30/23 09:09	06/01/23 10:55
10655602002	MW-3/T70	Water	05/30/23 09:23	06/01/23 10:55
10655602003	MW-4/T70	Water	05/30/23 09:30	06/01/23 10:55
10655602004	MW-5/T70	Water	05/30/23 09:02	06/01/23 10:55
10655602005	MW-6/T70	Water	05/30/23 09:15	06/01/23 10:55
10655602006	Trip Blank	Water	05/30/23 00:00	06/01/23 10:55

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: 49161494.03 100 102 SRC GWTK70

Pace Project No.: 10655602

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10655602001	MW-2R/T70	EPA 8260D	LPM	11	PASI-M
10655602002	MW-3/T70	EPA 8260D	LPM, PAB	11	PASI-M
10655602003	MW-4/T70	EPA 8260D	LPM	11	PASI-M
10655602004	MW-5/T70	EPA 8260D	LPM, PAB	11	PASI-M
10655602005	MW-6/T70	EPA 8260D	LPM, PAB	11	PASI-M
10655602006	Trip Blank	EPA 8260D	LPM	11	PASI-M

PASI-M = Pace Analytical Services - Minneapolis

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 49161494.03 100 102 SRC GWTK70

Pace Project No.: 10655602

Sample: MW-2R/T70 **Lab ID: 10655602001** Collected: 05/30/23 09:09 Received: 06/01/23 10:55 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8260D MSV UST									
Analytical Method: EPA 8260D									
Pace Analytical Services - Minneapolis									
Benzene	18500	ug/L	200	20.6	200		06/02/23 23:14	71-43-2	
Ethylbenzene	2110	ug/L	200	21.8	200		06/02/23 23:14	100-41-4	
Methyl-tert-butyl ether	<25.2	ug/L	200	25.2	200		06/02/23 23:14	1634-04-4	
Naphthalene	827	ug/L	200	36.2	200		06/02/23 23:14	91-20-3	
Toluene	20300	ug/L	200	20.6	200		06/02/23 23:14	108-88-3	
1,2,4-Trimethylbenzene	3340	ug/L	200	26.0	200		06/02/23 23:14	95-63-6	
1,3,5-Trimethylbenzene	902	ug/L	200	22.6	200		06/02/23 23:14	108-67-8	
Xylene (Total)	19200	ug/L	600	39.8	200		06/02/23 23:14	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	99	%	75-125		200		06/02/23 23:14	2199-69-1	D4
4-Bromofluorobenzene (S)	101	%	75-125		200		06/02/23 23:14	460-00-4	
Toluene-d8 (S)	99	%	75-125		200		06/02/23 23:14	2037-26-5	

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ANALYTICAL RESULTS

Project: 49161494.03 100 102 SRC GWTK70

Pace Project No.: 10655602

Sample: MW-3/T70 **Lab ID: 10655602002** Collected: 05/30/23 09:23 Received: 06/01/23 10:55 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8260D MSV UST									
Analytical Method: EPA 8260D									
Pace Analytical Services - Minneapolis									
Benzene	509	ug/L	5.0	0.52	5		06/06/23 16:16	71-43-2	
Ethylbenzene	84.9	ug/L	1.0	0.11	1		06/02/23 22:29	100-41-4	
Methyl-tert-butyl ether	<0.13	ug/L	1.0	0.13	1		06/02/23 22:29	1634-04-4	
Naphthalene	24.0	ug/L	1.0	0.18	1		06/02/23 22:29	91-20-3	
Toluene	8.3	ug/L	1.0	0.10	1		06/02/23 22:29	108-88-3	
1,2,4-Trimethylbenzene	149	ug/L	1.0	0.13	1		06/02/23 22:29	95-63-6	
1,3,5-Trimethylbenzene	6.3	ug/L	1.0	0.11	1		06/02/23 22:29	108-67-8	
Xylene (Total)	286	ug/L	3.0	0.20	1		06/02/23 22:29	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	100	%	75-125		1		06/02/23 22:29	2199-69-1	
4-Bromofluorobenzene (S)	102	%	75-125		1		06/02/23 22:29	460-00-4	
Toluene-d8 (S)	99	%	75-125		1		06/02/23 22:29	2037-26-5	

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ANALYTICAL RESULTS

Project: 49161494.03 100 102 SRC GWTK70

Pace Project No.: 10655602

Sample: MW-4/T70 **Lab ID: 10655602003** Collected: 05/30/23 09:30 Received: 06/01/23 10:55 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8260D MSV UST									
Analytical Method: EPA 8260D									
Pace Analytical Services - Minneapolis									
Benzene	14700	ug/L	200	20.6	200		06/02/23 23:29	71-43-2	
Ethylbenzene	1320	ug/L	200	21.8	200		06/02/23 23:29	100-41-4	
Methyl-tert-butyl ether	<25.2	ug/L	200	25.2	200		06/02/23 23:29	1634-04-4	
Naphthalene	738	ug/L	200	36.2	200		06/02/23 23:29	91-20-3	
Toluene	16000	ug/L	200	20.6	200		06/02/23 23:29	108-88-3	
1,2,4-Trimethylbenzene	2990	ug/L	200	26.0	200		06/02/23 23:29	95-63-6	
1,3,5-Trimethylbenzene	837	ug/L	200	22.6	200		06/02/23 23:29	108-67-8	
Xylene (Total)	19000	ug/L	600	39.8	200		06/02/23 23:29	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	101	%	75-125		200		06/02/23 23:29	2199-69-1	D4
4-Bromofluorobenzene (S)	100	%	75-125		200		06/02/23 23:29	460-00-4	
Toluene-d8 (S)	101	%	75-125		200		06/02/23 23:29	2037-26-5	

