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BARR

March 2, 2023

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

Re: 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

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 2022.

1 Facility and Site Background Information

Figure 1 shows the location of Tank 70 within the refinery, the approximate property boundary of the refinery, and the area surrounding the refinery. Figure 2 presents the site layout of Tank 70, which is located in the SW ¼ of the SW ¼ 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. The basin's ground surface 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 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), 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. In January 2021, Husky and Cenovus merged to become Cenovus Energy Inc. (Cenovus); however, the legal name of the refinery will remain unchanged.

2 Tank 70 Basin Release Site Investigation and Remediation Summary (February 1999-October 2021)

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 project gauging data for 2022.

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 x 10^{-5} cm/sec). The hydraulic conductivity of the native clay underlying the refinery is on the order of 1 x 10^{-7} cm/sec, as described in the previous section of this letter report (GF, 2014).

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. 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 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 January 2022.

3 Remedial and Monitoring Activities in 2022

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 has not been sampled since June 2015, and MW-1R/T70 has not been sampled since October 2017 because of damaged PVC casing and possible surface water infiltration. Both of these wells were abandoned in 2022 as discussed below in Section 3.3 - monitoring well maintenance activities.

Year-round access to monitoring wells, monitoring points, and the test pit at the refinery 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 (typically April/May and September/October). Monitoring wells, monitoring points and test pit TP-1/T70 are routinely checked for the presence of product and, if encountered, the product is removed from the well, point, or pit by bailing.

Since the most recent remediation progress report was submitted to the WDNR on January 6, 2022 (Barr, 2022), work at Tank 70 has included the gauging of water and product levels in associated site monitoring wells, monitoring points, and a test pit, and the collection of groundwater samples from select locations. Monitoring and gauging activities conducted in 2022 are summarized in Table 1.

3.1 Product Recovery

During the reporting period, measurable product was not encountered in the monitoring wells, monitoring points, or test pit TP-1/T70. 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, but for all practical purposes, free product likely has been recovered to the extent practical from the Tank 70 basin.

3.2 Groundwater Sampling and Results

Groundwater samples were collected by Barr and Insight Environmental (Insight) field staff at the site during May and October 2022. 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 samples. Routine sampling of monitoring wells MW-2R/T70 through MW-6/T70 was conducted on May 25, 2022 and October 11, 2022. Field staff used new one-time-use polyethylene disposable bailers with new nylon rope to collect each groundwater sample. The May 2022 and October 2022 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).

Wells not sampled due to damaged PVC casing/surface water infiltration include MW-7/T70 starting in October 2015 and MW-1R/T70 starting in June 2018.

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:

- 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 exceed an ES since 2017.
- Because of the removal of accumulated free product over the years, PVOC and naphthalene concentrations in the wells have been stable or decreasing. For example, Figure 3 through Figure 5 present trend analysis plots for concentrations of BTEX; BTEX plus naphthalene; and BTEX plus naphthalene plus TMBs (respectively) in groundwater samples from MW-1R/T70, MW-2R/T70, and MW-4/T70 through MW-7/T70. Note that the best-fit exponential trend lines were generated using a scatter plot chart. Note that the plotted data for each well only includes the time period since: a) free product was most recently removed; and b) samples were collected at least once per year. As shown on Figure 3 through Figure 5, dissolved-phase concentrations in the wells have followed a general downward trend.

Attachment A provides copies of the laboratory reports and chain of custody records for the groundwater samples collected in 2022.

Historically, a groundwater contour map for the Tank 70 release site has not been prepared because groundwater levels in the wells either are influenced by 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).

1.1 Monitoring Well Maintenance Activities

As previously reported (Barr, 2022), the PVC casing in monitoring wells MW-1R/T70 and MW-7/T70 was damaged. As a result, these wells have not been samples since 2018 and 2015, respectively. Product had never been measured in MW-1R/T70 since it was installed in May 2008 and product had not been measured in MW-7/T70 since November 2007. Historical data had shown that the PVOC and naphthalene concentrations in both wells had been decreasing (Figure 3 through Figure 5). Both monitoring wells were abandoned in fall 2022. The well abandonment forms are provided in Attachment B.

4 Future Work

SRC's work plan for 2023 is as follows:

- Continue to check for, and if present, manually bail 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 product is observed, then check the wells, points, and test pit sump monthly. If product is not observed, then check the wells, points, and sump 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.

- Discontinue monthly product checks at monitoring wells and monitoring points. If, however, product is observed during the spring gauging event, monthly monitoring of these locations will resume. If product is not observed, the wells and points will only be checked during the spring and fall sampling events.

- 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 product, and analytical results of the 2023 groundwater samples in a remediation progress report to the WDNR by the end of the first quarter of 2024. If product is not encountered in any of the wells, monitoring points, or sump in 2023, and the concentrations continue to show a decreasing trend, a site closure request may be prepared for WDNR review and approval.

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,

BARR ENGINEERING CO.

Lynette M. Carney
Project Manager

cc: Joseph Pearson (SRC)

Tables

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Table 2	Groundwater Analytical Results for Detected Compounds

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Figure 2	Tank 70 Area Site Layout
Figure 3	BTEX Groundwater Concentrations vs. Time
Figure 4	BTEX+N Groundwater Concentrations vs. Time
Figure 5	BTEX+N+TMBs Groundwater Concentrations vs. Time

Attachments

Attachment A	Pace Analytical Laboratory Reports
Attachment B	Well Abandonment Forms (MW-1R/T70 and MW-7/T70)

References

Barr Engineering Co., 2022. *2021 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.* January 6, 2022.

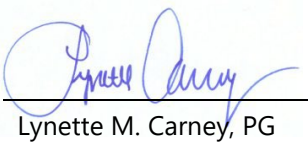
Gannett Fleming, Inc. (GF), 2014. *Final Memorandum of Agreement, Site Investigation and Remedial Action Plan, Superior Refinery, Superior, Wisconsin, WDNR BRRTS# 02-16-559511.* April 2014.

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.

Wisconsin Department of Natural Resources, 2020. *Reminder to Include Evaluation of Emerging Contaminants in Site Investigation, Murphy Oil – Tank #70, 2407 Stinson Ave, BRRTS# 02-16-223154*. Letter to Husky Energy dated August 17, 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."



March 2, 2023

Lynette M. Carney, PG
Reg #: 1138

Tables

Table 1
2022 Fluid Level Monitoring Data
Tank 70 Release Site (1)
Superior Refining Company LLC
Superior, Wisconsin

	MP-1/T70		MP-2/T70		MP-3/T70		MP-4/T70		MW-1R/T70		MW-2R/T70		MW-3/T70		MW-4/T70		MW-5/T70		MW-6/T70		MW-7/T70		TP-1/T70		Comments/
Date	**DTP**	**DTW**	**DTP**	**DTW**	**DTP**	**DTW**	**DTP**	**DTW**	**DTP**	**DTW**	**DTP**	**DTW**	**DTP**	**DTW**	**DTP**	**DTW**	**DTP**	**DTW**	**DTP**	**DTW**	**DTP**	**DTW**	**DTP**	**DTW**	**Footnotes**
	Depth to Fluid from Top of Casing (feet)																								
04/28/22	--[5]	--[5]	--[5]	--[5]	--[5]	--[5]	--[5]	--[5]	--[5]	--[5]	--	2.35	--	4.97	--[5]	--[5]	--	4.13	--	3.72	--[5]	--[5]	--[5]	--[5]	(2)
05/11/22	--	5.32	--	5.90	--	5.13	--	5.39	--	3.38	--	2.32	--	4.68	--	4.70	--	4.02	--	3.65	--	3.82	--	4.31	(2)
05/25/22	--	4.97	--	5.74	--	5.73	--	5.14	--	3.13	--	2.49	--	4.96	--	4.70	--	3.95	--	3.58	--	3.54	--	4.16	(3)
07/22/22	--	5.50	--	6.10	--	5.40	--	5.70	--	3.00	--	3.70	--	5.80	--	5.30	--	4.40	--	4.50	--	4.30	--	4.75	(4)
09/13/22	--	5.32	--	5.69	--	5.23	--	5.53	--	3.60	--	3.10	--	5.12	--	5.04	--	4.30	--	4.36	--	3.94	--	4.55	(2)
09/28/22	--	5.14	--	5.32	--	5.04	--	5.45	nm[6]	nm[6]	--	4.88	--	5.02	--	5.02	--	4.51	--	4.19	nm[6]	nm[6]	--	4.43	(2)
10/11/22	--	5.09	--	5.25	--	4.90	--	5.31	nm[6]	nm[6]	--	4.30	--	7.16	--	5.00	--	4.25	--	4.40	nm[6]	nm[6]	--	4.22	(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.
(2) Bailed the monitoring wells (MWs) dry in preparation for sampling, but skipped MW-1R/T70 and MW-7/T70 due to damaged PVC casing.
(3) Sampled the MWs (see Table 2 for summary of analytical results), but MW-1R/T70 and MW-7/T70 not sampled due to damaged PVC casing/surface water infiltration.
(4) Free product check
(5) Water was frozen in well.
(6) Well was sealed.

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

Well ID / Date	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-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

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

Well ID / Date	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
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

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Tank 70 Release Site
Superior Refining Company LLC
Superior, Wisconsin

Well ID / Date	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
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
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
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

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Well ID Date	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
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	6.6	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
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 quanitation 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

Tank 70

Newton Creek

Nemadji River

Douglas County

Superior Refining Company LLC (SRC)