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ANALYTICAL RESULTS

Project: 49161494.03 100 102 SRC GWTK70

Pace Project No.: 10655602

Sample: MW-5/T70 **Lab ID: 10655602004** Collected: 05/30/23 09:02 Received: 06/01/23 10:55 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8260D MSV UST									
Analytical Method: EPA 8260D									
Pace Analytical Services - Minneapolis									
Benzene	2.8	ug/L	1.0	0.10	1		06/06/23 15:02	71-43-2	
Ethylbenzene	15.6	ug/L	1.0	0.11	1		06/02/23 22:44	100-41-4	
Methyl-tert-butyl ether	<0.13	ug/L	1.0	0.13	1		06/02/23 22:44	1634-04-4	
Naphthalene	31.7	ug/L	1.0	0.18	1		06/02/23 22:44	91-20-3	
Toluene	6.0	ug/L	1.0	0.10	1		06/02/23 22:44	108-88-3	
1,2,4-Trimethylbenzene	11.7	ug/L	1.0	0.13	1		06/02/23 22:44	95-63-6	
1,3,5-Trimethylbenzene	4.1	ug/L	1.0	0.11	1		06/02/23 22:44	108-67-8	
Xylene (Total)	29.1	ug/L	3.0	0.20	1		06/02/23 22:44	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	100	%	75-125		1		06/02/23 22:44	2199-69-1	
4-Bromofluorobenzene (S)	101	%	75-125		1		06/02/23 22:44	460-00-4	
Toluene-d8 (S)	102	%	75-125		1		06/02/23 22:44	2037-26-5	

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ANALYTICAL RESULTS

Project: 49161494.03 100 102 SRC GWTK70

Pace Project No.: 10655602

Sample: MW-6/T70 **Lab ID: 10655602005** Collected: 05/30/23 09:15 Received: 06/01/23 10:55 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8260D MSV UST									
Analytical Method: EPA 8260D									
Pace Analytical Services - Minneapolis									
Benzene	3350	ug/L	25.0	2.6	25		06/06/23 17:31	71-43-2	
Ethylbenzene	531	ug/L	25.0	2.7	25		06/06/23 17:31	100-41-4	
Methyl-tert-butyl ether	<0.25	ug/L	2.0	0.25	2		06/02/23 22:59	1634-04-4	
Naphthalene	138	ug/L	2.0	0.36	2		06/02/23 22:59	91-20-3	
Toluene	165	ug/L	2.0	0.21	2		06/02/23 22:59	108-88-3	
1,2,4-Trimethylbenzene	687	ug/L	25.0	3.2	25		06/06/23 17:31	95-63-6	
1,3,5-Trimethylbenzene	156	ug/L	2.0	0.23	2		06/02/23 22:59	108-67-8	
Xylene (Total)	2200	ug/L	75.0	5.0	25		06/06/23 17:31	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	98	%	75-125		2		06/02/23 22:59	2199-69-1	D4
4-Bromofluorobenzene (S)	101	%	75-125		2		06/02/23 22:59	460-00-4	
Toluene-d8 (S)	102	%	75-125		2		06/02/23 22:59	2037-26-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 49161494.03 100 102 SRC GWTK70

Pace Project No.: 10655602

Sample: Trip Blank **Lab ID: 10655602006** Collected: 05/30/23 00:00 Received: 06/01/23 10:55 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8260D MSV UST									
Analytical Method: EPA 8260D									
Pace Analytical Services - Minneapolis									
Benzene	<0.10	ug/L	1.0	0.10	1		06/02/23 21:00	71-43-2	
Ethylbenzene	<0.11	ug/L	1.0	0.11	1		06/02/23 21:00	100-41-4	
Methyl-tert-butyl ether	<0.13	ug/L	1.0	0.13	1		06/02/23 21:00	1634-04-4	
Naphthalene	<0.18	ug/L	1.0	0.18	1		06/02/23 21:00	91-20-3	
Toluene	<0.10	ug/L	1.0	0.10	1		06/02/23 21:00	108-88-3	
1,2,4-Trimethylbenzene	<0.13	ug/L	1.0	0.13	1		06/02/23 21:00	95-63-6	
1,3,5-Trimethylbenzene	<0.11	ug/L	1.0	0.11	1		06/02/23 21:00	108-67-8	
Xylene (Total)	<0.20	ug/L	3.0	0.20	1		06/02/23 21:00	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	99	%	75-125		1		06/02/23 21:00	2199-69-1	
4-Bromofluorobenzene (S)	101	%	75-125		1		06/02/23 21:00	460-00-4	
Toluene-d8 (S)	101	%	75-125		1		06/02/23 21:00	2037-26-5	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 49161494.03 100 102 SRC GWTK70

Pace Project No.: 10655602

QC Batch: 884850 Analysis Method: EPA 8260D
QC Batch Method: EPA 8260D Analysis Description: 8260D MSV UST-WATER
Laboratory: Pace Analytical Services - Minneapolis