Oil Refinery

TANK FARM

Site Location

Approximate SRC Property Boundaries for Contiguous Operations

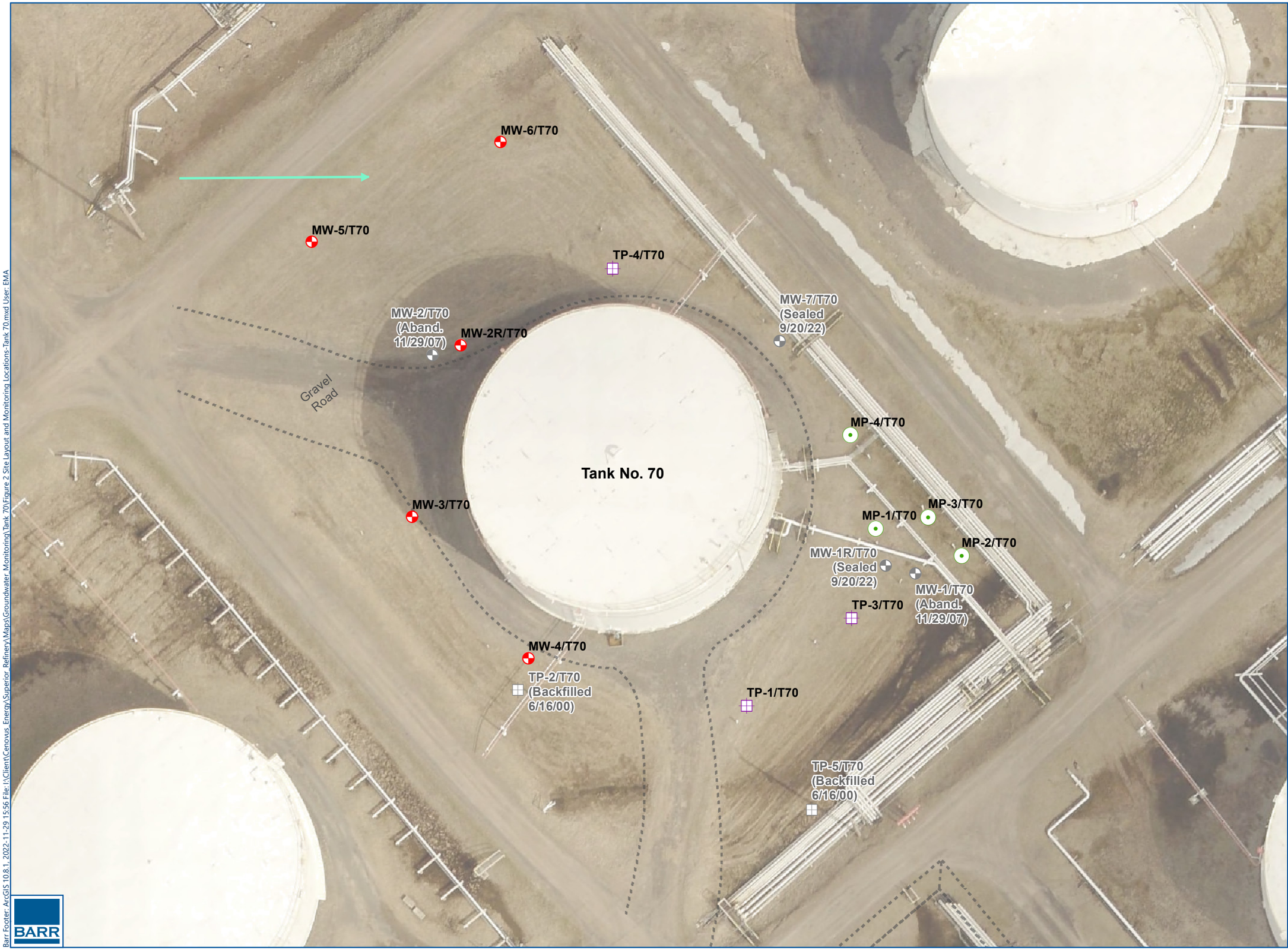
Approximate Fenceline Boundaries for Refining-Related Activities

0 750 1,500

Feet

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

FIGURE 1



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

N

0 15 30

Feet

1 inch = 30 feet

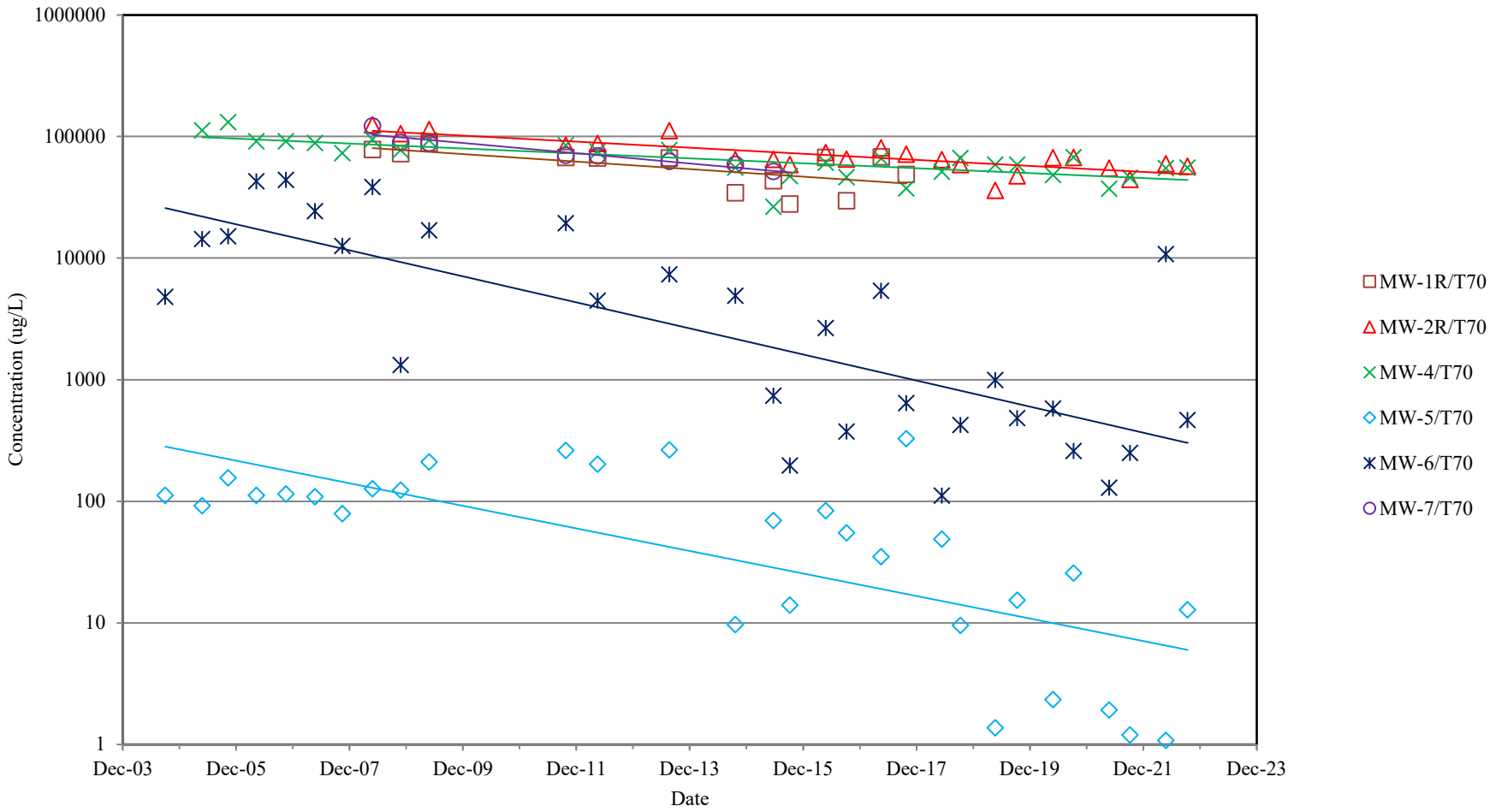
TANK 70 SITE LAYOUT & MONITORING LOCATIONS
Superior Refining Company LLC (SRC)
Superior, WI

FIGURE 2

BARR

Barr Footer: ArcGIS 10.8.1, 2022-11-29 15:56 File: I:\Client\Cenovus_Energy\Superior_Refinery\Maps\Groundwater_Monitoring\Tank 70\Figure 2 Site Layout and Monitoring Locations-Tank 70.mxd User: EMA

FIGURE 3

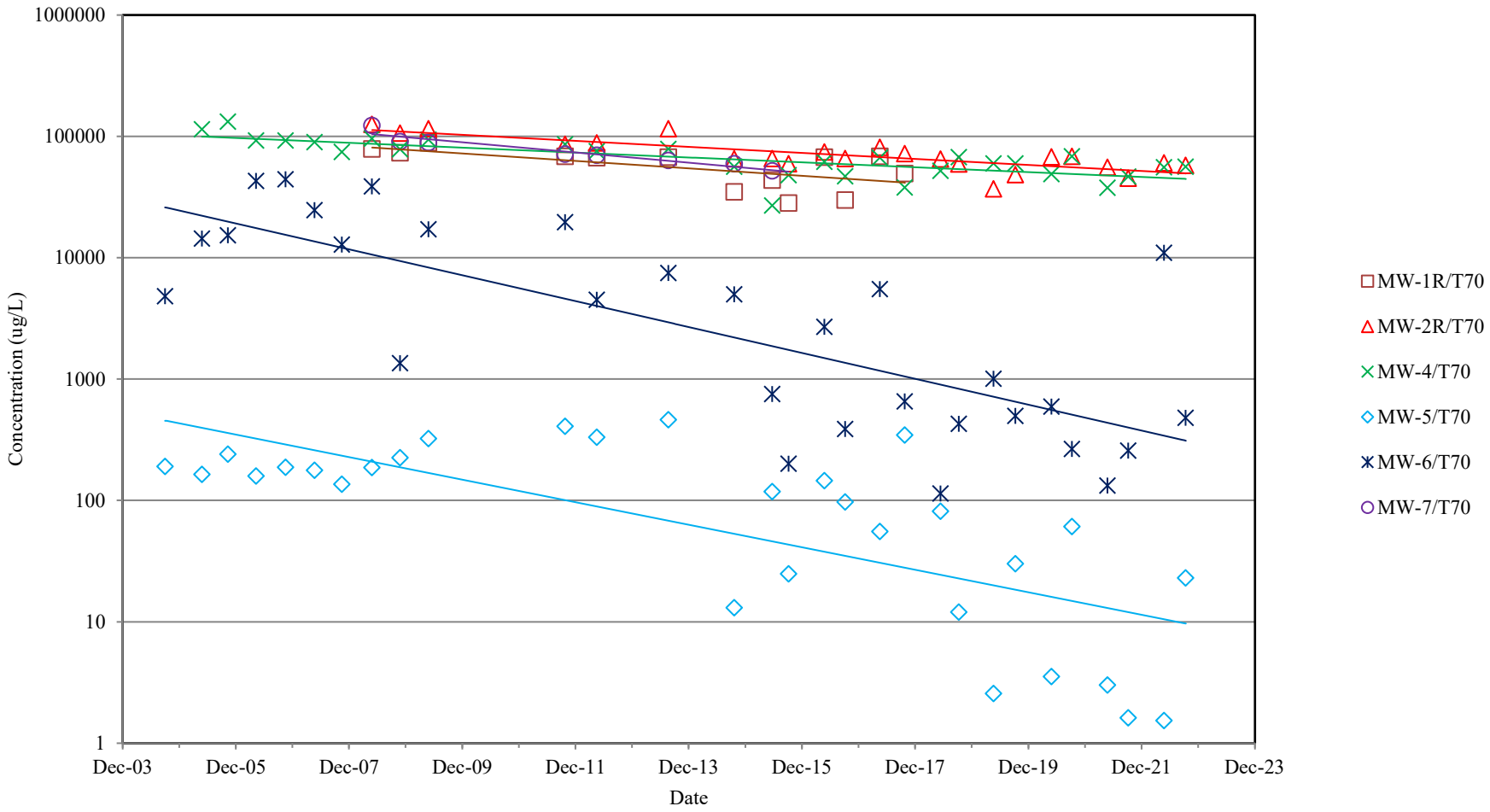


Note: Best-fit exponential trend lines generated using Excel and non-detect concentrations (if any) plotted at detection limit.

BTEX GROUNDWATER CONCENTRATIONS TANK 70 BASIN

SUPERIOR REFINING COMPANY LLC
SUPERIOR, WISCONSIN

FIGURE 4

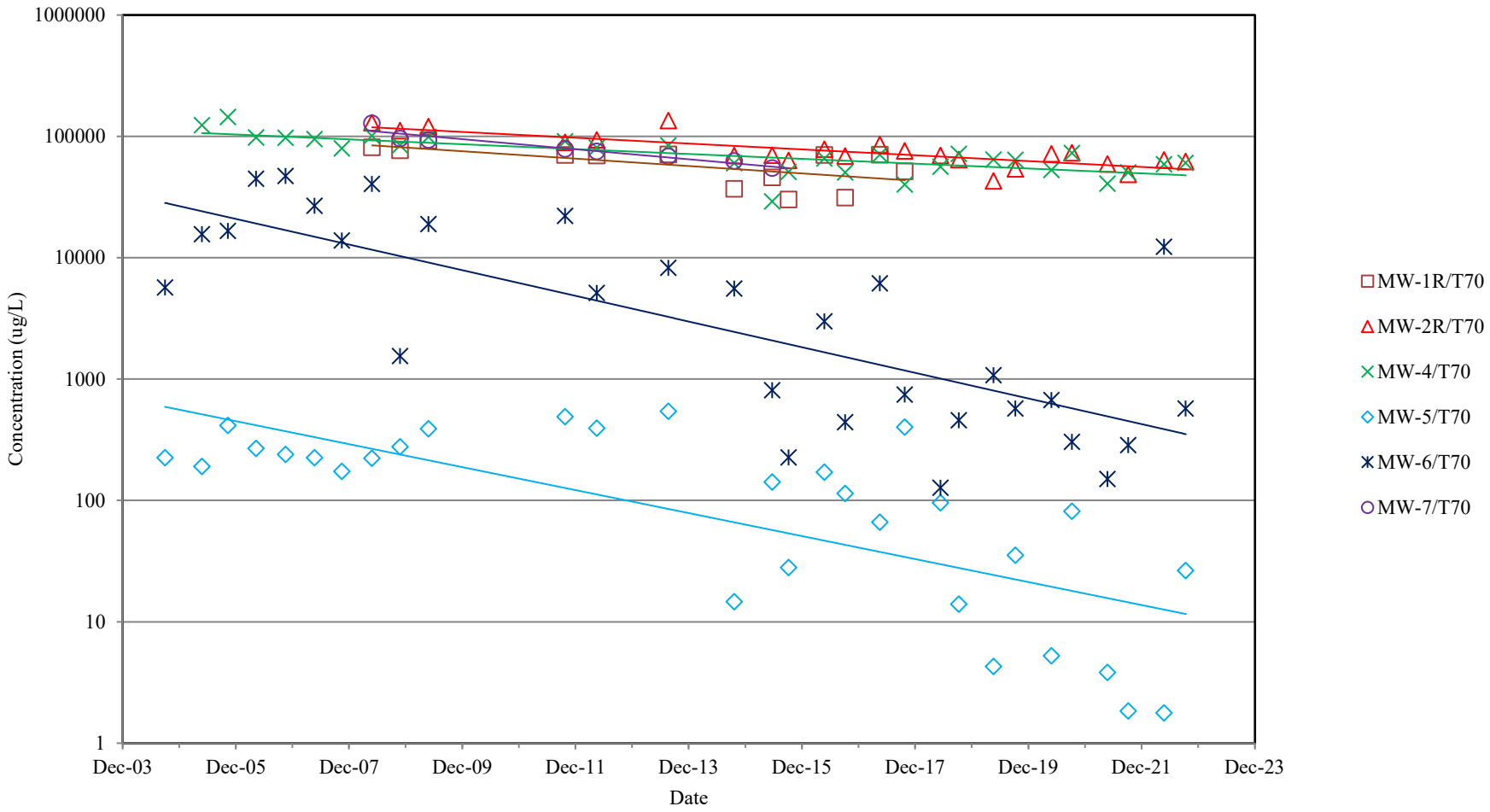


Note: Best-fit exponential trend lines generated using Excel and non-detect concentrations (if any) plotted at detection limit.

BTEX+N GROUNDWATER CONCENTRATIONS TANK 70 BASIN

SUPERIOR REFINING COMPANY LLC
SUPERIOR, WISCONSIN

FIGURE 5



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

BTEX+N+TMBs GROUNDWATER CONCENTRATIONS TANK 70 BASIN

SUPERIOR REFINING COMPANY LLC
SUPERIOR, WISCONSIN

Attachments

Attachment A

Pace Analytical Laboratory Reports

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

October 18, 2022

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

RE: Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

Dear Jim Taraldsen:

Enclosed are the analytical results for sample(s) received by the laboratory on October 12, 2022. 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

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

Pace Analytical Services, LLC - Minneapolis MN
1700 Elm Street SE, Minneapolis, MN 55414
A2LA Certification #: 2926.01*
1800 Elm Street SE, Minneapolis, MN 55414--Satellite Air Lab
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
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
Ohio VAP Certification (1800) #: CL110*
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
*Please Note: Applicable air certifications are denoted with an asterisk (*).

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10629408001	**MW-2R/T70**	Water	10/11/22 13:32	10/12/22 08:00
10629408002	**MW-3/T70**	Water	10/11/22 13:40	10/12/22 08:00
10629408003	**MW-4/T70**	Water	10/11/22 13:46	10/12/22 08:00
10629408004	**MW-5/T70**	Water	10/11/22 13:27	10/12/22 08:00
10629408005	**MW6/T70**	Water	10/11/22 13:20	10/12/22 08:00
10629408006	**Trip Blank**	Water	10/11/22 00:00	10/12/22 08:00

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10629408001	**MW-2R/T70**	EPA 8260D	NMB	11	PASI-M
10629408002	**MW-3/T70**	EPA 8260D	TKL	11	PASI-M
10629408003	**MW-4/T70**	EPA 8260D	NMB	11	PASI-M
10629408004	**MW-5/T70**	EPA 8260D	NMB	11	PASI-M
10629408005	**MW6/T70**	EPA 8260D	TKL	11	PASI-M
10629408006	**Trip Blank**	EPA 8260D	NMB	11	PASI-M

PASI-M = Pace Analytical Services - Minneapolis

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

Sample: MW-2R/T70 **Lab ID: 10629408001** Collected: 10/11/22 13:32 Received: 10/12/22 08:00 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	**17100**	ug/L	200	20.6	200		10/13/22 22:11	71-43-2	
Ethylbenzene	**1490**	ug/L	200	21.8	200		10/13/22 22:11	100-41-4	
Methyl-tert-butyl ether	**<25.2**	ug/L	200	25.2	200		10/13/22 22:11	1634-04-4	
Naphthalene	**685**	ug/L	200	36.2	200		10/13/22 22:11	91-20-3	
Toluene	**19900**	ug/L	200	20.6	200		10/13/22 22:11	108-88-3	
1,2,4-Trimethylbenzene	**3410**	ug/L	200	26.0	200		10/13/22 22:11	95-63-6	
1,3,5-Trimethylbenzene	**887**	ug/L	200	22.6	200		10/13/22 22:11	108-67-8	
Xylene (Total)	**18400**	ug/L	600	39.8	200		10/13/22 22:11	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	100	%.	75-125		200		10/13/22 22:11	2199-69-1	D4
4-Bromofluorobenzene (S)	98	%.	75-125		200		10/13/22 22:11	460-00-4	
Toluene-d8 (S)	98	%.	75-125		200		10/13/22 22:11	2037-26-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

Sample: MW-3/T70 **Lab ID: 10629408002** Collected: 10/11/22 13:40 Received: 10/12/22 08:00 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	**188**	ug/L	2.0	0.21	2		10/17/22 14:47	71-43-2	
Ethylbenzene	**17.2**	ug/L	2.0	0.22	2		10/17/22 14:47	100-41-4	
Methyl-tert-butyl ether	**<0.25**	ug/L	2.0	0.25	2		10/17/22 14:47	1634-04-4	
Naphthalene	**10.9**	ug/L	2.0	0.36	2		10/17/22 14:47	91-20-3	
Toluene	**0.85J**	ug/L	2.0	0.21	2		10/17/22 14:47	108-88-3	
1,2,4-Trimethylbenzene	**26.5**	ug/L	2.0	0.26	2		10/17/22 14:47	95-63-6	
1,3,5-Trimethylbenzene	**0.36J**	ug/L	2.0	0.23	2		10/17/22 14:47	108-67-8	
Xylene (Total)	**69.8**	ug/L	6.0	0.40	2		10/17/22 14:47	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	98	%.	75-125		2		10/17/22 14:47	2199-69-1	D4
4-Bromofluorobenzene (S)	102	%.	75-125		2		10/17/22 14:47	460-00-4	
Toluene-d8 (S)	100	%.	75-125		2		10/17/22 14:47	2037-26-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

Sample: MW-4/T70 **Lab ID: 10629408003** Collected: 10/11/22 13:46 Received: 10/12/22 08:00 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	**15200**	ug/L	200	20.6	200		10/13/22 22:26	71-43-2	
Ethylbenzene	**1350**	ug/L	200	21.8	200		10/13/22 22:26	100-41-4	
Methyl-tert-butyl ether	**<25.2**	ug/L	200	25.2	200		10/13/22 22:26	1634-04-4	
Naphthalene	**738**	ug/L	200	36.2	200		10/13/22 22:26	91-20-3	
Toluene	**17700**	ug/L	200	20.6	200		10/13/22 22:26	108-88-3	
1,2,4-Trimethylbenzene	**3270**	ug/L	200	26.0	200		10/13/22 22:26	95-63-6	
1,3,5-Trimethylbenzene	**867**	ug/L	200	22.6	200		10/13/22 22:26	108-67-8	
Xylene (Total)	**21200**	ug/L	600	39.8	200		10/13/22 22:26	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	98	%.	75-125		200		10/13/22 22:26	2199-69-1	D4
4-Bromofluorobenzene (S)	98	%.	75-125		200		10/13/22 22:26	460-00-4	
Toluene-d8 (S)	99	%.	75-125		200		10/13/22 22:26	2037-26-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