Associated Lab Samples: 10655602001, 10655602002, 10655602003, 10655602004, 10655602005, 10655602006

METHOD BLANK: 4662435 Matrix: Water

Associated Lab Samples: 10655602001, 10655602002, 10655602003, 10655602004, 10655602005, 10655602006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/L	<0.13	1.0	06/02/23 19:46	
1,3,5-Trimethylbenzene	ug/L	<0.11	1.0	06/02/23 19:46	
Benzene	ug/L	<0.10	1.0	06/02/23 19:46	
Ethylbenzene	ug/L	<0.11	1.0	06/02/23 19:46	
Methyl-tert-butyl ether	ug/L	<0.13	1.0	06/02/23 19:46	
Naphthalene	ug/L	<0.18	1.0	06/02/23 19:46	
Toluene	ug/L	<0.10	1.0	06/02/23 19:46	
Xylene (Total)	ug/L	<0.20	3.0	06/02/23 19:46	
1,2-Dichlorobenzene-d4 (S)	%	99	75-125	06/02/23 19:46	
4-Bromofluorobenzene (S)	%	102	75-125	06/02/23 19:46	
Toluene-d8 (S)	%	101	75-125	06/02/23 19:46	

LABORATORY CONTROL SAMPLE: 4662436

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/L	20	17.6	88	75-125	
1,3,5-Trimethylbenzene	ug/L	20	17.8	89	75-125	
Benzene	ug/L	20	17.5	87	75-125	
Ethylbenzene	ug/L	20	17.8	89	75-125	
Methyl-tert-butyl ether	ug/L	20	18.9	94	75-125	
Naphthalene	ug/L	20	17.9	90	67-140	
Toluene	ug/L	20	17.3	86	74-125	
Xylene (Total)	ug/L	60	55.3	92	75-125	
1,2-Dichlorobenzene-d4 (S)	%			100	75-125	
4-Bromofluorobenzene (S)	%			103	75-125	
Toluene-d8 (S)	%			99	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4662502 4662503

Parameter	Units	MS		MSD		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		10655602001 Result	Spike Conc.	Spike Conc.	Conc.								
1,2,4-Trimethylbenzene	ug/L	3340	4000	4000	4000	7150	6940	95	90	61-143	3	30	
1,3,5-Trimethylbenzene	ug/L	902	4000	4000	4000	4690	4470	95	89	70-134	5	30	
Benzene	ug/L	18500	4000	4000	4000	22100	21200	90	66	66-127	4	30	
Ethylbenzene	ug/L	2110	4000	4000	4000	5690	5500	90	85	74-128	3	30	
Methyl-tert-butyl ether	ug/L	<25.2	4000	4000	4000	3990	3920	100	98	65-132	2	30	
Naphthalene	ug/L	827	4000	4000	4000	4610	4560	95	93	61-150	1	30	

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: 49161494.03 100 102 SRC GWTK70

Pace Project No.: 10655602

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4662502 4662503												
Parameter	Units	MS		MSD		MS		MSD		% Rec Limits	Max RPD	Qual
		10655602001 Result	Spike Conc.	Spike Conc.	MS Result	MSD Result	% Rec	% Rec				
Toluene	ug/L	20300	4000	4000	23900	23000	90	67	66-125	4	30	
Xylene (Total)	ug/L	19200	12000	12000	29900	29500	89	86	75-126	1	30	
1,2-Dichlorobenzene-d4 (S)	%						99	100	75-125			
4-Bromofluorobenzene (S)	%						100	101	75-125			
Toluene-d8 (S)	%						100	99	75-125			

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: 49161494.03 100 102 SRC GWTK70

Pace Project No.: 10655602

QC Batch: 885398	Analysis Method: EPA 8260D
QC Batch Method: EPA 8260D	Analysis Description: 8260D MSV UST-WATER
	Laboratory: Pace Analytical Services - Minneapolis

Associated Lab Samples: 10655602002, 10655602004, 10655602005

METHOD BLANK: 4665765 Matrix: Water

Associated Lab Samples: 10655602002, 10655602004, 10655602005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/L	<0.13	1.0	06/06/23 14:26	
Benzene	ug/L	<0.10	1.0	06/06/23 14:26	
Ethylbenzene	ug/L	<0.11	1.0	06/06/23 14:26	
Xylene (Total)	ug/L	<0.20	3.0	06/06/23 14:26	
1,2-Dichlorobenzene-d4 (S)	%	100	75-125	06/06/23 14:26	
4-Bromofluorobenzene (S)	%	101	75-125	06/06/23 14:26	
Toluene-d8 (S)	%	102	75-125	06/06/23 14:26	

LABORATORY CONTROL SAMPLE: 4665766

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/L	20	17.2	86	75-125	
Benzene	ug/L	20	17.0	85	75-125	
Ethylbenzene	ug/L	20	17.3	87	75-125	
Xylene (Total)	ug/L	60	53.4	89	75-125	
1,2-Dichlorobenzene-d4 (S)	%			99	75-125	
4-Bromofluorobenzene (S)	%			101	75-125	
Toluene-d8 (S)	%			100	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4665804 4665805