Sample: MW-5/T70 **Lab ID: 10629408004** Collected: 10/11/22 13:27 Received: 10/12/22 08:00 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	**0.93J**	ug/L	1.0	0.10	1		10/13/22 20:24	71-43-2	
Ethylbenzene	**2.3**	ug/L	1.0	0.11	1		10/13/22 20:24	100-41-4	
Methyl-tert-butyl ether	**<0.13**	ug/L	1.0	0.13	1		10/13/22 20:24	1634-04-4	
Naphthalene	**10.2**	ug/L	1.0	0.18	1		10/13/22 20:24	91-20-3	
Toluene	**1.9**	ug/L	1.0	0.10	1		10/13/22 20:24	108-88-3	
1,2,4-Trimethylbenzene	**2.5**	ug/L	1.0	0.13	1		10/13/22 20:24	95-63-6	
1,3,5-Trimethylbenzene	**0.89J**	ug/L	1.0	0.11	1		10/13/22 20:24	108-67-8	
Xylene (Total)	**7.7**	ug/L	3.0	0.20	1		10/13/22 20:24	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	98	%.	75-125		1		10/13/22 20:24	2199-69-1	
4-Bromofluorobenzene (S)	97	%.	75-125		1		10/13/22 20:24	460-00-4	
Toluene-d8 (S)	101	%.	75-125		1		10/13/22 20:24	2037-26-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

Sample: MW6/T70 **Lab ID: 10629408005** Collected: 10/11/22 13:20 Received: 10/12/22 08:00 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	**258**	ug/L	2.0	0.21	2		10/17/22 15:02	71-43-2	
Ethylbenzene	**6.9**	ug/L	2.0	0.22	2		10/17/22 15:02	100-41-4	
Methyl-tert-butyl ether	**<0.25**	ug/L	2.0	0.25	2		10/17/22 15:02	1634-04-4	
Naphthalene	**14.9**	ug/L	2.0	0.36	2		10/17/22 15:02	91-20-3	
Toluene	**12.8**	ug/L	2.0	0.21	2		10/17/22 15:02	108-88-3	
1,2,4-Trimethylbenzene	**72.2**	ug/L	2.0	0.26	2		10/17/22 15:02	95-63-6	
1,3,5-Trimethylbenzene	**20.9**	ug/L	2.0	0.23	2		10/17/22 15:02	108-67-8	
Xylene (Total)	**187**	ug/L	6.0	0.40	2		10/17/22 15:02	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	100	%.	75-125		2		10/17/22 15:02	2199-69-1	D4
4-Bromofluorobenzene (S)	101	%.	75-125		2		10/17/22 15:02	460-00-4	
Toluene-d8 (S)	99	%.	75-125		2		10/17/22 15:02	2037-26-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

Sample: Trip Blank **Lab ID: 10629408006** Collected: 10/11/22 00:00 Received: 10/12/22 08:00 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		10/13/22 19:23	71-43-2	
Ethylbenzene	**<0.11**	ug/L	1.0	0.11	1		10/13/22 19:23	100-41-4	
Methyl-tert-butyl ether	**<0.13**	ug/L	1.0	0.13	1		10/13/22 19:23	1634-04-4	
Naphthalene	**<0.18**	ug/L	1.0	0.18	1		10/13/22 19:23	91-20-3	
Toluene	**<0.10**	ug/L	1.0	0.10	1		10/13/22 19:23	108-88-3	
1,2,4-Trimethylbenzene	**<0.13**	ug/L	1.0	0.13	1		10/13/22 19:23	95-63-6	
1,3,5-Trimethylbenzene	**<0.11**	ug/L	1.0	0.11	1		10/13/22 19:23	108-67-8	
Xylene (Total)	**<0.20**	ug/L	3.0	0.20	1		10/13/22 19:23	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	100	%.	75-125		1		10/13/22 19:23	2199-69-1	
4-Bromofluorobenzene (S)	94	%.	75-125		1		10/13/22 19:23	460-00-4	
Toluene-d8 (S)	102	%.	75-125		1		10/13/22 19:23	2037-26-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

QC Batch: 846727
QC Batch Method: EPA 8260D
Analysis Method: EPA 8260D
Analysis Description: 8260D MSV UST-WATER
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10629408001, 10629408003, 10629408004, 10629408006

METHOD BLANK: 4480046 Matrix: Water
Associated Lab Samples: 10629408001, 10629408003, 10629408004, 10629408006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/L	<0.13	1.0	10/13/22 18:52	
1,3,5-Trimethylbenzene	ug/L	<0.11	1.0	10/13/22 18:52	
Benzene	ug/L	<0.10	1.0	10/13/22 18:52	
Ethylbenzene	ug/L	<0.11	1.0	10/13/22 18:52	
Methyl-tert-butyl ether	ug/L	<0.13	1.0	10/13/22 18:52	
Naphthalene	ug/L	<0.18	1.0	10/13/22 18:52	
Toluene	ug/L	<0.10	1.0	10/13/22 18:52	
Xylene (Total)	ug/L	<0.20	3.0	10/13/22 18:52	
1,2-Dichlorobenzene-d4 (S)	%.	100	75-125	10/13/22 18:52	
4-Bromofluorobenzene (S)	%.	95	75-125	10/13/22 18:52	
Toluene-d8 (S)	%.	101	75-125	10/13/22 18:52	

LABORATORY CONTROL SAMPLE: 4480047

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/L	20	21.5	108	75-125	
1,3,5-Trimethylbenzene	ug/L	20	21.1	105	75-125	
Benzene	ug/L	20	21.1	106	73-125	
Ethylbenzene	ug/L	20	21.2	106	75-125	
Methyl-tert-butyl ether	ug/L	20	19.2	96	75-125	
Naphthalene	ug/L	20	20.7	103	66-127	
Toluene	ug/L	20	20.9	105	74-125	
Xylene (Total)	ug/L	60	62.9	105	72-125	
1,2-Dichlorobenzene-d4 (S)	%.			98	75-125	
4-Bromofluorobenzene (S)	%.			101	75-125	
Toluene-d8 (S)	%.			101	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4480050 4480051

Parameter	Units	10629448002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,2,4-Trimethylbenzene	ug/L	7.7	100	100	111	113	103	106	62-138	2	30	
1,3,5-Trimethylbenzene	ug/L	7.1	100	100	108	110	101	103	64-135	2	30	
Benzene	ug/L	452	100	100	529	539	77	88	65-140	2	30	
Ethylbenzene	ug/L	7.4	100	100	108	109	101	102	66-126	1	30	
Methyl-tert-butyl ether	ug/L	<0.63	100	100	94.0	96.2	94	96	65-137	2	30	
Naphthalene	ug/L	2.5J	100	100	109	113	107	111	56-141	4	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

Pace Analytical Services, LLC
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Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4480050 4480051

Parameter	Units	10629448002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Toluene	ug/L	21.9	100	100	117	121	95	99	69-131	3	30	
Xylene (Total)	ug/L	65.9	300	300	372	376	102	103	68-136	1	30	
1,2-Dichlorobenzene-d4 (S)	%.						99	100	75-125			D4
4-Bromofluorobenzene (S)	%.						102	101	75-125			
Toluene-d8 (S)	%.						99	100	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

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

QC Batch: 847322
QC Batch Method: EPA 8260D
Analysis Method: EPA 8260D
Analysis Description: 8260D MSV UST-WATER
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10629408002, 10629408005

METHOD BLANK: 4483172 Matrix: Water
Associated Lab Samples: 10629408002, 10629408005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/L	<0.13	1.0	10/17/22 11:35	
1,3,5-Trimethylbenzene	ug/L	<0.11	1.0	10/17/22 11:35	
Benzene	ug/L	<0.10	1.0	10/17/22 11:35	
Ethylbenzene	ug/L	<0.11	1.0	10/17/22 11:35	
Methyl-tert-butyl ether	ug/L	<0.13	1.0	10/17/22 11:35	
Naphthalene	ug/L	<0.18	1.0	10/17/22 11:35	
Toluene	ug/L	<0.10	1.0	10/17/22 11:35	
Xylene (Total)	ug/L	<0.20	3.0	10/17/22 11:35	
1,2-Dichlorobenzene-d4 (S)	%.	99	75-125	10/17/22 11:35	
4-Bromofluorobenzene (S)	%.	99	75-125	10/17/22 11:35	
Toluene-d8 (S)	%.	100	75-125	10/17/22 11:35	

LABORATORY CONTROL SAMPLE: 4483173

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/L	20	19.2	96	75-125	
1,3,5-Trimethylbenzene	ug/L	20	18.7	93	75-125	
Benzene	ug/L	20	17.3	86	73-125	
Ethylbenzene	ug/L	20	18.3	92	75-125	
Methyl-tert-butyl ether	ug/L	20	17.9	89	75-125	
Naphthalene	ug/L	20	19.9	100	66-127	
Toluene	ug/L	20	17.4	87	74-125	
Xylene (Total)	ug/L	60	54.8	91	72-125	
1,2-Dichlorobenzene-d4 (S)	%.			98	75-125	
4-Bromofluorobenzene (S)	%.			103	75-125	
Toluene-d8 (S)	%.			101	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4483180 4483181

Parameter	Units	10628432008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,2,4-Trimethylbenzene	ug/L	1520	2000	2000	4050	4180	127	133	62-138	3	30	
1,3,5-Trimethylbenzene	ug/L	119	2000	2000	2450	2540	117	121	64-135	3	30	
Benzene	ug/L	8960	2000	2000	10900	11300	95	116	65-140	4	30	
Ethylbenzene	ug/L	1450	2000	2000	3810	3940	118	125	66-126	4	30	
Methyl-tert-butyl ether	ug/L	ND	2000	2000	2260	2270	113	113	65-137	0	30	
Naphthalene	ug/L	284	2000	2000	2560	2600	114	116	56-141	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

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4483180 4483181

Parameter	Units	10628432008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Toluene	ug/L	ND	2000	2000	2210	2310	107	113	69-131	5	30	
Xylene (Total)	ug/L	807			7800	7950				2	30	
1,2-Dichlorobenzene-d4 (S)	%.						97	98	75-125			
4-Bromofluorobenzene (S)	%.						105	103	75-125			
Toluene-d8 (S)	%.						101	100	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

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

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.

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.

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10629408

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10629408001	**MW-2R/T70**	EPA 8260D	846727		
10629408002	**MW-3/T70**	EPA 8260D	847322		
10629408003	**MW-4/T70**	EPA 8260D	846727		
10629408004	**MW-5/T70**	EPA 8260D	846727		
10629408005	**MW6/T70**	EPA 8260D	847322		
10629408006	**Trip Blank**	EPA 8260D	846727		

Barr Engineering Co. Chain of Custody

Sample Origination State
☐ CO ☐ MI ☐ MN ☐ MO ☐ ND ☐ NV ☐ TX ☐ UT ☒ WI ☐ WY ☐ Other: _____

COC Number: **№ 591385**
COC 1 of 1

WO#: 10629408

10629408

REPORT TO		INVOICE TO	
Company:	Barr Engineering Co.	Company:	Barr
Address:	325 S. Lake Ave	Address:	
Address:	Duluth, MN 55802	Address:	
Name:	Lynette Carney	Name:	
email:	LCarney@barr.com	email:	
Copy to:	BarrDM@barr.com	P.O.	
Project Name:	SRC GW TK70	Barr Project No:	49161494.02 100 102

Location	Sample Depth Start	Stop	Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix Code	Perform MS/MSD Y / N	Total Number Of Containers	Analysis Requested: PVOCs + Naphthalene (EPA 8260) Water	Soil	% Solids	Preservative Code	Field Filtered Y/N
1. MW-2R/T70				10/11/2022	1332	GW	N	3	X				001
2. MW-3/T70					1340	GW	N	3	X				002
3. MW-4/T70					1346	GW	N	3	X				003
4. MW-5/T70					1327	GW	N	3	X				004
5. MW6/T70					1320	GW	N	3	X				005
6. Trip Blank					—	WQ	N	2	X				006
7.													
8.													
9.													
10.													

vv = Unspecified
S = Soil/Solid
SD = Sediment
SQ = MeOH blank
OTH = Other (Oil, etc.)
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = Zn Acetate
K = Other

BARR USE ONLY

Sampled by: KLS3
Barr Proj. Manager: LMC
Barr DQ Manager: JET
Lab Name: Pace
Lab Location: ~~Green Bay~~ or Minneapolis

Relinquished by:	On Ice?	Date	Time	Received by:	Date	Time
Greg Schneider	(Y) N	10/11/22	1542	Melanie Pace	10/11/22	15:42
Relinquished by:	On Ice?	Date	Time	Received by:	Date	Time
Melanie Pace	(Y) N	10/11/22	15:42		10/12/22	0800

Samples Shipped VIA: ☐ Ground Courier ☐ Air Carrier ☐ Sampler ☐ Other: _____

Air Bill Number:

Lab WO:

Temperature on Receipt (°C): 4.6 Custody Seal Intact? ☐ Y ☐ N ☐ None

Requested Due Date:
☒ Standard Turn Around Time
☐ Rush _____ (mm/dd/yyyy)

Distribution - White-Original: Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; Scan and email: LaCopy to BarrDM@barr.com for tracking and filing procedures

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

Page 7 of 18

Sample Condition Upon Receipt

Client Name: Barr Engineering

Project #: WO#: 10629408
PM: MKH Due Date: 10/26/22
CLIENT: BARR

Courier: ☐ FedEx ☐ UPS ☐ USPS ☐ Client ☑ Pace ☐ SpeeDee ☐ Commercial

Tracking Number: _____ ☐ See Exceptions ENV-FRM-MIN4-0142

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 (1336) ☐ T3 (0459) ☐ T4 (0254) ☐ T5 (0178) ☐ T6 (0235) ☐ T7 (0042) ☐ T8 (0775) ☐ 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:** 2.4 °C

Correction Factor: +0.2 **Cooler Temp Corrected w/temp blank:** 2.6 °C

Average Corrected Temp (no temp blank only): _____ °C ☐ See Exceptions ENV-FRM-MIN4-0142 ☐ 1 Container

USDA Regulated Soil: ☑ N/A, water sample/other: _____) **Date/Initials of Person Examining Contents:** KB 10/12/22

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): ☐ Duluth ☑ Minneapolis ☐ Virginia

				COMMENTS
Chain of Custody Present and Filled Out?	☑ Yes	☐ No		1.
Chain of Custody Relinquished?	☑ Yes	☐ No		2.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	3.
Samples Arrived within Hold Time?	☑ Yes	☐ No		4. If fecal: ☐ <8 hrs ☐ >8 hr, <24 ☐ No
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No		5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E.coli ☐ BOD/cBOD ☐ Hex Chrom ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐ Other
Rush Turn Around Time Requested?	☐ Yes	☑ No		6.
Sufficient Sample Volume?	☑ Yes	☐ No		7.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	8.
-Pace Containers Used?	☑ Yes	☐ No		
Containers Intact?	☑ Yes	☐ No		9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☑ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC?	☑ Yes	☐ No		11. **If no, write ID/Date/Time of container below:** ☐ See Exceptions ENV-FRM-MIN4-0142
Matrix: ☐ Water ☐ Soil ☐ Oil ☐ Other				
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☑ N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO3, H2SO4, <2pH, NaOH >9 Sulfide, NaOH>10 Cyanide)	☐ Yes	☐ No	☑ N/A	☐ NaOH ☐ HNO3 ☐ H2SO4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxins/PFAS (*If adding preservative to a container, it must be added to associated field and equipment blanks--verify with PM first.)	☑ Yes	☐ No	☐ N/A	Positive for Residual Chlorine? ☐ Yes ☐ No ☐ 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?	☐ Yes	☐ No	☑ N/A	13.
Extra labels present on soil VOA or WIDRO containers?	☑ Yes	☐ No	☐ N/A	14. ☐ See Exceptions ENV-FRM-MIN4-0142
Headspace in VOA Vials (greater than 6mm)?	☐ Yes	☑ No	☐ N/A	
3 Trip Blanks Present?	☑ Yes	☐ No	☐ N/A	15.
Trip Blank Custody Seals Present?	☑ Yes	☐ No	☐ N/A	Pace Trip Blank Lot # (if purchased): 386612(2)

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: _____ Date/Time: _____

Comments/Resolution: _____

Project Manager Review: _____ **Date:** 10/12/22

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: KB **Line:** 2

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

June 09, 2022

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

RE: Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

Dear Jim Taraldsen:

Enclosed are the analytical results for sample(s) received by the laboratory on May 27, 2022. 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

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

Pace Analytical Services, LLC - Minneapolis MN

1700 Elm Street SE, Minneapolis, MN 55414
A2LA Certification #: 2926.01*
1800 Elm Street SE, Minneapolis, MN 55414--Satellite Air Lab
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
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
Ohio VAP Certification (1800) #: CL110*
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
*Please Note: Applicable air certifications are denoted with an asterisk (*).

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10610502001	**MW-2R/T70**	Water	05/25/22 13:45	05/27/22 18:45
10610502002	**MW-3/T70**	Water	05/25/22 13:49	05/27/22 18:45
10610502003	**MW-4/T70**	Water	05/25/22 13:54	05/27/22 18:45
10610502004	**MW-5/T70**	Water	05/25/22 14:00	05/27/22 18:45
10610502005	**MW-6/T70**	Water	05/25/22 14:10	05/27/22 18:45
10610502006	**Trip Blank**	Water	05/25/22 00:00	05/27/22 18:45

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10610502001	**MW-2R/T70**	EPA 8260D	NMB, TKL	11	PASI-M
10610502002	**MW-3/T70**	EPA 8260D	NMB	11	PASI-M
10610502003	**MW-4/T70**	EPA 8260D	TKL	11	PASI-M
10610502004	**MW-5/T70**	EPA 8260D	NMB	11	PASI-M
10610502005	**MW-6/T70**	EPA 8260D	NMB, TKL, ZB	11	PASI-M
10610502006	**Trip Blank**	EPA 8260D	NMB	11	PASI-M

PASI-M = Pace Analytical Services - Minneapolis

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

Sample: MW-2R/T70 **Lab ID: 10610502001** Collected: 05/25/22 13:45 Received: 05/27/22 18:45 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	**16600**	ug/L	100	10.3	100		06/02/22 23:11	71-43-2	
Ethylbenzene	**2260**	ug/L	100	10.9	100		06/02/22 23:11	100-41-4	
Methyl-tert-butyl ether	**<12.6**	ug/L	100	12.6	100		06/02/22 23:11	1634-04-4	
Naphthalene	**665**	ug/L	100	18.1	100		06/02/22 23:11	91-20-3	
Toluene	**23100**	ug/L	200	20.6	200		06/07/22 04:21	108-88-3	
1,2,4-Trimethylbenzene	**2830**	ug/L	100	13.0	100		06/02/22 23:11	95-63-6	
1,3,5-Trimethylbenzene	**736**	ug/L	100	11.3	100		06/02/22 23:11	108-67-8	
Xylene (Total)	**17600**	ug/L	300	19.9	100		06/02/22 23:11	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	103	%.	75-125		100		06/02/22 23:11	2199-69-1	D4
4-Bromofluorobenzene (S)	101	%.	75-125		100		06/02/22 23:11	460-00-4	
Toluene-d8 (S)	101	%.	75-125		100		06/02/22 23:11	2037-26-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

Sample: MW-3/T70 **Lab ID: 10610502002** Collected: 05/25/22 13:49 Received: 05/27/22 18:45 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	**478**	ug/L	1.0	0.10	1		06/01/22 18:28	71-43-2	E,P6
Ethylbenzene	**58.0**	ug/L	1.0	0.11	1		06/01/22 18:28	100-41-4	M1
Methyl-tert-butyl ether	**<0.13**	ug/L	1.0	0.13	1		06/01/22 18:28	1634-04-4	R1
Naphthalene	**26.4**	ug/L	1.0	0.18	1		06/01/22 18:28	91-20-3	
Toluene	**6.5**	ug/L	1.0	0.10	1		06/01/22 18:28	108-88-3	
1,2,4-Trimethylbenzene	**126**	ug/L	1.0	0.13	1		06/01/22 18:28	95-63-6	M1
1,3,5-Trimethylbenzene	**8.8**	ug/L	1.0	0.11	1		06/01/22 18:28	108-67-8	M1
Xylene (Total)	**281**	ug/L	3.0	0.20	1		06/01/22 18:28	1330-20-7	MS
Surrogates									
1,2-Dichlorobenzene-d4 (S)	101	%.	75-125		1		06/01/22 18:28	2199-69-1	P2
4-Bromofluorobenzene (S)	105	%.	75-125		1		06/01/22 18:28	460-00-4	
Toluene-d8 (S)	102	%.	75-125		1		06/01/22 18:28	2037-26-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