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		10655608004 Result	Spike Conc.	Spike Conc.	Result						
1,2,4-Trimethylbenzene	ug/L	34.0	200	200	218	217	92	92	61-143	0	30
Benzene	ug/L	1020	200	200	1180	1160	79	71	66-127	1	30
Ethylbenzene	ug/L	68.5	200	200	241	242	86	87	74-128	0	30
Xylene (Total)	ug/L	218	600	600	755	761	90	90	75-126	1	30
1,2-Dichlorobenzene-d4 (S)	%						100	100	75-125		
4-Bromofluorobenzene (S)	%						101	100	75-125		
Toluene-d8 (S)	%						100	98	75-125		

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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QUALIFIERS

Project: 49161494.03 100 102 SRC GWTK70

Pace Project No.: 10655602

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

D4 Sample was diluted due to the presence of high levels of target analytes.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 49161494.03 100 102 SRC GWTK70

Pace Project No.: 10655602

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10655602001	MW-2R/T70	EPA 8260D	884850		
10655602002	MW-3/T70	EPA 8260D	884850		
10655602002	MW-3/T70	EPA 8260D	885398		
10655602003	MW-4/T70	EPA 8260D	884850		
10655602004	MW-5/T70	EPA 8260D	884850		
10655602004	MW-5/T70	EPA 8260D	885398		
10655602005	MW-6/T70	EPA 8260D	884850		
10655602005	MW-6/T70	EPA 8260D	885398		
10655602006	Trip Blank	EPA 8260D	884850		

REPORT OF LABORATORY ANALYSIS

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Barr Engineering Co. Chain of Custody

Sample Origination State

CO MI MN MO ND NV TX UT WI WY Other: _____

REPORT TO	INVOICE TO
Company: <u>Barr Engineering Co</u>	Company: <u>Barr</u>
Address: <u>325 South Lake Ave</u>	Address:
Address: <u>Duluth, MN 55802</u>	Address:
Name: <u>LCarney@barr.com</u>	Name:
email: <u>Lynette Carney</u>	email:
Copy to: <u>BarrDM@barr.com</u>	P.O.
Project Name: <u>SRC GW TK-70</u>	Barr Project No: <u>49161494.03 100 102</u>

Perform MS/MSD Y / N	Total Number Of Containers	Analysis Requested		% Solids
		Water	Soil	
N	3	X		
N	3	X		
N	3	X		
N	3	X		
N	3	X		
N	2	X		

COC Number: **No 591713**

COC 1 of 1

Matrix Code:	Preservative Code:
GW = Groundwater	A = None
SW = Surface Water	B = HCl
DW = Drinking Water	C = HNO ₃
PW = Pore Water	D = H ₂ SO ₄
WW = Waste Water	E = NaOH
WQ = TB, FB, EB, etc.	F = MeOH
W = Unspecified	G = NaHSO ₄
S = Soil/Solid	H = Na ₂ S ₂ O ₃
SD = Sediment	I = Ascorbic Acid
SQ = MeOH blank	J = Zn Acetate
OTH = Other (Oil, etc.)	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	% Solids	Preservative Code	Field Filtered Y/N
	Start	Stop	Unit (m./ft. or in.)								
1. <u>MW-2R/T70</u>	—	—		<u>05/30/2023</u>	<u>9:09</u>	<u>GW</u>	<u>N</u>	<u>3</u>	<u>X</u>	<u>001</u>	
2. <u>MW-3/T70</u>	—	—			<u>9:23</u>	<u>GW</u>	<u>N</u>	<u>3</u>	<u>X</u>	<u>002</u>	
3. <u>MW-4/T70</u>	—	—			<u>9:30</u>	<u>GW</u>	<u>N</u>	<u>3</u>	<u>X</u>	<u>003</u>	
4. <u>MW-5/T70</u>	—	—			<u>9:02</u>	<u>GW</u>	<u>N</u>	<u>3</u>	<u>X</u>	<u>004</u>	
5. <u>MW-6/T70</u>	—	—			<u>9:15</u>	<u>GW</u>	<u>N</u>	<u>3</u>	<u>X</u>	<u>005</u>	
6. <u>Trip Blank</u>	—	—			—	<u>WG</u>	<u>N</u>	<u>2</u>	<u>X</u>	<u>006</u>	
7.											
8.											
9.											
10.											

WO#: 10655602



BARR USE ONLY		Relinquished by: <u>Kimberly Schneider</u>	On Ice? <input checked="" type="radio"/> Y <input type="radio"/> N	Date: <u>5/31/2023</u>	Time: <u>13:57</u>	Received by: <u>Frank H. ...</u>	Date: <u>5/31</u>	Time: <u>13:57</u>
Sampled by: <u>KLS3</u>	Barr Proj. Manager: <u>LMC</u>	Relinquished by: <u>Megan Axberg</u>	On Ice? <input checked="" type="radio"/> Y <input type="radio"/> N	Date: <u>5/31/23</u>	Time: <u>14:20</u>	Received by: <u>MT</u>	Date: <u>5/31</u>	Time: <u>08:00</u>
Barr DQ Manager: <u>JET</u>	Lab Name: <u>Pace</u>	Samples Shipped VIA: <input type="checkbox"/> Ground Courier <input type="checkbox"/> Air Carrier	Air Bill Number:		Requested Due Date: <u>10.5</u>			
Lab Location: <u>minneapolis</u>	Lab WO:	<input type="checkbox"/> Sampler <input type="checkbox"/> Other: _____	Temperature on Receipt (°C): <u>4.8</u>		Custody Seal Intact? <input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> None		<input type="checkbox"/> Rush _____ (mm/dd/yyyy) <u>mt</u>	

HR/LS/STD/FORMS Chain of Custody Form 2015 RLG Rev. 01/30/2020

Sample Condition Upon Receipt	Client Name: <u>Barr Engineering Co</u>	Project #: _____	WO#: 10655602
Courier: <input type="checkbox"/> FedEx <input type="checkbox"/> UPS <input type="checkbox"/> USPS <input type="checkbox"/> Client <input checked="" type="checkbox"/> Pace <input type="checkbox"/> SpeedDee <input type="checkbox"/> Commercial		PM: MKH Due Date: 06/15/23 CLIENT: BARR	
Tracking Number: _____		<input type="checkbox"/> See Exceptions 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? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Were All Container Temps Taken? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Temp should be above freezing to 6 °C	Average Corrected Temp (no temp blank only): _____ °C
Correction Factor: <u>70.3</u>	Cooler Temp Read w/Temp Blank: <u>0.6</u> °C
	Cooler Temp Corrected w/temp blank: <u>0.9</u> °C
<input type="checkbox"/> See Exceptions ENV-FRM-MIN4-0142 <input type="checkbox"/> 1 Container	

USDA Regulated Soil: N/A, water sample/other: _____) Date/Initials of Person Examining Contents: MMK 6-1-23

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):	COMMENTS
Duluth <input type="checkbox"/> Minneapolis <input checked="" type="checkbox"/> Virginia <input type="checkbox"/>	
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?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 11. If no, write ID/Date/Time of container below: <input type="checkbox"/> See Exceptions ENV-FRM-MIN4-0142
Matrix: <input checked="" type="checkbox"/> Water <input type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other	
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
Exception: <u>VOA</u> 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 checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input 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
	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 type="checkbox"/> No <input checked="" 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 checked="" type="checkbox"/> No <input type="checkbox"/> N/A
3 Trip Blanks Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A 15. <u>ZMC1</u> Pace Trip Blank Lot # (if purchased): <u>417883</u>
Trip Blank Custody Seals Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

CLIENT NOTIFICATION/RESOLUTION
 Person Contacted: _____ Date/Time: _____
 Comments/Resolution: _____
 Project Manager Review: _____ Date: 6/1/23

Field Data Required? Yes No



October 24, 2023

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

RE: Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10672707

Dear Jim Taraldsen:

Enclosed are the analytical results for sample(s) received by the laboratory on October 17, 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

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CERTIFICATIONS

Project: 49161494.02 100 102 SRC GWTK70

Pace Project No.: 10672707

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

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SAMPLE SUMMARY

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10672707

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10672707001	MW-2R/T70	Water	10/16/23 09:47	10/17/23 11:05
10672707002	MW-3/T70	Water	10/16/23 10:00	10/17/23 11:05
10672707003	MW-4/T70	Water	10/16/23 10:07	10/17/23 11:05
10672707004	MW-5/T70	Water	10/16/23 09:40	10/17/23 11:05
10672707005	MW-6/T70	Water	10/16/23 09:53	10/17/23 11:05
10672707006	Trip Blank	Water	10/16/23 08:00	10/17/23 11:05

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SAMPLE ANALYTE COUNT

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10672707

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10672707001	MW-2R/T70	EPA 8260D	TKL	11	PASI-M
10672707002	MW-3/T70	EPA 8260D	LPM	11	PASI-M
10672707003	MW-4/T70	EPA 8260D	TKL	11	PASI-M
10672707004	MW-5/T70	EPA 8260D	TKL	11	PASI-M
10672707005	MW-6/T70	EPA 8260D	LPM	11	PASI-M
10672707006	Trip Blank	EPA 8260D	TKL	11	PASI-M

PASI-M = Pace Analytical Services - Minneapolis

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70

Pace Project No.: 10672707

Sample: MW-2R/T70 Lab ID: 10672707001 Collected: 10/16/23 09:47 Received: 10/17/23 11:05 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8260D MSV UST									
Analytical Method: EPA 8260D									
Pace Analytical Services - Minneapolis									
Benzene	18300	ug/L	200	42.6	200		10/18/23 23:00	71-43-2	
Ethylbenzene	1680	ug/L	200	21.8	200		10/18/23 23:00	100-41-4	
Methyl-tert-butyl ether	<25.2	ug/L	200	25.2	200		10/18/23 23:00	1634-04-4	
Naphthalene	637	ug/L	200	35.0	200		10/18/23 23:00	91-20-3	
Toluene	21400	ug/L	200	41.4	200		10/18/23 23:00	108-88-3	
1,2,4-Trimethylbenzene	3100	ug/L	200	26.0	200		10/18/23 23:00	95-63-6	
1,3,5-Trimethylbenzene	828	ug/L	200	22.6	200		10/18/23 23:00	108-67-8	
Xylene (Total)	18100	ug/L	600	83.8	200		10/18/23 23:00	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	102	%	75-125		200		10/18/23 23:00	2199-69-1	D4
4-Bromofluorobenzene (S)	102	%	75-125		200		10/18/23 23:00	460-00-4	
Toluene-d8 (S)	104	%	75-125		200		10/18/23 23:00	2037-26-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70

Pace Project No.: 10672707

Sample: MW-3/T70 Lab ID: 10672707002 Collected: 10/16/23 10:00 Received: 10/17/23 11:05 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8260D MSV UST									
Analytical Method: EPA 8260D									
Pace Analytical Services - Minneapolis									
Benzene	41.0	ug/L	1.0	0.21	1		10/19/23 21:46	71-43-2	
Ethylbenzene	5.6	ug/L	1.0	0.11	1		10/19/23 21:46	100-41-4	
Methyl-tert-butyl ether	<0.13	ug/L	1.0	0.13	1		10/19/23 21:46	1634-04-4	
Naphthalene	1.8	ug/L	1.0	0.18	1		10/19/23 21:46	91-20-3	
Toluene	0.22J	ug/L	1.0	0.21	1		10/19/23 21:46	108-88-3	
1,2,4-Trimethylbenzene	13.4	ug/L	1.0	0.13	1		10/19/23 21:46	95-63-6	
1,3,5-Trimethylbenzene	<0.11	ug/L	1.0	0.11	1		10/19/23 21:46	108-67-8	
Xylene (Total)	21.7	ug/L	3.0	0.42	1		10/19/23 21:46	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	100	%	75-125		1		10/19/23 21:46	2199-69-1	
4-Bromofluorobenzene (S)	100	%	75-125		1		10/19/23 21:46	460-00-4	
Toluene-d8 (S)	99	%	75-125		1		10/19/23 21:46	2037-26-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70

Pace Project No.: 10672707

Sample: MW-4/T70 Lab ID: 10672707003 Collected: 10/16/23 10:07 Received: 10/17/23 11:05 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8260D MSV UST									
Analytical Method: EPA 8260D									
Pace Analytical Services - Minneapolis									
Benzene	16300	ug/L	200	42.6	200		10/18/23 23:15	71-43-2	
Ethylbenzene	1350	ug/L	200	21.8	200		10/18/23 23:15	100-41-4	
Methyl-tert-butyl ether	<25.2	ug/L	200	25.2	200		10/18/23 23:15	1634-04-4	
Naphthalene	662	ug/L	200	35.0	200		10/18/23 23:15	91-20-3	
Toluene	18700	ug/L	200	41.4	200		10/18/23 23:15	108-88-3	
1,2,4-Trimethylbenzene	3170	ug/L	200	26.0	200		10/18/23 23:15	95-63-6	
1,3,5-Trimethylbenzene	852	ug/L	200	22.6	200		10/18/23 23:15	108-67-8	
Xylene (Total)	21000	ug/L	600	83.8	200		10/18/23 23:15	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	100	%	75-125		200		10/18/23 23:15	2199-69-1	D4
4-Bromofluorobenzene (S)	102	%	75-125		200		10/18/23 23:15	460-00-4	
Toluene-d8 (S)	103	%	75-125		200		10/18/23 23:15	2037-26-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70

Pace Project No.: 10672707

Sample: MW-5/T70 Lab ID: 10672707004 Collected: 10/16/23 09:40 Received: 10/17/23 11:05 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8260D MSV UST									
Analytical Method: EPA 8260D									
Pace Analytical Services - Minneapolis									
Benzene	0.90J	ug/L	1.0	0.21	1		10/18/23 21:00	71-43-2	
Ethylbenzene	<0.11	ug/L	1.0	0.11	1		10/18/23 21:00	100-41-4	
Methyl-tert-butyl ether	<0.13	ug/L	1.0	0.13	1		10/18/23 21:00	1634-04-4	
Naphthalene	4.1	ug/L	1.0	0.18	1		10/18/23 21:00	91-20-3	
Toluene	0.25J	ug/L	1.0	0.21	1		10/18/23 21:00	108-88-3	
1,2,4-Trimethylbenzene	1.0	ug/L	1.0	0.13	1		10/18/23 21:00	95-63-6	
1,3,5-Trimethylbenzene	0.28J	ug/L	1.0	0.11	1		10/18/23 21:00	108-67-8	
Xylene (Total)	4.1	ug/L	3.0	0.42	1		10/18/23 21:00	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	101	%	75-125		1		10/18/23 21:00	2199-69-1	
4-Bromofluorobenzene (S)	103	%	75-125		1		10/18/23 21:00	460-00-4	
Toluene-d8 (S)	105	%	75-125		1		10/18/23 21:00	2037-26-5	

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ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70

Pace Project No.: 10672707

Sample: MW-6/T70 Lab ID: 10672707005 Collected: 10/16/23 09:53 Received: 10/17/23 11:05 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8260D MSV UST									
Analytical Method: EPA 8260D									
Pace Analytical Services - Minneapolis									
Benzene	16.8	ug/L	1.0	0.21	1		10/19/23 22:02	71-43-2	
Ethylbenzene	1.8	ug/L	1.0	0.11	1		10/19/23 22:02	100-41-4	
Methyl-tert-butyl ether	<0.13	ug/L	1.0	0.13	1		10/19/23 22:02	1634-04-4	
Naphthalene	0.36J	ug/L	1.0	0.18	1		10/19/23 22:02	91-20-3	
Toluene	0.58J	ug/L	1.0	0.21	1		10/19/23 22:02	108-88-3	
1,2,4-Trimethylbenzene	2.3	ug/L	1.0	0.13	1		10/19/23 22:02	95-63-6	
1,3,5-Trimethylbenzene	0.65J	ug/L	1.0	0.11	1		10/19/23 22:02	108-67-8	
Xylene (Total)	25.7	ug/L	3.0	0.42	1		10/19/23 22:02	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	101	%	75-125		1		10/19/23 22:02	2199-69-1	
4-Bromofluorobenzene (S)	99	%	75-125		1		10/19/23 22:02	460-00-4	
Toluene-d8 (S)	98	%	75-125		1		10/19/23 22:02	2037-26-5	

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ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70

Pace Project No.: 10672707

Sample: Trip Blank Lab ID: 10672707006 Collected: 10/16/23 08:00 Received: 10/17/23 11:05 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
8260D MSV UST									
Analytical Method: EPA 8260D									
Pace Analytical Services - Minneapolis									
Benzene	<0.21	ug/L	1.0	0.21	1		10/18/23 20:00	71-43-2	
Ethylbenzene	<0.11	ug/L	1.0	0.11	1		10/18/23 20:00	100-41-4	
Methyl-tert-butyl ether	<0.13	ug/L	1.0	0.13	1		10/18/23 20:00	1634-04-4	
Naphthalene	<0.18	ug/L	1.0	0.18	1		10/18/23 20:00	91-20-3	
Toluene	<0.21	ug/L	1.0	0.21	1		10/18/23 20:00	108-88-3	
1,2,4-Trimethylbenzene	<0.13	ug/L	1.0	0.13	1		10/18/23 20:00	95-63-6	
1,3,5-Trimethylbenzene	<0.11	ug/L	1.0	0.11	1		10/18/23 20:00	108-67-8	
Xylene (Total)	<0.42	ug/L	3.0	0.42	1		10/18/23 20:00	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	101	%	75-125		1		10/18/23 20:00	2199-69-1	
4-Bromofluorobenzene (S)	103	%	75-125		1		10/18/23 20:00	460-00-4	
Toluene-d8 (S)	105	%	75-125		1		10/18/23 20:00	2037-26-5	

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QUALITY CONTROL DATA

Project: 49161494.02 100 102 SRC GWTK70

Pace Project No.: 10672707

QC Batch: 912707 Analysis Method: EPA 8260D
 QC Batch Method: EPA 8260D Analysis Description: 8260D MSV UST-WATER
 Laboratory: Pace Analytical Services - Minneapolis
 Associated Lab Samples: 10672707001, 10672707003, 10672707004, 10672707006

METHOD BLANK: 4802984 Matrix: Water
 Associated Lab Samples: 10672707001, 10672707003, 10672707004, 10672707006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/L	<0.13	1.0	10/18/23 19:30	
1,3,5-Trimethylbenzene	ug/L	<0.11	1.0	10/18/23 19:30	
Benzene	ug/L	<0.21	1.0	10/18/23 19:30	
Ethylbenzene	ug/L	<0.11	1.0	10/18/23 19:30	
Methyl-tert-butyl ether	ug/L	<0.13	1.0	10/18/23 19:30	
Naphthalene	ug/L	<0.18	1.0	10/18/23 19:30	
Toluene	ug/L	<0.21	1.0	10/18/23 19:30	
Xylene (Total)	ug/L	<0.42	3.0	10/18/23 19:30	
1,2-Dichlorobenzene-d4 (S)	%	99	75-125	10/18/23 19:30	
4-Bromofluorobenzene (S)	%	103	75-125	10/18/23 19:30	
Toluene-d8 (S)	%	104	75-125	10/18/23 19:30	

LABORATORY CONTROL SAMPLE: 4802985

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/L	20	17.0	85	75-125	
1,3,5-Trimethylbenzene	ug/L	20	17.1	86	75-125	
Benzene	ug/L	20	18.4	92	75-125	
Ethylbenzene	ug/L	20	17.5	88	75-125	
Methyl-tert-butyl ether	ug/L	20	19.5	98	75-125	
Naphthalene	ug/L	20	15.4	77	67-140	
Toluene	ug/L	20	18.3	92	74-125	
Xylene (Total)	ug/L	60	53.5	89	75-125	
1,2-Dichlorobenzene-d4 (S)	%			100	75-125	
4-Bromofluorobenzene (S)	%			104	75-125	
Toluene-d8 (S)	%			104	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4803009 4803010

Parameter	Units	MS		MSD		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		10672707001 Result	Spike Conc.	Spike Conc.	Conc.								
1,2,4-Trimethylbenzene	ug/L	3100	4000	4000	6880	6710	95	90	61-143	2	30		
1,3,5-Trimethylbenzene	ug/L	828	4000	4000	4540	4410	93	90	70-134	3	30		
Benzene	ug/L	18300	4000	4000	21900	21500	91	81	66-127	2	30		
Ethylbenzene	ug/L	1680	4000	4000	5510	5400	96	93	74-128	2	30		
Methyl-tert-butyl ether	ug/L	<25.2	4000	4000	4190	4200	105	105	65-132	0	30		
Naphthalene	ug/L	637	4000	4000	4060	4210	86	89	61-150	4	30		

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QUALITY CONTROL DATA

Project: 49161494.02 100 102 SRC GWTK70

Pace Project No.: 10672707

Parameter	Units	4803009		4803010		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		10672707001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result								
Toluene	ug/L	21400	4000	4000	24800	24100	85	68	66-125	3	30		
Xylene (Total)	ug/L	18100	12000	12000	29600	29000	96	91	75-126	2	30		
1,2-Dichlorobenzene-d4 (S)	%						100	100	75-125			D4	
4-Bromofluorobenzene (S)	%						103	104	75-125				
Toluene-d8 (S)	%						104	104	75-125				

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QUALITY CONTROL DATA

Project: 49161494.02 100 102 SRC GWTK70

Pace Project No.: 10672707

QC Batch: 913026

Analysis Method: EPA 8260D

QC Batch Method: EPA 8260D

Analysis Description: 8260D MSV UST-WATER

Laboratory: Pace Analytical Services - Minneapolis

Associated Lab Samples: 10672707002, 10672707005

METHOD BLANK: 4804526

Matrix: Water

Associated Lab Samples: 10672707002, 10672707005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/L	<0.13	1.0	10/19/23 21:13	
1,3,5-Trimethylbenzene	ug/L	<0.11	1.0	10/19/23 21:13	
Benzene	ug/L	<0.21	1.0	10/19/23 21:13	
Ethylbenzene	ug/L	<0.11	1.0	10/19/23 21:13	
Methyl-tert-butyl ether	ug/L	<0.13	1.0	10/19/23 21:13	
Naphthalene	ug/L	<0.18	1.0	10/19/23 21:13	
Toluene	ug/L	<0.21	1.0	10/19/23 21:13	
Xylene (Total)	ug/L	<0.42	3.0	10/19/23 21:13	
1,2-Dichlorobenzene-d4 (S)	%	101	75-125	10/19/23 21:13	
4-Bromofluorobenzene (S)	%	99	75-125	10/19/23 21:13	
Toluene-d8 (S)	%	103	75-125	10/19/23 21:13	

LABORATORY CONTROL SAMPLE & LCSD: 4804527

4804528

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
1,2,4-Trimethylbenzene	ug/L	20	21.2	20.7	106	104	75-125	2	20	
1,3,5-Trimethylbenzene	ug/L	20	22.7	20.5	113	103	75-125	10	20	
Benzene	ug/L	20	20.6	20.5	103	102	75-125	1	20	
Ethylbenzene	ug/L	20	20.7	20.5	104	102	75-125	1	20	
Methyl-tert-butyl ether	ug/L	20	20.2	21.7	101	108	75-125	7	20	
Naphthalene	ug/L	20	19.9	21.0	100	105	67-140	6	20	
Toluene	ug/L	20	19.4	20.2	97	101	74-125	4	20	
Xylene (Total)	ug/L	60	63.9	63.5	106	106	75-125	1	20	
1,2-Dichlorobenzene-d4 (S)	%				96	99	75-125			
4-Bromofluorobenzene (S)	%				100	100	75-125			
Toluene-d8 (S)	%				97	103	75-125			

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: 49161494.02 100 102 SRC GWTK70

Pace Project No.: 10672707

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: 913026

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

ANALYTE QUALIFIERS

D4 Sample was diluted due to the presence of high levels of target analytes.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10672707

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10672707001	MW-2R/T70	EPA 8260D	912707		
10672707002	MW-3/T70	EPA 8260D	913026		
10672707003	MW-4/T70	EPA 8260D	912707		
10672707004	MW-5/T70	EPA 8260D	912707		
10672707005	MW-6/T70	EPA 8260D	913026		
10672707006	Trip Blank	EPA 8260D	912707		

REPORT OF LABORATORY ANALYSIS

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Effective Date: 4/14/2023

Sample Condition Upon Receipt Client Name: Barr

Project #: **WO#: 10672707**
PM: MKH Due Date: 10/31/23
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
Biological Tissue Frozen? Yes No N/A
Packing Material: Bubble Wrap Bubble Bags None Other Temp Blank? Yes No
Thermometer: T1 (0461) T2 (0436) T3 (0459) T4 (0402) T5 (0178)
 T6 (0235) T7 (0042) T8 (0775) T9(0727) 01339252/1710
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: 5.0 °C Average Corrected Temp (no temp blank only): _____ °C
Correction Factor: to 1 Cooler Temp Corrected w/temp blank: 5.1 °C
 See Exceptions ENV-FRM-MIN4-0142 1 Container

USDA Regulated Soil; N/A, water sample/other: _____ Date/Initials of Person Examining Contents: ETL 10/18/23
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? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	11. If no, write ID/Date/Time of container below: <u>Aw-4 labeled MW-4D</u> <input type="checkbox"/> See Exceptions ENV-FRM-MIN4-0142
Matrix: <input checked="" type="checkbox"/> Water <input type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other	
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? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A (HNO3, H2SO4, <2pH, NaOH >9 Sulfide, NaOH >10 Cyanide)	
Exceptions: <u>VOA</u> , Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxins/PFAS <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A (*If adding preservative to a container, it must be added to associated field and equipment blanks--verify with PM first.)	Positive for Residual Chlorine? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> See Exceptions ENV-FRM-MIN4-0142
	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 type="checkbox"/> No <input checked="" 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 checked="" type="checkbox"/> No <input 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 checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Pace Trip Blank Lot # (if purchased): <u>456308(2)</u>

CLIENT NOTIFICATION/RESOLUTION
Person Contacted: _____ Date/Time: _____
Comments/Resolution: _____
Project Manager Review: [Signature] Date: 10/18/23
Field Data Required? Yes No

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: 2