Sample: MW-4/T70 **Lab ID: 10610502003** Collected: 05/25/22 13:54 Received: 05/27/22 18:45 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	**16800**	ug/L	200	20.6	200		06/07/22 04:37	71-43-2	
Ethylbenzene	**1310**	ug/L	200	21.8	200		06/07/22 04:37	100-41-4	
Methyl-tert-butyl ether	**<25.2**	ug/L	200	25.2	200		06/07/22 04:37	1634-04-4	
Naphthalene	**650**	ug/L	200	36.2	200		06/07/22 04:37	91-20-3	
Toluene	**19700**	ug/L	200	20.6	200		06/07/22 04:37	108-88-3	
1,2,4-Trimethylbenzene	**2510**	ug/L	200	26.0	200		06/07/22 04:37	95-63-6	
1,3,5-Trimethylbenzene	**698**	ug/L	200	22.6	200		06/07/22 04:37	108-67-8	
Xylene (Total)	**17100**	ug/L	600	39.8	200		06/07/22 04:37	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	100	%.	75-125		200		06/07/22 04:37	2199-69-1	D4
4-Bromofluorobenzene (S)	101	%.	75-125		200		06/07/22 04:37	460-00-4	
Toluene-d8 (S)	100	%.	75-125		200		06/07/22 04:37	2037-26-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

Sample: MW-5/T70 **Lab ID: 10610502004** Collected: 05/25/22 14:00 Received: 05/27/22 18:45 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	**0.12J**	ug/L	1.0	0.10	1		06/02/22 21:53	71-43-2	
Ethylbenzene	**0.14J**	ug/L	1.0	0.11	1		06/02/22 21:53	100-41-4	
Methyl-tert-butyl ether	**<0.13**	ug/L	1.0	0.13	1		06/02/22 21:53	1634-04-4	
Naphthalene	**0.46J**	ug/L	1.0	0.18	1		06/02/22 21:53	91-20-3	
Toluene	**0.26J**	ug/L	1.0	0.10	1		06/02/22 21:53	108-88-3	
1,2,4-Trimethylbenzene	**0.13J**	ug/L	1.0	0.13	1		06/02/22 21:53	95-63-6	
1,3,5-Trimethylbenzene	**<0.11**	ug/L	1.0	0.11	1		06/02/22 21:53	108-67-8	
Xylene (Total)	**0.56J**	ug/L	3.0	0.20	1		06/02/22 21:53	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	101	%.	75-125		1		06/02/22 21:53	2199-69-1	
4-Bromofluorobenzene (S)	102	%.	75-125		1		06/02/22 21:53	460-00-4	
Toluene-d8 (S)	102	%.	75-125		1		06/02/22 21:53	2037-26-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

Sample: MW-6/T70 **Lab ID: 10610502005** Collected: 05/25/22 14:10 Received: 05/27/22 18:45 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	**5790**	ug/L	50.0	5.2	50		06/07/22 23:31	71-43-2	
Ethylbenzene	**951**	ug/L	10.0	1.1	10		06/07/22 03:04	100-41-4	
Methyl-tert-butyl ether	**<0.13**	ug/L	1.0	0.13	1		06/02/22 22:08	1634-04-4	
Naphthalene	**204**	ug/L	10.0	1.8	10		06/07/22 03:04	91-20-3	
Toluene	**182**	ug/L	1.0	0.10	1		06/02/22 22:08	108-88-3	
1,2,4-Trimethylbenzene	**1030**	ug/L	10.0	1.3	10		06/07/22 03:04	95-63-6	
1,3,5-Trimethylbenzene	**255**	ug/L	10.0	1.1	10		06/07/22 03:04	108-67-8	
Xylene (Total)	**3870**	ug/L	30.0	2.0	10		06/07/22 03:04	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	100	%.	75-125		1		06/02/22 22:08	2199-69-1	
4-Bromofluorobenzene (S)	101	%.	75-125		1		06/02/22 22:08	460-00-4	
Toluene-d8 (S)	103	%.	75-125		1		06/02/22 22:08	2037-26-5	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

Sample: Trip Blank **Lab ID: 10610502006** Collected: 05/25/22 00:00 Received: 05/27/22 18:45 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		06/02/22 20:35	71-43-2	
Ethylbenzene	**<0.11**	ug/L	1.0	0.11	1		06/02/22 20:35	100-41-4	
Methyl-tert-butyl ether	**<0.13**	ug/L	1.0	0.13	1		06/02/22 20:35	1634-04-4	
Naphthalene	**<0.18**	ug/L	1.0	0.18	1		06/02/22 20:35	91-20-3	
Toluene	**<0.10**	ug/L	1.0	0.10	1		06/02/22 20:35	108-88-3	
1,2,4-Trimethylbenzene	**<0.13**	ug/L	1.0	0.13	1		06/02/22 20:35	95-63-6	
1,3,5-Trimethylbenzene	**<0.11**	ug/L	1.0	0.11	1		06/02/22 20:35	108-67-8	
Xylene (Total)	**<0.20**	ug/L	3.0	0.20	1		06/02/22 20:35	1330-20-7	
Surrogates									
1,2-Dichlorobenzene-d4 (S)	101	%.	75-125		1		06/02/22 20:35	2199-69-1	
4-Bromofluorobenzene (S)	102	%.	75-125		1		06/02/22 20:35	460-00-4	
Toluene-d8 (S)	102	%.	75-125		1		06/02/22 20:35	2037-26-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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QUALITY CONTROL DATA

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

QC Batch: 818919
QC Batch Method: EPA 8260D
Analysis Method: EPA 8260D
Analysis Description: 8260D MSV UST-WATER
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10610502002

METHOD BLANK: 4339603 Matrix: Water
Associated Lab Samples: 10610502002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/L	<0.13	1.0	06/01/22 16:39	
1,3,5-Trimethylbenzene	ug/L	<0.11	1.0	06/01/22 16:39	
Benzene	ug/L	<0.10	1.0	06/01/22 16:39	
Ethylbenzene	ug/L	<0.11	1.0	06/01/22 16:39	
Methyl-tert-butyl ether	ug/L	<0.13	1.0	06/01/22 16:39	
Naphthalene	ug/L	<0.18	1.0	06/01/22 16:39	
Toluene	ug/L	<0.10	1.0	06/01/22 16:39	
Xylene (Total)	ug/L	<0.20	3.0	06/01/22 16:39	
1,2-Dichlorobenzene-d4 (S)	%.	101	75-125	06/01/22 16:39	
4-Bromofluorobenzene (S)	%.	104	75-125	06/01/22 16:39	
Toluene-d8 (S)	%.	100	75-125	06/01/22 16:39	

LABORATORY CONTROL SAMPLE: 4339604

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/L	20	18.0	90	75-125	
1,3,5-Trimethylbenzene	ug/L	20	18.1	91	75-125	
Benzene	ug/L	20	18.1	91	73-125	
Ethylbenzene	ug/L	20	18.8	94	75-125	
Methyl-tert-butyl ether	ug/L	20	20.7	103	75-125	
Naphthalene	ug/L	20	17.8	89	66-127	
Toluene	ug/L	20	18.5	93	74-125	
Xylene (Total)	ug/L	60	55.8	93	72-125	
1,2-Dichlorobenzene-d4 (S)	%.			100	75-125	
4-Bromofluorobenzene (S)	%.			106	75-125	
Toluene-d8 (S)	%.			102	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4339609 4339610

Parameter	Units	10610502002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,2,4-Trimethylbenzene	ug/L	126	20	20	145	136	94	50	62-138	6	30	M1
1,3,5-Trimethylbenzene	ug/L	8.8	20	20	26.7	21.2	89	62	64-135	23	30	M1
Benzene	ug/L	478	20	20	484	509	31	154	65-140	5	30	E,P6
Ethylbenzene	ug/L	58.0	20	20	75.6	70.2	88	61	66-126	8	30	M1
Methyl-tert-butyl ether	ug/L	<0.13	20	20	19.0	13.6	95	68	65-137	33	30	R1
Naphthalene	ug/L	26.4	20	20	47.9	40.8	108	72	56-141	16	30	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4339609 4339610

Parameter	Units	10610502002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Toluene	ug/L	6.5	20	20	24.0	21.0	87	73	69-131	13	30	
Xylene (Total)	ug/L	281	60	60	328	248	78	-56	68-136	28	30	MS
1,2-Dichlorobenzene-d4 (S)	%.						101	102	75-125			P2
4-Bromofluorobenzene (S)	%.						106	85	75-125			
Toluene-d8 (S)	%.						101	101	75-125			

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

QC Batch: 819185
QC Batch Method: EPA 8260D
Analysis Method: EPA 8260D
Analysis Description: 8260D MSV UST-WATER
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10610502001, 10610502004, 10610502005, 10610502006

METHOD BLANK: 4340777 Matrix: Water
Associated Lab Samples: 10610502001, 10610502004, 10610502005, 10610502006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/L	<0.13	1.0	06/02/22 20:19	
1,3,5-Trimethylbenzene	ug/L	<0.11	1.0	06/02/22 20:19	
Benzene	ug/L	<0.10	1.0	06/02/22 20:19	
Ethylbenzene	ug/L	<0.11	1.0	06/02/22 20:19	
Methyl-tert-butyl ether	ug/L	<0.13	1.0	06/02/22 20:19	
Naphthalene	ug/L	<0.18	1.0	06/02/22 20:19	
Toluene	ug/L	<0.10	1.0	06/02/22 20:19	
Xylene (Total)	ug/L	<0.20	3.0	06/02/22 20:19	
1,2-Dichlorobenzene-d4 (S)	%.	100	75-125	06/02/22 20:19	
4-Bromofluorobenzene (S)	%.	102	75-125	06/02/22 20:19	
Toluene-d8 (S)	%.	101	75-125	06/02/22 20:19	

LABORATORY CONTROL SAMPLE: 4340778

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/L	20	15.9	80	75-125	
1,3,5-Trimethylbenzene	ug/L	20	15.7	79	75-125	
Benzene	ug/L	20	16.9	85	73-125	
Ethylbenzene	ug/L	20	16.8	84	75-125	
Methyl-tert-butyl ether	ug/L	20	19.2	96	75-125	
Naphthalene	ug/L	20	16.3	81	66-127	
Toluene	ug/L	20	17.0	85	74-125	
Xylene (Total)	ug/L	60	49.4	82	72-125	
1,2-Dichlorobenzene-d4 (S)	%.			100	75-125	
4-Bromofluorobenzene (S)	%.			105	75-125	
Toluene-d8 (S)	%.			104	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4340779 4340780

Parameter	Units	10610470001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,2,4-Trimethylbenzene	ug/L	109	20	20	131	127	110	86	62-138	4	30	
1,3,5-Trimethylbenzene	ug/L	14.1	20	20	35.9	34.5	109	102	64-135	4	30	
Benzene	ug/L	ND	20	20	22.2	21.9	99	98	65-140	1	30	
Ethylbenzene	ug/L	ND	20	20	25.4	24.8	105	102	66-126	3	30	
Methyl-tert-butyl ether	ug/L	ND	20	20	22.8	21.2	114	106	65-137	7	30	
Naphthalene	ug/L	48.2	20	20	70.2	68.7	110	102	56-141	2	30	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4340779 4340780

Parameter	Units	10610470001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Toluene	ug/L	ND	20	20	22.6	18.9	109	90	69-131	18	30	
Xylene (Total)	ug/L	103	60	60	164	158	102	93	68-136	3	30	
1,2-Dichlorobenzene-d4 (S)	%.						100	101	75-125			
4-Bromofluorobenzene (S)	%.						104	104	75-125			
Toluene-d8 (S)	%.						103	90	75-125			

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

QC Batch: 819534
QC Batch Method: EPA 8260D
Analysis Method: EPA 8260D
Analysis Description: 8260D MSV UST-WATER
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10610502001, 10610502003, 10610502005

METHOD BLANK: 4342739 Matrix: Water
Associated Lab Samples: 10610502001, 10610502003, 10610502005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/L	<0.13	1.0	06/07/22 02:02	
1,3,5-Trimethylbenzene	ug/L	<0.11	1.0	06/07/22 02:02	
Benzene	ug/L	<0.10	1.0	06/07/22 02:02	
Ethylbenzene	ug/L	<0.11	1.0	06/07/22 02:02	
Methyl-tert-butyl ether	ug/L	<0.13	1.0	06/07/22 02:02	
Naphthalene	ug/L	<0.18	1.0	06/07/22 02:02	
Toluene	ug/L	<0.10	1.0	06/07/22 02:02	
Xylene (Total)	ug/L	<0.20	3.0	06/07/22 02:02	
1,2-Dichlorobenzene-d4 (S)	%.	100	75-125	06/07/22 02:02	
4-Bromofluorobenzene (S)	%.	105	75-125	06/07/22 02:02	
Toluene-d8 (S)	%.	104	75-125	06/07/22 02:02	

LABORATORY CONTROL SAMPLE: 4342740

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/L	20	19.3	97	75-125	
1,3,5-Trimethylbenzene	ug/L	20	19.7	99	75-125	
Benzene	ug/L	20	19.8	99	73-125	
Ethylbenzene	ug/L	20	19.5	97	75-125	
Methyl-tert-butyl ether	ug/L	20	20.6	103	75-125	
Naphthalene	ug/L	20	20.0	100	66-127	
Toluene	ug/L	20	19.1	96	74-125	
Xylene (Total)	ug/L	60	58.5	97	72-125	
1,2-Dichlorobenzene-d4 (S)	%.			101	75-125	
4-Bromofluorobenzene (S)	%.			101	75-125	
Toluene-d8 (S)	%.			102	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4342750 4342751

Parameter	Units	10610178004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,2,4-Trimethylbenzene	ug/L	1050	1000	1000	1940	1940	89	89	62-138	0	30	
1,3,5-Trimethylbenzene	ug/L	305	1000	1000	1130	1160	82	85	64-135	2	30	
Benzene	ug/L	4880	1000	1000	6150	5910	126	103	65-140	4	30	
Ethylbenzene	ug/L	393	1000	1000	1260	1170	87	78	66-126	7	30	
Methyl-tert-butyl ether	ug/L	<6.3	1000	1000	895	888	89	89	65-137	1	30	
Naphthalene	ug/L	149	1000	1000	1080	1080	93	93	56-141	0	30	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4342750 4342751

Parameter	Units	10610178004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Toluene	ug/L	71.3	1000	1000	885	876	81	81	69-131	1	30	
Xylene (Total)	ug/L	2660	3000	3000	5480	5140	94	83	68-136	6	30	
1,2-Dichlorobenzene-d4 (S)	%.						100	98	75-125			
4-Bromofluorobenzene (S)	%.						102	92	75-125			
Toluene-d8 (S)	%.						97	101	75-125			

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

QC Batch: 820116
QC Batch Method: EPA 8260D
Analysis Method: EPA 8260D
Analysis Description: 8260D MSV UST-WATER
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10610502005

METHOD BLANK: 4345721 Matrix: Water
Associated Lab Samples: 10610502005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Benzene	ug/L	<0.10	1.0	06/07/22 22:00	
1,2-Dichlorobenzene-d4 (S)	%.	97	75-125	06/07/22 22:00	
4-Bromofluorobenzene (S)	%.	95	75-125	06/07/22 22:00	
Toluene-d8 (S)	%.	100	75-125	06/07/22 22:00	

LABORATORY CONTROL SAMPLE: 4345722

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Benzene	ug/L	20	22.9	115	73-125	
1,2-Dichlorobenzene-d4 (S)	%.			98	75-125	
4-Bromofluorobenzene (S)	%.			96	75-125	
Toluene-d8 (S)	%.			103	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4345730 4345731

Parameter	Units	10610422001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Benzene	ug/L	ND	20	20	23.8	17.9	118	88	65-140	28	30	
1,2-Dichlorobenzene-d4 (S)	%.						97	102	75-125			1M
4-Bromofluorobenzene (S)	%.						100	97	75-125			
Toluene-d8 (S)	%.						101	101	75-125			

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REPORT OF LABORATORY ANALYSIS

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1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

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.

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

1M	Post-analysis pH measurement indicates insufficient VOA sample preservation. Therefore, analysis was conducted outside the recognized method holding time.
D4	Sample was diluted due to the presence of high levels of target analytes.
E	Analyte concentration exceeded the calibration range. The reported result is estimated.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
MS	Analyte recovery in the matrix spike was outside QC limits for one or more of the constituent analytes used in the calculated result.
P2	Re-extraction or re-analysis could not be performed due to insufficient sample amount.
P6	Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.
R1	RPD value was outside control limits.

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 49161494.02 100 102 SRC GWTK70
Pace Project No.: 10610502

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10610502001	**MW-2R/T70**	EPA 8260D	819185		
10610502001	**MW-2R/T70**	EPA 8260D	819534		
10610502002	**MW-3/T70**	EPA 8260D	818919		
10610502003	**MW-4/T70**	EPA 8260D	819534		
10610502004	**MW-5/T70**	EPA 8260D	819185		
10610502005	**MW-6/T70**	EPA 8260D	819185		
10610502005	**MW-6/T70**	EPA 8260D	819534		
10610502005	**MW-6/T70**	EPA 8260D	820116		
10610502006	**Trip Blank**	EPA 8260D	819185		

...gineering Co. Chain of Custody

...n State
☐ CO ☐ MI ☐ MN ☐ MO ☐ ND ☐ TX ☐ UT ☒ WI ☐ Other: _____

COC Number: № 589271
COC 1 of 1

WO#: 10610502
10610502

REPORT TO		INVOICE TO	
Company:	Barr Engineering Co.	Company:	Barr
Address:	325 S. Lake Ave	Address:	
Address:	Duluth MN 55802	Address:	
Name:	Lynette Carney	Name:	
email:	lcarney@barr.com	email:	
Copy to:	BarrDM@barr.com	P.O.	—
Project Name:	SRE GW TK70	Barr Project No:	49161494.02 100 102

	Location	Sample Depth Start	Stop	Unit (m./ft. or in.)	Collection Date (mm/dd/yyyy)	Collection Time (hh:mm)	Matrix Code	Perform MS/MSD Y / N	Total Number Of Containers	Analysis Requested: Water: PVOC + Naphthalene	Soil: % Solids	Preservative Code	Field Filtered Y/N	
1.	MW-2R / T70	—	—		05/25/2022	1345	GW	N	3	X				001
2.	MW-3 / T70	—	—			1349		N	3	X				002
3.	MW-4 / T70	—	—			1354		N	3	X				003
4.	MW-5 / T70	—	—			1400		N	3	X				004
5.	MW-6 / T70	—	—			1410		N	3	X				005
6.	Trip Blank	—	—			—	—	N	2	X				006
7.														
8.														
9.														
10.														

O = Other
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = Zn Acetate
K = Other

BARR USE ONLY

Sampled by: KMJ3
Barr Proj. Manager: LMC
Barr DQ Manager: JET
Lab Name: Pace
Lab Location: Green Bay or Minneapolis

Relinquished by: [signature] | On Ice? Y 0 N | Date 5/25/22 | Time 1503 | Received by: [signature] | Date 5/25/22 | Time 1503

Relinquished by: | On Ice? Y N | Date | Time | Received by: [signature] | Date 5/27/22 | Time 1815

Samples Shipped VIA: ☐ Ground Courier ☐ Air Carrier ☐ Sampler ☐ Other: _____

Air Bill Number:

Lab WO:

Temperature on Receipt (°C): 2.1 Custody Seal Intact? ☐ Y ☐ N ☐ None

Requested Due Date:
☒ Standard Turn Around Time
☐ Rush _____ (mm/dd/yyyy)

Distribution - **White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Scan and email:** a copy to BarrDM@barr.com for tracking and filing procedures

DC#_Title: ENV-FRM-MIN4-0150 v05_Sample Condition Upon Receipt (SCUR)

Effective Date: 04/12/2022

Sample Condition Upon Receipt

Client Name: Barr

Project #: WO#: 10610502

PM: MKH Due Date: 06/14/22

CLIENT: BARR

Courier: ☐Fed Ex ☐UPS ☐USPS ☑Client MKH 5/30/22
☒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(1336) ☐T3(0459) ☐T4(0254) ☐T5(0489) ☐T6(0235) ☐T7 (0042) ☐01339252/1710 ☐122639816 ☐140792808

Type of Ice: ☒Wet ☐Blue ☐None ☐Dry ☐Melted

Did Samples Originate in West Virginia? ☐Yes ☒No **Were All Container Temps Taken?** ☐Yes ☐No ☒N/A

Temp should be above freezing to 6°C **Cooler Temp Read w/temp blank:** 4.0 °C

Correction Factor: tme **Cooler Temp Corrected w/temp blank:** 4.0 °C

Average Corrected Temp (no temp blank only): ____ °C ☐See Exceptions ENV-FRM-MIN4-0142 ☐1 Container

USDA Regulated Soil: (☒N/A, water sample/Other:)

Date/Initials of Person Examining Contents: MH 5/30/22

Did samples originate in a quarantine zone within the United States: AL, AR, 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): ☐ Duluth ☒ Minneapolis ☐ Virginia				**COMMENTS:**
Chain of Custody Present and Filled Out?	☒Yes	☐No		1.
Chain of Custody Relinquished?	☒Yes	☐No		2.
Sampler Name and/or Signature on COC?	☒Yes	☐No	☐N/A	3.
Samples Arrived within Hold Time?	☒Yes	☐No		4. If Fecal: ☐<8 hrs ☐>8hr, <24 hrs, ☐>24 hrs
Short Hold Time Analysis (<72 hr)?	☐Yes	☒No		5. ☐Fecal Coliform ☐HPC ☐Total Coliform/E coli ☐BOD/cBOD ☐Hex Chrome ☐Turbidity ☐Nitrate ☐Nitrite ☐Orthophos ☐Other
Rush Turn Around Time Requested?	☐Yes	☒No		6.
Sufficient Volume?	☒Yes	☐No		7.
Correct Containers Used?	☒Yes	☐No		8.
-Pace Containers Used?	☒Yes	☐No		
Containers Intact?	☒Yes	☐No		9.
Field Filtered Volume Received for Dissolved Tests?	☐Yes	☐No	☒N/A	10. Is sediment visible in the dissolved container? ☐Yes ☐No
Is sufficient information available to reconcile the samples to the COC? Matrix: ☒Water ☐Soil ☐Oil ☐Other-	☒Yes	☐No		11. **If no, write ID/ Date/Time on Container Below:** **See Exception** ☐ **ENV-FRM-MIN4-0142**
All containers needing acid/base preservation have been checked?	☐Yes	☐No	☒N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, <2pH, NaOH >9 Sulfide, NaOH>10 Cyanide)	☐Yes	☐No	☒N/A	☐ NaOH ☐ HNO_3 ☐ H_2SO_4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS	☒Yes	☐No	☐N/A	Positive for Res. Chlorine? ☐Yes ☐No **pH Paper Lot#** **See Exception** ☐ **ENV-FRM-MIN4-0142**
				Res. Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Headspace in Methyl Mercury Container?	☐Yes	☐No	☒N/A	MKH 5/30/22
Extra labels present on soil VOA or WIDRO containers?	☐Yes	☐No	☒N/A	13. **See Exception** ☑ **ENV-FRM-MIN4-0140**
Headspace in VOA Vials (greater than 6mm)?	☐Yes	☐No	☒N/A	
Trip Blank Present?	☒Yes	☐No	☐N/A	14.
Trip Blank Custody Seals Present?	☒Yes	☐No	☐N/A	Pace Trip Blank Lot # (if purchased): 365294 (2)

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐Yes ☐No

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: MH **Date:** 5/30/22

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: KNC (2)

Attachment B

Well Abandonment Forms

(MW-1R/T70 and MW-7/T70)

State of Wis., Dept. of Natural Resources
dnr.wi.gov

Well / Drillhole / Borehole Filling & Sealing Report

Form 3300-005 (R 4/2015)

Notice: Completion of this report is required by chs. 160, 281, 283, 289, 291-293, 295, and 299, Wis. Stats., and chs. NR 141 and 812, Wis. Adm. Code. In accordance with chs. 281, 289, 291-293, 295, and 299, Wis. Stats., failure to file this form may result in a forfeiture of between $10-25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. Return form to the appropriate DNR office and bureau. See instructions on reverse for more information.

☒ **Verification Only of Fill and Seal**

Route to DNR Bureau:
☐ Drinking Water ☐ Watershed/Wastewater ☒ Remediation/Redevelopment
☐ Waste Management ☐ Other: _____

1. Well Location Information

County	WI Unique Well # of Removed Well	Hicap #
Douglas	___ ___ ___ ___ ___	

Latitude / Longitude (see instructions)	Format Code	Method Code
46.693281 N	☒ DD	☐ GPS008
-92.071998 W	☐ DDM	☐ SCR002 ☒ OTH001

¼ / ¼	¼	Section	Township	Range
SW	SW	25	49 N	☐ E ☒ W

or Gov't Lot #

Well Street Address: 2407 Stinson Ave

Well City, Village or Town	Well ZIP Code
Superior	54880

Subdivision Name	Lot #

Reason for Removal from Service	WI Unique Well # of Replacement Well
Damaged	___ ___ ___ ___ ___

2. Facility / Owner Information

Facility Name: Superior Refining Company

Facility ID (FID or PWS): 816009590

License/Permit/Monitoring #: MW-1R/T70

Original Well Owner: Murphy Oil

Present Well Owner: Superior Refining Company

Mailing Address of Present Owner: 2407 Stinson Ave

City of Present Owner	State	ZIP Code
Superior	WI	54880

3. Filled & Sealed Well / Drillhole / Borehole Information

☒ Monitoring Well ☐ Water Well ☐ Borehole / Drillhole

Original Construction Date (mm/dd/yyyy):

If a Well Construction Report is available, please attach.

Construction Type:
☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☐ Other (specify): _____

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth From Ground Surface (ft.)	Casing Diameter (in.)
	2"

Lower Drillhole Diameter (in.)	Casing Depth (ft.)

Was well annular space grouted? ☐ Yes ☐ No ☐ Unknown

If yes, to what depth (feet)?	Depth to Water (feet)

4. Pump, Liner, Screen, Casing & Sealing Material

Pump and piping removed?	☐ Yes	☐ No	☒ N/A
Liner(s) removed?	☐ Yes	☐ No	☒ N/A
Liner(s) perforated?	☐ Yes	☐ No	☒ N/A
Screen removed?	☒ Yes	☐ No	☐ N/A
Casing left in place?	☐ Yes	☒ No	☐ N/A
Was casing cut off below surface?	☐ Yes	☐ No	☒ N/A
Did sealing material rise to surface?	☐ Yes	☒ No	☐ N/A
Did material settle after 24 hours?	☐ Yes	☐ No	☒ N/A
If yes, was hole retopped?	☐ Yes	☐ No	☒ N/A
If bentonite chips were used, were they hydrated with water from a known safe source?	☒ Yes	☐ No	☐ N/A

Required Method of Placing Sealing Material
☐ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☒ Screened & Poured (Bentonite Chips) ☐ Other (Explain): _____

Sealing Materials
☐ Neat Cement Grout ☐ Concrete
☐ Sand-Cement (Concrete) Grout ☒ Bentonite Chips

For Monitoring Wells and Monitoring Well Boreholes Only:
☒ Bentonite Chips ☐ Bentonite - Cement Grout
☐ Granular Bentonite ☐ Bentonite - Sand Slurry

5. Material Used to Fill Well / Drillhole

	From (ft.)	To (ft.)	No. Yards, Sacks Sealant or Volume (circle one)	Mix Ratio or Mud Weight
Sand	0	0.5 ft bgs	<1/2 gal	
Bentonite Chips 3/8 inch	0.5	bottom	<1 bag	

6. Comments

9/20/2022 - bentonite chips added to well, 10/7/2022- protective well casing removed and PVC riser pipe cut down 6 inches bgs. Hole was backfilled with sand to grade

7. Supervision of Work

Name of Person or Firm Doing Filling & Sealing	License #	Date of Filling & Sealing or Verification (mm/dd/yyyy)
Kinzey Schneider		09/20/2022

Street or Route	Telephone Number
325 South Lake Avenue	(218)529-8200

City	State	ZIP Code	Signature of Person Doing Work	Date Signed
Duluth	MN	55802	Kinzey Schneider	12/1/2022

DNR Use Only

Date Received	Noted By

Comments:

State of Wis., Dept. of Natural Resources
dnr.wi.gov

MW-7/ T70

Well / Drillhole / Borehole Filling & Sealing Report

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☐ Drinking Water ☐ Watershed/Wastewater ☒ Remediation/Redevelopment
☐ Waste Management ☐ Other: _____

1. Well Location Information

County	WI Unique Well # of Removed Well	Hicap #
Douglas	___ ___ ___ ___ ___	

Latitude / Longitude (see instructions)	Format Code	Method Code
46.693486 N	☒ DD	☐ GPS008
-92.072139 W	☐ DDM	☐ SCR002 ☒ OTH001

¼ / ¼	¼	Section	Township	Range
SW	SW	25	49 N	☐ E ☒ W

or Gov't Lot #

Well Street Address: 2407 Stinson Ave

Well City, Village or Town	Well ZIP Code
Superior	54880

Subdivision Name	Lot #

Reason for Removal from Service	WI Unique Well # of Replacement Well
damaged	___ ___ ___ ___ ___

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License/Permit/Monitoring #: MW-7/T70

Original Well Owner: Murphy Oil

Present Well Owner: Superior Refining Company

Mailing Address of Present Owner: 2407 Stinson Ave

City of Present Owner	State	ZIP Code
Superior	WI	54880

3. Filled & Sealed Well / Drillhole / Borehole Information

☒ Monitoring Well ☐ Water Well ☐ Borehole / Drillhole

Original Construction Date (mm/dd/yyyy):

If a Well Construction Report is available, please attach.

Construction Type:
☐ Drilled ☐ Driven (Sandpoint) ☐ Dug
☐ Other (specify): _____

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth From Ground Surface (ft.)	Casing Diameter (in.)
	2"

Lower Drillhole Diameter (in.)	Casing Depth (ft.)

Was well annular space grouted? ☐ Yes ☐ No ☐ Unknown

If yes, to what depth (feet)?	Depth to Water (feet)

4. Pump, Liner, Screen, Casing & Sealing Material

	Yes	No	N/A
Pump and piping removed?	☐	☐	☒
Liner(s) removed?	☐	☐	☒
Liner(s) perforated?	☐	☐	☒
Screen removed?	☒	☐	☐
Casing left in place?	☐	☒	☐
Was casing cut off below surface?	☒	☐	☐
Did sealing material rise to surface?	☐	☒	☐
Did material settle after 24 hours?	☐	☐	☒
If yes, was hole retopped?	☐	☐	☒
If bentonite chips were used, were they hydrated with water from a known safe source?	☒	☐	☐

Required Method of Placing Sealing Material
☐ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☒ Screened & Poured (Bentonite Chips) ☐ Other (Explain): _____

Sealing Materials
☐ Neat Cement Grout ☐ Concrete
☐ Sand-Cement (Concrete) Grout ☒ Bentonite Chips

For Monitoring Wells and Monitoring Well Boreholes Only:
☒ Bentonite Chips ☐ Bentonite - Cement Grout
☐ Granular Bentonite ☐ Bentonite - Sand Slurry

5. Material Used to Fill Well / Drillhole

	From (ft.)	To (ft.)	No. Yards, Sacks Sealant or Volume (circle one)	Mix Ratio or Mud Weight
topsoil	Surface	1 in bgs		
sand	1 in bgs	6 in bgs	~1/2 gal	
bentonite chips 3/8"	6 in bgs	bottom	<1 bag	

6. Comments

7. Supervision of Work

Name of Person or Firm Doing Filling & Sealing	License #	Date of Filling & Sealing or Verification (mm/dd/yyyy)
Kinzey Schneider		09/20/2022

Street or Route	Telephone Number
325 South Lake Avenue	(218)529-8200

City	State	ZIP Code	Signature of Person Doing Work	Date Signed
Duluth	MN	55802	Kinzey Schneider	12/1/2022

DNR Use Only

Date Received	Noted By

Comments: