Memo

SUBJECT
RACER Pontiac North Campus
Supplemental RCRA Facility Investigation
Summary and Recommendations

TO
Jennifer Stanhope
United States Environmental
Protection Agency (USEPA)

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This memo summarizes the supplemental investigation completed to address data gaps at several areas of interest (AOIs) located at the Revitalizing Auto Communities Environmental Response Trust (RACER) Pontiac North Campus properties (Site) located in Pontiac, Michigan (**Figure 1**). The investigation was completed to address soil analytical exceedances of current criteria summarized in the *Draft RCRA Corrective Action Summary Report,* provided to the United States Environmental Protection Agency (USEPA) on July 25, 2023 (July 2023 Draft CA Summary Report)*.* Soil impacts in excess of Michigan Department of Environment, Great Lakes, and Energy (EGLE) Site-Specific Volatilization to Indoor Air Criteria (SSVIAC), Volatilization to Indoor Air Pathway screening levels (VIAP), Direct Contact (DC) Criteria, and United States Environmental Protection Agency (USEPA) Toxic Substances Control Act (TSCA) screening levels were identified in the July 2023 Draft CA Summary Report.

The Draft *Supplemental RCRA Facility Investigation Scope of Work* (Scope of Work), was submitted to USEPA on September 26, 2023, and detailed the investigation methodology and data quality objectives for the additional investigation. Following comments from USEPA and responses from RACER, USEPA approved the Scope of Work on November 3, 2023, via email transmittal, and the fieldwork was completed November 6th through November 9th, 2023. A Final Scope of Work was submitted to USEPA on November 28, 2023.

The objective of the supplemental investigation activities was to verify historical (since 2001) soil exceedances and determine if further characterization or evaluation of potential corrective measures are warranted. Resample locations were located using the coordinates of the original location and a GPS unit accurate to within +/- 1.5 feet. For locations with a permanent feature, such as a monitoring well, resample borings were placed within 5 feet of the feature. Resampling of locations was completed to assess if soil impacts noted at historical borings were still present (i.e., reproducible) or widespread at those locations. The historical soil boring locations were biased to locations where releases were most likely to have occurred and, in most cases, there were other nearby soil sampling locations completed for delineation (see Scope of Work).

Soil samples collected at resample boring locations that do not show exceedances of criteria are used as a line of evidence to indicate the contaminant(s) of concern are either no longer present, or at a minimum, not significantly or consistently present at that location, and when considered with other nearby sampling results, not widespread.

Northern Metal Fabrication Division

Located within the Northern Metal Fabrication Division (NMFD) in AOIs M-30 and M-32, four locations, MWM32-08, MWM30-01, BM30-01, and BM30-03, were identified exceeding applicable criteria and warranting follow-up sampling based on the available information. At each of the four locations, resample borings were completed to verify the exceedances. Boring locations and results are shown on **Figure 2** and comprehensive analytical results are provided in **Table 1**. Data validation and laboratory analytical reports are provided in **Attachment 1**. Soil boring logs for each resample location are provided in **Attachment 2**. A summary of the historical and resample results is provided below:

- MWM32-08 (2007), benzo(a)pyrene (BaP) was detected at 20,000 micrograms per kilogram (µg/kg) in the 5.0 – 6.0 feet below ground surface (ft bgs) sample, which is above the nonresidential DC criteria (8,000 µg/kg). A resample boring was attempted at this location but was unsuccessful due to the thickness of concrete present. Approximately 2.5 feet of concrete was encountered before abandoning the boring.
- BM30-01 (2004) and BM30-03 (2004), polychlorinated biphenyls (PCBs) were detected at 2,020 micrograms per kilogram (µg/kg) and 45 mg/kg; respectively. These concentrations exceed the TSCA screening level for PCBs in soil (1,000 µg/kg). Exceedances from each location were from the shallowest sample collected from 0.5 – 2.5 ft bgs.
    - Resample location BM30-01RE had samples collected from 0-1, 2-3, and 4-5 ft bgs. Samples were submitted for laboratory analysis of PCBs by USEPA Method 8082. All sample intervals were non-detect for PCBs.
    - Resample location BM30-03RE had samples collected from 1-1.5, 2-3, and 4-5 ft bgs. Samples were submitted for laboratory analysis of PCBs by USEPA Method 8082. All sample intervals were non-detect for PCBs.
- MWM30-01 (2004), PCBs were detected at 1,400 µg/kg. This concentration exceeds the TSCA screening level for PCBs in soil (1,000 µg/kg). The exceedance was from the shallowest sample collected from 0-2 ft bgs.
    - Resample location MWM30-01RE had samples collected from 0-1, 2-3, and 4-5 ft bgs. Samples were submitted for laboratory analysis of PCBs by USEPA Method 8082. The 0-1 and 4-5 ft bgs samples were non-detect for PCBs. The 2-3 ft bgs sample had a detection of 9,000 µg/kg, which is above the TSCA screening level.

Based on the results of the resample locations and other available information, the following is recommended for the NMFD. Additional recommended investigation locations are shown on **Figure 2** (orange locations are proposed boring locations).

- Due to the thickness of concrete present and depth of the exceedance at location MWM32-08 resampling will not be completed and a notice of the location, compound, and concentration of the exceedance will be added to an updated declaration of restrictive covenant (DRC).
- Location MWM30-01RE will require further investigation to delineate the PCB impacts in soil. Step-out borings will be completed approximately 10 feet north, west, south, and east from the resample location.
- Locations BM30-01RE and BM30-03RE do not warrant further investigation.

Southern Metal Fabrication Division

Located within the Southern Metal Fabrication Division (SMFD) in AOIs M-19, W-5, and W-1, six locations, SM19-01, SM19-02, SM19-03, SM19-06, BW5-06, and MWW1-04, were identified exceeding applicable criteria. At each of the six locations, resample borings were completed to verify the exceedances. Boring locations and results are shown on **Figure 3** and **Figure 4** and comprehensive analytical results are provided in **Table 1**. Data validation and laboratory analytical reports are provided in **Attachment 1**. Soil boring logs for each resample location are provided in **Attachment 2**. A summary of the historical and resample results is provided below:

- SM19-01 (2001), SM19-02 (2001), and SM19-03 (2001), arsenic was detected at 54.5 milligrams per kilogram (mg/kg), 55.6 mg/kg, and 52.1 mg/kg; respectively. These samples exceed the nonresidential DC criteria (37,000 µg/kg). All exceedances were collected from the 0-2 ft bgs sample.
  - Resample locations SM19-01RE, SM19-02RE, and SM19-03RE had samples collected from 0-1, 2-3, and 4-5 ft bgs. All samples were analyzed for arsenic by USEPA Method 6020 and results were below the nonresidential DC criteria.
- SM19-06 (2001), PCBs were detected at 1,500 µg/kg in the 0-2 ft bgs sample, which is above the TSCA screening levels for PCBs (1,000 µg/kg).
  - Resample location SM19-06RE had samples collected from 0-1, 2-3, and 4-5 ft bgs. All samples were analyzed for PCBs and results were below the TSCA screening level.
- BW5-06 (2006), PCBs were detected at 11,000 µg/kg in the 11-12 ft bgs sample, which is above the TSCA screening levels for PCBs (1,000 µg/kg).
  - Upon locating boring BW5-06 in the field, it appeared to be located within the TSCA cap in the southern portion of the Former Plant 14S Property. Therefore, the resample location was moved approximately 20-feet south of the original location as to not disturb the cap. However, upon re-evaluating the original location after completion of the field work, it was determined that the original location was not located within the TSCA cap area. Resample location BW5-06RE had samples collected from 0-1, 5-6, 11-12, and 14-15 ft bgs. All samples were analyzed for PCBs and all results were non-detect and below the TSCA screening level.
- MWW1-04 (2001), PCBs were detected at 5,560 µg/kg in the 2-4 ft bgs sample and 5,110 µg/kg in the 4-6 ft bgs sample, which is above the TSCA screening levels for PCBs (1,000 µg/kg).
  - Resample location MWW1-04RE had samples collected from 0-1, 2.5-3.5, 4.5-5.5, and 5.5-6 ft bgs. The samples from 2.5-3.5 ft bgs and 4.5-5.5 ft bgs had detections of 2,900 µg/kg and 2,200 µg/kg, respectively. These results are above the TSCA screening level. The 0-1 and 5.5-6 ft bgs samples were non-detect.

Based on the results of the resample locations and other available information, the following is recommended for the SMFD. Additional recommended investigation locations are shown on **Figure 3** and **Figure 4**.

- No further evaluation is warranted at locations SM19-01RE, SM19-02RE, SM19-03RE, and SM19-06RE.
- At location MWW1-04RE, step out borings to delineate the PCBs impacts are proposed. Borings will be placed approximately 10 ft bgs to the north, west, south and east from MWW1-04RE.
- At BW5-06 the objective was to assess if PCB concentrations exceeding TSCA Criteria are still present at 11-12 ft bgs and to evaluate PCB concentrations in soil above and below 12 ft bgs. However, the re-sample location was off-set from the original location because of a misunderstanding during the field work. Therefore, an additional boring will be completed at the original BW5-06. Per the approved Scope of Work, soil samples

will be collected for PCB analysis from 0.0 – 1.0 ft bgs, 5.0 – 6.0 ft bgs, 11.0 – 12.0 ft bgs, and 14.0 – 15.0 ft bgs.

Former Fiero Properties

Located within the Former Fiero Properties in AOIs F-7, F12, and F-17, three locations, MWF7-01, MWF12-01, and BF17-21, were identified exceeding applicable criteria. At each of the three locations, resample borings were completed to verify the exceedances. Boring locations and results are shown on **Figure 5** and comprehensive analytical results are provided in **Table 1** and **Table 2**. Data validation and laboratory analytical reports are provided in **Attachment 1**. Soil boring logs for each resample location are provided in **Attachment 2**. A summary of the historical and resample results is provided below:

- MWF7-01 (2001), PCBs were detected at 1,600 µg/kg in the 0-2 ft bgs sample and 1,400 µg/kg in the 8-10 ft bgs sample, which are above the TSCA screening level (1,000 µg/kg). In addition, arsenic was detected at 39.4 mg/kg in the 8-10 ft bgs sample, which is above the nonresidential DC criteria (37 mg/kg).
    - Resample location MWF7-01RE had samples collected from 0-1, 4-5, 8-9, and 14-15 ft bgs. All results were below the TSCA screening level for PCBs and the nonresidential DC criteria for arsenic.
- MWF12-01 (2001), naphthalene was detected at 390 µg/kg in the 0-2 ft bgs sample, which is above the residential SSIVAC (67 µg/kg). Residential criteria were used to evaluate this location since it is within 100 ft of the Site property boundary that borders off-site residential properties to the south, as further discussed in the July 2023 Draft CA Summary.
    - Resample location MWF12-01RE had samples collected from 0-1, 2-3, and 4-5 ft bgs. From 0-1 ft bgs the naphthalene result was 2,030 µg/kg, from 2-3 ft bgs the result was 2,420 µg/kg, and from 4-5 ft bgs the result was 130 µg/kg. All samples were analyzed by USEPA Method 8260, and all results were above the residential SSVIAC.
- BF17-21 (2006), tetrachloroethylene (PCE) was detected at 88 µg/kg in the 0-2 ft bgs sample, which is above the residential SSIVAC (6.2 µg/kg). Residential criteria were used to evaluate this location since it is within 100 ft of the Site property boundary that borders off-site residential properties to the south, as further discussed in the July 2023 Draft CA Summary.
    - Resample location BF17-21RE had samples collected from 0-1, 2-3, and 4-5 ft bgs. All samples were analyzed by USEPA Method 8260, and all results were non-detect for PCE.
    - The target detection limit (TDL) for PCE for samples analyzed by USEPA Method 8260 was above the EGLE VIAP residential screening level. However, in accordance with EGLE guidance, when the TDL for a hazardous substance is greater than the developed volatilization to indoor air protection screening level, the TDL is used to evaluate the risk posed from the pathway. Additionally, refer to **Attachment 1** for a memo detailing additional information related to the TDL provided by the laboratory.

Based on the results of the resample locations the following is recommended for the Former Fiero Properties. Additional recommended investigation locations are shown on **Figure 5**.

- Based on results from MWF12-01RE and the proximity to the property boundary, additional step out borings will be completed to delineate the naphthalene exceedances. Two borings will be placed approximately 20 ft east and west of location MWF12-01RE (behind the concrete retaining wall) and a third location will be placed as close as possible to approximately 30 ft north of the property boundary, if accessible. The soil borings will have soil samples collected from similar intervals as MWF12-01RE (0 – 1 ft bgs, 2 – 3 ft bgs, and 4 – 5 ft bgs). A step out boring was not proposed to the north since the naphthalene exceedance only represents a potential offsite residential risk and on-site can be addressed by a planned site-wide deed restriction to restrict use to nonresidential and assess or mitigate the volatilization to indoor air pathway (VIAP) before a building can be constructed or occupied.

- Results from MWF7-01RE and B17-21RE indicate no further investigation is warranted.

Former Stormwater Detention Facility

Located within the Former Stormwater Detention Facility (SWDF), location MWDP-01, was identified exceeding criteria. A resample borings was completed to verify the exceedance. The boring location and results are shown on **Figure 4** and comprehensive analytical results are provided in **Table 1**. Data validation and laboratory analytical reports are provided in **Attachment 1**. Soil boring logs for each resample location are provided in **Attachment 2**. A summary of the historical and resample results is provided below:

- MWDP-01 (2001), trichloroethylene (TCE) was detected at 1.7 µg/kg in the 1-3 ft bgs sample, which is above the residential VIAP screening levels (0.33 µg/kg). Residential criteria were used to evaluate this location since it is within 100 ft of the SWDF property boundary that borders off-site properties.
    - Resample location MWDP-01RE had samples collected from 0-1, 2-3, and 4-5 ft bgs. All samples were analyzed by USEPA Method 8260, and all results were non-detect for TCE.
    - The TDL for TCE for samples analyzed by USEPA Method 8260 was above the EGLE VIAP residential screening level. However, in accordance with EGLE guidance, when the TDL for a hazardous substance is greater than the developed volatilization to indoor air protection screening level, the TDL is used to evaluate the risk posed from the pathway. Additionally, refer to **Attachment 1** for a memo detailing additional information related to the TDL provided by the laboratory.

Based on the results of the resample location, no further evaluation is recommended.

Summary of Recommendations

Based on the results of the resample locations completed in the various areas of the Site and other available information contained in the Scope of Work and July 2023 Draft CA Summary, the following are recommended:

- 4 step-out borings approximately 10 ft in roughly cardinal directions away from MWM30-10RE with samples collected and analyzed for PCBs from similar intervals (0 – 1 ft bgs, 2 – 3 ft bgs, and 4 – 5 ft bgs) collected at MWM30-01RE.
- 4 step-out borings approximately 10 ft in roughly cardinal directions away from MWW1-04RE with samples collected and analyzed for PCBs from similar intervals (0 – 1 ft bgs, 2.5 – 3.5 ft bgs, 4.5 – 5.5 ft bgs, and 5.5 – 6.5 ft bgs) collected at MWW1-04RE.
- 3 step-out borings, including 1 approximately 20 ft to the east of MWF12-01RE, 1 approximately 20 ft to the west of MWF12-01RE, and 1 approximately 30 ft north of the property boundary, if accessible. Samples will be collected at similar intervals (0 – 1 ft bgs, 2 – 3 ft bgs, and 4 – 5 ft bgs) as at MWF12-01RE and analyzed for naphthalene.
- One soil boring will be advanced at the location of original BW5-06 and per the Scope of Work samples collected and analyzed for PCBs from 0.0 – 1.0 ft bgs, 5.0 – 6.0 ft bgs, 11.0 – 12.0 ft bgs, and 14.0 – 15.0 ft bgs intervals.

The data quality objectives, sampling protocols, laboratory methods, and quality control are provided in the previous Scope of Work approved by the USEPA on November 3, 2023. Following the completion of additional investigation, sample results will be evaluated, reviewed with USEPA and documented in a brief report to be submitted to USEPA. Recommendations for any follow-up activity will be provided as appropriate.

Jennifer Stanhope
USEPA
Draft Submittal: March 8, 2024
Final Submittal: October 1, 2024

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Table 1 – RCRA Soil Investigation Analytical Summary

Table 2 – RCRA Soil Investigation Analytical Summary – Fiero SSVIAC Comparison

Figure 1 – Site Layout

Figure 2 – RCRA Soil Investigation Summary – NMFD

Figure 3 – RCRA Soil Investigation Summary - SMFD

Figure 4 – RCRA Soil Investigation Summary – SMFD/SWDF

Figure 5 – RCRA Soil Investigation Summary – Former Fiero Properties

Attachment 1 – Data Validation, Laboratory TDL Memo, and Laboratory Analytical Reports

Attachment 2 – Resample Soil Boring Logs

Attachment 3 – Arcadis Technical Guidance Instructions

TABLES

Table 1
RCRA Soil Investigation Analytical Summary
RACER Trust Pontiac North Campus
Pontiac, Michigan

Location		Residential Soil VIAP	Nonresidential Soil VIAP	Residential Direct Contact	Nonresidential Direct Contact	TSCA PCBs	BM30-01	BM30-01	BM30-01	BM30-03	BM30-03	BM30-03	BW5-06	BW5-06
Sample ID							BM30-01RE(0-1)_11092023	BM30-01RE(2-3)_11092023	BM30-01RE(4-5)_11092023	BM30-03RE(1-1.5)_11092023	BM30-03RE(2-3)_11092023	BM30-03RE(4-5)_11092023	BW5-06RE(0-1)_11082023	BW5-06RE(5-6)_11082023
Depth Interval (ft bgs)							0-1	2-3	4-5	1-1.5	2-3	4-5	0-1	5-6
Sample Date							11/9/2023	11/9/2023	11/9/2023	11/9/2023	11/9/2023	11/9/2023	11/8/2023	11/8/2023
Chemical	**Units**													
General Chemistry														
Total solids	%	--	--	**--**	*--*	--	97	86	86	89 (88)	86	89	89	90
Metals														
Arsenic	mg/kg	--	--	**7.6**	*37*	--	--	--	--	--	--	--	--	--
PCBs														
Aroclor-1016 (PCB-1016)	ug/kg	--	--	**--**	*--*	1,000	< 330 U	< 330 U	< 330 U	< 330 U (< 330 U)	< 330 U	< 330 U	< 330 U	< 330 U
Aroclor-1221 (PCB-1221)	ug/kg	--	--	**--**	*--*	1,000	< 330 U	< 330 U	< 330 U	< 330 U (< 330 U)	< 330 U	< 330 U	< 330 U	< 330 U
Aroclor-1232 (PCB-1232)	ug/kg	--	--	**--**	*--*	1,000	< 330 U	< 330 U	< 330 U	< 330 U (< 330 U)	< 330 U	< 330 U	< 330 U	< 330 U
Aroclor-1242 (PCB-1242)	ug/kg	--	--	**--**	*--*	1,000	< 330 U	< 330 U	< 330 U	< 330 U (< 330 U)	< 330 U	< 330 U	< 330 U	< 330 U
Aroclor-1248 (PCB-1248)	ug/kg	--	--	**--**	*--*	1,000	< 330 UJ	< 330 UJ	< 330 UJ	< 330 UJ (< 330 UJ)	< 330 UJ	< 330 UJ	< 330 UJ	< 330 UJ
Aroclor-1254 (PCB-1254)	ug/kg	--	--	**--**	*--*	1,000	< 330 U	< 330 U	< 330 U	< 330 U (< 330 U)	< 330 U	< 330 U	< 330 U	< 330 U
Aroclor-1260 (PCB-1260)	ug/kg	--	--	**--**	*--*	1,000	< 330 U	< 330 U	< 330 U	< 330 U (< 330 U)	< 330 U	< 330 U	< 330 U	< 330 U
VOCs														
Naphthalene	ug/kg	67	1,900	**16,000,000**	*52,000,000*	--	--	--	--	--	--	--	--	--
Tetrachloroethene	ug/kg	6.2	74	**200,000**	*930,000*	--	--	--	--	--	--	--	--	--
Trichloroethene	ug/kg	0.33	4.0	**110,000**	*660,000*	--	--	--	--	--	--	--	--	--

Table 1
RCRA Soil Investigation Analytical Summary
RACER Trust Pontiac North Campus
Pontiac, Michigan

Location		Residential Soil VIAP	Nonresidential Soil VIAP	Residential Direct Contact	Nonresidential Direct Contact	TSCA PCBs	BW5-06	BW5-06	MWDP-01	MWDP-01	MWDP-01	MWF7-01	MWF7-01
Sample ID							BW5-06RE(11-12)_11082023	BW5-06RE(14-15)_11082023	MWDP-01RE(0-1)_11082023	MWDP-01RE(2-3)_11082023	MWDP-01RE(4-5)_11082023	MWF7-01RE(0-1)_11082023	MWF7-01RE(4-5)_11082023
Depth Interval (ft bgs)							11-12	14-15	0-1	2-3	4-5	0-1	4-5
Sample Date							11/8/2023	11/8/2023	11/8/2023	11/8/2023	11/8/2023	11/8/2023	11/8/2023
Chemical	Units												
General Chemistry													
Total solids	%	--	--	**--**	--	--	85	88 (84)	88	88	88 (88)	92	85
Metals													
Arsenic	mg/kg	--	--	**7.6**	*37*	--	--	--	--	--	--	**8.12**	**13.4**
PCBs													
Aroclor-1016 (PCB-1016)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U (< 330 U)	--	--	--	< 330 U	< 330 U
Aroclor-1221 (PCB-1221)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U (< 330 U)	--	--	--	< 330 U	< 330 U
Aroclor-1232 (PCB-1232)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U (< 330 U)	--	--	--	< 330 U	< 330 U
Aroclor-1242 (PCB-1242)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U (< 330 U)	--	--	--	< 330 U	< 330 U
Aroclor-1248 (PCB-1248)	ug/kg	--	--	**--**	--	1,000	< 330 UJ	< 330 UJ (< 330 UJ)	--	--	--	< 330 UJ	< 330 UJ
Aroclor-1254 (PCB-1254)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U (< 330 U)	--	--	--	< 330 U	< 330 U
Aroclor-1260 (PCB-1260)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U (< 330 U)	--	--	--	< 330 U	< 330 U
VOCs													
Naphthalene	ug/kg	67	1,900	**16,000,000**	*52,000,000*	--	--	--	--	--	--	--	--
Tetrachloroethene	ug/kg	6.2	74	**200,000**	*930,000*	--	--	--	--	--	--	--	--
Trichloroethene	ug/kg	0.33	4.0	**110,000**	*660,000*	--	--	--	< 60 U*	< 60 U*	< 60 U (< 60 U)*	--	--

Table 1
RCRA Soil Investigation Analytical Summary
RACER Trust Pontiac North Campus
Pontiac, Michigan

Location Sample ID Depth Interval (ft bgs) Sample Date		Residential Soil VIAP	Nonresidential Soil VIAP	Residential Direct Contact	Nonresidential Direct Contact	TSCA PCBs	MWF7-01 MWF7-01RE(8-9)_11082023 8-9 11/8/2023	MWF7-01 MWF7-01RE(14-15)_11082023 14-15 11/8/2023	MWM30-01 MWM30-01RE(0-1)_11092023 0-1 11/9/2023	MWM30-01 MWM30-01RE(2-3)_11092023 2-3 11/9/2023	MWM30-01 MWM30-01RE(4-5)_11092023 4-5 11/9/2023	MWW1-04 MWW1-04RE(0-1)_11082023 0-1 11/8/2023	MWW1-04 MWW1-04RE(2.5-3.5)_11082023 2.5-3.5 11/8/2023
Chemical	Units												
General Chemistry													
Total solids	%	--	--	**--**	--	--	86	88	89	92	85	95	85
Metals													
Arsenic	mg/kg	--	--	**7.6**	*37*	--	**9.28**	3.94	--	--	--	--	--
PCBs													
Aroclor-1016 (PCB-1016)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U	< 330 U	< 1,000 UY	< 330 U	< 330 U	< 600 UYJ
Aroclor-1221 (PCB-1221)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U	< 330 U	< 1,000 UY	< 330 U	< 330 U	< 600 UYJ
Aroclor-1232 (PCB-1232)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U	< 330 U	< 1,000 UY	< 330 U	< 330 U	< 600 UYJ
Aroclor-1242 (PCB-1242)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U	< 330 U	< 1,000 UY	< 330 U	< 330 U	< 600 UYJ
Aroclor-1248 (PCB-1248)	ug/kg	--	--	**--**	--	1,000	< 330 UJ	< 330 UJ	< 330 UJ	9,000 YJ	< 330 UJ	< 330 UJ	2,900 YJ
Aroclor-1254 (PCB-1254)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U	< 330 U	< 1,000 UY	< 330 U	< 330 U	< 600 UYJ
Aroclor-1260 (PCB-1260)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U	< 330 U	< 1,000 UY	< 330 U	< 330 U	< 600 UYJ
VOCs													
Naphthalene	ug/kg	67	1,900	**16,000,000**	*52,000,000*	--	--	--	--	--	--	--	--
Tetrachloroethene	ug/kg	6.2	74	**200,000**	*930,000*	--	--	--	--	--	--	--	--
Trichloroethene	ug/kg	0.33	4.0	**110,000**	*660,000*	--	--	--	--	--	--	--	--

Table 1
RCRA Soil Investigation Analytical Summary
RACER Trust Pontiac North Campus
Pontiac, Michigan

Location		Residential Soil VIAP	Nonresidential Soil VIAP	Residential Direct Contact	Nonresidential Direct Contact	TSCA PCBs	MWW1-04	MWW1-04	SM19-01	SM19-01	SM19-01	SM19-02	SM19-02
Sample ID							MWW1-04RE(4.5-5.5)_11082023	MWW1-04RE(5.5-6)_11082023	SM19-01RE(0-1)_11072023	SM19-01RE(2-3)_11072023	SM19-01RE(4-5)_11072023	SM19-02RE(0-1)_11072023	SM19-02RE(2-3)_11072023
Depth Interval (ft bgs)							4.5-5.5	5.5-6	0-1	2-3	4-5	0-1	2-3
Sample Date							11/8/2023	11/8/2023	11/7/2023	11/7/2023	11/7/2023	11/7/2023	11/7/2023
Chemical	Units												
General Chemistry													
Total solids	%	--	--	**--**	--	--	91	78	93	90	89	92	92 (92)
Metals													
Arsenic	mg/kg	--	--	**7.6**	*37*	--	--	--	6.53	5.64	5.56	5.95	6.14 (6.50)
PCBs													
Aroclor-1016 (PCB-1016)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U	--	--	--	--	--
Aroclor-1221 (PCB-1221)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U	--	--	--	--	--
Aroclor-1232 (PCB-1232)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U	--	--	--	--	--
Aroclor-1242 (PCB-1242)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U	--	--	--	--	--
Aroclor-1248 (PCB-1248)	ug/kg	--	--	**--**	--	1,000	2,200 J	< 330 UJ	--	--	--	--	--
Aroclor-1254 (PCB-1254)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U	--	--	--	--	--
Aroclor-1260 (PCB-1260)	ug/kg	--	--	**--**	--	1,000	< 330 U	< 330 U	--	--	--	--	--
VOCs													
Naphthalene	ug/kg	67	1,900	**16,000,000**	*52,000,000*	--	--	--	--	--	--	--	--
Tetrachloroethene	ug/kg	6.2	74	**200,000**	*930,000*	--	--	--	--	--	--	--	--
Trichloroethene	ug/kg	0.33	4.0	**110,000**	*660,000*	--	--	--	--	--	--	--	--

Table 1
RCRA Soil Investigation Analytical Summary
RACER Trust Pontiac North Campus
Pontiac, Michigan

Location		Residential Soil VIAP	Nonresidential Soil VIAP	Residential Direct Contact	Nonresidential Direct Contact	TSCA PCBs	SM19-02	SM19-03	SM19-03	SM19-03	SM19-06	SM19-06	SM19-06
Sample ID							SM19-02RE(4-5)_11072023	SM19-03RE(0-1)_11072023	SM19-03RE(2-3)_11072023	SM19-03RE(4-5)_11072023	SM19-06RE(0-1)_11082023	SM19-06RE(2-3)_11082023	SM19-06RE(4-5)_11082023
Depth Interval (ft bgs)							4-5	0-1	2-3	4-5	0-1	2-3	4-5
Sample Date							11/7/2023	11/7/2023	11/7/2023	11/7/2023	11/8/2023	11/8/2023	11/8/2023
Chemical	**Units**												
General Chemistry													
Total solids	%	--	--	**--**	--	--	86	94	90	89	91	90	91
Metals													
Arsenic	mg/kg	--	--	**7.6**	*37*	--	**26.9**	5.39	2.69	6.58	--	--	--
PCBs													
Aroclor-1016 (PCB-1016)	ug/kg	--	--	**--**	--	1,000	--	--	--	--	< 330 U	< 330 U	< 330 U
Aroclor-1221 (PCB-1221)	ug/kg	--	--	**--**	--	1,000	--	--	--	--	< 330 U	< 330 U	< 330 U
Aroclor-1232 (PCB-1232)	ug/kg	--	--	**--**	--	1,000	--	--	--	--	< 330 U	< 330 U	< 330 U
Aroclor-1242 (PCB-1242)	ug/kg	--	--	**--**	--	1,000	--	--	--	--	< 330 U	< 330 U	< 330 U
Aroclor-1248 (PCB-1248)	ug/kg	--	--	**--**	--	1,000	--	--	--	--	< 330 UJ	< 330 UJ	< 330 UJ
Aroclor-1254 (PCB-1254)	ug/kg	--	--	**--**	--	1,000	--	--	--	--	< 330 U	< 330 U	< 330 U
Aroclor-1260 (PCB-1260)	ug/kg	--	--	**--**	--	1,000	--	--	--	--	< 330 U	< 330 U	< 330 U
VOCs													
Naphthalene	ug/kg	67	1,900	**16,000,000**	*52,000,000*	--	--	--	--	--	--	--	--
Tetrachloroethene	ug/kg	6.2	74	**200,000**	*930,000*	--	--	--	--	--	--	--	--
Trichloroethene	ug/kg	0.33	4.0	**110,000**	*660,000*	--	--	--	--	--	--	--	--

NOTES:

1) Residential and Nonresidential Volatilization to Indoor Air Pathway Screening Levels (Groundwater Not in Contact) are from the DEQ Guidance Document for the Vapor Intrusion Pathway, Appendix C - Tables 1 and 2, September 4, 2020. Criteria listed are from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Clean Up Criteria Requirements Table 2: Residential Soil Criteria, Table 3: Nonresidential Soil Criteria, Part 201 Generic Cleanup Criteria and Screening Levels, December 21, 2020. PCB criteria listed are from USEPA PCB Site Revitalization Guidance Under the TSCA, Table 2, November 2005.
2) Values highlighted in yellow denotes exceedance and/or equal to Residential Soil VIAP Criteria.
3) Values highlighted in orange denotes exceedance and/or equal to Nonresidential Soil VIAP Criteria.
4) Values with bold text denotes exceedance and/or equal to Michigan Soil Residential Direct Contact Criteria.
5) Values italicized denotes exceedance and/or equal to Michigan Soil Nonresidential Direct Contact Criteria.
6) Values with red text denotes exceedance and/or equal to TSCA PCB Clean-Up Criteria
7) Samples were analyzed by EPA Methods 6020, 8082, 8260, and 8270
8) Duplicate analyses are in parenthesis
* in accordance with Michigan Department of Environment, Great Lakes, and Energy guidance, when the TDL for a hazardous substance is greater than the developed volatilization to indoor air protection screening level, the TDL is used to evaluate the risk posed from the pathway.

ABBREVIATIONS:

--	Not analyzed
%	Percent
mg/kg	Milligrams per kilogram
µg/kg	Micrograms per kilogram
<	Non-detect
bgs	Below ground surface
ft	Feet
U	Compound analyzed for but not detected above the reporting limit
Y	Elevated reporting limit due to high target concentration
J	Qualified as estimated
PCB	Polychlorinated biphenyl
TDL	Target Detection Limit
TSCA	Toxic Substances Control Act
VIAP	Volatilization to indoor air protection
VOC	Volatile organic compound

Table 2
RCRA Soil Investigation Analytical Results - Fiero SSVIAC Comparison
RACER Trust Pontiac North Campus
Pontiac, Michigan

Location		Res Fiero SSVIAC SOG	Res Fiero SSVIAC BASE	NR Fiero SSVIAC <50k SOG	NR Fiero SSVIAC <50k BASE	NR Fiero SSVIAC >50k SOG	NR Fiero SSVIAC >50k BASE	BF17-21	BF17-21	BF17-21	MWF12-01	MWF12-01	MWF12-01
Sample ID								BF17-21RE(0-1)_11082023	BF17-21RE(2-3)_11082023	BF17-21RE(4-5)_11082023	MWF12-01RE(0-1)_11082023	MWF12-01RE(2-3)_11082023	MWF12-01RE(4-5)_11082023
Depth Interval (ft bgs)								0-1	2-3	4-5	0-1	2-3	4-5
Sample Date								11/8/2023	11/8/2023	11/8/2023	11/8/2023	11/8/2023	11/8/2023
Chemical	Units												
General Chemistry													
Total solids	%	--	--	**--**	**--**	**--**	**--**	89 (80)	89	85	82	86	88
VOCs													
Naphthalene	ug/kg	67	67	**3,800**	**2,500**	**5,700**	**3,800**	--	--	--	2,030	2,420	130
Tetrachloroethene	ug/kg	6.2	6.2	**150**	**99**	**220**	**150**	< 60 U (< 80 U)*	< 60 U*	< 70 U*	--	--	--

Table 2
RCRA Soil Investigation Analytical Results - Fiero SSVIAC Comparison
RACER Trust Pontiac North Campus
Pontiac, Michigan

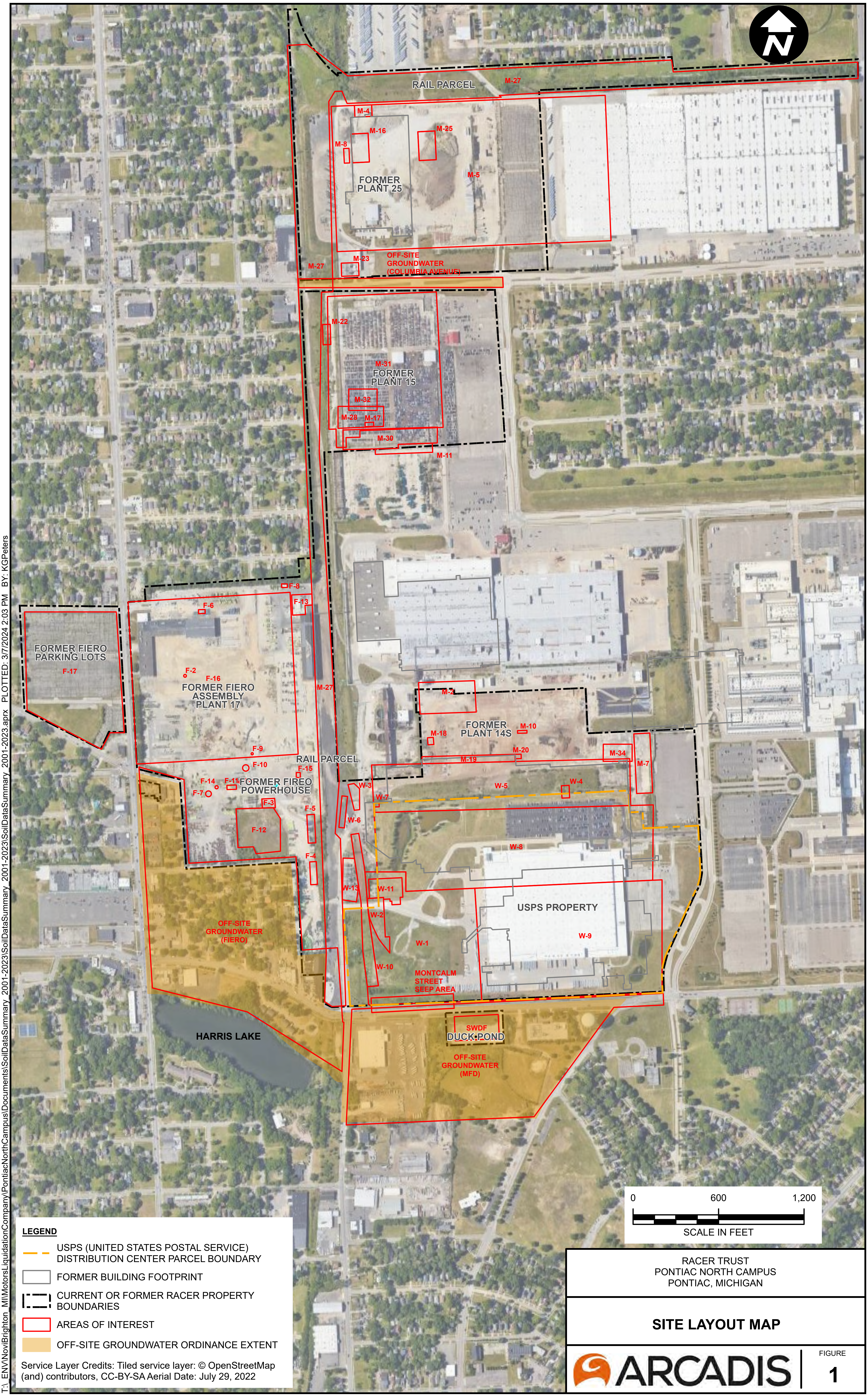
NOTES:

1) Criteria listed are from the EGLE Former Fiero Assembly Site-Specific Criteria Evaluation dated April 21, 2020.
2) Values with red text denotes exceedance and/or equal to Residential Fiero SSVIAC Criteria.
3) Values with bold text denotes exceedance and/or equal to Nonresidential Fiero SSVIAC Criteria.
4) Samples were analyzed by EPA Methods 8260
5) Duplicate analyses are in parenthesis
6) Table only includes data screened against Fiero SSVIAC
* in accordance with Michigan Department of Environment, Great Lakes, and Energy guidance, when the TDL for a hazardous substance is greater than the developed volatilization to indoor air protection screening level, the TDL is used to evaluate the risk posed from the pathw

ABBREVIATIONS:

--	Not analyzed
%	Percent
µg/kg	Micrograms per kilogram
<	Non-detect
<50k	Less than 50,000 square feet
>50k	Greater than 50,000 square feet
BASE	Basement scenario
bgs	Below ground surface
ft	Feet
NR	Nonresidential
Res	Residential
SOG	Slab-On-Grade scenario
SSVIAC	Site-Specific Volatilization to Indoor Air Criteria
TDL	Target Detection Limit
TSCA	Toxic Substances Control Act
U	Compound analyzed for but not detected above the reporting limit
J	Qualified as estimated
VOC	Volatile organic compound

FIGURES



LEGEND

- USPS (UNITED STATES POSTAL SERVICE) DISTRIBUTION CENTER PARCEL BOUNDARY
- FORMER BUILDING FOOTPRINT
- CURRENT OR FORMER RACER PROPERTY BOUNDARIES
- AREAS OF INTEREST
- OFF-SITE GROUNDWATER ORDINANCE EXTENT

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RACER TRUST
PONTIAC NORTH CAMPUS
PONTIAC, MICHIGAN

SITE LAYOUT MAP

ARCADIS

FIGURE
1

CITY: NOVI, MI DIV: ENV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl PLOTTED: 3/7/2024 2:03 PM BY: KGPeters
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CITY: NOVI, MI DIV: ENV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl PLOTTED: 2/28/2024 4:38 PM BY: TYarbrough
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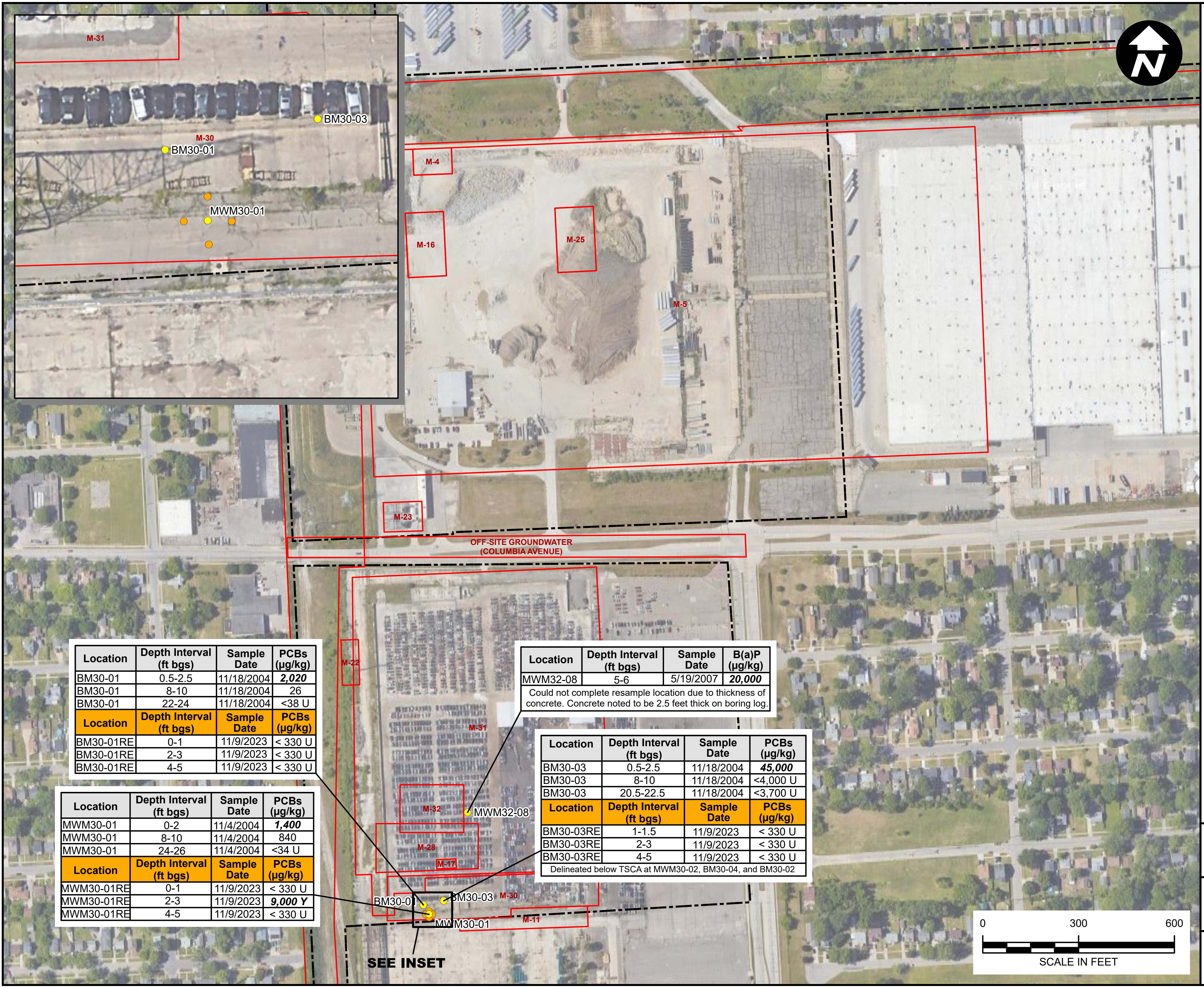

Location	Depth Interval (ft bgs)	Sample Date	PCBs (µg/kg)
BM30-01	0.5-2.5	11/18/2004	***2,020***
BM30-01	8-10	11/18/2004	26
BM30-01	22-24	11/18/2004	<38 U
Location	**Depth Interval (ft bgs)**	**Sample Date**	**PCBs (µg/kg)**
BM30-01RE	0-1	11/9/2023	< 330 U
BM30-01RE	2-3	11/9/2023	< 330 U
BM30-01RE	4-5	11/9/2023	< 330 U

Location	Depth Interval (ft bgs)	Sample Date	PCBs (µg/kg)
MWM30-01	0-2	11/4/2004	***1,400***
MWM30-01	8-10	11/4/2004	840
MWM30-01	24-26	11/4/2004	<34 U
Location	**Depth Interval (ft bgs)**	**Sample Date**	**PCBs (µg/kg)**
MWM30-01RE	0-1	11/9/2023	< 330 U
MWM30-01RE	2-3	11/9/2023	***9,000 Y***
MWM30-01RE	4-5	11/9/2023	< 330 U

Location	Depth Interval (ft bgs)	Sample Date	B(a)P (µg/kg)
MWM32-08	5-6	5/19/2007	***20,000***
Could not complete resample location due to thickness of concrete. Concrete noted to be 2.5 feet thick on boring log.			

Location	Depth Interval (ft bgs)	Sample Date	PCBs (µg/kg)
BM30-03	0.5-2.5	11/18/2004	***45,000***
BM30-03	8-10	11/18/2004	<4,000 U
BM30-03	20.5-22.5	11/18/2004	<3,700 U
Location	**Depth Interval (ft bgs)**	**Sample Date**	**PCBs (µg/kg)**
BM30-03RE	1-1.5	11/9/2023	< 330 U
BM30-03RE	2-3	11/9/2023	< 330 U
BM30-03RE	4-5	11/9/2023	< 330 U
Delineated below TSCA at MWM30-02, BM30-04, and BM30-02			

LEGEND

●	RE-SAMPLE LOCATION
●	PROPOSED STEP-OUT BORING LOCATION
▭	AREAS OF INTEREST
⬚	CURRENT OR FORMER RACER PROPERTY BOUNDARIES

Compound	Unit	Residential Soil VIAP	Nonresidential Soil VIAP	Residential Direct Contact	Nonresidential Direct Contact	TSCA PCBs
PCBs	ug/kg	--	--	--	--	***1,000***

µg/kg	MICROGRAMS PER KILOGRAM
<	NON-DETECT
bgs	BELOW GROUND SURFACE
ft	FEET
NR	NONRESIDENTIAL
Res	RESIDENTIAL
TSCA	TOXIC SUBSTANCES CONTROL ACT
U	COMPOUND ANALYZED FOR BUT NOT DETECTED ABOVE THE REPORTING LIMIT
VIAP	VOLATILIZATION TO INDOOR AIR PROTECTION
Y	ELEVATED REPORTING LIMIT DUE TO HIGH TARGET CONCENTRATION
PCB	POLYCHLORINATED BIPHENYL

NOTES:

1) PCB CRITERIA LISTED ARE FROM USEPA PCB SITE REVITALIZATION GUIDANCE UNDER THE TSCA, TABLE 2, NOVEMBER 2005.

2) BOLD AND ITALIC VALUES INDICATE AN EXCEEDANCE OF THE TSCA SCREENING LEVEL

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RACER TRUST
PONTIAC NORTH CAMPUS
PONTIACC, MICHIGAN

RCRA SOIL INVESTIGATION SUMMARY - NMFD

ARCADIS

FIGURE
2

CITY: NOVI, MI DIV: ENV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl PLOTTED: 2/28/2024 4:38 PM BY: TYarbrough
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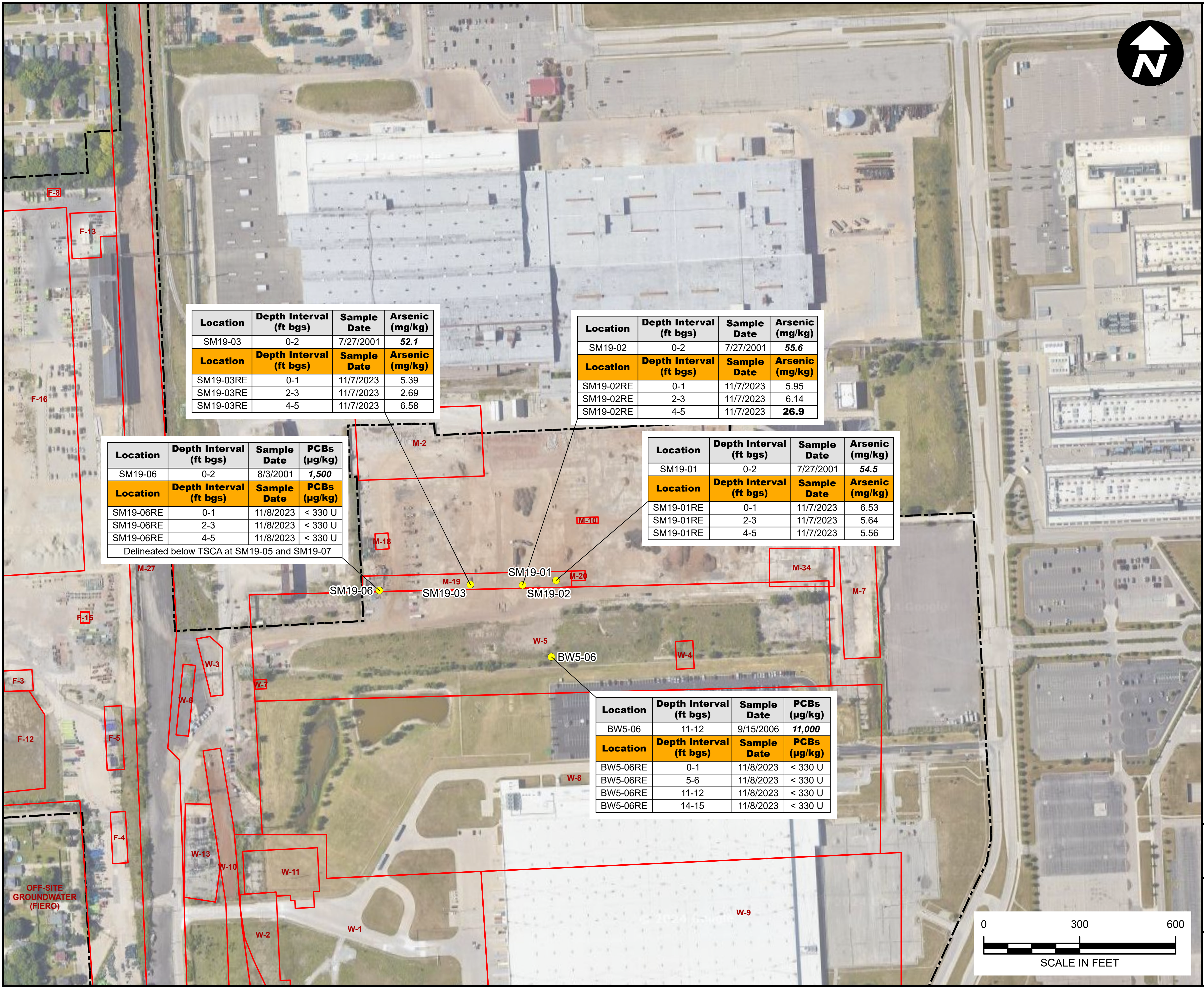

Location	Depth Interval (ft bgs)	Sample Date	Arsenic (mg/kg)
SM19-03	0-2	7/27/2001	***52.1***
Location	**Depth Interval (ft bgs)**	**Sample Date**	**Arsenic (mg/kg)**
SM19-03RE	0-1	11/7/2023	5.39
SM19-03RE	2-3	11/7/2023	2.69
SM19-03RE	4-5	11/7/2023	6.58

Location	Depth Interval (ft bgs)	Sample Date	Arsenic (mg/kg)
SM19-02	0-2	7/27/2001	***55.6***
Location	**Depth Interval (ft bgs)**	**Sample Date**	**Arsenic (mg/kg)**
SM19-02RE	0-1	11/7/2023	5.95
SM19-02RE	2-3	11/7/2023	6.14
SM19-02RE	4-5	11/7/2023	**26.9**

Location	Depth Interval (ft bgs)	Sample Date	PCBs (µg/kg)
SM19-06	0-2	8/3/2001	***1,500***
Location	**Depth Interval (ft bgs)**	**Sample Date**	**PCBs (µg/kg)**
SM19-06RE	0-1	11/8/2023	< 330 U
SM19-06RE	2-3	11/8/2023	< 330 U
SM19-06RE	4-5	11/8/2023	< 330 U
Delineated below TSCA at SM19-05 and SM19-07			

Location	Depth Interval (ft bgs)	Sample Date	Arsenic (mg/kg)
SM19-01	0-2	7/27/2001	***54.5***
Location	**Depth Interval (ft bgs)**	**Sample Date**	**Arsenic (mg/kg)**
SM19-01RE	0-1	11/7/2023	6.53
SM19-01RE	2-3	11/7/2023	5.64
SM19-01RE	4-5	11/7/2023	5.56

Location	Depth Interval (ft bgs)	Sample Date	PCBs (µg/kg)
BW5-06	11-12	9/15/2006	***11,000***
Location	**Depth Interval (ft bgs)**	**Sample Date**	**PCBs (µg/kg)**
BW5-06RE	0-1	11/8/2023	< 330 U
BW5-06RE	5-6	11/8/2023	< 330 U
BW5-06RE	11-12	11/8/2023	< 330 U
BW5-06RE	14-15	11/8/2023	< 330 U

LEGEND

●	RE-SAMPLE LOCATION
☐	AREAS OF INTEREST
⬚	CURRENT OR FORMER RACER PROPERTY BOUNDARIES

Compound	Unit	Residential Soil VIAP	Nonresidential Soil VIAP	Residential Direct Contact	Nonresidential Direct Contact	TSCA PCBs
Arsenic	mg/kg	--	--	**7.6**	***37***	--
PCBs	ug/kg	--	--	--	--	***1,000***

µg/kg	MICROGRAMS PER KILOGRAM
<	NON-DETECT
bgs	BELOW GROUND SURFACE
ft	FEET
NR	NONRESIDENTIAL
Res	RESIDENTIAL
SSVIAC	SITE-SPECIFIC VOLATILIZATION TO INDOOR AIR CRITERIA
TSCA	TOXIC SUBSTANCES CONTROL ACT
U	COMPOUND ANALYZED FOR BUT NOT DETECTED ABOVE THE REPORTING LIMIT
mg/kg	MILIGRAMS PER KILOGRAM
VIAP	VOLATILIZATION TO INDOOR AIR PROTECTION
Y	ELEVATED REPORTING LIMIT DUE TO HIGH TARGET CONCENTRATION
PCB	POLYCHLORINATED BIPHENYL

NOTES:

1) CRITERIA LISTED ARE FROM THE MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY (EGLE) CLEAN UP CRITERIA REQUIREMENTS TABLE 2: RESIDENTIAL SOIL CRITERIA, TABLE 3: NONRESIDENTIAL SOIL CRITERIA, PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS, DECEMBER 21, 2020. PCB CRITERIA LISTED ARE FROM USEPA PCB SITE REVITALIZATION GUIDANCE UNDER THE TSCA, TABLE 2, NOVEMBER 2005.

2) BOLD VALUES INDICATE AN EXCEEDANCE OF THE RESIDENTIAL CRITERIA.

3) BOLD AND ITALIC VALUES INDICATE AN EXCEEDANCE OF THE NONRESIDENTIAL CRITERIA OR THEW TSCA SCREENING LEVEL.

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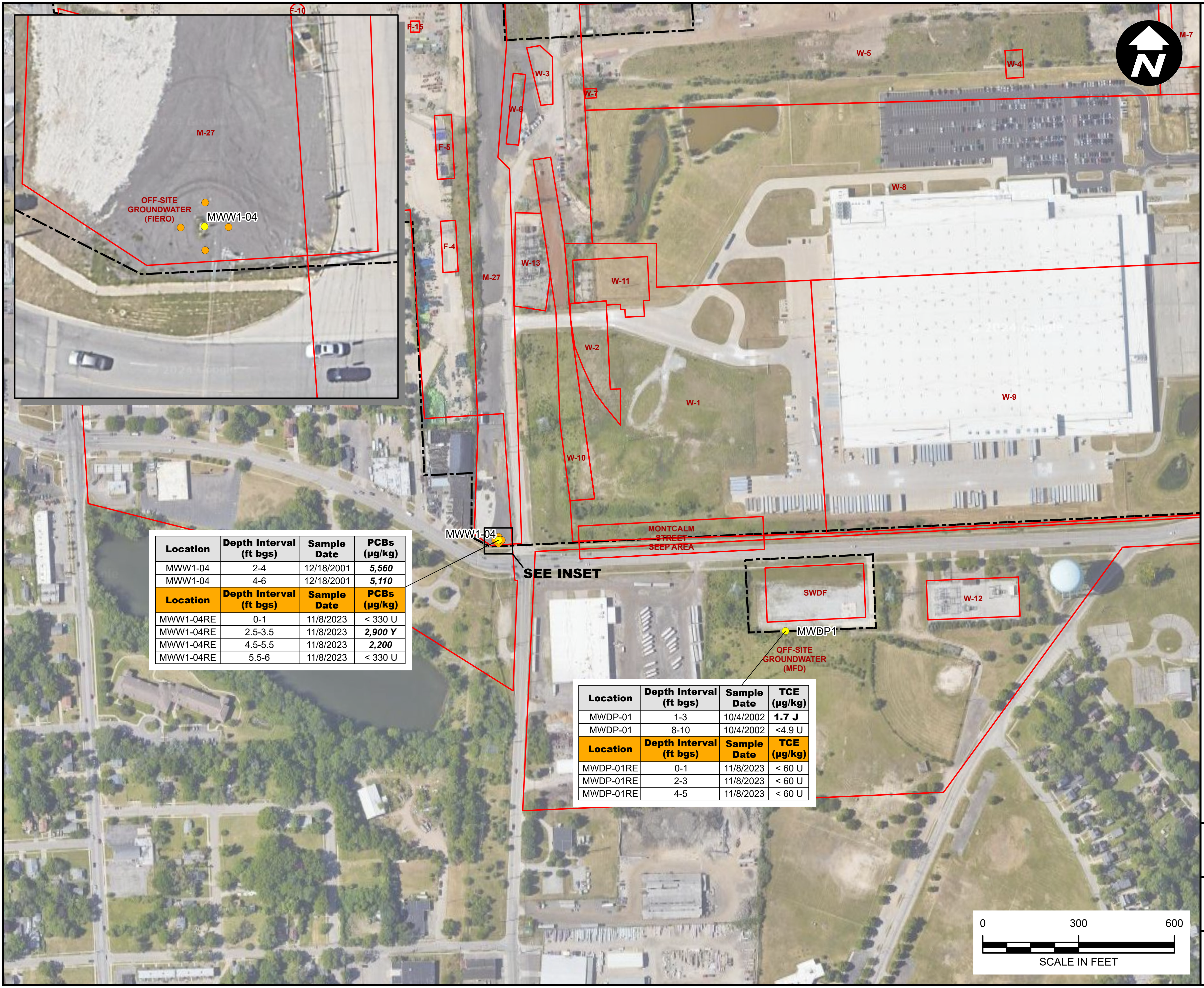
RACER TRUST
PONTIAC NORTH CAMPUS
PONTIACC, MICHIGAN

RCRA SOIL INVESTIGATION SUMMARY - SMFD

ARCADIS

FIGURE
3

CITY: NOVI, MI DIV: ENV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
D:\GIS\Project Files\MotorsLiquidationCompany\PontiacNorthCampus\Documents\SoilDataSummary_2001-2023\SoilDataSummary_2001-2023.aprx PLOTTED: 2/28/2024 4:38 PM BY: TYarbrough



Location	Depth Interval (ft bgs)	Sample Date	PCBs (µg/kg)
MWW1-04	2-4	12/18/2001	***5,560***
MWW1-04	4-6	12/18/2001	***5,110***
Location	**Depth Interval (ft bgs)**	**Sample Date**	**PCBs (µg/kg)**
MWW1-04RE	0-1	11/8/2023	< 330 U
MWW1-04RE	2.5-3.5	11/8/2023	***2,900 Y***
MWW1-04RE	4.5-5.5	11/8/2023	***2,200***
MWW1-04RE	5.5-6	11/8/2023	< 330 U

Location	Depth Interval (ft bgs)	Sample Date	TCE (µg/kg)
MWDP-01	1-3	10/4/2002	**1.7 J**
MWDP-01	8-10	10/4/2002	<4.9 U
Location	**Depth Interval (ft bgs)**	**Sample Date**	**TCE (µg/kg)**
MWDP-01RE	0-1	11/8/2023	< 60 U
MWDP-01RE	2-3	11/8/2023	< 60 U
MWDP-01RE	4-5	11/8/2023	< 60 U

LEGEND

●	RE-SAMPLE LOCATION
●	PROPOSED STEP-OUT BORING LOCATION
🟥	AREAS OF INTEREST
▭	CURRENT OR FORMER RACER PROPERTY BOUNDARIES

Compound	Unit	Residential Soil VIAP	Nonresidential Soil VIAP	Residential Direct Contact	Nonresidential Direct Contact	TSCA PCBs
PCBs	ug/kg	--	--	--	--	***1,000***
Trichloroethene	ug/kg	**0.33**	***4.0***	**110,000**	***660,000***	--

µg/kg	MICROGRAMS PER KILOGRAM
<	NON-DETECT
bgs	BELOW GROUND SURFACE
ft	FEET
NR	NONRESIDENTIAL
Res	RESIDENTIAL
TSCA	TOXIC SUBSTANCES CONTROL ACT
U	COMPOUND ANALYZED FOR BUT NOT DETECTED ABOVE THE REPORTING LIMIT
VIAP	VOLATILIZATION TO INDOOR AIR PROTECTION
Y	ELEVATED REPORTING LIMIT DUE TO HIGH TARGET CONCENTRATION
PCB	POLYCHLORINATED BIPHENYL

NOTES:

1) RESIDENTIAL AND NONRESIDENTIAL VOLATILIZATION TO INDOOR AIR PATHWAY SCREENING LEVELS (GROUNDWATER NOT IN CONTACT) ARE FROM THE DEQ GUIDANCE DOCUMENT FOR THE VAPOR INTRUSION PATHWAY, APPENDIX C - TABLES 1 AND 2, SEPTEMBER 4, 2020. PCB CRITERIA LISTED ARE FROM USEPA PCB SITE REVITALIZATION GUIDANCE UNDER THE TSCA, TABLE 2, NOVEMBER 2005.

2) BOLD VALUES INDICATE AN EXCEEDANCE OF THE RESIDENTIAL CRITERIA.

3) BOLD AND ITALIC VALUES INDICATE AN EXCEEDANCE OF THE NONRESIDENTIAL CRITERIA OR TSCA SCREENING LEVEL.

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RACER TRUST
PONTIAC NORTH CAMPUS
PONTIACC, MICHIGAN

RCRA SOIL INVESTIGATION SUMMARY - SMFD/SWDF

ARCADIS

FIGURE
4

CITY: NOVI, MI DIV: ENV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl PLOTTED: 2/29/2024 9:37 AM BY: TYarbrough
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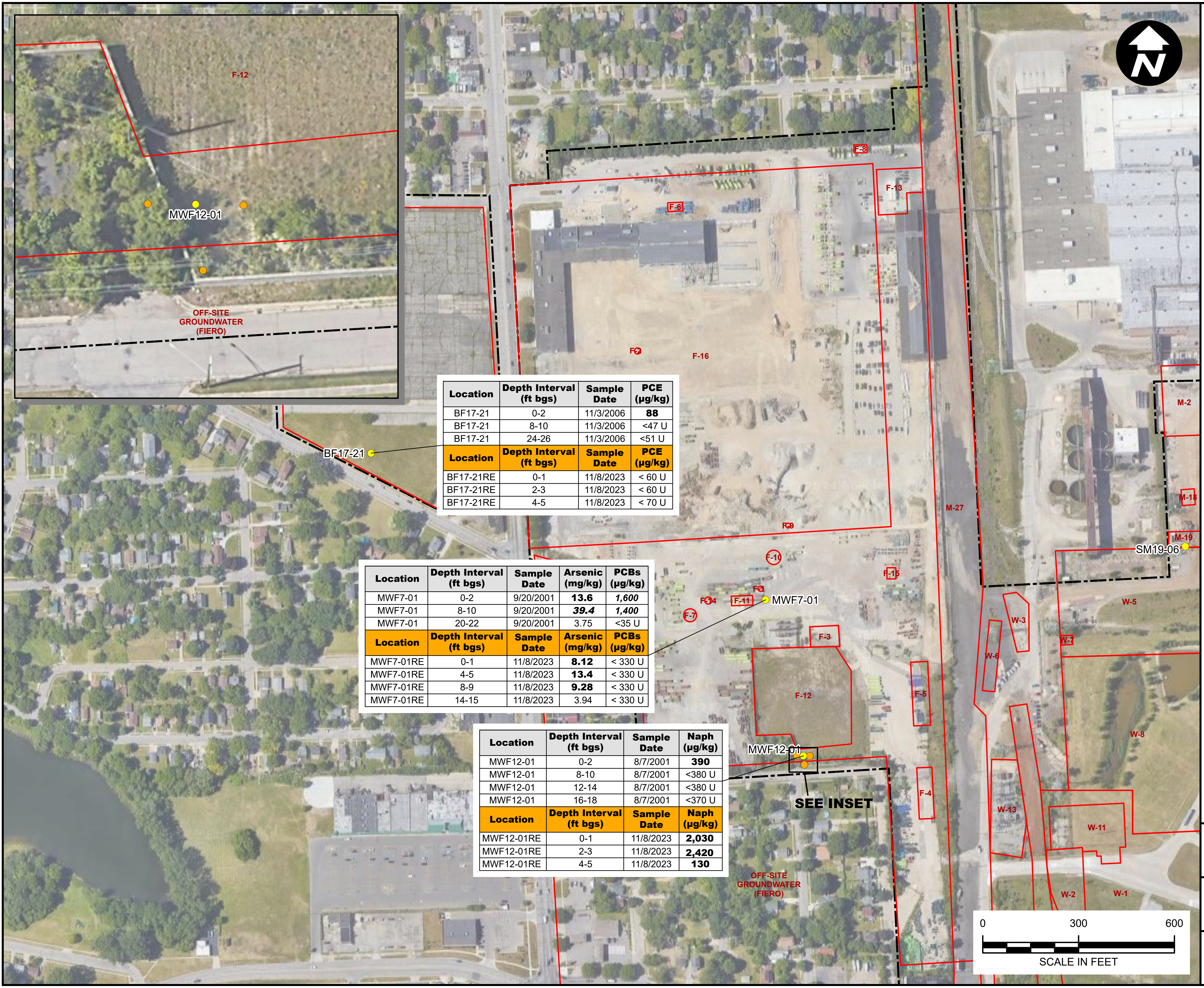

Location	Depth Interval (ft bgs)	Sample Date	PCE (µg/kg)
BF17-21	0-2	11/3/2006	**88**
BF17-21	8-10	11/3/2006	<47 U
BF17-21	24-26	11/3/2006	<51 U
Location	**Depth Interval (ft bgs)**	**Sample Date**	**PCE (µg/kg)**
BF17-21RE	0-1	11/8/2023	< 60 U
BF17-21RE	2-3	11/8/2023	< 60 U
BF17-21RE	4-5	11/8/2023	< 70 U

Location	Depth Interval (ft bgs)	Sample Date	Arsenic (mg/kg)	PCBs (µg/kg)
MWF7-01	0-2	9/20/2001	**13.6**	***1,600***
MWF7-01	8-10	9/20/2001	***39.4***	***1,400***
MWF7-01	20-22	9/20/2001	3.75	<35 U
Location	**Depth Interval (ft bgs)**	**Sample Date**	**Arsenic (mg/kg)**	**PCBs (µg/kg)**
MWF7-01RE	0-1	11/8/2023	**8.12**	< 330 U
MWF7-01RE	4-5	11/8/2023	**13.4**	< 330 U
MWF7-01RE	8-9	11/8/2023	**9.28**	< 330 U
MWF7-01RE	14-15	11/8/2023	3.94	< 330 U

Location	Depth Interval (ft bgs)	Sample Date	Naph (µg/kg)
MWF12-01	0-2	8/7/2001	**390**
MWF12-01	8-10	8/7/2001	<380 U
MWF12-01	12-14	8/7/2001	<380 U
MWF12-01	16-18	8/7/2001	<370 U
Location	**Depth Interval (ft bgs)**	**Sample Date**	**Naph (µg/kg)**
MWF12-01RE	0-1	11/8/2023	**2,030**
MWF12-01RE	2-3	11/8/2023	**2,420**
MWF12-01RE	4-5	11/8/2023	**130**

LEGEND

●	RE-SAMPLE LOCATION
●	PROPOSED STEP-OUT BORING LOCATION
🟥	AREAS OF INTEREST
▭	CURRENT OR FORMER RACER PROPERTY BOUNDARIES

Compound	Unit	Res Fiero SSVIAC SOG	Res Fiero SSVIAC BASE	NR Fiero SSVIAC <50k SOG	NR Fiero SSVIAC <50k BASE	NR Fiero SSVIAC >50k SOG	NR Fiero SSVIAC >50k BASE
Naphthalene	ug/kg	**67**	**67**	***3,800***	***2,500***	***5,700***	***3,800***
Tetrachloroethene	ug/kg	**6.2**	**6.2**	***150***	***99***	***220***	***150***

Compound	Unit	Residential Soil VIAP	Nonresidential Soil VIAP	Residential Direct Contact	Nonresidential Direct Contact	TSCA PCBs
Arsenic	mg/kg	--	--	**7.6**	***37***	--
PCBs	ug/kg	--	--	--	--	***1,000***

µg/kg	MICROGRAMS PER KILOGRAM
<	NON-DETECT
<50k	LESS THAN 50,000 SQUARE FEET
>50k	GREATER THAN 50,000 SQUARE FEET
BASE	BASEMENT SCENARIO
bgs	BELOW GROUND SURFACE
ft	FEET
NR	NONRESIDENTIAL
Res	RESIDENTIAL
SOG	SLAB-ON-GRADE SCENARIO
SSVIAC	SITE-SPECIFIC VOLATILIZATION TO INDOOR AIR CRITERIA
TSCA	TOXIC SUBSTANCES CONTROL ACT
U	COMPOUND ANALYZED FOR BUT NOT DETECTED ABOVE THE REPORTING LIMIT
mg/kg	MILIGRAMS PER KILOGRAM
Y	ELEVATED REPORTING LIMIT DUE TO HIGH TARGET CONCENTRATION
PCB	POLYCHLORINATED BIPHENYL

NOTES:

1) CRITERIA LISTED ARE FROM THE MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY (EGLE) CLEAN UP CRITERIA REQUIREMENTS TABLE 2: RESIDENTIAL SOIL CRITERIA, TABLE 3: NONRESIDENTIAL SOIL CRITERIA, PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS, DECEMBER 21, 2020. PCB CRITERIA LISTED ARE FROM USEPA PCB SITE REVITALIZATION GUIDANCE UNDER THE TSCA, TABLE 2, NOVEMBER 2005.

2) CRITERIA LISTED ARE FROM THE EGLE FORMER FIERO ASSEMBLY SITE-SPECIFIC CRITERIA EVALUATION DATED APRIL 21, 2020.

3) BOLD VALUES INDICATE AN EXCEEDANCE OF THE RESIDENTIAL CRITERIA.

4) BOLD AND ITALIC VALUES INDICATE AN EXCEEDANCE OF THE NONRESIDENTIAL CRITERIA OR TSCA SCREENING LEVEL.

Service Layer Credits: Tiled service layer: © OpenStreetMap (and) contributors, CC-BY-SA Aerial Date: July 29, 2022

RACER TRUST
PONTIAC NORTH CAMPUS
PONTIACC, MICHIGAN

RCRA SOIL INVESTIGATION SUMMARY - FORMER FIERO PROPERTIES

ARCADIS

FIGURE
5

Attachment 1

Data Validation, Laboratory TDL Memo, and Laboratory Analytical Reports

Memo

SUBJECT
Validation Summary for RACER Pontiac North Campus
November 2023 Sample Collection

TO
Project Team

DATE
August 16, 2024

OUR REF

DEPARTMENT
Environment

PROJECT NUMBER
30214041

COPIES TO
Project File

NAME
Rachelle Borne LaGarde, Data Validation
Rachelle.Borne@arcadis.com

Validation Memorandum for SDG S55623

Forty-eight soil samples, five duplicates, two equipment blanks and one trip blank were sent to Merit Laboratories in Lansing, Michigan for laboratory analysis. The samples were collected November 7th-9th 2023. The analysis included Methods 8260C, 6020A, 8082A and 8270D.

The Level II data review was performed using the review criteria specified in "National Functional Guidelines for Inorganic Superfund Methods Data Review", EPA 540-R-2017-001, January 2017 and "National Functional Guidelines for Organic Superfund Methods Data Review", EPA 540-R-2017-002, January 2017. During the data validation process the following items are checked: blanks, holding times, surrogate recoveries (when applicable), LCS/LCSD recoveries and RPDs, MS/MSD recoveries and RPDs, total and dissolved metals (when applicable) and field duplicate RPDs (when applicable).

DUP-01 was collected as a field duplicate of BM30-03RE(1-1.5). The RPDs were acceptable at non-detect.

DUP-02 was collected as a field duplicate of SM19-02RE(2-3). The RPD was acceptable.

DUP-03 was collected as a field duplicate of BW5-06RE(14-15). The RPD was acceptable at non-detect.

DUP-04 was collected as a field duplicate of BF17-21RE(0-1). The RPD was acceptable at non-detect.

DUP-05 was collected as a field duplicate of MWDP-01RE(4-5). The RPD was acceptable at non-detect.

The results were qualified as follows:

-All PCB results for sample MWW1-04RE(2.5-3.5) would be qualified as estimated (J/UJ) because the surrogates were diluted out and could not be evaluated.

-PCB 1248 would be qualified as estimated (J) because the surrogate recoveries were above the control limits.

Summary:

All data is considered usable as qualified due to the minor QA/QC deviations listed above.

Merit Laboratories, Inc.

MERIT LABORATORIES, INC.
2680 EAST LANSING DRIVE
EAST LANSING • MICHIGAN • 48823
PHONE: 517-332-0167
FAX: 517-332-6333
FULL SERVICE ANALYTICAL TESTING
FIELD SERVICES • CONSULTING • TRAINING

July 17, 2024

Tiffany Linder
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

RE: RLs corrected and reported on a dry weight basis

Dear Tiffany,

The Reporting Limit for methanol-extracted VOC compounds is 50 ppb. When correcting for solids, this limit will be higher for samples with high moisture or high water content that are reported on a dry weight basis. High moisture/high water content samples include samples with total solids below 90% (i.e., 10% or more water). See SW 846 Method 5035A, Section 11.5 (Revision 1, July 2002).

Per MDEQ RRD Operational Memorandum No. 2 Attachment 6 (page 8) October 2004 (SAMPLING AND ANALYSIS – ATTACHMENT 6 SAMPLING METHODS FOR VOLATILE ORGANIC COMPOUNDS) in Section CORRECTION FOR SAMPLES WITH HIGH WATER CONTENT and ELEVATED REPORTING LIMITS DUE TO HIGH MOISTURE, samples for volatile compounds in soils "must be reported on a dry weight basis using the moisture content of the soil to adjust results (RL)."

The MDEQ's most current refence document (https://www.michigan.gov/egle/0,9429,7-135-3311_4109_9846-101581--,00.html), Application of Target Detection Limits and Designated analytical methods Resource Materials, Section 2.0, page 6, Rev. March, 2016, states: "For soil matrices, laboratory quantitative reporting limits should be equal to, or less than, the listed TDLs on a **wet weight basis**. Reported results are on a dry weight basis."

Below, please find an example calculation for Tetrachloroethene, where it was not detected, but with the % moisture corrections, the final reporting limit is 60 ppb.

EXAMPLE CALCULATION

55623.35	
Tetrachloroethene	
Sample Wet Weight (g)	12.568
MeOH volume (ml)	12.00
%Solids	**0.89**
% moisture	0.11
% moisture x sample weight	1.38
TOTAL VOLUME = % moisture x sample weight + MeOH volume	13.38
Total volume/(sample weight x % solids)	1.19
Standard dilution (5000 ul/100ul MeOH extract)	50.00
DILUTION FACTOR (DF)	59.8
PQL (Lowest Calibration concentration in ppb)	1.00
RL (with correction for Total Solids in ppb) = RL x DF	59.8 (rounded to 60)

If you need more information, please do not hesitate to contact me at (517) 827-2744 or email me at mayamurshak@meritlabs.com.

Sincerely,

Maya Murshak

Maya Murshak
CEO/Technical Director

Analytical Laboratory Report

Report ID: S55623.01(01)+QC01
Generated on 12/01/2023

Report to

Attention: Tiffany Linder
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-994-2272 FAX:
Email: tiffany.linder@arcadis.com

Addtional Contacts: Ian Drost, Alexis Crisp

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S55623.01-S55623.57
Project: Racer PNC
Collected Date(s): 11/07/2023 - 11/09/2023
Submitted Date/Time: 11/10/2023 11:15
Sampled by: Jonathan Lust
P.O. #: 30167840

Table of Contents

Maya Murshak

Maya Murshak
Technical Director

Analytical Laboratory Report

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile, and 2-chloroethylvinyl ether need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Starred (*) analytes are not NY NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

All accreditations/certifications held by this laboratory are listed on page 3. Not all accreditations/certifications are applicable to this report.

For a specific list of accredited analytes, please feel free to contact the laboratory or visit https://www.meritlabs.com/certifications.

Report Narrative

There is no additional narrative for this analytical report

Analytical Laboratory Report

Laboratory Accreditations (For Reference Only)

Authority	Accreditation ID
Michigan DEQ	#9956
DOD ELAP & ISO/IEC 17025:2017	#69699 PJLA Testing
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
E608.3	EPA Method 608.3 December 2016
N/A	Not Applicable
SM2540B	Standard Method 2540 B 2015
SW3050B	SW 846 Method 3050B Revision 2 December 1996
SW3510C	SW 846 Method 3510C Revision 3 December 1996
SW3546	SW 846 Method 3546 Revision 0 February 2007
SW5030C/8260C	SW 846 Method 8260C Revision 3 August 2006 / 5030C Revision 3 May 2003
SW5035A	SW 846 Method 5035A Revision 1 July 2002
SW5035A/8260C	SW 846 Method 8260C Revision 3 August 2006 / 5035A Revision 1 July 2002
SW6020A	SW 846 Method 6020A Revision 1 February 2007
SW8082A	SW 846 Method 8082A Revision 1 February 2007
SW8270D	SW 846 Method 8270D Revision 4 February 2007

Analytical Laboratory Report

Sample Summary (57 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S55623.01	BW5-06RE(0-1)_11082023	Soil	11/08/23 10:10
S55623.02	BW5-06RE(5-6)_11082023	Soil	11/08/23 10:20
S55623.03	BW5-06RE(11-12)_11082023	Soil	11/08/23 10:25
S55623.04	BW5-06RE(14-15)_11082023	Soil	11/08/23 10:25
S55623.05	MWDP-01RE(0-1)_11082023	Soil	11/08/23 13:20
S55623.06	MWDP-01RE(2-3)_11082023	Soil	11/08/23 13:30
S55623.07	MWDP-01RE(4-5)_11082023	Soil	11/08/23 13:40
S55623.08	MWW1-04RE(0-1)_11082023	Soil	11/08/23 11:50
S55623.09	MWW1-04RE(2.5-3.5)_11082023	Soil	11/08/23 11:50
S55623.10	MWW1-04RE(4.5-5.5)_11082023	Soil	11/08/23 12:15
S55623.11	MWW1-04RE(5.5-6)_11082023	Soil	11/08/23 12:50
S55623.12	MWF7-01RE(0-1)_11082023	Soil	11/08/23 14:30
S55623.13	SM19-01RE(0-1)_11072023	Soil	11/07/23 13:40
S55623.14	SM19-01RE(2-3)_11072023	Soil	11/07/23 14:00
S55623.15	SM19-01RE(2-3)_11072023 MS	Soil	11/07/23 14:00
S55623.16	SM19-01RE(2-3)_11072023 MSD	Soil	11/07/23 14:00
S55623.17	SM19-01RE(4-5)_11072023	Soil	11/07/23 14:00
S55623.18	SM19-03RE(0-1)_11072023	Soil	11/07/23 15:00
S55623.19	SM19-03RE(2-3)_11072023	Soil	11/07/23 15:35
S55623.20	SM19-03RE(4-5)_11072023	Soil	11/07/23 15:35
S55623.21	SM19-02RE(0-1)_11072023	Soil	11/07/23 15:00
S55623.22	SM19-02RE(2-3)_11072023	Soil	11/07/23 15:00
S55623.23	SM19-02RE(4-5)_11072023	Soil	11/07/23 15:00
S55623.24	SM19-06RE(0-1)_11082023	Soil	11/08/23 08:50
S55623.25	SM19-06RE(2-3)_11082023	Soil	11/08/23 09:00
S55623.26	SM19-06RE(4-5)_11082023	Soil	11/08/23 09:00
S55623.27	MWF7-01RE(4-5)_11082023	Soil	11/08/23 14:40
S55623.28	MWF7-01RE(8-9)_11082023	Soil	11/08/23 14:45
S55623.29	MWF7-01RE(14-15)_11082023	Soil	11/08/23 14:45
S55623.30	MWF12-01RE(0-1)_11082023	Soil	11/08/23 15:10
S55623.31	MWF12-01RE(2-3)_11082023	Soil	11/08/23 15:15
S55623.32	MWF12-01RE(4-5)_11082023	Soil	11/08/23 15:20
S55623.33	MWF12-01RE(4-5)_11082023 MS	Soil	11/08/23 15:20
S55623.34	MWF12-01RE(4-5)_11082023 MSD	Soil	11/08/23 15:20
S55623.35	BF17-21RE(0-1)_11082023	Soil	11/08/23 16:00
S55623.36	BF17-21RE(2-3)_11082023	Soil	11/08/23 16:05
S55623.37	BF17-21RE(4-5)_11082023	Soil	11/08/23 16:10
S55623.38	BM30-03RE(1-1.5)_11092023	Soil	11/09/23 13:20
S55623.39	BM30-03RE(2-3)_11092023	Soil	11/09/23 13:25
S55623.40	BM30-03RE(4-5)_11092023	Soil	11/09/23 13:30
S55623.41	EB-01	Water	11/07/23 15:45
S55623.42	EB-02	Water	11/08/23 16:40
S55623.43	EB-03	Water	11/09/23 14:00
S55623.44	MWM30-01RE(0-1)_11092023	Soil	11/09/23 08:45
S55623.45	MWM30-01RE(2-3)_11092023	Soil	11/09/23 08:50
S55623.46	MWM30-01RE(4-5)_11092023	Soil	11/09/23 08:55
S55623.47	MWM30-01RE(4-5)_11092023 MS	Soil	11/09/23 08:55
S55623.48	MWM30-01RE(4-5)_11092023 MSD	Soil	11/09/23 08:55
S55623.49	Trip Blank	Methanol	11/09/23 00:01
S55623.50	DUP-01	Soil	11/09/23 00:01
S55623.51	DUP-02	Soil	11/07/23 00:01
S55623.52	DUP-03	Soil	11/08/23 00:01
S55623.53	DUP-04	Soil	11/08/23 00:01

Sample Summary (continued)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S55623.54	DUP-05	Soil	11/08/23 00:01
S55623.55	BM30-01RE(4-5)_11092023	Soil	11/09/23 09:35
S55623.56	BM30-01RE(2-3)_11092023	Soil	11/09/23 09:30
S55623.57	BM30-01RE(0-1)_11092023	Soil	11/09/23 09:25

Analytical Laboratory Report

Lab Sample ID: S55623.01
Sample Tag: BW5-06RE(0-1)_11082023
Collected Date/Time: 11/08/2023 10:10
Matrix: Soil
COC Reference: 168371

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/17/23 13:20	DJS	

Inorganics

Method: SM2540B, Run Date: 11/13/23 13:55, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	89	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/20/23 20:00, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.02
Sample Tag: BW5-06RE(5-6)_11082023
Collected Date/Time: 11/08/2023 10:20
Matrix: Soil
COC Reference: 168371

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/17/23 13:20	DJS	

Inorganics

Method: SM2540B, Run Date: 11/13/23 13:55, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	90	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/20/23 20:12, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.03
Sample Tag: BW5-06RE(11-12)_11082023
Collected Date/Time: 11/08/2023 10:25
Matrix: Soil
COC Reference: 168371

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/17/23 13:20	DJS	

Inorganics

Method: SM2540B, Run Date: 11/13/23 13:55, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	85	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/21/23 13:33, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	10	12674-11-2	
PCB-1242	Not detected	330		ug/kg	10	53469-21-9	
PCB-1221	Not detected	330		ug/kg	10	11104-28-2	
PCB-1232	Not detected	330		ug/kg	10	11141-16-5	
PCB-1248	Not detected	330		ug/kg	10	12672-29-6	
PCB-1254	Not detected	330		ug/kg	10	11097-69-1	
PCB-1260	Not detected	330		ug/kg	10	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.04
Sample Tag: BW5-06RE(14-15)_11082023
Collected Date/Time: 11/08/2023 10:25
Matrix: Soil
COC Reference: 168371

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/17/23 13:20	DJS	

Inorganics

Method: SM2540B, Run Date: 11/13/23 13:55, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	88	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/20/23 20:24, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	50	12674-11-2	
PCB-1242	Not detected	330		ug/kg	50	53469-21-9	
PCB-1221	Not detected	330		ug/kg	50	11104-28-2	
PCB-1232	Not detected	330		ug/kg	50	11141-16-5	
PCB-1248	Not detected	330		ug/kg	50	12672-29-6	
PCB-1254	Not detected	330		ug/kg	50	11097-69-1	
PCB-1260	Not detected	330		ug/kg	50	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.05
Sample Tag: MWDP-01RE(0-1)_11082023
Collected Date/Time: 11/08/2023 13:20
Matrix: Soil
COC Reference: 168371

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR
1	40mL Glass	MeOH	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Sample wt. (g) / Methanol (ml)*	23.308/23	SW5035A	11/13/23 12:23	ACK	

Inorganics

Method: SM2540B, Run Date: 11/13/23 13:55, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	88	1		%	1		

Organics - Volatiles

Method: SW5035A/8260C, Run Date: 11/14/23 18:48, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Trichloroethene	Not detected	60		ug/kg	62.9	79-01-6	

Analytical Laboratory Report

Lab Sample ID: S55623.06
Sample Tag: MWDP-01RE(2-3)_11082023
Collected Date/Time: 11/08/2023 13:30
Matrix: Soil
COC Reference: 168371

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR
1	40mL Glass	MeOH	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Sample wt. (g) / Methanol (ml)*	17.012/17	SW5035A	11/13/23 12:23	ACK	

Inorganics

Method: SM2540B, Run Date: 11/13/23 13:55, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	88	1		%	1		

Organics - Volatiles

Method: SW5035A/8260C, Run Date: 11/14/23 19:12, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Trichloroethene	Not detected	60		ug/kg	63.6	79-01-6	

Analytical Laboratory Report

Lab Sample ID: S55623.07
Sample Tag: MWDP-01RE(4-5)_11082023
Collected Date/Time: 11/08/2023 13:40
Matrix: Soil
COC Reference: 168371

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR
1	40mL Glass	MeOH	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Sample wt. (g) / Methanol (ml)*	10.492/10	SW5035A	11/13/23 12:23	ACK	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	88	1		%	1		

Organics - Volatiles

Method: SW5035A/8260C, Run Date: 11/14/23 19:36, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Trichloroethene	Not detected	60		ug/kg	61	79-01-6	

Analytical Laboratory Report

Lab Sample ID: S55623.08
Sample Tag: MWW1-04RE(0-1)_11082023
Collected Date/Time: 11/08/2023 11:50
Matrix: Soil
COC Reference: 168371

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/17/23 13:20	DJS	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	95	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/21/23 13:47, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	10	12674-11-2	
PCB-1242	Not detected	330		ug/kg	10	53469-21-9	
PCB-1221	Not detected	330		ug/kg	10	11104-28-2	
PCB-1232	Not detected	330		ug/kg	10	11141-16-5	
PCB-1248	Not detected	330		ug/kg	10	12672-29-6	
PCB-1254	Not detected	330		ug/kg	10	11097-69-1	
PCB-1260	Not detected	330		ug/kg	10	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.09
Sample Tag: MWW1-04RE(2.5-3.5)_11082023
Collected Date/Time: 11/08/2023 11:50
Matrix: Soil
COC Reference: 168371

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/17/23 13:20	DJS	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	85	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/21/23 14:25, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	600		ug/kg	100	12674-11-2	Y
PCB-1242	Not detected	600		ug/kg	100	53469-21-9	Y
PCB-1221	Not detected	600		ug/kg	100	11104-28-2	Y
PCB-1232	Not detected	600		ug/kg	100	11141-16-5	Y
PCB-1248	2,900	600		ug/kg	100	12672-29-6	Y
PCB-1254	Not detected	600		ug/kg	100	11097-69-1	Y
PCB-1260	Not detected	600		ug/kg	100	11096-82-5	Y

Y-Elevated reporting limit due to high target concentration

Analytical Laboratory Report

Lab Sample ID: S55623.10
Sample Tag: MWW1-04RE(4.5-5.5)_11082023
Collected Date/Time: 11/08/2023 12:15
Matrix: Soil
COC Reference: 168371

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/17/23 13:20	DJS	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	91	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/20/23 21:13, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	50	12674-11-2	
PCB-1242	Not detected	330		ug/kg	50	53469-21-9	
PCB-1221	Not detected	330		ug/kg	50	11104-28-2	
PCB-1232	Not detected	330		ug/kg	50	11141-16-5	
PCB-1248	2,200	330		ug/kg	50	12672-29-6	
PCB-1254	Not detected	330		ug/kg	50	11097-69-1	
PCB-1260	Not detected	330		ug/kg	50	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.11
Sample Tag: MWW1-04RE(5.5-6)_11082023
Collected Date/Time: 11/08/2023 12:50
Matrix: Soil
COC Reference: 168371

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/17/23 13:20	DJS	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	78	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/20/23 21:25, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.12
Sample Tag: MWF7-01RE(0-1)_11082023
Collected Date/Time: 11/08/2023 14:30
Matrix: Soil
COC Reference: 168371

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	92	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 11:29, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	8.12	0.20		mg/kg	246	7440-38-2	

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 18:58, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.13

Sample Tag: SM19-01RE(0-1)_11072023
Collected Date/Time: 11/07/2023 13:40
Matrix: Soil
COC Reference: 168372

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	93	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 11:30, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	6.53	0.20		mg/kg	267	7440-38-2	

Analytical Laboratory Report

Lab Sample ID: S55623.14

Sample Tag: SM19-01RE(2-3)_11072023

Collected Date/Time: 11/07/2023 14:00

Matrix: Soil

COC Reference: 168372

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	90	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 11:44, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	5.64	0.20		mg/kg	262	7440-38-2	

Analytical Laboratory Report

Lab Sample ID: S55623.15

Sample Tag: SM19-01RE(2-3)_11072023 MS

Collected Date/Time: 11/07/2023 14:00

Matrix: Soil

COC Reference: 168372

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	81	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 11:46, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	39.6	0.20		mg/kg	279	7440-38-2	

Analytical Laboratory Report

Lab Sample ID: S55623.16
Sample Tag: SM19-01RE(2-3)_11072023 MSD
Collected Date/Time: 11/07/2023 14:00
Matrix: Soil
COC Reference: 168372

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	88	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 11:48, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	34.4	0.20		mg/kg	270	7440-38-2	

Analytical Laboratory Report

Lab Sample ID: S55623.17
Sample Tag: SM19-01RE(4-5)_11072023
Collected Date/Time: 11/07/2023 14:00
Matrix: Soil
COC Reference: 168372

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	89	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 11:32, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	5.56	0.20		mg/kg	264	7440-38-2	

Analytical Laboratory Report

Lab Sample ID: S55623.18
Sample Tag: SM19-03RE(0-1)_11072023
Collected Date/Time: 11/07/2023 15:00
Matrix: Soil
COC Reference: 168372

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	94	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 11:34, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	5.39	0.20		mg/kg	250	7440-38-2	

Analytical Laboratory Report

Lab Sample ID: S55623.19
Sample Tag: SM19-03RE(2-3)_11072023
Collected Date/Time: 11/07/2023 15:35
Matrix: Soil
COC Reference: 168372

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	90	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 11:36, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	2.69	0.20		mg/kg	267	7440-38-2	

Analytical Laboratory Report

Lab Sample ID: S55623.20
Sample Tag: SM19-03RE(4-5)_11072023
Collected Date/Time: 11/07/2023 15:35
Matrix: Soil
COC Reference: 168372

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	89	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 11:37, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	6.58	0.20		mg/kg	252	7440-38-2	

Analytical Laboratory Report

Lab Sample ID: S55623.21
Sample Tag: SM19-02RE(0-1)_11072023
Collected Date/Time: 11/07/2023 15:00
Matrix: Soil
COC Reference: 168372

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	92	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 11:39, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	5.95	0.20		mg/kg	260	7440-38-2	

Analytical Laboratory Report

Lab Sample ID: S55623.22
Sample Tag: SM19-02RE(2-3)_11072023
Collected Date/Time: 11/07/2023 15:00
Matrix: Soil
COC Reference: 168372

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	92	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 11:41, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	6.14	0.20		mg/kg	235	7440-38-2	

Analytical Laboratory Report

Lab Sample ID: S55623.23

Sample Tag: SM19-02RE(4-5)_11072023
Collected Date/Time: 11/07/2023 15:00
Matrix: Soil
COC Reference: 168372

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	86	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 11:43, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	26.9	0.20		mg/kg	251	7440-38-2	

Lab Sample ID: S55623.24
Sample Tag: SM19-06RE(0-1)_11082023
Collected Date/Time: 11/08/2023 08:50
Matrix: Soil
COC Reference: 168372

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	91	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 19:10, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.25

Sample Tag: SM19-06RE(2-3)_11082023

Collected Date/Time: 11/08/2023 09:00

Matrix: Soil

COC Reference: 168372

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	90	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 19:22, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.26

Sample Tag: SM19-06RE(4-5)_11082023
Collected Date/Time: 11/08/2023 09:00
Matrix: Soil
COC Reference: 168372

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	91	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 19:34, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.27
Sample Tag: MWF7-01RE(4-5)_11082023
Collected Date/Time: 11/08/2023 14:40
Matrix: Soil
COC Reference: 168370

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	85	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 11:59, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	13.4	0.20		mg/kg	277	7440-38-2	

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 19:46, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.28

Sample Tag: MWF7-01RE(8-9)_11082023

Collected Date/Time: 11/08/2023 14:45

Matrix: Soil

COC Reference: 168370

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	86	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 12:01, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	9.28	0.20		mg/kg	268	7440-38-2	

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 15:10, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.29

Sample Tag: MWF7-01RE(14-15)_11082023

Collected Date/Time: 11/08/2023 14:45

Matrix: Soil

COC Reference: 168370

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	88	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 12:03, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	3.94	0.20		mg/kg	264	7440-38-2	

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 15:22, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.30
Sample Tag: MWF12-01RE(0-1)_11082023
Collected Date/Time: 11/08/2023 15:10
Matrix: Soil
COC Reference: 168370

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR
1	40mL Glass	MeOH	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Sample wt. (g) / Methanol (ml)*	11.585/11	SW5035A	11/13/23 12:23	ACK	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	82	1		%	1		

Organics - Volatiles

Method: SW5035A/8260C, Run Date: 11/14/23 20:00, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Naphthalene	2,030	70		ug/kg	68.9	91-20-3	

Analytical Laboratory Report

Lab Sample ID: S55623.31
Sample Tag: MWF12-01RE(2-3)_11082023
Collected Date/Time: 11/08/2023 15:15
Matrix: Soil
COC Reference: 168370

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR
1	40mL Glass	MeOH	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Sample wt. (g) / Methanol (ml)*	10.692/10	SW5035A	11/13/23 12:23	ACK	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	86	1		%	1		

Organics - Volatiles

Method: SW5035A/8260C, Run Date: 11/14/23 20:24, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Naphthalene	2,420	60		ug/kg	62.5	91-20-3	

Analytical Laboratory Report

Lab Sample ID: S55623.32
Sample Tag: MWF12-01RE(4-5)_11082023
Collected Date/Time: 11/08/2023 15:20
Matrix: Soil
COC Reference: 168370

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR
1	40mL Glass	MeOH	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Sample wt. (g) / Methanol (ml)*	13.367/13	SW5035A	11/13/23 12:23	ACK	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	88	1		%	1		

Organics - Volatiles

Method: SW5035A/8260C, Run Date: 11/17/23 19:53, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Naphthalene	130	60		ug/kg	62.1	91-20-3	

Analytical Laboratory Report

Lab Sample ID: S55623.33
Sample Tag: MWF12-01RE(4-5)_11082023 MS
Collected Date/Time: 11/08/2023 15:20
Matrix: Soil
COC Reference: 168370

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR
1	40mL Glass	MeOH	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Sample wt. (g) / Methanol (ml)*	14.341/14	SW5035A	11/13/23 12:23	ACK	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	87	1		%	1		

Organics - Volatiles

Method: SW5035A/8260C, Run Date: 11/17/23 23:50, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Naphthalene	3,680	60		ug/kg	63.6	91-20-3	1

1-Spiked at 3.18 mg/kg

Analytical Laboratory Report

Lab Sample ID: S55623.34

Sample Tag: MWF12-01RE(4-5)_11082023 MSD

Collected Date/Time: 11/08/2023 15:20

Matrix: Soil

COC Reference: 168370

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR
1	40mL Glass	MeOH	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Sample wt. (g) / Methanol (ml)*	13.120/13	SW5035A	11/13/23 12:23	ACK	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	91	1		%	1		

Organics - Volatiles

Method: SW5035A/8260C, Run Date: 11/18/23 00:14, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Naphthalene	3,650	60		ug/kg	59.4	91-20-3	1

1-Spiked at 2.97 mg/kg

Analytical Laboratory Report

Lab Sample ID: S55623.35
Sample Tag: BF17-21RE(0-1)_11082023
Collected Date/Time: 11/08/2023 16:00
Matrix: Soil
COC Reference: 168370

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR
1	40mL Glass	MeOH	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Sample wt. (g) / Methanol (ml)*	12.568/12	SW5035A	11/13/23 12:23	ACK	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	89	1		%	1		

Organics - Volatiles

Method: SW5035A/8260C, Run Date: 11/14/23 20:48, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Tetrachloroethene	Not detected	60		ug/kg	59.8	127-18-4	

Analytical Laboratory Report

Lab Sample ID: S55623.36
Sample Tag: BF17-21RE(2-3)_11082023
Collected Date/Time: 11/08/2023 16:05
Matrix: Soil
COC Reference: 168370

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR
1	40mL Glass	MeOH	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Sample wt. (g) / Methanol (ml)*	13.722/13	SW5035A	11/13/23 12:23	ACK	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	89	1		%	1		

Organics - Volatiles

Method: SW5035A/8260C, Run Date: 11/15/23 01:33, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Tetrachloroethene	Not detected	60		ug/kg	59.4	127-18-4	

Analytical Laboratory Report

Lab Sample ID: S55623.37
Sample Tag: BF17-21RE(4-5)_11082023
Collected Date/Time: 11/08/2023 16:10
Matrix: Soil
COC Reference: 168370

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR
1	40mL Glass	MeOH	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Sample wt. (g) / Methanol (ml)*	9.496/10	SW5035A	11/13/23 12:23	ACK	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	85	1		%	1		

Organics - Volatiles

Method: SW5035A/8260C, Run Date: 11/17/23 20:17, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Tetrachloroethene	Not detected	70		ug/kg	70.8	127-18-4	

Analytical Laboratory Report

Lab Sample ID: S55623.38
Sample Tag: BM30-03RE(1-1.5)_11092023
Collected Date/Time: 11/09/2023 13:20
Matrix: Soil
COC Reference: 168370

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	89	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 19:58, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.39
Sample Tag: BM30-03RE(2-3)_11092023
Collected Date/Time: 11/09/2023 13:25
Matrix: Soil
COC Reference: 168370

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	86	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 20:09, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.40
Sample Tag: BM30-03RE(4-5)_11092023
Collected Date/Time: 11/09/2023 13:30
Matrix: Soil
COC Reference: 168370

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	89	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 20:21, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Lab Sample ID: S55623.41
Sample Tag: EB-01
Collected Date/Time: 11/07/2023 15:45
Matrix: Water
COC Reference: 168368

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	1L Amber	None	Yes	5.1	IR
3	40mL Glass	HCL	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	11/14/23 16:02	ACK	
BNA Extraction	Completed	SW3510C	11/14/23 14:00	JWR	

Organics - Semi-Volatiles

Semi-Volatile Organics - MDEQ, Method: SW8270D, Run Date: 11/16/23 21:42, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	5		ug/L	2	83-32-9	
Acenaphthylene	Not detected	5		ug/L	2	208-96-8	
Anthracene	Not detected	5		ug/L	2	120-12-7	
Benzo(a)anthracene	Not detected	1		ug/L	2	56-55-3	
Benzo(b)fluoranthene	Not detected	1		ug/L	2	205-99-2	
Benzo(k)fluoranthene	Not detected	1		ug/L	2	207-08-9	
Benzo(ghi)perylene	Not detected	1		ug/L	2	191-24-2	
Benzo(a)pyrene	Not detected	1		ug/L	2	50-32-8	
bis(2-Chloroethoxy)methane	Not detected	5		ug/L	2	111-91-1	
bis(2-Chloroethyl)ether	Not detected	5		ug/L	2	111-44-4	
bis(2-Chloroisopropyl)ether*	Not detected	5		ug/L	2	108-60-1	
bis(2-Ethylhexyl)phthalate	Not detected	5		ug/L	2	117-81-7	
4-Bromophenyl phenyl ether	Not detected	5		ug/L	2	101-55-3	
Butyl benzyl phthalate	Not detected	5		ug/L	2	85-68-7	
4-Chloroaniline	Not detected	10		ug/L	2	106-47-8	
2-Chloronaphthalene	Not detected	5		ug/L	2	91-58-7	
4-Chloro-3-methylphenol	Not detected	5		ug/L	2	59-50-7	
2-Chlorophenol	Not detected	10		ug/L	2	95-57-8	
4-Chlorophenyl phenyl ether	Not detected	5		ug/L	2	7005-72-3	
Chrysene	Not detected	1		ug/L	2	218-01-9	
3-, 4-Methylphenol (p,m-Cresol)	Not detected	20		ug/L	2	3/4-CRESOL	
2-Methylphenol (o-Cresol)	Not detected	10		ug/L	2	95-48-7	
Dibenzo(ah)anthracene	Not detected	2		ug/L	2	53-70-3	
Dibenzofuran	Not detected	4		ug/L	2	132-64-9	
di-n-Butyl phthalate	Not detected	5		ug/L	2	84-74-2	
1,2-Dichlorobenzene	Not detected	1		ug/L	2	95-50-1	
1,3-Dichlorobenzene	Not detected	1		ug/L	2	541-73-1	
1,4-Dichlorobenzene	Not detected	1		ug/L	2	106-46-7	
3,3'-Dichlorobenzidine	Not detected	5		ug/L	2	91-94-1	
2,4-Dichlorophenol	Not detected	10		ug/L	2	120-83-2	
Diethyl phthalate	Not detected	5		ug/L	2	84-66-2	
2,4-Dimethylphenol	Not detected	5		ug/L	2	105-67-9	
Dimethyl phthalate	Not detected	5		ug/L	2	131-11-3	
4,6-Dinitro-2-methylphenol	Not detected	20		ug/L	2	534-52-1	
2,4-Dinitrophenol	Not detected	25		ug/L	2	51-28-5	

Lab Sample ID: S55623.41 (continued)
Sample Tag: EB-01

Semi-Volatile Organics - MDEQ, Method: SW8270D, Run Date: 11/16/23 21:42, Analyst: PL (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
2,4-Dinitrotoluene	Not detected	5		ug/L	2	121-14-2	
2,6-Dinitrotoluene	Not detected	5		ug/L	2	606-20-2	
1,2-Diphenylhydrazine*	Not detected	5		ug/L	2	122-66-7	
di-n-Octyl phthalate	Not detected	5		ug/L	2	117-84-0	
Fluoranthene	Not detected	1		ug/L	2	206-44-0	
Fluorene	Not detected	5		ug/L	2	86-73-7	
Hexachlorobenzene	Not detected	5		ug/L	2	118-74-1	
Hexachlorobutadiene	Not detected	10		ug/L	2	87-68-3	
Hexachlorocyclopentadiene*	Not detected	5		ug/L	2	77-47-4	
Hexachloroethane	Not detected	5		ug/L	2	67-72-1	
Indeno(1,2,3-cd)pyrene	Not detected	2		ug/L	2	193-39-5	
Isophorone	Not detected	5		ug/L	2	78-59-1	
2-Methylnaphthalene	Not detected	5		ug/L	2	91-57-6	
Naphthalene	Not detected	5		ug/L	2	91-20-3	
2-Nitroaniline	Not detected	25		ug/L	2	88-74-4	
3-Nitroaniline	Not detected	25		ug/L	2	99-09-2	
4-Nitroaniline	Not detected	25		ug/L	2	100-01-6	
Nitrobenzene	Not detected	5		ug/L	2	98-95-3	
2-Nitrophenol	Not detected	5		ug/L	2	88-75-5	
4-Nitrophenol	Not detected	25		ug/L	2	100-02-7	
N-Nitrosodiphenylamine	Not detected	5		ug/L	2	86-30-6	
N-Nitrosodi-n-propylamine	Not detected	5		ug/L	2	621-64-7	
Pentachlorophenol	Not detected	5		ug/L	2	87-86-5	
Phenanthrene	Not detected	2		ug/L	2	85-01-8	
Phenol	Not detected	5		ug/L	2	108-95-2	
Pyrene	Not detected	5		ug/L	2	129-00-0	
1,2,4-Trichlorobenzene	Not detected	5		ug/L	2	120-82-1	
2,4,5-Trichlorophenol	Not detected	5		ug/L	2	95-95-4	
2,4,6-Trichlorophenol	Not detected	4		ug/L	2	88-06-2	

Organics - Volatiles

Volatile Organics - DEQ List, Method: SW5030C/8260C, Run Date: 11/13/23 15:23, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Diethyl ether	Not detected	10		ug/L	1	60-29-7	
Acetone	Not detected	50		ug/L	1	67-64-1	
Methyl iodide	Not detected	1		ug/L	1	74-88-4	
Carbon disulfide	Not detected	5		ug/L	1	75-15-0	
tert-Methyl butyl ether (MTBE)	Not detected	5		ug/L	1	1634-04-4	
Acrylonitrile	Not detected	2		ug/L	1	107-13-1	
2-Butanone (MEK)	Not detected	25		ug/L	1	78-93-3	
Dichlorodifluoromethane	Not detected	5		ug/L	1	75-71-8	
Chloromethane	Not detected	5		ug/L	1	74-87-3	
Vinyl chloride	Not detected	1		ug/L	1	75-01-4	
Bromomethane	Not detected	5		ug/L	1	74-83-9	
Chloroethane	Not detected	5		ug/L	1	75-00-3	
Trichlorofluoromethane	Not detected	1		ug/L	1	75-69-4	
1,1-Dichloroethene	Not detected	1		ug/L	1	75-35-4	
Methylene chloride	Not detected	5		ug/L	1	75-09-2	
trans-1,2-Dichloroethene	Not detected	1		ug/L	1	156-60-5	
1,1-Dichloroethane	Not detected	1		ug/L	1	75-34-3	

Analytical Laboratory Report

Lab Sample ID: S55623.41 (continued)
Sample Tag: EB-01

Volatile Organics - DEQ List, Method: SW5030C/8260C, Run Date: 11/13/23 15:23, Analyst: NDK (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
cis-1,2-Dichloroethene	Not detected	1		ug/L	1	156-59-2	
Tetrahydrofuran*	Not detected	90		ug/L	1	109-99-9	
Chloroform	2	1		ug/L	1	67-66-3	
Bromochloromethane	Not detected	1		ug/L	1	74-97-5	
1,1,1-Trichloroethane	Not detected	1		ug/L	1	71-55-6	
4-Methyl-2-pentanone (MIBK)	Not detected	50		ug/L	1	108-10-1	
2-Hexanone	Not detected	50		ug/L	1	591-78-6	
Carbon tetrachloride	Not detected	1		ug/L	1	56-23-5	
Benzene	Not detected	1		ug/L	1	71-43-2	
1,2-Dichloroethane	Not detected	1		ug/L	1	107-06-2	
Trichloroethene	Not detected	1		ug/L	1	79-01-6	
1,2-Dichloropropane	Not detected	1		ug/L	1	78-87-5	
Bromodichloromethane	Not detected	1		ug/L	1	75-27-4	
Dibromomethane	Not detected	5		ug/L	1	74-95-3	
cis-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-01-5	
Toluene	Not detected	1		ug/L	1	108-88-3	
trans-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-02-6	
1,1,2-Trichloroethane	Not detected	1		ug/L	1	79-00-5	
Tetrachloroethene	Not detected	1		ug/L	1	127-18-4	
trans-1,4-Dichloro-2-butene	Not detected	1		ug/L	1	110-57-6	
Dibromochloromethane	Not detected	5		ug/L	1	124-48-1	
1,2-Dibromoethane	Not detected	1		ug/L	1	106-93-4	
Chlorobenzene	Not detected	1		ug/L	1	108-90-7	
1,1,1,2-Tetrachloroethane	Not detected	1		ug/L	1	630-20-6	
Ethylbenzene	Not detected	1		ug/L	1	100-41-4	
p,m-Xylene*	Not detected	2		ug/L	1		
o-Xylene	Not detected	1		ug/L	1	95-47-6	
Styrene	Not detected	1		ug/L	1	100-42-5	
Isopropylbenzene	Not detected	5		ug/L	1	98-82-8	
Bromoform	Not detected	1		ug/L	1	75-25-2	
1,1,2,2-Tetrachloroethane	Not detected	1		ug/L	1	79-34-5	
1,2,3-Trichloropropane	Not detected	1		ug/L	1	96-18-4	
n-Propylbenzene	Not detected	1		ug/L	1	103-65-1	
Bromobenzene	Not detected	1		ug/L	1	108-86-1	
1,3,5-Trimethylbenzene	Not detected	1		ug/L	1	108-67-8	
tert-Butylbenzene	Not detected	1		ug/L	1	98-06-6	
1,2,4-Trimethylbenzene	Not detected	1		ug/L	1	95-63-6	
sec-Butylbenzene	Not detected	1		ug/L	1	135-98-8	
p-Isopropyltoluene	Not detected	5		ug/L	1	99-87-6	
1,3-Dichlorobenzene	Not detected	1		ug/L	1	541-73-1	
1,4-Dichlorobenzene	Not detected	1		ug/L	1	106-46-7	
1,2-Dichlorobenzene	Not detected	1		ug/L	1	95-50-1	
1,2,3-Trimethylbenzene	Not detected	1		ug/L	1	526-73-8	
n-Butylbenzene	Not detected	1		ug/L	1	104-51-8	
Hexachloroethane	Not detected	5		ug/L	1	67-72-1	
1,2-Dibromo-3-chloropropane	Not detected	5		ug/L	1	96-12-8	
1,2,4-Trichlorobenzene	Not detected	5		ug/L	1	120-82-1	
1,2,3-Trichlorobenzene	Not detected	5		ug/L	1	87-61-6	
Naphthalene	Not detected	5		ug/L	1	91-20-3	
2-Methylnaphthalene	Not detected	5		ug/L	1	91-57-6	

Lab Sample ID: S55623.42
Sample Tag: EB-02
Collected Date/Time: 11/08/2023 16:40
Matrix: Water
COC Reference: 168368

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	1L Amber	None	Yes	5.1	IR
3	40mL Glass	HCL	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	11/14/23 16:02	ACK	
Extraction, PCB*	Completed	E608.3	11/10/23 14:00	JWR	

Organics - PCBs/Pesticides

PCB, Method: E608.3, Run Date: 11/17/23 14:23, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	0.1		ug/L	1	12674-11-2	
PCB-1221	Not detected	0.1		ug/L	1	11104-28-2	
PCB-1232	Not detected	0.1		ug/L	1	11141-16-5	
PCB-1242	Not detected	0.1		ug/L	1	53469-21-9	
PCB-1248	Not detected	0.1		ug/L	1	12672-29-6	
PCB-1254	Not detected	0.1		ug/L	1	11097-69-1	
PCB-1260	Not detected	0.1		ug/L	1	11096-82-5	
PCB, Total*	Not detected	0.1		ug/L	1	1336-36-3	

Organics - Volatiles

Volatile Organics - DEQ List, Method: SW5030C/8260C, Run Date: 11/13/23 15:46, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Diethyl ether	Not detected	10		ug/L	1	60-29-7	
Acetone	Not detected	50		ug/L	1	67-64-1	
Methyl iodide	Not detected	1		ug/L	1	74-88-4	
Carbon disulfide	Not detected	5		ug/L	1	75-15-0	
tert-Methyl butyl ether (MTBE)	Not detected	5		ug/L	1	1634-04-4	
Acrylonitrile	Not detected	2		ug/L	1	107-13-1	
2-Butanone (MEK)	Not detected	25		ug/L	1	78-93-3	
Dichlorodifluoromethane	Not detected	5		ug/L	1	75-71-8	
Chloromethane	Not detected	5		ug/L	1	74-87-3	
Vinyl chloride	Not detected	1		ug/L	1	75-01-4	
Bromomethane	Not detected	5		ug/L	1	74-83-9	
Chloroethane	Not detected	5		ug/L	1	75-00-3	
Trichlorofluoromethane	Not detected	1		ug/L	1	75-69-4	
1,1-Dichloroethene	Not detected	1		ug/L	1	75-35-4	
Methylene chloride	Not detected	5		ug/L	1	75-09-2	
trans-1,2-Dichloroethene	Not detected	1		ug/L	1	156-60-5	
1,1-Dichloroethane	Not detected	1		ug/L	1	75-34-3	
cis-1,2-Dichloroethene	Not detected	1		ug/L	1	156-59-2	
Tetrahydrofuran*	Not detected	90		ug/L	1	109-99-9	
Chloroform	Not detected	1		ug/L	1	67-66-3	
Bromochloromethane	Not detected	1		ug/L	1	74-97-5	
1,1,1-Trichloroethane	Not detected	1		ug/L	1	71-55-6	
4-Methyl-2-pentanone (MIBK)	Not detected	50		ug/L	1	108-10-1	

Lab Sample ID: S55623.42 (continued)
Sample Tag: EB-02

Volatile Organics - DEQ List, Method: SW5030C/8260C, Run Date: 11/13/23 15:46, Analyst: NDK (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
2-Hexanone	Not detected	50		ug/L	1	591-78-6	
Carbon tetrachloride	Not detected	1		ug/L	1	56-23-5	
Benzene	Not detected	1		ug/L	1	71-43-2	
1,2-Dichloroethane	Not detected	1		ug/L	1	107-06-2	
Trichloroethene	Not detected	1		ug/L	1	79-01-6	
1,2-Dichloropropane	Not detected	1		ug/L	1	78-87-5	
Bromodichloromethane	Not detected	1		ug/L	1	75-27-4	
Dibromomethane	Not detected	5		ug/L	1	74-95-3	
cis-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-01-5	
Toluene	Not detected	1		ug/L	1	108-88-3	
trans-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-02-6	
1,1,2-Trichloroethane	Not detected	1		ug/L	1	79-00-5	
Tetrachloroethene	Not detected	1		ug/L	1	127-18-4	
trans-1,4-Dichloro-2-butene	Not detected	1		ug/L	1	110-57-6	
Dibromochloromethane	Not detected	5		ug/L	1	124-48-1	
1,2-Dibromoethane	Not detected	1		ug/L	1	106-93-4	
Chlorobenzene	Not detected	1		ug/L	1	108-90-7	
1,1,1,2-Tetrachloroethane	Not detected	1		ug/L	1	630-20-6	
Ethylbenzene	Not detected	1		ug/L	1	100-41-4	
p,m-Xylene*	Not detected	2		ug/L	1		
o-Xylene	Not detected	1		ug/L	1	95-47-6	
Styrene	Not detected	1		ug/L	1	100-42-5	
Isopropylbenzene	Not detected	5		ug/L	1	98-82-8	
Bromoform	Not detected	1		ug/L	1	75-25-2	
1,1,2,2-Tetrachloroethane	Not detected	1		ug/L	1	79-34-5	
1,2,3-Trichloropropane	Not detected	1		ug/L	1	96-18-4	
n-Propylbenzene	Not detected	1		ug/L	1	103-65-1	
Bromobenzene	Not detected	1		ug/L	1	108-86-1	
1,3,5-Trimethylbenzene	Not detected	1		ug/L	1	108-67-8	
tert-Butylbenzene	Not detected	1		ug/L	1	98-06-6	
1,2,4-Trimethylbenzene	Not detected	1		ug/L	1	95-63-6	
sec-Butylbenzene	Not detected	1		ug/L	1	135-98-8	
p-Isopropyltoluene	Not detected	5		ug/L	1	99-87-6	
1,3-Dichlorobenzene	Not detected	1		ug/L	1	541-73-1	
1,4-Dichlorobenzene	Not detected	1		ug/L	1	106-46-7	
1,2-Dichlorobenzene	Not detected	1		ug/L	1	95-50-1	
1,2,3-Trimethylbenzene	Not detected	1		ug/L	1	526-73-8	
n-Butylbenzene	Not detected	1		ug/L	1	104-51-8	
Hexachloroethane	Not detected	5		ug/L	1	67-72-1	
1,2-Dibromo-3-chloropropane	Not detected	5		ug/L	1	96-12-8	
1,2,4-Trichlorobenzene	Not detected	5		ug/L	1	120-82-1	
1,2,3-Trichlorobenzene	Not detected	5		ug/L	1	87-61-6	
Naphthalene	Not detected	5		ug/L	1	91-20-3	
2-Methylnaphthalene	Not detected	5		ug/L	1	91-57-6	

Analytical Laboratory Report

Lab Sample ID: S55623.43
Sample Tag: EB-03
Collected Date/Time: 11/09/2023 14:00
Matrix: Water
COC Reference: 168368

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	1L Amber	None	Yes	5.1	IR
3	40mL Glass	HCL	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
pH check for VOCs*	<2	N/A	11/14/23 16:02	ACK	
BNA Extraction	Completed	SW3510C	11/15/23 11:00	JWR	

Organics - Semi-Volatiles

Semi-Volatile Organics - MDEQ, Method: SW8270D, Run Date: 11/17/23 23:34, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	5		ug/L	2	83-32-9	
Acenaphthylene	Not detected	5		ug/L	2	208-96-8	
Anthracene	Not detected	5		ug/L	2	120-12-7	
Benzo(a)anthracene	Not detected	1		ug/L	2	56-55-3	
Benzo(b)fluoranthene	Not detected	1		ug/L	2	205-99-2	
Benzo(k)fluoranthene	Not detected	1		ug/L	2	207-08-9	
Benzo(ghi)perylene	Not detected	1		ug/L	2	191-24-2	
Benzo(a)pyrene	Not detected	1		ug/L	2	50-32-8	
bis(2-Chloroethoxy)methane	Not detected	5		ug/L	2	111-91-1	
bis(2-Chloroethyl)ether	Not detected	5		ug/L	2	111-44-4	
bis(2-Chloroisopropyl)ether*	Not detected	5		ug/L	2	108-60-1	
bis(2-Ethylhexyl)phthalate	Not detected	5		ug/L	2	117-81-7	
4-Bromophenyl phenyl ether	Not detected	5		ug/L	2	101-55-3	
Butyl benzyl phthalate	Not detected	5		ug/L	2	85-68-7	
4-Chloroaniline	Not detected	10		ug/L	2	106-47-8	
2-Chloronaphthalene	Not detected	5		ug/L	2	91-58-7	
4-Chloro-3-methylphenol	Not detected	5		ug/L	2	59-50-7	
2-Chlorophenol	Not detected	10		ug/L	2	95-57-8	
4-Chlorophenyl phenyl ether	Not detected	5		ug/L	2	7005-72-3	
Chrysene	Not detected	1		ug/L	2	218-01-9	
3-, 4-Methylphenol (p,m-Cresol)	Not detected	20		ug/L	2	3/4-CRESOL	
2-Methylphenol (o-Cresol)	Not detected	10		ug/L	2	95-48-7	
Dibenzo(ah)anthracene	Not detected	2		ug/L	2	53-70-3	
Dibenzofuran	Not detected	4		ug/L	2	132-64-9	
di-n-Butyl phthalate	Not detected	5		ug/L	2	84-74-2	
1,2-Dichlorobenzene	Not detected	1		ug/L	2	95-50-1	
1,3-Dichlorobenzene	Not detected	1		ug/L	2	541-73-1	
1,4-Dichlorobenzene	Not detected	1		ug/L	2	106-46-7	
3,3'-Dichlorobenzidine	Not detected	5		ug/L	2	91-94-1	
2,4-Dichlorophenol	Not detected	10		ug/L	2	120-83-2	
Diethyl phthalate	Not detected	5		ug/L	2	84-66-2	
2,4-Dimethylphenol	Not detected	5		ug/L	2	105-67-9	
Dimethyl phthalate	Not detected	5		ug/L	2	131-11-3	
4,6-Dinitro-2-methylphenol	Not detected	20		ug/L	2	534-52-1	
2,4-Dinitrophenol	Not detected	25		ug/L	2	51-28-5	

Lab Sample ID: S55623.43 (continued)
Sample Tag: EB-03

Semi-Volatile Organics - MDEQ, Method: SW8270D, Run Date: 11/17/23 23:34, Analyst: PL (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
2,4-Dinitrotoluene	Not detected	5		ug/L	2	121-14-2	
2,6-Dinitrotoluene	Not detected	5		ug/L	2	606-20-2	
1,2-Diphenylhydrazine*	Not detected	5		ug/L	2	122-66-7	
di-n-Octyl phthalate	Not detected	5		ug/L	2	117-84-0	
Fluoranthene	Not detected	1		ug/L	2	206-44-0	
Fluorene	Not detected	5		ug/L	2	86-73-7	
Hexachlorobenzene	Not detected	5		ug/L	2	118-74-1	
Hexachlorobutadiene	Not detected	10		ug/L	2	87-68-3	
Hexachlorocyclopentadiene*	Not detected	5		ug/L	2	77-47-4	
Hexachloroethane	Not detected	5		ug/L	2	67-72-1	
Indeno(1,2,3-cd)pyrene	Not detected	2		ug/L	2	193-39-5	
Isophorone	Not detected	5		ug/L	2	78-59-1	
2-Methylnaphthalene	Not detected	5		ug/L	2	91-57-6	
Naphthalene	Not detected	5		ug/L	2	91-20-3	
2-Nitroaniline	Not detected	25		ug/L	2	88-74-4	
3-Nitroaniline	Not detected	25		ug/L	2	99-09-2	
4-Nitroaniline	Not detected	25		ug/L	2	100-01-6	
Nitrobenzene	Not detected	5		ug/L	2	98-95-3	
2-Nitrophenol	Not detected	5		ug/L	2	88-75-5	
4-Nitrophenol	Not detected	25		ug/L	2	100-02-7	
N-Nitrosodiphenylamine	Not detected	5		ug/L	2	86-30-6	
N-Nitrosodi-n-propylamine	Not detected	5		ug/L	2	621-64-7	
Pentachlorophenol	Not detected	5		ug/L	2	87-86-5	
Phenanthrene	Not detected	2		ug/L	2	85-01-8	
Phenol	Not detected	5		ug/L	2	108-95-2	
Pyrene	Not detected	5		ug/L	2	129-00-0	
1,2,4-Trichlorobenzene	Not detected	5		ug/L	2	120-82-1	
2,4,5-Trichlorophenol	Not detected	5		ug/L	2	95-95-4	
2,4,6-Trichlorophenol	Not detected	4		ug/L	2	88-06-2	

Organics - Volatiles

Volatile Organics - DEQ List, Method: SW5030C/8260C, Run Date: 11/13/23 16:10, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Diethyl ether	Not detected	10		ug/L	1	60-29-7	
Acetone	Not detected	50		ug/L	1	67-64-1	
Methyl iodide	Not detected	1		ug/L	1	74-88-4	
Carbon disulfide	Not detected	5		ug/L	1	75-15-0	
tert-Methyl butyl ether (MTBE)	Not detected	5		ug/L	1	1634-04-4	
Acrylonitrile	Not detected	2		ug/L	1	107-13-1	
2-Butanone (MEK)	Not detected	25		ug/L	1	78-93-3	
Dichlorodifluoromethane	Not detected	5		ug/L	1	75-71-8	
Chloromethane	Not detected	5		ug/L	1	74-87-3	
Vinyl chloride	Not detected	1		ug/L	1	75-01-4	
Bromomethane	Not detected	5		ug/L	1	74-83-9	
Chloroethane	Not detected	5		ug/L	1	75-00-3	
Trichlorofluoromethane	Not detected	1		ug/L	1	75-69-4	
1,1-Dichloroethene	Not detected	1		ug/L	1	75-35-4	
Methylene chloride	Not detected	5		ug/L	1	75-09-2	
trans-1,2-Dichloroethene	Not detected	1		ug/L	1	156-60-5	
1,1-Dichloroethane	Not detected	1		ug/L	1	75-34-3	

Lab Sample ID: S55623.43 (continued)
Sample Tag: EB-03

Volatile Organics - DEQ List, Method: SW5030C/8260C, Run Date: 11/13/23 16:10, Analyst: NDK (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
cis-1,2-Dichloroethene	Not detected	1		ug/L	1	156-59-2	
Tetrahydrofuran*	Not detected	90		ug/L	1	109-99-9	
Chloroform	Not detected	1		ug/L	1	67-66-3	
Bromochloromethane	Not detected	1		ug/L	1	74-97-5	
1,1,1-Trichloroethane	Not detected	1		ug/L	1	71-55-6	
4-Methyl-2-pentanone (MIBK)	Not detected	50		ug/L	1	108-10-1	
2-Hexanone	Not detected	50		ug/L	1	591-78-6	
Carbon tetrachloride	Not detected	1		ug/L	1	56-23-5	
Benzene	Not detected	1		ug/L	1	71-43-2	
1,2-Dichloroethane	Not detected	1		ug/L	1	107-06-2	
Trichloroethene	Not detected	1		ug/L	1	79-01-6	
1,2-Dichloropropane	Not detected	1		ug/L	1	78-87-5	
Bromodichloromethane	Not detected	1		ug/L	1	75-27-4	
Dibromomethane	Not detected	5		ug/L	1	74-95-3	
cis-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-01-5	
Toluene	Not detected	1		ug/L	1	108-88-3	
trans-1,3-Dichloropropene	Not detected	1		ug/L	1	10061-02-6	
1,1,2-Trichloroethane	Not detected	1		ug/L	1	79-00-5	
Tetrachloroethene	Not detected	1		ug/L	1	127-18-4	
trans-1,4-Dichloro-2-butene	Not detected	1		ug/L	1	110-57-6	
Dibromochloromethane	Not detected	5		ug/L	1	124-48-1	
1,2-Dibromoethane	Not detected	1		ug/L	1	106-93-4	
Chlorobenzene	Not detected	1		ug/L	1	108-90-7	
1,1,1,2-Tetrachloroethane	Not detected	1		ug/L	1	630-20-6	
Ethylbenzene	Not detected	1		ug/L	1	100-41-4	
p,m-Xylene*	Not detected	2		ug/L	1		
o-Xylene	Not detected	1		ug/L	1	95-47-6	
Styrene	Not detected	1		ug/L	1	100-42-5	
Isopropylbenzene	Not detected	5		ug/L	1	98-82-8	
Bromoform	Not detected	1		ug/L	1	75-25-2	
1,1,2,2-Tetrachloroethane	Not detected	1		ug/L	1	79-34-5	
1,2,3-Trichloropropane	Not detected	1		ug/L	1	96-18-4	
n-Propylbenzene	Not detected	1		ug/L	1	103-65-1	
Bromobenzene	Not detected	1		ug/L	1	108-86-1	
1,3,5-Trimethylbenzene	Not detected	1		ug/L	1	108-67-8	
tert-Butylbenzene	Not detected	1		ug/L	1	98-06-6	
1,2,4-Trimethylbenzene	Not detected	1		ug/L	1	95-63-6	
sec-Butylbenzene	Not detected	1		ug/L	1	135-98-8	
p-Isopropyltoluene	Not detected	5		ug/L	1	99-87-6	
1,3-Dichlorobenzene	Not detected	1		ug/L	1	541-73-1	
1,4-Dichlorobenzene	Not detected	1		ug/L	1	106-46-7	
1,2-Dichlorobenzene	Not detected	1		ug/L	1	95-50-1	
1,2,3-Trimethylbenzene	Not detected	1		ug/L	1	526-73-8	
n-Butylbenzene	Not detected	1		ug/L	1	104-51-8	
Hexachloroethane	Not detected	5		ug/L	1	67-72-1	
1,2-Dibromo-3-chloropropane	Not detected	5		ug/L	1	96-12-8	
1,2,4-Trichlorobenzene	Not detected	5		ug/L	1	120-82-1	
1,2,3-Trichlorobenzene	Not detected	5		ug/L	1	87-61-6	
Naphthalene	Not detected	5		ug/L	1	91-20-3	
2-Methylnaphthalene	Not detected	5		ug/L	1	91-57-6	

Analytical Laboratory Report

Lab Sample ID: S55623.44

Sample Tag: MWM30-01RE(0-1)_11092023
Collected Date/Time: 11/09/2023 08:45
Matrix: Soil
COC Reference: 168368

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	89	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 20:33, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.45
Sample Tag: MWM30-01RE(2-3)_11092023
Collected Date/Time: 11/09/2023 08:50
Matrix: Soil
COC Reference: 168368

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	92	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/27/23 15:07, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	1,000		ug/kg	200	12674-11-2	Y
PCB-1242	Not detected	1,000		ug/kg	200	53469-21-9	Y
PCB-1221	Not detected	1,000		ug/kg	200	11104-28-2	Y
PCB-1232	Not detected	1,000		ug/kg	200	11141-16-5	Y
PCB-1248	9,000	1,000		ug/kg	200	12672-29-6	Y
PCB-1254	Not detected	1,000		ug/kg	200	11097-69-1	Y
PCB-1260	Not detected	1,000		ug/kg	200	11096-82-5	Y

Y-Elevated reporting limit due to high target concentration

Analytical Laboratory Report

Lab Sample ID: S55623.46

Sample Tag: MWM30-01RE(4-5)_11092023
Collected Date/Time: 11/09/2023 08:55
Matrix: Soil
COC Reference: 168368

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	85	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 14:23, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	1	12674-11-2	
PCB-1242	Not detected	330		ug/kg	1	53469-21-9	
PCB-1221	Not detected	330		ug/kg	1	11104-28-2	
PCB-1232	Not detected	330		ug/kg	1	11141-16-5	
PCB-1248	Not detected	330		ug/kg	1	12672-29-6	
PCB-1254	Not detected	330		ug/kg	1	11097-69-1	
PCB-1260	Not detected	330		ug/kg	1	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.47

Sample Tag: MWM30-01RE(4-5)_11092023 MS
Collected Date/Time: 11/09/2023 08:55
Matrix: Soil
COC Reference: 168368

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	86	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 14:35, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	30	330		ug/kg	1	12674-11-2	
PCB-1242	Not detected	330		ug/kg	1	53469-21-9	
PCB-1221	Not detected	330		ug/kg	1	11104-28-2	
PCB-1232	Not detected	330		ug/kg	1	11141-16-5	
PCB-1248	Not detected	330		ug/kg	1	12672-29-6	
PCB-1254	Not detected	330		ug/kg	1	11097-69-1	
PCB-1260	30	330		ug/kg	1	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.48
Sample Tag: MWM30-01RE(4-5)_11092023 MSD
Collected Date/Time: 11/09/2023 08:55
Matrix: Soil
COC Reference: 168368

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	86	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 14:57, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	30	330		ug/kg	1	12674-11-2	
PCB-1242	Not detected	330		ug/kg	1	53469-21-9	
PCB-1221	Not detected	330		ug/kg	1	11104-28-2	
PCB-1232	Not detected	330		ug/kg	1	11141-16-5	
PCB-1248	Not detected	330		ug/kg	1	12672-29-6	
PCB-1254	Not detected	330		ug/kg	1	11097-69-1	
PCB-1260	30	330		ug/kg	1	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.49
Sample Tag: Trip Blank
Collected Date/Time: 11/09/2023 00:01
Matrix: Methanol
COC Reference: 168368

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
4	40mL Glass	MeOH	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Sample wt. (g) / Methanol (ml)*	10.0/10	SW5035A	11/13/23 12:23	ACK	

Organics - Volatiles

Volatile Organics 5035, Method: SW5035A/8260C, Run Date: 11/17/23 19:06, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Diethyl ether	Not detected	200		ug/kg	50	60-29-7	
Acetone	Not detected	1,000		ug/kg	50	67-64-1	
Methyl iodide	Not detected	100		ug/kg	50	74-88-4	
Carbon disulfide	Not detected	300		ug/kg	50	75-15-0	
tert-Methyl butyl ether (MTBE)	Not detected	200		ug/kg	50	1634-04-4	
Acrylonitrile	Not detected	100		ug/kg	50	107-13-1	
2-Butanone (MEK)	Not detected	750		ug/kg	50	78-93-3	
Dichlorodifluoromethane	Not detected	300		ug/kg	50	75-71-8	
Chloromethane	Not detected	300		ug/kg	50	74-87-3	
Vinyl chloride	Not detected	50		ug/kg	50	75-01-4	
Bromomethane	Not detected	200		ug/kg	50	74-83-9	
Chloroethane	Not detected	300		ug/kg	50	75-00-3	
Trichlorofluoromethane	Not detected	100		ug/kg	50	75-69-4	
1,1-Dichloroethene	Not detected	50		ug/kg	50	75-35-4	
Methylene chloride	Not detected	100		ug/kg	50	75-09-2	
trans-1,2-Dichloroethene	Not detected	50		ug/kg	50	156-60-5	
1,1-Dichloroethane	Not detected	50		ug/kg	50	75-34-3	
cis-1,2-Dichloroethene	Not detected	50		ug/kg	50	156-59-2	
Tetrahydrofuran*	Not detected	1,000		ug/kg	50	109-99-9	
Chloroform	Not detected	50		ug/kg	50	67-66-3	
Bromochloromethane	Not detected	100		ug/kg	50	74-97-5	
1,1,1-Trichloroethane	Not detected	50		ug/kg	50	71-55-6	
4-Methyl-2-pentanone (MIBK)	Not detected	3,000		ug/kg	50	108-10-1	
2-Hexanone	Not detected	3,000		ug/kg	50	591-78-6	
Carbon tetrachloride	Not detected	50		ug/kg	50	56-23-5	
Benzene	Not detected	50		ug/kg	50	71-43-2	
1,2-Dichloroethane	Not detected	50		ug/kg	50	107-06-2	
Trichloroethene	Not detected	50		ug/kg	50	79-01-6	
1,2-Dichloropropane	Not detected	50		ug/kg	50	78-87-5	
Bromodichloromethane	Not detected	100		ug/kg	50	75-27-4	
Dibromomethane	Not detected	300		ug/kg	50	74-95-3	
cis-1,3-Dichloropropene	Not detected	50		ug/kg	50	10061-01-5	
Toluene	Not detected	50		ug/kg	50	108-88-3	
trans-1,3-Dichloropropene	Not detected	50		ug/kg	50	10061-02-6	
1,1,2-Trichloroethane	Not detected	50		ug/kg	50	79-00-5	
Tetrachloroethene	Not detected	50		ug/kg	50	127-18-4	
trans-1,4-Dichloro-2-butene	Not detected	50		ug/kg	50	110-57-6	

Lab Sample ID: S55623.49 (continued)
Sample Tag: Trip Blank

Volatile Organics 5035, Method: SW5035A/8260C, Run Date: 11/17/23 19:06, Analyst: NDK (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Dibromochloromethane	Not detected	100		ug/kg	50	124-48-1	
1,2-Dibromoethane	Not detected	20		ug/kg	50	106-93-4	M
Chlorobenzene	Not detected	50		ug/kg	50	108-90-7	
1,1,1,2-Tetrachloroethane	Not detected	100		ug/kg	50	630-20-6	
Ethylbenzene	Not detected	50		ug/kg	50	100-41-4	
p,m-Xylene	Not detected	100		ug/kg	50		
o-Xylene	Not detected	50		ug/kg	50	95-47-6	
Styrene	Not detected	50		ug/kg	50	100-42-5	
Isopropylbenzene	Not detected	300		ug/kg	50	98-82-8	
Bromoform	Not detected	100		ug/kg	50	75-25-2	
1,1,2,2-Tetrachloroethane	Not detected	50		ug/kg	50	79-34-5	
1,2,3-Trichloropropane	Not detected	100		ug/kg	50	96-18-4	
n-Propylbenzene	Not detected	50		ug/kg	50	103-65-1	
Bromobenzene	Not detected	100		ug/kg	50	108-86-1	
1,3,5-Trimethylbenzene	Not detected	50		ug/kg	50	108-67-8	
tert-Butylbenzene	Not detected	50		ug/kg	50	98-06-6	
1,2,4-Trimethylbenzene	Not detected	50		ug/kg	50	95-63-6	
sec-Butylbenzene	Not detected	50		ug/kg	50	135-98-8	
p-Isopropyltoluene	Not detected	100		ug/kg	50	99-87-6	
1,3-Dichlorobenzene	Not detected	100		ug/kg	50	541-73-1	
1,4-Dichlorobenzene	Not detected	100		ug/kg	50	106-46-7	
1,2-Dichlorobenzene	Not detected	100		ug/kg	50	95-50-1	
1,2,3-Trimethylbenzene	Not detected	50		ug/kg	50	526-73-8	
n-Butylbenzene	Not detected	50		ug/kg	50	104-51-8	
Hexachloroethane	Not detected	300		ug/kg	50	67-72-1	
1,2-Dibromo-3-chloropropane	Not detected	300		ug/kg	50	96-12-8	
1,2,4-Trichlorobenzene	Not detected	330		ug/kg	50	120-82-1	
1,2,3-Trichlorobenzene	Not detected	330		ug/kg	50	87-61-6	
Naphthalene	Not detected	300		ug/kg	50	91-20-3	
2-Methylnaphthalene	Not detected	100		ug/kg	50	91-57-6	

M-Result reported to MDL not RDL

Analytical Laboratory Report

Lab Sample ID: S55623.50
Sample Tag: DUP-01
Collected Date/Time: 11/09/2023 00:01
Matrix: Soil
COC Reference: 168368

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 14:51, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	88	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 15:33, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.51
Sample Tag: DUP-02
Collected Date/Time: 11/07/2023 00:01
Matrix: Soil
COC Reference: 168368

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	11/16/23 09:05	JRH	

Inorganics

Method: SM2540B, Run Date: 11/13/23 15:03, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	92	1		%	1		

Metals

Method: SW6020A, Run Date: 11/16/23 12:05, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	6.50	0.20		mg/kg	260	7440-38-2	

Analytical Laboratory Report

Lab Sample ID: S55623.52
Sample Tag: DUP-03
Collected Date/Time: 11/08/2023 00:01
Matrix: Soil
COC Reference: 168368

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 15:03, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	84	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 20:57, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.53
Sample Tag: DUP-04
Collected Date/Time: 11/08/2023 00:01
Matrix: Soil
COC Reference: 168368

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR
1	40mL Glass	MeOH	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Sample wt. (g) / Methanol (ml)*	9.571/10	SW5035A	11/13/23 12:23	ACK	

Inorganics

Method: SM2540B, Run Date: 11/13/23 15:03, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	80	1		%	1		

Organics - Volatiles

Method: SW5035A/8260C, Run Date: 11/17/23 20:41, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Tetrachloroethene	Not detected	80		ug/kg	77.8	127-18-4	

Analytical Laboratory Report

Lab Sample ID: S55623.54
Sample Tag: DUP-05
Collected Date/Time: 11/08/2023 00:01
Matrix: Soil
COC Reference: 168368

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR
1	40mL Glass	MeOH	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Sample wt. (g) / Methanol (ml)*	13.317/13	SW5035A	11/13/23 12:23	ACK	

Inorganics

Method: SM2540B, Run Date: 11/13/23 15:03, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	88	1		%	1		

Organics - Volatiles

Method: SW5035A/8260C, Run Date: 11/17/23 21:04, Analyst: NDK

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Trichloroethene	Not detected	60		ug/kg	62.3	79-01-6	

Analytical Laboratory Report

Lab Sample ID: S55623.55

Sample Tag: BM30-01RE(4-5)_11092023
Collected Date/Time: 11/09/2023 09:35
Matrix: Soil
COC Reference: 168369

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 15:03, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	86	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 15:44, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.56
Sample Tag: BM30-01RE(2-3)_11092023
Collected Date/Time: 11/09/2023 09:30
Matrix: Soil
COC Reference: 168369

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 15:03, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	86	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/22/23 15:55, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Analytical Laboratory Report

Lab Sample ID: S55623.57

Sample Tag: BM30-01RE(0-1)_11092023
Collected Date/Time: 11/09/2023 09:25
Matrix: Soil
COC Reference: 168369

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	4oz Glass	None	Yes	5.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Extraction, PCB*	Completed	SW3546	11/20/23 15:30	JWR	

Inorganics

Method: SM2540B, Run Date: 11/13/23 15:03, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	97	1		%	1		

Organics - PCBs/Pesticides

PCB List, Method: SW8082A, Run Date: 11/30/23 12:13, Analyst: JANB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PCB-1016	Not detected	330		ug/kg	5	12674-11-2	
PCB-1242	Not detected	330		ug/kg	5	53469-21-9	
PCB-1221	Not detected	330		ug/kg	5	11104-28-2	
PCB-1232	Not detected	330		ug/kg	5	11141-16-5	
PCB-1248	Not detected	330		ug/kg	5	12672-29-6	
PCB-1254	Not detected	330		ug/kg	5	11097-69-1	
PCB-1260	Not detected	330		ug/kg	5	11096-82-5	

Quality Control Report

Report ID: S55623.01(01)+QC01
Generated on 12/01/2023

Report to
Attention: Tiffany Linder
Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-994-2272 FAX:

Report Produced by
Merit Laboratories
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Report Summary
Lab Sample ID(s): S55623.01-S55623.57
Project: Racer PNC
Submitted Date/Time: 11/10/2023 11:15
Sampled by: Jonathan Lust
P.O. #: 30167840

QC Report Sections

Report Flag Descriptions
*: QC result is outside of indicated control limits
W: Surrogate result not applicable due to sample dilution

I certify that this data package is in compliance with the terms and conditions of the program, and project, and contractual requirements both technically and for completeness. Release of the data contained in this hardcopy data package and its computer-readable data submitted has been authorized by the Quality Assurance Manager and his/her designee, as verified by the following signature.

Barbara Ball

Barbara Ball
Quality Assurance Manager

QC Report - Analysis Summary

Lab Sample ID: S55623.01
Sample Tag: BW5-06RE(0-1)_11082023
Collected Date/Time: 11/08/2023 10:10
Matrix: Soil
COC Reference: 168371

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 13:55	TS231113B	TS231113B	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/20/23 20:00	E231120	PA231117S3	Yes	BLK/LCS/LCSD

QC Report - Analysis Summary

Lab Sample ID: S55623.02

Sample Tag: BW5-06RE(5-6)_11082023
Collected Date/Time: 11/08/2023 10:20
Matrix: Soil
COC Reference: 168371

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 13:55	TS231113B	TS231113B	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/20/23 20:12	E231120	PA231117S3	Yes	BLK/LCS/LCSD

QC Report - Analysis Summary

Lab Sample ID: S55623.03

Sample Tag: BW5-06RE(11-12)_11082023
Collected Date/Time: 11/08/2023 10:25
Matrix: Soil
COC Reference: 168371

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 13:55	TS231113B	TS231113B	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/21/23 13:33	E231121	PA231117S3	Yes	BLK/LCS/LCSD

QC Report - Analysis Summary

Lab Sample ID: S55623.04

Sample Tag: BW5-06RE(14-15)_11082023
Collected Date/Time: 11/08/2023 10:25
Matrix: Soil
COC Reference: 168371

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 13:55	TS231113B	TS231113B	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/20/23 20:24	E231120	PA231117S3	Yes	BLK/LCS/LCSD

QC Report - Analysis Summary

Lab Sample ID: S55623.05

Sample Tag: MWDP-01RE(0-1)_11082023

Collected Date/Time: 11/08/2023 13:20

Matrix: Soil

COC Reference: 168371

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 13:55	TS231113B	TS231113B	No	BLK/LCS/DUP
Organics - Volatiles						
Trichloroethene	SW5035A/8260C	11/14/23 18:48	231114A5	VF231114S1	Yes	BLK/LCS/LCSD

QC Report - Analysis Summary

Lab Sample ID: S55623.06
Sample Tag: MWDP-01RE(2-3)_11082023
Collected Date/Time: 11/08/2023 13:30
Matrix: Soil
COC Reference: 168371

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 13:55	TS231113B	TS231113B	No	BLK/LCS/DUP
Organics - Volatiles						
Trichloroethene	SW5035A/8260C	11/14/23 19:12	231114A5	VF231114S1	Yes	BLK/LCS/LCSD

QC Report - Analysis Summary

Lab Sample ID: S55623.07

Sample Tag: MWDP-01RE(4-5)_11082023
Collected Date/Time: 11/08/2023 13:40
Matrix: Soil
COC Reference: 168371

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Organics - Volatiles						
Trichloroethene	SW5035A/8260C	11/14/23 19:36	231114A5	VF231114S1	Yes	BLK/LCS/LCSD

QC Report - Analysis Summary

Lab Sample ID: S55623.08

Sample Tag: MWW1-04RE(0-1)_11082023

Collected Date/Time: 11/08/2023 11:50

Matrix: Soil

COC Reference: 168371

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/21/23 13:47	E231121	PA231117S3	Yes	BLK/LCS/LCSD

QC Report - Analysis Summary

Lab Sample ID: S55623.09

Sample Tag: MWW1-04RE(2.5-3.5)_11082023

Collected Date/Time: 11/08/2023 11:50

Matrix: Soil

COC Reference: 168371

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/21/23 14:25	E231121	PA231117S3	Yes	BLK/LCS/LCSD

QC Report - Analysis Summary

Lab Sample ID: S55623.10

Sample Tag: MWW1-04RE(4.5-5.5)_11082023
Collected Date/Time: 11/08/2023 12:15
Matrix: Soil
COC Reference: 168371

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/20/23 21:13	E231120	PA231117S3	Yes	BLK/LCS/LCSD

QC Report - Analysis Summary

Lab Sample ID: S55623.11
Sample Tag: MWW1-04RE(5.5-6)_11082023
Collected Date/Time: 11/08/2023 12:50
Matrix: Soil
COC Reference: 168371

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/20/23 21:25	E231120	PA231117S3	Yes	BLK/LCS/LCSD

QC Report - Analysis Summary

Lab Sample ID: S55623.12

Sample Tag: MWF7-01RE(0-1)_11082023

Collected Date/Time: 11/08/2023 14:30

Matrix: Soil

COC Reference: 168371

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 11:29	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 18:58	E231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.13
Sample Tag: SM19-01RE(0-1)_11072023
Collected Date/Time: 11/07/2023 13:40
Matrix: Soil
COC Reference: 168372

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 11:30	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.14
Sample Tag: SM19-01RE(2-3)_11072023
Collected Date/Time: 11/07/2023 14:00
Matrix: Soil
COC Reference: 168372

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 11:44	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.15

Sample Tag: SM19-01RE(2-3)_11072023 MS

Collected Date/Time: 11/07/2023 14:00

Matrix: Soil

COC Reference: 168372

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 11:46	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.16
Sample Tag: SM19-01RE(2-3)_11072023 MSD
Collected Date/Time: 11/07/2023 14:00
Matrix: Soil
COC Reference: 168372

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 11:48	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.17

Sample Tag: SM19-01RE(4-5)_11072023
Collected Date/Time: 11/07/2023 14:00
Matrix: Soil
COC Reference: 168372

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 11:32	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.18
Sample Tag: SM19-03RE(0-1)_11072023
Collected Date/Time: 11/07/2023 15:00
Matrix: Soil
COC Reference: 168372

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 11:34	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.19
Sample Tag: SM19-03RE(2-3)_11072023
Collected Date/Time: 11/07/2023 15:35
Matrix: Soil
COC Reference: 168372

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 11:36	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.20
Sample Tag: SM19-03RE(4-5)_11072023
Collected Date/Time: 11/07/2023 15:35
Matrix: Soil
COC Reference: 168372

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 11:37	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.21

Sample Tag: SM19-02RE(0-1)_11072023

Collected Date/Time: 11/07/2023 15:00

Matrix: Soil

COC Reference: 168372

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 11:39	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.22

Sample Tag: SM19-02RE(2-3)_11072023

Collected Date/Time: 11/07/2023 15:00

Matrix: Soil

COC Reference: 168372

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 11:41	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.23

Sample Tag: SM19-02RE(4-5)_11072023

Collected Date/Time: 11/07/2023 15:00

Matrix: Soil

COC Reference: 168372

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 11:43	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.24

Sample Tag: SM19-06RE(0-1)_11082023
Collected Date/Time: 11/08/2023 08:50
Matrix: Soil
COC Reference: 168372

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 19:10	E231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.25

Sample Tag: SM19-06RE(2-3)_11082023

Collected Date/Time: 11/08/2023 09:00

Matrix: Soil

COC Reference: 168372

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 19:22	E231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.26

Sample Tag: SM19-06RE(4-5)_11082023
Collected Date/Time: 11/08/2023 09:00
Matrix: Soil
COC Reference: 168372

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113C	TS231113C	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 19:34	E231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.27
Sample Tag: MWF7-01RE(4-5)_11082023
Collected Date/Time: 11/08/2023 14:40
Matrix: Soil
COC Reference: 168370

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 11:59	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 19:46	E231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.28

Sample Tag: MWF7-01RE(8-9)_11082023
Collected Date/Time: 11/08/2023 14:45
Matrix: Soil
COC Reference: 168370

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 12:01	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 15:10	A231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.29

Sample Tag: MWF7-01RE(14-15)_11082023
Collected Date/Time: 11/08/2023 14:45
Matrix: Soil
COC Reference: 168370

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 12:03	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 15:22	A231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.30

Sample Tag: MWF12-01RE(0-1)_11082023

Collected Date/Time: 11/08/2023 15:10

Matrix: Soil

COC Reference: 168370

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - Volatiles						
Naphthalene	SW5035A/8260C	11/14/23 20:00	231114A5	VF231114S1	Yes	BLK/LCS/LCSD

QC Report - Analysis Summary

Lab Sample ID: S55623.31

Sample Tag: MWF12-01RE(2-3)_11082023
Collected Date/Time: 11/08/2023 15:15
Matrix: Soil
COC Reference: 168370

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - Volatiles						
Naphthalene	SW5035A/8260C	11/14/23 20:24	231114A5	VF231114S1	Yes	BLK/LCS/LCSD

QC Report - Analysis Summary

Lab Sample ID: S55623.32

Sample Tag: MWF12-01RE(4-5)_11082023

Collected Date/Time: 11/08/2023 15:20

Matrix: Soil

COC Reference: 168370

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - Volatiles						
Naphthalene	SW5035A/8260C	11/17/23 19:53	231117A5	VF231117S1	Yes	BLK/LCS/LCSD/MS/MS

QC Report - Analysis Summary

Lab Sample ID: S55623.33

Sample Tag: MWF12-01RE(4-5)_11082023 MS

Collected Date/Time: 11/08/2023 15:20

Matrix: Soil

COC Reference: 168370

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - Volatiles						
Naphthalene	SW5035A/8260C	11/17/23 23:50	231117A5	VF231117S1	Yes	BLK/LCS/LCSD/MS/MS

QC Report - Analysis Summary

Lab Sample ID: S55623.34

Sample Tag: MWF12-01RE(4-5)_11082023 MSD

Collected Date/Time: 11/08/2023 15:20

Matrix: Soil

COC Reference: 168370

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - Volatiles						
Naphthalene	SW5035A/8260C	11/18/23 00:14	231117A5	VF231117S1	Yes	BLK/LCS/LCSD/MS/MS

QC Report - Analysis Summary

Lab Sample ID: S55623.35

Sample Tag: BF17-21RE(0-1)_11082023
Collected Date/Time: 11/08/2023 16:00
Matrix: Soil
COC Reference: 168370

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - Volatiles						
Tetrachloroethene	SW5035A/8260C	11/14/23 20:48	231114A5	VF231114S1	Yes	BLK/LCS/LCSD

QC Report - Analysis Summary

Lab Sample ID: S55623.36

Sample Tag: BF17-21RE(2-3)_11082023

Collected Date/Time: 11/08/2023 16:05

Matrix: Soil

COC Reference: 168370

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - Volatiles						
Tetrachloroethene	SW5035A/8260C	11/15/23 01:33	231114B5	VF231114S3	Yes	BLK/LCS/LCSD

QC Report - Analysis Summary

Lab Sample ID: S55623.37

Sample Tag: BF17-21RE(4-5)_11082023

Collected Date/Time: 11/08/2023 16:10

Matrix: Soil

COC Reference: 168370

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - Volatiles						
Tetrachloroethene	SW5035A/8260C	11/17/23 20:17	231117A5	VF231117S1	Yes	BLK/LCS/LCSD/MS/MS

QC Report - Analysis Summary

Lab Sample ID: S55623.38

Sample Tag: BM30-03RE(1-1.5)_11092023

Collected Date/Time: 11/09/2023 13:20

Matrix: Soil

COC Reference: 168370

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 19:58	E231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.39

Sample Tag: BM30-03RE(2-3)_11092023

Collected Date/Time: 11/09/2023 13:25

Matrix: Soil

COC Reference: 168370

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 20:09	E231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.40

Sample Tag: BM30-03RE(4-5)_11092023
Collected Date/Time: 11/09/2023 13:30
Matrix: Soil
COC Reference: 168370

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 20:21	E231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.41

Sample Tag: EB-01

Collected Date/Time: 11/07/2023 15:45

Matrix: Water

COC Reference: 168368

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Organics - Semi-Volatiles						
Semi-Volatile Organics - MDEQ	SW8270D	11/16/23 21:42	U231116B	SF231114W1	Yes	BLK/LCS/LCSD
Organics - Volatiles						
Volatile Organics - DEQ List	SW5030C/8260C	11/13/23 15:23	231113A3	VF231113W2	Yes	BLK/LCS/LCSD/MS/MS

QC Report - Analysis Summary

Lab Sample ID: S55623.42

Sample Tag: EB-02
Collected Date/Time: 11/08/2023 16:40
Matrix: Water
COC Reference: 168368

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Organics - PCBs/Pesticides						
PCB	E608.3	11/17/23 14:23	A231117	PA231110W1	Yes	BLK/LCS/LCSD
Organics - Volatiles						
Volatile Organics - DEQ List	SW5030C/8260C	11/13/23 15:46	231113A3	VF231113W2	Yes	BLK/LCS/LCSD/MS/MS

QC Report - Analysis Summary

Lab Sample ID: S55623.43

Sample Tag: EB-03

Collected Date/Time: 11/09/2023 14:00

Matrix: Water

COC Reference: 168368

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Organics - Semi-Volatiles						
Semi-Volatile Organics - MDEQ	SW8270D	11/17/23 23:34	U231117C	SF231115W1	Yes	BLK/LCS/LCSD
Organics - Volatiles						
Volatile Organics - DEQ List	SW5030C/8260C	11/13/23 16:10	231113A3	VF231113W2	Yes	BLK/LCS/LCSD/MS/MS

QC Report - Analysis Summary

Lab Sample ID: S55623.44

Sample Tag: MWM30-01RE(0-1)_11092023

Collected Date/Time: 11/09/2023 08:45

Matrix: Soil

COC Reference: 168368

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 20:33	E231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.45

Sample Tag: MWM30-01RE(2-3)_11092023

Collected Date/Time: 11/09/2023 08:50

Matrix: Soil

COC Reference: 168368

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/27/23 15:07	E231127	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.46
Sample Tag: MWM30-01RE(4-5)_11092023
Collected Date/Time: 11/09/2023 08:55
Matrix: Soil
COC Reference: 168368

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 14:23	A231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.47
Sample Tag: MWM30-01RE(4-5)_11092023 MS
Collected Date/Time: 11/09/2023 08:55
Matrix: Soil
COC Reference: 168368

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 14:35	A231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.48

Sample Tag: MWM30-01RE(4-5)_11092023 MSD
Collected Date/Time: 11/09/2023 08:55
Matrix: Soil
COC Reference: 168368

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 14:57	A231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.49

Sample Tag: Trip Blank

Collected Date/Time: 11/09/2023 00:01

Matrix: Methanol

COC Reference: 168368

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Organics - Volatiles						
Volatile Organics 5035	SW5035A/8260C	11/17/23 19:06	231117A5	VF231117S1	Yes	BLK/LCS/LCSD/MS/MS

QC Report - Analysis Summary

Lab Sample ID: S55623.50

Sample Tag: DUP-01

Collected Date/Time: 11/09/2023 00:01

Matrix: Soil

COC Reference: 168368

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 14:51	TS231113D	TS231113D	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 15:33	A231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.51

Sample Tag: DUP-02

Collected Date/Time: 11/07/2023 00:01

Matrix: Soil

COC Reference: 168368

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 15:03	TS231113E	TS231113E	No	BLK/LCS/DUP
Metals						
Arsenic	SW6020A	11/16/23 12:05	MT5-23-1116A	MTD-111623-1	No	BLK/LCS/MS/MSD

Lab Sample ID: S55623.52

Sample Tag: DUP-03
Collected Date/Time: 11/08/2023 00:01
Matrix: Soil
COC Reference: 168368

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 15:03	TS231113E	TS231113E	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 20:57	E231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.53
Sample Tag: DUP-04
Collected Date/Time: 11/08/2023 00:01
Matrix: Soil
COC Reference: 168368

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 15:03	TS231113E	TS231113E	No	BLK/LCS/DUP
Organics - Volatiles						
Tetrachloroethene	SW5035A/8260C	11/17/23 20:41	231117A5	VF231117S1	Yes	BLK/LCS/LCSD/MS/MS

QC Report - Analysis Summary

Lab Sample ID: S55623.54

Sample Tag: DUP-05

Collected Date/Time: 11/08/2023 00:01

Matrix: Soil

COC Reference: 168368

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 15:03	TS231113E	TS231113E	No	BLK/LCS/DUP
Organics - Volatiles						
Trichloroethene	SW5035A/8260C	11/17/23 21:04	231117A5	VF231117S1	Yes	BLK/LCS/LCSD/MS/MS

QC Report - Analysis Summary

Lab Sample ID: S55623.55

Sample Tag: BM30-01RE(4-5)_11092023
Collected Date/Time: 11/09/2023 09:35
Matrix: Soil
COC Reference: 168369

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 15:03	TS231113E	TS231113E	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 15:44	A231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.56

Sample Tag: BM30-01RE(2-3)_11092023
Collected Date/Time: 11/09/2023 09:30
Matrix: Soil
COC Reference: 168369

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 15:03	TS231113E	TS231113E	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/22/23 15:55	A231122	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Analysis Summary

Lab Sample ID: S55623.57

Sample Tag: BM30-01RE(0-1)_11092023
Collected Date/Time: 11/09/2023 09:25
Matrix: Soil
COC Reference: 168369

Analysis	Method	Run Date/Time	Batch ID	Prep ID	Surr	QC Types
Inorganics						
Total Solids	SM2540B	11/13/23 15:03	TS231113E	TS231113E	No	BLK/LCS/DUP
Organics - PCBs/Pesticides						
PCB List	SW8082A	11/30/23 12:13	E231130	PA231120S2	Yes	BLK/LCS/MS/MSD

QC Report - Prep Batch Summary

Inorganics, Prep Batch ID: TS231113B

Surrogates: No, QC Types: BLK/LCS/DUP

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.01	Total Solids	SM2540B	11/13/23 13:55	TS231113B
S55623.02	Total Solids	SM2540B	11/13/23 13:55	TS231113B
S55623.03	Total Solids	SM2540B	11/13/23 13:55	TS231113B
S55623.04	Total Solids	SM2540B	11/13/23 13:55	TS231113B
S55623.05	Total Solids	SM2540B	11/13/23 13:55	TS231113B
S55623.06	Total Solids	SM2540B	11/13/23 13:55	TS231113B

Inorganics, Prep Batch ID: TS231113C

Surrogates: No, QC Types: BLK/LCS/DUP

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.07	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.08	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.09	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.10	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.11	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.12	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.13	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.14	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.15	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.16	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.17	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.18	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.19	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.20	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.21	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.22	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.23	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.24	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.25	Total Solids	SM2540B	11/13/23 14:51	TS231113C
S55623.26	Total Solids	SM2540B	11/13/23 14:51	TS231113C

Inorganics, Prep Batch ID: TS231113D

Surrogates: No, QC Types: BLK/LCS/DUP

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.27	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.28	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.29	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.30	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.31	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.32	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.33	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.34	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.35	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.36	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.37	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.38	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.39	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.40	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.44	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.45	Total Solids	SM2540B	11/13/23 14:51	TS231113D

Inorganics, Prep Batch ID: TS231113D (continued)

Surrogates: No, QC Types: BLK/LCS/DUP

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.46	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.47	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.48	Total Solids	SM2540B	11/13/23 14:51	TS231113D
S55623.50	Total Solids	SM2540B	11/13/23 14:51	TS231113D

Inorganics, Prep Batch ID: TS231113E

Surrogates: No, QC Types: BLK/LCS/DUP

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.51	Total Solids	SM2540B	11/13/23 15:03	TS231113E
S55623.52	Total Solids	SM2540B	11/13/23 15:03	TS231113E
S55623.53	Total Solids	SM2540B	11/13/23 15:03	TS231113E
S55623.54	Total Solids	SM2540B	11/13/23 15:03	TS231113E
S55623.55	Total Solids	SM2540B	11/13/23 15:03	TS231113E
S55623.56	Total Solids	SM2540B	11/13/23 15:03	TS231113E
S55623.57	Total Solids	SM2540B	11/13/23 15:03	TS231113E

Metals, Prep Batch ID: MTD-111623-1

Surrogates: No, QC Types: BLK/LCS/MS/MSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.12	Arsenic	SW6020A	11/16/23 11:29	MT5-23-1116A
S55623.13	Arsenic	SW6020A	11/16/23 11:30	MT5-23-1116A
S55623.14	Arsenic	SW6020A	11/16/23 11:44	MT5-23-1116A
S55623.15	Arsenic	SW6020A	11/16/23 11:46	MT5-23-1116A
S55623.16	Arsenic	SW6020A	11/16/23 11:48	MT5-23-1116A
S55623.17	Arsenic	SW6020A	11/16/23 11:32	MT5-23-1116A
S55623.18	Arsenic	SW6020A	11/16/23 11:34	MT5-23-1116A
S55623.19	Arsenic	SW6020A	11/16/23 11:36	MT5-23-1116A
S55623.20	Arsenic	SW6020A	11/16/23 11:37	MT5-23-1116A
S55623.21	Arsenic	SW6020A	11/16/23 11:39	MT5-23-1116A
S55623.22	Arsenic	SW6020A	11/16/23 11:41	MT5-23-1116A
S55623.23	Arsenic	SW6020A	11/16/23 11:43	MT5-23-1116A
S55623.27	Arsenic	SW6020A	11/16/23 11:59	MT5-23-1116A
S55623.28	Arsenic	SW6020A	11/16/23 12:01	MT5-23-1116A
S55623.29	Arsenic	SW6020A	11/16/23 12:03	MT5-23-1116A
S55623.51	Arsenic	SW6020A	11/16/23 12:05	MT5-23-1116A

Organics - PCBs/Pesticides, Prep Batch ID: PA231110W1

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.42	PCB	E608.3	11/17/23 14:23	A231117

Organics - PCBs/Pesticides, Prep Batch ID: PA231117S3

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.01	PCB List	SW8082A	11/20/23 20:00	E231120
S55623.02	PCB List	SW8082A	11/20/23 20:12	E231120
S55623.03	PCB List	SW8082A	11/21/23 13:33	E231121
S55623.04	PCB List	SW8082A	11/20/23 20:24	E231120
S55623.08	PCB List	SW8082A	11/21/23 13:47	E231121

Organics - PCBs/Pesticides, Prep Batch ID: PA231117S3 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.09	PCB List	SW8082A	11/21/23 14:25	E231121
S55623.10	PCB List	SW8082A	11/20/23 21:13	E231120
S55623.11	PCB List	SW8082A	11/20/23 21:25	E231120

Organics - PCBs/Pesticides, Prep Batch ID: PA231120S2

Surrogates: Yes, QC Types: BLK/LCS/MS/MSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.12	PCB List	SW8082A	11/22/23 18:58	E231122
S55623.24	PCB List	SW8082A	11/22/23 19:10	E231122
S55623.25	PCB List	SW8082A	11/22/23 19:22	E231122
S55623.26	PCB List	SW8082A	11/22/23 19:34	E231122
S55623.27	PCB List	SW8082A	11/22/23 19:46	E231122
S55623.28	PCB List	SW8082A	11/22/23 15:10	A231122
S55623.29	PCB List	SW8082A	11/22/23 15:22	A231122
S55623.38	PCB List	SW8082A	11/22/23 19:58	E231122
S55623.39	PCB List	SW8082A	11/22/23 20:09	E231122
S55623.40	PCB List	SW8082A	11/22/23 20:21	E231122
S55623.44	PCB List	SW8082A	11/22/23 20:33	E231122
S55623.45	PCB List	SW8082A	11/27/23 15:07	E231127
S55623.46	PCB List	SW8082A	11/22/23 14:23	A231122
S55623.47	PCB List	SW8082A	11/22/23 14:35	A231122
S55623.48	PCB List	SW8082A	11/22/23 14:57	A231122
S55623.50	PCB List	SW8082A	11/22/23 15:33	A231122
S55623.52	PCB List	SW8082A	11/22/23 20:57	E231122
S55623.55	PCB List	SW8082A	11/22/23 15:44	A231122
S55623.56	PCB List	SW8082A	11/22/23 15:55	A231122
S55623.57	PCB List	SW8082A	11/30/23 12:13	E231130

Organics - Semi-Volatiles, Prep Batch ID: SF231114W1

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.41	Semi-Volatile Organics - MDEQ	SW8270D	11/16/23 21:42	U231116B

Organics - Semi-Volatiles, Prep Batch ID: SF231115W1

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.43	Semi-Volatile Organics - MDEQ	SW8270D	11/17/23 23:34	U231117C

Organics - Volatiles, Prep Batch ID: VF231113W2

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.41	Volatile Organics - DEQ List	SW5030C/8260C	11/13/23 15:23	231113A3
S55623.42	Volatile Organics - DEQ List	SW5030C/8260C	11/13/23 15:46	231113A3
S55623.43	Volatile Organics - DEQ List	SW5030C/8260C	11/13/23 16:10	231113A3

Organics - Volatiles, Prep Batch ID: VF231114S1

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.05	Trichloroethene	SW5035A/8260C	11/14/23 18:48	231114A5

QC Report - Prep Batch Summary

Organics - Volatiles, Prep Batch ID: VF231114S1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.06	Trichloroethene	SW5035A/8260C	11/14/23 19:12	231114A5
S55623.07	Trichloroethene	SW5035A/8260C	11/14/23 19:36	231114A5
S55623.30	Naphthalene	SW5035A/8260C	11/14/23 20:00	231114A5
S55623.31	Naphthalene	SW5035A/8260C	11/14/23 20:24	231114A5
S55623.35	Tetrachloroethene	SW5035A/8260C	11/14/23 20:48	231114A5

Organics - Volatiles, Prep Batch ID: VF231114S3

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.36	Tetrachloroethene	SW5035A/8260C	11/15/23 01:33	231114B5

Organics - Volatiles, Prep Batch ID: VF231117S1

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Sample ID	Analysis	Method	Run Date/Time	Batch ID
S55623.32	Naphthalene	SW5035A/8260C	11/17/23 19:53	231117A5
S55623.33	Naphthalene	SW5035A/8260C	11/17/23 23:50	231117A5
S55623.34	Naphthalene	SW5035A/8260C	11/18/23 00:14	231117A5
S55623.37	Tetrachloroethene	SW5035A/8260C	11/17/23 20:17	231117A5
S55623.49	Volatile Organics 5035	SW5035A/8260C	11/17/23 19:06	231117A5
S55623.53	Tetrachloroethene	SW5035A/8260C	11/17/23 20:41	231117A5
S55623.54	Trichloroethene	SW5035A/8260C	11/17/23 21:04	231117A5

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.03

Sample Tag: BW5-06RE(11-12)_11082023

Collected Date/Time: 11/08/2023 10:25

Matrix: Soil

COC Reference: 168371

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: E231121, Run Date: 11/21/2023 13:33, Matrix: SO, Dilution: 10

Surrogate	Flags	**%Rec**	LCL	UCL
TCX	W	**118.00**	33.0	135.3
DCBP	W	**95.00**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.05

Sample Tag: MWDP-01RE(0-1)_11082023

Collected Date/Time: 11/08/2023 13:20

Matrix: Soil

COC Reference: 168371

Organics - Volatiles, Analysis: Trichloroethene

Run in Batch: 231114A5, Run Date: 11/14/2023 18:48, Matrix: SO, Dilution: 62.9

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**100.9**	81.0	124.0
1,2-Dichloroethane-D4		**114.3**	71.0	124.0
Toluene-D8		**104.3**	83.0	120.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.06

Sample Tag: MWDP-01RE(2-3)_11082023

Collected Date/Time: 11/08/2023 13:30

Matrix: Soil

COC Reference: 168371

Organics - Volatiles, Analysis: Trichloroethene

Run in Batch: 231114A5, Run Date: 11/14/2023 19:12, Matrix: SO, Dilution: 63.6

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**99.3**	81.0	124.0
1,2-Dichloroethane-D4		**114.8**	71.0	124.0
Toluene-D8		**104.9**	83.0	120.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.07

Sample Tag: MWDP-01RE(4-5)_11082023

Collected Date/Time: 11/08/2023 13:40

Matrix: Soil

COC Reference: 168371

Organics - Volatiles, Analysis: Trichloroethene

Run in Batch: 231114A5, Run Date: 11/14/2023 19:36, Matrix: SO, Dilution: 61

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**101.2**	81.0	124.0
1,2-Dichloroethane-D4		**117.8**	71.0	124.0
Toluene-D8		**104.3**	83.0	120.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.08

Sample Tag: MWW1-04RE(0-1)_11082023

Collected Date/Time: 11/08/2023 11:50

Matrix: Soil

COC Reference: 168371

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: E231121, Run Date: 11/21/2023 13:47, Matrix: SO, Dilution: 10

Surrogate	Flags	**%Rec**	LCL	UCL
TCX	W	**109.00**	33.0	135.3
DCBP	W	**66.00**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.09

Sample Tag: MWW1-04RE(2.5-3.5)_11082023

Collected Date/Time: 11/08/2023 11:50

Matrix: Soil

COC Reference: 168371

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: E231121, Run Date: 11/21/2023 14:25, Matrix: SO, Dilution: 100

Surrogate	Flags	**%Rec**	LCL	UCL
TCX	W*	**0.00**	33.0	135.3

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.12

Sample Tag: MWF7-01RE(0-1)_11082023

Collected Date/Time: 11/08/2023 14:30

Matrix: Soil

COC Reference: 168371

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: E231122, Run Date: 11/22/2023 18:58, Matrix: SO, Dilution: 5

Surrogate	Flags	**%Rec**	LCL	UCL
TCX	W	**93.00**	33.0	135.3
DCBP	W	**85.50**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.24

Sample Tag: SM19-06RE(0-1)_11082023

Collected Date/Time: 11/08/2023 08:50

Matrix: Soil

COC Reference: 168372

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: E231122, Run Date: 11/22/2023 19:10, Matrix: SO, Dilution: 5

Surrogate	Flags	**%Rec**	LCL	UCL
TCX	W	**40.00**	33.0	135.3
DCBP	W	**101.50**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.25

Sample Tag: SM19-06RE(2-3)_11082023

Collected Date/Time: 11/08/2023 09:00

Matrix: Soil

COC Reference: 168372

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: E231122, Run Date: 11/22/2023 19:22, Matrix: SO, Dilution: 5

Surrogate	Flags	%Rec	LCL	UCL
TCX	W	**106.00**	33.0	135.3
DCBP	W	**84.00**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.26

Sample Tag: SM19-06RE(4-5)_11082023

Collected Date/Time: 11/08/2023 09:00

Matrix: Soil

COC Reference: 168372

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: E231122, Run Date: 11/22/2023 19:34, Matrix: SO, Dilution: 5

Surrogate	Flags	**%Rec**	LCL	UCL
TCX	W	**61.50**	33.0	135.3
DCBP	W	**81.00**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.27

Sample Tag: MWF7-01RE(4-5)_11082023

Collected Date/Time: 11/08/2023 14:40

Matrix: Soil

COC Reference: 168370

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: E231122, Run Date: 11/22/2023 19:46, Matrix: SO, Dilution: 5

Surrogate	Flags	%Rec	LCL	UCL
TCX	W	**73.00**	33.0	135.3
DCBP	W	**64.50**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.28

Sample Tag: MWF7-01RE(8-9)_11082023

Collected Date/Time: 11/08/2023 14:45

Matrix: Soil

COC Reference: 168370

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: A231122, Run Date: 11/22/2023 15:10, Matrix: SO, Dilution: 5

Surrogate	Flags	**%Rec**	LCL	UCL
TCX	W	**103.00**	33.0	135.3
DCBP	W	**69.50**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.29

Sample Tag: MWF7-01RE(14-15)_11082023

Collected Date/Time: 11/08/2023 14:45

Matrix: Soil

COC Reference: 168370

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: A231122, Run Date: 11/22/2023 15:22, Matrix: SO, Dilution: 5

Surrogate	Flags	%Rec	LCL	UCL
TCX	W	**102.50**	33.0	135.3
DCBP	W	**56.00**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.30

Sample Tag: MWF12-01RE(0-1)_11082023

Collected Date/Time: 11/08/2023 15:10

Matrix: Soil

COC Reference: 168370

Organics - Volatiles, Analysis: Naphthalene

Run in Batch: 231114A5, Run Date: 11/14/2023 20:00, Matrix: SO, Dilution: 68.9

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**100.3**	81.0	124.0
1,2-Dichloroethane-D4		**116.6**	71.0	124.0
Toluene-D8		**107.0**	83.0	120.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.31

Sample Tag: MWF12-01RE(2-3)_11082023

Collected Date/Time: 11/08/2023 15:15

Matrix: Soil

COC Reference: 168370

Organics - Volatiles, Analysis: Naphthalene

Run in Batch: 231114A5, Run Date: 11/14/2023 20:24, Matrix: SO, Dilution: 62.5

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**100.7**	81.0	124.0
1,2-Dichloroethane-D4		**114.7**	71.0	124.0
Toluene-D8		**108.4**	83.0	120.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.32

Sample Tag: MWF12-01RE(4-5)_11082023

Collected Date/Time: 11/08/2023 15:20

Matrix: Soil

COC Reference: 168370

Organics - Volatiles, Analysis: Naphthalene

Run in Batch: 231117A5, Run Date: 11/17/2023 19:53, Matrix: SO, Dilution: 62.1

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**99.2**	81.0	124.0
1,2-Dichloroethane-D4		**109.2**	71.0	124.0
Toluene-D8		**104.4**	83.0	120.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.35

Sample Tag: BF17-21RE(0-1)_11082023

Collected Date/Time: 11/08/2023 16:00

Matrix: Soil

COC Reference: 168370

Organics - Volatiles, Analysis: Tetrachloroethene

Run in Batch: 231114A5, Run Date: 11/14/2023 20:48, Matrix: SO, Dilution: 59.8

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**100.9**	81.0	124.0
1,2-Dichloroethane-D4		**115.4**	71.0	124.0
Toluene-D8		**105.7**	83.0	120.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.36

Sample Tag: BF17-21RE(2-3)_11082023

Collected Date/Time: 11/08/2023 16:05

Matrix: Soil

COC Reference: 168370

Organics - Volatiles, Analysis: Tetrachloroethene

Run in Batch: 231114B5, Run Date: 11/15/2023 01:33, Matrix: SO, Dilution: 59.4

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**100.7**	81.0	124.0
1,2-Dichloroethane-D4		**113.6**	71.0	124.0
Toluene-D8		**104.5**	83.0	120.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.37

Sample Tag: BF17-21RE(4-5)_11082023

Collected Date/Time: 11/08/2023 16:10

Matrix: Soil

COC Reference: 168370

Organics - Volatiles, Analysis: Tetrachloroethene

Run in Batch: 231117A5, Run Date: 11/17/2023 20:17, Matrix: SO, Dilution: 70.8

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**99.6**	81.0	124.0
1,2-Dichloroethane-D4		**111.7**	71.0	124.0
Toluene-D8		**104.4**	83.0	120.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.38

Sample Tag: BM30-03RE(1-1.5)_11092023

Collected Date/Time: 11/09/2023 13:20

Matrix: Soil

COC Reference: 168370

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: E231122, Run Date: 11/22/2023 19:58, Matrix: SO, Dilution: 5

Surrogate	Flags	**%Rec**	LCL	UCL
TCX	W	**113.50**	33.0	135.3
DCBP	W	**90.50**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.39

Sample Tag: BM30-03RE(2-3)_11092023

Collected Date/Time: 11/09/2023 13:25

Matrix: Soil

COC Reference: 168370

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: E231122, Run Date: 11/22/2023 20:09, Matrix: SO, Dilution: 5

Surrogate	Flags	%Rec	LCL	UCL
TCX	W	**81.00**	33.0	135.3
DCBP	W	**78.50**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.40

Sample Tag: BM30-03RE(4-5)_11092023

Collected Date/Time: 11/09/2023 13:30

Matrix: Soil

COC Reference: 168370

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: E231122, Run Date: 11/22/2023 20:21, Matrix: SO, Dilution: 5

Surrogate	Flags	%Rec	LCL	UCL
TCX	W	**77.00**	33.0	135.3
DCBP	W	**79.50**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.41

Sample Tag: EB-01

Collected Date/Time: 11/07/2023 15:45

Matrix: Water

COC Reference: 168368

Organics - Semi-Volatiles, Analysis: Semi-Volatile Organics - MDEQ

Run in Batch: U231116B, Run Date: 11/16/2023 21:42, Matrix: WW, Dilution: 2

Surrogate	Flags	%Rec	LCL	UCL
2-Fluorophenol		**33.5**	10.0	110.0
Phenol-D5		**23.9**	10.0	110.0
Nitrobenzene-D5		**75.7**	10.0	114.0
2-Fluorobiphenyl		**76.6**	10.0	116.0
2,4,6-Tribromophenol		**72.3**	10.0	123.0
Terphenyl-D14		**82.2**	10.0	141.0

Organics - Volatiles, Analysis: Volatile Organics - DEQ List

Run in Batch: 231113A3, Run Date: 11/13/2023 15:23, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**100.2**	80.0	124.0
1,2-Dichloroethane-D4		**110.9**	72.0	125.0
Toluene-D8		**101.0**	89.0	112.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.42
Sample Tag: EB-02
Collected Date/Time: 11/08/2023 16:40
Matrix: Water
COC Reference: 168368

Organics - PCBs/Pesticides, Analysis: PCB

Run in Batch: A231117, Run Date: 11/17/2023 14:23, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
TCX		**77.40**	34.1	137.1
DCBP		**65.40**	30.0	138.6

Organics - Volatiles, Analysis: Volatile Organics - DEQ List

Run in Batch: 231113A3, Run Date: 11/13/2023 15:46, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**99.3**	80.0	124.0
1,2-Dichloroethane-D4		**107.5**	72.0	125.0
Toluene-D8		**100.9**	89.0	112.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.43

Sample Tag: EB-03

Collected Date/Time: 11/09/2023 14:00

Matrix: Water

COC Reference: 168368

Organics - Semi-Volatiles, Analysis: Semi-Volatile Organics - MDEQ

Run in Batch: U231117C, Run Date: 11/17/2023 23:34, Matrix: WW, Dilution: 2

Surrogate	Flags	%Rec	LCL	UCL
2-Fluorophenol		**25.3**	10.0	110.0
Phenol-D5		**17.7**	10.0	110.0
Nitrobenzene-D5		**54.9**	10.0	114.0
2-Fluorobiphenyl		**62.8**	10.0	116.0
2,4,6-Tribromophenol		**73.9**	10.0	123.0
Terphenyl-D14		**76.9**	10.0	141.0

Organics - Volatiles, Analysis: Volatile Organics - DEQ List

Run in Batch: 231113A3, Run Date: 11/13/2023 16:10, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**100.7**	80.0	124.0
1,2-Dichloroethane-D4		**111.8**	72.0	125.0
Toluene-D8		**101.1**	89.0	112.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.44

Sample Tag: MWM30-01RE(0-1)_11092023

Collected Date/Time: 11/09/2023 08:45

Matrix: Soil

COC Reference: 168368

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: E231122, Run Date: 11/22/2023 20:33, Matrix: SO, Dilution: 5

Surrogate	Flags	%Rec	LCL	UCL
TCX	W	**85.50**	33.0	135.3
DCBP	W	**93.50**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.45

Sample Tag: MWM30-01RE(2-3)_11092023
Collected Date/Time: 11/09/2023 08:50
Matrix: Soil
COC Reference: 168368

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: E231127, Run Date: 11/27/2023 15:07, Matrix: SO, Dilution: 200

Surrogate	Flags	%Rec	LCL	UCL
TCX	W*	**4860.00**	33.0	135.3
DCBP	W*	**6220.00**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.46

Sample Tag: MWM30-01RE(4-5)_11092023

Collected Date/Time: 11/09/2023 08:55

Matrix: Soil

COC Reference: 168368

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: A231122, Run Date: 11/22/2023 14:23, Matrix: SO, Dilution: 1

Surrogate	Flags	**%Rec**	LCL	UCL
TCX		**86.70**	33.0	135.3
DCBP		**71.50**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.49

Sample Tag: Trip Blank

Collected Date/Time: 11/09/2023 00:01

Matrix: Methanol

COC Reference: 168368

Organics - Volatiles, Analysis: Volatile Organics 5035

Run in Batch: 231117A5, Run Date: 11/17/2023 19:06, Matrix: SO, Dilution: 50

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**100.0**	81.0	124.0
1,2-Dichloroethane-D4		**108.9**	71.0	124.0
Toluene-D8		**102.3**	83.0	120.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.50

Sample Tag: DUP-01

Collected Date/Time: 11/09/2023 00:01

Matrix: Soil

COC Reference: 168368

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: A231122, Run Date: 11/22/2023 15:33, Matrix: SO, Dilution: 5

Surrogate	Flags	**%Rec**	LCL	UCL
TCX	W	**114.00**	33.0	135.3
DCBP	W	**79.50**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.52

Sample Tag: DUP-03

Collected Date/Time: 11/08/2023 00:01

Matrix: Soil

COC Reference: 168368

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: E231122, Run Date: 11/22/2023 20:57, Matrix: SO, Dilution: 5

Surrogate	Flags	**%Rec**	LCL	UCL
TCX	W	**63.00**	33.0	135.3
DCBP	W	**62.50**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.53

Sample Tag: DUP-04

Collected Date/Time: 11/08/2023 00:01

Matrix: Soil

COC Reference: 168368

Organics - Volatiles, Analysis: Tetrachloroethene

Run in Batch: 231117A5, Run Date: 11/17/2023 20:41, Matrix: SO, Dilution: 77.8

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**98.6**	81.0	124.0
1,2-Dichloroethane-D4		**109.3**	71.0	124.0
Toluene-D8		**104.5**	83.0	120.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.54

Sample Tag: DUP-05

Collected Date/Time: 11/08/2023 00:01

Matrix: Soil

COC Reference: 168368

Organics - Volatiles, Analysis: Trichloroethene

Run in Batch: 231117A5, Run Date: 11/17/2023 21:04, Matrix: SO, Dilution: 62.3

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**99.9**	81.0	124.0
1,2-Dichloroethane-D4		**111.1**	71.0	124.0
Toluene-D8		**104.7**	83.0	120.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.55

Sample Tag: BM30-01RE(4-5)_11092023

Collected Date/Time: 11/09/2023 09:35

Matrix: Soil

COC Reference: 168369

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: A231122, Run Date: 11/22/2023 15:44, Matrix: SO, Dilution: 5

Surrogate	Flags	**%Rec**	LCL	UCL
TCX	W	**120.00**	33.0	135.3
DCBP	W	**75.50**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.56

Sample Tag: BM30-01RE(2-3)_11092023

Collected Date/Time: 11/09/2023 09:30

Matrix: Soil

COC Reference: 168369

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: A231122, Run Date: 11/22/2023 15:55, Matrix: SO, Dilution: 5

Surrogate	Flags	**%Rec**	LCL	UCL
TCX	W	**116.50**	33.0	135.3
DCBP	W	**87.00**	30.0	137.0

QC Report - Surrogates per Lab Sample

Lab Sample ID: S55623.57

Sample Tag: BM30-01RE(0-1)_11092023

Collected Date/Time: 11/09/2023 09:25

Matrix: Soil

COC Reference: 168369

Organics - PCBs/Pesticides, Analysis: PCB List

Run in Batch: E231130, Run Date: 11/30/2023 12:13, Matrix: SO, Dilution: 5

Surrogate	Flags	**%Rec**	LCL	UCL
TCX	W	**62.00**	33.0	135.3
DCBP	W	**52.00**	30.0	137.0

QC Report - Surrogates per QC Sample

Organics - PCBs/Pesticides, Prep Batch ID: PA231110W1

QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: b23111013.sblk-w.01

Run in Batch: B231110, Run Date: 11/10/2023 14:13, Prep Date: 11/10/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
TCX		**87.30**	34.1	137.1
DCBP		**101.20**	30.0	138.6

Blank (BLK)

Lab Sample ID: e23111509.sblk-w.01

Run in Batch: E231115, Run Date: 11/15/2023 12:11, Prep Date: 11/10/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
TCX		**99.70**	34.1	137.1
DCBP		**102.50**	30.0	138.6

Laboratory Control Sample (LCS)

Lab Sample ID: b23111014.slcs-w.01

Run in Batch: B231110, Run Date: 11/10/2023 14:30, Prep Date: 11/10/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
TCX		**88.40**	34.1	137.1
DCBP		**100.50**	30.0	138.6

Laboratory Control Sample (LCS)

Lab Sample ID: e23111510.slcs-w.01

Run in Batch: E231115, Run Date: 11/15/2023 12:23, Prep Date: 11/10/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
TCX		**100.60**	34.1	137.1
DCBP		**98.10**	30.0	138.6

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: b23111015.slcs-w.01d, Parent Sample ID: b23111014.slcs-w.01

Run in Batch: B231110, Run Date: 11/10/2023 14:46, Prep Date: 11/10/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
TCX		**85.40**	34.1	137.1
DCBP		**101.00**	30.0	138.6

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: e23111511.slcs-w.01d, Parent Sample ID: e23111510.slcs-w.01

Run in Batch: E231115, Run Date: 11/15/2023 12:35, Prep Date: 11/10/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
TCX		**88.20**	34.1	137.1
DCBP		**96.00**	30.0	138.6

QC Report - Surrogates per QC Sample

Organics - PCBs/Pesticides, Prep Batch ID: PA231117S3

QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: a23112006.sblk-s.01

Run in Batch: A231120, Run Date: 11/20/2023 13:52, Prep Date: 11/17/2023, Matrix: SO, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
TCX		**82.40**	33.0	135.3
DCBP		**61.70**	30.0	137.0

Laboratory Control Sample (LCS)

Lab Sample ID: a23112007.slcs-s.01

Run in Batch: A231120, Run Date: 11/20/2023 14:03, Prep Date: 11/17/2023, Matrix: SO, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
TCX		**87.20**	33.0	135.3
DCBP		**61.10**	30.0	137.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: a23112008.slcs-s.01d, Parent Sample ID: a23112007.slcs-s.01

Run in Batch: A231120, Run Date: 11/20/2023 14:41, Prep Date: 11/17/2023, Matrix: SO, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
TCX		**87.10**	33.0	135.3
DCBP		**69.30**	30.0	137.0

QC Report - Surrogates per QC Sample

Organics - PCBs/Pesticides, Prep Batch ID: PA231120S2

QC Types: BLK/LCS/MS/MSD

Blank (BLK)

Lab Sample ID: a23112212.sblk-s.03

Run in Batch: A231122, Run Date: 11/22/2023 13:58, Prep Date: 11/20/2023, Matrix: SO, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
TCX		**86.00**	33.0	135.3
DCBP		**68.70**	30.0	137.0

Laboratory Control Sample (LCS)

Lab Sample ID: a23112213.slcs-s.03

Run in Batch: A231122, Run Date: 11/22/2023 14:11, Prep Date: 11/20/2023, Matrix: SO, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
TCX		**88.80**	33.0	135.3
DCBP		**76.20**	30.0	137.0

Matrix Spike (MS)

Lab Sample ID: a23112215.s55623.47, Parent Sample ID: S55623.46

Run in Batch: A231122, Run Date: 11/22/2023 14:35, Prep Date: 11/20/2023, Matrix: SO, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
TCX		**102.70**	33.0	135.3
DCBP		**69.20**	30.0	137.0

Matrix Spike Duplicate (MSD)

Lab Sample ID: a23112216.s55623.48, Parent Sample ID: a23112215.s55623.47

Run in Batch: A231122, Run Date: 11/22/2023 14:57, Prep Date: 11/20/2023, Matrix: SO, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
TCX		**90.20**	33.0	135.3
DCBP		**61.90**	30.0	137.0

QC Report - Surrogates per QC Sample

Organics - Semi-Volatiles, Prep Batch ID: SF231114W1

QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: U231116B.BLKW14A

Run in Batch: U231116B, Run Date: 11/16/2023 18:27, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
2-Fluorophenol		**29.6**	10.0	110.0
Phenol-D5		**21.4**	10.0	110.0
Nitrobenzene-D5		**62.2**	10.0	114.0
2-Fluorobiphenyl		**57.5**	10.0	116.0
2,4,6-Tribromophenol		**61.0**	10.0	123.0
Terphenyl-D14		**65.3**	10.0	141.0

Blank (BLK)

Lab Sample ID: U231116C.BLKW14A

Run in Batch: U231116C, Run Date: 11/16/2023 18:27, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
No Surrogates				

Blank (BLK)

Lab Sample ID: U231127.BLKW14A

Run in Batch: U231127, Run Date: 11/27/2023 17:06, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
No Surrogates				

Laboratory Control Sample (LCS)

Lab Sample ID: U231116B.LCSW14A

Run in Batch: U231116B, Run Date: 11/16/2023 18:51, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
2-Fluorophenol		**30.4**	10.0	110.0
Phenol-D5		**22.8**	10.0	110.0
Nitrobenzene-D5		**61.3**	10.0	114.0
2-Fluorobiphenyl		**61.6**	10.0	116.0
2,4,6-Tribromophenol		**64.0**	10.0	123.0
Terphenyl-D14		**65.2**	10.0	141.0

Laboratory Control Sample (LCS)

Lab Sample ID: U231116C.LCSW14A

Run in Batch: U231116C, Run Date: 11/16/2023 18:51, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
No Surrogates				

QC Report - Surrogates per QC Sample

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: U231116B.LCSDW14A, Parent Sample ID: U231116B.LCSW14A

Run in Batch: U231116B, Run Date: 11/16/2023 19:16, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	**%Rec**	LCL	UCL
2-Fluorophenol		**34.8**	10.0	110.0
Phenol-D5		**26.2**	10.0	110.0
Nitrobenzene-D5		**69.1**	10.0	114.0
2-Fluorobiphenyl		**68.2**	10.0	116.0
2,4,6-Tribromophenol		**73.5**	10.0	123.0
Terphenyl-D14		**71.8**	10.0	141.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: U231116C.LCSDW14A, Parent Sample ID: U231116C.LCSW14A

Run in Batch: U231116C, Run Date: 11/16/2023 19:16, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	**%Rec**	LCL	UCL
No Surrogates				

QC Report - Surrogates per QC Sample

Organics - Semi-Volatiles, Prep Batch ID: SF231115W1

QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: U231117C.BLKW15A

Run in Batch: U231117C, Run Date: 11/17/2023 21:09, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
2-Fluorophenol		**23.3**	10.0	110.0
Phenol-D5		**16.6**	10.0	110.0
Nitrobenzene-D5		**48.3**	10.0	114.0
2-Fluorobiphenyl		**53.7**	10.0	116.0
2,4,6-Tribromophenol		**58.7**	10.0	123.0
Terphenyl-D14		**61.9**	10.0	141.0

Blank (BLK)

Lab Sample ID: U231117D.BLKW15A

Run in Batch: U231117D, Run Date: 11/17/2023 21:09, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
No Surrogates				

Laboratory Control Sample (LCS)

Lab Sample ID: U231117C.LCSW15A

Run in Batch: U231117C, Run Date: 11/17/2023 21:33, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
2-Fluorophenol		**27.4**	10.0	110.0
Phenol-D5		**19.4**	10.0	110.0
Nitrobenzene-D5		**53.3**	10.0	114.0
2-Fluorobiphenyl		**61.7**	10.0	116.0
2,4,6-Tribromophenol		**74.4**	10.0	123.0
Terphenyl-D14		**74.2**	10.0	141.0

Laboratory Control Sample (LCS)

Lab Sample ID: U231117D.LCSW15A

Run in Batch: U231117D, Run Date: 11/17/2023 21:33, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
No Surrogates				

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: U231117C.LCSDW15A, Parent Sample ID: U231117C.LCSW15A

Run in Batch: U231117C, Run Date: 11/17/2023 21:58, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
2-Fluorophenol		**27.2**	10.0	110.0
Phenol-D5		**19.8**	10.0	110.0
Nitrobenzene-D5		**53.1**	10.0	114.0
2-Fluorobiphenyl		**61.0**	10.0	116.0
2,4,6-Tribromophenol		**70.4**	10.0	123.0
Terphenyl-D14		**69.2**	10.0	141.0

QC Report - Surrogates per QC Sample

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: U231117D.LCSDW15A, Parent Sample ID: U231117D.LCSW15A

Run in Batch: U231117D, Run Date: 11/17/2023 21:58, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	**%Rec**	LCL	UCL
No Surrogates				

QC Report - Surrogates per QC Sample

Organics - Volatiles, Prep Batch ID: VF231113W2

QC Types: BLK/LCS/LCSD/MS/MSD

Blank (BLK)

Lab Sample ID: 231113A3.BLKW13A

Run in Batch: 231113A3, Run Date: 11/13/2023 14:36, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**98.1**	80.0	124.0
1,2-Dichloroethane-D4		**102.0**	72.0	125.0
Toluene-D8		**100.7**	89.0	112.0

Laboratory Control Sample (LCS)

Lab Sample ID: 231113A3.LCSW13A

Run in Batch: 231113A3, Run Date: 11/13/2023 13:03, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**101.1**	80.0	124.0
1,2-Dichloroethane-D4		**106.6**	72.0	125.0
Toluene-D8		**100.3**	89.0	112.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: 231113A3.LCSDW13A, Parent Sample ID: 231113A3.LCSW13A

Run in Batch: 231113A3, Run Date: 11/13/2023 13:26, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**102.9**	80.0	124.0
1,2-Dichloroethane-D4		**109.5**	72.0	125.0
Toluene-D8		**99.9**	89.0	112.0

Matrix Spike (MS)

Lab Sample ID: 231113A3.5560906M, Parent Sample ID: S55609.05

Run in Batch: 231113A3, Run Date: 11/13/2023 22:01, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**102.0**	80.0	124.0
1,2-Dichloroethane-D4		**111.2**	72.0	125.0
Toluene-D8		**98.7**	89.0	112.0

Matrix Spike Duplicate (MSD)

Lab Sample ID: 231113A3.5560907N, Parent Sample ID: 231113A3.5560906M

Run in Batch: 231113A3, Run Date: 11/13/2023 22:25, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**103.1**	80.0	124.0
1,2-Dichloroethane-D4		**109.3**	72.0	125.0
Toluene-D8		**100.7**	89.0	112.0

QC Report - Surrogates per QC Sample

Organics - Volatiles, Prep Batch ID: VF231114S1

QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: 231114A5.BLKS14A

Run in Batch: 231114A5, Run Date: 11/14/2023 14:03, Prep Date: 11/14/2023, Matrix: SO, Dilution: 50

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**100.7**	81.0	124.0
1,2-Dichloroethane-D4		**110.5**	71.0	124.0
Toluene-D8		**104.2**	83.0	120.0

Laboratory Control Sample (LCS)

Lab Sample ID: 231114A5.LCSS14A

Run in Batch: 231114A5, Run Date: 11/14/2023 12:05, Prep Date: 11/14/2023, Matrix: SO, Dilution: 50

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**100.6**	81.0	124.0
1,2-Dichloroethane-D4		**118.6**	71.0	124.0
Toluene-D8		**105.4**	83.0	120.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: 231114A5.LCSDS14A, Parent Sample ID: 231114A5.LCSS14A

Run in Batch: 231114A5, Run Date: 11/14/2023 12:28, Prep Date: 11/14/2023, Matrix: SO, Dilution: 50

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**100.2**	81.0	124.0
1,2-Dichloroethane-D4		**120.8**	71.0	124.0
Toluene-D8		**104.2**	83.0	120.0

QC Report - Surrogates per QC Sample

Organics - Volatiles, Prep Batch ID: VF231114S3

QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: 231114B5.BLKS14B

Run in Batch: 231114B5, Run Date: 11/15/2023 00:45, Prep Date: 11/14/2023, Matrix: WW, Dilution: 50

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**101.4**	81.0	124.0
1,2-Dichloroethane-D4		**111.0**	71.0	124.0
Toluene-D8		**103.7**	83.0	120.0

Laboratory Control Sample (LCS)

Lab Sample ID: 231114B5.LCSS14B

Run in Batch: 231114B5, Run Date: 11/14/2023 23:34, Prep Date: 11/14/2023, Matrix: WW, Dilution: 50

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**100.1**	81.0	124.0
1,2-Dichloroethane-D4		**119.1**	71.0	124.0
Toluene-D8		**105.0**	83.0	120.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: 231114B5.LCSDS14B, Parent Sample ID: 231114B5.LCSS14B

Run in Batch: 231114B5, Run Date: 11/14/2023 23:58, Prep Date: 11/14/2023, Matrix: WW, Dilution: 50

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**99.7**	81.0	124.0
1,2-Dichloroethane-D4		**122.4**	71.0	124.0
Toluene-D8		**105.0**	83.0	120.0

QC Report - Surrogates per QC Sample

Organics - Volatiles, Prep Batch ID: VF231117S1

QC Types: BLK/LCS/LCSD/MS/MSD

Blank (BLK)

Lab Sample ID: 231117A5.BLKS17A

Run in Batch: 231117A5, Run Date: 11/17/2023 16:21, Prep Date: 11/17/2023, Matrix: WW, Dilution: 50

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**98.3**	81.0	124.0
1,2-Dichloroethane-D4		**110.0**	71.0	124.0
Toluene-D8		**103.6**	83.0	120.0

Blank (BLK)

Lab Sample ID: 231117D5.BLKS17A

Run in Batch: 231117D5, Run Date: 11/17/2023 16:21, Prep Date: 11/17/2023, Matrix: SO, Dilution: 50

Surrogate	Flags	%Rec	LCL	UCL
Toluene-D8		**102.6**	83.0	120.0

Laboratory Control Sample (LCS)

Lab Sample ID: 231117A5.LCSS17A

Run in Batch: 231117A5, Run Date: 11/17/2023 14:22, Prep Date: 11/17/2023, Matrix: WW, Dilution: 50

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**97.9**	81.0	124.0
1,2-Dichloroethane-D4		**116.9**	71.0	124.0
Toluene-D8		**104.8**	83.0	120.0

Laboratory Control Sample (LCS)

Lab Sample ID: 231117D5.LCSG17A

Run in Batch: 231117D5, Run Date: 11/17/2023 15:33, Prep Date: 11/17/2023, Matrix: SO, Dilution: 50

Surrogate	Flags	%Rec	LCL	UCL
Toluene-D8		**103.4**	83.0	120.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: 231117A5.LCSDS17A, Parent Sample ID: 231117A5.LCSS17A

Run in Batch: 231117A5, Run Date: 11/17/2023 14:46, Prep Date: 11/17/2023, Matrix: WW, Dilution: 50

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**99.0**	81.0	124.0
1,2-Dichloroethane-D4		**118.2**	71.0	124.0
Toluene-D8		**104.6**	83.0	120.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: 231117D5.LCSDG17A, Parent Sample ID: 231117D5.LCSG17A

Run in Batch: 231117D5, Run Date: 11/17/2023 15:57, Prep Date: 11/17/2023, Matrix: SO, Dilution: 50

Surrogate	Flags	%Rec	LCL	UCL
Toluene-D8		**103.1**	83.0	120.0

QC Report - Surrogates per QC Sample

Matrix Spike (MS)

Lab Sample ID: 231117A5.5562333M, Parent Sample ID: S55623.32

Run in Batch: 231117A5, Run Date: 11/17/2023 23:50, Prep Date: 11/17/2023, Matrix: SO, Dilution: 63.6

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**99.7**	81.0	124.0
1,2-Dichloroethane-D4		**122.8**	71.0	124.0
Toluene-D8		**105.5**	83.0	120.0

Matrix Spike Duplicate (MSD)

Lab Sample ID: 231117A5.5562334N, Parent Sample ID: 231117A5.5562333M

Run in Batch: 231117A5, Run Date: 11/18/2023 00:14, Prep Date: 11/17/2023, Matrix: SO, Dilution: 59.4

Surrogate	Flags	%Rec	LCL	UCL
4-Bromofluorobenzene		**100.2**	81.0	124.0
1,2-Dichloroethane-D4		**123.1**	71.0	124.0
Toluene-D8		**104.9**	83.0	120.0

QC Report - Internal Standards per Lab Sample

Lab Sample ID: S55623.05

Sample Tag: MWDP-01RE(0-1)_11082023

Collected Date/Time: 11/08/2023 13:20

Matrix: Soil

COC Reference: 168371

Organics - Volatiles, Analysis: Trichloroethene

Run in Batch: 231114A5, Run Date: 11/14/2023 18:48, Matrix: SO, Dilution: 62.9

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**91.2**	50.0	200.0
1,4-Difluorobenzene		**92.7**	50.0	200.0
Chlorobenzene-D5		**94.4**	50.0	200.0
1,4-Dichlorobenzene-D4		**96.2**	50.0	200.0

QC Report - Internal Standards per Lab Sample

Lab Sample ID: S55623.06

Sample Tag: MWDP-01RE(2-3)_11082023

Collected Date/Time: 11/08/2023 13:30

Matrix: Soil

COC Reference: 168371

Organics - Volatiles, Analysis: Trichloroethene

Run in Batch: 231114A5, Run Date: 11/14/2023 19:12, Matrix: SO, Dilution: 63.6

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**89.2**	50.0	200.0
1,4-Difluorobenzene		**90.3**	50.0	200.0
Chlorobenzene-D5		**91.9**	50.0	200.0
1,4-Dichlorobenzene-D4		**92.7**	50.0	200.0

QC Report - Internal Standards per Lab Sample

Lab Sample ID: S55623.07

Sample Tag: MWDP-01RE(4-5)_11082023

Collected Date/Time: 11/08/2023 13:40

Matrix: Soil

COC Reference: 168371

Organics - Volatiles, Analysis: Trichloroethene

Run in Batch: 231114A5, Run Date: 11/14/2023 19:36, Matrix: SO, Dilution: 61

Internal Standard	Flags	**%Rec**	LCL	UCL
Pentafluorobenzene		**85.9**	50.0	200.0
1,4-Difluorobenzene		**88.2**	50.0	200.0
Chlorobenzene-D5		**88.7**	50.0	200.0
1,4-Dichlorobenzene-D4		**89.4**	50.0	200.0

QC Report - Internal Standards per Lab Sample

Lab Sample ID: S55623.30

Sample Tag: MWF12-01RE(0-1)_11082023

Collected Date/Time: 11/08/2023 15:10

Matrix: Soil

COC Reference: 168370

Organics - Volatiles, Analysis: Naphthalene

Run in Batch: 231114A5, Run Date: 11/14/2023 20:00, Matrix: SO, Dilution: 68.9

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**89.7**	50.0	200.0
1,4-Difluorobenzene		**90.9**	50.0	200.0
Chlorobenzene-D5		**90.8**	50.0	200.0
1,4-Dichlorobenzene-D4		**91.3**	50.0	200.0

QC Report - Internal Standards per Lab Sample

Lab Sample ID: S55623.31

Sample Tag: MWF12-01RE(2-3)_11082023

Collected Date/Time: 11/08/2023 15:15

Matrix: Soil

COC Reference: 168370

Organics - Volatiles, Analysis: Naphthalene

Run in Batch: 231114A5, Run Date: 11/14/2023 20:24, Matrix: SO, Dilution: 62.5

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**101.7**	50.0	200.0
1,4-Difluorobenzene		**102.8**	50.0	200.0
Chlorobenzene-D5		**103.8**	50.0	200.0
1,4-Dichlorobenzene-D4		**106.2**	50.0	200.0

QC Report - Internal Standards per Lab Sample

Lab Sample ID: S55623.32

Sample Tag: MWF12-01RE(4-5)_11082023

Collected Date/Time: 11/08/2023 15:20

Matrix: Soil

COC Reference: 168370

Organics - Volatiles, Analysis: Naphthalene

Run in Batch: 231117A5, Run Date: 11/17/2023 19:53, Matrix: SO, Dilution: 62.1

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**89.7**	50.0	200.0
1,4-Difluorobenzene		**91.0**	50.0	200.0
Chlorobenzene-D5		**93.6**	50.0	200.0
1,4-Dichlorobenzene-D4		**93.5**	50.0	200.0

QC Report - Internal Standards per Lab Sample

Lab Sample ID: S55623.35

Sample Tag: BF17-21RE(0-1)_11082023

Collected Date/Time: 11/08/2023 16:00

Matrix: Soil

COC Reference: 168370

Organics - Volatiles, Analysis: Tetrachloroethene

Run in Batch: 231114A5, Run Date: 11/14/2023 20:48, Matrix: SO, Dilution: 59.8

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**85.5**	50.0	200.0
1,4-Difluorobenzene		**87.0**	50.0	200.0
Chlorobenzene-D5		**89.6**	50.0	200.0
1,4-Dichlorobenzene-D4		**91.8**	50.0	200.0

QC Report - Internal Standards per Lab Sample

Lab Sample ID: S55623.36

Sample Tag: BF17-21RE(2-3)_11082023

Collected Date/Time: 11/08/2023 16:05

Matrix: Soil

COC Reference: 168370

Organics - Volatiles, Analysis: Tetrachloroethene

Run in Batch: 231114B5, Run Date: 11/15/2023 01:33, Matrix: SO, Dilution: 59.4

Internal Standard	Flags	**%Rec**	LCL	UCL
Pentafluorobenzene		**97.9**	50.0	200.0
1,4-Difluorobenzene		**97.8**	50.0	200.0
Chlorobenzene-D5		**100.0**	50.0	200.0
1,4-Dichlorobenzene-D4		**100.3**	50.0	200.0

QC Report - Internal Standards per Lab Sample

Lab Sample ID: S55623.37

Sample Tag: BF17-21RE(4-5)_11082023

Collected Date/Time: 11/08/2023 16:10

Matrix: Soil

COC Reference: 168370

Organics - Volatiles, Analysis: Tetrachloroethene

Run in Batch: 231117A5, Run Date: 11/17/2023 20:17, Matrix: SO, Dilution: 70.8

Internal Standard	Flags	**%Rec**	LCL	UCL
Pentafluorobenzene		**87.8**	50.0	200.0
1,4-Difluorobenzene		**90.0**	50.0	200.0
Chlorobenzene-D5		**91.0**	50.0	200.0
1,4-Dichlorobenzene-D4		**92.3**	50.0	200.0

QC Report - Internal Standards per Lab Sample

Lab Sample ID: S55623.41

Sample Tag: EB-01

Collected Date/Time: 11/07/2023 15:45

Matrix: Water

COC Reference: 168368

Organics - Semi-Volatiles, Analysis: Semi-Volatile Organics - MDEQ

Run in Batch: U231116B, Run Date: 11/16/2023 21:42, Matrix: WW, Dilution: 2

Internal Standard	Flags	%Rec	LCL	UCL
1,4-Dichlorobenzene-D4		**84.6**	50.0	200.0
Naphthalene-D8		**84.3**	50.0	200.0
Acenaphthalene-D10		**82.0**	50.0	200.0
Phenanthrene-D10		**80.9**	50.0	200.0
Chrysene-D12		**79.4**	50.0	200.0
Perylene-D12		**71.5**	50.0	200.0

Organics - Volatiles, Analysis: Volatile Organics - DEQ List

Run in Batch: 231113A3, Run Date: 11/13/2023 15:23, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**95.2**	50.0	200.0
1,4-Difluorobenzene		**99.3**	50.0	200.0
Chlorobenzene-D5		**102.8**	50.0	200.0
1,4-Dichlorobenzene-D4		**98.9**	50.0	200.0

QC Report - Internal Standards per Lab Sample

Lab Sample ID: S55623.42
Sample Tag: EB-02
Collected Date/Time: 11/08/2023 16:40
Matrix: Water
COC Reference: 168368

Organics - Volatiles, Analysis: Volatile Organics - DEQ List

Run in Batch: 231113A3, Run Date: 11/13/2023 15:46, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**88.4**	50.0	200.0
1,4-Difluorobenzene		**91.4**	50.0	200.0
Chlorobenzene-D5		**93.6**	50.0	200.0
1,4-Dichlorobenzene-D4		**90.3**	50.0	200.0

QC Report - Internal Standards per Lab Sample

Lab Sample ID: S55623.43
Sample Tag: EB-03
Collected Date/Time: 11/09/2023 14:00
Matrix: Water
COC Reference: 168368

Organics - Semi-Volatiles, Analysis: Semi-Volatile Organics - MDEQ

Run in Batch: U231117C, Run Date: 11/17/2023 23:34, Matrix: WW, Dilution: 2

Internal Standard	Flags	%Rec	LCL	UCL
1,4-Dichlorobenzene-D4		**107.1**	50.0	200.0
Naphthalene-D8		**108.2**	50.0	200.0
Acenaphthalene-D10		**109.5**	50.0	200.0
Phenanthrene-D10		**107.6**	50.0	200.0
Chrysene-D12		**108.0**	50.0	200.0
Perylene-D12		**99.6**	50.0	200.0

Organics - Volatiles, Analysis: Volatile Organics - DEQ List

Run in Batch: 231113A3, Run Date: 11/13/2023 16:10, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**91.6**	50.0	200.0
1,4-Difluorobenzene		**95.3**	50.0	200.0
Chlorobenzene-D5		**98.3**	50.0	200.0
1,4-Dichlorobenzene-D4		**95.9**	50.0	200.0

QC Report - Internal Standards per Lab Sample

Lab Sample ID: S55623.49

Sample Tag: Trip Blank

Collected Date/Time: 11/09/2023 00:01

Matrix: Methanol

COC Reference: 168368

Organics - Volatiles, Analysis: Volatile Organics 5035

Run in Batch: 231117A5, Run Date: 11/17/2023 19:06, Matrix: SO, Dilution: 50

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**96.0**	50.0	200.0
1,4-Difluorobenzene		**97.2**	50.0	200.0
Chlorobenzene-D5		**97.0**	50.0	200.0
1,4-Dichlorobenzene-D4		**97.5**	50.0	200.0

QC Report - Internal Standards per Lab Sample

Lab Sample ID: S55623.53

Sample Tag: DUP-04

Collected Date/Time: 11/08/2023 00:01

Matrix: Soil

COC Reference: 168368

Organics - Volatiles, Analysis: Tetrachloroethene

Run in Batch: 231117A5, Run Date: 11/17/2023 20:41, Matrix: SO, Dilution: 77.8

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**92.5**	50.0	200.0
1,4-Difluorobenzene		**92.8**	50.0	200.0
Chlorobenzene-D5		**95.1**	50.0	200.0
1,4-Dichlorobenzene-D4		**94.6**	50.0	200.0

QC Report - Internal Standards per Lab Sample

Lab Sample ID: S55623.54

Sample Tag: DUP-05

Collected Date/Time: 11/08/2023 00:01

Matrix: Soil

COC Reference: 168368

Organics - Volatiles, Analysis: Trichloroethene

Run in Batch: 231117A5, Run Date: 11/17/2023 21:04, Matrix: SO, Dilution: 62.3

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**85.0**	50.0	200.0
1,4-Difluorobenzene		**86.5**	50.0	200.0
Chlorobenzene-D5		**88.1**	50.0	200.0
1,4-Dichlorobenzene-D4		**88.5**	50.0	200.0

QC Report - Internal Standards per QC Sample

Organics - Semi-Volatiles, Prep Batch ID: SF231114W1

QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: U231116B.BLKW14A

Run in Batch: U231116B, Run Date: 11/16/2023 18:27, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
1,4-Dichlorobenzene-D4		**95.7**	50.0	200.0
Naphthalene-D8		**96.3**	50.0	200.0
Acenaphthalene-D10		**93.5**	50.0	200.0
Phenanthrene-D10		**90.2**	50.0	200.0
Chrysene-D12		**88.3**	50.0	200.0
Perylene-D12		**81.9**	50.0	200.0

Blank (BLK)

Lab Sample ID: U231116C.BLKW14A

Run in Batch: U231116C, Run Date: 11/16/2023 18:27, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
1,4-Dichlorobenzene-D4		**120.7**	50.0	200.0
Naphthalene-D8		**121.2**	50.0	200.0
Acenaphthalene-D10		**122.3**	50.0	200.0
Phenanthrene-D10		**123.7**	50.0	200.0
Chrysene-D12		**123.3**	50.0	200.0
Perylene-D12		**122.1**	50.0	200.0

Blank (BLK)

Lab Sample ID: U231127.BLKW14A

Run in Batch: U231127, Run Date: 11/27/2023 17:06, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
Chrysene-D12		**66.9**	50.0	200.0
Acenaphthalene-D10		**79.3**	50.0	200.0

Laboratory Control Sample (LCS)

Lab Sample ID: U231116B.LCSW14A

Run in Batch: U231116B, Run Date: 11/16/2023 18:51, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
1,4-Dichlorobenzene-D4		**91.7**	50.0	200.0
Naphthalene-D8		**92.6**	50.0	200.0
Acenaphthalene-D10		**91.0**	50.0	200.0
Phenanthrene-D10		**90.3**	50.0	200.0
Chrysene-D12		**89.1**	50.0	200.0
Perylene-D12		**87.1**	50.0	200.0

QC Report - Internal Standards per QC Sample

Laboratory Control Sample (LCS)

Lab Sample ID: U231116C.LCSW14A

Run in Batch: U231116C, Run Date: 11/16/2023 18:51, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
1,4-Dichlorobenzene-D4		**115.7**	50.0	200.0
Naphthalene-D8		**116.5**	50.0	200.0
Acenaphthalene-D10		**119.1**	50.0	200.0
Phenanthrene-D10		**123.8**	50.0	200.0
Chrysene-D12		**124.4**	50.0	200.0
Perylene-D12		**129.7**	50.0	200.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: U231116B.LCSDW14A, Parent Sample ID: U231116B.LCSW14A

Run in Batch: U231116B, Run Date: 11/16/2023 19:16, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
1,4-Dichlorobenzene-D4		**90.5**	50.0	200.0
Naphthalene-D8		**91.2**	50.0	200.0
Acenaphthalene-D10		**89.5**	50.0	200.0
Phenanthrene-D10		**89.3**	50.0	200.0
Chrysene-D12		**88.1**	50.0	200.0
Perylene-D12		**86.4**	50.0	200.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: U231116C.LCSDW14A, Parent Sample ID: U231116C.LCSW14A

Run in Batch: U231116C, Run Date: 11/16/2023 19:16, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
1,4-Dichlorobenzene-D4		**114.1**	50.0	200.0
Naphthalene-D8		**114.7**	50.0	200.0
Acenaphthalene-D10		**117.0**	50.0	200.0
Phenanthrene-D10		**122.5**	50.0	200.0
Chrysene-D12		**123.0**	50.0	200.0
Perylene-D12		**128.7**	50.0	200.0

QC Report - Internal Standards per QC Sample

Organics - Semi-Volatiles, Prep Batch ID: SF231115W1

QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: U231117C.BLKW15A

Run in Batch: U231117C, Run Date: 11/17/2023 21:09, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
1,4-Dichlorobenzene-D4		**125.0**	50.0	200.0
Naphthalene-D8		**126.5**	50.0	200.0
Acenaphthalene-D10		**126.4**	50.0	200.0
Phenanthrene-D10		**118.8**	50.0	200.0
Chrysene-D12		**109.9**	50.0	200.0
Perylene-D12		**103.3**	50.0	200.0

Blank (BLK)

Lab Sample ID: U231117D.BLKW15A

Run in Batch: U231117D, Run Date: 11/17/2023 21:09, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
1,4-Dichlorobenzene-D4		**114.0**	50.0	200.0
Naphthalene-D8		**115.3**	50.0	200.0
Acenaphthalene-D10		**119.5**	50.0	200.0
Phenanthrene-D10		**120.6**	50.0	200.0
Chrysene-D12		**126.2**	50.0	200.0
Perylene-D12		**126.3**	50.0	200.0

Laboratory Control Sample (LCS)

Lab Sample ID: U231117C.LCSW15A

Run in Batch: U231117C, Run Date: 11/17/2023 21:33, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
1,4-Dichlorobenzene-D4		**115.5**	50.0	200.0
Naphthalene-D8		**116.6**	50.0	200.0
Acenaphthalene-D10		**116.8**	50.0	200.0
Phenanthrene-D10		**113.7**	50.0	200.0
Chrysene-D12		**113.4**	50.0	200.0
Perylene-D12		**113.6**	50.0	200.0

Laboratory Control Sample (LCS)

Lab Sample ID: U231117D.LCSW15A

Run in Batch: U231117D, Run Date: 11/17/2023 21:33, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
1,4-Dichlorobenzene-D4		**105.3**	50.0	200.0
Naphthalene-D8		**106.2**	50.0	200.0
Acenaphthalene-D10		**110.4**	50.0	200.0
Phenanthrene-D10		**115.4**	50.0	200.0
Chrysene-D12		**130.2**	50.0	200.0
Perylene-D12		**138.9**	50.0	200.0

QC Report - Internal Standards per QC Sample

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: U231117C.LCSDW15A, Parent Sample ID: U231117C.LCSW15A

Run in Batch: U231117C, Run Date: 11/17/2023 21:58, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	**%Rec**	LCL	UCL
1,4-Dichlorobenzene-D4		**121.8**	50.0	200.0
Naphthalene-D8		**122.5**	50.0	200.0
Acenaphthalene-D10		**123.3**	50.0	200.0
Phenanthrene-D10		**121.6**	50.0	200.0
Chrysene-D12		**120.7**	50.0	200.0
Perylene-D12		**121.1**	50.0	200.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: U231117D.LCSDW15A, Parent Sample ID: U231117D.LCSW15A

Run in Batch: U231117D, Run Date: 11/17/2023 21:58, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	**%Rec**	LCL	UCL
1,4-Dichlorobenzene-D4		**111.0**	50.0	200.0
Naphthalene-D8		**111.6**	50.0	200.0
Acenaphthalene-D10		**116.5**	50.0	200.0
Phenanthrene-D10		**123.5**	50.0	200.0
Chrysene-D12		**138.6**	50.0	200.0
Perylene-D12		**148.1**	50.0	200.0

QC Report - Internal Standards per QC Sample

Organics - Volatiles, Prep Batch ID: VF231113W2

QC Types: BLK/LCS/LCSD/MS/MSD

Blank (BLK)

Lab Sample ID: 231113A3.BLKW13A

Run in Batch: 231113A3, Run Date: 11/13/2023 14:36, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**94.2**	50.0	200.0
1,4-Difluorobenzene		**96.1**	50.0	200.0
Chlorobenzene-D5		**97.6**	50.0	200.0
1,4-Dichlorobenzene-D4		**90.1**	50.0	200.0

Laboratory Control Sample (LCS)

Lab Sample ID: 231113A3.LCSW13A

Run in Batch: 231113A3, Run Date: 11/13/2023 13:03, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**103.2**	50.0	200.0
1,4-Difluorobenzene		**102.3**	50.0	200.0
Chlorobenzene-D5		**103.6**	50.0	200.0
1,4-Dichlorobenzene-D4		**103.8**	50.0	200.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: 231113A3.LCSDW13A, Parent Sample ID: 231113A3.LCSW13A

Run in Batch: 231113A3, Run Date: 11/13/2023 13:26, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**98.5**	50.0	200.0
1,4-Difluorobenzene		**99.4**	50.0	200.0
Chlorobenzene-D5		**100.1**	50.0	200.0
1,4-Dichlorobenzene-D4		**101.0**	50.0	200.0

Matrix Spike (MS)

Lab Sample ID: 231113A3.5560906M, Parent Sample ID: S55609.05

Run in Batch: 231113A3, Run Date: 11/13/2023 22:01, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**94.5**	50.0	200.0
1,4-Difluorobenzene		**97.7**	50.0	200.0
Chlorobenzene-D5		**97.7**	50.0	200.0
1,4-Dichlorobenzene-D4		**97.4**	50.0	200.0

Matrix Spike Duplicate (MSD)

Lab Sample ID: 231113A3.5560907N, Parent Sample ID: 231113A3.5560906M

Run in Batch: 231113A3, Run Date: 11/13/2023 22:25, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**93.9**	50.0	200.0
1,4-Difluorobenzene		**95.3**	50.0	200.0
Chlorobenzene-D5		**97.6**	50.0	200.0
1,4-Dichlorobenzene-D4		**98.4**	50.0	200.0

QC Report - Internal Standards per QC Sample

Organics - Volatiles, Prep Batch ID: VF231114S1

QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: 231114A5.BLKS14A

Run in Batch: 231114A5, Run Date: 11/14/2023 14:03, Prep Date: 11/14/2023, Matrix: SO, Dilution: 50

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**101.6**	50.0	200.0
1,4-Difluorobenzene		**101.6**	50.0	200.0
Chlorobenzene-D5		**101.6**	50.0	200.0
1,4-Dichlorobenzene-D4		**103.3**	50.0	200.0

Laboratory Control Sample (LCS)

Lab Sample ID: 231114A5.LCSS14A

Run in Batch: 231114A5, Run Date: 11/14/2023 12:05, Prep Date: 11/14/2023, Matrix: SO, Dilution: 50

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**96.4**	50.0	200.0
1,4-Difluorobenzene		**95.9**	50.0	200.0
Chlorobenzene-D5		**96.4**	50.0	200.0
1,4-Dichlorobenzene-D4		**96.5**	50.0	200.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: 231114A5.LCSDS14A, Parent Sample ID: 231114A5.LCSS14A

Run in Batch: 231114A5, Run Date: 11/14/2023 12:28, Prep Date: 11/14/2023, Matrix: SO, Dilution: 50

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**94.9**	50.0	200.0
1,4-Difluorobenzene		**94.5**	50.0	200.0
Chlorobenzene-D5		**94.3**	50.0	200.0
1,4-Dichlorobenzene-D4		**93.9**	50.0	200.0

QC Report - Internal Standards per QC Sample

Organics - Volatiles, Prep Batch ID: VF231114S3

QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: 231114B5.BLKS14B

Run in Batch: 231114B5, Run Date: 11/15/2023 00:45, Prep Date: 11/14/2023, Matrix: WW, Dilution: 50

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**98.9**	50.0	200.0
1,4-Difluorobenzene		**100.5**	50.0	200.0
Chlorobenzene-D5		**100.9**	50.0	200.0
1,4-Dichlorobenzene-D4		**101.1**	50.0	200.0

Laboratory Control Sample (LCS)

Lab Sample ID: 231114B5.LCSS14B

Run in Batch: 231114B5, Run Date: 11/14/2023 23:34, Prep Date: 11/14/2023, Matrix: WW, Dilution: 50

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**99.4**	50.0	200.0
1,4-Difluorobenzene		**99.8**	50.0	200.0
Chlorobenzene-D5		**100.5**	50.0	200.0
1,4-Dichlorobenzene-D4		**99.6**	50.0	200.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: 231114B5.LCSDS14B, Parent Sample ID: 231114B5.LCSS14B

Run in Batch: 231114B5, Run Date: 11/14/2023 23:58, Prep Date: 11/14/2023, Matrix: WW, Dilution: 50

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**91.7**	50.0	200.0
1,4-Difluorobenzene		**92.9**	50.0	200.0
Chlorobenzene-D5		**94.0**	50.0	200.0
1,4-Dichlorobenzene-D4		**93.0**	50.0	200.0

QC Report - Internal Standards per QC Sample

Organics - Volatiles, Prep Batch ID: VF231117S1

QC Types: BLK/LCS/LCSD/MS/MSD

Blank (BLK)

Lab Sample ID: 231117A5.BLKS17A

Run in Batch: 231117A5, Run Date: 11/17/2023 16:21, Prep Date: 11/17/2023, Matrix: WW, Dilution: 50

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**89.6**	50.0	200.0
1,4-Difluorobenzene		**90.3**	50.0	200.0
Chlorobenzene-D5		**92.1**	50.0	200.0
1,4-Dichlorobenzene-D4		**92.2**	50.0	200.0

Blank (BLK)

Lab Sample ID: 231117D5.BLKS17A

Run in Batch: 231117D5, Run Date: 11/17/2023 16:21, Prep Date: 11/17/2023, Matrix: SO, Dilution: 50

Internal Standard	Flags	%Rec	LCL	UCL
1,4-Difluorobenzene		**89.6**	50.0	200.0
Chlorobenzene-D5		**93.0**	50.0	200.0
1,4-Dichlorobenzene-D4		**92.4**	50.0	200.0

Laboratory Control Sample (LCS)

Lab Sample ID: 231117A5.LCSS17A

Run in Batch: 231117A5, Run Date: 11/17/2023 14:22, Prep Date: 11/17/2023, Matrix: WW, Dilution: 50

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**98.9**	50.0	200.0
1,4-Difluorobenzene		**98.5**	50.0	200.0
Chlorobenzene-D5		**99.0**	50.0	200.0
1,4-Dichlorobenzene-D4		**96.7**	50.0	200.0

Laboratory Control Sample (LCS)

Lab Sample ID: 231117D5.LCSG17A

Run in Batch: 231117D5, Run Date: 11/17/2023 15:33, Prep Date: 11/17/2023, Matrix: SO, Dilution: 50

Internal Standard	Flags	%Rec	LCL	UCL
1,4-Difluorobenzene		**99.7**	50.0	200.0
Chlorobenzene-D5		**100.4**	50.0	200.0
1,4-Dichlorobenzene-D4		**100.1**	50.0	200.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: 231117A5.LCSDS17A, Parent Sample ID: 231117A5.LCSS17A

Run in Batch: 231117A5, Run Date: 11/17/2023 14:46, Prep Date: 11/17/2023, Matrix: WW, Dilution: 50

Internal Standard	Flags	%Rec	LCL	UCL
Pentafluorobenzene		**92.4**	50.0	200.0
1,4-Difluorobenzene		**93.0**	50.0	200.0
Chlorobenzene-D5		**93.9**	50.0	200.0
1,4-Dichlorobenzene-D4		**93.8**	50.0	200.0

QC Report - Internal Standards per QC Sample

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: 231117D5.LCSDG17A, Parent Sample ID: 231117D5.LCSG17A

Run in Batch: 231117D5, Run Date: 11/17/2023 15:57, Prep Date: 11/17/2023, Matrix: SO, Dilution: 50

Internal Standard	Flags	**%Rec**	LCL	UCL
1,4-Difluorobenzene		**90.7**	50.0	200.0
Chlorobenzene-D5		**90.6**	50.0	200.0
1,4-Dichlorobenzene-D4		**90.5**	50.0	200.0

Matrix Spike (MS)

Lab Sample ID: 231117A5.5562333M, Parent Sample ID: S55623.32

Run in Batch: 231117A5, Run Date: 11/17/2023 23:50, Prep Date: 11/17/2023, Matrix: SO, Dilution: 63.6

Internal Standard	Flags	**%Rec**	LCL	UCL
Pentafluorobenzene		**82.4**	50.0	200.0
1,4-Difluorobenzene		**84.2**	50.0	200.0
Chlorobenzene-D5		**84.8**	50.0	200.0
1,4-Dichlorobenzene-D4		**84.1**	50.0	200.0

Matrix Spike Duplicate (MSD)

Lab Sample ID: 231117A5.5562334N, Parent Sample ID: 231117A5.5562333M

Run in Batch: 231117A5, Run Date: 11/18/2023 00:14, Prep Date: 11/17/2023, Matrix: SO, Dilution: 59.4

Internal Standard	Flags	**%Rec**	LCL	UCL
Pentafluorobenzene		**82.7**	50.0	200.0
1,4-Difluorobenzene		**83.4**	50.0	200.0
Chlorobenzene-D5		**84.5**	50.0	200.0
1,4-Dichlorobenzene-D4		**84.9**	50.0	200.0

QC Report - Batch QC Results

Inorganics, Prep Batch ID: TS231113B

Surrogates: No, QC Types: BLK/LCS/DUP

Blank (BLK)

Lab Sample ID: TS231113B.LRB1

Run in Batch: TS231113B, Run Date: 11/13/2023 13:55, Prep Date: 11/13/2023, Matrix: Liquid, Dilution: 1

Analyte	Flags	Conc	RDL	Units
Total Solids		ND	1	%

Laboratory Control Sample (LCS)

Lab Sample ID: TS231113B.LCS1

Run in Batch: TS231113B, Run Date: 11/13/2023 13:55, Prep Date: 11/13/2023, Matrix: Liquid, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
Total Solids		100	90	110

Duplicate (DUP)

Lab Sample ID: TS231113B.DP1, Parent Sample ID: S55672.01

Run in Batch: TS231113B, Run Date: 11/13/2023 13:55, Prep Date: 11/13/2023, Matrix: Soil, Dilution: 1

Analyte	Flags	RPD	RPD CL
Total Solids		1	5

Duplicate (DUP)

Lab Sample ID: TS231113B.DP2, Parent Sample ID: S55076.02

Run in Batch: TS231113B, Run Date: 11/13/2023 13:55, Prep Date: 11/13/2023, Matrix: Soil, Dilution: 1

Analyte	Flags	RPD	RPD CL
Total Solids		3	5

QC Report - Batch QC Results

Inorganics, Prep Batch ID: TS231113C

Surrogates: No, QC Types: BLK/LCS/DUP

Blank (BLK)

Lab Sample ID: TS231113C.LRB1

Run in Batch: TS231113C, Run Date: 11/13/2023 14:51, Prep Date: 11/13/2023, Matrix: Liquid, Dilution: 1

Analyte	Flags	Conc	RDL	Units
Total Solids		ND	1	%

Laboratory Control Sample (LCS)

Lab Sample ID: TS231113C.LCS1

Run in Batch: TS231113C, Run Date: 11/13/2023 14:51, Prep Date: 11/13/2023, Matrix: Liquid, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
Total Solids		100	90	110

Duplicate (DUP)

Lab Sample ID: TS231113C.DP1, Parent Sample ID: S55623.07

Run in Batch: TS231113C, Run Date: 11/13/2023 14:51, Prep Date: 11/13/2023, Matrix: Soil, Dilution: 1

Analyte	Flags	RPD	RPD CL
Total Solids		1	5

Duplicate (DUP)

Lab Sample ID: TS231113C.DP2, Parent Sample ID: S55623.17

Run in Batch: TS231113C, Run Date: 11/13/2023 14:51, Prep Date: 11/13/2023, Matrix: Soil, Dilution: 1

Analyte	Flags	RPD	RPD CL
Total Solids		0	5

QC Report - Batch QC Results

Inorganics, Prep Batch ID: TS231113D

Surrogates: No, QC Types: BLK/LCS/DUP

Blank (BLK)

Lab Sample ID: TS231113D.LRB1

Run in Batch: TS231113D, Run Date: 11/13/2023 14:51, Prep Date: 11/13/2023, Matrix: Liquid, Dilution: 1

Analyte	Flags	Conc	RDL	Units
Total Solids		ND	1	%

Laboratory Control Sample (LCS)

Lab Sample ID: TS231113D.LCS1

Run in Batch: TS231113D, Run Date: 11/13/2023 14:51, Prep Date: 11/13/2023, Matrix: Liquid, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
Total Solids		100	90	110

Duplicate (DUP)

Lab Sample ID: TS231113D.DP1, Parent Sample ID: S55623.27

Run in Batch: TS231113D, Run Date: 11/13/2023 14:51, Prep Date: 11/13/2023, Matrix: Soil, Dilution: 1

Analyte	Flags	RPD	RPD CL
Total Solids		0	5

Duplicate (DUP)

Lab Sample ID: TS231113D.DP2, Parent Sample ID: S55623.37

Run in Batch: TS231113D, Run Date: 11/13/2023 14:51, Prep Date: 11/13/2023, Matrix: Soil, Dilution: 1

Analyte	Flags	RPD	RPD CL
Total Solids		0	5

QC Report - Batch QC Results

Inorganics, Prep Batch ID: TS231113E

Surrogates: No, QC Types: BLK/LCS/DUP

Blank (BLK)

Lab Sample ID: TS231113E.LRB1

Run in Batch: TS231113E, Run Date: 11/13/2023 15:03, Prep Date: 11/13/2023, Matrix: Liquid, Dilution: 1

Analyte	Flags	Conc	RDL	Units
Total Solids		ND	1	%

Laboratory Control Sample (LCS)

Lab Sample ID: TS231113E.LCS1

Run in Batch: TS231113E, Run Date: 11/13/2023 15:03, Prep Date: 11/13/2023, Matrix: Liquid, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
Total Solids		100	90	110

Duplicate (DUP)

Lab Sample ID: TS231113E.DP1, Parent Sample ID: S55623.51

Run in Batch: TS231113E, Run Date: 11/13/2023 15:03, Prep Date: 11/13/2023, Matrix: Soil, Dilution: 1

Analyte	Flags	RPD	RPD CL
Total Solids		0	5

QC Report - Batch QC Results

Metals, Prep Batch ID: MTD-111623-1

Surrogates: No, QC Types: BLK/LCS/MS/MSD

Blank (BLK)

Lab Sample ID: MT5-23-1116A.022.LRB

Run in Batch: MT5-23-1116A, Run Date: 11/16/2023 11:25, Prep Date: 11/16/2023, Matrix: Liquid, Dilution: 1

Analyte	Flags	Conc	RDL	Units
Arsenic		ND	0.0004	mg/L

Laboratory Control Sample (LCS)

Lab Sample ID: MT5-23-1116A.021.LCS

Run in Batch: MT5-23-1116A, Run Date: 11/16/2023 11:23, Prep Date: 11/16/2023, Matrix: Liquid, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
Arsenic		101	85	115

Matrix Spike (MS)

Lab Sample ID: MT5-23-1116A.034.MS, Parent Sample ID: S55623.14

Run in Batch: MT5-23-1116A, Run Date: 11/16/2023 11:46, Prep Date: 11/16/2023, Matrix: Soil, Dilution: 279

Analyte	Flags	% Rec	LCL	UCL
Arsenic		122	75	125

Matrix Spike (MS)

Lab Sample ID: MT5-23-1116A.036.MS, Parent Sample ID: S55623.14

Run in Batch: MT5-23-1116A, Run Date: 11/16/2023 11:52, Prep Date: 11/16/2023, Matrix: Soil, Dilution: 262

Analyte	Flags	% Rec	LCL	UCL
Arsenic		108	75	125

Matrix Spike Duplicate (MSD)

Lab Sample ID: MT5-23-1116A.035.MSD, Parent Sample ID: MT5-23-1116A.034.MS

Run in Batch: MT5-23-1116A, Run Date: 11/16/2023 11:48, Prep Date: 11/16/2023, Matrix: Soil, Dilution: 270

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
Arsenic		103	75	125	14	20

QC Report - Batch QC Results

Organics - PCBs/Pesticides, Prep Batch ID: PA231110W1

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: e23111509.sblk-w.01

Run in Batch: E231115, Run Date: 11/15/2023 12:11, Prep Date: 11/10/2023, Matrix: WW, Dilution: 1

Analyte	Flags	Conc	RDL	Units
PCB-1016		ND	0.10	ug/L
PCB-1221		ND	0.10	ug/L
PCB-1232		ND	0.10	ug/L
PCB-1242		ND	0.10	ug/L
PCB-1248		ND	0.10	ug/L
PCB-1254		ND	0.10	ug/L
PCB-1260		ND	0.10	ug/L

Laboratory Control Sample (LCS)

Lab Sample ID: e23111510.slcs-w.01

Run in Batch: E231115, Run Date: 11/15/2023 12:23, Prep Date: 11/10/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
PCB-1016/1260		95.60	50.0	125.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: e23111511.slcs-w.01d, Parent Sample ID: e23111510.slcs-w.01

Run in Batch: E231115, Run Date: 11/15/2023 12:35, Prep Date: 11/10/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
PCB-1016/1260		95.18	50.0	125.0	0.4	20.0

QC Report - Batch QC Results

Organics - PCBs/Pesticides, Prep Batch ID: PA231117S3

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: a23112006.sblk-s.01

Run in Batch: A231120, Run Date: 11/20/2023 13:52, Prep Date: 11/17/2023, Matrix: SO, Dilution: 1

Analyte	Flags	Conc	RDL	Units
PCB-1016		ND	5.00	ug/kg
PCB-1242		ND	5.00	ug/kg
PCB-1221		ND	5.00	ug/kg
PCB-1232		ND	5.00	ug/kg
PCB-1248		ND	5.00	ug/kg
PCB-1254		ND	5.00	ug/kg
PCB-1260		ND	5.00	ug/kg

Laboratory Control Sample (LCS)

Lab Sample ID: a23112007.slcs-s.01

Run in Batch: A231120, Run Date: 11/20/2023 14:03, Prep Date: 11/17/2023, Matrix: SO, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
PCB-1016/1260		86.94	50.0	125.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: a23112008.slcs-s.01d, Parent Sample ID: a23112007.slcs-s.01

Run in Batch: A231120, Run Date: 11/20/2023 14:41, Prep Date: 11/17/2023, Matrix: SO, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
PCB-1016/1260		97.52	50.0	125.0	11.5	20.0

QC Report - Batch QC Results

Organics - PCBs/Pesticides, Prep Batch ID: PA231120S2

Surrogates: Yes, QC Types: BLK/LCS/MS/MSD

Blank (BLK)

Lab Sample ID: a23112212.sblk-s.03

Run in Batch: A231122, Run Date: 11/22/2023 13:58, Prep Date: 11/20/2023, Matrix: SO, Dilution: 1

Analyte	Flags	Conc	RDL	Units
PCB-1016		ND	5.00	ug/kg
PCB-1242		ND	5.00	ug/kg
PCB-1221		ND	5.00	ug/kg
PCB-1232		ND	5.00	ug/kg
PCB-1248		ND	5.00	ug/kg
PCB-1254		ND	5.00	ug/kg
PCB-1260		ND	5.00	ug/kg

Laboratory Control Sample (LCS)

Lab Sample ID: a23112213.slcs-s.03

Run in Batch: A231122, Run Date: 11/22/2023 14:11, Prep Date: 11/20/2023, Matrix: SO, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
PCB-1016/1260		101.84	50.0	125.0

Matrix Spike (MS)

Lab Sample ID: a23112215.s55623.47, Parent Sample ID: S55623.46

Run in Batch: A231122, Run Date: 11/22/2023 14:35, Prep Date: 11/20/2023, Matrix: SO, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
PCB-1016/1260		99.36	50.0	125.0

Matrix Spike Duplicate (MSD)

Lab Sample ID: a23112216.s55623.48, Parent Sample ID: a23112215.s55623.47

Run in Batch: A231122, Run Date: 11/22/2023 14:57, Prep Date: 11/20/2023, Matrix: SO, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
PCB-1016/1260		94.06	50.0	125.0	5.3	20.0

QC Report - Batch QC Results

Organics - Semi-Volatiles, Prep Batch ID: SF231114W1

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: U231116B.BLKW14A

Run in Batch: U231116B, Run Date: 11/16/2023 18:27, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Analyte	Flags	Conc	RDL	Units
Acenaphthene		ND	0.00050	mg/l
Acenaphthylene		ND	0.00050	mg/l
Anthracene		ND	0.00050	mg/l
Benzo(a)anthracene		ND	0.00050	mg/l
Benzo(b)fluoranthene		ND	0.00050	mg/l
Benzo(k)fluoranthene		ND	0.00050	mg/l
Benzo(ghi)perylene		ND	0.00050	mg/l
Benzo(a)pyrene		ND	0.00050	mg/l
bis(2-Chloroethoxy)methane		ND	0.00050	mg/l
bis(2-Chloroethyl)ether		ND	0.00050	mg/l
bis(2-Chloroisopropyl)ether		ND	0.00050	mg/l
bis(2-Ethylhexyl)phthalate		ND	0.00050	mg/l
4-Bromophenyl phenyl ether		ND	0.00050	mg/l
Butyl benzyl phthalate		ND	0.00050	mg/l
4-Chloroaniline		ND	0.00050	mg/l
2-Chloronaphthalene		ND	0.00050	mg/l
4-Chloro-3-methylphenol		ND	0.00050	mg/l
2-Chlorophenol		ND	0.00050	mg/l
4-Chlorophenyl phenyl ether		ND	0.00050	mg/l
Chrysene		ND	0.00050	mg/l
3-, 4-Methylphenol (p,m-Cresol)		ND	0.00050	mg/l
2-Methylphenol (o-Cresol)		ND	0.00050	mg/l
Dibenzo(ah)anthracene		ND	0.00050	mg/l
Dibenzofuran		ND	0.00050	mg/l
di-n-Butyl phthalate		ND	0.00050	mg/l
1,2-Dichlorobenzene		ND	0.00050	mg/l
1,3-Dichlorobenzene		ND	0.00050	mg/l
1,4-Dichlorobenzene		ND	0.00050	mg/l
3,3'-Dichlorobenzidine		ND	0.00050	mg/l
2,4-Dichlorophenol		ND	0.00050	mg/l
Diethyl phthalate		ND	0.00050	mg/l
2,4-Dimethylphenol		ND	0.00050	mg/l
Dimethyl phthalate		ND	0.00050	mg/l
4,6-Dinitro-2-methylphenol		ND	0.00050	mg/l
2,4-Dinitrophenol		ND	0.00050	mg/l
2,4-Dinitrotoluene		ND	0.00050	mg/l
2,6-Dinitrotoluene		ND	0.00050	mg/l
1,2-Diphenylhydrazine		ND	0.00050	mg/l
di-n-Octyl phthalate		ND	0.00050	mg/l
Fluoranthene		ND	0.00050	mg/l
Fluorene		ND	0.00050	mg/l
Hexachlorobenzene		ND	0.00050	mg/l
Hexachlorobutadiene		ND	0.00050	mg/l
Hexachlorocyclopentadiene		ND	0.00050	mg/l
Hexachloroethane		ND	0.00050	mg/l
Indeno(1,2,3-cd)pyrene		ND	0.00050	mg/l

QC Report - Batch QC Results

Organics - Semi-Volatiles, Prep Batch ID: SF231114W1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Blank (BLK) (continued)

Lab Sample ID: U231116B.BLKW14A

Run in Batch: U231116B, Run Date: 11/16/2023 18:27, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Analyte	Flags	Conc	RDL	Units
Isophorone		ND	0.00050	mg/l
2-Methylnaphthalene		ND	0.00050	mg/l
Naphthalene		ND	0.00050	mg/l
2-Nitroaniline		ND	0.00050	mg/l
3-Nitroaniline		ND	0.00050	mg/l
4-Nitroaniline		ND	0.00050	mg/l
Nitrobenzene		ND	0.00050	mg/l
2-Nitrophenol		ND	0.00050	mg/l
4-Nitrophenol		ND	0.00050	mg/l
N-Nitrosodiphenylamine		ND	0.00050	mg/l
N-Nitrosodi-n-propylamine		ND	0.00050	mg/l
Pentachlorophenol		ND	0.00050	mg/l
Phenanthrene		ND	0.00050	mg/l
Phenol		ND	0.00050	mg/l
Pyrene		ND	0.00050	mg/l
1,2,4-Trichlorobenzene		ND	0.00050	mg/l
2,4,5-Trichlorophenol		ND	0.00050	mg/l
2,4,6-Trichlorophenol		ND	0.00050	mg/l

Blank (BLK)

Lab Sample ID: U231127.BLKW14A

Run in Batch: U231127, Run Date: 11/27/2023 17:06, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Analyte	Flags	Conc	RDL	Units
Benzo(a)pyrene		ND	0.01	ug/l
Hexachlorobenzene		ND	0.01	ug/l
Hexachlorobutadiene		ND	0.01	ug/l
Hexachlorocyclopentadiene		ND	0.01	ug/l

Laboratory Control Sample (LCS)

Lab Sample ID: U231116B.LCSW14A

Run in Batch: U231116B, Run Date: 11/16/2023 18:51, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
Acenaphthene		63.5	27	111
Acenaphthylene		64.5	16	116
Anthracene		69.3	31	119
Benzo(a)anthracene		68.2	35	119
Benzo(b)fluoranthene		67.1	27	129
Benzo(k)fluoranthene		67.4	36	120
Benzo(ghi)perylene		78.9	31	126
Benzo(a)pyrene		68.6	32	121
bis(2-Chloroethoxy)methane		61.0	23	106
bis(2-Chloroethyl)ether		57.9	29	94
bis(2-Chloroisopropyl)ether		57.2	23	91
bis(2-Ethylhexyl)phthalate		75.7	35	121
4-Bromophenyl phenyl ether		67.5	27	122
Butyl benzyl phthalate		74.3	36	117

Organics - Semi-Volatiles, Prep Batch ID: SF231114W1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Laboratory Control Sample (LCS) (continued)

Lab Sample ID: U231116B.LCSW14A

Run in Batch: U231116B, Run Date: 11/16/2023 18:51, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
4-Chloroaniline		44.3	19	91
2-Chloronaphthalene		59.3	21	109
4-Chloro-3-methylphenol		60.7	36	105
2-Chlorophenol		47.7	24	94
4-Chlorophenyl phenyl ether		66.4	31	114
Chrysene		69.9	34	119
3-, 4-Methylphenol (p,m-Cresol)		42.1	21	90
2-Methylphenol (o-Cresol)		44.3	23	79
Dibenzo(ah)anthracene		77.5	32	119
Dibenzofuran		65.0	29	115
di-n-Butyl phthalate		73.5	34	121
1,2-Dichlorobenzene		41.2	11	88
1,3-Dichlorobenzene		37.5	10	85
1,4-Dichlorobenzene		38.5	10	85
3,3'-Dichlorobenzidine		57.1	27	110
2,4-Dichlorophenol		58.7	33	106
Diethyl phthalate		70.1	36	116
2,4-Dimethylphenol		56.2	30	105
Dimethyl phthalate		68.1	35	116
4,6-Dinitro-2-methylphenol		69.1	19	116
2,4-Dinitrophenol		62.8	10	125
2,4-Dinitrotoluene		66.4	33	119
2,6-Dinitrotoluene		65.9	34	117
1,2-Diphenylhydrazine		67.2	34	113
di-n-Octyl phthalate		74.4	30	133
Fluoranthene		69.8	35	121
Fluorene		66.6	32	114
Hexachlorobenzene		66.4	26	126
Hexachlorobutadiene		37.5	10	95
Hexachlorocyclopentadiene		55.8	10	90
Hexachloroethane		34.5	10	82
Indeno(1,2,3-cd)pyrene		77.0	31	124
Isophorone		63.7	26	104
2-Methylnaphthalene		56.0	21	103
Naphthalene		53.6	21	99
2-Nitroaniline		64.4	34	111
3-Nitroaniline		46.2	34	111
4-Nitroaniline		57.3	34	100
Nitrobenzene		57.7	30	98
2-Nitrophenol		58.4	31	108
4-Nitrophenol		37.9	10	90
N-Nitrosodiphenylamine		68.1	31	120
N-Nitrosodi-n-propylamine		61.4	33	102
Pentachlorophenol		68.9	10	108
Phenanthrene		67.9	35	113
Phenol		25.6	10	43

Organics - Semi-Volatiles, Prep Batch ID: SF231114W1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Laboratory Control Sample (LCS) (continued)

Lab Sample ID: U231116B.LCSW14A

Run in Batch: U231116B, Run Date: 11/16/2023 18:51, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
Pyrene		71.4	33	120
1,2,4-Trichlorobenzene		44.7	10	98
2,4,5-Trichlorophenol		66.0	31	120
2,4,6-Trichlorophenol		64.5	31	114

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: U231116B.LCSDW14A, Parent Sample ID: U231116B.LCSW14A

Run in Batch: U231116B, Run Date: 11/16/2023 19:16, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
Acenaphthene		73.0	27	111	13.9	30.0
Acenaphthylene		73.2	16	116	12.6	30.0
Anthracene		79.0	31	119	13.1	30.0
Benzo(a)anthracene		78.0	35	119	13.4	30.0
Benzo(b)fluoranthene		78.7	27	129	15.9	30.0
Benzo(k)fluoranthene		74.2	36	120	9.6	30.0
Benzo(ghi)perylene		89.3	31	126	12.3	30.0
Benzo(a)pyrene		78.1	32	121	12.9	30.0
bis(2-Chloroethoxy)methane		70.4	23	106	14.3	30.0
bis(2-Chloroethyl)ether		67.8	29	94	15.7	30.0
bis(2-Chloroisopropyl)ether		65.5	23	91	13.6	30.0
bis(2-Ethylhexyl)phthalate		86.4	35	121	13.3	30.0
4-Bromophenyl phenyl ether		76.5	27	122	12.5	30.0
Butyl benzyl phthalate		85.3	36	117	13.8	30.0
4-Chloroaniline		48.3	19	91	8.7	30.0
2-Chloronaphthalene		67.3	21	109	12.7	30.0
4-Chloro-3-methylphenol		70.7	36	105	15.1	30.0
2-Chlorophenol		55.7	24	94	15.5	30.0
4-Chlorophenyl phenyl ether		75.5	31	114	12.9	30.0
Chrysene		79.3	34	119	12.7	30.0
3-, 4-Methylphenol (p,m-Cresol)		48.9	21	90	15.1	30.0
2-Methylphenol (o-Cresol)		51.4	23	79	14.8	30.0
Dibenzo(ah)anthracene		87.8	32	119	12.5	30.0
Dibenzofuran		73.5	29	115	12.4	30.0
di-n-Butyl phthalate		82.9	34	121	12.0	30.0
1,2-Dichlorobenzene		45.7	11	88	10.5	30.0
1,3-Dichlorobenzene		40.8	10	85	8.4	30.0
1,4-Dichlorobenzene		42.2	10	85	9.3	30.0
3,3'-Dichlorobenzidine		61.6	27	110	7.5	30.0
2,4-Dichlorophenol		68.1	33	106	14.9	30.0
Diethyl phthalate		80.1	36	116	13.3	30.0
2,4-Dimethylphenol		64.5	30	105	13.7	30.0
Dimethyl phthalate		78.0	35	116	13.6	30.0
4,6-Dinitro-2-methylphenol		81.7	19	116	16.8	30.0
2,4-Dinitrophenol		77.7	10	125	21.3	30.0
2,4-Dinitrotoluene		76.7	33	119	14.4	30.0
2,6-Dinitrotoluene		76.4	34	117	14.7	30.0

Organics - Semi-Volatiles, Prep Batch ID: SF231114W1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Laboratory Control Sample Duplicate (LCSD) (continued)

Lab Sample ID: U231116B.LCSDW14A, Parent Sample ID: U231116B.LCSW14A

Run in Batch: U231116B, Run Date: 11/16/2023 19:16, Prep Date: 11/14/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
1,2-Diphenylhydrazine		76.8	34	113	13.3	30.0
di-n-Octyl phthalate		84.4	30	133	12.6	30.0
Fluoranthene		79.0	35	121	12.4	30.0
Fluorene		75.6	32	114	12.6	30.0
Hexachlorobenzene		75.5	26	126	12.8	30.0
Hexachlorobutadiene		39.8	10	95	6.0	30.0
Hexachlorocyclopentadiene		62.7	10	90	11.6	30.0
Hexachloroethane		36.3	10	82	5.1	30.0
Indeno(1,2,3-cd)pyrene		86.0	31	124	11.1	30.0
Isophorone		72.7	26	104	13.2	30.0
2-Methylnaphthalene		63.6	21	103	12.6	30.0
Naphthalene		61.6	21	99	13.9	30.0
2-Nitroaniline		75.4	34	111	15.7	30.0
3-Nitroaniline		51.2	34	111	10.3	30.0
4-Nitroaniline		67.6	34	100	16.5	30.0
Nitrobenzene		67.0	30	98	15.0	30.0
2-Nitrophenol		68.5	31	108	15.9	30.0
4-Nitrophenol		45.2	10	90	17.7	30.0
N-Nitrosodiphenylamine		77.0	31	120	12.3	30.0
N-Nitrosodi-n-propylamine		70.2	33	102	13.4	30.0
Pentachlorophenol		80.5	10	108	15.6	30.0
Phenanthrene		77.2	35	113	12.8	30.0
Phenol		29.9	10	43	15.5	30.0
Pyrene		81.0	33	120	12.7	30.0
1,2,4-Trichlorobenzene		49.9	10	98	11.0	30.0
2,4,5-Trichlorophenol		76.8	31	120	15.0	30.0
2,4,6-Trichlorophenol		74.8	31	114	14.7	30.0

QC Report - Batch QC Results

Organics - Semi-Volatiles, Prep Batch ID: SF231115W1

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: U231117C.BLKW15A

Run in Batch: U231117C, Run Date: 11/17/2023 21:09, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Analyte	Flags	Conc	RDL	Units
Acenaphthene		ND	0.00050	mg/l
Acenaphthylene		ND	0.00050	mg/l
Anthracene		ND	0.00050	mg/l
Benzo(a)anthracene		ND	0.00050	mg/l
Benzo(b)fluoranthene		ND	0.00050	mg/l
Benzo(k)fluoranthene		ND	0.00050	mg/l
Benzo(ghi)perylene		ND	0.00050	mg/l
Benzo(a)pyrene		ND	0.00050	mg/l
bis(2-Chloroethoxy)methane		ND	0.00050	mg/l
bis(2-Chloroethyl)ether		ND	0.00050	mg/l
bis(2-Chloroisopropyl)ether		ND	0.00050	mg/l
bis(2-Ethylhexyl)phthalate		ND	0.00050	mg/l
4-Bromophenyl phenyl ether		ND	0.00050	mg/l
Butyl benzyl phthalate		ND	0.00050	mg/l
4-Chloroaniline		ND	0.00050	mg/l
2-Chloronaphthalene		ND	0.00050	mg/l
4-Chloro-3-methylphenol		ND	0.00050	mg/l
2-Chlorophenol		ND	0.00050	mg/l
4-Chlorophenyl phenyl ether		ND	0.00050	mg/l
Chrysene		ND	0.00050	mg/l
3-, 4-Methylphenol (p,m-Cresol)		ND	0.00050	mg/l
2-Methylphenol (o-Cresol)		ND	0.00050	mg/l
Dibenzo(ah)anthracene		ND	0.00050	mg/l
Dibenzofuran		ND	0.00050	mg/l
di-n-Butyl phthalate		ND	0.00050	mg/l
1,2-Dichlorobenzene		ND	0.00050	mg/l
1,3-Dichlorobenzene		ND	0.00050	mg/l
1,4-Dichlorobenzene		ND	0.00050	mg/l
3,3'-Dichlorobenzidine		ND	0.00050	mg/l
2,4-Dichlorophenol		ND	0.00050	mg/l
Diethyl phthalate		ND	0.00050	mg/l
2,4-Dimethylphenol		ND	0.00050	mg/l
Dimethyl phthalate		ND	0.00050	mg/l
4,6-Dinitro-2-methylphenol		ND	0.00050	mg/l
2,4-Dinitrophenol		ND	0.00050	mg/l
2,4-Dinitrotoluene		ND	0.00050	mg/l
2,6-Dinitrotoluene		ND	0.00050	mg/l
1,2-Diphenylhydrazine		ND	0.00050	mg/l
di-n-Octyl phthalate		ND	0.00050	mg/l
Fluoranthene		ND	0.00050	mg/l
Fluorene		ND	0.00050	mg/l
Hexachlorobenzene		ND	0.00050	mg/l
Hexachlorobutadiene		ND	0.00050	mg/l
Hexachlorocyclopentadiene		ND	0.00050	mg/l
Hexachloroethane		ND	0.00050	mg/l
Indeno(1,2,3-cd)pyrene		ND	0.00050	mg/l

Organics - Semi-Volatiles, Prep Batch ID: SF231115W1 (continued)
Surrogates: Yes, QC Types: BLK/LCS/LCSD

Blank (BLK) (continued)
Lab Sample ID: U231117C.BLKW15A
Run in Batch: U231117C, Run Date: 11/17/2023 21:09, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Analyte	Flags	Conc	RDL	Units
Isophorone		ND	0.00050	mg/l
2-Methylnaphthalene		ND	0.00050	mg/l
Naphthalene		ND	0.00050	mg/l
2-Nitroaniline		ND	0.00050	mg/l
3-Nitroaniline		ND	0.00050	mg/l
4-Nitroaniline		ND	0.00050	mg/l
Nitrobenzene		ND	0.00050	mg/l
2-Nitrophenol		ND	0.00050	mg/l
4-Nitrophenol		ND	0.00050	mg/l
N-Nitrosodiphenylamine		ND	0.00050	mg/l
N-Nitrosodi-n-propylamine		ND	0.00050	mg/l
Pentachlorophenol		ND	0.00050	mg/l
Phenanthrene		ND	0.00050	mg/l
Phenol		ND	0.00050	mg/l
Pyrene		ND	0.00050	mg/l
1,2,4-Trichlorobenzene		ND	0.00050	mg/l
2,4,5-Trichlorophenol		ND	0.00050	mg/l
2,4,6-Trichlorophenol		ND	0.00050	mg/l

Laboratory Control Sample (LCS)
Lab Sample ID: U231117C.LCSW15A
Run in Batch: U231117C, Run Date: 11/17/2023 21:33, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
Acenaphthene		59.6	27	111
Acenaphthylene		59.3	16	116
Anthracene		66.4	31	119
Benzo(a)anthracene		63.1	35	119
Benzo(b)fluoranthene		65.2	27	129
Benzo(k)fluoranthene		64.7	36	120
Benzo(ghi)perylene		70.5	31	126
Benzo(a)pyrene		65.3	32	121
bis(2-Chloroethoxy)methane		50.1	23	106
bis(2-Chloroethyl)ether		49.0	29	94
bis(2-Chloroisopropyl)ether		33.4	23	91
bis(2-Ethylhexyl)phthalate		67.4	35	121
4-Bromophenyl phenyl ether		69.0	27	122
Butyl benzyl phthalate		64.4	36	117
4-Chloroaniline		36.9	19	91
2-Chloronaphthalene		55.8	21	109
4-Chloro-3-methylphenol		55.5	36	105
2-Chlorophenol		43.0	24	94
4-Chlorophenyl phenyl ether		65.6	31	114
Chrysene		66.9	34	119
3-, 4-Methylphenol (p,m-Cresol)		37.2	21	90
2-Methylphenol (o-Cresol)		39.1	23	79
Dibenzo(ah)anthracene		71.4	32	119

Organics - Semi-Volatiles, Prep Batch ID: SF231115W1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Laboratory Control Sample (LCS) (continued)

Lab Sample ID: U231117C.LCSW15A

Run in Batch: U231117C, Run Date: 11/17/2023 21:33, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
Dibenzofuran		62.1	29	115
di-n-Butyl phthalate		71.2	34	121
1,2-Dichlorobenzene		44.2	11	88
1,3-Dichlorobenzene		41.3	10	85
1,4-Dichlorobenzene		42.0	10	85
3,3'-Dichlorobenzidine		48.6	27	110
2,4-Dichlorophenol		54.1	33	106
Diethyl phthalate		66.9	36	116
2,4-Dimethylphenol		51.3	30	105
Dimethyl phthalate		64.5	35	116
4,6-Dinitro-2-methylphenol		67.0	19	116
2,4-Dinitrophenol		61.2	10	125
2,4-Dinitrotoluene		63.1	33	119
2,6-Dinitrotoluene		62.5	34	117
1,2-Diphenylhydrazine		62.7	34	113
di-n-Octyl phthalate		69.6	30	133
Fluoranthene		68.6	35	121
Fluorene		63.2	32	114
Hexachlorobenzene		71.6	26	126
Hexachlorobutadiene		50.0	10	95
Hexachlorocyclopentadiene		69.2	10	90
Hexachloroethane		39.8	10	82
Indeno(1,2,3-cd)pyrene		69.3	31	124
Isophorone		52.9	26	104
2-Methylnaphthalene		52.3	21	103
Naphthalene		51.9	21	99
2-Nitroaniline		57.4	34	111
3-Nitroaniline		39.1	34	111
4-Nitroaniline		48.3	34	100
Nitrobenzene		49.2	30	98
2-Nitrophenol		54.2	31	108
4-Nitrophenol		28.3	10	90
N-Nitrosodiphenylamine		62.3	31	120
N-Nitrosodi-n-propylamine		49.7	33	102
Pentachlorophenol		69.9	10	108
Phenanthrene		65.3	35	113
Phenol		21.3	10	43
Pyrene		65.2	33	120
1,2,4-Trichlorobenzene		48.9	10	98
2,4,5-Trichlorophenol		64.9	31	120
2,4,6-Trichlorophenol		61.7	31	114

Organics - Semi-Volatiles, Prep Batch ID: SF231115W1 (continued)
Surrogates: Yes, QC Types: BLK/LCS/LCSD

Laboratory Control Sample Duplicate (LCSD)
Lab Sample ID: U231117C.LCSDW15A, Parent Sample ID: U231117C.LCSW15A
Run in Batch: U231117C, Run Date: 11/17/2023 21:58, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
Acenaphthene		58.6	27	111	1.7	30.0
Acenaphthylene		58.9	16	116	0.7	30.0
Anthracene		62.4	31	119	6.2	30.0
Benzo(a)anthracene		60.1	35	119	5.0	30.0
Benzo(b)fluoranthene		61.1	27	129	6.4	30.0
Benzo(k)fluoranthene		61.3	36	120	5.4	30.0
Benzo(ghi)perylene		64.1	31	126	9.5	30.0
Benzo(a)pyrene		61.1	32	121	6.6	30.0
bis(2-Chloroethoxy)methane		50.1	23	106	0.0	30.0
bis(2-Chloroethyl)ether		46.6	29	94	5.0	30.0
bis(2-Chloroisopropyl)ether		32.7	23	91	2.1	30.0
bis(2-Ethylhexyl)phthalate		63.2	35	121	6.4	30.0
4-Bromophenyl phenyl ether		65.5	27	122	5.1	30.0
Butyl benzyl phthalate		61.3	36	117	5.0	30.0
4-Chloroaniline		38.3	19	91	3.9	30.0
2-Chloronaphthalene		55.7	21	109	0.1	30.0
4-Chloro-3-methylphenol		53.6	36	105	3.5	30.0
2-Chlorophenol		42.9	24	94	0.2	30.0
4-Chlorophenyl phenyl ether		64.3	31	114	2.1	30.0
Chrysene		62.4	34	119	7.1	30.0
3-, 4-Methylphenol (p,m-Cresol)		36.4	21	90	2.1	30.0
2-Methylphenol (o-Cresol)		39.0	23	79	0.3	30.0
Dibenzo(ah)anthracene		66.4	32	119	7.3	30.0
Dibenzofuran		60.7	29	115	2.3	30.0
di-n-Butyl phthalate		66.5	34	121	6.8	30.0
1,2-Dichlorobenzene		41.3	11	88	6.8	30.0
1,3-Dichlorobenzene		38.6	10	85	6.6	30.0
1,4-Dichlorobenzene		39.8	10	85	5.3	30.0
3,3'-Dichlorobenzidine		49.0	27	110	0.8	30.0
2,4-Dichlorophenol		53.4	33	106	1.3	30.0
Diethyl phthalate		63.7	36	116	4.9	30.0
2,4-Dimethylphenol		50.4	30	105	1.8	30.0
Dimethyl phthalate		62.9	35	116	2.4	30.0
4,6-Dinitro-2-methylphenol		63.7	19	116	4.9	30.0
2,4-Dinitrophenol		60.3	10	125	1.4	30.0
2,4-Dinitrotoluene		60.8	33	119	3.8	30.0
2,6-Dinitrotoluene		59.7	34	117	4.5	30.0
1,2-Diphenylhydrazine		59.2	34	113	5.7	30.0
di-n-Octyl phthalate		65.3	30	133	6.3	30.0
Fluoranthene		64.7	35	121	5.9	30.0
Fluorene		61.1	32	114	3.3	30.0
Hexachlorobenzene		67.3	26	126	6.2	30.0
Hexachlorobutadiene		47.1	10	95	5.9	30.0
Hexachlorocyclopentadiene		66.3	10	90	4.2	30.0
Hexachloroethane		36.8	10	82	7.9	30.0
Indeno(1,2,3-cd)pyrene		63.9	31	124	8.1	30.0

Organics - Semi-Volatiles, Prep Batch ID: SF231115W1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Laboratory Control Sample Duplicate (LCSD) (continued)

Lab Sample ID: U231117C.LCSDW15A, Parent Sample ID: U231117C.LCSW15A

Run in Batch: U231117C, Run Date: 11/17/2023 21:58, Prep Date: 11/15/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
Isophorone		51.9	26	104	1.9	30.0
2-Methylnaphthalene		52.3	21	103	0.1	30.0
Naphthalene		51.4	21	99	1.0	30.0
2-Nitroaniline		55.8	34	111	2.9	30.0
3-Nitroaniline		39.9	34	111	2.1	30.0
4-Nitroaniline		48.1	34	100	0.5	30.0
Nitrobenzene		48.8	30	98	0.9	30.0
2-Nitrophenol		54.2	31	108	0.0	30.0
4-Nitrophenol		28.1	10	90	0.9	30.0
N-Nitrosodiphenylamine		59.4	31	120	4.8	30.0
N-Nitrosodi-n-propylamine		49.3	33	102	0.8	30.0
Pentachlorophenol		66.4	10	108	5.2	30.0
Phenanthrene		61.3	35	113	6.3	30.0
Phenol		21.4	10	43	0.6	30.0
Pyrene		61.8	33	120	5.3	30.0
1,2,4-Trichlorobenzene		47.3	10	98	3.4	30.0
2,4,5-Trichlorophenol		63.3	31	120	2.5	30.0
2,4,6-Trichlorophenol		59.4	31	114	3.7	30.0

QC Report - Batch QC Results

Organics - Volatiles, Prep Batch ID: VF231113W2

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Blank (BLK)

Lab Sample ID: 231113A3.BLKW13A

Run in Batch: 231113A3, Run Date: 11/13/2023 14:36, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Analyte	Flags	Conc	RDL	Units
Diethyl ether		ND	1.00	ug/l
Acetone		ND	10.00	ug/l
Methyl iodide		ND	1.00	ug/l
Carbon disulfide		ND	1.00	ug/l
tert-Methyl butyl ether (MTBE)		ND	1.00	ug/l
Acrylonitrile		ND	1.00	ug/l
2-Butanone (MEK)		ND	10.00	ug/l
Dichlorodifluoromethane		ND	1.00	ug/l
Chloromethane		ND	1.00	ug/l
Vinyl chloride		ND	1.00	ug/l
Bromomethane		ND	1.00	ug/l
Chloroethane		ND	1.00	ug/l
Trichlorofluoromethane		ND	1.00	ug/l
1,1-Dichloroethene		ND	1.00	ug/l
Methylene chloride		ND	1.00	ug/l
trans-1,2-Dichloroethene		ND	1.00	ug/l
1,1-Dichloroethane		ND	1.00	ug/l
cis-1,2-Dichloroethene		ND	1.00	ug/l
Tetrahydrofuran		ND	10.00	ug/l
Chloroform		ND	1.00	ug/l
Bromochloromethane		ND	1.00	ug/l
1,1,1-Trichloroethane		ND	1.00	ug/l
4-Methyl-2-pentanone (MIBK)		ND	10.00	ug/l
2-Hexanone		ND	10.00	ug/l
Carbon tetrachloride		ND	1.00	ug/l
Benzene		ND	1.00	ug/l
1,2-Dichloroethane		ND	1.00	ug/l
Trichloroethene		ND	1.00	ug/l
1,2-Dichloropropane		ND	1.00	ug/l
Bromodichloromethane		ND	1.00	ug/l
Dibromomethane		ND	1.00	ug/l
cis-1,3-Dichloropropene		ND	1.00	ug/l
Toluene		ND	1.00	ug/l
trans-1,3-Dichloropropene		ND	1.00	ug/l
1,1,2-Trichloroethane		ND	1.00	ug/l
Tetrachloroethene		ND	1.00	ug/l
trans-1,4-Dichloro-2-butene		ND	1.00	ug/l
Dibromochloromethane		ND	1.00	ug/l
1,2-Dibromoethane		ND	1.00	ug/l
Chlorobenzene		ND	1.00	ug/l
1,1,1,2-Tetrachloroethane		ND	1.00	ug/l
Ethylbenzene		ND	1.00	ug/l
p,m-Xylene		ND	1.00	ug/l
o-Xylene		ND	1.00	ug/l
Styrene		ND	1.00	ug/l
Isopropylbenzene		ND	1.00	ug/l

Organics - Volatiles, Prep Batch ID: VF231113W2 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Blank (BLK) (continued)

Lab Sample ID: 231113A3.BLKW13A

Run in Batch: 231113A3, Run Date: 11/13/2023 14:36, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Analyte	Flags	Conc	RDL	Units
Bromoform		ND	1.00	ug/l
1,1,2,2-Tetrachloroethane		ND	1.00	ug/l
1,2,3-Trichloropropane		ND	1.00	ug/l
n-Propylbenzene		ND	1.00	ug/l
Bromobenzene		ND	1.00	ug/l
1,3,5-Trimethylbenzene		ND	1.00	ug/l
tert-Butylbenzene		ND	1.00	ug/l
1,2,4-Trimethylbenzene		ND	1.00	ug/l
sec-Butylbenzene		ND	1.00	ug/l
p-Isopropyltoluene		ND	1.00	ug/l
1,3-Dichlorobenzene		ND	1.00	ug/l
1,4-Dichlorobenzene		ND	1.00	ug/l
1,2-Dichlorobenzene		ND	1.00	ug/l
1,2,3-Trimethylbenzene		ND	1.00	ug/l
n-Butylbenzene		ND	1.00	ug/l
Hexachloroethane		ND	1.00	ug/l
1,2-Dibromo-3-chloropropane		ND	1.00	ug/l
1,2,4-Trichlorobenzene		ND	1.00	ug/l
1,2,3-Trichlorobenzene		ND	1.00	ug/l
Naphthalene		ND	1.00	ug/l
2-Methylnaphthalene		ND	1.00	ug/l

Laboratory Control Sample (LCS)

Lab Sample ID: 231113A3.LCSW13A

Run in Batch: 231113A3, Run Date: 11/13/2023 13:03, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
Diethyl ether		105.1	67.4	121.2
Acetone		92.7	29.9	161.5
Methyl iodide		103.5	68.8	116.4
Carbon disulfide		99.1	63.8	137.4
tert-Methyl butyl ether (MTBE)		105.9	73.2	122.4
Acrylonitrile		102.0	69.9	128.9
2-Butanone (MEK)		96.3	44.0	134.4
Dichlorodifluoromethane		93.9	10.0	222.8
Chloromethane		95.1	23.8	166.5
Vinyl chloride		98.5	43.5	149.1
Bromomethane		100.2	56.8	151.3
Chloroethane		98.9	53.4	149.4
Trichlorofluoromethane		98.1	59.7	151.8
1,1-Dichloroethene		100.9	69.6	139.4
Methylene chloride		104.7	73.3	121.1
trans-1,2-Dichloroethene		103.3	73.6	129.3
1,1-Dichloroethane		104.7	71.5	126.2
cis-1,2-Dichloroethene		105.6	76.6	122.1
Tetrahydrofuran		94.5	59.0	117.9
Chloroform		104.3	78.4	124.0

Organics - Volatiles, Prep Batch ID: VF231113W2 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Laboratory Control Sample (LCS) (continued)

Lab Sample ID: 231113A3.LCSW13A

Run in Batch: 231113A3, Run Date: 11/13/2023 13:03, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
Bromochloromethane		106.3	78.2	120.8
1,1,1-Trichloroethane		102.1	79.4	130.9
4-Methyl-2-pentanone (MIBK)		94.5	71.6	125.2
2-Hexanone		93.8	55.4	136.9
Carbon tetrachloride		100.0	72.6	133.0
Benzene		100.7	79.9	124.9
1,2-Dichloroethane		98.5	76.0	126.3
Trichloroethene		100.5	79.7	124.2
1,2-Dichloropropane		102.1	78.6	126.4
Bromodichloromethane		103.2	80.4	128.2
Dibromomethane		102.8	76.9	122.1
cis-1,3-Dichloropropene		105.6	79.8	129.9
Toluene		99.8	79.8	124.5
trans-1,3-Dichloropropene		104.2	74.0	131.3
1,1,2-Trichloroethane		101.8	78.7	123.1
Tetrachloroethene		100.7	74.5	124.5
trans-1,4-Dichloro-2-butene		105.8	68.6	135.4
Dibromochloromethane		104.0	74.6	127.2
1,2-Dibromoethane		100.2	70.3	133.7
Chlorobenzene		101.8	79.2	122.7
1,1,1,2-Tetrachloroethane		104.9	80.3	128.2
Ethylbenzene		101.0	79.5	129.1
p,m-Xylene		102.5	79.4	132.2
o-Xylene		103.2	80.2	131.0
Styrene		107.9	69.5	126.7
Isopropylbenzene		103.3	74.4	121.5
Bromoform		102.9	69.4	128.0
1,1,2,2-Tetrachloroethane		99.2	79.8	126.3
1,2,3-Trichloropropane		98.2	78.3	138.8
n-Propylbenzene		103.1	82.0	130.7
Bromobenzene		102.8	78.7	124.6
1,3,5-Trimethylbenzene		104.9	81.3	128.9
tert-Butylbenzene		103.7	80.7	128.9
1,2,4-Trimethylbenzene		106.1	81.4	130.8
sec-Butylbenzene		101.9	77.4	129.8
p-Isopropyltoluene		103.0	79.8	137.5
1,3-Dichlorobenzene		102.7	77.0	131.3
1,4-Dichlorobenzene		101.4	20.7	137.7
1,2-Dichlorobenzene		101.0	10.0	166.2
1,2,3-Trimethylbenzene		102.3	76.3	124.2
n-Butylbenzene		103.9	80.0	133.3
Hexachloroethane		107.2	23.8	138.1
1,2-Dibromo-3-chloropropane		93.7	21.2	189.4
1,2,4-Trichlorobenzene		106.5	27.4	143.4
1,2,3-Trichlorobenzene		107.3	75.4	131.4
Naphthalene		104.9	32.9	135.8

Organics - Volatiles, Prep Batch ID: VF231113W2 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Laboratory Control Sample (LCS) (continued)

Lab Sample ID: 231113A3.LCSW13A

Run in Batch: 231113A3, Run Date: 11/13/2023 13:03, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
2-Methylnaphthalene		93.0	25.5	165.5

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: 231113A3.LCSDW13A, Parent Sample ID: 231113A3.LCSW13A

Run in Batch: 231113A3, Run Date: 11/13/2023 13:26, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
Diethyl ether		102.6	67.4	121.2	2.4	30.0
Acetone		95.4	29.9	161.5	2.9	30.0
Methyl iodide		96.4	68.8	116.4	7.1	30.0
Carbon disulfide		90.7	63.8	137.4	8.9	30.0
tert-Methyl butyl ether (MTBE)		104.6	73.2	122.4	1.3	30.0
Acrylonitrile		101.3	69.9	128.9	0.6	30.0
2-Butanone (MEK)		95.2	44.0	134.4	1.1	30.0
Dichlorodifluoromethane		83.2	10.0	222.8	12.1	30.0
Chloromethane		86.7	23.8	166.5	9.2	30.0
Vinyl chloride		88.5	43.5	149.1	10.7	30.0
Bromomethane		91.0	56.8	151.3	9.5	30.0
Chloroethane		90.2	53.4	149.4	9.2	30.0
Trichlorofluoromethane		86.6	59.7	151.8	12.4	30.0
1,1-Dichloroethene		91.1	69.6	139.4	10.2	30.0
Methylene chloride		99.2	73.3	121.1	5.4	30.0
trans-1,2-Dichloroethene		93.4	73.6	129.3	10.1	30.0
1,1-Dichloroethane		96.1	71.5	126.2	8.6	30.0
cis-1,2-Dichloroethene		96.2	76.6	122.1	9.3	30.0
Tetrahydrofuran		95.1	59.0	117.9	0.6	30.0
Chloroform		96.7	78.4	124.0	7.6	30.0
Bromochloromethane		100.8	78.2	120.8	5.3	30.0
1,1,1-Trichloroethane		91.6	79.4	130.9	10.9	30.0
4-Methyl-2-pentanone (MIBK)		95.9	71.6	125.2	1.5	30.0
2-Hexanone		95.6	55.4	136.9	2.0	30.0
Carbon tetrachloride		87.8	72.6	133.0	13.0	30.0
Benzene		90.5	79.9	124.9	10.7	30.0
1,2-Dichloroethane		93.1	76.0	126.3	5.7	30.0
Trichloroethene		90.4	79.7	124.2	10.6	30.0
1,2-Dichloropropane		93.3	78.6	126.4	9.0	30.0
Bromodichloromethane		95.5	80.4	128.2	7.8	30.0
Dibromomethane		98.6	76.9	122.1	4.2	30.0
cis-1,3-Dichloropropene		98.0	79.8	129.9	7.4	30.0
Toluene		90.0	79.8	124.5	10.4	30.0
trans-1,3-Dichloropropene		98.2	74.0	131.3	5.9	30.0
1,1,2-Trichloroethane		96.6	78.7	123.1	5.3	30.0
Tetrachloroethene		90.3	74.5	124.5	10.8	30.0
trans-1,4-Dichloro-2-butene		98.0	68.6	135.4	7.7	30.0
Dibromochloromethane		99.0	74.6	127.2	5.0	30.0
1,2-Dibromoethane		96.0	70.3	133.7	4.3	30.0
Chlorobenzene		93.4	79.2	122.7	8.6	30.0

Organics - Volatiles, Prep Batch ID: VF231113W2 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Laboratory Control Sample Duplicate (LCSD) (continued)

Lab Sample ID: 231113A3.LCSDW13A, Parent Sample ID: 231113A3.LCSW13A

Run in Batch: 231113A3, Run Date: 11/13/2023 13:26, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
1,1,1,2-Tetrachloroethane		97.8	80.3	128.2	7.1	30.0
Ethylbenzene		91.3	79.5	129.1	10.1	30.0
p,m-Xylene		92.2	79.4	132.2	10.6	30.0
o-Xylene		94.1	80.2	131.0	9.2	30.0
Styrene		97.3	69.5	126.7	10.3	30.0
Isopropylbenzene		91.9	74.4	121.5	11.6	30.0
Bromoform		99.4	69.4	128.0	3.4	30.0
1,1,2,2-Tetrachloroethane		98.5	79.8	126.3	0.8	30.0
1,2,3-Trichloropropane		97.8	78.3	138.8	0.4	30.0
n-Propylbenzene		92.3	82.0	130.7	11.1	30.0
Bromobenzene		96.0	78.7	124.6	6.8	30.0
1,3,5-Trimethylbenzene		96.2	81.3	128.9	8.6	30.0
tert-Butylbenzene		93.5	80.7	128.9	10.4	30.0
1,2,4-Trimethylbenzene		96.0	81.4	130.8	10.0	30.0
sec-Butylbenzene		90.7	77.4	129.8	11.6	30.0
p-Isopropyltoluene		92.2	79.8	137.5	11.1	30.0
1,3-Dichlorobenzene		93.3	77.0	131.3	9.7	30.0
1,4-Dichlorobenzene		92.8	20.7	137.7	8.9	30.0
1,2-Dichlorobenzene		94.6	10.0	166.2	6.6	30.0
1,2,3-Trimethylbenzene		93.7	76.3	124.2	8.8	30.0
n-Butylbenzene		92.1	80.0	133.3	12.0	30.0
Hexachloroethane		97.3	23.8	138.1	9.7	30.0
1,2-Dibromo-3-chloropropane		95.9	21.2	189.4	2.3	30.0
1,2,4-Trichlorobenzene		100.4	27.4	143.4	5.9	30.0
1,2,3-Trichlorobenzene		102.6	75.4	131.4	4.5	30.0
Naphthalene		102.5	32.9	135.8	2.4	30.0
2-Methylnaphthalene		95.8	25.5	165.5	3.0	30.0

Matrix Spike (MS)

Lab Sample ID: 231113A3.5560906M, Parent Sample ID: S55609.05

Run in Batch: 231113A3, Run Date: 11/13/2023 22:01, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
Diethyl ether		112.7	67.4	121.2
Acetone		108.1	29.9	161.5
Methyl iodide		108.0	68.8	116.4
Carbon disulfide		103.0	63.8	137.4
tert-Methyl butyl ether (MTBE)		116.0	73.2	122.4
Acrylonitrile		116.7	69.9	128.9
2-Butanone (MEK)		113.4	44.0	134.4
Dichlorodifluoromethane		99.0	10.0	222.8
Chloromethane		101.1	23.8	166.5
Vinyl chloride		105.1	43.5	149.1
Bromomethane		104.9	56.8	151.3
Chloroethane		104.5	53.4	149.4
Trichlorofluoromethane		103.4	59.7	151.8
1,1-Dichloroethene		105.9	69.6	139.4

Organics - Volatiles, Prep Batch ID: VF231113W2 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Matrix Spike (MS) (continued)

Lab Sample ID: 231113A3.5560906M, Parent Sample ID: S55609.05

Run in Batch: 231113A3, Run Date: 11/13/2023 22:01, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
Methylene chloride		111.0	73.3	121.1
trans-1,2-Dichloroethene		107.9	73.6	129.3
1,1-Dichloroethane		109.7	71.5	126.2
cis-1,2-Dichloroethene		109.9	76.6	122.1
Tetrahydrofuran		110.1	59.0	117.9
Chloroform		110.1	78.4	124.0
Bromochloromethane		113.6	78.2	120.8
1,1,1-Trichloroethane		107.5	79.4	130.9
4-Methyl-2-pentanone (MIBK)		105.1	71.6	125.2
2-Hexanone		105.0	55.4	136.9
Carbon tetrachloride		100.7	72.6	133.0
Benzene		102.7	79.9	124.9
1,2-Dichloroethane		102.3	76.0	126.3
Trichloroethene		100.9	79.7	124.2
1,2-Dichloropropane		104.0	78.6	126.4
Bromodichloromethane		104.4	80.4	128.2
Dibromomethane		107.5	76.9	122.1
cis-1,3-Dichloropropene		103.2	79.8	129.9
Toluene		99.8	79.8	124.5
trans-1,3-Dichloropropene		100.7	74.0	131.3
1,1,2-Trichloroethane		104.9	78.7	123.1
Tetrachloroethene		99.8	74.5	124.5
trans-1,4-Dichloro-2-butene		103.1	68.6	135.4
Dibromochloromethane		84.4	74.6	127.2
1,2-Dibromoethane		106.3	70.3	133.7
Chlorobenzene		102.1	79.2	122.7
1,1,1,2-Tetrachloroethane		105.7	80.3	128.2
Ethylbenzene		101.8	79.5	129.1
p,m-Xylene		103.0	79.4	132.2
o-Xylene		103.5	80.2	131.0
Styrene		107.1	69.5	126.7
Isopropylbenzene		103.0	74.4	121.5
Bromoform		104.3	69.4	128.0
1,1,2,2-Tetrachloroethane		107.6	79.8	126.3
1,2,3-Trichloropropane		105.6	78.3	138.8
n-Propylbenzene		102.6	82.0	130.7
Bromobenzene		104.2	78.7	124.6
1,3,5-Trimethylbenzene		104.3	81.3	128.9
tert-Butylbenzene		104.2	80.7	128.9
1,2,4-Trimethylbenzene		106.0	81.4	130.8
sec-Butylbenzene		101.7	77.4	129.8
p-Isopropyltoluene		103.3	79.8	137.5
1,3-Dichlorobenzene		103.0	77.0	131.3
1,4-Dichlorobenzene		101.8	20.7	137.7
1,2-Dichlorobenzene		104.0	10.0	166.2
1,2,3-Trimethylbenzene		105.0	76.3	124.2

Organics - Volatiles, Prep Batch ID: VF231113W2 (continued)
Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Matrix Spike (MS) (continued)
Lab Sample ID: 231113A3.5560906M, Parent Sample ID: S55609.05
Run in Batch: 231113A3, Run Date: 11/13/2023 22:01, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL
n-Butylbenzene		102.1	80.0	133.3
Hexachloroethane		106.6	23.8	138.1
1,2-Dibromo-3-chloropropane		105.5	21.2	189.4
1,2,4-Trichlorobenzene		108.2	27.4	143.4
1,2,3-Trichlorobenzene		109.6	75.4	131.4
Naphthalene		112.2	32.9	135.8
2-Methylnaphthalene		100.4	25.5	165.5

Matrix Spike Duplicate (MSD)
Lab Sample ID: 231113A3.5560907N, Parent Sample ID: 231113A3.5560906M
Run in Batch: 231113A3, Run Date: 11/13/2023 22:25, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
Diethyl ether		101.5	67.4	121.2	10.5	30.0
Acetone		93.2	29.9	161.5	14.7	30.0
Methyl iodide		101.0	68.8	116.4	6.7	30.0
Carbon disulfide		95.5	63.8	137.4	7.5	30.0
tert-Methyl butyl ether (MTBE)		103.7	73.2	122.4	11.2	30.0
Acrylonitrile		99.0	69.9	128.9	16.5	30.0
2-Butanone (MEK)		91.0	44.0	134.4	21.9	30.0
Dichlorodifluoromethane		94.2	10.0	222.8	4.9	30.0
Chloromethane		94.6	23.8	166.5	6.6	30.0
Vinyl chloride		96.7	43.5	149.1	8.3	30.0
Bromomethane		96.7	56.8	151.3	8.1	30.0
Chloroethane		96.2	53.4	149.4	8.2	30.0
Trichlorofluoromethane		95.2	59.7	151.8	8.3	30.0
1,1-Dichloroethene		96.9	69.6	139.4	8.9	30.0
Methylene chloride		100.5	73.3	121.1	9.9	30.0
trans-1,2-Dichloroethene		97.5	73.6	129.3	10.0	30.0
1,1-Dichloroethane		99.2	71.5	126.2	10.0	30.0
cis-1,2-Dichloroethene		99.1	76.6	122.1	10.3	30.0
Tetrahydrofuran		89.8	59.0	117.9	20.3	30.0
Chloroform		98.7	78.4	124.0	10.9	30.0
Bromochloromethane		101.0	78.2	120.8	11.7	30.0
1,1,1-Trichloroethane		96.2	79.4	130.9	11.1	30.0
4-Methyl-2-pentanone (MIBK)		90.1	71.6	125.2	15.4	30.0
2-Hexanone		89.7	55.4	136.9	15.7	30.0
Carbon tetrachloride		92.8	72.6	133.0	8.1	30.0
Benzene		93.0	79.9	124.9	10.0	30.0
1,2-Dichloroethane		91.9	76.0	126.3	10.6	30.0
Trichloroethene		92.7	79.7	124.2	8.4	30.0
1,2-Dichloropropane		93.5	78.6	126.4	10.6	30.0
Bromodichloromethane		95.1	80.4	128.2	9.3	30.0
Dibromomethane		95.0	76.9	122.1	12.4	30.0
cis-1,3-Dichloropropene		94.4	79.8	129.9	8.9	30.0
Toluene		92.6	79.8	124.5	7.5	30.0
trans-1,3-Dichloropropene		93.1	74.0	131.3	7.8	30.0

QC Report - Batch QC Results

Organics - Volatiles, Prep Batch ID: VF231113W2 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Matrix Spike Duplicate (MSD) (continued)

Lab Sample ID: 231113A3.5560907N, Parent Sample ID: 231113A3.5560906M

Run in Batch: 231113A3, Run Date: 11/13/2023 22:25, Prep Date: 11/13/2023, Matrix: WW, Dilution: 1

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
1,1,2-Trichloroethane		95.1	78.7	123.1	9.7	30.0
Tetrachloroethene		92.3	74.5	124.5	6.3	30.0
trans-1,4-Dichloro-2-butene		87.5	68.6	135.4	16.3	30.0
Dibromochloromethane	*	74.2	74.6	127.2	10.2	30.0
1,2-Dibromoethane		92.6	70.3	133.7	13.8	30.0
Chlorobenzene		93.2	79.2	122.7	9.1	30.0
1,1,1,2-Tetrachloroethane		94.8	80.3	128.2	10.8	30.0
Ethylbenzene		92.3	79.5	129.1	9.8	30.0
p,m-Xylene		93.2	79.4	132.2	10.0	30.0
o-Xylene		93.7	80.2	131.0	9.9	30.0
Styrene		96.9	69.5	126.7	9.9	30.0
Isopropylbenzene		94.0	74.4	121.5	9.1	30.0
Bromoform		90.1	69.4	128.0	14.6	30.0
1,1,2,2-Tetrachloroethane		93.3	79.8	126.3	14.2	30.0
1,2,3-Trichloropropane		91.6	78.3	138.8	14.2	30.0
n-Propylbenzene		93.1	82.0	130.7	9.6	30.0
Bromobenzene		94.4	78.7	124.6	9.9	30.0
1,3,5-Trimethylbenzene		96.6	81.3	128.9	7.6	30.0
tert-Butylbenzene		94.8	80.7	128.9	9.4	30.0
1,2,4-Trimethylbenzene		96.7	81.4	130.8	9.1	30.0
sec-Butylbenzene		92.0	77.4	129.8	10.0	30.0
p-Isopropyltoluene		92.4	79.8	137.5	11.1	30.0
1,3-Dichlorobenzene		93.0	77.0	131.3	10.2	30.0
1,4-Dichlorobenzene		91.4	20.7	137.7	10.7	30.0
1,2-Dichlorobenzene		92.1	10.0	166.2	12.1	30.0
1,2,3-Trimethylbenzene		95.0	76.3	124.2	10.0	30.0
n-Butylbenzene		91.3	80.0	133.3	11.1	30.0
Hexachloroethane		97.4	23.8	138.1	9.1	30.0
1,2-Dibromo-3-chloropropane		89.0	21.2	189.4	16.9	30.0
1,2,4-Trichlorobenzene		96.1	27.4	143.4	11.9	30.0
1,2,3-Trichlorobenzene		98.7	75.4	131.4	10.5	30.0
Naphthalene		96.9	32.9	135.8	14.6	30.0
2-Methylnaphthalene		87.1	25.5	165.5	14.1	30.0

QC Report - Batch QC Results

Organics - Volatiles, Prep Batch ID: VF231114S1

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: 231114A5.BLKS14A

Run in Batch: 231114A5, Run Date: 11/14/2023 14:03, Prep Date: 11/14/2023, Matrix: SO, Dilution: 50

Analyte	Flags	Conc	RDL	Units
Naphthalene		ND	50.0	ug/kg
Tetrachloroethene		ND	50.0	ug/kg
Trichloroethene		ND	50.0	ug/kg

Laboratory Control Sample (LCS)

Lab Sample ID: 231114A5.LCSS14A

Run in Batch: 231114A5, Run Date: 11/14/2023 12:05, Prep Date: 11/14/2023, Matrix: SO, Dilution: 50

Analyte	Flags	% Rec	LCL	UCL
Naphthalene		103.0	39.3	129.2
Tetrachloroethene		99.3	73.0	124.7
Trichloroethene		103.7	74.1	127.6

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: 231114A5.LCSDS14A, Parent Sample ID: 231114A5.LCSS14A

Run in Batch: 231114A5, Run Date: 11/14/2023 12:28, Prep Date: 11/14/2023, Matrix: SO, Dilution: 50

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
Naphthalene		102.8	39.3	129.2	0.2	30.0
Tetrachloroethene		100.7	73.0	124.7	1.4	30.0
Trichloroethene		107.4	74.1	127.6	3.5	30.0

QC Report - Batch QC Results

Organics - Volatiles, Prep Batch ID: VF231114S3

Surrogates: Yes, QC Types: BLK/LCS/LCSD

Blank (BLK)

Lab Sample ID: 231114B5.BLKS14B

Run in Batch: 231114B5, Run Date: 11/15/2023 00:45, Prep Date: 11/14/2023, Matrix: WW, Dilution: 50

Analyte	Flags	Conc	RDL	Units
Tetrachloroethene		ND	50.0	ug/l

Laboratory Control Sample (LCS)

Lab Sample ID: 231114B5.LCSS14B

Run in Batch: 231114B5, Run Date: 11/14/2023 23:34, Prep Date: 11/14/2023, Matrix: WW, Dilution: 50

Analyte	Flags	% Rec	LCL	UCL
Tetrachloroethene		98.4	73.0	124.7

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: 231114B5.LCSDS14B, Parent Sample ID: 231114B5.LCSS14B

Run in Batch: 231114B5, Run Date: 11/14/2023 23:58, Prep Date: 11/14/2023, Matrix: WW, Dilution: 50

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
Tetrachloroethene		102.5	73.0	124.7	4.1	30.0

QC Report - Batch QC Results

Organics - Volatiles, Prep Batch ID: VF231117S1
Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Blank (BLK)
Lab Sample ID: 231117A5.BLKS17A
Run in Batch: 231117A5, Run Date: 11/17/2023 16:21, Prep Date: 11/17/2023, Matrix: WW, Dilution: 50

Analyte	Flags	Conc	RDL	Units
Acetone		ND	500.0	ug/l
Acrylonitrile		ND	50.0	ug/l
2-Butanone (MEK)		ND	500.0	ug/l
Benzene		ND	50.0	ug/l
n-Butylbenzene		ND	50.0	ug/l
Bromobenzene		ND	50.0	ug/l
Bromochloromethane		ND	50.0	ug/l
Bromodichloromethane		ND	50.0	ug/l
Bromoform		ND	50.0	ug/l
Bromomethane		ND	50.0	ug/l
sec-Butylbenzene		ND	50.0	ug/l
tert-Butylbenzene		ND	50.0	ug/l
Carbon disulfide		ND	50.0	ug/l
Carbon tetrachloride		ND	50.0	ug/l
Chlorobenzene		ND	50.0	ug/l
Chloroethane		ND	50.0	ug/l
Chloroform		ND	50.0	ug/l
Chloromethane		ND	50.0	ug/l
1,1-Dichloroethane		ND	50.0	ug/l
1,1-Dichloroethene		ND	50.0	ug/l
1,2-Dibromo-3-chloropropane		ND	50.0	ug/l
1,2-Dibromoethane		ND	50.0	ug/l
1,2-Dichlorobenzene		ND	50.0	ug/l
1,2-Dichloroethane		ND	50.0	ug/l
1,2-Dichloropropane		ND	50.0	ug/l
1,3-Dichlorobenzene		ND	50.0	ug/l
1,4-Dichlorobenzene		ND	50.0	ug/l
cis-1,2-Dichloroethene		ND	50.0	ug/l
cis-1,3-Dichloropropene		ND	50.0	ug/l
Dibromochloromethane		ND	50.0	ug/l
Dibromomethane		ND	50.0	ug/l
Dichlorodifluoromethane		ND	50.0	ug/l
Diethyl ether		ND	50.0	ug/l
trans-1,2-Dichloroethene		ND	50.0	ug/l
trans-1,3-Dichloropropene		ND	50.0	ug/l
trans-1,4-Dichloro-2-butene		ND	50.0	ug/l
Ethylbenzene		ND	50.0	ug/l
2-Hexanone		ND	500.0	ug/l
Hexachloroethane		ND	50.0	ug/l
p-Isopropyltoluene		ND	50.0	ug/l
Isopropylbenzene		ND	50.0	ug/l
2-Methylnaphthalene		ND	50.0	ug/l
4-Methyl-2-pentanone (MIBK)		ND	500.0	ug/l
tert-Methyl butyl ether (MTBE)		ND	50.0	ug/l
Methyl iodide		ND	50.0	ug/l
Methylene chloride		ND	50.0	ug/l

QC Report - Batch QC Results

Organics - Volatiles, Prep Batch ID: VF231117S1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Blank (BLK) (continued)

Lab Sample ID: 231117A5.BLKS17A

Run in Batch: 231117A5, Run Date: 11/17/2023 16:21, Prep Date: 11/17/2023, Matrix: WW, Dilution: 50

Analyte	Flags	Conc	RDL	Units
Naphthalene		ND	50.0	ug/l
n-Propylbenzene		ND	50.0	ug/l
Styrene		ND	50.0	ug/l
1,1,1,2-Tetrachloroethane		ND	50.0	ug/l
1,1,1-Trichloroethane		ND	50.0	ug/l
1,1,2,2-Tetrachloroethane		ND	50.0	ug/l
1,1,2-Trichloroethane		ND	50.0	ug/l
1,2,3-Trichlorobenzene		ND	50.0	ug/l
1,2,3-Trichloropropane		ND	50.0	ug/l
1,2,3-Trimethylbenzene		ND	50.0	ug/l
1,2,4-Trichlorobenzene		ND	50.0	ug/l
1,2,4-Trimethylbenzene		ND	50.0	ug/l
1,3,5-Trimethylbenzene		ND	50.0	ug/l
Tetrachloroethene		ND	50.0	ug/l
Tetrahydrofuran		ND	500.0	ug/l
Toluene		ND	50.0	ug/l
Trichloroethene		ND	50.0	ug/l
Trichlorofluoromethane		ND	50.0	ug/l
Vinyl chloride		ND	50.0	ug/l
o-Xylene		ND	50.0	ug/l
p,m-Xylene		ND	50.0	ug/l

Laboratory Control Sample (LCS)

Lab Sample ID: 231117A5.LCSS17A

Run in Batch: 231117A5, Run Date: 11/17/2023 14:22, Prep Date: 11/17/2023, Matrix: WW, Dilution: 50

Analyte	Flags	% Rec	LCL	UCL
Acetone		102.8	25.3	155.1
Acrylonitrile		107.3	58.7	133.0
2-Butanone (MEK)		103.2	38.7	136.9
Benzene		106.8	74.6	128.9
n-Butylbenzene		106.5	75.0	138.6
Bromobenzene		98.0	74.0	132.4
Bromochloromethane		106.1	72.3	122.8
Bromodichloromethane		113.6	76.7	128.4
Bromoform		105.1	54.7	137.4
Bromomethane		114.6	10.0	157.4
sec-Butylbenzene		107.8	72.7	135.6
tert-Butylbenzene		102.5	75.6	134.6
Carbon disulfide		111.1	57.0	123.0
Carbon tetrachloride		112.0	70.1	132.7
Chlorobenzene		100.1	74.2	128.1
Chloroethane		122.5	10.0	169.1
Chloroform		110.4	74.6	123.2
Chloromethane		111.8	30.2	152.7
1,1-Dichloroethane		111.6	72.5	123.4
1,1-Dichloroethene		113.3	59.2	137.5

Organics - Volatiles, Prep Batch ID: VF231117S1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Laboratory Control Sample (LCS) (continued)

Lab Sample ID: 231117A5.LCSS17A

Run in Batch: 231117A5, Run Date: 11/17/2023 14:22, Prep Date: 11/17/2023, Matrix: WW, Dilution: 50

Analyte	Flags	% Rec	LCL	UCL
1,2-Dibromo-3-chloropropane		102.2	54.1	156.4
1,2-Dibromoethane		102.6	71.4	129.3
1,2-Dichlorobenzene		103.0	73.5	132.7
1,2-Dichloroethane		111.9	73.2	125.4
1,2-Dichloropropane		106.7	77.6	124.4
1,3-Dichlorobenzene		104.6	77.3	131.0
1,4-Dichlorobenzene		103.3	33.1	125.8
cis-1,2-Dichloroethene		107.5	75.0	120.5
cis-1,3-Dichloropropene		112.9	79.3	128.3
Dibromochloromethane		106.4	68.9	132.7
Dibromomethane		104.4	72.5	127.3
Dichlorodifluoromethane		122.1	10.0	171.8
Diethyl ether		116.9	51.7	123.0
trans-1,2-Dichloroethene		113.2	72.5	128.8
trans-1,3-Dichloropropene		113.8	74.5	129.7
trans-1,4-Dichloro-2-butene		107.6	58.3	143.3
Ethylbenzene		103.4	77.7	130.4
2-Hexanone		104.2	45.7	141.9
Hexachloroethane		112.3	55.5	129.0
p-Isopropyltoluene		108.2	77.1	140.9
Isopropylbenzene		102.0	70.3	128.2
2-Methylnaphthalene		113.2	10.0	175.9
4-Methyl-2-pentanone (MIBK)		104.8	60.4	133.8
tert-Methyl butyl ether (MTBE)		112.5	67.5	123.7
Methyl iodide		106.8	56.9	110.8
Methylene chloride		109.1	70.5	121.5
Naphthalene		101.9	39.3	129.2
n-Propylbenzene		103.9	77.3	135.2
Styrene		101.2	71.3	119.3
1,1,1,2-Tetrachloroethane		105.1	76.6	133.0
1,1,1-Trichloroethane		114.9	73.8	128.9
1,1,2,2-Tetrachloroethane		99.1	65.4	134.9
1,1,2-Trichloroethane		107.0	71.3	125.7
1,2,3-Trichlorobenzene		102.1	59.4	157.9
1,2,3-Trichloropropane		102.8	67.2	154.5
1,2,3-Trimethylbenzene		107.6	70.9	130.2
1,2,4-Trichlorobenzene		104.4	37.1	131.3
1,2,4-Trimethylbenzene		100.9	76.9	139.1
1,3,5-Trimethylbenzene		99.8	75.6	137.0
Tetrachloroethene		105.2	73.0	124.7
Tetrahydrofuran		97.8	48.2	125.7
Toluene		104.9	74.8	129.2
Trichloroethene		107.3	74.1	127.6
Trichlorofluoromethane		123.6	25.7	157.8
Vinyl chloride		110.1	45.3	138.7
o-Xylene		102.9	79.4	132.3

Organics - Volatiles, Prep Batch ID: VF231117S1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Laboratory Control Sample (LCS) (continued)

Lab Sample ID: 231117A5.LCSS17A

Run in Batch: 231117A5, Run Date: 11/17/2023 14:22, Prep Date: 11/17/2023, Matrix: WW, Dilution: 50

Analyte	Flags	% Rec	LCL	UCL
p,m-Xylene		102.4	79.8	132.0

Laboratory Control Sample Duplicate (LCSD)

Lab Sample ID: 231117A5.LCSDS17A, Parent Sample ID: 231117A5.LCSS17A

Run in Batch: 231117A5, Run Date: 11/17/2023 14:46, Prep Date: 11/17/2023, Matrix: WW, Dilution: 50

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
Acetone		89.9	25.3	155.1	13.4	30.0
Acrylonitrile		96.3	58.7	133.0	10.9	30.0
2-Butanone (MEK)		93.1	38.7	136.9	10.3	30.0
Benzene		95.4	74.6	128.9	11.3	30.0
n-Butylbenzene		95.8	75.0	138.6	10.6	30.0
Bromobenzene		87.3	74.0	132.4	11.5	30.0
Bromochloromethane		94.7	72.3	122.8	11.4	30.0
Bromodichloromethane		99.9	76.7	128.4	12.9	30.0
Bromoform		93.2	54.7	137.4	12.0	30.0
Bromomethane		104.0	10.0	157.4	9.7	30.0
sec-Butylbenzene		95.9	72.7	135.6	11.8	30.0
tert-Butylbenzene		90.9	75.6	134.6	12.0	30.0
Carbon disulfide		101.9	57.0	123.0	8.7	30.0
Carbon tetrachloride		103.1	70.1	132.7	8.3	30.0
Chlorobenzene		88.9	74.2	128.1	11.9	30.0
Chloroethane		112.1	10.0	169.1	8.9	30.0
Chloroform		99.0	74.6	123.2	10.9	30.0
Chloromethane		94.3	30.2	152.7	17.0	30.0
1,1-Dichloroethane		100.0	72.5	123.4	11.0	30.0
1,1-Dichloroethene		103.9	59.2	137.5	8.7	30.0
1,2-Dibromo-3-chloropropane		90.7	54.1	156.4	12.0	30.0
1,2-Dibromoethane		91.1	71.4	129.3	11.8	30.0
1,2-Dichlorobenzene		90.4	73.5	132.7	13.0	30.0
1,2-Dichloroethane		99.6	73.2	125.4	11.7	30.0
1,2-Dichloropropane		95.8	77.6	124.4	10.7	30.0
1,3-Dichlorobenzene		92.7	77.3	131.0	12.1	30.0
1,4-Dichlorobenzene		91.1	33.1	125.8	12.6	30.0
cis-1,2-Dichloroethene		97.8	75.0	120.5	9.5	30.0
cis-1,3-Dichloropropene		100.7	79.3	128.3	11.4	30.0
Dibromochloromethane		93.6	68.9	132.7	12.8	30.0
Dibromomethane		93.5	72.5	127.3	11.0	30.0
Dichlorodifluoromethane		106.9	10.0	171.8	13.3	30.0
Diethyl ether		104.5	51.7	123.0	11.3	30.0
trans-1,2-Dichloroethene		102.1	72.5	128.8	10.2	30.0
trans-1,3-Dichloropropene		101.6	74.5	129.7	11.4	30.0
trans-1,4-Dichloro-2-butene		98.7	58.3	143.3	8.6	30.0
Ethylbenzene		92.6	77.7	130.4	11.0	30.0
2-Hexanone		95.9	45.7	141.9	8.4	30.0
Hexachloroethane		96.0	55.5	129.0	15.7	30.0
p-Isopropyltoluene		96.3	77.1	140.9	11.6	30.0

Organics - Volatiles, Prep Batch ID: VF231117S1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Laboratory Control Sample Duplicate (LCSD) (continued)

Lab Sample ID: 231117A5.LCSDS17A, Parent Sample ID: 231117A5.LCSS17A

Run in Batch: 231117A5, Run Date: 11/17/2023 14:46, Prep Date: 11/17/2023, Matrix: WW, Dilution: 50

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
Isopropylbenzene		92.1	70.3	128.2	10.2	30.0
2-Methylnaphthalene		99.5	10.0	175.9	12.9	30.0
4-Methyl-2-pentanone (MIBK)		94.7	60.4	133.8	10.1	30.0
tert-Methyl butyl ether (MTBE)		100.8	67.5	123.7	11.0	30.0
Methyl iodide		97.8	56.9	110.8	8.8	30.0
Methylene chloride		98.6	70.5	121.5	10.1	30.0
Naphthalene		90.8	39.3	129.2	11.5	30.0
n-Propylbenzene		94.0	77.3	135.2	9.9	30.0
Styrene		91.1	71.3	119.3	10.6	30.0
1,1,1,2-Tetrachloroethane		93.0	76.6	133.0	12.3	30.0
1,1,1-Trichloroethane		105.0	73.8	128.9	9.0	30.0
1,1,2,2-Tetrachloroethane		88.6	65.4	134.9	11.2	30.0
1,1,2-Trichloroethane		95.7	71.3	125.7	11.2	30.0
1,2,3-Trichlorobenzene		90.4	59.4	157.9	12.2	30.0
1,2,3-Trichloropropane		91.1	67.2	154.5	12.0	30.0
1,2,3-Trimethylbenzene		94.2	70.9	130.2	13.3	30.0
1,2,4-Trichlorobenzene		93.9	37.1	131.3	10.6	30.0
1,2,4-Trimethylbenzene		90.1	76.9	139.1	11.3	30.0
1,3,5-Trimethylbenzene		89.4	75.6	137.0	10.9	30.0
Tetrachloroethene		94.8	73.0	124.7	10.4	30.0
Tetrahydrofuran		87.8	48.2	125.7	10.8	30.0
Toluene		93.5	74.8	129.2	11.4	30.0
Trichloroethene		96.0	74.1	127.6	11.1	30.0
Trichlorofluoromethane		112.7	25.7	157.8	9.2	30.0
Vinyl chloride		101.6	45.3	138.7	8.0	30.0
o-Xylene		91.1	79.4	132.3	12.2	30.0
p,m-Xylene		92.2	79.8	132.0	10.4	30.0

Matrix Spike (MS)

Lab Sample ID: 231117A5.5562333M, Parent Sample ID: S55623.32

Run in Batch: 231117A5, Run Date: 11/17/2023 23:50, Prep Date: 11/17/2023, Matrix: SO, Dilution: 63.6

Analyte	Flags	% Rec	LCL	UCL
Acetone		121.0	25.3	155.1
Acrylonitrile		127.5	58.7	133.0
2-Butanone (MEK)		121.1	38.7	136.9
Benzene		114.1	74.6	128.9
n-Butylbenzene		91.5	75.0	138.6
Bromobenzene		97.3	74.0	132.4
Bromochloromethane		114.9	72.3	122.8
Bromodichloromethane		116.8	76.7	128.4
Bromoform		110.3	54.7	137.4
Bromomethane		120.2	10.0	157.4
sec-Butylbenzene		111.7	72.7	135.6
tert-Butylbenzene		108.2	75.6	134.6
Carbon disulfide		111.0	57.0	123.0
Carbon tetrachloride		122.8	70.1	132.7

Organics - Volatiles, Prep Batch ID: VF231117S1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Matrix Spike (MS) (continued)

Lab Sample ID: 231117A5.5562333M, Parent Sample ID: S55623.32

Run in Batch: 231117A5, Run Date: 11/17/2023 23:50, Prep Date: 11/17/2023, Matrix: SO, Dilution: 63.6

Analyte	Flags	% Rec	LCL	UCL
Chlorobenzene		102.1	74.2	128.1
Chloroethane		132.0	10.0	169.1
Chloroform		117.4	74.6	123.2
Chloromethane		112.7	30.2	152.7
1,1-Dichloroethane		121.5	72.5	123.4
1,1-Dichloroethene		125.3	59.2	137.5
1,2-Dibromo-3-chloropropane		115.6	54.1	156.4
1,2-Dibromoethane		109.7	71.4	129.3
1,2-Dichlorobenzene		97.2	73.5	132.7
1,2-Dichloroethane		116.5	73.2	125.4
1,2-Dichloropropane		114.2	77.6	124.4
1,3-Dichlorobenzene		94.8	77.3	131.0
1,4-Dichlorobenzene		91.0	33.1	125.8
cis-1,2-Dichloroethene		116.5	75.0	120.5
cis-1,3-Dichloropropene		111.0	79.3	128.3
Dibromochloromethane		109.6	68.9	132.7
Dibromomethane		111.6	72.5	127.3
Dichlorodifluoromethane		140.1	10.0	171.8
Diethyl ether	*	123.2	51.7	123.0
trans-1,2-Dichloroethene		118.1	72.5	128.8
trans-1,3-Dichloropropene		111.4	74.5	129.7
trans-1,4-Dichloro-2-butene		97.3	58.3	143.3
Ethylbenzene		109.1	77.7	130.4
2-Hexanone		119.1	45.7	141.9
Hexachloroethane		113.7	55.5	129.0
p-Isopropyltoluene		104.2	77.1	140.9
Isopropylbenzene		109.7	70.3	128.2
2-Methylnaphthalene		106.5	10.0	175.9
4-Methyl-2-pentanone (MIBK)		118.9	60.4	133.8
tert-Methyl butyl ether (MTBE)		120.8	67.5	123.7
Methyl iodide		107.7	56.9	110.8
Methylene chloride		114.5	70.5	121.5
Naphthalene		111.3	39.3	129.2
n-Propylbenzene		103.0	77.3	135.2
Styrene		101.7	71.3	119.3
1,1,1,2-Tetrachloroethane		110.7	76.6	133.0
1,1,1-Trichloroethane		128.9	73.8	128.9
1,1,2,2-Tetrachloroethane		106.6	65.4	134.9
1,1,2-Trichloroethane		114.2	71.3	125.7
1,2,3-Trichlorobenzene		87.8	59.4	157.9
1,2,3-Trichloropropane		115.8	67.2	154.5
1,2,3-Trimethylbenzene		105.5	70.9	130.2
1,2,4-Trichlorobenzene		77.9	37.1	131.3
1,2,4-Trimethylbenzene		100.5	76.9	139.1
1,3,5-Trimethylbenzene		99.5	75.6	137.0
Tetrachloroethene		106.1	73.0	124.7

Organics - Volatiles, Prep Batch ID: VF231117S1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Matrix Spike (MS) (continued)

Lab Sample ID: 231117A5.5562333M, Parent Sample ID: S55623.32

Run in Batch: 231117A5, Run Date: 11/17/2023 23:50, Prep Date: 11/17/2023, Matrix: SO, Dilution: 63.6

Analyte	Flags	% Rec	LCL	UCL
Tetrahydrofuran		118.7	48.2	125.7
Toluene		116.4	74.8	129.2
Trichloroethene		114.0	74.1	127.6
Trichlorofluoromethane		139.0	25.7	157.8
Vinyl chloride		122.7	45.3	138.7
o-Xylene		109.5	79.4	132.3
p,m-Xylene		106.2	79.8	132.0

Matrix Spike Duplicate (MSD)

Lab Sample ID: 231117A5.5562334N, Parent Sample ID: 231117A5.5562333M

Run in Batch: 231117A5, Run Date: 11/18/2023 00:14, Prep Date: 11/17/2023, Matrix: SO, Dilution: 59.4

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
Acetone		117.8	25.3	155.1	2.5	30.0
Acrylonitrile		123.2	58.7	133.0	3.4	30.0
2-Butanone (MEK)		116.3	38.7	136.9	4.1	30.0
Benzene		119.5	74.6	128.9	4.6	30.0
n-Butylbenzene		102.6	75.0	138.6	11.5	30.0
Bromobenzene		103.4	74.0	132.4	6.1	30.0
Bromochloromethane		117.3	72.3	122.8	2.1	30.0
Bromodichloromethane		122.0	76.7	128.4	4.3	30.0
Bromoform		112.7	54.7	137.4	2.2	30.0
Bromomethane		118.4	10.0	157.4	1.6	30.0
sec-Butylbenzene		115.1	72.7	135.6	3.0	30.0
tert-Butylbenzene		112.8	75.6	134.6	4.2	30.0
Carbon disulfide	*	123.7	57.0	123.0	10.8	30.0
Carbon tetrachloride		127.3	70.1	132.7	3.6	30.0
Chlorobenzene		106.1	74.2	128.1	3.8	30.0
Chloroethane		132.6	10.0	169.1	0.5	30.0
Chloroform		122.5	74.6	123.2	4.3	30.0
Chloromethane		126.5	30.2	152.7	11.6	30.0
1,1-Dichloroethane	*	125.1	72.5	123.4	2.9	30.0
1,1-Dichloroethene		129.7	59.2	137.5	3.4	30.0
1,2-Dibromo-3-chloropropane		113.8	54.1	156.4	1.5	30.0
1,2-Dibromoethane		110.4	71.4	129.3	0.6	30.0
1,2-Dichlorobenzene		101.8	73.5	132.7	4.7	30.0
1,2-Dichloroethane		120.9	73.2	125.4	3.7	30.0
1,2-Dichloropropane		117.3	77.6	124.4	2.7	30.0
1,3-Dichlorobenzene		102.5	77.3	131.0	7.8	30.0
1,4-Dichlorobenzene		98.6	33.1	125.8	8.0	30.0
cis-1,2-Dichloroethene		120.5	75.0	120.5	3.4	30.0
cis-1,3-Dichloropropene		113.6	79.3	128.3	2.3	30.0
Dibromochloromethane		111.2	68.9	132.7	1.4	30.0
Dibromomethane		115.1	72.5	127.3	3.1	30.0
Dichlorodifluoromethane		138.5	10.0	171.8	1.2	30.0
Diethyl ether	*	129.0	51.7	123.0	4.6	30.0
trans-1,2-Dichloroethene		126.2	72.5	128.8	6.6	30.0

QC Report - Batch QC Results

Organics - Volatiles, Prep Batch ID: VF231117S1 (continued)

Surrogates: Yes, QC Types: BLK/LCS/LCSD/MS/MSD

Matrix Spike Duplicate (MSD) (continued)

Lab Sample ID: 231117A5.5562334N, Parent Sample ID: 231117A5.5562333M

Run in Batch: 231117A5, Run Date: 11/18/2023 00:14, Prep Date: 11/17/2023, Matrix: SO, Dilution: 59.4

Analyte	Flags	% Rec	LCL	UCL	RPD	RPD CL
trans-1,3-Dichloropropene		112.4	74.5	129.7	0.9	30.0
trans-1,4-Dichloro-2-butene		100.2	58.3	143.3	3.0	30.0
Ethylbenzene		115.0	77.7	130.4	5.2	30.0
2-Hexanone		119.2	45.7	141.9	0.1	30.0
Hexachloroethane		116.1	55.5	129.0	2.1	30.0
p-Isopropyltoluene		110.6	77.1	140.9	6.0	30.0
Isopropylbenzene		113.8	70.3	128.2	3.7	30.0
2-Methylnaphthalene		125.9	10.0	175.9	15.9	30.0
4-Methyl-2-pentanone (MIBK)		115.7	60.4	133.8	2.7	30.0
tert-Methyl butyl ether (MTBE)		121.2	67.5	123.7	0.4	30.0
Methyl iodide	*	120.2	56.9	110.8	11.0	30.0
Methylene chloride		119.1	70.5	121.5	4.0	30.0
Naphthalene		118.4	39.3	129.2	5.9	30.0
n-Propylbenzene		112.8	77.3	135.2	9.0	30.0
Styrene		107.3	71.3	119.3	5.3	30.0
1,1,1,2-Tetrachloroethane		112.0	76.6	133.0	1.2	30.0
1,1,1-Trichloroethane	*	131.5	73.8	128.9	2.0	30.0
1,1,2,2-Tetrachloroethane		108.3	65.4	134.9	1.6	30.0
1,1,2-Trichloroethane		115.3	71.3	125.7	1.0	30.0
1,2,3-Trichlorobenzene		98.1	59.4	157.9	11.0	30.0
1,2,3-Trichloropropane		115.9	67.2	154.5	0.1	30.0
1,2,3-Trimethylbenzene		109.5	70.9	130.2	3.7	30.0
1,2,4-Trichlorobenzene		91.4	37.1	131.3	16.0	30.0
1,2,4-Trimethylbenzene		108.5	76.9	139.1	7.6	30.0
1,3,5-Trimethylbenzene		105.5	75.6	137.0	5.8	30.0
Tetrachloroethene		113.9	73.0	124.7	7.0	30.0
Tetrahydrofuran		110.7	48.2	125.7	6.8	30.0
Toluene		122.9	74.8	129.2	5.2	30.0
Trichloroethene		118.9	74.1	127.6	4.1	30.0
Trichlorofluoromethane		143.1	25.7	157.8	2.9	30.0
Vinyl chloride		126.4	45.3	138.7	3.0	30.0
o-Xylene		116.7	79.4	132.3	6.3	30.0
p,m-Xylene		113.0	79.8	132.0	6.1	30.0

Merit Laboratories Login Checklist

Lab Set ID: S55623

Client: ARCADIS_NOVI (ARCADIS U.S., Inc.)

Project: Racer PNC

Submitted: 11/10/2023 11:15 Login User: MMC

Attention: Tiffany Linder
Address: Arcadis
28550 Cabot Drive
Suite 500
Novi, MI 48377

Phone: 248-994-2272 FAX:
Email: tiffany.linder@arcadis.com

Selection				Description	Note
Sample Receiving					
01.	☒ Yes	☐ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.1
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☒ Yes	☐ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☒ Yes	☐ No	☐ N/A	Merit bottles used	
16.	☐ Yes	☒ No	☐ N/A	Sufficient sample volume received	Only one amber provided for samples .41-.43
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☒ No	☐ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: ______________________ Date: ____________

Merit Laboratories, Inc.

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www.meritlabs.com

C.O.C. PAGE # 1 OF 5

168371

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME Tiffany Linder
COMPANY Arcadis
ADDRESS 28550 Cabot dr #500
CITY Novi STATE MI ZIP CODE 48377
PHONE NO. 810-225-1928 CELL NO. P.O. NO. 30167840
E-MAIL ADDRESS tiffany.Linder@arcadis.com QUOTE NO.

INVOICE TO

CONTACT NAME ☒ SAME
COMPANY
ADDRESS
CITY STATE ZIP CODE
PHONE NO. E-MAIL ADDRESS

PROJECT NO./NAME Racer PVC
SAMPLER(S) - PLEASE PRINT/SIGN NAME Jonathan Lusk / Jonathan Lusk

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☒ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: W=WATER GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR WS=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

MERIT LAB NO. FOR LAB USE ONLY	COLLECTION DATE	COLLECTION TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Arsenic via 6020	PCBs via 8082	Napthalene via 8260	TCE via 8260	PCE via 8260	Benzo(a) Pyrene via 8270	Field moisture			
55623.01	11-8-23	1010	BW5-06RE(0-1)_11082023	S	1	1								X								
.02	11-8-23	1020	BW5-06RE(5-6)_11082023	S	1	1								X								
.03	11-8-23	1025	BW5-06RE(11-12)_11082023	S	1	1								X								
.04	11-8-23	1025	BW5-06RE(14-15)_11082023	S	1	1								X								
.05	11-8-23	1320	MWDP-01RE(0-1)_11082023	S	2	1					1					X			X			
.06	11-8-23	1330	MWDP-01RE(2-3)_11082023	S	2	1					1					X			X			
.07	11-8-23	1340	MWDP-01RE(4-5)_11082023	S	2	1					1					X			X			
.08	11-8-23	1150	MWWI-04RE(0-1)_11082023	S	1	1								X								
.09	11-8-23	1150	MWWI-04RE(2.5-3.5)_11082023	S	1	1								X								
.10	11-8-23	1215	MWWI-04RE(4.5-5.5)_11082023	S	1	1								X								
.11	11-8-23	1250	MWWI-04RE(5.5-6)_11082023	S	1	1								X								
.12	11-8-23	1430	MWF7-01RE(0-1)_11082023	S	2	2							X	X								

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

RELINQUISHED BY: SIGNATURE/ORGANIZATION / Arcadis ☒ Sampler DATE 11-9-23 TIME 1200
RECEIVED BY: SIGNATURE/ORGANIZATION Novi Cold Storage / Arcadis DATE 11-9-23 TIME 1200
RELINQUISHED BY: SIGNATURE/ORGANIZATION Novi Cold Storage / Arcadis DATE 11-10-23 TIME 0850
RECEIVED BY: SIGNATURE/ORGANIZATION / Arcadis DATE 11-10-23 TIME 0850

RELINQUISHED BY: SIGNATURE/ORGANIZATION / Arcadis DATE 11-10-23 TIME 1010
RECEIVED BY: SIGNATURE/ORGANIZATION 11/10/23 DATE TIME 1010
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS 11/10/23 1115 NOTES: TEMP. ON ARRIVAL 5.1
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS M Chilcote 11/10/23 1115

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 1.26.22

Merit Laboratories, Inc.

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C.O.C. PAGE # 2 OF 5

168372

CHAIN OF COSTODY RECORD

REPORT TO

CONTACT NAME Tiffany Linder
COMPANY Arcadis
ADDRESS 28550 Cabot dr #500
CITY Novi STATE MI ZIP CODE 48377
PHONE NO. 810-225-1928 CELL NO.
P.O. NO. 30167840
E-MAIL ADDRESS tiffany.linder@arcadis.com
QUOTE NO.

INVOICE TO

CONTACT NAME ☒ SAME
COMPANY
ADDRESS
CITY STATE ZIP CODE
PHONE NO. E-MAIL ADDRESS

PROJECT NO./NAME RACER PNC
SAMPLER(S) - PLEASE PRINT/SIGN NAME Jonathan Lust

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☒ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: W=WATER GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR WS=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

MERIT LAB NO. FOR LAB USE ONLY	COLLECTION DATE	COLLECTION TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Arsenic via 6020	PCBs via 8082	Napthalene via 8260	TCE via 8260	PCE via 8260	Benzo(a)pyrene via 8270					Special Instructions
55623.13	11-7-23	1340	SM19-01RE(0-1)_11072023	S	1	1							X										
14/.15/.16	11-7-23	1400	SM19-01RE(2-3)_11072023	S	3	3							X										MS/MSD
.17	11-7-23	1400	SM19-01RE(4-5)_11072023	S	1	1							X										
.18	11-7-23	1500	SM19-03RE(0-1)_11072023	S	1	1							+										
.19	11-7-23	1535	SM19-03RE(2-3)_11072023	S	1	1							+										
.20	11-7-23	1535	SM19-03RE(4-5)_11072023	S	1	1							X										
.21	11-7-23	0800	SM19-02RE(0-1)_11072023	S	1	1							X										
.22	11-7-23	1500	SM19-02RE (2-3)_11072023	S	1	1							X										
.23	11-7-23	0800	SM19-02 RE(4-5)_11072023	S	1	1							X										
.24	11-8-23	0850	SM19-06RE(0-1)_11082023	S	1	1								X									
.25	11-8-23	0900	SM19-06RE (2-3)_11082023	S	1	1								X									
.26	11-8-23	0900	SM19-06RE(4-5)_11082023	S	1	1								X									

RELINQUISHED BY: SIGNATURE/ORGANIZATION Arcadis ☒ Sampler DATE 11-9-23 TIME 1700
RECEIVED BY: SIGNATURE/ORGANIZATION Novi Cold Storage/Arcadis DATE 11-9-23 TIME 1700
RELINQUISHED BY: SIGNATURE/ORGANIZATION Novi Cold Storage/Arcadis DATE 11-10-23 TIME 0850
RECEIVED BY: SIGNATURE/ORGANIZATION /Arcadis DATE 11-10-23 TIME 0850

RELINQUISHED BY: SIGNATURE/ORGANIZATION /Arcadis DATE 11-10-23 TIME 1010
RECEIVED BY: SIGNATURE/ORGANIZATION 11/10/23 1210 DATE TIME
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS 11/10/23 1115
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS
NOTES: 11/10/23 1115
TEMP. ON ARRIVAL 5.1

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 1.26.22

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2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 3 OF 5

168370

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME Tiffany Linder
COMPANY Arcadis
ADDRESS 28550 Cabot dr #500
CITY Novi STATE MI ZIP CODE 48377
PHONE NO. 810-225-1928 CELL NO.
P.O. NO. 30167840
E-MAIL ADDRESS tiffany.linder@arcadis.com QUOTE NO.

INVOICE TO

CONTACT NAME ☒ SAME
COMPANY
ADDRESS
CITY STATE ZIP CODE
PHONE NO. E-MAIL ADDRESS

PROJECT NO./NAME Racer PNC
SAMPLER(S) - PLEASE PRINT/SIGN NAME Jonathan Lust Jonathan Lust

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☒ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: W=WATER GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR WS=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

MERIT LAB NO. FOR LAB USE ONLY	COLLECTION DATE	COLLECTION TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives: NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Arsenic via 6020	PCBs via 8082	Napthalene via 8260	TCE via 8260	PCE via 8260	Benzo (a) Pyrene via 8270	field moisture			
55623.27	11-8-23	1440	MWF7-01RE(4-5)_11082023	S	2	2							X	X								
.28	11-8-23	1445	MWF7-01RE(8-9)_11082023	S	2	2							X	X								
.29	11-8-23	1445	MWF7-01RE(14-15)-11082023	S	2	2							X	X								
.30	11-8-23	1510	MWF12-01RE (0-1)_11082023	S	2	1					1				X		~~X~~		X			
.31	11-8-23	1515	MWF12-01RE (2-3)-11082023	S	2	1					1				X		~~X~~		X			
.32/.33/.34	11-8-23	1520	MWF12-01RE (4-5)_11082023	S	6	3					3				X		~~X~~		X			
.35	11-8-23	1600	BF17-21RE(0-1)_11082023	S	2	1					1				~~X~~		X		X			
.36	11-8-23	1605	BF17-21RE (2-3)_11082023	S	2	1					1						X		X			
.37	11-8-23	1610	BF17-21RE (4-5)_11082023	S	2	1					1						X		X			
.38	11-9-23	1320	BM30-03RE(1-1.5)_11092023	S	1	1								X								
.39	11-9-23	1325	BM30-03RE(2-3)_11092023	S	1	1								X								
.40	11-9-23	1330	BM30-03RE(4-5)_11092023	S	1	1								X								

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions
MS/MSD

RELINQUISHED BY: SIGNATURE/ORGANIZATION Jonathan Lust / Arcadis ☒ Sampler DATE 11-9-23 TIME 1700
RECEIVED BY: SIGNATURE/ORGANIZATION Novi Cold Storage / Arcadis DATE 11-9-23 TIME 1700
RELINQUISHED BY: SIGNATURE/ORGANIZATION Novi Cold Storage / Arcadis DATE 11-10-23 TIME 0950
RECEIVED BY: SIGNATURE/ORGANIZATION Jonathan Lust / Arcadis DATE 11-10-23 TIME 0950

RELINQUISHED BY: SIGNATURE/ORGANIZATION Jonathan Lust / Arcadis DATE 11-10-23 TIME 1010
RECEIVED BY: SIGNATURE/ORGANIZATION 11/10/23 1120 DATE TIME
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS 11/10/23 NOTES: TEMP. ON ARRIVAL 5.1
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS M Chalcote 11/10/23 1115

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 1.26.22

Merit Laboratories, Inc.

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 4 OF 5

168368

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME Tiffany Linder
COMPANY Arcadis
ADDRESS 28550 Cabot dr # 500
CITY NOVI STATE MI ZIP CODE 48377
PHONE NO. 810-225-1928 CELL NO. P.O. NO. 30167840
E-MAIL ADDRESS Tiffany.Linder@arcadis.com QUOTE NO.

INVOICE TO

CONTACT NAME ☒ SAME
COMPANY
ADDRESS
CITY STATE ZIP CODE
PHONE NO. E-MAIL ADDRESS

PROJECT NO./NAME Racer FNC
SAMPLER(S) - PLEASE PRINT/SIGN NAME Jonathan Lust

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☒ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: W=WATER GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR WS=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

MERIT LAB NO. FOR LAB USE ONLY	COLLECTION DATE	COLLECTION TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	Arsenic via 6020	SVOCs / PCBs	VOCs	Benzo(a) Pyrene via 8270	PCE via 8260	TCE via 8260	field moisture	PCB via 8082			Special Instructions
55623.41	11-7-23	1545	EB-01	W	4	1	3							X	+								
.42	11-8-23	1640	EB-02	w	4	1	3							X	X								
.43	11-9-23	1400	EB-03	W	4	1	3							+	+								
.44	11-9-23	0845	MWM30-01KE(0-1)-11092023	S	1	1														X			
.45	11-9-23	0850	MWM30-01KE(2-3)-11092023	S	1	1														X			
.46/.47/.48	11-9-23	0855	MWM30-01KE(4-5)-11092023	S	3	3														X			MS/MSD
.49	11-9-23	—	Trip Blank	S	4						4				X								
.50	—	—	DUP-01	S	1	1										~~X~~ JL				X			PCB
.51	—	—	DUP-02	S	1	1							X										
.52	—	—	DUP-03	S	1	1														X			
.53	—	—	DUP-04	S	2	1					1						X		X				
.54	—	—	DUP-05	S	2	1					1							X	X				

RELINQUISHED BY: SIGNATURE/ORGANIZATION ☒ Sampler		DATE 11-9-23	TIME 1700
RECEIVED BY: SIGNATURE/ORGANIZATION	NOVI Cold Storage / Arcadis	DATE 11-9-23	TIME 1700
RELINQUISHED BY: SIGNATURE/ORGANIZATION	NOVI Cold Storage / Arcadis	DATE 11/10/23	TIME 0950
RECEIVED BY: SIGNATURE/ORGANIZATION	/ Arcadis	DATE 11-10-23	TIME 0950

RELINQUISHED BY: SIGNATURE/ORGANIZATION	/ Arcadis	DATE 11-10-23	TIME 1010
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE 11-10-23	TIME
SEAL NO.	SEAL INTACT YES☐ NO☐	INITIALS	NOTES: (1) Bins TEMP. ON ARRIVAL 5.1
SEAL NO.	SEAL INTACT YES☐ NO☐	INITIALS M Chilcott 11/10/23 1115	

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 1.26.22

Merit Laboratories, Inc.

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C.O.C. PAGE # 5 OF 5

168369

CHAIN OF CUSTODY RECORD

REPORT TO

CONTACT NAME tiffany Linder
COMPANY Arcadis
ADDRESS 28550 Cabot dr #500
CITY Novi
STATE MI
ZIP CODE 48377
PHONE NO. 810-225-1928
CELL NO.
P.O. NO. 30167840
E-MAIL ADDRESS tiffany.Linder@arcadis.com
QUOTE NO.

INVOICE TO

CONTACT NAME
☒ SAME
COMPANY
ADDRESS
CITY
STATE
ZIP CODE
PHONE NO.
E-MAIL ADDRESS

PROJECT NO./NAME RACER PRL
SAMPLER(S) - PLEASE PRINT/SIGN NAME Jonathon Luz

TURNAROUND TIME REQUIRED ☐ 1 DAY ☐ 2 DAYS ☐ 3 DAYS ☒ STANDARD ☐ OTHER

DELIVERABLES REQUIRED ☒ STD ☐ LEVEL II ☐ LEVEL III ☐ LEVEL IV ☐ EDD ☐ OTHER

MATRIX CODE: W=WATER GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR WS=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

MERIT LAB NO. FOR LAB USE ONLY	COLLECTION DATE	COLLECTION TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO_3	H_2SO_4	NaOH	MeOH	OTHER	PCB VIA 8082
55623.55	11-9-23	0935	BM30-01RE(4-5)_11092023	S	1	1							X
.56	11-9-23	0930	BM30-01RE(2-3)_11092023	S	1	1							X
.57	11-9-23	0925	BM30-01RE(0-1)_11092023	S	1	1							X

Certifications
☐ OHIO VAP ☐ Drinking Water
☐ DoD ☐ NPDES

Project Locations
☐ Detroit ☐ New York
☐ Other

Special Instructions

RELINQUISHED BY: SIGNATURE/ORGANIZATION /Arcadis ☒ Sampler DATE 11-9-23 TIME 1700
RECEIVED BY: SIGNATURE/ORGANIZATION Novi CCD Storage DATE 11-9-23 TIME 1700
RELINQUISHED BY: SIGNATURE/ORGANIZATION Novi CCD Storage / Arcadis DATE 11-10-23 TIME 0950
RECEIVED BY: SIGNATURE/ORGANIZATION /Arcadis DATE 11-10-23 TIME 0950

RELINQUISHED BY: SIGNATURE/ORGANIZATION Jonathon Luz /Arcadis DATE 11-10-23 TIME 1010
RECEIVED BY: SIGNATURE/ORGANIZATION 11/10/23 1010
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS 11/10/23 1115 NOTES: TEMP. ON ARRIVAL 5.1
SEAL NO. SEAL INTACT YES ☐ NO ☐ INITIALS M Chilcote 11/10/23 1115

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev. 1.26.22

Attachment 2

Resample Soil Boring Logs

Soil Boring Log

Boring No.: BF17-21RE

Sheet: 1 of 1

Client Name: RACER Trust
Project Number: 30167840
Project Name: RACER Pontiac North Campus 2023

Date Started: 11-08-2023
Date Completed: 11-08-2023
Total Depth: 5.0 ft bgs

Logger: Jonathon Lust
Reviewer: Ian Drost

Depth (feet)	Sample ID	Rec. (ft)	PID (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
0	BF17-21RE(0-1)_11082022		0.0			(0-0.4 ft) NOTE: Topsoil / grass.	(0-1 ft) DUP-04 collected at 0-1 ft bgs
						(0.4-1.5 ft) SAND, very fine to medium, subround; trace small pebbles, subround; well sorted; little silt, no plasticity; dry; loose; 10YR 5/4 - yellowish brown; no odor.	
1			0.0				
						(1.5-5 ft) CLAY, low to medium plasticity, slow dilatancy; little silt, low plasticity; trace small pebbles, subround; trace very fine to fine sand, subround; well sorted; dry; very stiff; 10YR 5/3 - brown; no odor.	
2	BF17-21RE(2-3)_11082022		0.0				
3			0.0				
4	BF17-21RE(4-5)_11082022		0.0				
5						5 ft. bgs End of Boring	
6							
7							
8							
9							
10							

Drilling Company: Fibertec
Driller: Rhex Moore
Drilling Method: Direct-Push
Drill Rig: Geoprobe
Remarks: bgs = below ground surface; ft = feet; PID = photo-ionization detector; ppm = parts per million; Rec. = recovery.

Sampling Method: Dual Tube
Sampling Dimensions: 5 ft
First Encountered Water (ft bgs): NA
Static Water Level (ft bgs): NA
Top of Casing Elevation: NA
Surface Elevation: 976.81
North Coordinate: 425177.70
East Coordinate: 13409788.13

ARCADIS

Soil Boring Log

Boring No.: BM30-01RE

Sheet: 1 of 1

Client Name: RACER Trust
Date Started: 11-09-2023
Logger: Jonathon Lust
Project Number: 30167840
Date Completed: 11-09-2023
Reviewer: Ian Drost
Project Name: RACER Pontiac North Campus 2023
Total Depth: 5.0 ft bgs

Depth (feet)	Sample ID	Rec. (ft)	PID (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
0–1	BM30-01RE(0-1)_11092023		0.0		▦	(0-0.5 ft) NOTE: Concrete.	
					▨	(0.5-1 ft) CLAY, low plasticity, rapid dilatancy; little silt, low plasticity; little very fine to fine sand, subangular to subround; trace granules, subround; well sorted; dry; very stiff; 10YR 4/1 - dark gray; no odor.	
1–2			0.0		▨	(1-2 ft) CLAY, low plasticity, rapid dilatancy; some very fine to fine sand, subangular to subround; little silt, no plasticity; well sorted; dry; stiff; 10YR 3/1 - very dark gray; no odor; Organic staining (wood pieces).	
2–3	BM30-01RE(2-3)_11092023		0.0		░	(2-3 ft) SAND, very fine to medium, subround; well sorted; moist; medium dense; little silt, no plasticity, rapid dilatancy; 10YR 5/4 - yellowish brown; no odor.	
3–4			0.0		▨	(3-5 ft) CLAY, medium plasticity, slow dilatancy; little silt, low plasticity; little very fine to fine sand, subangular to subround; trace small to medium pebbles, subround; well sorted; dry; very stiff; 10YR 4/1 - dark gray, and 10YR 5/4 - yellowish brown; no odor; mottled structure.	
4–5	BM30-01RE(4-5)_11092023		0.0		▨		(4-5 ft) MS/MSD Collected 4-5 ft bgs

5 ft. bgs End of Boring

6
7
8
9
10

Drilling Company: Fibertec
Driller: Rhex Moore
Drilling Method: Direct-Push
Drill Rig: Geoprobe
Remarks: ; Finished with cement; bgs = below ground surface; ft = feet; PID = photo-ionization detector; ppm = parts per million; Rec. = recovery.

Sampling Method: Dual Tube
Sampling Dimensions: 5 ft
First Encountered Water (ft bgs): NA
Static Water Level (ft bgs): NA
Top of Casing Elevation: NA
Surface Elevation: 982.74
North Coordinate: 427133.50
East Coordinate: 13411844.16

ARCADIS

Soil Boring Log

Boring No.: BM30-03RE

Sheet: 1 of 1

Client Name: RACER Trust
Date Started: 11-09-2023
Logger: Jonathon Lust
Project Number: 30167840
Date Completed: 11-09-2023
Reviewer: Ian Drost
Project Name: RACER Pontiac North Campus 2023
Total Depth: 5.0 ft bgs

Depth (feet)	Sample ID	Rec. (ft)	PID (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
0			0.0			(0-0.8 ft) NOTE: Concrete.	(0-1 ft) Concrete coring
					☒	(0.8-1 ft) NOTE: Fill: gravel and sand.	
1	BM30-03RE(1-1.5)_11092023		0.0		▨	(1-2 ft) CLAY, low to medium plasticity, slow dilatancy; little silt, no plasticity; some very fine to fine sand, subround; trace small pebbles, subround; well sorted; dry; stiff; 10YR 5/1 - gray, some 2.5Y 4/3 - olive brown; no odor; mottled structure.	(1-1.5 ft) DUP-01 collected at 1.0-1.5 ft bgs
					▨	(1.9-2 ft) CLAY, medium plasticity, slow dilatancy; Some Silt, no plasticity AND Sand, very fine to fine, sub-rounded; Well sorted; dry; soft; 10YR 5/1-Gray. NOTE: Silty Sand Seam.	
2	BM30-03RE(2-3)_11092023		0.0		▨	(2-2.3 ft) CLAY, low to medium plasticity, slow dilatancy; little silt, no plasticity; some very fine to fine sand, subround; trace small pebbles, subround; well sorted; dry; stiff; 10YR 5/1 - gray, some 2.5Y 4/3 - olive brown; no odor; mottled structure.	
					▨	(2.3-2.4 ft) CLAY, medium plasticity, slow dilatancy; Some Silt, no plasticity AND Sand very fine to fine, sub-rounded; Well sorted;dry; soft; 10YR 5/1-Gray. NOTE: Silty Sand Seam.	
3			0.0		▨	(2.4-4.5 ft) CLAY, low to medium plasticity, slow dilatancy; little silt, no plasticity; some very fine to fine sand, subround; trace small pebbles, subround; well sorted; dry; stiff; 10YR 5/1 - gray, some 2.5Y 4/3 - olive brown; no odor; mottled structure.	
4	BM30-03RE(4-5)_11092023		0.0				
						(4.5-5 ft) SILT, low plasticity, rapid dilatancy; trace clay, low plasticity, slow dilatancy, stiff; and SAND, very fine to medium, subround, well sorted; moist; 10YR 6/1 - gray; no odor.	
5						5 ft. bgs End of Boring	
6							
7							
8							
9							
10							

Drilling Company: Fibertec
Driller: Rhex Moore
Drilling Method: Direct-Push
Drill Rig: Geoprobe
Remarks: ; Finished with cement; bgs = below ground surface; ft = feet; PID = photo-ionization detector; ppm = parts per million; Rec. = recovery.

Sampling Method: Dual Tube
Sampling Dimensions: 5 ft
First Encountered Water (ft bgs): NA
Static Water Level (ft bgs): NA
Top of Casing Elevation: NA
Surface Elevation: 982.83
North Coordinate: 427146.39
East Coordinate: 13411907.99

Soil Boring Log

Boring No.: BW5-06RE

Sheet: 1 of 1

Client Name: RACER Trust
Date Started: 11-08-2023
Logger: Jonathon Lust
Project Number: 30167840
Date Completed: 11-08-2023
Reviewer: Ian Drost
Project Name: RACER Pontiac North Campus 2023
Total Depth: 15.0 ft bgs

Depth (feet)	Sample ID	Rec. (ft)	PID (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
	BW5-06RE(0-1)_11082023		0.0			(0-0.5 ft) NOTE: Topsoil. (0.5-1 ft) NOTE: Fill, clay / concrete.	
1			0.0			(1-4.5 ft) SAND, very fine to medium, subangular to subround; little small to medium pebbles, subround; little silt, low plasticity; well sorted; dry; medium dense; 10YR 5/2 - grayish brown; no odor.	
2			0.0				
3			0.0				
4			0.1			(4.5-5 ft) PEBBLES and SAND, small to medium, fine to medium sand, subround, subangular to subround; well sorted; dry; 10YR 3/1 - very dark gray; no odor.	
5	BW5-06RE(5-6)_11082023		0.0			(5-6 ft) PEBBLES and SAND, small to medium, fine to coarse sand, angular to subangular; well sorted; dry; 10YR 5/2 - grayish brown; no odor.	
6			0.0			(6-9 ft) CLAY, high plasticity, slow dilatancy; little very fine to medium sand, subround; little small pebbles, subround; well sorted; moist; soft; 10YR 5/2 - grayish brown; no odor.	
7			0.1				
8			0.9				
9			1.3			(9-14 ft) CLAY, high plasticity, slow dilatancy; little very fine to medium sand, subround; little small to medium pebbles, subround; well sorted; moist; very soft; 10YR 4/1 - dark gray; moderate odor. NOTE: Poor recovery. Visible sheen on sample liner.	(9-15 ft) Quite strong odor, staining, and visible impacts. PID/Soil is cold and is not reading as elevated as it should
10			1.4				
11	BW5-06RE(11-12)_11082023		2.7				
12			4.3				
13			4.3				
14	BW5-06RE(14-15)_11082023		5.8			(14-16 ft) SILT, low plasticity, rapid dilatancy; little clay, low plasticity, rapid dilatancy; some very fine to medium sand, subangular to subround; trace granules, subround; trace small pebbles, subround; well sorted; moist; soft; 10YR 4/1 - dark gray; strong odor. NOTE: Visible impacts / sheen on sample casing. 15 ft. bgs End of Boring	(14-15 ft) DUP-03 Collected 14-15 ft bgs
15							
16							
17							
18							
19							
20							

Drilling Company: Fibertec
Driller: Rhex Moore
Drilling Method: Direct-Push
Drill Rig: Geoprobe
Remarks: bgs = below ground surface; ft = feet; PID = photo-ionization detector; ppm = parts per million; Rec. = recovery.

Sampling Method: Dual Tube
Sampling Dimensions: 5 ft
First Encountered Water (ft bgs): NA
Static Water Level (ft bgs): NA
Top of Casing Elevation: NA
Surface Elevation: 970.17
North Coordinate: 424663.01
East Coordinate: 13412876.00

ARCADIS

Soil Boring Log

Boring No.: MMW1-04RE

Sheet: 1 of 1

Client Name:	RACER Trust	Date Started:	11-08-2023	Logger:	Jonathon Lust
Project Number:	30167840	Date Completed:	11-08-2023	Reviewer:	Ian Drost
Project Name:	RACER Pontiac North Campus 2023	Total Depth:	6.0 ft bgs		

Depth (feet)	Sample ID	Rec. (ft)	PID (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
	MWW1-04RE(0-1)_11082023		8.9		▨	(0-0.8 ft) NOTE: Fill: broken asphalt / gravel.	
1			4.5		▨	(0.8-6 ft) NOTE: Fill: gravel, concrete, bricks.	
2			2.3		▨		
3	MWW1-04RE(2.5-3.5)_11082023		1.1		▨		
4			0.4		▨		
5			0.0		▨		(5-6 ft) Drilling refusal. Stepped over multiple times and unable to exceed 6 ft bgs.
6	MWW1-04RE(5.5-6)_11082023				▨		
						6 ft. bgs End of Boring	
7							
8							
9							
10							

Drilling Company:	Fibertec	Sampling Method:	Dual Tube
Driller:	Rhex Moore	Sampling Dimensions:	5 ft
Drilling Method:	Direct-Push	First Encountered Water (ft bgs):	NA
Drill Rig:	Geoprobe	Static Water Level (ft bgs):	NA
Remarks:	bgs = below ground surface; ft = feet; PID = photo-ionization detector; ppm = parts per million; Rec. = recovery.	Top of Casing Elevation:	NA
		Surface Elevation:	944.55
		North Coordinate:	423195.01
		East Coordinate:	13411677.95

ARCADIS

Soil Boring Log

Boring No.: MWDP-01RE

Sheet: 1 of 1

Client Name: RACER Trust
Project Number: 30167840
Project Name: RACER Pontiac North Campus 2023
Date Started: 11-08-2023
Date Completed: 11-08-2023
Total Depth: 5.0 ft bgs
Logger: Jonathon Lust
Reviewer: Ian Drost

Depth (feet)	Sample ID	Rec. (ft)	PID (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
0			0.0			(0-0.2 ft) NOTE: Grass.	
	MWDP-01RE(0-1)_11082023					(0.2-1 ft) SAND, very fine to medium, subangular to subround; little small pebbles, subround; well sorted; some clay, low plasticity, slow dilatancy; little silt, low plasticity, slow dilatancy; dry; medium dense; 10YR 6/3 - pale brown; no odor. NOTE: Some organic matter.	
1			0.0			(1-5 ft) CLAY, low to medium plasticity, slow dilatancy; little very fine to fine sand, subround; little small pebbles, subround; well sorted; dry; stiff; 10YR 7/1 - light gray, and 10YR 7/6 - yellow; no odor; mottled structure.	
2	MWDP-01RE(2-3)_11082023		0.0				
3			0.0				
4	MWDP-01RE(4-5)_11082023		0.0				(4-5 ft) DUP-05 collected 4-5 ft bgs
5						5 ft. bgs End of Boring	

6

7

8

9

10

Drilling Company: Fibertec
Driller: Rhex Moore
Drilling Method: Direct-Push
Drill Rig: Geoprobe
Remarks: bgs = below ground surface; ft = feet; PID = photo-ionization detector; ppm = parts per million; Rec. = recovery.

Sampling Method: Dual Tube
Sampling Dimensions: 5 ft
First Encountered Water (ft bgs): NA
Static Water Level (ft bgs): NA
Top of Casing Elevation: NA
Surface Elevation: 947.80
North Coordinate: 422910.38
East Coordinate: 13412576.39

Soil Boring Log

Boring No.: MWF7-01RE

Sheet: 1 of 1

Client Name: RACER Trust
Project Number: 30167840
Project Name: RACER Pontiac North Campus 2023
Date Started: 11-08-2023
Date Completed: 11-08-2023
Total Depth: 15.0 ft bgs
Logger: Jonathon Lust
Reviewer: Ian Drost

Depth (feet)	Sample ID	Rec. (ft)	PID (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
1	MWF17-01RE(0-1)_11082023		0.0			(0-2 ft) NOTE: Fill: cobbles, sand, gravel.	
2			0.0				
3			0.0			(2-4 ft) SAND, very fine to medium, subangular to subround; little small to medium pebbles, angular to subangular; well sorted; little silt, no plasticity, rapid dilatancy; dry; medium dense; 10YR 5/3 - brown; no odor. NOTE: Possibly fill sand / gravel.	
4			0.0				
5	MWF17-01RE(4-5)_11082023		0.0			(4-6.5 ft) SAND, very fine to medium, subangular to subround; little small to medium pebbles, subangular; well sorted; little silt, no plasticity, rapid dilatancy; little clay, low plasticity; dry; medium dense; 10YR 4/2 - dark grayish brown; no odor.	
6			0.0				
7			0.0			(6.5-15 ft) SAND, very fine to medium, subangular; little silt, no plasticity; well sorted; dry to moist; loose; 10YR 7/6 - yellow; no odor.	
8			0.0				
9	MWF17-01RE(8-9)_11082023		0.0				
10			0.0				
11			0.0				
12			0.0				
13			0.0				
14			0.0				
15	MWF17-01RE(14-15)_11082023		0.0				
16						15 ft. bgs End of Boring	
17							
18							
19							
20							

Drilling Company: Fibertec
Driller: Rhex Moore
Drilling Method: Direct-Push
Drill Rig: Geoprobe
Remarks: bgs = below ground surface; ft = feet; PID = photo-ionization detector; ppm = parts per million; Rec. = recovery.

Sampling Method: Dual Tube
Sampling Dimensions: 5 ft
First Encountered Water (ft bgs): NA
Static Water Level (ft bgs): NA
Top of Casing Elevation: NA
Surface Elevation: 970.84
North Coordinate: 424720.05
East Coordinate: 13411023.43

ARCADIS

Soil Boring Log

Boring No.: MWF12-01RE

Sheet: 1 of 1

Client Name: RACER Trust
Project Number: 30167840
Project Name: RACER Pontiac North Campus 2023
Date Started: 11-08-2023
Date Completed: 11-08-2023
Total Depth: 5.0 ft bgs
Logger: Jonathon Lust
Reviewer: Ian Drost

Depth (feet)	Sample ID	Rec. (ft)	PID (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
1	MWF12-01RE(0-1)_11082023		0.0		▩	(0-1 ft) NOTE: Fill:gravel/sand.	
2			0.0		▨	(1-3 ft) SAND, fine to medium, subangular to subround; little small to medium pebbles, subangular; some clay, low plasticity; well sorted; dry; medium dense; 10YR 5/2 - grayish brown; no odor.	
3	MWF12-01RE(2-3)_11082023		0.0		▨		
4			0.0		▨	(3-5 ft) CLAY, low plasticity, slow dilatancy; little silt, no plasticity; little fine to medium sand, subangular to subround; little small to medium pebbles, subangular; well sorted; dry; medium stiff; 10YR 3/2 - very dark grayish brown; no odor.	
5	MWF12-01RE(4-5)_11082023		0.0		▨		(4-5 ft) MS/MSD collected 4-5 ft bgs
6						5 ft. bgs End of Boring	
7							
8							
9							
10							

Drilling Company: Fibertec
Driller: Rhex Moore
Drilling Method: Direct-Push
Drill Rig: Geoprobe
Remarks: bgs = below ground surface; ft = feet; PID = photo-ionization detector; ppm = parts per million; Rec. = recovery.

Sampling Method: Dual Tube
Sampling Dimensions: 5 ft
First Encountered Water (ft bgs): NA
Static Water Level (ft bgs): NA
Top of Casing Elevation: NA
Surface Elevation: 965.05
North Coordinate: 424231.86
East Coordinate: 13411141.80

ARCADIS

Soil Boring Log

Boring No.: MWM30-01RE

Sheet: 1 of 1

Client Name: RACER Trust
Date Started: 11-09-2023
Logger: Jonathon Lust
Project Number: 30167840
Date Completed: 11-09-2023
Reviewer: Ian Drost
Project Name: RACER Pontiac North Campus 2023
Total Depth: 5.0 ft bgs

Depth (feet)	Sample ID	Rec. (ft)	PID (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
	MWM30-01RE(0-1)_11092023		0.0		■	(0-1.5 ft) NOTE: Asphalt / road base.	
1			0.0		■		
					▨	(1.5-2 ft) CLAY, low to medium plasticity, slow dilatancy; little silt, low plasticity; little very fine to fine sand, angular to subangular; little small pebbles, subround; well sorted; dry; stiff; 10YR 4/1 - dark gray, some 10YR 6/6 - brownish yellow; mild odor.	
2	MWM30-01RE(2-3)_11092023		0.0		▨	(2-4 ft) CLAY, medium plasticity, slow dilatancy; little silt, low plasticity; little very fine to fine sand, subangular; trace small pebbles, subround; well sorted; dry; medium stiff; 10YR 4/1 - dark gray; mild odor.	
3			0.0		▨		
4	MWM30-01RE(4-5)_11092023		0.0		▨	(4-5 ft) CLAY, low plasticity, slow dilatancy; little silt, no plasticity; little very fine to fine sand, subangular; trace granules, subround; well sorted; dry; medium stiff; 10YR 6/4 - light yellowish brown; no odor.	(4-5 ft) (4-5 ft) MS/MSD collected 4-5 ft bgs
5						5 ft. bgs End of Boring	
6							
7							
8							
9							
10							

Drilling Company: Fibertec
Driller: Rhex Moore
Drilling Method: Direct-Push
Drill Rig: Geoprobe
Remarks: bgs = below ground surface; ft = feet; PID = photo-ionization detector; ppm = parts per million; Rec. = recovery.

Sampling Method: Dual Tube
Sampling Dimensions: 5 ft
First Encountered Water (ft bgs): NA
Static Water Level (ft bgs): NA
Top of Casing Elevation: NA
Surface Elevation: 979.83
North Coordinate: 427106.08
East Coordinate: 13411861.94

ARCADIS

Soil Boring Log

Boring No.: MWM32-08RE

Sheet: 1 of 1

Client Name: RACER Trust
Project Number: 30167840
Project Name: RACER Pontiac North Campus 2023

Date Started: 11-09-2023
Date Completed: 11-09-2023
Total Depth: 1.1 ft bgs

Logger: Jonathon Lust
Reviewer: Ian Drost

Depth (feet)	Sample ID	Rec. (ft)	PID (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
0–1		0			▨	(0-1.1 ft) NOTE: Concrete.	(0-1 ft) Rough drilling
1						1.1 ft. bgs End of Boring	(1-1.1 ft) Drilling refusal. Reinforced concrete is too thick. Drill bit cannot get through rebar. Previous boring logs in this location indicate concrete thickness at 2.5 ft, abandoning attempts.
2							
3							
4							
5							
6							
7							
8							
9							
10							

Drilling Company: Fibertec
Driller: Rhex Moore
Drilling Method: Direct-Push
Drill Rig: Geoprobe
Remarks: ; Finished with cement; bgs = below ground surface; ft = feet; PID = photo-ionization detector; ppm = parts per million; Rec. = recovery.

Sampling Method: Dual Tube
Sampling Dimensions: 5 ft
First Encountered Water (ft bgs): NA
Static Water Level (ft bgs): NA
Top of Casing Elevation: NA
Surface Elevation: 984.09
North Coordinate: 427425.42
East Coordinate: 13411982.46

Boring No.: SM19-01RE

Soil Boring Log

Sheet: 1 of 1

Client Name: RACER Trust
Date Started: 11-07-2023
Logger: Jonathon Lust
Project Number: 30167840
Date Completed: 11-07-2023
Reviewer: Ian Drost
Project Name: RACER Pontiac North Campus 2023
Total Depth: 5.0 ft bgs

Depth (feet)	Sample ID	Rec. (ft)	PID (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
	SM19-01RE(0-1)_11072023	5	0.5		▩	(0-2.5 ft) SAND, fine to coarse, angular to subangular; some small to medium pebbles, subround; little granules, subangular; well sorted; dry; medium dense; 10YR 3/1 - very dark gray; no odor; fill.	
1			0.0		▩		(1-2 ft) Hand augering difficult through packed gravel.
2	SM19-01RE(02-3)_11072023		0.0		▩		(2-3 ft) MS/MSD collected 2-3 ft bgs
					▩	(2.5-23 ft) NOTE: Concrete fill.	
3			0.0		▨	(3-4 ft) SAND, very fine to medium, subangular to subround; some clay, low plasticity, rapid dilatancy; trace silt, no plasticity, rapid dilatancy; trace small to medium pebbles, subround; well sorted; dry; medium dense; 10YR 4/2 - dark grayish brown; no odor.	
4	SM19-01RE(4-5)_11072023		0.0		▨	(4-5 ft) CLAY, no plasticity, rapid dilatancy; little very fine to medium sand, subangular; little small to medium pebbles, subangular; well sorted; dry; medium stiff; 10YR 4/2 - dark grayish brown; no odor.	
5						5 ft. bgs End of Boring	
6							
7							
8							
9							
10							

Drilling Company: Fibertec
Driller: Rhex Moore
Drilling Method: Direct-Push
Drill Rig: Geoprobe
Remarks: bgs = below ground surface; ft = feet; PID = photo-ionization detector; ppm = parts per million; Rec. = recovery.

Sampling Method: Dual Tube
Sampling Dimensions: 5 ft
First Encountered Water (ft bgs): NA
Static Water Level (ft bgs): NA
Top of Casing Elevation: NA
Surface Elevation: 967.93
North Coordinate: 424919.15
East Coordinate: 13412890.98

ARCADIS

Soil Boring Log

Boring No.: SM19-02RE

Sheet: 1 of 1

Client Name: RACER Trust
Date Started: 11-07-2023
Logger: Jonathon Lust
Project Number: 30167840
Date Completed: 11-07-2023
Reviewer: Ian Drost
Project Name: RACER Pontiac North Campus 2023
Total Depth: 5.0 ft bgs

Depth (feet)	Sample ID	Rec. (ft)	PID (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
1	SM19-02RE(0-1)_11072023		3.4		▩	(0-2.5 ft) NOTE: Fill, gravel, concrete, asphalt, sand.	
2			0.4		▩		
3	SM19-02RE(2-3)_11072023		0.0		▩ ░	(2.5-3 ft) SAND, fine to coarse, subangular; some clay, low plasticity, rapid dilatancy; little small pebbles, subangular; poorly sorted; dry; medium dense; 10YR 4/1 - dark gray; no odor.	(2-3 ft) DUP-02 collected at 2-3 ft bgs
4			0.0		▨	(3-5 ft) CLAY, low plasticity, rapid dilatancy; some very fine to medium sand, subround; little silt, low plasticity, rapid dilatancy; little small pebbles, subround; well sorted; dry; stiff; 10YR 3/1 - very dark gray; no odor.	
5	SM19-02RE(4+5)_110720[illegible]3		0.0		▨		
6						5 ft. bgs End of Boring	
7							
8							
9							
10							

Drilling Company: Fibertec
Driller: Rhex Moore
Drilling Method: Direct-Push
Drill Rig: Geoprobe
Remarks: bgs = below ground surface; ft = feet; PID = photo-ionization detector; ppm = parts per million; Rec. = recovery.

Sampling Method: Dual Tube
Sampling Dimensions: 5 ft
First Encountered Water (ft bgs): NA
Static Water Level (ft bgs): NA
Top of Casing Elevation: NA
Surface Elevation: 968.01
North Coordinate: 424904.45
East Coordinate: 13412784.98

ARCADIS

Soil Boring Log

Boring No.: SM19-03RE

Sheet: 1 of 1

Client Name: RACER Trust
Date Started: 11-07-2023
Logger: Jonathon Lust

Project Number: 30167840
Date Completed: 11-07-2023
Reviewer: Ian Drost

Project Name: RACER Pontiac North Campus 2023
Total Depth: 5.0 ft bgs

Depth (feet)	Sample ID	Rec. (ft)	PID (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
0–1	SM19-03RE(0-1)_11072023		0.2		▩	(0-2 ft) NOTE: Fill: gravel, sand, clay, concrete .	
1–2			0.4		▩		
2–3	SM19-03RE(2-3)_11072023		0.1		▨	(2-3.5 ft) CLAY, low plasticity, rapid dilatancy; some very fine to coarse sand, subangular to subround; little small to medium pebbles, subround; poorly sorted; little silt, no plasticity, rapid dilatancy; dry; stiff; 10YR 4/2 - dark grayish brown; no odor.	
3–4			0.1		▨		
3.5–5					▨	(3.5-5 ft) CLAY, medium to high plasticity, slow dilatancy; little silt, medium to high plasticity, slow dilatancy; medium stiff; little small to large pebbles, subround; little very fine to medium sand, subround; poorly sorted ; dry; 10YR 5/2 - grayish brown; no odor.	
4–5	SM19-03RE(4-5)_11072023		0.0		▨		
5						5 ft. bgs End of Boring	
6							
7							
8							
9							
10							

Drilling Company: Fibertec

Driller: Rhex Moore

Drilling Method: Direct-Push

Drill Rig: Geoprobe

Remarks: bgs = below ground surface; ft = feet; PID = photo-ionization detector; ppm = parts per million; Rec. = recovery.

Sampling Method: Dual Tube

Sampling Dimensions: 5 ft

First Encountered Water (ft bgs): NA

Static Water Level (ft bgs): NA

Top of Casing Elevation: NA

Surface Elevation: 968.22

North Coordinate: 424905.65

East Coordinate: 13412622.38

Soil Boring Log

Boring No.: SM19-06RE

Sheet: 1 of 1

Client Name: RACER Trust
Date Started: 11-08-2023
Logger: Jonathon Lust
Project Number: 30167840
Date Completed: 11-08-2023
Reviewer: Ian Drost
Project Name: RACER Pontiac North Campus 2023
Total Depth: 5.0 ft bgs

Depth (feet)	Sample ID	Rec. (ft)	PID (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
	SM19-06RE(0-1)_11082023		0.0		▩	(0-1 ft) NOTE: Fill: silt, pebbles, sand.	
1			0.0		▨	(1-3.5 ft) CLAY, low plasticity, rapid dilatancy; some very fine to medium sand, angular to subangular; little small to medium pebbles, subangular; well sorted; little silt, no plasticity, rapid dilatancy; dry; medium stiff; 10YR 4/1 - dark gray; no odor.	
2	SM19-06RE(2-3)_11082023		0.0		▨		
3			0.0		▨	(3.5-5 ft) CLAY, high plasticity, slow dilatancy; little small to medium pebbles, subangular; little very fine to medium sand, subangular to subround; well sorted; dry; medium stiff; 10YR 4/2 - dark grayish brown; no odor.	
4	SM19-06RE(4-5)_11082023		0.0		▨		
5						5 ft. bgs End of Boring	
6							
7							
8							
9							
10							

Drilling Company: Fibertec
Driller: Rhex Moore
Drilling Method: Direct-Push
Drill Rig: Geoprobe
Remarks: bgs = below ground surface; ft = feet; PID = photo-ionization detector; ppm = parts per million; Rec. = recovery.

Sampling Method: Dual Tube
Sampling Dimensions: 5 ft
First Encountered Water (ft bgs): NA
Static Water Level (ft bgs): NA
Top of Casing Elevation: NA
Surface Elevation: 967.76
North Coordinate: 424886.65
East Coordinate: 13412337.57

Attachment 3

Arcadis Technical Guidance Instructions

TGI – GROUNDWATER AND SOIL SAMPLING EQUIPMENT DECONTAMINATION

Rev: 0

Rev Date: February 23, 2017

VERSION CONTROL

Revision No	Revision Date	Page No(s)	Description	Reviewed by
0	February 23, 2017	ALL	Conversion from SOP to TGI	Cassandra McCloud / Pete Frederick

APPROVAL SIGNATURES

Prepared by: Derrick Maurer Date: 02/23/2017

Derrick Maurer

Technical Expert Reviewed by: Date: 02/23/2017

Cassandra McCloud (Technical Expert)

1 INTRODUCTION

This document describes general and/or specific procedures, methods, actions, steps, and considerations to be used and observed by Arcadis staff when performing work, tasks, or actions under the scope and relevancy of this document. This document may describe expectations, requirements, guidance, recommendations, and/or instructions pertinent to the service, work task, or activity it covers.

It is the responsibility of the Arcadis Certified Project Manager (CPM) to provide this document to the persons conducting services that fall under the scope and purpose of this procedure, instruction, and/or guidance. The Arcadis CPM will also ensure that the persons conducting the work falling under this document are appropriately trained and familiar with its content. The persons conducting the work under this document are required to meet the minimum competency requirements outlined herein, and inquire to the CPM regarding any questions, misunderstanding, or discrepancy related to the work under this document.

This document is not considered to be all inclusive nor does it apply to any and all projects. It is the CPM's responsibility to determine the proper scope and personnel required for each project. There may be project- and/or client- and/or state-specific requirements that may be more or less stringent than what is described herein. The CPM is responsible for informing Arcadis and/or Subcontractor personnel of omissions and/or deviations from this document that may be required for the project. In turn, project staff are required to inform the CPM if or when there is a deviation or omission from work performed as compared to what is described herein.

In following this document to execute the scope of work for a project, it may be necessary for staff to make professional judgment decisions to meet the project's scope of work based upon site conditions, staffing expertise, state-specific requirements, health and safety concerns, etc. Staff are required to consult with the CPM when or if a deviation or omission from this document is required that has not already been previously approved by the CPM. Upon approval by the CPM, the staff can perform the deviation or omission as confirmed by the CPM.

2 SCOPE AND APPLICATION

Decontamination is performed on sampling equipment prior to sample collection to ensure that the sampling equipment that contacts a sample, or monitoring equipment that is brought into contact with environmental media to be sampled, is free from analytes of interest and/or constituents that could interfere with laboratory analysis for analytes of interest. Sampling equipment must be appropriately cleaned prior to use for sampling or coming into contact with environmental media to be sampled, and following completion of the sampling event prior to shipment or storage. The effectiveness of the decontamination procedure should be verified by collecting and analyzing equipment blank samples.

The sampling equipment cleaning procedures described herein includes pre-field, in the field, and post-field cleaning of sampling equipment which may be conducted at an established equipment decontamination area (EDA) on site, as appropriate and necessary. Sampling equipment that may require decontamination at a given site includes: soil sampling tools; groundwater, sediment, and surface-water sampling devices; water testing instruments; down-hole instruments; and other activity-specific sampling equipment. Non-disposable equipment will be cleaned before collecting each sample, between each sample collected, and prior to placing sampling equipment in protective cases, or containers for transport. Cleaning procedures for sampling equipment should be monitored by collecting equipment blank samples as required in project work plans, field sampling plans, quality assurance project plans (QAPP), or other pertinent project documents. Dedicated and/or single-use (i.e., not to be re-used) sampling equipment will not require decontamination.

3 PERSONNEL QUALIFICATIONS

Arcadis field sampling personnel will have completed or are in the process of completing site-specific training as well as having current health and safety training as required by Arcadis, client, or regulations, such as 40-hour HAZWOPER training and/or OSHA HAZWOPER site supervisor training. Arcadis personnel will also have current training as specified in the Health and Safety Plan (HASP) which may include first aid, cardiopulmonary resuscitation (CPR), Blood Borne Pathogens (BBP) as needed. In addition, Arcadis field sampling personnel will be knowledgeable in the relevant processes, procedures, and Technical Guidance Instructions (TGIs) and possess the demonstrated required skills and experience necessary to successfully complete the desired field work. The project health and safety plan (HASP) and other documents will identify other training requirements or access control requirements.

4 EQUIPMENT LIST

The equipment required for equipment decontamination is presented below:

- Health and safety equipment, including appropriate PPE, as required in the site Health and Safety Plan (HASP)
- Deionized water that meets that analytical criteria for deionized water with no detectable constituents above the reporting limits for the methods to be used and analytes being analyzed for. Deionized water is used for inorganics, and organic-free water for VOCs, SVOCs, pesticides, etc.
- Non-phosphate detergent such as Alconox or, if sampling for phosphorus or phosphorus-containing compounds, Liquinox (or equivalent).
- Tap water
- Rinsate collection plastic containers
- DOT-approved waste shipping container(s), as specified in the work plan, field sampling plan, or regulatory requirements if decontamination waste is to be shipped for disposal
- Brushes
- Large heavy-duty garbage bags
- Spray bottles
- (Optional) – Isopropyl alcohol (free of ketones) or methanol. These can be wipes or diluted with water (usually 1part isopropyl/methanol to 10 parts water) if a spray is needed.
- Airtight, sealable plastic baggies, such as Ziploc-type
- Plastic sheeting

5 CAUTIONS

Rinse equipment thoroughly and allow the equipment to dry before re-use or storage to prevent introducing solvent into sample medium. If manual drying of equipment is required, use clean lint-free material to wipe the equipment dry. Ensure all rinsate materials do not adversely affect sample collection efficiency or analytical results.

Store decontaminated equipment in a clean, dry environment. Do not store near combustion engine exhausts. Properly containerize equipment to ensure cross-contamination doesn't happen from other uncontaminated surfaces or equipment.

If equipment is damaged to the extent that decontamination is uncertain due to cracks, gouges, crevices, or dents, the equipment should not be used and should be discarded or submitted for repair prior to use for sample collection.

A proper shipping determination regarding hazardous materials will be performed by a DOT-trained individual for cleaning materials shipped by Arcadis.

Caution should be exercised to avoid contact with the pump casing and water in the container while the pump is running (do not use metal drums or garbage cans) to avoid electric shock.

6 HEALTH AND SAFETY CONSIDERATIONS

Review the safety data sheets (SDS) for the cleaning agents and materials used in decontamination. If solvent is used during decontamination, use appropriate PPE and work in a well-ventilated area and stand upwind while applying solvent to equipment. Apply solvent in a manner that minimizes potential for exposure to workers and bystanders. Follow health and safety procedures outlined in the HASP.

7 PROCEDURE

A designated area will be established to clean sampling equipment in the field prior to and following sample collection. Equipment cleaning areas will be set up within or adjacent to the specific work area, but not at a location that expose equipment to contamination (i.e. exposed to combustion engine exhaust). Detergent solutions will be prepared in clean containers for use in equipment decontamination. Decontaminated equipment should be handled by workers wearing clean gloves, properly changed to prevent cross-contamination.

Cleaning Sampling Equipment

1. Wash the equipment/pump with potable water.
2. Wash with detergent solution (Alconox, Liquinox or equivalent) to remove all visible particulate matter and any residual oils or grease.
3. If equipment is very dirty, precleaning gross debris with a brush and tap water may be necessary.
4. If non-aqueous phase liquids are present, the use of isopropyl alcohol (free of ketones) or methanol is recommended. Cloth wipes or diluted solution can be used to remove the non-aqueous phase liquids that are hard to remove with detergent solution in step 2. Consult with project manager if

non-aqueous phase liquids are present onsite and design an appropriate decontamination procedure that includes step 4.

5. Rinse with deionized water.

Decontaminating Submersible Pumps

Submersible pumps may be used during well development, groundwater sampling, or other investigative activities. The pumps must be cleaned and flushed before and between uses. This cleaning process will consist of an external detergent solution wash and tap water rinse, a flush of detergent solution through the pump, followed by a flush of potable water through the pump. Flushing will be accomplished by using an appropriate container filled with detergent solution and another container filled with potable water. The pump should be flushed with deionized water as the last step prior to use. The pump will run long enough to effectively flush the pump housing and hose (unless new, disposable hose is used). Disconnect the pump from the power source before handling. The pump and hose should be placed on or in clean polyethylene sheeting to avoid contact with the ground surface.

8 WASTE MANAGEMENT

Equipment decontamination rinsate will be managed in conjunction with all other waste produced during the field sampling effort. Waste management procedures are outlined in the work plan or Waste Management Plan (WMP).

9 DATA RECORDING AND MANAGEMENT

Equipment cleaning and decontamination will be noted in the field notebook for project documentation. Information will include the type of equipment cleaned, the decontamination location, specific procedures utilized, solvents and/or cleaning agents used, source of water, and deviations or omissions from this TGI.

Unusual field conditions should be noted if there is potential to impact the efficacy of the decontamination or subsequent sample collection.

An inventory of the solvents brought on site and used and removed from the site will be maintained in the project documentation. Records will be maintained for solvents used in decontamination, including lot number and expiration date.

Containers with decontamination fluids will be labeled.

10 QUALITY ASSURANCE

Equipment blanks should be collected to verify that the decontamination procedures are effective in minimizing potential for cross contamination. The equipment blank is prepared by pouring deionized water (or organic-free water, for organic analyses) over the clean and dry tools and collecting the water into appropriate sample containers. Equipment blanks should be analyzed for the same set of parameters that are performed on the field samples collected with the equipment that was cleaned as specified in the sampling and analysis plan. Equipment blanks are collected per equipment set, which represents all of the tools needed to collect a specific sample.

11 REFERENCES

USEPA Region 9 - Field Sampling Guidance #1230, Sampling Equipment Decontamination.

USEPA Region 1 - Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells.

TGI – Sample Chain of Custody

Rev: 3

Rev Date: March 28, 2022

Version Control

Issue	Revision No.	Date Issued	Page No.	Description	Reviewed By
	0	April 19, 2017	All	Re-write to COC only	Richard Murphy
	1	May 23, 2017	4,7,9	Add: Guidance on use of previous version of TGI. Add: Info on COCs for multiple shipping containers Modify: Move letter i. to letter m. and change to “when appropriate”	Peter Frederick
	2	April 29, 2020	4, 11	Remove obsolete link	Lyndi Mott
	3	December 28, 2022	All	Updated Arcadis format Added to 6c. Collection time between COC and container must match. Added to 6o. Add name of overnight courier when relinquishing samples. Updated reference documents and added internet links.	Lyndi Mott

Approval Signatures

Prepared by: 3/28/2022

Lyndi Mott (Preparer) Date

Reviewed by: Dennis K. Capria 3/28/2022

Dennis Capria (Chain of Custody Reviewer) Date

Reviewed by: 12/22/2021

Lyndi Mott (Subject Matter Expert) Date

1 Introduction

This Technical Guidance Instruction (TGI) provides the procedure for Arcadis field personnel for required documentation during the collection of environmental field samples and transfer of custody to a laboratory. It provides direction for completion of the Chain of Custody form that must accompany collected field samples for analysis by a laboratory.

2 Intended Use and Responsibilities

This document describes general and/or specific procedures, methods, actions, steps, and considerations to be used and observed by Arcadis staff when performing work, tasks, or actions under the scope and relevancy of this document. This document may describe expectations, requirements, guidance, recommendations, and/or instructions pertinent to the service, work task, or activity it covers.

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3 Scope and Application

This TGI describes the general Chain of Custody (COC) procedures and guidance instructions for samples collected from project sites that are relinquished from Arcadis' possession.

COC is defined as the maintenance of an unbroken record of possession of an item from the time of its collection through some analytical or testing procedure. COC is typically documented by a written record of the collection, possession, and handling of samples collected from a project location. Each sample will be tracked by a documented record that efficiently documents the individuals who were responsible for the sample during each successive transfer of that sample to various recipients beyond Arcadis' possession. This information can be used to legally establish the integrity of the samples and therefore the analytical results derived from the samples. This information can be used in addition to other records and documentation regarding the samples, such as field forms, field logs, and photographs.

A sample is considered under custody if:

- It is in your possession; or
- It is in your view, after being in your possession; or
- It was in your possession and then you then locked it up to prevent tampering; or
- It is in a designated secure area.

Continued use of previous version of TGI:

Although not recommended, Arcadis program-, project-, and client-teams may be able to use the previous version of this TGI provided that it meets all of the quality expectations of Arcadis and client and meets applicable regulatory requirements. It is up to the program, project, and/or client-team leader to determine whether it is appropriate to adopt the current TGI or to continue using the previous version.

However, all new work not associated with the previous version of this TGI must be performed with the current version of the TGI.

When adopting this new TGI, users of the previous versions must be aware that specific handling, packing, and shipping procedures and guidance has been removed and that those should be addressed within program or project plans (e.g., Quality Assurance Project Plans (QAPP), Work Plans, Sampling and Analysis Plans (SAPs), etc.) or in a more detailed TGI specific to that sampling activity, whether related to media, constituent/analyte, client, state, etc.

In addition, adopting this new TGI will require users to refer to the Arcadis Department of Transportation (DOT) Safety Program for procedures and guidance on the determination and handling, packing, and shipping of samples that are or may be considered hazardous materials.

4 Personnel Qualifications

Arcadis personnel performing work under the purview of this TGI will have received appropriate training and have field experience regarding the collection of samples from project locations. Arcadis personnel will have all other applicable and appropriate training relevant to the sampling work and project site.

5 Equipment List

The following list provides materials that may be required for each COC. Project reporting and documentation requirements must be reviewed with the CPM prior to execution of work. Additional materials, tools, equipment, etc. may be required, and project staff are required to verify with the CPM and/or Technical Expert what specific equipment is required to complete the COC.

- Indelible ink pen (preferably either black or blue ink);
- COC form **(Appendix A)** from either Arcadis, laboratory receiving and analyzing the samples, or other applicable and appropriate entity for the work performed;
- When appropriate, such as for litigation or expert testimony work, custody seals or tape.

6 Cautions

One way in which the law tries to ensure the integrity of evidence is by requiring proof of the chain of custody by the party who is seeking to introduce a particular piece of evidence.

A proper chain of custody requires three types of affirmations: (1) affirmation that a sample is what it purports to be (for example, soil collected from a specified location and depth); (2) affirmation of continuous possession by each individual who has had possession of the sample from the time it is collected until the time it is analyzed or held by a laboratory; and (3) affirmation by each person who has had possession that sample remained in substantially the same condition and not contaminated or affected by outside influences from the moment one person took possession until the moment that person released the evidence into the custody of another (for example, affirmation that the sample was stored in a secure location where no one but the person in custody had access to it).

Proving chain of custody is necessary to "lay a foundation" for the samples in question, by showing the absence of alteration, substitution, or change of condition.

Ensure that appropriate sample containers with applicable preservatives, coolers, and packing material are planned for and provided at the site at the time of sample collection.

Understand the offsite transfer requirements of the samples for the facility at which samples are collected.

If overnight courier service is required schedule pick-up or know where the drop-off service center is located and the hours of operation.

An Arcadis employee appropriately trained at the correct level of internal hazardous materials/DOT)shipping must complete an Arcadis shipping determination to address applicable DOT and International Air Transport Association (IATA) shipping requirements. Review the applicable Arcadis procedures and guidance instructions for sample packaging, and labeling. Prior to using air transportation, confirm air shipment is acceptable under DOT and IATA regulations.

The person relinquishing possession of the samples or other member of the project team should contact the final recipient of the samples to confirm receipt and review any special provisions on the COC or questions that they may have.

7 Health and Safety Considerations

Follow the health and safety procedures outlined in the project/site Health and Safety Plan (HASP) as well as other applicable H&S requirements, such as:

- Arcadis Hazardous Material/DOT handling, packaging, and shipping training
- Project site-specific H&S training
- Client-specific H&S training
- Constituent-specific H&S training
- Media-specific H&S training

8 Procedure

Collected samples must be uniquely identified, and properly documented, containerized, labeled with unique identifier, possessed in a secure manner during remainder of sampling event, packaged, and shipped to recipient laboratory.

Sample Identification

The method of sample identification depends on the type of measurement or analyses performed. In some cases, in-situ measurements of existing conditions and/or sample location must be made during sample collection.

These data will be recorded directly on field forms, logbooks, or other project record data sheets used to permanently retain this information for the project file. Examples of location identification information includes: latitude/longitudinal measurements, compass directions, well number, building number, floor number, room name, or proximity to a site feature unique to the site. Examples of in-situ measurements are pH, temperature, conductivity, flow measurement, or physical condition of the media being sampled. Physical samples collected are identified by a unique identifying number or code on a sample tag or label. These physical samples are removed from the sample location and transported to a laboratory for analyses.

In some cases, before samples are placed into individual containers and labeled as individual samples, samples may be separated into portions depending upon the analytical methods and required duplicate or triplicate analyses to be performed.

When completing a COC for samples, personnel must complete the following:

1. Written COCs must be completed with indelible ink (preferably either black or blue colored ink).
2. Written COCs must be completed using legible printed writing, and not cursive writing.
3. All entry fields on the COC form must be completed. If information is not applicable for a specific entry field, personnel will either put “N/A” or use a strike-out line or dash like “-----------“ to indicate no applicable information is needed for that field.
4. Use of quotation marks or lines/down arrows to represent repetitive/duplicative text in similar fields.
5. Regardless of the type or specific COC form, the following pertinent information must be provided on the COC form:
    a. Arcadis project number
    b. Arcadis project name
    c. Project location, including street address, city, state, building number, providing as much detail as appropriate
    d. Recipient laboratory contact and sample receiving shipping location information
    e. Entities’/persons’ contact information for who will be receiving analytical results
    f. Name of sampler, i.e., person collecting sample and relinquishing possession of samples to the next entity in the chain of custody
    g. Date of sample collection
    h. If appropriate for the sample media, contaminant/constituent of concern, or analytical method, document time of sample collection using standard military time
    i. Sample analytical method(s)

   j. Turnaround time required for analyses and/or reporting
   k. Instructions to laboratory regarding handling, timing, analyses, etc. as applicable and appropriate.
   l. Printed name and signature of the individual person who collected the samples and relinquishing possession of the samples
   m. If appropriate or when documentation of the specific sample collection method will influence how the laboratory handles, prepares, or analyzes the samples, document the sample collection methodology used for collecting the samples (e.g., ASTM D5755)

6. The following additional specific information will be entered on the COC form, regardless of what type of COC is being used:
   a. Unique Sample Identifier – The sample identifier (ID) must be unique to the individual sample it is applied to. The information in which the sample ID conveys is determined by the CPM, Technical Expert, and/or other project team members in advance of sample collection so that sample identification is consistently applied for the project. The sample nomenclature may be dictated by a specific client, program, or project database and require unique identification for each sample collected for the project. Consult with the CPM and/or Technical Expert for additional information regarding sample identification.

      The sample ID could convey specific information regarding the sample to aid personnel in recognizing what the sample represents, or they may be arbitrary so as to facilitate the anonymity of the sample location, media, constituent of concern, project site, etc.

      Examples of unique identifiers include:

      1. Well locations, grid points, or soil boring identification numbers (e.g., MW-3, X-20, SB-30). When the depth interval is included, the complete sample ID would be "SB-30 (0.5-1.0) where the depth interval is in feet. Please note it is very important that the use of hyphens in sample names and depth units (i.e., feet or inches) remain consistent for all samples entered on the chain of custody form. DO NOT use the apostrophe or quotes in the sample ID.

      2. Sample names may also use the abbreviations "FB," "TB," "FD" and "DUP" as prefixes or suffixes to indicate that the sample is a field blank, trip blank, or field duplicate, respectively.

   b. List the date of sample collection. All indicated dates must be formatted using either mm/dd/yy (e.g., 03/07/09) or mm/dd/yyyy (e.g., 03/07/2009).

   c. List the local time that the sample was collected. The time value should be presented using military format. For example, 3:15 P.M. should be entered as 15:15. The time listed on the COC form must match the sample collection time on the sample container(s).

   d. Samples should be indicated to be either "Grab" or "Composite". Grab samples are collected from only one unique location at one specific point in time.

   e. Composite samples are a group of individual samples that are combined for analysis in their totality. Composite samples need to be documented if they are either collected from a number of different locations over a broader area to be representative of the entire area being sampled, or if they are representative of a single location over an extended period of time.

f. If used, preservatives for the individual sample will be noted.

g. The requested analytical method(s) that the samples are being analyzed for must be indicated. As much detail, as necessary, should be presented to allow the analytical laboratory to properly analyze the samples. For example, polychlorinated biphenyl (PCB) analyses may be represented by entering "EPA Method 8082 – PCBs" or "EPA PLM 600-R93-116." In cases where multiple analytical methods and/or analytical parameters are required for an individual sample, each method should be indicated for the sample (e.g., EPA 8082/8260/8270 or EPA PLM/400-point count).

h. If there are project-specific sample analytes to be reported, they should be specifically listed for each individual sample (e.g., 40 CFR 264 Appendix IX).

i. The total number of containers for each analytical method requested should be documented. This information may be included under the parameter or as a total for the sample.

j. When necessary, note which samples should be used for site specific matrix spikes in the Remarks or Comments field.

k. Indicate special project-specific requirements pertinent to the handling, shipping, or analyses. These requirements may be on a per sample basis such as "extract and hold sample until notified," or may be used to inform the laboratory of special reporting requirements for the entire sample delivery group (SDG).

l. Indicate turnaround time (TAT) required for samples on COC. If individual samples have differing TATs, the different TATs for each sample or groups of samples must be clearly indicated.

m. Provide contact name and phone number in the event that problems are encountered when samples are received at the laboratory. The person relinquishing possession of the samples or other member of the project team should contact the final recipient of the samples to confirm receipt and review any special provisions on the COC or questions that they may have.

n. If available, attach the Laboratory Task Order or Work Authorization forms.

o. The "Relinquished By" field must contain the signature of the Arcadis person who relinquished custody of the samples to the next entity in the chain of custody, which may be another person, the shipping courier, or the analytical laboratory. If a courier, enter the shipping courier in the "Received by" such as FedEx. The date/time relinquished should be when the person signs the COC and seals the cooler or shipping container for pick-up by the shipping courier.

p. Dates and times must be indicated using the following format:

    1) Date: either mm/dd/yy e.g., 01/01/17 OR mm/dd/yyyy e.g., 01/01/2017

    2) Time: use military format, e.g., 9:30 a.m. is 0930 and 9:30 p.m. is 2130

q. The "Received By" section is signed by sample courier or laboratory representative who received the samples from the sampler. The laboratory will sign upon laboratory receipt from the overnight courier service.

7. When more than one page of the COC form is required to complete the total number of samples, use as many sheets as necessary to accurately and clearly, document the samples and information. Some COCs may have a standard first page/cover page, and subsequent pages may not contain all the detailed fields as

the first page/cover page. Ensure that any subsequent pages convey all of the necessary and pertinent information for each individual sample as required in this procedure document.

8. Pages of the COC must retain a page count of the total number of pages; e.g., Page 1 of 3, Page 2 of 3, Page 3 of 3.
9. Upon completing the COC forms, forward the original signed COC with the sample package. Ensure that the original COC form is secured with the sample package so that it remains with the physical samples for the duration of transport and handling to its final destination and ensure that the COC form will not be become damaged or rendered unreadable due to sample breakage/leakage if stored inside the sample shipping container or outside influences if COC is stored in an outside plastic pouch to the container.
10. If you've collected enough samples that would require more than one container to ship them all to the same laboratory or location, then each separate/individual container that contains any number of samples must have a separate COC representing only those samples contained within that specific container. For example, if you have 3 total shipping containers for all of your samples, you must have a total of 3 separate, individual COCs for each of the 3 containers representing only those samples in their representative container. Thus, every container holding samples must have its own, individual COC.
11. If electronic chain of custody (eCOC) forms are utilized, ensure that the requirements of this procedure and guidance instructions are followed to the extent possible. Verify that proper signature and COC procedures are maintained with the CPM and/or Technical Expert when using eCOC.

9 Waste Management

Not Applicable.

10 Data Recording and Management

The original signed COC shall be submitted with the samples. Copies of COC records will be transmitted to the CPM or designee at the end of each day unless otherwise directed by the CPM. The sampling team leader retains copies of the chain of custody forms for filing in the project file. Record retention shall be in accordance with client- and project-specific requirements and Arcadis policies, the most stringent will apply.

The option to use the Electronic Chain of Custody (eCOC) form in conjunction with the appropriate sample application(s) may be available through the FieldNow® program but is currently limited to a select list of approved analytical laboratories. Use of the eCOC application is intended to reduce common transcription errors both by field staff and laboratory staff on a conventional handwritten paper COC. Once the eCOC form is completed and approved on the field tablet by field staff, a PDF version of the form is automatically emailed to each assigned team member. In addition, a dedicated or mobile printer is recommended for printing a hard copy of the completed eCOC to be included in each sample cooler to meet laboratory requirements.

11 Quality Assurance

COC forms will be legibly completed in accordance with this procedure and guidance instruction document, as well as other applicable and appropriate project documents such as SAP, Quality QAPP, Work Plan, or other project guidance documents.

COC records will be reviewed by the CPM or their appropriate designee for completeness and accuracy to the applicable requirements. Non-conformances will be noted and corrected in a timely manner on the copies retained by Arcadis as well as contacting the ultimate receiving entity for correction to the originally signed COC in their possession.

12 References

Arcadis Transportation Safety Program requirements, procedures, and guidance instructions.

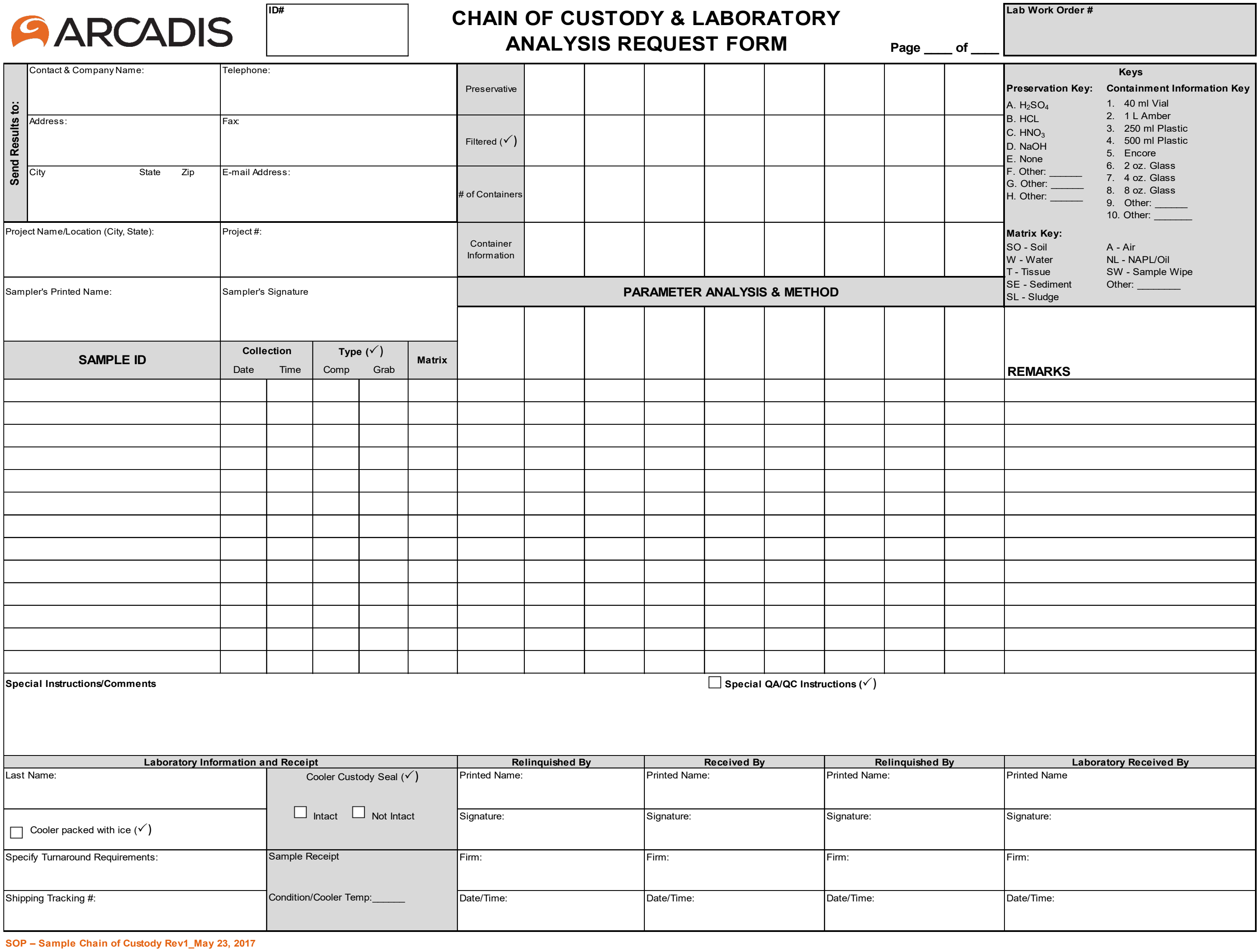
EPA Samplers' Guide – Contract Laboratory Program Guidance for Field Samplers, EPA document EPA-540-R014-013 October 2014 https://www.epa.gov/sites/default/files/2015-03/documents/samplers_guide.pdf.

EPA Region III – Sample Submission Procedures for the Office of Analytical Services and Quality Assurance (OASQA) Laboratory Branch revision 14.0 October 18, 2018, https://www.epa.gov/sites/default/files/2018-12/documents/sample-submission-procedures-rev14.pdf.

EPA Region IV Science and Ecosystem Support Division Operating Procedure for Sample and Evidence Management May 25, 2016, https://www.epa.gov/sites/default/files/2015-06/documents/Sample-and-Evidence-Management.pdf.

Attachment A

Chain of Custody and Laboratory Analysis Request Form



ID#

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

Page ____ of ____

Lab Work Order #

Send Results to:

Contact & Company Name:	Telephone:	Preservative							
Address:	Fax:	Filtered (✓)							
City State Zip	E-mail Address:	# of Containers							
Project Name/Location (City, State):	Project #:	Container Information							
Sampler's Printed Name:	Sampler's Signature	**PARAMETER ANALYSIS & METHOD**							

Keys

Preservation Key:
A. H_2SO_4
B. HCL
C. HNO_3
D. NaOH
E. None
F. Other: ______
G. Other: ______
H. Other: ______

Containment Information Key
1. 40 ml Vial
2. 1 L Amber
3. 250 ml Plastic
4. 500 ml Plastic
5. Encore
6. 2 oz. Glass
7. 4 oz. Glass
8. 8 oz. Glass
9. Other: ______
10. Other: _______

Matrix Key:
SO - Soil
W - Water
T - Tissue
SE - Sediment
SL - Sludge
A - Air
NL - NAPL/Oil
SW - Sample Wipe
Other: ________

SAMPLE ID	**Collection**		**Type (✓)**		**Matrix**										**REMARKS**
	Date	Time	Comp	Grab											

Special Instructions/Comments

☐ **Special QA/QC Instructions (✓)**

Laboratory Information and Receipt		**Relinquished By**	**Received By**	**Relinquished By**	**Laboratory Received By**
Last Name:	Cooler Custody Seal (✓)	Printed Name:	Printed Name:	Printed Name:	Printed Name
☐ Cooler packed with ice (✓)	☐ Intact ☐ Not Intact	Signature:	Signature:	Signature:	Signature:
Specify Turnaround Requirements:	Sample Receipt	Firm:	Firm:	Firm:	Firm:
Shipping Tracking #:	Condition/Cooler Temp:______	Date/Time:	Date/Time:	Date/Time:	Date/Time:

SOP – Sample Chain of Custody Rev1_May 23, 2017

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TGI – Soil Drilling and Sample Collection

Rev: #2

Rev Date: April 8, 2022

Version Control

Issue	Revision No.	Date Issued	Page No.	Description	Reviewed By
	0	October 11, 2018	All	Updated and re-written as a TGI	Marc Killingstad
	1	May 12, 2020	None	Review – no changes necessary	Marc Killingstad
	2	April 8, 2022	All	Updated to new format and minor content (e.g., PFAS)	Chris Shepherd/Marc Killingstad

Approval Signatures

Prepared by: 4/8/2022

Chris Shepherd (Preparer) Date

Reviewed by: 4/8/2022

Marc Killingstad (Subject Matter Expert) Date

1 Introduction

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3 Scope and Application

This Technical Guidance Instruction (TGI) describes general drilling procedures and the methods to be used to field screen and collect soil samples for laboratory analysis in unconsolidated or weakly consolidated sediments. For soil description procedures, please refer to the *TGI - Soil Description*. For monitoring well installation in granular aquifers, please refer to the *TGI - Monitoring Well Installation*. For per- and polyfluoroalkyl substances (PFASs) drilling and soil sampling procedures, please refer to: *TGI – PFAS-Specific Drilling and Monitoring Well Installation, TGI – Per- and Polyfluoroalkyl Substances (PFAS) Field Sampling Guide*, and *TGI – Equipment and Reagent Blank Sample Collection for PFAS Analysis*.

Overburden (unconsolidated sediments) drilling is commonly performed using the hollow-stem auger drilling method. Other drilling methods suitable for overburden drilling, which are sometimes necessary due to site-specific geologic conditions, include: direct-push, drive-and-wash, spun casing, rotasonic, dual-rotary (Barber Rig), and fluid/mud rotary with core barrel or roller bit. Direct-push techniques (e.g., Geoprobe or cone penetrometer) and hand tools may also be used. Drilling within consolidated materials such as fractured rock is commonly performed using water-rotary (coring or tri-cone roller bit), air rotary or rotasonic methods. For guidance when drilling in consolidated materials (i.e., bedrock), please refer to *the TGI – Bedrock Core Collection and Description.*

The drilling method to be used at a given site will be selected based on site-specific consideration of anticipated drilling depths, targeted chemicals, site or regional geologic knowledge, types of sampling to be conducted, required sample quality and volume, and cost.

Field screening of soil samples is commonly performed using a photoionization detector (PID) and/or a flame ionization detector (FID). These instruments are used to measure relative concentrations of volatile organic compounds (VOCs) for the selection of samples for further laboratory or field analysis. Field screening for dense non-aqueous phase liquids (DNAPL) may be performed using hydrophobic dye (Oil Red O or Sudan IV), which is pertinent at chlorinated solvent sites.

Collection of soil samples for laboratory analysis may be performed using a variety of techniques including grab samples, undisturbed cores, and composite or homogenized samples. Samples may require homogenization across a given depth interval, or several discrete grabs (usually five) may be combined into a composite sample. Samples for VOC analysis will not be homogenized or composited and are collected as discrete grab samples.

No oils or grease will be used on equipment introduced into the boring (e.g., drill rod, casing, or sampling tools). Some lubricants (e.g., vegetable oil-based lubricants) may be acceptable, if the constituents won't interfere with the analyses.

4 Personnel Qualifications

Arcadis field personnel will have completed or are in the process of completing site-specific training as well as having current health and safety training as required by Arcadis, client, or state/federal regulations, such as 40-hour HAZWOPER training and/or OSHA HAZWOPER site supervisor training. Arcadis personnel will also have current training as identified in the site-specific Health and Safety Plan (HASP) which may include first aid, cardiopulmonary resuscitation (CPR), Blood Borne Pathogens (BBP) as needed. The HASP will also identify any access control requirements.

Prior to mobilizing to the field, Arcadis field personnel will review and be thoroughly familiar with relevant site-specific documents including but not limited to the task-specific work plan or field implementation plan (FIP), Quality Assurance Project Plan (QAPP), HASP, historical information, and other relevant site documents.

Arcadis field personnel will be knowledgeable in the relevant processes, procedures, and TGIs and possess the demonstrated required skills and experience necessary to successfully complete the desired field work. Personnel responsible for overseeing drilling operations will have at least 16 hours of prior training overseeing drilling activities with an experienced geologist, environmental scientist, or engineer with at least 2 years of prior experience.

Arcadis personnel directing, supervising, or leading soil sampling activities will have a minimum of 1 year of previous environmental soil sampling experience. Field employees with less than 6 months of experience will be accompanied by a supervisor (as described above) to ensure that proper sample collection techniques are employed.

Additionally, the Arcadis field team will review and be thoroughly familiar with documentation provided by equipment manufacturers and become familiar with the operation of (i.e., hands-on experience) all equipment that will be used in the field prior to mobilization.

5 Equipment List

The following materials will be available, as required, during soil boring drilling, field screening, andsampling activities:

- Site-specific HASP and health and safety documents identified in the HASP
- FIP/work plan that includes site map with proposed boring locations, fieldsampling plan (with corresponding depths, sample analyses, sample volume required, and sample holding time), and previous boring logs (as available)
- Appropriate personal protective equipment (PPE), as specified in the HASP
- Including but not limited to disposable chemical resistant gloves and Level D PPE
- Traffic cones, delineators, and caution tape as appropriate for securing the work area as specified in the Traffic Safety Plan (TSP)
- Photoionization detector (PID), flame ionization detector (FID) or other air/soil screening equipment, asneeded, in accordance with the HASP or workplan
- Sampling equipment:
- Drilling equipment required by *ASTM D1586*, when performing split-spoon sampling including clean sample sleeves
- Disposable plastic liners, when drilling with direct-push equipment
- Stainless steel hand auger and stainless-steel spade if using manual methods
- Appropriate soil sampling equipment (e.g., stainless steel spatulas/spoons/bowls, knife)
- Sealable plastic bags (e.g., Ziploc®)

- Air-tight sample containers and 8-oz. glass Mason jars or driller's jars
- Aluminum foil
- Appropriate sample blanks (trip blank supplied by the laboratory), as specified in the FSP
- Soil sample containers and labels (supplied by the laboratory) appropriate for the analytical method(s) with preservative, as needed (parameter-specific)
- Sample labels
- Indelible ink pens
- Engineer's ruler or survey rod
- Plastic sheeting (e.g., Weatherall Visqueen)
- Appropriate transport containers (coolers) with ice and appropriate labeling, packing, and shipping materials
- Decontamination equipment (buckets, distilled or deionized water, cleansers appropriate for removing expected chemicals of concern, paper towels) in accordance with the *TGI for Groundwater and Soil Sampling Equipment Decontamination*
- Forms/notes:
    - Tablet with digital forms, etc., if appropriate
    - Appropriate soil boring log (**Attachment 1**)
    - Chain-of-custody forms
    - Field notebook
    - Digital camera (or smart phone with camera)
- Drums or other containers appropriate for soil and decontamination water, as specified by the site investigation-derived waste (IDW) management plan, and appropriate drum labels

6 Cautions

Prior to beginning field work, underground utilities in the vicinity of the drilling areas will be delineated by the drilling contractor or an independent underground utility locator service in accordance with the work plan, client requirements, and Arcadis guidance. See appropriate guidance forproper utility clearance protocol. Work will be performed in accordance with the Arcadis *Utility Location and Clearance Health and Safety Standard* and the *Utilities and Structures Checklist* will be completed before beginning any intrusive work.

Prior to beginning field work, the project technical team will ensure that all field logistics (e.g., access issues, health and safety issues, communication network, schedules, etc.) and task objectives are clearly understood by all team members. An internal call with the project technical team to review the FIP/work plan scope and objectives is strongly recommended prior to mobilization to ensure that the field work will be effectively and efficiently executed.

Some regulatory agencies have specific requirements regarding borehole abandonment and grout mixtures. Determine whether the oversight agency has any such requirements prior to finalizing the drilling plan.

If DNAPL is known or expected to exist at the site, refer to the project specific documents (e.g., DNAPL Contingency Plan) for additional details regarding drilling to reduce the potential for inadvertent DNAPL remobilization.

Similarly, if light non-aqueous phase liquid (LNAPL) is known or expected to be present as “perched” layers above the water table, refer to the DNAPL Contingency Plan. Follow the general provisions and concepts in the DNAPL contingency plan during drilling above the water table at known or expected LNAPL sites.

Avoid using drilling fluids or materials that could impact groundwater or soil quality, or could be incompatible with the subsurface conditions. Water used for drilling, decontamination of drilling/sampling equipment, or grouting boreholes uponcompletion will be of a quality acceptable for project objectives. Testing of water supply will be considered.

Specifications of materials used for backfilling the borehole will be obtained, reviewed and approved to meet project quality objectives. Bentonite is not recommended where DNAPL is likely to be present or in groundwater with high salinity. In these situations, neat cement grout is preferred.

Store and/or stage empty and full sample containers and coolers out of direct sunlight. Sample container threads should be wiped down with a clean, nonabrasive material (e.g., paper towels) to better ensure the sample container is properly sealed. Be careful not to over-tighten lids with Teflon® liners or septa. Over-tightening can impair the integrity of the seal and cancause the glass to shatter and create a risk for hand injuries.

NOTE: *Field logs and some forms are considered to be legal documents. All field logs and forms will therefore be filled out in indelible ink. Do not use permanent marker or felt-tipped pens for labels on sample container or sample coolers. Permanent markers could introduce volatile constituents into the samples.*

NOTE: *An Arcadis employee that is appropriately trained at the correct level of internal hazardous materials/DOT (Department of Transportation) shipping must complete an Arcadis shipping determination to address applicable DOT and IATA (International Air Transport Association) shipping requirements. Review the applicable Arcadis procedures and guidance instructions for sample packaging and labeling. Prior to using air transportation, confirm air shipment is acceptable under DOT and IATA regulations.*

7 Health and Safety Considerations

The HASP will be followed, as appropriate, to ensure the safety of field personnel. Review all site-specific and procedural hazards as they are provided in the HASP, and review Job SafetyAnalysis (JSA) documents in the field each day prior to beginning work.

Prior to drilling, utility clearance must be performed (see Section 5). Appropriate personal protective equipment (PPE) will be worn at all times in line with the task and thesite-specific HASP.

Working outside at sites with suspected contamination may expose field personnel to hazardous materials such as contaminated groundwater or NAPL (e.g., oil). Other potential hazards include biological hazards (e.g., stinging insects, ticks in long grass/weeds, etc.), and potentially the use of sharp cutting tools (scissors, knife). Only use non-toxic peppermint oil spray for stinging insect nests. Review client-specific health and safety requirements, which may preclude the useof fixed/folding-blade knives and use appropriate hand protection.

If thunder or lightning is present, discontinue drilling and sampling until 30 minutes have passed after the last occurrence of thunder or lightning.

8 Procedure

The procedures for drilling and the methods to be used to field screen and collect soil samples for laboratory analysis are presented below:

8.1 Drilling Procedures

8.1.1 Hollow-Stem Auger, Drive-and-Wash, Spun Casing, Fluid/Mud Rotary, Rotasonic, and Dual-Rotary Drilling Methods

1. Find/identify boring location, establish work zone, and set up sampling equipment decontamination area.
    a. Verify utilities were cleared (see Section 5) and use soft dig technique to clear borehole, if applicable
    b. Clean sampling equipment in accordance with the FIP/work plan prior to drilling
2. Advance boring to target depth:
    a. Collect soil samples at appropriate interval as specified in the FIP/work plan (or equivalent) using the appropriate tooling (e.g., split-barrel sampler) and sample containers
        i. Split-barrel or drive-ahead samples are obtained during drilling
        ii. A common sampling method that produces high-quality soil samples with relatively littlesoil disturbance is described in *ASTM D1586 – Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils* (ASTM D1586).
    b. Always change disposable gloves before handling the sampling equipment
    c. Collect, document, and store samples for laboratory analysis as specified in the FIP/work plan (or equivalent; see below for additional details on sample collection procedures)
    d. Field screen samples as specified in the FIP/work plan (or equivalent; see below for additional details on field screening procedures)
    e. Rotasonic drilling produces soil cores that, for the most part, are relatively undisturbed, but note that when drilling in consolidated or finer-grained sediment the vibratory action during core barrel advancement may create secondary fractures or breaks. The core is retrieved by vibrating the soil/rock into a separate core bag, typically in 5-foot or 10-foot increments. The soil cores may consolidate or expand during retrieval, depending on soils, etc.
    f. Dual-rotary removes cuttings by compressed air or water/mud and allow only a

generalassessment of geology unless separate coring tools and techniques are used

   g. Decontaminate equipment between samples in accordance with the FIP/work plan (or equivalent)

3. Describe each soil sample as outlined in the appropriate project records (refer to the description procedures outlined in the *TGI - Soil Description*)
   a. Record descriptions on the soil boring log (**Attachment 1**) and/or field notebook
   b. When possible, photo document the samples (e.g., soil cores, split-barrels)
   c. During soil boring advancement, document all drilling events in field notebook, including blow counts (i.e., the number of blows from a soil sampling drive weight [140 pounds] required to drive the split-barrel sampler in 6-inch increments) and work stoppages
   d. Blow counts will not be available if rotasonic, dual-rotary, or direct-push methods are used; however, if standard penetration testing is required during rotasonic drilling, an automatic drop hammer may be used in conjunction with the method to switch from core barrel advancement to standard penetration testing
   e. If soils are screened with a PID/FID or another instrument, document the measurement in accordance with the work plan

4. The drilling contractor will be responsible for obtaining accurate and representative samples, informing the supervising Arcadis geologist of changes in drilling pressure, drilling penetration rates, and keeping a separategeneral log of soils encountered, including blow counts
   a. The term “samples” means soil materials from particular depth intervals, whether or not portions of these materials are submitted for laboratory analyses
   b. Records will also be kept of occurrences of premature refusal due to boulders, construction materials that may have been used as fill, etc.
   c. Where a boring cannot be advanced to the desired depth, the boring will be abandoned, and an additional boring will be advanced at an adjacent location to obtain the required sample in accordance with the work plan
   d. Where it is desirable to avoid leaving vertical connections between depth intervals (e.g., if DNAPL or perched LNAPL are known or expected to exist at the site), the borehole will be sealed using cement and/or bentonite (see **Section 5** above)
   e. Multiple refusals may lead to a decision by the supervising geologist to abandon that sampling location

8.1.2 Direct-Push Method

The direct-push drilling method may also be used to complete soil borings. Examples of this technique include Geoprobe®, Diedrich Environmental Soil Probe (ESP) System, or AMS PowerProbe.

Environmental probe systems typically use a hydraulically operated percussion hammer.

Depending on the equipment used, the hammer delivers 140- to 350-foot pounds of energy with each blow. The hammer provides the force needed to penetrate very stiff to medium dense soil formations. The hammer simultaneously advances an outer steel casing that contains a dual tube liner for samplingsoil (dual tube sampling system).

The outside diameter (OD) of the outer casing ranges from 2.25 to 6 inches and the OD of the inner sampling tube diameter ranges from 1.4 to 4.5 inches. The outer casing isolates overlying soil and permits the unit to continue to probe at depth. The dual tube sampling system provides a borehole that may be tremie-grouted from the bottom up. Alternatively, a single rod system may be used that does notprovide a cased boring and which limits tremie-grouting from the bottom up.

Direct-push drilling can generally achieve target depths 100 feet or less depending on the site geology. The known or expected site conditions (e.g., presence of NAPL) will be evaluated when selecting the typeof direct-push sampling system to be employed.

1. Find/identify boring location, establish work zone, and set up sampling equipment decontamination area
    a. Verify utilities were cleared (see Section 5) and use soft dig technique to clear borehole, if applicable
    b. Clean sampling equipment in accordance with the FIP/work plan prior to drilling
2. Advance soil boring to target depth.
    a. Collect soil samples at appropriate interval as specified in the FIP/work plan (or equivalent) using clean/disposable sampling equipment (plastic liners)
    b. Always change disposable gloves before handling the sampling equipment
    c. Collect, document, and store samples for laboratory analysis as specified in theFIP/work plan (or equivalent; see below for additional details on sample collection procedures)
    d. Field screen samples as specified in the FIP/work plan (or equivalent; see below for additional details on field screening procedures)
3. Decontaminate equipment between samples in accordance with the FIP/work plan (or equivalent)
4. Describe samples in accordance with the procedures outlined in **Step 3** under ***Hollow-Stem Auger, Drive-and-Wash, Spun Casing, Fluid/Mud Rotary, Rotasonic, and Dual-Rotary Drilling Methods*** above (refer to the description procedures outlined in the *TGI - Soil Description*)

8.1.3 Manual Methods

Manual methods may also be used to complete shallow soil borings. Examples of this technique include using a spade, spoon, scoop, hand auger, or slide hammer. Manual methods are typically used to collect surface soil samples (0 to 6 inches) or to complete soil borings/collect soil samples from a depth of 5 feet or less.

1. Find/identify boring location, establish work zone, and set up sampling equipment decontamination area
2. Clear the ground surface of brush, root mat, grass, leaves, or other debris
3. Use a spade, spoon, scoop, hand auger, or slide hammer to collect a sample of the required depth interval
4. Use an engineer's ruler or survey rod to verify that the sample is collected to the correct depth and

record the top and bottom depths from the ground surface

5. To collect samples below the surface interval, remove the surface interval first; then collect the deeper interval
    a. To prevent the hole from collapsing, it may be necessary to remove a wider section from the surface or use cut polyvinyl chloride (PVC) pipe to maintain the opening
    b. Collect soil samples at appropriate interval as specified in the FIP/work plan (or equivalent) and transfer to the appropriate, laboratory-supplied container
    c. Collect, document, and store samples for laboratory analysis as specified in the FIP/work plan (or equivalent; see below for additional details on sample collection procedures)
    d. Field screen samples as specified in the FIP/work plan (or equivalent; see below for additional details on field screening procedures)
6. Decontaminate equipment between samples in accordance with the FIP/work plan (orequivalent)
7. Describe samples in accordance with the procedures outlined in **Step 3** under ***Hollow-Stem Auger, Drive-and-Wash, Spun Casing, Fluid/Mud Rotary, Rotasonic, and Dual-Rotary Drilling Methods*** above (refer to the description procedures outlined in the *TGI - Soil Description*)

8.2 Field Screening Procedures

8.2.1 PID and FID Screening

Soils are typically field screened with a PID or FID for a relative measure of the total VOCs at sites where VOCs are known or suspected to exist. PIDs and FIDs require calibration in accordance with the work plan(s) and manufacturer’s specifications and PIDs should be calibrated based on the target chemicals. The PID employs an ultraviolet lamp to measure VOCs and the ionizationenergy (IE) of the site constituents need to be considered when selecting the type of lamp (e.g., 10.6 eV, 11.7 eV) that will be used. In general, any compound with an IE lower than that of the lamp photons canbe measured. The FID has a wide linear range and responds to almost all VOCs.

Field screening is performed using one (or both) of the following two methods:

1. Upon opening the sampler, the soil is split open and the PID or FID probe is placed in the opening and covered with a clean, gloved hand. Such readings will be obtained at several locations along the lengthof the sample.
2. A portion of the collected soil is placed in a jar, which is covered with aluminum foil, sealed, and allowed to warm to room temperature (see below). After warming, the cover is removed, the foil is pierced withthe PID or FID probe, and a reading is obtained.

Prior to usage, the PID or FID must be calibrated according to the manufacturer's specifications at a minimum frequencyof once per day prior to collecting PID or FID readings. The PID will be calibrated to a benzene-related compound (isobutylene) or other appropriate gas, while the FID will be calibrated to methane. The time, date, and calibration procedure must be clearly documented in the field notebook and/or the calibration form.

If at any time the PID or FID results appear erratic or inconsistent with field observations, then the instrument will be recalibrated.

If calibration is difficult to achieve, then the PID's lamp will be checked for dirt or moisture and cleaned, or technical assistance will be required. Maintenance and calibration records will be kept as part of the field quality assurance program.

Initial PID readings will be recorded on the soil boring log (**Attachment 1**) and/or in the field notes. The soil sample will be separated from the slough material (if any) by using disposable gloves and a pre-cleaned stainless-steel spoon or tool.

For the second method, a representative portion of the sample will be placed in a pre-cleaned air-tight container (as quickly as possible to avoid loss of VOCs), filling the container half full to allow for the accumulation of vapors above the soil. An aluminum foil seal will be placed between the glass and cap and the cap will be screwed on tightly. Unless the screening will be performed immediately after the sample is placed in the container, the sample containers will be stored in a cooler chilled to approximately4ºC until screening can be performed.

The headspace of the container will be measured using a PID or FID as follows:

1. Samples will be taken to a warm workspace and allowed to equilibrate to room temperature for atleast one hour.
2. Prior to measuring the soil vapor headspace concentration, the container will be shaken.
3. The headspace of the sample will then be measured directly from the container by piercingthe aluminum foil seal with the probe of the PID or FID and measuring the relative concentration of VOCs in the headspace of the soil sample. The initial (peak) reading must be recorded.

8.2.2 NAPL Screening

To screen for the potential presence of non-aqueous phase liquid (NAPL) in soil, drilling procedures must allow for high-quality porous media samples to be taken. Split-barrel samplers or direct-push samplers will be collected continuously ahead of the auger, drill casing/rods, or probe rods. Upon opening each split-barrel sampler or direct-push plastic liner sleeve, the soil will immediately be evaluated for the presence of visible NAPL and odors. If suspected NAPL is immediately visible in the sample, its depth will benoted.

Additionally, the soil will be screened for the presence of organic vapors using a PID or FID, in accordance with the work plan, if applicable. During screening, the soil will be split open using a clean spatula or knife and the PID or FID probe will be placedin the opening and covered with a clean, gloved hand (**Method 1** above). Such readings will be obtained along the entire length of the sample. Alternatively, **Method 2** for PID/FID screening (outlined above) may also be performed. If the PID or FID examination reveals the presence of organic vapors above 100 parts permillion (ppm), the sample will undergo further detailed evaluation for visible NAPL.

The assessment for NAPL will include the following tests/observations:

- Evaluation for Visible NAPL Sheen or Free-Phase NAPL in Soil Sampler
    - NAPL sheen will be a colorful iridescent appearance on the soil sample
    - NAPL may also appear as droplets or continuous accumulations of liquid with a color typically ranging from yellow to brown to black, depending on the type of NAPL
    - Creosote DNAPL (associated with wood-treating sites) and coal tar DNAPL (associated with manufactured gas plant [MGP] sites) are typically black and have a characteristic, pungent odor
    - Pure chlorinated solvents may be colorless in the absence of hydrophobic dye. Solvents mixed

with oils may appear brown

  - Particular care will be taken to fully describe any sheens observed, staining, discoloration, droplets (blebs), or NAPL saturation
- Soil-Water Pan Test
  - A portion of the selected soil interval with the highest PID or FID reading above 100 ppm will be placed in a disposable polyethylene dish along with a small volume of potable or distilled water
  - The dish will be gently tilted back and forth to mix the soil and water, and the surface of the water will be viewed in natural light to observe the development of a sheen, if any
  - A small quantity of Oil Red O or Sudan IV hydrophobic dye powder should be added in accordance with the work plan, and the soil and dye will be manually mixed for approximately 30 to 60 seconds and smeared in the dish tocreate a paste-like consistency
  - A positive test result will be indicated by a sheen on the surface of the water and/or a bright red color imparted to the soil following mixing with dye
- Soil-Water Shake Test
  - A small quantity of soil (up to 15 cc) will be placed in a clear, colorless, jar containing an equal volume of potable or distilled water (40-mL vials are well suited to this purpose, but not required)
  - After the soil settles into the water, the surface of the water will be evaluated for a visible sheen under natural light
  - The jar will be closed and gently shaken for approximately 10 to 20 seconds
  - Again, the surface of the water will be evaluated for a visible sheen or a temporary layer of foam
  - A small quantity (approximately 0.5 to 1 cc) of Oil Red O or Sudan IV powder will be placed in the jar in accordance with the work plan
  - The sheen layer, if present, will be evaluated for a reaction to the dye (change to bright red color)
  - The jar will be closed and gently shaken for approximately 10 to 20 seconds
  - The contents in the closed jar will be examined under natural light for visible bright red dyed liquid inside the jar

  - A positive test result will be indicated by the presence of a visible sheen or foam on the surface ofwater, a reaction between the dye and the sheen layer upon first addition of the dye powder, a bright red coating on the inside of the vial (particularly above the water line), or red-dyed droplets within the soil

NOTE: *If NAPL is obviously present upon opening the soil sampler or evaluating the soil sample within the split-spoon sampler or direct-push liner sleeve, it is not necessary to perform a soil-water pan test or soil-water shake test. In addition, it is not necessary to perform both a soil-water pan test and a soil-water shake test; either test method is acceptable. The pan test may be preferred in some circumstances because the presence of a sheen may be easier to see on a wider surface. Further, these tests will only be performed if specified in the work plan(s).*

NOTE: *When using hydrophobic dye in the tests above, color will be assessed outdoors under natural light during the period between sunrise and sunset, regardless of the degree of cloud cover. The hydrophobic dye Safety Data Sheets (SDS) will be incorporated into the HASP and reviewed prior to use and the dyes will be carefully handled and disposed in accordance with regulations, if applicable*.

8.3 Soil Sample Collection for Laboratory Procedures

If not specifically identified in the FIP/work plan, soil samples will be selected for laboratory analysis based on:

1. Their position in relation to identified source areas
2. The visual presence of source residues (e.g., NAPL or staining)
3. The relative levels of total VOCs based on field screening measurements
4. The judgment of the field coordinator
5. Moisture content or relative position with regard to apparent groundwater table/saturation

Samples designated for laboratory analysis will be placed in the appropriate containers.

Sample containers for VOC analysis will be filled first immediately following soil core retrieval to reduce loss of VOCs.

If samples will be collected for other analyses, a sufficient amount of the remaining soil willthen be homogenized as described below and sample containers will be filled for other parameters.

VOC samples will be collected as discrete samples using a small diameter core sampler (e.g., En Core® Sampler, Terra Core™ Sampler).

The En Core® Sampler is a disposable volumetric sampling device that collects, stores and delivers soil samples without in-field chemical preservation. The En Core® Sampler requires the use of a reusable T-handle.

The Terra Core™ Sampler is a one-time use transfer tool, designed to collect soil samples and transfer them to the appropriate containers for in-field chemical preservation (e.g., methanol).

The small diameter core samplers will be used according to the manufacturer's instructions (e.g., En Novative Technologies). Some regulatory agencies have specific requirements regarding VOC sample collection. Determine whether the oversight agency has specific requirements prior to commencing sampling and collect samples at appropriate interval as specified in the FIP/work plan (or equivalent). Samples may require homogenization across a given depth interval, or several discrete grabs (usually five) may be combined into a composite sample.

NOTE: *Samples for VOC and PFAS analysis will NOT be homogenized or composited and will be collected asdiscrete samples as described above*.

The procedure for mixing samples is provided below.

1. Mix the materials in a stainless steel (or appropriate non-reactive material) bowl using a stainless-steel spoon (or disposable equivalents)
   a. When dealing with large sample quantities, use disposable plastic sheeting and a shovelor trowel
   b. NOTE: *When preparing samples for metals analyses, do not use disposable aluminum(or metal tools or trays other than stainless steel), as it may influence the analytical results*
2. Flatten the pile by pressing the top without further mixing
3. Divide the circular pile by into four equal quarters by dividing out two diameters at right angles
4. Mix each quarter individually using appropriate non-reactive bowls, spoons and/or sheeting
5. Mix two quarters (as described above) to form halves, then mix the two halves to form a composite orhomogenized sample
6. Place composite or homogenized sample into specified containers
7. Remaining material will be disposed of in accordance with project requirements and applicableregulations
8. Sample containers will be labeled with sample identification number, date, and time of collection andplaced on ice in a cooler (target 4° Celsius)
9. Samples selected for laboratory analysis will be documented (chain-of-custody forms), handled, packed, and shipped in accordance with the procedures outlined in the FIP/work plan (or equivalent).

8.4 Soil Boring Abandonment

All soil borings need to be abandoned in accordance with ***TGI for Monitoring Well and Soil Boring Decommissioning***. See Attachment E of the TGI for specifics.

9 Waste Management

Investigative-Derived Waste (IDW) generated during drilling activities, including soil and excess drilling fluids (if used), and decontamination liquids, will be stored on site in appropriately labeled containers and disposed of properly. Disposable materials will be stored and disposed of separately. Containers must be labeled at the time of collection and will include date, location(s), site name, city, state, and description of matrix contained (e.g., soil, PPE). Waste will be managed in accordance with the *TGI – Investigation-Derived Waste Handling and Storage,* the procedures identified in the FIP/work plan or QAPP as well as state-, federal- or client-specific requirements. Be certain that waste containers are properly labeled and documented in the field log.

10 Data Recording and Management

Digital data collection is the Arcadis standard using available FieldNow® applications that enable real-time, paperless data collection, entry, and automated reporting. Paper forms should only be used as backup to FieldNow® digital data collection and/or as necessary to collect data not captured by available FieldNow® applications. The Field Now® digital form applications follow a standardized approach, correlate to most TGIs and are available to all projects accessible with a PC or capable mobile device. Once the digital forms are saved within FieldNow®, the data is instantly available for review on a web interface. This facilitates review by project management team members and SMEs enabling error or anomalous data detection for correction while the staff are still in the field. Continual improvements of FieldNow® applications are ongoing, and revisions are made as necessary in response to feedback from users and subject matter experts.

Management of the original documents from the field will be completed in accordance with the site- specific QAPP.

In general, drilling activities will be documented on appropriate field/log forms as well as in a proper field notebook. All field data will be recorded digitally or with indelible ink. Field forms, logs/notes (including daily field and calibration logs), digital records, and chain-of-custody records will be maintained by the field team lead. Any deviations or omissions from this TGI should be documented.

Initial field logs and chain-of-custody records will be transmitted to the Arcadis CPM and Technical Lead at the end of each day unless otherwise directed by the CPM. The field teamleader retains copies of the field documentation.

Additionally, all documents (and photographs) will be scanned and electronically filed in the appropriate project directory for easy access. Pertinent information will include personnel present on site, times of arrival and departure, significant weather conditions, timing of drilling activities, soil descriptions, soil boring information, and quantities of materials used.

In addition, the locations of soil borings will be documented photographically and in a site sketch. If appropriate, a measuring wheel or engineer's tape will be used to determine approximate distances between important site features.

Records generated as a result of this TGI will be controlled and maintained in the project record files in accordance with project requirements.

11 Quality Assurance

Quality assurance procedures shall be conducted in accordance with the Arcadis Quality Management System or the site-specific QAPP.

All drilling equipment and associated tools (including augers, drill rods, sampling equipment, wrenches, and any other equipment or tools) that may have come in contact with soil will be cleaned in accordance with the procedures outlined in the appropriate TGI.

Field-derived quality assurance blanks will be collected as specified in the FIP/work plan and/or site- specific QAPP, depending on the project quality objectives. Typically, field rinse blanks (equipment blanks) will be collected when non-dedicated equipment (e.g., split-spoon sampler, stainless steel spoon) is used during soil sampling. Field rinse blanks will be used to confirm that decontamination procedures are sufficient and samples are representative of site conditions. Trip blanks for VOCs, which aid in the detection of contaminants from other media, sources, or the container itself, will be kept with the coolers and the sample containers throughout the sampling activities and during transport to the laboratory.

Operate all monitoring instrumentation in accordance with manufacturer’s instructions and calibration procedures. Calibrate instruments at the beginning of each day and verify the calibration at the end of each day. Record all calibration activities in the field notebook.

12 References

ASTM D1586 - *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils*. ASTM International. West Conshohocken, Pennsylvania.

13 Attachments

Attachment 1. Soil Boring Log Form

Attachment 1

Soil Boring Log Form

BORING LOG

ARCADIS

Boring ID: ____________________

Project Name: ____________________

Page: ____________________

Permit ID: ____________________

Date Started: ____________________

Ground Elevation: ____________________

Site Address: ____________________

Date Completed: ____________________

Vertical Datum: ____________________

City, State: ____________________

Total Depth: ____________________

Northing: ____________________

Drilling Co: ____________________

Depth to Water: ____________________

Easting: ____________________

Driller: ____________________

Hole Diameter: ____________________

Horizontal Datum: ____________________

Drilling Method: ____________________

Core Device: ____________________

Prepared by: ____________________

Boring Status: ____________________

Drilling Fluid: ____________________

Reviewed by: ____________________

Drilling Information				**Primary Texture**											**Soil Description (Udden-Wentworth System)**	**Field Notes**
Drilling Depth (ft bgs)	**Core Interval (ft)**	**Core Recovery (inches)**	**PID Reading (ppm)**	**Fines**		**Sand**					**Gravel**				Depth interval (ft), Moisture, PRIMARY TEXTURE, Modifier/Minor Texture, Sorting, Angularity, Consistency, Plasticity, Color - Only Record Sand Density with Standard Penetration Tests Minor Texture Modifiers: Trace (<10%), Little (10 to 20%), Some (21 to 35%), And (36 to 50%)	Driller's Observations, Particle Size Percentages, Geologic Formation, Field Screening Results, Sample Interval etc.
				clay	silt	very fine	fine	medium	coarse	very coarse	granule	pebble	cobble	boulder		

BORING LOG

ARCADIS

Boring ID: ______________ **Project Name:** ______________ **Page:** /

Drilling Information				Primary Texture											Soil Description (Udden-Wentworth System)	Field Notes
Drilling Depth (ft bgs)	Core Interval (ft)	Core Recovery (inches)	PID Reading (ppm)	Fines		Sand					Gravel				Depth interval (ft), Moisture, PRIMARY TEXTURE, Modifier/Minor Texture, Sorting, Angularity, Consistency, Plasticity, Color - Only Record Sand Density with Standard Penetration Tests Minor Texture Modifiers: Trace (<10%), Little (10 to 20%), Some (21 to 35%), And (36 to 50%)	Driller's Observations, Particle Size Percentages, Geologic Formation, Field Screening Results, Sample Interval etc.
				clay	silt	very fine	fine	medium	coarse	very coarse	granule	pebble	cobble	boulder		

BORING LOG

ARCADIS

Boring ID: ____________________ **Project Name:** ______________________________ **Page:** ___/___

Drilling Information				Primary Texture											Soil Description (Udden-Wentworth System)	Field Notes
Drilling Depth (ft bgs)	Core Interval (ft)	Core Recovery (inches)	PID Reading (ppm)	Fines		Sand					Gravel				Depth interval (ft), Moisture, PRIMARY TEXTURE, Modifier/Minor Texture, Sorting, Angularity, Consistency, Plasticity, Color - Only Record Sand Density with Standard Penetration Tests Minor Texture Modifiers: Trace (<10%), Little (10 to 20%), Some (21 to 35%), And (36 to 50%)	Driller's Observations, Particle Size Percentages, Geologic Formation, Field Screening Results, Sample Interval etc.
				clay	silt	very fine	fine	medium	coarse	very coarse	granule	pebble	cobble	boulder		

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TGI – Vertical Aquifer Profile (VAP) Sampling

Rev: 2.0

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Version Control

Issue	Revision No.	Date Issued	Page No.	Description	Reviewed By
	0	June 22, 2018	All	Original SOP	Joe Quinnan
	1	May 11, 2020	Multiple	Added content to Personnel Qualifications, references to Geoprobe SP-16 and SP-22, Attachment 3, and updated references /formatting	Marc Killingstad
	2	June 15, 2022	Multiple	Combined with PFAS-specific VAP TGI and dye/tracer procedures.	Patrick Curry

Approval Signatures

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1 Introduction

This Arcadis Technical Guidance Instruction (TGI) describes proper vertical aquifer profile (VAP) sampling procedures using a variety of methods and approaches. This document has been developed to emphasize drilling and sampling procedures used to collect groundwater samples from boreholes installed via direct push technology (DPT), hollow stem auger (HSA), and rotary-sonic (sonic) methods and includes the use of visible tracer in drilling fluid to obtain representative samples during vertical profiling.

2 Intended Use and Responsibilities

This document describes general and/or specific procedures, methods, actions, steps, and considerations to be used and observed by Arcadis staff when performing work, tasks, or actions under the scope and relevancy of this document. This document may describe expectations, requirements, guidance, recommendations, and/or instructions pertinent to the service, work task, or activity it covers.

It is the responsibility of the Arcadis Certified Project Manager (CPM) to provide this document to the persons conducting services that fall under the scope and purpose of this procedure, instruction, and/or guidance. The Arcadis CPM will also ensure that the persons conducting the work falling under this document are appropriately trained and familiar with its content. The persons conducting the work under this document are required to meet the minimum competency requirements outlined herein, and inquire to the CPM regarding any questions, misunderstanding, or discrepancy related to the work under this document.

This document is not considered to be all inclusive nor does it apply to all projects. It is the CPM's responsibility to determine the proper scope and personnel required for each project. There may be project- and/or client- and/or state-specific requirements that may be more or less stringent than what is described herein. The CPM is responsible for informing Arcadis and/or Subcontractor personnel of omissions and/or deviations from this document that may be required for the project. In turn, project staff are required to inform the CPM if or when there is a deviation or omission from work performed as compared to what is described herein.

In following this document to execute the scope of work for a project, it may be necessary for staff to make professional judgment decisions to meet the project's scope of work based upon site conditions, staffing expertise, regulation-specific requirements, health and safety concerns, etc. Staff are required to consult with the CPM when or if a deviation or omission from this document is required that has not already been previously approved by the CPM. Upon approval by the CPM, the staff can perform the deviation or omission as confirmed by the CPM.

3 Scope and Application

Vertical aquifer profile (VAP) borings are typically advanced via DPT, HSA, or sonic drilling techniques to collect single or multiple depth-discrete groundwater samples using low-flow or grab sampling methodologies. This can be combined with retrieval of continuous soil cores and lithologic logging, as well as collection of single or multiple depth-discrete dry and saturated soil samples.

When possible, co-locate or bias VAP groundwater sampling intervals towards potential discrete transport zones (and target slow advection zones when feasible) as indicated by soil logging observations or permeability measurements (e.g., point slug tests, Geoprobe® hydraulic profiling tool [HPT] [preferred], Waterloo APS™ [alternate]). Permeability measurements coupled with contaminant concentration allows estimationof relative flux and mass discharge to evaluate potential risk to downgradient receptors. In the absence ofpermeability measurements, field soil lithological logging observations may be used to interpret hydrostratigraphy and select sampling intervals.

The intent of this TGI is to provide VAP instructions including specific considerations for per- and polyfluoroalkyl substances (PFAS) due to their unique chemical and physical properties, low detection limits, and regulatory standards. It also covers field procedures for using nontoxic fluorescent tracer (e.g., fluorescein dye) in drilling fluid during drilling to assist in determining when sufficient purging has been performed prior to collecting screening-level groundwater samples during the drilling process. Screening level groundwater samples may be obtained by evacuating water from the drill casing or from intervals of geologic formations isolated by inflatable packers. This procedure improves the quality of screening-level groundwater samples by providing a technical basis to determine when purging has sufficiently removed drill water prior to collecting screening-level groundwater samples.

Multiple VAP samples can be collected through temporary wells, drilling rod tooling (e.g., Geoprobe® Screen Point 16 [SP-16]/Screen Point 22 [SP-22] Groundwater Samplers or SP-60 Sonic Groundwater Sampler or Cascade's Sonic Push-Ahead or Packer Isolation Groundwater Profilers) or via combined hydraulic profiling and sampling tools (e.g., Geoprobe® HPT-Groundwater Sampling System [HPT-GWS] or Waterloo APS™). They can be analyzed quickly via on-site mobile lab or expedited off-site fixed lab analysis to provide adaptive high-resolution quantitative groundwater concentration data. The vertical frequency of groundwater sampling within a formation will be determined relative to the scale of variability demonstrated in site hydrostratigraphy and outlined in the FIP/Work Plan. Thin aquifers with transport zones only tens of feet thick (or less) can be sampled at intervals as close as 3 to 5 feet. In aquifers with transport zones substantially thicker (e.g., more than 50 feet), sample spacing of 5 to 20 feet may be adequate. It is important to note that field data be evaluated to verify that sampling intervals provide sufficient resolution to meet data quality objectives (DQOs) (See **Section 7**).

4 Personnel Qualifications

In general, VAP activities will be performed by persons who have been trained in proper drilling and sampling procedures under the guidance of an experienced field geologist, engineer, or technician. Arcadis personnel overseeing, directing, or supervising VAP activities shall have previous related experience (minimum of 2 years) in drilling and groundwater sampling. Drilling subcontractors will need current applicable drilling licenses.

Arcadis field personnel will have completed or are in the process of completing site-specific training as well as having current health and safety training as required by Arcadis, client, or regulations, such as 40-hour HAZWOPER training and/or OSHA HAZWOPER site supervisor training. Arcadis personnel will also have current training as identified in the site-specific Health and Safety Plan (HASP) which may include first aid, cardiopulmonary resuscitation (CPR), Blood Borne Pathogens (BBP) as needed. The HASP will also identify any access control requirements.

Prior to mobilization, the field team will review and be thoroughly familiar with relevant site-specific documents including but not limited to the task-specific work plan or field implementation plan (FIP)/field sampling plan, Quality Assurance Project Plan (QAPP), HASP, historical information, and other relevant site documents.

Arcadis field sampling personnel will be knowledgeable in the relevant processes, procedures, and TGIs and possess the demonstrated required skills and experience necessary to successfully complete the desired field work. Additionally, the field team will review and be thoroughly familiar with documentation provided by equipment manufacturers and become familiar with the operation of (i.e., hands-on experience) all equipment that will be used in the field prior to mobilization.

5 Equipment List

The following equipment and materials must be available for VAP sampling

- Site plan with proposed sampling locations
- Relevant work plan (or equivalent)
- Health and Safety Plan (HASP)
- Field Tablet with appropriate Fulcrum app for logging groundwater sampling.
- NOTE: *As of June 2022, several digital logging applications are available through the FieldNow™ program and the Fulcrum app. A future revision of this TGI, likely in early 2023, will emphasize digital logging methods and groundwater sampling. FieldNow™ is discussed further in Section 10.*
- Appropriate health and safety equipment, as specified in the site HASP
    - Drilling Equipment
    - Drill rig (to be provided by drilling subcontractor). Type (e.g., roto-sonic, direct push) to be determined based on site-specific details
    - Traffic cones, delineators, caution tape, and/or fencing as appropriate for securing the work area,if not provided by the drillers

    NOTE: *Prior to mobilizing to the site, Arcadis personnel will contact the drilling subcontractor or in-house driller (as appropriate) to confirm that appropriate sampling equipment will be provided in quantities capable of achieving estimated target depths. Typical equipment/materials providedby the driller could include*

    - Acetate or plastic liners
    - Appropriate length of drilling rods and tooling
    - Drilling and sampling equipment decontamination materials,
    - Decontamination pad materials, if required. See **Section 6.3** below for more information

- Sampling Equipment
    - Appropriate groundwater sampling equipment (e.g., disposable bailers for volumetric sampling,peristaltic pump for shallow groundwater sampling, submersible bladder pump for deeper sampling). Refer to *the TGI – Low-Flow Groundwater Purging and Sampling Procedures for Monitoring Wells* (Arcadis 2020a) for necessary equipment
    - Direct push groundwater samplers (e.g., Geoprobe® SP-22) or roto-sonic sampling devices (e.g.,Cascade Push Ahead/Packer Isolation Groundwater Profiler or Geoprobe® SP-60 Sonic Groundwater Sampler) (to be provided by drilling subcontractor)
    - Appropriate soil sampling equipment (e.g., stainless steel spatulas, knife, metal trowel)

  - Dedicated plastic sheeting (preferably high-density polyethylene [HDPE]) or other clean surface toprevent sample contact with the ground
  - Multi-parameter water quality probe (e.g., conductivity, temperature, pH, dissolved oxygen,oxidation reduction potential, and turbidity meter)
  - Water level meter
  - Appropriate sample containers and labels
    - Labeled sample bottles: see the *TGI – Poly- and Perfluorinated Alkyl Substances (PFAS)Field Sampling Guidance* (Arcadis 2017a) for PFAS-specific considerations
    - Ziplock-style bags to hold ice and samples
    - Appropriate blanks (field reagent blanks supplied by the laboratory)
    - Packing and shipping materials
    - Chain-of-Custody (COC) Forms; see the *Sample Chain of Custody* for reference (Arcadis2017b)
    - Appropriate transport bottles (coolers) with ice and appropriate labeling, no blue ice
- Decontamination Equipment
  - Equipment cleaning materials: see the *TGI – Poly- and Perfluorinated Alkyl Substances (PFAS)Field Sampling Guidance* (Arcadis 2017a) or the *TGI – Groundwater and Soil Sampling Equipment Decontamination* (Arcadis 2020b) as applicable
  - Drum labels as required for investigation derived waste handling: see the *TGI – Investigation-Derived Waste Handling and Storage* for details (Arcadis 2017c)
- Documentation/Field Notes
  - Electronic data collection device (smart phone or tablet) as applicable
  - Pens, pencils, and/or Sharpie® brand pens for writing
  - Digital camera
  - Any other appropriate field forms
- Tracer Equipment (as needed)
  - Sodium fluorescein (also known as fluorescein or uranine dye) tracer (to be added to drilling water to produce a vibrant yellow-green color); 38 grams of dye will be added to each 500 gallons of drilling water (potable water) to achieve target applied tracer concentration of 20 milligrams per liter (mg/L)
  - Bottles for retaining dyed drilling water samples and preparing visual dye standards (clear, colorless, 40 mL unpreserved VOA bottles or equivalent)
  - Graduated cylinders (50 mL and 1 L)
  - Scale for measuring mass of dye to the nearest 1 gram
  - Bottles for groundwater samples to be analyzed for tracer dye (if necessary) and chemicals of concern (COCs)

  - Poly storage tank (typically 550-to-1,000-gallon capacity)
  - Potable water source
  - Generator
  - Utility pump for mixing dye
  - Pump for groundwater purging and sampling
  - Flashlight or other portable lighting device
  - Blue ice (for tracer dye samples)

6 Cautions

Field activities associated with borehole advancement and VAP groundwater sampling will be performed in accordance with the HASP, a copy of which will be present on site during such activities. Field staff (including subcontractors) will be aware of and understand the associated physical and health hazards.

6.1 Utility Clearance

The appropriate drilling authorities will be contacted and a site visit for public utility line clearance at the proposed boring locations will be conducted at least 72 hours prior to work commencing. As applicable, utility maps will be reviewed during field reconnaissance of the proposed investigation locations to determine if any are co-located with public utility lines. Arcadis will also contract an independent geophysical survey company to verify that proposed boring locations are not co-located with existing underground utility/substructure features, as necessary. Arcadis will clear locations with soft dig methods to assess the presence of underground utilities as necessary.

See the *Utility Location and Clearance Arcadis Health and Safety Standard* (Arcadis 2020c) for reference.

6.2 PFAS-Specific General Sampling Considerations

This section provides a summary of methods and procedures applicable to the collection of environmental samples for field screening or laboratory analysis during PFAS site characterization activities. In general, sampling techniques used for PFAS site characterization are consistent with conventional sampling techniques used in the environmental industry, but special consideration is made regarding PFAS-containing materials and cross-contamination potential. For example, Teflon™ and other fluoropolymer containing materials are found in pumps, tubing, and sample storage containers and, therefore, will be avoided if possible (Department of Environment Regulation [DER], Western Australia 2016; New Hampshire Department of Environmental Services [NHDES] 2016). Certain field documentation materials such as waterproof paper or field books, adhesive paper products, and some writing utensils (grouped as non-Sharpie® markers) are also prohibited items during PFAS sampling (DER 2016; NHDES 2016).

Attachment 1 (Tables 1 and 2) provides recommendations for PFAS Site Investigation equipment. Table 1 provides a summary of materials that have been approved for site investigation; this list is expected to grow longer as industry experience increases. Table 2 provides a summary of field equipment and materials that have available testing information and/or industry knowledge regarding PFAS cross-contamination potential, and it is recommended that these materials be prohibited for samplecollection. For materials that are suspected of containing and/or retaining PFAS, these recommendations are considered preliminary and subject to change.

Given the extremely low detection limits associated with PFAS analysis and the many potential sources of trace levels of PFAS, field personnel are typically advised to err on the side of caution by strictly following field wear guidelines and decontamination procedures as specified in the *TGI - Poly- and Perfluorinated Alkyl Substances (PFAS) Field Sampling Guidance* (Arcadis 2022).The most important consideration during PFAS related VAP sampling is to prevent contact between sample media and suspect PFAS sources.

6.3 PFAS-Specific Groundwater Sampling

The potential presence of material containing PFAS in equipment that may come into contact with the target water sample must be evaluated as part of the sample planning process to maintain sample integrity. For example, low-flow sampling with a peristaltic pump will be conducted using silicone or HDPE tubing; Teflon™ tubing is prohibited (DER 2016). If a bladder pump is used to collect samples, the bladder and other internal parts (e.g., check balls, O-rings, compression fittings) will not contain Teflon™, and bladder and O-rings will be changed between samples (DER 2016).

Note that if high concentrations of PFAS related to Class B firefighting foams are expected in a groundwater sample, it has been recommended to collect and shake a small portion of the sample at the time of sample collection (USACE 2016; Arcadis 2017a). If foaming is noted within the sample, it indicates elevated concentrations of PFAS may be present and the sample will be proactively diluted at the laboratory prior to analysis, and the foaming will be noted on the sample COC form. It is recommended to collect sampling equipment blanks following foam observation to confirm the effectiveness of decontamination procedures.

6.4 Use of Tracer in Drilling Fluid

Field staff (including subcontractors) will be aware of tracer hazards and understand the associated health hazards. Please be sure to read the SDS (included as Attachment 2) for fluorescein dye. Note that some individuals can experience a mild allergic reaction to skin contact with fluorescein. Protective gloves will be worn during dye handling and mixing activities, and rinse bottles will be readily available for washing affected areas in case of accidental contact.

7 Health and Safety Considerations

To ensure the safety of the field personnel, field activities associated with VAP will be performed in accordance with a site-specific HASP, a copy of which will be present on site during such activities. Review all site-specific and procedural hazards as they are provided in the HASP and review relevant Job SafetyAnalysis (JSA) documents in the field each day prior to beginning work.

Appropriate personal protective equipment (PPE) will be always worn in line with the task and the site-specific HASP. Verify staff has required health and safety training and personal protection equipment in accordance with the HASP and JSAs. At a minimum, all staff will have level D PPE with chemical resistant gloves.

8 Procedure

The specific procedure for advancing VAP borings will be developed after careful review and consideration of project DQOs and clearly detailed in the FIP/Work Plan. Typically, VAP borings are conducted in boreholes adjacent to soil borings previously completed to develop stratigraphic and relative permeability profiles of the aquifer to determine sampling depth intervals that target transport zones. Prior boreholes typically consist of soil borings with detailed soil descriptions or Geoprobe® HPT borings. The primary advantage of completing stratigraphic/permeability profiles in advance of VAP sampling is to gain an understanding of hydrofacies trends to ensure that the most appropriate intervals and sampling methods are used. For sonic or HSA drilling, VAP samples are typically collected from the same borehole as soil samples. In the absence of a co-located boring, sample depth intervals can be determined based upon lithologic logging of soil cores, either from a separate adjacent borehole or from the same borehole. HPT drilling will be completed consistent with the *TGI – Geoprobe Hydraulic Profiling Tool (HPT)* (Arcadis 2022a), and soil lithologic logging will be performed in accordance with *TGI – Soil Description* (Arcadis 2022b).

NOTE: *Waterloo APS™ can be utilized as an alternative to HPT to provide permeability profiles, but it is more time consuming than HPT; therefore, it is not considered the preferred tool for permeability profiling.*

8.1 Direct Push Vertical Aquifer Profile Sampling

Direct push tooling is ideal for shallow unconsolidated aquifers and requires minimal water for drilling, reducing the potential for sample dilution/cross-contamination. For sites with shallow groundwater in unconsolidated formations (e.g., at less than 100 feet bgs), the typical approach is to collect VAP groundwater samples nominally every 5 to 10 feet with a bias to the more permeable transport zones.

When a zone of interest is identified, either by using permeability measurements (preferred) or logging soil, a screen point sampling device such as Geoprobe® SP-16 or SP-22 (see **Attachment 3**) can be driven to the target interval and the screen opened to collect a groundwater sample. In poorly sorted aquifers with appreciable amounts of silt, VAP sampling from an adjacent borehole after completing initial permeability profiling (e.g., Geoprobe® HPT or point slug tests) is typically more efficient and cost effective. In the absence of permeability profiling tools (e.g., HPT), VAP sampling can be performed based on soil lithological observations alone, either from a separate borehole or in the same borehole. However, VAP sample collection can be more efficient when conducted from an adjacent borehole, particularly if a bottom-up sampling approach is used. See Section 8.1.1.

Combined permeability profiling and sampling tools such as the Geoprobe® HPT-GWS (or Waterloo APS™ as an alternate) can be used to collect groundwater samples based on permeability measurements from the same borehole at deeper depths where the process is more cost-effective; otherwise at shallower depths, separate permeability profiling prior to VAP sampling is preferred. This is most effective in well-sorted sand and gravel when small volumes are required for analysis, since these tools provide limited volumes for purging and sample collection. Use of these combined tools (HPT-GWS or Waterloo APS™) for PFAS sites is not recommended because low detection and regulatory thresholds for PFASs require more extensive purging to decontaminate the sampling equipment (i.e., insufficient data are available to confirm the volume of purging required to eliminate cross-contamination with PFAS).

It is recommended that DPT drilling for VAP sampling be completed using a dual-tube drilling approach. An outer casing is advanced with the screen point sampling device to limit the potential for cross-contamination between sampling intervals. Pre-calculated volume purging and monitoring for water quality parameter stabilization can be performed consistent with low-flow sampling to help determine when purge water is representative of the groundwater formation.

There are two general methods for completing VAP sampling: bottom-up and top-down. With bottom-up sampling, a greater purge volume is required to ensure a representative groundwater sample; however, the overall time savings is significant relative to top-down sampling, where more time is required per borehole to lower the tooling, retract it, and decontaminate it between subsequent sampling intervals. However, the top-down method minimizes any potential for cross-contamination and is the preferred approach for PFAS projects due to the low detection limits and regulatory levels associated with PFASs.

8.1.1 Bottom-Up VAP Sampling

Bottom-up VAP sampling involves advancing dual-tube direct push casing to the deepest target depth with either a solid drive tip (without collecting soil cores) or acetate liners for collection of continuous soil cores to provide a lithological log for the entire boring. This is followed by lowering the groundwater sampling screen through the outer casing to the bottom of the borehole and collecting multiple VAP groundwater samples at different depths as the casing and screen is retracted up the borehole.

Using this approach, the external casing is retracted to allow borehole collapse around the sampling screen while isolating it from the section above that is still covered by the external casing.

NOTE: *Bottom-up VAP sampling is not recommended when there is a potential for dense non-aqueous phase liquid (DNAPL), the highest concentrations are expected to be at the bottom of the formation, or the borehole goes through multiple confining units. Bottom-up is not recommended for PFAS sampling due to potential cross-contamination concerns associated with lack of decontamination between sample intervals.*

The advantages of this approach are: (1) when combined with soil core collection, groundwater sampling depth intervals can be pre-selected based on lithologic observations to target the transport zones, especially in the absence of any co-located permeability measurements, and (2) the entire process is much more time-efficient per borehole as the sampling equipment is not pulled, decontaminated, and then drilled to the next interval. However, additional purging (i.e., 3to 5 casing volumes) is required to assure a representative groundwater sample. Bottom-up sampling also does not allow for post-grouting of the borehole since when the groundwater sampling device is pulled up to the next VAP sampling interval, the sidewalls of the open borehole below collapse.

8.1.2 Top-Down VAP Sampling

Top-down VAP sampling involves advancing dual-tube direct push casing with either a solid drive tip (without collecting soil cores) or a plastic liner for soil core retrieval from target depth interval followed by lowering the screen point sampling screen to target depth and pulling up the outer casing to expose the screen. After purging and sample collection, the screen point device is pulled back up and decontaminated. A solid drive tip or plastic liner is lowered back into the borehole and the entire assembly is then advanced to the next depth interval. Thus, top-down sampling requires pulling the tooling after each sample interval, decontaminating the tooling, re-setting the groundwater sampler, and advancing the tooling to the next planned interval.

The advantages of this approach are that it allows grouting of the borehole from the bottom of the borehole and reduces the potential for cross-contamination from adjacent sampling intervals.

The primary disadvantage is that the entire process is much less time-efficient per borehole since the tooling must be retracted and re-advanced every time.

NOTE: *Top-down is the preferred method for PFAS VAP sampling.*

8.2 Sonic Drilling VAP Sampling

For sites with deep unconsolidated aquifers, bedrock/weathered bedrock, or otherwise challenging drilling conditions (e.g., presence of dense tills, caliche, cobbles), sonic drilling will be necessary to complete VAP. Like direct push, groundwater profilers can be used with sonic rigs to collect multiple depth-discrete groundwater samples biased towards transport zones based on soil lithological cores. The configuration of individual samplers varies based on their manufacturer by different drilling contractors (e.g., Cascade Push Ahead/Packer Isolation Groundwater Profiler or Geoprobe® SP-60).

The overall strategy of sonic drilling VAP sampling is consistent with direct push VAP sampling; however, drilling with sonic or some rotary methods can require the introduction of drilling fluid/water that can potentially affect the integrity of the groundwater sample. If possible, sonic drilling for VAP borings will be conducted without the use of drilling water. If, for example, the geology is known for flowing sands or VAP is required deep below the water table, drilling water will be used to keep the core barrel free inside the outer drill casing. In this case it is recommended that a visible dye be used to spike the drilling water to assist with purging of the VAP interval. The VAP interval is then purged until the visible dye is no longer visible, or less the 10% of the starting concentration. For more on drilling with visible dye, see Section 8.2.3. Sonic VAP sampling is typically performed in a top-down manner using either a push ahead sampling device or a packer system.

8.2.1 Push-Ahead Groundwater Profiler

Push-ahead groundwater sampling devices are available through Cascade Drilling and other sonic drillers and consists of a stainless-steel sheathed “screen” threaded to the base of the sonic drill rod. The device is driven ahead of the sonic casing into the undisturbed formation to the prescribed sample depth interval. Once the point is at the specified interval, the threaded portion between the profiler and rod is partially unthreaded to expose the water ports to allow native formation water to enter the profiler. A groundwater sample is then obtained using either a stainless-steel bailer or pump with tubing depending on the DQOs. The interval is typically purged until relatively free of fine-grained material.

The disadvantage of using this device is that groundwater samples are obtained from undisturbed native formation with unknown soil lithology, so sampling is conducted “blind”. Therefore, it is recommended that a pre-existing lithological log from an adjacent borehole is used to determine sampling depth intervals.

8.2.2 Packer Isolation Groundwater Profiler

Packer Isolation groundwater profilers (e.g., Packer Isolation groundwater profiler from Cascade, Geoprobe ® SP-60 Sonic Groundwater Profiler) work by driving the casing over the soil core, retrieving the soil core barrel, and then lowering a stainless screen and packer assembly to the base of the sonic casing. The sonic outer casing is then extracted to expose the screen to the formation, and the packer is inflated within the casing above the screen to isolate the screened interval from any water that might be above the packer in the sonic casing. A groundwater sample can then be collected from the screen.

The biggest advantage of this device is that groundwater sampling depth intervals can be determined based on lithological logs obtained from the same borehole.

A disadvantage is that a large volume of purge water may need to be removed to clear the borehole of water introduced from above.

8.2.3 Drilling with Visible Dye

Potable water is commonly used as a drilling fluid during drilling to remove cuttings of geologic materials from the borehole (e.g., coring or roller-bit rotary drilling), cool the drill bit (e.g., sonic drilling), and/or maintain sufficient hydraulic pressure within the drilling tools to prevent heaving of aquifer solids into the drill casing(s).

Typically, if groundwater sampling is performed during drilling, the purge volume to be removed is at least as much as was lost during drilling. However, accurately determining the volume of water lost to the formation, or to specific intervals of the borehole, is not always feasible or possible.

To ensure that groundwater samples accurately represent groundwater quality of the surrounding formation and are not significantly influenced by unrecovered drilling fluid, fluorescein dye can be added to the drilling water to visually confirm when unimpacted native groundwater enters the borehole and can be sampled.

The target concentration of dye is approximately 20 mg/L, which is greater than two (2) orders of magnitude above its visual threshold (approximately 0.1 mg/L) and over five (5) orders of magnitude above its typical laboratory detection limit (less than 0.001 mg/L). Once the drilling tool has been advanced to the prescribed depth for groundwater sampling, water will be pumped from the borehole until the discharge water is relatively clear of fluorescein. The goal of purging is to reach the clarity of a prepared visual standard, indicating that the discharge water is comprised of at least 95 percent formation water and less than 5 percent drilling water. Groundwater samples will then be collected for COC analysis.

If the visual standard is still not reached after a reasonable period and volume of purging, then COC sampling can still be performed, provided that samples of the dyed drilling water and groundwater are also sent for fluorescein analysis. The fluorescein data can then be used to calculate a correction factor to be applied to COC analytical results.

8.2.3.1 Set-Up Procedures

a. Dye Batch Preparation

- Prior to initiating drilling activities, measure the proper mass of powdered dye for mixing with drilling water - 38 grams of fluorescein (provided by Ozark Underground Laboratory) will be added to every 500 gallons of water to yield an average tracer concentration of approximately 20 mg/L.
- If the drilling water “batch” is larger or smaller than 500 gallons, the same ratio of dye to drilling water will be used.
- Measure the mass of dye using a scale with an accuracy of +/- 1 gram.
- Add the dye to the drilling water batch tank while also adding the potable water to provide agitation to assist in mixing the dye.
- A utility pump is also recommended to mix the tracer with the drilling water by recirculating water in the tank for at least 15 minutes.

- Place 40 mL of the dyed drilling water into a 50 mL graduated cylinder for use in preparing the visual standard discussed below.
- Collect four (4) additional 40 ml unpreserved VOA vials of drilling water from each batch of drilling water – label all four of these vials “DW1” for the first batch of drilling water, “DW2” for the second batch, etc. These samples will be archived for potential use in preparing other standards with other dilutions (optional) or for submittal for laboratory analysis, if necessary.

b. Preparation of Visual Standard: A visual standard will be prepared for each batch of dyed drilling water, as follows.

- Pour the 40 mL volume of dyed drilling water from the 50 mL graduated cylinder into a 1 L graduated cylinder.
- Add 760 mL of un-dyed potable water (from the same potable water source used to prepare the dyed drilling water) to the 1 L graduated cylinder to produce 800 mL of “visual standard”.
- Fill one 40-mL unpreserved VOA vial with visual standard solution and label this “VS1” for the visual standard from the first batch of drilling water, “VS2” for the visual standard from the second batch of drilling water, etc.
- These visual standards represent a 95% dilution of the drill water and will provide a visual standard to verify that sufficient purging has been performed to remove at least 95% of the drilling water from a given interval, indicating that the purge water consists of at least 95% formation water.
- Discard the remaining fluid within the graduated cylinder using an appropriate container.
- Photograph the “DW” samples and the “VS” sample from each batch of drilling water with adequate, consistent light, against a white background.
- Keep all the dyed drilling water (“DW”) samples and visual standard (“VS”) samples in a cooler to keep them dark as the dye will degrade with exposure to light.

8.2.3.2 Drilling Procedures

- Fresh drilling water from the dyed drilling water batch tank will be used during drilling operations. In general, a positive head will be maintained during drilling, which should prevent dilution of the drilling water by formation water. However, any water upwelling from the casing during drilling will be contained in a tub positioned over the borehole. As needed, recovered water in the tub will be pumped to a frac tank.
- The drilling water source will be sampled for chlorine and pH at the start of the project. Chlorine, if present in detectable quantities, will consume fluorescein; therefore, wait a period of at least four (4) hours between dye addition and sampling (and use) of the drilling fluid. Below pH values of about 5, fluorescein will have reduced fluorescence. Depending on the source of the drilling fluid and project objectives, the source water may also be sampled for COCs and fluorescein.
- In open sunlight, fluorescein photodegrades rapidly. If the tracer batch tank is translucent, use 1-millimeter (mm) thick black plastic to cover the tank during the day to minimize photodegradation of the tracer batch water.
- After tracer addition, each batch of drilling fluid will be sampled at least once for fluorescein.
- At the end of the day, any excess tracer batch water can be stored for use on the following day, or it may be disposed of as investigation derived waste. Alternatively, fluorescein concentrations can be reduced to below

visible concentrations with granular activated carbon, UV-oxidation, chemical oxidants, or direct exposure to sunlight for several days.

- The field geologist will record the amount of drilling water lost to the formation during drilling of each sampling depth interval.
- At the end of the project, any excess tracer batch water can be disposed of as investigation derived waste. Alternatively, fluorescein concentrations can be reduced to below visible concentrations with granular activated carbon, UV-oxidation, chemical oxidants, or direct exposure to sunlight for several days. Depending on project and regulatory requirements, excess batch water with fluorescein concentrations below the visible limit could be discharged to a sanitary sewer or other discharge location.

8.2.3.3 Purging and Sampling Procedures

- After a groundwater sampling interval is reached, purging and screening-level groundwater sampling will be performed.
- The target sample interval will be purged using a pump, and during purging, purge water will be periodically collected in a 40-mL unpreserved VOA vial and compared to the visual standard (“VS” sample) prepared from the drilling water used to drill that depth interval.
- If the purge water contains significant suspended particulates/turbidity, it may be necessary to allow particulates to settle before comparing the purge water sample to the visual standard.
- Purging will continue until *one* of the following two conditions is met:
    1) Purge water clarity (in terms of remaining dye content) matches or exceeds the clarity of the visual standard, indicating that the purge water consists of at least 95% formation water.
        a. In this case, the purge water sample and the associated visual standard will be photographed against a white background to document that the purging goal has been reached.

OR

    2) A different practical purging limit has been reached, based on purge volume or time
        a. In this case, the purge water sample and the associated visual standard will be photographed against a white background to document the degree of purge water visual clarity that was attained
        b. Also, a sample of the purge water will be collected in a 40 mL unpreserved VOA; this sample and one of the vials of dyed drilling water will be submitted to Ozark Underground Laboratories for quantitative analysis of fluorescein. These samples will be shipped in a cooler with reusable “Blue Ice” rather than wet ice. The analytical results for fluorescein will be used to calculate a COC correction factor, as discussed below (see Section 8.2.3.4).

- After purging has been completed, screening-level groundwater samples will be collected from the discharge end of the pump tubing for COC analysis in accordance with the approved work plan.

8.2.3.4 Calculation of Correction Factor

- If the purge water does not reach the goal indicated by the visual standard (“VS” sample), a sample of the drilling water and a sample of the purge water (obtained immediately prior to sampling for COC analysis) will be sent for laboratory analysis of fluorescein.
- Representative COC concentrations in groundwater (C_{gw}) can then be calculated as:

$$C_{gw} = C_m [F_d / (F_d - F_s)]$$

where: C_m = measured COC concentration, as reported by the lab

F_d = fluorescein concentration in drilling water

F_s = fluorescein concentration in groundwater sample

- The term $[F_d / (F_d - F_s)]$ is the COC correction factor.

8.3 Boring Abandonment

Upon completion, each top-down borehole is backfilled with bentonite grout from the terminal end of the boring upward. The top portion of each boring is sealed with asphalt or concrete to match the existing grade. Each bottom-up borehole is typically abandoned by the collapse as the rods are retraced.

Borehole abandonment requirements in some geographies dictate top-down sampling; this should be verified in advance of work and outlined in the FIP/Work Plan. See also *TGI for Monitoring Well and Borehole Decommissioning.*

9 Waste Management

Investigation derived waste (IDW) (e.g., soil cuttings and decontamination water generated during cleaning procedures) will be collected and contained on site in appropriate containers: see the *TGI – Investigation- Derived Waste Handling and Storage* for details (Arcadis 2020d). All IDW generated during field activities will be placed in Department of Transportation approved containers, sealed, and labeled. Containerized IDW will be stored on site until it is profiled and subsequently transported to an approved facility for disposal or recycling.

Personal protective equipment (e.g., gloves, disposable clothing, disposable equipment) resulting from personnel cleaning procedures and soil sampling activities will be placed in plastic bags. These bags will be transferred into appropriately labeled containers for appropriate disposal.

Waste manifests for all IDW suspected to have come into contact with PFAS will clearly note the potential presence of PFAS.

Additional IDW sampling and management details will be provided in the site-specific FIP/Work Plan/QAPP addendum and will be consistent with applicable client and state requirements.

10 Data Recording and Management

Digital data collection is the Arcadis standard using available FieldNow® applications that enable real-time, paperless data collection, entry, and automated reporting. Paper forms should only be used as backup to FieldNow® digital data collection and/or as necessary to collect data not captured by available FieldNow® applications. The Field Now® digital form applications follow a standardized approach, correlate to most TGIs and are available to all projects accessible with a PC or capable mobile device. Once the digital forms are saved within FieldNow®, the data is instantly available for review on a web interface. This facilitates review by project management team members and SMEs enabling error or anomalous data detection for correction while the staff are still in the field. Continual improvements of FieldNow® applications are ongoing, and revisions are made as necessary in response to feedback from users and subject matter experts.

The supervising field lead will be responsible for documenting drilling events and for recording all relevant information in a clear and concise format. The record of drilling events will include (at a minimum):

- Start and finish drilling dates
- Project name and location
- Project number, client, and site location
- VAP boring number and depths
- Depth to water
- Type of VAP performed and associated tools
- Core barrel size
- Names of contractor's drillers, inspectors, or other people onsite
- Weather conditions

Field staff will ensure COC Forms are properly completed and will verify which analytes (including PFAS analytes) are required for analysis and note on the COC.

Waterproof field books must not be used for field notes. Instead, it's recommended that field notes be on loose paper on Masonite, plastic, or aluminum clip boards and/or electronic data collection tablets (as required). Other requirements for field notes include:

- Keep field notes, writing implements, and electronic data collection tablets away from samples and sampling materials; and,
- Do not write on sampling bottles unless they are closed.

11 Quality Assurance

In general, the following quality assurance and quality control (QA/QC) samples will be collected:

- Equipment blanks
- Field duplicates
- Field (i.e., reagent) blanks

- Matrix spike/matrix spike duplicate

Details on QC sampling requirements (e.g., frequency of collection, types of QA/QC samples) are provided in the QAPP and/or FIP/Work Plan. Additionally, detailed procedures related to equipment and field (i.e., reagent) blank sample collection are outlined in the *TGI for Equipment and Reagent Blank Sample Collection for PFAS Analysis*.

In general, equipment blanks should be collected from every piece of downhole equipment that could come into contact with soil or groundwater during sample collection. This includes the profiling tools (e.g., Geoprobe® SP-16, Geoprobe® SP-22, Geoprobe® SP-60, Cascade Packer Isolation Groundwater Profiler).

To avoid cross-contamination during drilling and sampling, reusable equipment such as hand tools will be cleaned using a non-phosphate soap free of VOCs, double-rinsed in potable water, and allowed to air dry prior to re-use. Drive casings and other drilling equipment will be steam cleaned or replaced with new equipment between boreholes. The drilling equipment will be cleaned in an area designated by the supervising engineer or geologist that is located outside of the work zone.

Prior to initiating field activities, water sources to be used during drilling activities will be sampled to verify those sources are PFAS-free to the extent possible.

Refer to quality control requirements for the project to ensure that appropriate quality assurance and quality control (QA/QC) samples are collected. When collecting QA/QC samples, the same guidelines apply as when collecting regular samples – specifically that:

- Samples will be collected in laboratory-supplied HDPE bottles
- Bottle caps must remain in the hand of the sampler until replaced on the bottle
- Labels must be completed after the caps have been placed back on each bottle
- Samples must be stored in appropriate transport bottles (coolers) with ice (Ziplock-type bags for use as ice containers) with appropriate labeling
- Do not use blue ice except for shipping fluorescein samples
- Store PFAS samples in a separate cooler from other types of samples

11.1 Equipment Blanks (if relevant)

QA/QC sampling typically includes daily collection of equipment blanks using the laboratory-supplied water, or in the case of PFAS sampling, “PFAS-free” water. For peristaltic pump tubing, laboratory supplied water will be poured into a clean HDPE sample bottle and then pumped through new HDPE tubing using the peristaltic pump (with new silicone tubing). Equipment blanks will also be collected from the water used by drillers, as well as any downhole tooling to ensure absence of any cross-contamination. Drilling water sources must be submitted for analysis of all COCs before work commences for VAP as discussed above. See *also TGI for Poly- and Perfluorinated Alkyl Substances (PFAS) Potable Water Sampling Guidance*.

11.2 Field Duplicates

QA/QC sampling typically includes the collection of one field duplicate for every 10 or 20 samples collected. Each duplicate sample will be collected immediately after the initial sample of which it is a duplicate into a separate laboratory-provided sample bottle. Do not indicate to the laboratory which sample the duplicate replicates (i.e., it will be given a blind reference on the COC and sample name such as “Dup 1”).

11.3 Field Blanks

QA/QC sampling for typically includes the submission of one laboratory supplied field blank per day. The reagent field blank sample is brought to the site in a laboratory-supplied sample bottle. Field staff transfer the laboratory-supplied reagent blank to an empty sample bottle. This reagent fieldblank will be placed in the same cooler as the other PFAS samples.

11.4 Matrix Spikes (optional in some cases)

QA/QC sampling includes submitting a sample to be used as a matrix spike if the project requires it. If a separate sample bottle is required, an additional sample will be collected immediately after the initial sample of which it is a duplicate into a separate laboratory-supplied sample bottle.

11.5 Laboratory Analytical QA/QC

- Internal laboratory QA/QC will consist of one laboratory blank and one laboratory control sample (or blank spike) per batch of samples, and additional QA/QCs as indicated by the laboratory QA/QC procedures. Isotope dilution will be used for quantification with isotope-labeled surrogate standards, as available.
- For groundwater and surface water samples, extract the entire groundwater and surface water sample and at least two sampling bottle solvent rinsates for analysis to increase sample accuracy. Avoid sub-sampling an aliquot of the sample bottle.
- Soil samples will be analyzed in their entirety or thoroughly homogenized before extraction and analysis.
- As part of the internal QA/QC, relative percent difference will be calculated between samples and corresponding field or laboratory duplicates. The laboratory quality assurance portion of the laboratory certificates will be reviewed to verify that all calculations/recoveries were within acceptable limits as established by the laboratory method.
- In January 2017, the U.S. Department of Defense and U.S. Department of Energy Quality Systems Manual (QSM) 5.1 (U.S. Department of Defense 2017) was finalized and introduced laboratory guidance for the measurement of PFAS in matrices other than drinking water. This guidance is not a detailed procedural method such as an U.S. Environmental Protection Agency method, but it does recommend best practices around the analysis of PFAS. Laboratories are not required to comply with QSM 5.1 until 2019, although the recommendations around PFAS analysis are similar to what most laboratories are already implementing. Arcadis recommends that any request for PFAS analysis in

groundwater or soil should specifically reference the need to comply with Table B-15 in the QSM 5.1 (i.e., Per- and Polyfluoroalkyl Substances (PFAS) Using Liquid Chromatography Tandem Mass Spectrometry (LC/MS/MS) With Isotope Dilution or Internal Standard Quantification in Matrices Other Than Drinking Water); however, this list can be modified to support project specific deliverables.

12 References

Arcadis U.S., Inc. (Arcadis). 2010. SOP – Use of Visible Tracer in Drilling Fluid to Obtain Representative Groundwater Samples During Drilling. September.

Arcadis. 2017a. TGI – Poly- and Perfluorinated Alkyl Substances (PFAS) Field Sampling Guidance. April 27.

Arcadis. 2017b. SOP – Sample Chain of Custody, Rev. #1. May 23.

Arcadis. 2017c. TGI – Investigation-Derived Waste Handling and Storage, Rev. #0. February

Arcadis. 2018. TGI – Soil Description, Rev. #2. February 16.

Arcadis. 2020a. TGI – Low-Flow Groundwater Purging and Sampling Procedures for Monitoring Wells, Rev. #1. May 7.

Arcadis. 2020b. TGI – Groundwater and Soil Sampling Equipment Decontamination, Rev. #1. May 8.

Arcadis. 2020c. Utility Location and Clearance, Rev. #17. May 13, 2020.

Arcadis. 2020d. TGI – Investigation- Derived Waste Handling and Storage

Department of Environment Regulation (DER). Government of Western Australia. 2016. Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS). Contaminated Sites Guidelines. February.

Massachusetts Department of Environmental Protection (MassDEP). 2017. DRAFT Fact Sheet, Guidance on Sampling and Analysis for PFAS at Disposal Sites Regulated under the Massachusetts Contingency Plan. January.

New Hampshire Department of Environmental Services (NHDES). 2016. Perfluorinated Compound (PFC) Sample Collection Guidance. November.

Obal, T., Robinson, A., Chia, S.C. 2012. Aqueous sample stability: PFOS, PFOA and other fluorinated compounds. REMTECH 2012: The Remediation Technologies Symposium, Banff, AB, Canada, 17-19 Oct 2012. Environmental Services Association of Alberta, Edmonton, AB.

Sabic. 2016. Article Safety Data Sheet for Generic SFS-PC Lexan™ Film/Sheet. Revised May 12.

United States Army Corps of Engineers (USACE). 2016. DRAFT – Standard Operating Procedure 047: Per/Poly Fluorinated Alkyl Substances (PFAS) Field Sampling. Revision: 1. March.

U.S. Department of Defense (DoD). 2017. Consolidated Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1. In conjunction with the U.S. Department of Energy. January.

United Nations Environment Programme (UNEP). 2015. PFAS analysis in water for the Global Monitoring Plan of the Stockholm Convention, Set-up and guidelines for monitoring. Jana Weiss, Jacob de Boer,Urs Berger, Derek Muir, Ting Ruan, Alejandra Torre, Foppe Smedes, Branislav Vrana, Fabrice Clavient, and Heidelore Fiedler. Division of Technology, Industry and Economics. Geneva. April.

ATTACHMENT 1

Table 1 and Table 2: PFAS Investigation Material Recommendations

Table 1: Summary of Acceptable Sampling Equipment and Materials for PFAS Site Investigations

Sampling Materials	Additional Considerations	References
Water Sampling Materials		
High density polyethylene (HDPE) or silicone tubing materials	--	DER 2016; USACE 2016; NHDES 2016; MassDEP 2017
HDPE HydraSleeves™	Low density polyethylene (LDPE) HydraSleeves™ are not recommended	USACE 2016; MassDEP 2017
Drilling and Soil Sampling Materials		
PFAS-free drilling fluids	--	DER 2016
PFAS-free makeup water	Confirm PFAS-free water source via laboratory analysis prior to investigation	--
Acetate liners	For use in soil sampling	USACE 2016
Sample Containers and Storage		
HDPE sample containers with HDPE lined lids for soil and water samples	Laboratory should provide; whole bottle analysis of aqueous samples combined with a solvent rinse of bottle is recommended	DER 2016, MassDEP 2017
Ice contained in plastic (polyethylene) bags (double bagged)	--	DER 2016; USACE 2016; NHDES 2016; MassDEP 2017
Field Documentation		
Sharpie®	--	NHDES 2016; USACE 2016; MassDEP 2017
Ball point pens	--	MassDEP 2017
Standard paper and paper labels	--	DER 2016; USACE 2016; NHDES 2016; MassDEP 2017
Decontamination		
Water-only decontamination	Confirm PFAS-free water source via laboratory analysis prior to investigation	DER 2016
Alconox®, Liquinox® or Citranox® followed by deionized water or PFAS-free water rinse	Alconox® known to contain trace levels of 1,4-dioxane	NHDES 2016; USACE 2016; MassDEP 2017
Methanol, isopropanol, or acetone	Special health and safety precautions are necessary	UNEP 2015; USACE 2016

Note: This list is considered preliminary and additional materials may be added as additional information becomes available. Project teams are expected to follow a methodical evaluation process of materials to be used and confirm acceptance prior to implementation of field activities.

Table 2: Summary of Equipment and Materials Not Recommended for PFAS Site Investigations.

Sampling Materials	Known PFAS-Containing Materials	Suspected PFAS-Containing Materials	Materials with Potential to Retain PFASs	References
Water Sampling Materials				
Teflon® or polytetrafluoroethylene (PTFE)-containing or coated field equipment (e.g., tubing, bailers, tape, plumbing paste)	x			DER 2016; USACE 2016; NHDES 2016; MassDEP 2017
Passive diffusion bags			x	MassDEP 2017
LDPE HydraSleeves ™			x	USACE 2016; MassDEP 2017
Water particle filters			x	MassDEP 2017
Drilling and Soil Sampling Materials				
Aluminum foil			x	DER 2016; USACE 2016; NHDES 2016; MassDEP 2017
Drilling fluid containing PFASs	x	x		DER 2016
Sample Containers and Storage				
Glass sample containers with lined lids			x	DER 2016; USACE 2016; NHDES 2016; MassDEP 2017
LDPE containers and lined lids			x	USACE 2016
Teflon® or PTFE- lined lids on containers (e.g., sample containers, rinsate water storage containers)	x			DER 2016; USACE 2016; NHDES 2016; MassDEP 2017
Reusable chemical or gel ice packs (e.g., BlueIce®)		x		DER 2016; USACE 2016; NHDES 2016; MassDEP 2017
Field Documentation				
Self-sticking notes and similar office products (e.g., 3M Post-it-notes)		x		DER 2016; USACE 2016; NHDES 2016; MassDEP 2017
Waterproof paper, notebooks, and labels	x			DER 2016, MassDEP 2017
Non-Sharpie® markers		x		NHDES 2016
Decontamination				
Some detergents and decontamination solutions (e.g., Decon 90® Decontamination Solution)	x	x		DER 2016; NHDES 2016; MassDEP 2017

Note: For materials that are suspected of containing PFASs, or have the potential to retain PFASs, project specific considerations may provide adequate justification for use during the field event. For example, further evaluation may be conducted in the form of pre-field equipment blank sample analysis.

ATTACHMENT 2

Safety Data Sheet (SDS) Fluorescein

SAFETY DATA SHEET (SDS)
REVISION DATE: 03/03/2016

HUE CORPORATION

Color your everything, may your Hue come true

SECTION I. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

PRODUCT IDENTIFIER:

PRODUCT NAME ……………………..... **HUE URANINE CONC** (Also known as Fluorescein)
PRODUCT NUMBER ………………… 1-C8-073PC
COLOR INDEX NAME ………………. ACID YELLOW 073
COLOR INDEX NO …….…………….. 45350
C. A. S. # ……………………………... 518-47-8
CHEMICAL FAMILY………………….. XANTHENE

INTENDED USE OF THE PRODUCT:

FELT TIP, MARKER INKS, WATER BASED COATINGS AND LEAK DETECTION

NAME, ADDRESS AND TELEPHONE OF RESPONSIBLE PARTY:

HUE CORPORATION	TELEPHONE	714-389-3130
P.O. BOX 509	FAX	714-389-9731
TUSTIN, CA 92781	EMAIL	SUPPORT@HUECORPORATION.COM

EMERGENCY TELEPHONE NUMBER:

CHEMTREC (USA)	1-800-424-9300
CHEMTREC (OUTSIDE USA)	1-703-527-3887

SECTION 2. HAZARD(S) IDENTIFICATION

CLASSIFICATION OF THE SUBSTANCE OR MIXTURE:

GHS-US
ACUTE TOX. - INHALATION (CATEGORY 5)
EYE DAM./IRRITATION (CATEGORY 2B)
SKIN CORR./IRRITATION (CATEGORY 3)

GHS LABELING:

HAZARD PICTOGRAMS (GHS-US):	NO SYMBOL
SIGNAL WORD	WARNING
HAZARD STATEMENT(S)	H333 - MAY BE HARMFUL IF INHALED H320 - CAUSES EYE IRRITATION H316 - CAUSES MILD SKIN IRRITATION
PRECAUTIONARY STATEMENTS	P305 + 351 + P338 - IF IN EYES: RINSE CAUTIOUSLY WITH WATER FOR SEVERAL MINUTES. REMOVE CONTACT LENSES IF PRESENT AND EASY

	TO DO. CONTINUE RINSING. P337 + P313 - IF EYE IRRITATION OCCURS/PERSISTS: GET MEDICAL ADVICE AND ATTENTION. P261 - AVOID BREATHING DUST/FUMES/GAS/MIST/VAPORS/SPRAY P264 - WASH FACE THOROUGHLY AFTER HANDLING. P322 + P313 - IF SKIN IRRITATION OCCURS: GET MEDICAL ADVICE/ ATTENTION. P304 + 312 - IF INHALED: CALL A POISON CENTER/DOCTOR/PHYSICIAN IF YOU FEEL UNWELL
OTHER HAZARDS	NO DATA AVAILABLE
UNKNOWN ACUTE TOXICITY	NO DATA AVAILABLE

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

DESCRIPTION OF MIXTURE: PROPRIETARY MIXTURE OF DYES.

SUBSTANCE:

NAME	C.A.S.#	WEIGHT 100%	GHS-US CLASSIFICATION
ACID YELLOW 073	518-47-8	100%	ACUTE TOX. - INHALATION (CATEGORY 5) EYE DAM./IRRITATION (CATEGORY 2B) SKIN CORR./IRRITATION (CATEGORY 3)

SECTION 4. FIRST AID MEASURES

FIRST AID MEASURES GENERAL:

INHALATION:	REMOVE TO FRESH AIR. IF BREATHING IS DIFFICULT, GIVE OXYGEN AND GET IMMEDIATE MEDICAL ATTENTION.
SKIN:	WASH WITH MILD SOAP AND WATER. IF IRRITATION OCCURS GET MEDICAL ATTENTION. IF CLOTHING IS CONTAMINATED, RE-MOVE AND WASH BEFORE REUSE.
EYES:	FLUSH EYES WITH WATER FOR AT LEAST 15 MINUTES, HOLDING EYELIDS APART FOR THOROUGH IRRIGATION. GET IMMEDIATE MEDICAL ATTENTION.
INGESTION:	INDUCE VOMITING - SEEK IMMEDIATE MEDICAL ATTENTION.

MOST IMPORTANT SYMPTOMS AND EFFECTS, ACUTE AND DELAYED:

THIS PRODUCT IS NOT HAZARDOUS AS DEFINED BY HAZARDOUS COMMUNICATION STANDARD. HOWEVER, AS WITH ALL CHEMICAL; HANDLE WITH CARE, AVOID EYE AND SKIN CONTACT, AVOID INHALATION OF DUSTS OR VAPORS. WASH THOROUGHLY AFTER HANDLING. KEEP CONTAINERS CLOSED.

SECTION 5. FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA:

WATER, DRY CHEMICAL, CARBON DIOXIDE, FOAM.

SPECIAL HAZARDS ARISING FROM SUBSTANCE OR MEDIA:

FIREFIGHTERS SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS TO GUARD AGAINST POTENTIALLY TOXIC AND IRRITATING FUMES. AVOID DUSTING. DUST CAN FORM EXPLOSIVE MIXTURES WITH AIR.

PROTECTION/ADVICE FOR FIREFIGHTER(S):

BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING.

SECTION 6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS:

REMOVE PERSONS FROM DANGER AREA.

ENVIROMENTAL PRECAUTIONS:

AVOID ANY UNCONTROLLED RELEASE OF MATERIAL. DO NOT EMPTY INTO DRAINS OR THE AQUATIC ENVIRONMENT.

EMERGENCY PROCEDURES:

NO ADDITIONAL INFORMATION

METHODS AND MATERIALS FOR CONTAMINENT AND CLEANING UP:

WHERE SPILLS ARE POSSIBLE, A COMPREHENSIVE SPILL RESPONSE PLAN SHOULD BE DEVELOPED AND IMPLEMENTED. AVOID ANY UNCONTROLLED RELEASE OF MATERIAL.

UTILIZE RECOMMENDED PROTECTIVE CLOTHING AND EQUIPMENT (SEE SECTION 8).
SPILLS SHOULD BE SWEPT UP USING AN ABSORBENT DUST CONTROL PRODUCT AND PLACED IN CONTAINERS. SPILL AREA CAN BE WASHED WITH WATER. COLLECT WATER FOR APPROVED DISPOSAL.
IN THE EVENT OF UNCONTROLLED RELEASE OF THIS MATERIAL, THE USER SHOULD DETERMINE IF THE RELEASE IS REPORTABLE UNDER APPLICABLE LAWS AND REGULATIONS.

SECTION 7. HANDLING AND STORAGE

PRECAUTIONS FOR SAFE HANDLING:

HANDLE WITH CARE. AVOID OVER EXPOSURE. USE NIOSH/OSHA APPROVED RESPIRATOR, WORK GLOVES, AND CLOTHING. WASH AFTER HANDLING. SENSITIVE INDIVIDUALS MAY EXPERIENCE RESPIRATORY ALLERGIES. MAY CAUSE SKIN IRRITATION. USE WITH LOCAL VENTILATION.

CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES:

USE PROCESS ENCLOSURES, LOCAL EXHAUST VENTILATION OR OTHER ENGINEERING CONTROLS TO KEEP AIRBORNE LEVELS BELOW RECOMMENDED EXPOSURE LIMITS.

KEEP AWAY FROM HEAT. KEEP AWAY FROM SOURCES OF IGNITION.

KEEP AWAY FROM STRONG OXIDIZING AND REDUSING AGENTS.

SPECIFIC END USES:

FELT TIP, MARKER INKS, WATER BASED COATINGS AND LEAK DETECTION

SECTION 8. EXPOSURE CONTROLS /PERSONAL PROTECTION

CONTROL PARAMETERS:

INGREDIENTS WITH LIMIT VALUES THAT REQUIRE MONITORING AT THE WORKPLACE - NOT REQUIRED

EXPOSURE CONTROLS:

APPROPRIATE ENGINEERING CONTROLS - THE USUAL PRECAUTIONARY MEASURES ARE TO BE ADHERED TO WHEN HANDLING CHEMICALS.

PERSONAL PROTECTIVE EQUIPMENT:

HAND PROTECTION	WEAR IMPERMEABLE RUBBER OR PLASTIC GLOVES
EYE PROTECTION	TIGHTLY SEALED SAFETY GOGGLES OR FULL FACE SIDE SHIELDS.
SKIN AND BODY	APRON, COVERALLS AND NON-LEATHER SOLED WORK SHOES. WASH DYE CONTAMINATED CLOTHES AND SKIN WITH MILD SOAP AND DETERGENTS.
RESPIRATORY	WEAR OSHA/NIOSH APPROVED DUST MASK/RESPIRATOR
HYGIENE MEASURES	HANDLE IN ACCORDANCE WITH GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES. WASH HANDS AFTER HANDLING MATERIAL.
OTHER PROTECTION	DELUGE SAFETY SHOWER AND EYE WASH STATION SHOULD BE LOCATED NEAR WORK AREA.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

INFORMATION ON BASIC PHYSICAL AND CHEMICAL PROPERTIES :

APPEARANCE, COLOR, ODOR	YELLOW POWDER, NO ODOR
pH	8.0 - 9.0
MELTING POINT/FREEZING POINT	ND
INITIAL BOILING POINT/BOILING RANGE	0.00
FLASHPOINT	NORMALLY STABLE, NOT COMBUSTIBLE NOR FLAMMABLE
EVAPORATION RATE	NO DATA
FLAMMABILITY (SOLID,GAS)	NORMALLY STABLE, NOT COMBUSTIBLE NOR FLAMMABLE
UPPER EXPLOSIVE LIMITS	NA
LOWER EXPLOSIVE LIMITS	NA
VAPOR PRESSURE	NA
VAPOR DENSITY	NA
RELATIVE DENSITY	NA
SOLUBILITY IN WATER	SOLUBLE
PARTITION COEFFICIENT N-OCTANOL/WATER	NO DATA

AUTO-IGNITION TEMPERATURE	NO DATA
DECOMPOSITION TEMPERATURE	NO DATA
VISCOSITY, DYNAMIC	NO DATA
VISCOSITY, CINEMATIC	NO DATA
EXPLOSIVE PROPERTIES	N/A
OXIDIZING PROPERTIES	NA
OTHER INFORMATION	NA

SECTION 10. STABILITY AND REACTIVITY

CHEMICAL STABILITY	STABLE UNDER NORMAL STORAGE AND HANDLING CONDITIONS.
CONDITIONS TO AVOID	OXIDIZING & REDUCING AGENTS MAY DESTROY COLOR.
INCOMPATIBLE MATERIALS	OXIDIZING & REDUCING AGENTS MAY DESTROY COLOR.

HAZARDOUS DECOMPOSITION PRODUCTS - CO, CO2, OXIDES OF NITROGEN AND OTHER POTENTIALLY TOXIC FUMES.

SECTION 11. TOXICOLOGICAL INFORMATION

TOXICOLOGICAL EFFECTS :

ORAL (ANIMAL	GREATER THAN 7,000 MG/KG - RAT
DERMAL (ANIMAL)	NA
EFFECTS TO EYES (ANIMAL)	EYES - RABBIT, NOT IRRITATING
SKIN IRRITATION (ANIMAL)	SKIN - RABBIT, SLIGHT IRRITANT

SKIN CORROSION/IRRITATION	NOT CLASSIFIED
SERIOUS EYE DAMAGE/IRRITATION	CAUSES EYE IRRITATION
RESPIRATORY OR SKIN SENSITIZATION	NOT CLASSIFIED
GERM CELL MUTAGENICITY	NOT CLASSIFIED
CARCINOGENICITY	NOT CLASSIFIED
REPRODUCTIVE TOXICITY	NOT CLASSIFIED
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE)	MAY CAUSE DROWSINESS OR DIZZINESS.
ASPIRATION HAZARD	NOT CLASSIFIED
INHALATION	MAY CAUSE DROWSINESS OR DIZZINESS.
EYE CONTACT	CAUSES SERIOUS EYE IRRITATION.
INGESTION	INGESTION MAY CAUSE NAUSEA, VOMITING AND DIARRHEA

SECTION 12. ECOLOGICAL INFORMATION

TOXICITY	NA
PERSISTENCE AND DEGRADABILITY	NA
BIOACCUMULATIVE POTENTIAL	NA
MOBILITY IN SOIL	LC-50 (LETHAL CONCENTRATION) UG = MICROGRAMS/LITER CHANNEL CATFISH - 2,267,000 UG/LITER RAINBOW TROUT - 1,372,000 UG/LITER BLUEGILL - 3,433,000 UG/LITER
OTHER ADVERSE EFFECTS	NA

SECTION 13. DISPOSAL CONSIDERATION

WASTE DISPOSAL RECOMMENDATION :

EMPTY BAGS THOROUGHLY. CARRY OUT THE PROPER RECYLING, REUSAGE OR DISPOSAL.
PLEASE REFER TO THE RELEVANT EU REGULATIONS, IN PARTICULAR THE GUIDELINES/DECISIONS OF THE COUNCIL REGARDING HANDLING OF WASTES (E.G. 75/442/EEC, 91/689/EEC, 94/67/EC, 94/904/EC) AS IMPLEMENTED IN NATIONAL REGULATIONS.

REGIONAL RECOMMENDATION :

BURY OR INCINERATE ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS.

CONTAINERS SHOULD NOT BE REUSED WITHOUT PROFESSIONAL CLEANING AND RECONDITIONING.
OBSERVE ALL LABELED SAFEGUARDS UNTIL CLEANED, RECONDITIONED OR DESTROYED.

PLEASE REFER TO SECTION 8 (EXPOSURE CONTROLS /PERSONAL PROTECTION) OF THIS SDS.

SECTION 14. TRANSPORTATION INFORMATION

UN NUMBER	NONE
UN PROPER SHIPPING NAME	NONE

DEPARTMENT OF TRANSPORTATION (DOT) : NOT HAZARDOUS FOR TRANSPORTATION

TRANSPORT HAZARD CLASS(ES)

HAZARD LABLES (DOT) :

PACKING GROUP (DOT)	NA
DOT SPECIAL PROVISIONS	NA

ADDITIONAL INFORMATION:

OVERLAND TRANSPORT	NONE
TRANSPORT BY SEA	NONE
AIR TRANSPORT	NONE
DOT QUANTITY LIMITATIONS PASSENGER AIRCRAFT	NA
DOT QUANTITY LIMITATIONS CARGO AIRCRAFT	NA

SECTION 15. REGULATORY INFORMATION

US FEDERAL REGULATIONS:

THE SUBSTANCES IS LISTED ON UNITED STATES TSCA (TOXIC SUBSTANCE CONTROL ACT) INVENTORY.

US STATE REGULATIONS:

NONE

CHEMICAL IDENTITY:

518-47-8	TSCA	DSL	NDSL	EINECS	ELINCS	ENCS	CHINA	KECL	PICCS	AICS
	X	-	-	-	-	-	-	-	-	-

TSCA STATUS	IN COMPLIANCE
E C CLASSIFICATION	(67/548/EEC - 88/379/EEC) N/A
EINECS NUMBER	
REACH CLASSIFICATION	
R PHRASES	
ADDITIONAL REGULATORY INFORMATION	

SECTION 16. OTHER INFORMATION

INDICATION OF CHANGES:

NA

OTHER INFORMATION:

NA

GHS FULL TEXT PHRASES:

MAY BE HARMFUL IF INHALED	H333
CAUSES EYE IRRITATION	H320
CASUES MILD SKIN IRRITATION	H316

	HEALTH	FLAMMABILITY	REACTIVITY	PERSONAL PROT
H. M. I. S. CLASSIFICATION:	1	0	0	D

HMIS CODE: **4** - SEVERE HAZARD, **3** - SERIOUS HAZARD, **2** - MODERATE HAZARD, **1** - SLIGHT HAZARD, **0** - MINIMAL HAZARD

SAFETY DATA SHEET (SDS)
REVISION DATE: 03/03/2016

ALL INFORMATION AND DATA APPEARING ON THIS SDS ARE BELIEVED TO BE RELIABLE AND ACCURATE. HOWEVER, IT IS THE USER' S RESPONSIBILITY TO DETERMINE THE SAFETY, TOXICITY, AND SUITABILITY FOR USE OF THE PRODUCT DESCRIBED. SINCE THE ACTUAL USE BY OTHERS IS BEYOND OUR CONTROL, NO GUARANTEE, EXPRESSED OR IMPLIED, IS MADE BY HUE CORPORATION. USER ASSUMES ALL RISK AND RESPONSIBILITY.

ATTACHMENT 3

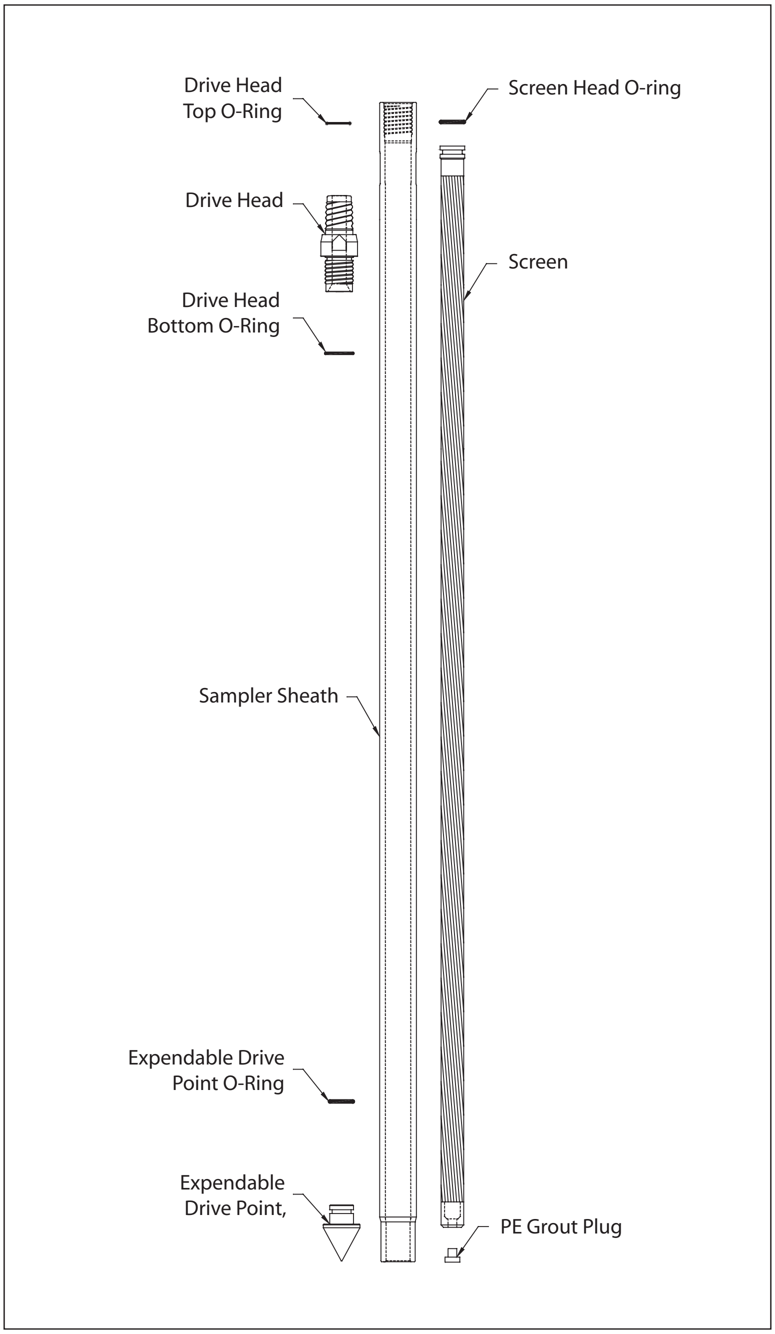
SOPs Geoprobe® Screen Point 16 and Screen Point 22 Groundwater Samplers

GEOPROBE® SCREEN POINT 16 GROUNDWATER SAMPLER

STANDARD OPERATING PROCEDURE

Technical Bulletin No. MK3142

PREPARED: November, 2006



GEOPROBE® SCREEN POINT 16 GROUNDWATER SAMPLER PARTS

Geoprobe® and Geoprobe Systems®, Macro-Core® and Direct Image® are Registered Trademarks of Kejr, Inc., Salina, Kansas

Screen Point 16 Groundwater Sampler is manufactured under U.S. Patent 5,612,498

1.0 OBJECTIVE

The objective of this procedure is to drive a sealed stainless steel or PVC screen to depth, deploy the screen, obtain a representative water sample from the screen interval, and grout the probe hole during abandonment. The Screen Point 16 Groundwater Sampler enables the operator to conduct abandonment grouting that meets American Society for Testing and Materials (ASTM) Method D 5299 requirements for decommissioning wells and borings for environmental activities (ASTM 1993).

2.0 BACKGROUND

2.1 Definitions

Geoprobe®: A brand name of high quality, hydraulically powered machines that utilize both static force and percussion to advance sampling and logging tools into the subsurface. The Geoprobe® brand name refers to both machines and tools manufactured by Geoprobe Systems®, Salina, Kansas. Geoprobe® tools are used to perform soil core and soil gas sampling, groundwater sampling and monitoring, soil conductivity and contaminant logging, grouting, and materials injection.

Screen Point 16 (SP16) Groundwater Sampler: A direct push device consisting of a PVC or stainless steel screen that is driven to depth within a sealed, steel sheath and then deployed for the collection of representative groundwater samples. The assembled SP16 Sampler is approximately 51.5 inches (1308 mm) long with an OD of 1.625 inches (41 mm). Upon deployment, up to 41 inches (1041 mm) of screen can be exposed to the formation. The Screen Point 16 Groundwater Sampler is designed for use with 1.5-inch probe rods and machines equipped with the more powerful GH60 Hydraulic Hammer. Operators with GH40 Series hammers may chose to use this sampler in soils where driving is difficult.

Rod Grip Pull System: An attachment mounted on the hydraulic hammer of a direct push machine which makes it possible to retract the tool string with extension rods or flexible tubing protruding from the top of the probe rods. The Rod Grip Pull System includes a pull block with rod grip jaws that are bolted directly to the machine. A removable handle assembly straddles the tool string while hooking onto the pull block to effectively grip the probe rods as the hammer is raised. A separate handle assembly is required for each probe rod diameter.

2.2 Discussion

In this procedure, the assembled Screen Point 16 Groundwater Sampler (Fig. 2.1A) is threaded onto the leading end of a Geoprobe® probe rod and advanced into the subsurface with a Geoprobe® direct push machine. Additional probe rods are added incrementally and advanced until the desired sampling interval is reached. While the sampler is advanced to depth, O-ring seals at each rod joint, the drive head, and the expendable drive point provide a watertight system. This system eliminates the threat of formation fluids entering the screen before deployment and assures sample integrity.

Once at the desired sampling interval, extension rods are sent downhole until the leading rod contacts the bottom of the sampler screen. The tool string is then retracted approximately 44 inches (1118 mm) while the screen is held in place with the extension rods (Fig. 2.1B). As the tool string is retracted, the expendable point is released from the sampler sheath. The tool string and sheath may be retracted the full length of the screen or as little as a few inches if a small sampling interval is desired.

There are three types of screens that can be used in the Screen Point 16 Groundwater Sampler. Two of the these, a stainless steel screen with a standard slot size of 0.004 inches (0.10 mm) and a PVC screen with a standard slot size of 0.010 inches (0.25 mm), are recovered with the tool string after sampling. The third screen is also manufactured from PVC with a standard slot size of 0.010 inches (0.25 mm), but is designed to be left downhole when sampling is complete. This disposable screen has an exposed screen length of approximately 43 inches (1092 mm). The two screens that are recovered with the sampler both have an exposed screen length of approximately 41 inches (1041 mm).

(continued on following page)

An O-ring on the head of the stainless steel screens maintains a seal at the top of the screen. As a result, any liquid entering the sampler during screen deployment must first pass through the screen. PVC screens do not require an O-ring because the tolerance between the screen head and sampler sheath is near that of the screen slot size.

The screens are constructed such that flexible tubing, a mini-bailer, or a small-diameter bladder pump can be inserted into the screen cavity. This makes direct sampling possible from anywhere within the saturated zone. A removable plug in the lower end of the screens allows the user to grout as the sampler is extracted for further use.

Groundwater samples can be obtained in a number of ways. A common method utilizes polyethylene (TB25L) or Teflon® (TB25T) tubing and a Check Valve Assembly (GW4210). The check valve (with check ball) is attached to one end of the tubing and inserted down the casing until it is immersed in groundwater. Water is pumped through the tubing and to the ground surface by oscillating the tubing up and down.

An alternative means of collecting groundwater samples is to attach a peristaltic or vacuum pump to the tubing. This method is limited in that water can be pumped to the surface from a maximum depth of approximately 26 feet (8 m). Another technique for groundwater sampling is to use a stainless steel Mini-Bailer Assembly (GW41). The mini-bailer is lowered down the inside of the casing below the water level where it fills with water and is then retrieved from the casing.

The latest option for collecting groundwater from the SP16 sampler is to utilize a Geoprobe® MB470 Series Mechanical Bladder Pump (MBP)*. The MBP may be used to meet requirements of the low-flow sampling protocol (Puls and Barcelona 1996, ASTM 2003). Through participation in a U.S. EPA Environmental Technology Verification study, it was confirmed that the MB470 can provide representative samples (EPA 2003).

**The Mechanical Bladder Pump is manufactured under U.S. Patent No. 6,877,965 issued April 12, 2005.*

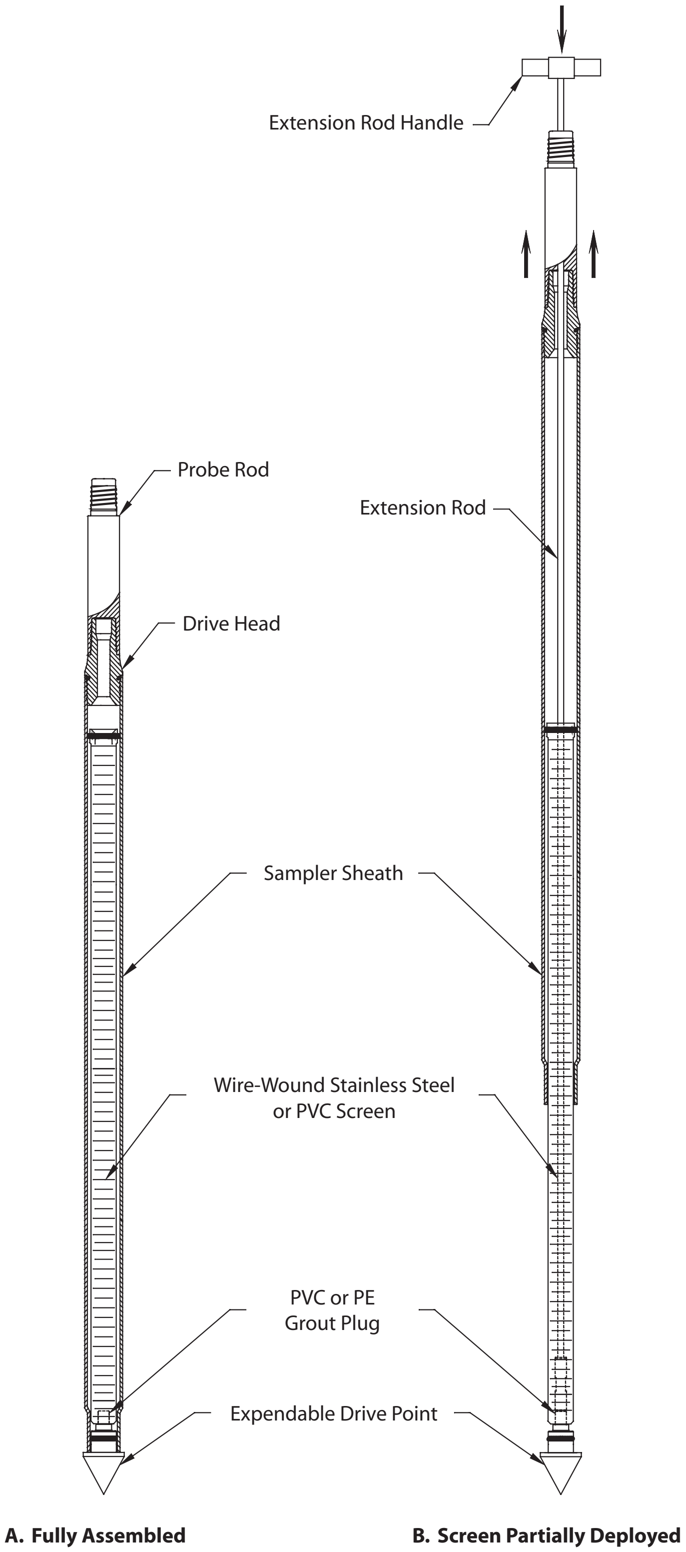


FIGURE 2.1

Screen Point 16 Groundwater Sampler

3.0 TOOLS AND EQUIPMENT

The following tools and equipment can be used to successfully recover representative groundwater samples with the Geoprobe® Screen Point 16 Groundwater Sampler. Refer to Figures 3.1 and 3.2 for identification of the specified parts. Tools are listed below for the most common SP16 / 1.5-inch probe rod configurations. Additional parts for optional rod sizes and accessories are listed in Appendix A.

SP16 Sampler Parts	**Part Number**
SP16 Sampler Sheath	15187
SP16 Drive Head, 0.5-inch bore, 1.5-inch rods*	18307
SP16 O-ring Service Kit, 1.5-inch rods *(includes 4 each of the O-ring packets below)*	15844
O-rings for Top of SP16 Drive Head, 1.5-inch rods only (Pkt. of 25)	*15389*
O-rings for Bottom of SP16 Drive Head (Pkt. of 25)	*13196*
O-rings for GW1520 Screen Head (Pkt. of 25)	*GW1520R*
O-rings for SP16 Expendable Drive Point (Pkt. of 25)	*GW1555R*
Screen, Wire-Wound Stainless Steel, 4-Slot*	GW1520
Grout Plugs, PE (Pkg. of 25)	GW1552K
Expendable Drive Points, steel, 1.625-inch OD (Pkg. of 25)*	GW1555K
Screen Point 16 Groundwater Sampler Kit, 1.5-inch Probe Rods *(includes 1 each of: 15187, 18307, 15844, GW1520, GW1535, GW1540, GW1555K, and GW1552K)*	15770

Probe Rods and Probe Rod Accessories	**Part Number**
Drive Cap, 1.5-inch probe rods, threadless, (for GH60 Hammer)	12787
Pull Cap, 1.5-inch probe rods	15090
Probe Rod, 1.5-inch x 60-inch*	11121

Extension Rods and Extension Rod Accessories	**Part Number**
Screen Push Adapter	GW1535
Grout Plug Push Adapter	GW1540
Extension Rod, 60-inch*	10073
Extension Rod Coupler	AT68
Extension Rod Handle	AT69
Extension Rod Jig	AT690
Extension Rod Quick Link Coupler, pin	AT695
Extension Rod Quick Link Coupler, box	AT696

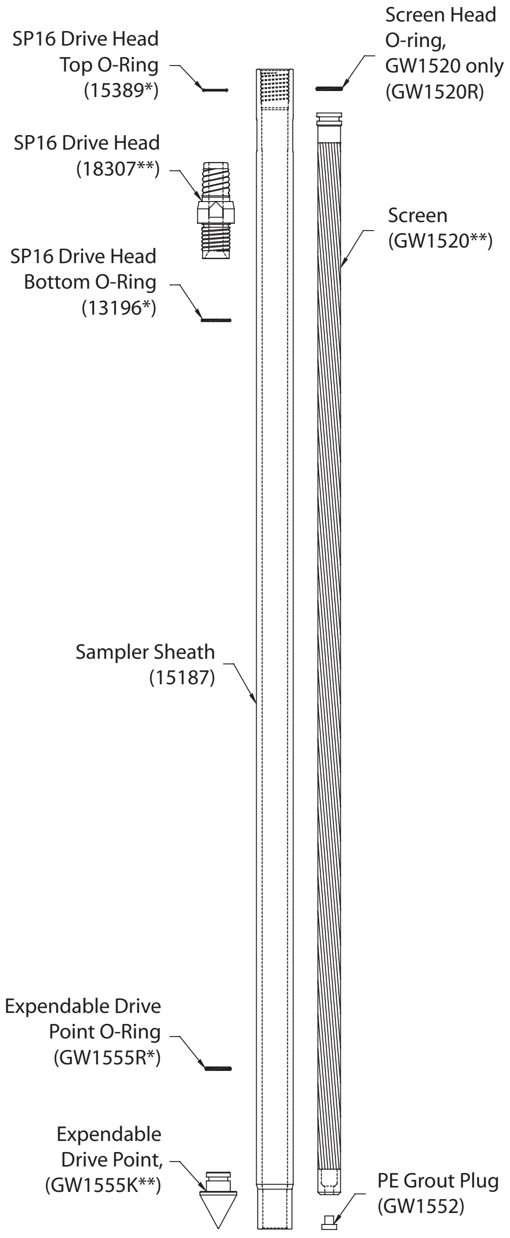
Grout Accessories	**Part Number**
Grout Nozzle, for 0.375-inch OD tubing	GW1545
High-Pressure Nylon Tubing, 0.375-inch OD / 0.25-inch ID, 100-ft. (30 m)	11633
Grout Machine, self-contained*	GS1000
Grout System Accessories Package, 1.5-inch rods	GS1015

Groundwater Purging and Sampling Accessories	**Part Number**
Polyethylene Tubing, 0.375-inch OD, 500 ft.*	TB25L
Check Valve Assembly, 0.375-inch OD Tubing*	GW4210
Water Level Meter, 0.438-inch OD Probe, 100 ft. cable*	GW2000
Mechanical Bladder Pump**	MB470
Mini Bailer Assembly, stainless steel	GW41

Additional Tools	**Part Number**
Adjustable Wrench, 6.0-inch	FA200
Adjustable Wrench, 10.0-inch	FA201
Pipe Wrenches	NA

* See Appendix A for additional tooling options.

** Refer to the Standard Operating Procedure (SOP) for the Mechanical Bladder Pump (Technical Bulletin No. MK3013) for additional tooling needs.



* Included in the SP16 O-ring Service Kit (15844)
** Part numbers show most common tool configuration. See Appendix A for alternative parts.

FIGURE 3.1
SP16 Sampler Parts

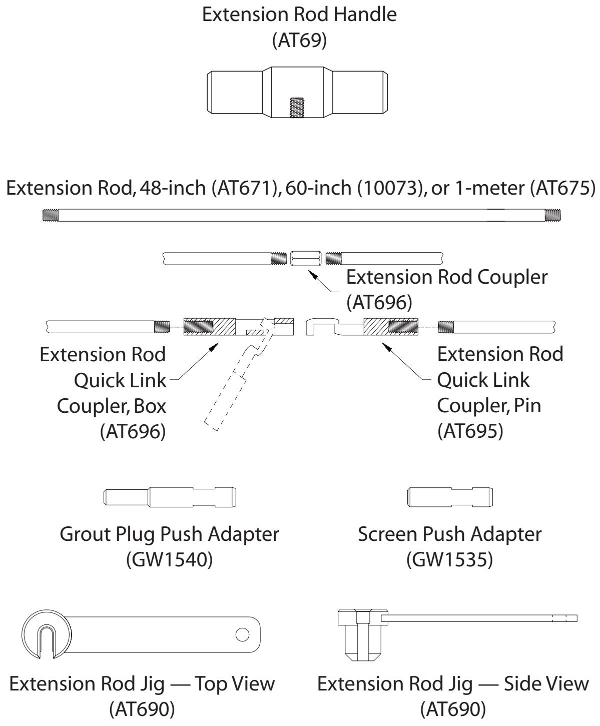


FIGURE 3.2
Geoprobe® Extension Rods and Accessories

4.0 OPERATION

4.1 Basic Operation

The SP16 sampler utilize a stainless steel or PVC screen which is encased in an alloy steel sampler sheath. An expendable drive point is placed in the lower end of the sheath while a drive head is attached to the top. O-rings on the drive head and expendable point provide a watertight sheath which keeps contaminants out of the system as the sampler is driven to depth.

Once the sampling interval is reached, extension rods equipped with a screen push adapter are inserted down the ID of the probe rods. The tool string is then retracted up to 44 inches (1118 mm) while the screen is held in place with the extension rods. The system is now ready for groundwater sampling. When sampling is complete, a removable plug in the bottom of the screen allows for grouting below the sampler as the tool string is retrieved.

4.2 Sampler Options

The Screen Point 15 and Screen Point 16 Groundwater Samplers are nearly identical. Subtle differences in the design of the SP16 sampler make it more durable than the earlier SP15 system. Operators of GH60-equipped machines should always utilize SP16 tooling. Operators of machines equipped with GH40 Series hammers may also choose SP16 tooling when sampling in difficult probing conditions.

A 1.75-inch OD Expendable Drive Point (17066K) and Disposable PVC Screen (16089) provide two useful options for the SP16 sampler. The 1.75-inch drive point may be used when soil conditions make it difficult to remove the sampler after driving to depth. The disposable PVC screen may be left downhole after sampling (when regulations permit) to eliminate the time required for screen decontamination.

4.3 Decontamination

In order to collect representative groundwater samples, all sampler parts must be thoroughly cleaned before and after each use. Scrub all metal parts using a stiff brush and a nonphosphate soap solution. Steam cleaning may be substituted for hand-washing if available. Rinse with distilled water and allow to air-dry before assembly.

4.4 SP16 Sampler Assembly (Figure 4.1)

Part numbers are listed for a standard SP16 sampler using 1.5-inch probe rods. Refer to Page 6 for screen and drive head alternatives.

1. Place an O-ring on a steel expendable drive point (GW1555K). Firmly seat the expendable point in the necked end of a sampler sheath (15187).

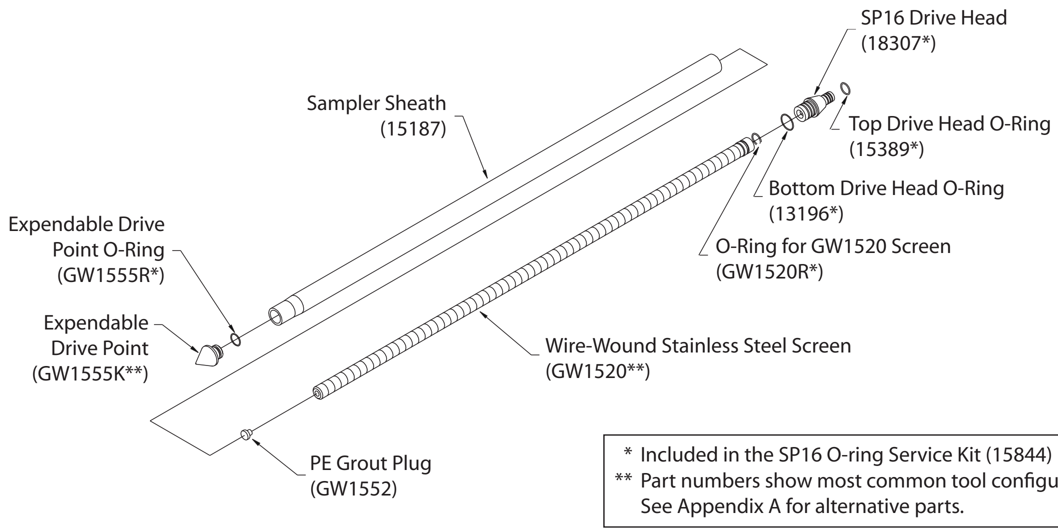
2. Install a PE Grout Plug (GW1552) in the bottom end of a Wire-wound Stainless Steel Screen (GW1520). Place a GW1520R O-ring in the groove on the top end of the screen.

3. Slide the screen inside of the sampler sheath with the grout plug toward the bottom of the sampler. Ensure that the expendable point was not displaced by the screen.

4. Install a bottom O-ring (13196) on a Drive Head (18307 or 15188). Thread the drive head into the sampler sheath using an adjustable wrench if necessary to ensure complete engagement of the threads. Attach a Drive Cap (12787 or 15590) to the top of the drive head.

   NOTE: The 18307 drive head should be used whenever possible as the smaller 0.5-inch ID provides a greater material cross-section for increased durability.

Sampler assembly is complete.



* Included in the SP16 O-ring Service Kit (15844)
** Part numbers show most common tool configuration.
See Appendix A for alternative parts.

FIGURE 4.1
Screen Point 16 Groundwater Sampler Assembly

4.5 Advancing the SP16 Sampler

To provide adequate room for screen deployment with the Rod Grip Pull System, the probe derrick should be extended a little over halfway out of the carrier vehicle when positioning for operation.

1. Begin by placing the assembled sampler (Fig. 2.1.A) in the driving position beneath the hydraulic hammer of the direct push machine as shown in Figure 4.2.

2. Advance the sampler with the throttle control at slow speed for the first few feet to ensure that the sampler is aligned properly. Switch to fast speed for the remainder of the probe stroke.

3. Completely raise the hammer assembly. Remove the drive cap and place an O-ring in the top groove of the drive head. Distilled water may be used to lubricate the O-ring if needed.

   Add a probe rod (length to be determined by operator) and reattach the drive cap to the rod string. Drive the sampler the entire length of the new rod with the throttle control at fast speed.

4. Repeat Step 3 until the desired sampling interval is reached. Approximately 12 inches (305 mm) of the last probe rod must extend above the ground surface to allow attachment of the puller assembly. A 12-inch (305 mm) rod may be added if the tool string is over-driven.

5. Remove the drive cap and retract the probe derrick away from the tool string.

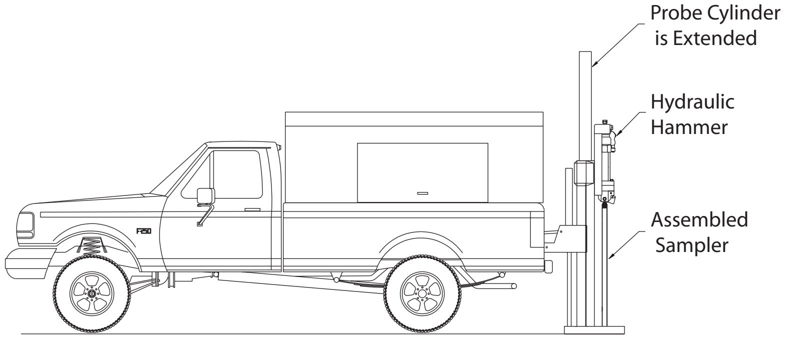


FIGURE 4.2
Screen Point 16 Groundwater Sampler in Driving Position

4.6 Screen Deployment

1. Thread a screen push adapter (GW1535) on an extension rod of suitable length (AT671, 10073, or AT675). Attach a threaded coupler (AT68) to the other end of the extension rod. Lower the extension rod inside of the probe rod taking care not to drop it down the tool string. An extension rod jig (AT690) may be used to hold the rods.

2. Add extension rods until the adapter contacts the bottom of the screen. To speed up this step, it is recommended that Extension Rod Quick Links (AT695 and AT696) are used at every other rod joint.

3. Ensure that at least 48 inches (1219 mm) of extension rod protrudes from the probe rod. Thread an extension rod handle (AT69) on the top extension rod.

4. Maneuver the probe assembly into position for pulling.

5. Raise (pull) the tool string while physically holding the screen in place with the extension rods (Fig. 4.3.B). A slight knock with the extension rod string will help to dislodge the expendable point and start the screen moving inside the sheath.

   Raise the hammer and tool string about 44 inches (1118 cm) if using a GW1520 or GW1530 screen. At this point the screen head will contact the necked portion of the sampler sheath (Fig. 4.3.C.) and the extension rods will rise with the probe rods. Use care when deploying a PVC screen so as not to break the screen when it contacts the bottom of the sampler sheath.

   The Disposable Screen (16089) will extend completely out of the sheath if the tool string is raised more than 45 inches (1143 mm). Measure and mark this distance on the top extension rod to avoid losing the screen during deployment.

6. Remove the rod grip handle, lower the hammer assembly, and retract the probe derrick. Remove the top extension rod (with handle) and top probe rod. Finally, extract all extension rods.

7. Groundwater samples can now be collected with a mini-bailer, peristaltic or vacuum pump, tubing bottom check valve assembly, bladder pump, or other acceptable small diameter sampling device.

   When inserting tubing or a bladder pump down the rod string, ensure that it enters the screen interval. The leading end of the tubing or bladder pump will sometimes catch at the screen head giving the illusion that the bottom of the screen has been reached. An up-and-down motion combined with rotation helps move the tubing or bladder pump past the lip and into the screen.

4.7 Abandonment Grouting for GW1520 and GW1530 Screens

The SP16 Sampler can meet ASTM D 5299 requirements for abandoning environmental wells or borings when grouting is conducted properly. A removable grout plug makes it possible to deploy tubing through the bottom of GW1520 and GW1530 screens. A GS500 or GS1000 Grout Machine is then used to pump grout into the open probe hole as the sampler is withdrawn. The following procedure is presented as an example only and should be modified to satisfy local abandonment grouting regulations.

1. Maneuver the probe assembly into position for pulling. Attach the rod grip puller to the top probe rod. Raise the tool string approximately 4 to 6 inches (102 to 152 cm) to allow removal of the grout plug.

2. Thread the Grout Plug Push Adapter (GW1540) onto an extension rod. Insert the adapter and extension rod inside the probe rod string. Add extension rods until the adapter contacts the grout plug at the bottom of the screen. Attach the handle to the top extension rod. When the extension rods are slightly raised and lowered, a relatively soft rebound should be felt as the adapter contacts the grout plug. This is especially true when using a PVC screen.

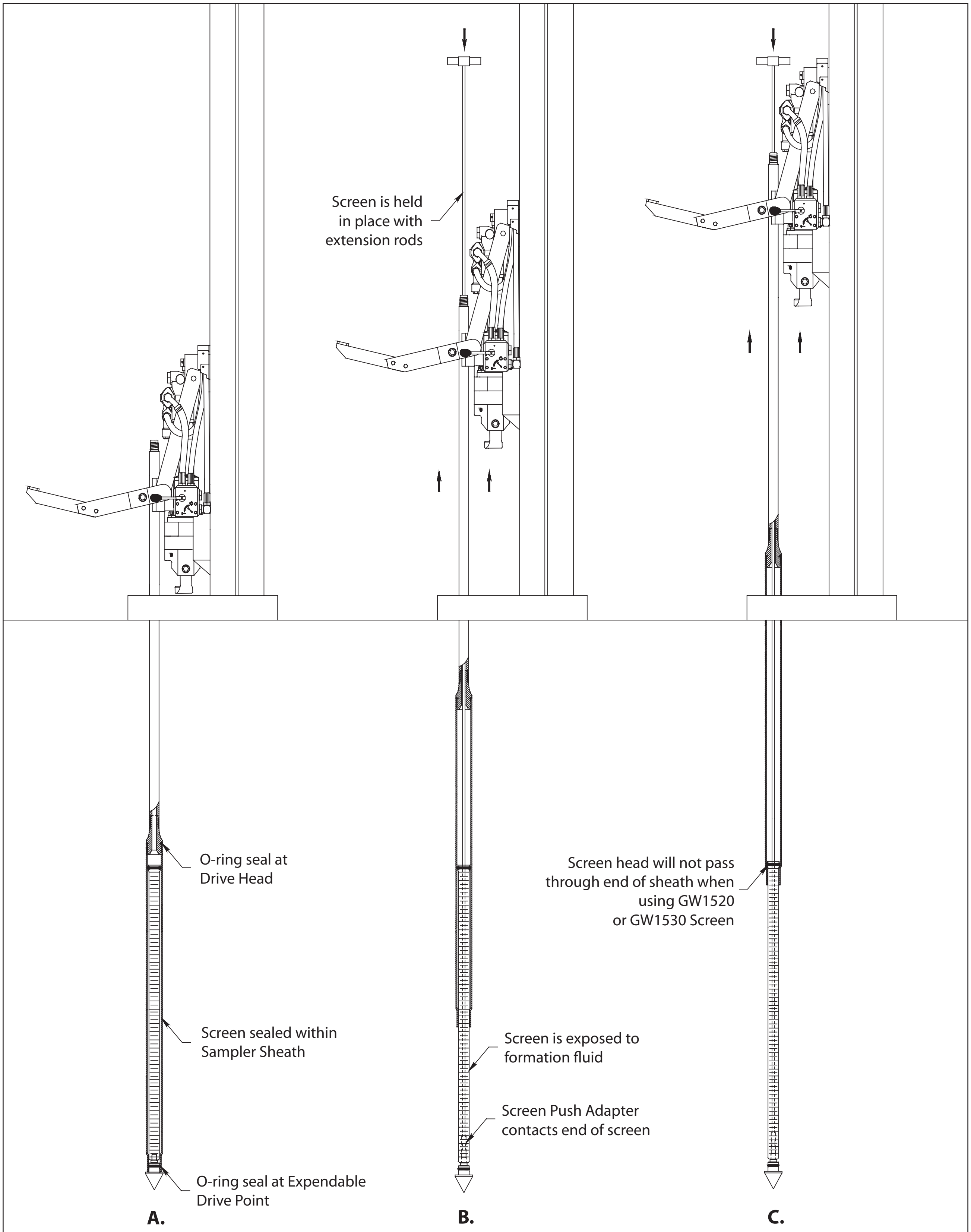


FIGURE 4.3
Screen Deployment for SP16 Sampler

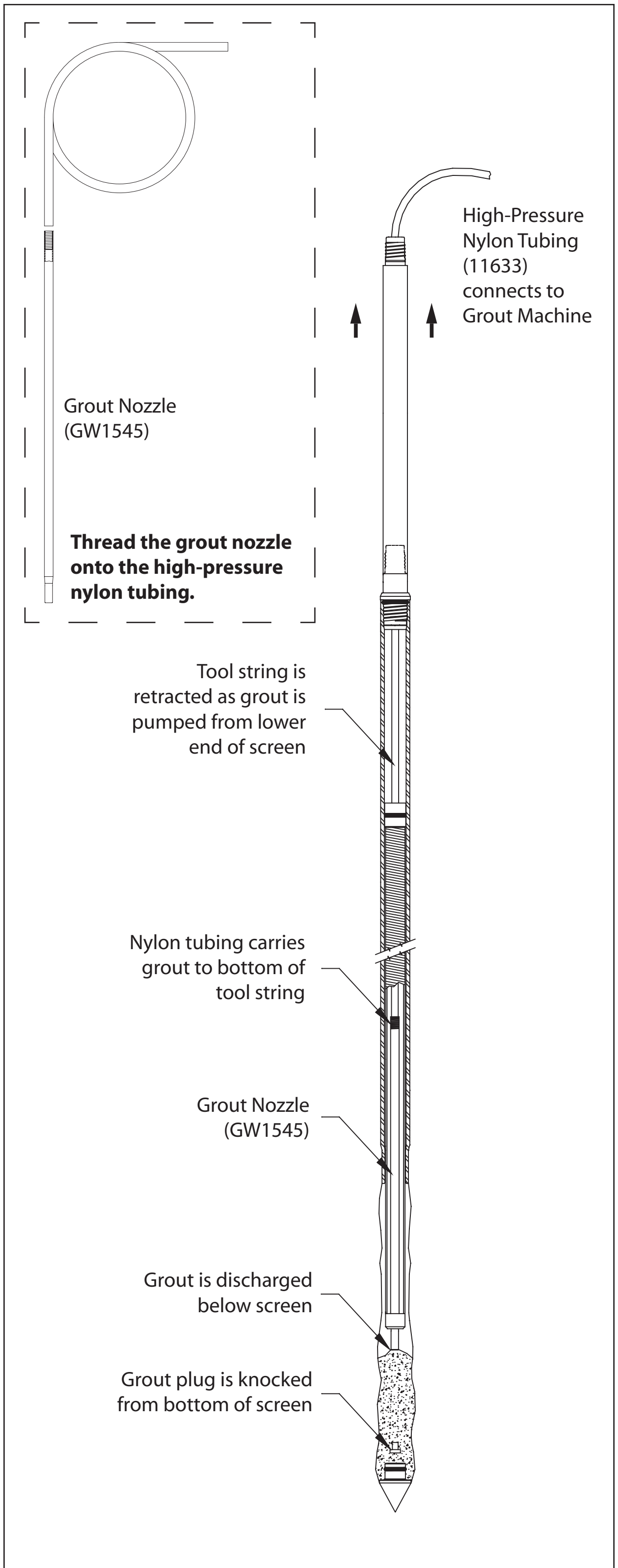


FIGURE 4.4
Grouting the SP16 Sampler With a GW1520 or GW1530 Screen

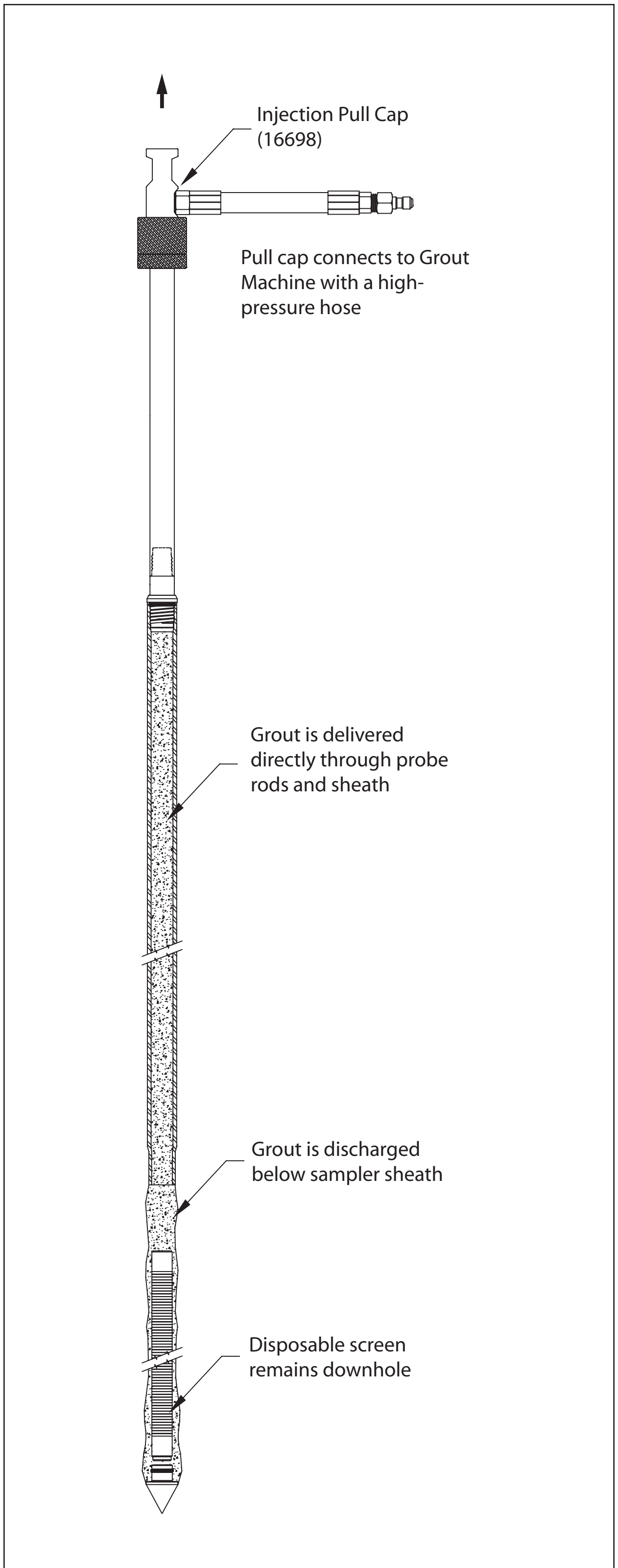


FIGURE 4.5
Grouting the SP16 Sampler With a 16089 Disposable Screen

3. Place a mark on the extension rod even with the top of the probe rod. Apply downward pressure on the extension rods and push the grout plug out of the screen. The mark placed on the extension rod should now be below the top of the probe rod. Remove all extension rods.

   Note: When working with a stainless steel screen, it may be necessary to raise and quickly lower the extension rods to jar the grout plug free. When the plug is successfully removed, a metal-on-metal sensation may be noted as the extension rods are gently "bounced" within the probe rods.

4. A Grout Nozzle (GW1545) is now connected to High-Pressure Nylon Tubing (11633) and inserted down through the probe rods to the bottom of the screen (Fig. 4.4). It may be necessary to pump a small amount of clean water through the tubing during deployment to jet out sediments that settled in the bottom of the screen. Resistance will sometimes be felt as the grout nozzle passes through the drive head. Rotate the tubing while moving it up-and-down to ensure that the nozzle has reached the bottom of the screen and is not hung up on the drive head.

   ***Note:** All probe rods remain strung on the tubing as the tool string is pulled. Provide extra tubing length to allow sufficient room to lay the rods on the ground as they are removed. An additional 20 feet is generally enough.*

5. Operate the grout pump while pulling the first rod with the rod grip pull system. Coordinate pumping and pulling rates so that grout fills the void left by the sampler. After pulling the first rod, release the rod grip handle, fully lower the hammer, and regrip the tool string. Unthread the top probe and slide it over the tubing placing it on the ground near the end of the tubing.

6. Repeat Step 5 until the sampler is retrieved. Do not bend or kink the tubing when pulling and laying out the probe rods. Sharp bends create weak spots in the tubing which may burst when pumping grout. Remember to operate the grout pump only when pulling the rod string. The probe hole is thus filled with grout from the bottom up as the rods are extracted.

7. Promptly clean all probe rods and sampler parts before the grout sets up and clogs the equipment.

4.8 Abandonment Grouting for the 16089 Disposable Screen

ASTM D 5299 requirements can also be met for the SP16 samplers when using the 16089 disposable screen. Because the screen remains downhole after sampling, the operator may choose either to deliver grout to the bottom of the tool string with nylon tubing or pump grout directly through the probe rods using an Injection Pull Cap (16698). A GS500 or GS1000 Grout Machine is needed to pump grout into the open probe hole as the sampler is withdrawn. The following procedure is presented as an example only and should be modified to satisfy local abandonment grouting regulations.

1. Maneuver the probe assembly into position for pulling with the rod grip puller.

2. Thread the screen push adapter onto an extension rod. Insert the adapter and extension rod inside the probe rod string. Add extension rods until the adapter contacts the bottom of the screen. Attach the handle to the top extension rod.

3. The disposable screen must be extended at least 46 inches (1168 mm) to clear the bottom of the sampler sheath. Considering the length of screen deployed in Section 4.7, determine the remaining distance required to fully extend the screen from the sheath. Mark this distance on the top extension rod.

4. Pull the tool string up to the mark on the top extension rod while holding the disposable screen in place.

   The screen is now fully deployed and the sampler is ready for abandonment grouting. Apply grout to the bottom of the tool string during retrieval using either flexible tubing (as described in Section 4.7) or an injection pull cap (Fig. 4.5). This section continues with a description of grouting with a pull cap.

5. Remove the rod grip handle and maneuver the probe assembly directly over the tool string. Thread an Injection Pull Cap (16698) onto the top probe rod and close the hammer pull latch over the top of the pull cap.

6. Connect the pull cap to a Geoprobe® grout machine using a high-pressure grout hose.

7. Operate the pump to fill the entire tool string with grout. When a sufficient volume has been pumped to fill the tool string, begin pulling the rods and sampler while continuing to operate the grout pump. Considering the known pump volume and sampler cross-section, time tooling withdrawal to slightly "overpump" grout into the subsurface. This will ensure that all voids are filled during sampler retrieval.

   The grouting process can lubricate the probe hole sufficiently to cause the tool string to slide back downhole when disconnected from the pull cap. Prevent this by withdrawing the tool string with the rod grip puller while maintaining a connection to the grout machine with the pull cap.

4.9 Retrieving the Screen Point 16 Sampler

If grouting is not required, the Screen Point 16 Sampler can be retrieved by pulling the probe rods as with most other Geoprobe® applications. The Rod Grip Pull System should be used for this process as it allows the operator to remove rods without completely releasing the tool string. This avoids having the probe rods fall back downhole when released during the pulling procedure. A standard Pull Cap (15164) may still be used if preferred. Refer to the Owner's Manual for your Geoprobe® direct push machine for specific instructions on pulling the tool string.

5.0 REFERENCES

American Society of Testing and Materials (ASTM), 2003. D6771-02 Standard Practice for Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations. ASTM, West Conshocken, PA. (www.astm.org)

American Society of Testing and Materials (ASTM), 1993. ASTM 5299 *Standard Guide for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities.* ASTM West Conshohocken, PA. (www.astm.org)

Geoprobe Systems®, 2003, *Tools Catalog, V.6.*

Geoprobe Systems®, 2006, *Model MB470 Mechanical Bladder Pump Standard Operating Procedure (SOP), Technical Bulletin No. MK3013.*

Puls, Robert W., and Michael J. Barcelona, 1996. Ground Water Issue: Low-Flow (Minimal Drawdown) Ground Water Sampling Procedures. EPA/540/S-95/504. April.

U.S. Environmental Protection Agency (EPA), 2003. Environmental Technology Verification Report: Geoprobe Inc., Mechanical Bladder Pump Model MB470. Office of Research and Development, Washington, D.C. EPA/600R-03/086. August.

Appendix A
ALTERNATIVE PARTS

The following parts are available to meet unique soil conditions. See section 3.0 for a complete listing of the common tool configurations for the Geoprobe® Screen Point 16 Groundwater Sampler.

SP16 Sampler Parts and Accessories	**Part Number**
SP16 Drive Head, 0.625-inch bore, 1.5-inch rods	15188
Expendable Drive Points, aluminum, 1.625-inch OD (Pkg. of 25)	GW1555ALK
Expendable Drive Points, steel, 1.75-inch OD (Pkg. of 25)	17066K
Screen, PVC, 10-Slot	GW1530
Screen, Disposable, PVC, 10-Slot	16089

Groundwater Purging and Sampling Accessories	**Part Number**
Polyethylene Tubing, 0.25-inch OD, 500 ft.	TB17L
Polyethylene Tubing, 0.5-inch OD, 500 ft.	TB37L
Polyethylene Tubing, 0.625-inch OD, 50 ft.	TB50L
Check Valve Assembly, 0.25-inch OD Tubing	GW4240
Check Valve Assembly, 0.5-inch OD Tubing	GW4220
Check Valve Assembly, 0.625-inch OD Tubing	GW4230
Water Level Meter, 0.375-inch OD Probe, 100-ft. cable	GW2001
Water Level Meter, 0.438-inch OD Probe, 200-ft. cable	GW2002
Water Level Meter, 0.375-inch OD Probe, 200-ft. cable	GW2003
Water Level Meter, 0.438-inch OD Probe, 30-m cable	GW2005
Water Level Meter, 0.438-inch OD Probe, 60-m cable	GW2007
Water Level Meter, 0.375-inch OD Probe, 60-m cable	GE2008

Grouting Accessories	**Part Number**
Grout Machine, auxiliary-powered	GS500

Probe Rods, Extension Rods, and Accessories	**Part Number**
Probe Rod, 1.5-inch x 1-meter	17899
Probe Rod, 1.5-inch x 48-inch	13359
Drive Cap, 1.5-inch rods (for GH40 Series Hammer)	15590
Rod Grip Pull Handle, 1.5-inch Probe Rods (for GH40 Series Hammer)	GH1555
Extension Rod, 48-inch	AT671
Extension Rod, 1-meter	AT675

Equipment and tool specifications, including weights, dimensions, materials, and operating specifications included in this brochure are subject to change without notice. Where specifications are critical to your application, please consult Geoprobe Systems®.

Geoprobe Systems®

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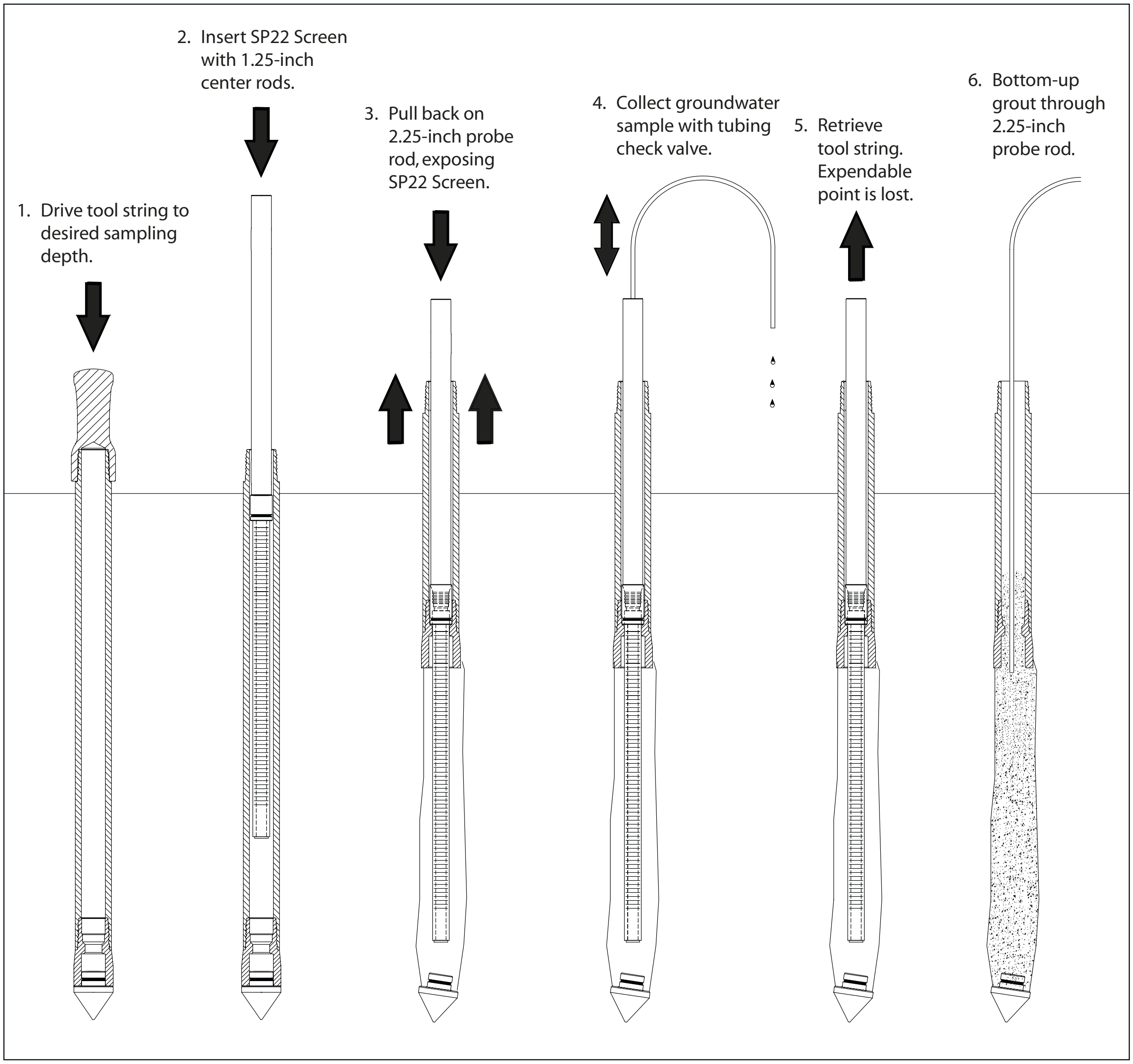
Geoprobe® Screen Point 22 Groundwater Sampler

Standard Operating Procedure

Technical Bulletin No. MK3173

PREPARED: April 2010



OPERATION OF THE GEOPROBE® SCREEN POINT 22 GROUNDWATER SAMPLER

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Screen Point 22 Groundwater Sampler is manufactured under U.S. Patent 5,612,498

1.0 OBJECTIVE

The objective of this procedure is to deploy a stainless steel or PVC screen at depth, obtain a representative water sample from the screen interval, and grout the probe hole during abandonment. The Screen Point 22 Groundwater Sampler enables the operator to conduct abandonment grouting that meets American Society for Testing and Materials (ASTM) Method D 5299 requirements for decommissioning wells and borings for environmental activities (ASTM 1993).

2.0 BACKGROUND

2.1 Definitions

Geoprobe®: A brand name of high quality, hydraulically powered machines that utilize static force and percussion or rotation to advance sampling and logging tools into the subsurface. The Geoprobe® brand name refers to both machines and tools manufactured by Geoprobe Systems®, Salina, Kansas. Geoprobe® tools are used to perform activities such as soil core and soil gas sampling, groundwater sampling and monitoring, soil conductivity and contaminant logging, grouting, and materials injection.

Screen Point 22 (SP22) Groundwater Sampler: A direct push device consisting of a PVC or stainless steel screen that is lowered (post-run) to depth within a sealed string of steel probe rods and then deployed for the collection of representative groundwater samples. Upon deployment, up to 48 inches (1219 mm) of screen can be exposed to the formation. There is also an optional 12-inch screen that can be used. The Screen Point 22 Groundwater Sampler is designed for use with 2.25-inch probe rods and machines equipped with the more powerful GH60 and GH80 series hydraulic hammers. Operators with GH40 series hammers may choose to use this sampler in soils where driving is easier.

Rod Grip Pull System: An attachment mounted on the hydraulic hammer of a direct push machine which makes it possible to retract the tool string with probe rods or flexible tubing protruding from the top of the probe rods. The Rod Grip Pull System includes a pull block with rod grip jaws that are bolted directly to the machine. A removable handle assembly straddles the tool string while hooking onto the pull block to effectively grip the probe rods as the hammer is raised. A separate handle assembly is required for each probe rod diameter.

2.2 Discussion (Fig. 2.1)

In this procedure, 2.25-inch probe rods are advanced into the subsurface with a Geoprobe® subsurface machine (Fig. 2.1, Step 1). While the tool string is advanced to depth, O-ring seals at each rod joint, the expendable point holder, and the expendable drive point provide a watertight system. This eliminates the threat of formation fluids entering the screen before deployment and assures sample integrity.

Once the leading end of the 2.25-inch probe rods reaches the desired sampling interval, an SP22 screen is lowered to the bottom of the rods using a string of either 1.25-inch outside diameter (OD) light-weight center rods, 1.25-inch probe rods, or 0.75-inch schedule 40 flush-thread PVC riser (Fig. 2.1, Step 2). The 2.25-inch rods are then retracted while the SP22 screen is held in place with the 1.25-inch rods or PVC riser (Fig 2.1, Step 3). As the 2.25-inch tool string is retracted, the expendable point is released from the expendable point holder. The tool string and expendable point holder may be retracted the full length of the screen or as little as a few inches if a small sampling interval is desired.

The SP22 Sampler can also be used with the Geoprobe® DT22 system. (Fig. 2.2)

(continued on following page)

Expendable Drive Points

The SP22 system utilizes an SP22 Expendable Point Holder (33764) and standard 2.45-inch (62-mm) OD steel Expendable Drive Points for 2.25-inch probe rods (AT2015K). Extended Shank Expendable Drive Points (19442) are available for soft soil conditions where standard points may be advanced out of the point holder during percussion. A third option is to use a part number 43128 SP22 Expendable Point Holder along with 1.625-inch (41-mm) steel Expendable Drive Points (GW1555K). These smaller drive points are more economical to purchase and ship, but must not be used with GH80 Series Hydraulic Hammers as they may not stay seated during percussion.

Screens

Two types of screens have been developed for use in the Screen Point 22 Groundwater Sampler - a stainless steel screen with a standard slot size of 0.004 inches (0.10 mm) and a PVC screen with a standard slot size of 0.010 inches (0.25 mm). These screens are available in nominal 48- and 12-inch lengths. Effective screen lengths for the 48- and 12-inch PVC screens are 48 inches (1219 mm) and 12 inches (305 mm), while 48- and 12-inch stainless steel screens have effective screen lengths of 43 inches (1092 mm) and 14 inches (356 mm) respectively. Both types of screens are recovered with the tool string after sampling.

The SP22 PVC Screen Head Adapter (37871) provides yet another screen option for the SP22 sampler. Using this adapter, a section of slotted 0.75-inch Schedule 40 PVC pipe may be lowered through the 2.25-inch probe rods using a string of flush-threaded 0.75-inch Schedule 40 PVC Riser. An SP22 PVC Screen Plug (38968) is installed in the leading end of the slotted pipe prior to use. The slotted pipe may be cut and the screen plug installed to provide custom screen lengths .

An O-ring is located at the top of each stainless screen and on the screen adapters. When a screen is deployed, this O-ring maintains a seal between the top of the screen and the inner wall of the probe rods or expendable point holder as indicated in Figure 2.1. As a result, any liquid entering the tool string must first pass through the screen.

Screens are constructed such that equipment can be inserted into the screen cavity for sample collection as noted in the following section and illustrated in Figure 2.1, Step 4. This makes direct sampling possible from anywhere within the saturated zone.

The inner rod string and screen are generally removed prior to grouting through the 2.25-inch rod string as shown in Figure 2.1, Steps 5-6. However, a removable plug in the lower end of the screens allows for grouting through flexible tubing extending out the bottom of the screen as with the Geoprobe® SP15/16 Groundwater Samplers if desired.

Sample Collection

Groundwater samples can be obtained from the SP22 screen in a number of ways. A common method utilizes 0.375-inch OD polyethylene (TB25L) or Teflon® (TB25T) tubing and a check valve assembly. The check valve (with check ball) is attached to one end of the tubing and inserted down the casing until it is immersed in groundwater. Water is then pumped through the tubing and to the ground surface by oscillating the tubing up and down.

An SP22 Check Valve Assembly (37893) is recommended if sampling through 1.25-inch light-weight center rods. The SP22 Check Valve Assembly is approximately 20 inches long to enable it to pass through the stepped diameters at each rod joint that may cause problems for other, shorter check valves.

An alternative means of collecting groundwater samples is to attach a peristaltic or vacuum pump to tubing that is inserted through the inner rods to within the SP22 screen. This method is limited in that water can be pumped to the surface from a maximum depth of approximately 26 feet (8 m). Another technique for groundwater sampling is to use a stainless steel Mini-Bailer Assembly (GW41). The mini-bailer is lowered down the inside of the casing below the water level where it fills with water and is then retrieved from the casing.

The latest option for collecting groundwater from the SP22 Sampler is to utilize a Geoprobe® MB470 Series Mechanical Bladder Pump (MBP)*. The MBP may be used to meet requirements of the low-flow sampling protocol (Puls and Barcelona 1996, ASTM 2003). Through participation in a U.S. EPA Environmental Technology Verification study, it was confirmed that the MB470 can provide representative samples (EPA 2003).

**The Mechanical Bladder Pump is manufactured under U.S. Patent No. 6,877,965 issued April 12, 2005.*

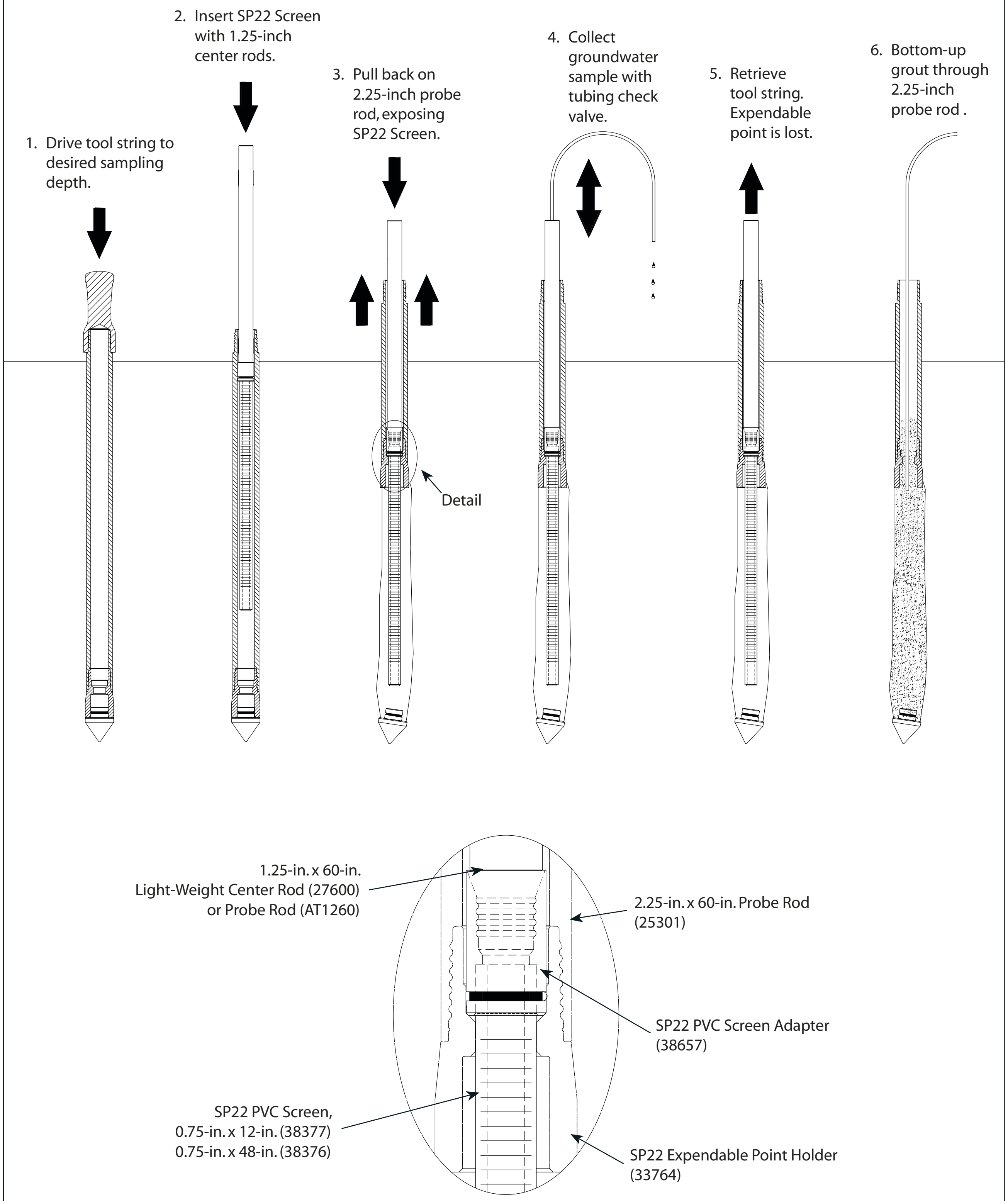

FIGURE 2.1

Screen Point 22 Groundwater Sampler - 0.75-inch PVC Screen Option

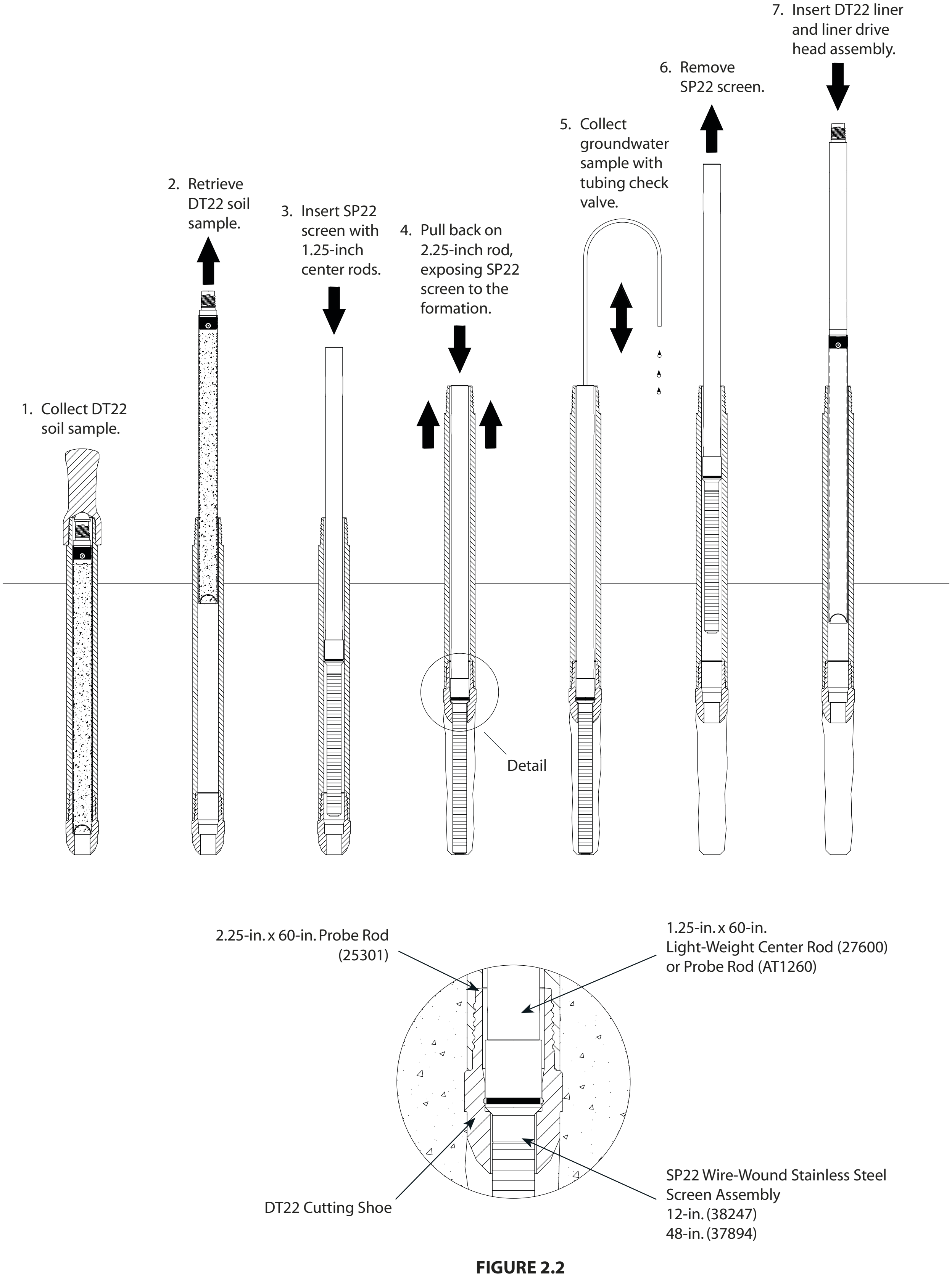

FIGURE 2.2

Screen Point 22 Groundwater Sampler Operation with DT22 Sampling System

3.0 TOOLS AND EQUIPMENT

The following tools and equipment can be used to successfully recover representative groundwater samples with the Geoprobe® Screen Point 22 Groundwater Sampler. Refer to Figures 3.1 and 3.2 for identification of the specified parts. Tools are listed below for the most common SP22 / 2.25-inch probe rod configurations. Additional rod sizes and accessories are available. Contact Geoprobe Systems® for information regarding tools and equipment options.

SP22 Sampler Parts	**Part Number**
SP22 Screen, Wire-Wound Stainless Steel, 4-Slot (48-in.)	37894
SP22 Screen, Wire-Wound Stainless Steel, 4-Slot (12-in.)	38247
Grout Plugs, PE (Pkg. of 25)	GW1552K
SP22 Screen, PVC, 10-Slot, 0.75-in. x 48-in.	38376
SP22 Screen, PVC, 10-Slot, 0.75-in. x 48-inch, Kit (includes 2 each of 38376 and 38429)	*38664*
SP22 Screen, PVC, 10-Slot, 0.75-in. x 12-in.	38377
SP22 Screen, PVC, 10-Slot 0.75-in. x 12-in., Kit (includes 2 each of 38377 and 38429)	*38667*
SP22 PVC Screen Plug	38968
SP22 PVC Screen Plug Kit (includes 10 of 38968)	*38530*
SP22 PVC Screen Adapter, 0.75-in. PVC x 1.25-in. Probe Rod Box	38657
SP22 PVC Screen Head Adapter, 0.75-in. (for flush-threaded 0.75-in. Schedule 40 PVC)	37871
SP22 O-ring Kit (Pkg. of 10 O-rings for SP22 PVC screen adapters and stainless steel screens)	37853
O-rings, 0.75-in. PVC Riser (Pkg. of 25)	GW4401R
SP22 Expendable Point Holder, 2.25-in. Probe Rods, AT2045K and 19442 Points	33764
SP22 Expendable Point Holder, 2.25-in. Probe Rods, GW1555 Points*	43128

Outer Casing (2.125-inch Probe Rods) and Inner Rod String	**Part Number**
Probe Rod, 2.25-in. x 60-in.	25301
Expendable Drive Points, Steel, 2.45-in. OD (Pkg. of 25)	AT2015K
Expendable Drive Points, Steel, 2.45-in. OD, extended shank	19442
Expendable Points, steel, 1.625-in. OD (Pkg. of 25)*	GW1555K
Drive Cap, 2.25-in. Probe Rods, Threadless, (for GH60 and GH80 Series Hammers)	31530
O-Rings, 2.25-in. Probe Rods (Pkg. of 25)	AT2100R
Rod Grip Handle, 2.25-in. Probe Rods, (for GH60 and GH80 Series Hammers)	29385
Light-Weight Center Rod, 1.25-in. x 60-in.	27600
Probe Rod, 1.25-in. x 60-in.	AT1260
O-ring, 1.25-in. rods (Pkg. of 25)	AT1250R
Rod Grip Handle, 1.25/1.5-in. Rods, (for GH60 and GH80 Series Hammers)	15554
PVC Riser, 0.75-in. Schedule 40 x 60-inch	11747
PVC Pipe, 0.75-in. Schedule 40 x 60-inch, 10-Slot	17474

Grout Accessories	**Part Number**
High-Pressure Nylon Tubing, 0.375-in. OD / 0.25-in. ID, 100-ft. (30 m)	11633
Grout Machine, Auxiliary-Powered	GS2200
Grout System Accessories Package, 2.25-in. rods	GS1015

Groundwater Purging and Sampling Accessories	**Part Number**
Polyethylene Tubing, 0.375-in. OD, 500 ft.	TB25L
Check Valve Assembly, 0.375-in. OD Tubing x 20 in. Long	37893
Water Level Meter, 0.438-in. OD Probe, 100 ft. cable	GW2000
Mechanical Bladder Pump**	MB470
Mini Bailer Assembly, Stainless Steel	GW41

* Not for use with GH80 Series Hydraulic Hammers

** Refer to the Standard Operating Procedure (SOP) for the Mechanical Bladder Pump (Technical Bulletin No. MK3013) for additional tooling needs.

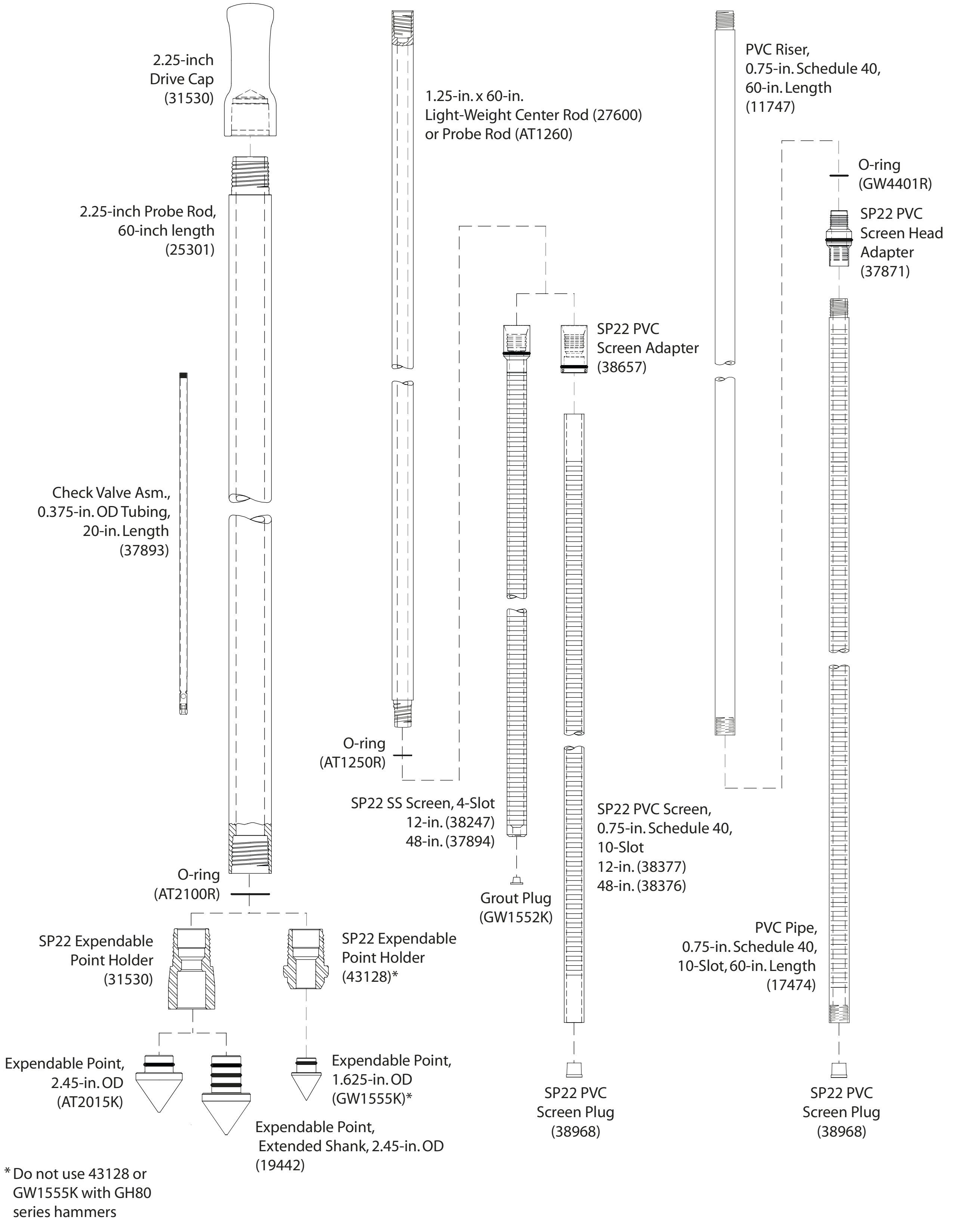

FIGURE 3.1

SP22 Sampler Parts

4.0 OPERATION

4.1 Basic Operation

The SP22 Sampler utilizes a stainless steel or PVC screen which is lowered (post-run) through an alloy steel 2.25-inch OD probe rod tool string. An expendable drive point is placed in an expendable point holder on the leading 2.25-inch probe rod prior to advancement (Fig. 4.1). This expendable point is removed and stays in the subsurface as the rods are pulled back to exposes the SP22 screen. O-rings on the probe rods , the expendable point holder, and the expendable drive point provide a watertight tool string which keeps contaminants out of the system as the 2.25-inch rods are driven to depth in preparation for installation of the SP22 screen.

Once the sampling interval is reached with the 2.25-inch probe rods, the stainless steel or PVC screen is lowered through the rods using 1.25-inch probe rods, 1.25-inch light-weight center rods, or 0.75-inch PVC riser pipe. The 2.25-inch tool string is then retracted while the screen is held in place with the inner rods or riser. The system is now ready for groundwater sampling. When sampling is complete, the inner rods and screen are removed for grouting during retrieval or the 2.25-inch rods. Alternatively, a removable plug is located in the bottom of the screens to allow grouting directly through the inner tool string with high-pressure tubing during retrieval.

4.2 Decontamination

In order to collect representative groundwater samples, all sampler parts must be thoroughly cleaned before and after each use. Scrub all metal parts using a stiff brush and a nonphosphate soap solution. Steam cleaning may be substituted for hand-washing if available. Rinse with distilled water and allow to air-dry before assembly.

4.3 Lead Rod Assembly (Fig. 4.1)

1. Place an O-ring on the expendable point holder.
2. Thread expendable point holder into the 2.25-inch probe rod.
3. Place an O-ring on a steel expendable drive point.
4. Firmly seat the expendable point in the expendable point holder.
5. Place 2.25-inch Drive Cap (31530) on the top of the 2.25-inch probe rod. The lead rod assembly is now ready to be driven to depth.

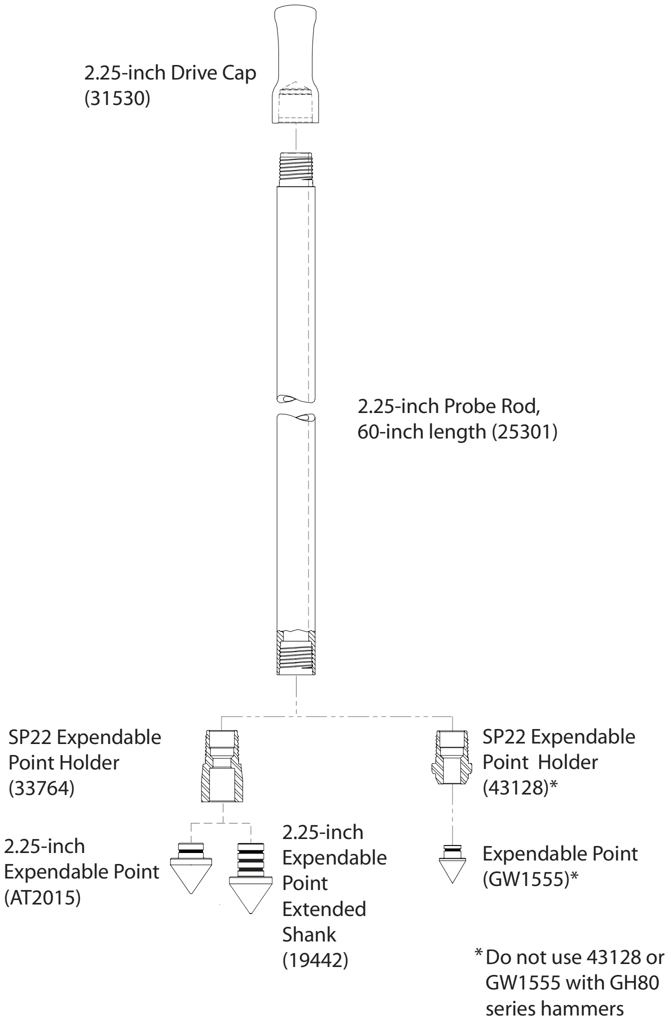

FIGURE 4.1
Lead Rod Assembly for the SP22 Groundwater Sampler

4.4 Advancing the Tool String (Fig. 4.2, step 1)

To provide adequate room for screen deployment with the Rod Grip Pull System, the probe derrick should be extended a little over halfway out of the carrier vehicle when positioning for operation.

1. Drive first 2.25-inch probe rod (as assembled in section 4.3).

2. Advance the tool string at a slow speed for the first few feet to ensure that the string is aligned properly.

3. Completely raise the hammer assembly. Remove the drive cap and place an O-ring in the top groove of the driven probe rod. Distilled water may be used to lubricate the O-ring if needed.

Add a probe rod (length to be determined by operator) and reattach the drive cap to the rod string. Drive the tool string the entire length of the new rod.

4. Repeat Step 3 until the desired sampling interval is reached. Approximately 12 inches (305 mm) of the last probe rod must extend above the ground surface to allow attachment of the puller assembly. A 12-inch (305 mm) rod may be added if the tool string is over-driven.

5. Remove the drive cap and retract the probe derrick away from the tool string.

4.5 Screen Deployment (Fig 4.2, step 2 - 4)

1. Attach an SP22 stainless steel or PVC screen to a 1.25-inch probe rod, 1.25-inch light-weight center rod, or 0.75-inch fiush-thread PVC riser using an SP22 PVC Screen Adapter (38657) or SP22 PVC Screen Head Adapter (37871) as shown in Figure 3.1. Note that the 38657 screen adapter is connected to the SP22 PVC screen using the setscrews provided with the adapter.

and lower it into the driven casing.

2. Lower the screen into the 2.25-inch probe rod casing and add rods or riser until the screen head contacts the bottom of the tool string.

3. Ensure that at least 48 inches (1219 mm) of rods or riser protrudes from the top 2.25-inch probe rod.

4. Maneuver the probe assembly into position for pulling.

5. Raise (pull) the outer 2.25-inch tool string while physically holding the screen in place with the inner 1.25-inch rods or 0.75-inch riser. A slight knock with the inner tool string will help to dislodge the expendable point and start the screen moving inside the probe rod.

Raise the hammer and outer tool string to expose the desired length of screen. The inner rods will begin raising with the outer rods when the screen adapter contacts the necked portion of the expendable point holder or DT22 Cutting Shoe. Use care when deploying a PVC screen so as not to break the screen when it contacts the expendable point.

6. Remove the rod grip handle, lower the hammer assembly, and retract the probe derrick. Remove the top 2.25-inch probe rod.

7. Groundwater samples can now be collected with a mini-bailer, peristaltic or vacuum pump, tubing bottom check valve assembly, bladder pump, or other acceptable small diameter sampling device.

When inserting tubing or a bladder pump down the rod string, ensure that it enters the screen interval. The leading end of the tubing or bladder pump will sometimes catch at the screen head giving the illusion that the bottom of the screen has been reached. An up-and-down motion combined with rotation helps move the tubing or bladder pump past the lip and into the screen.

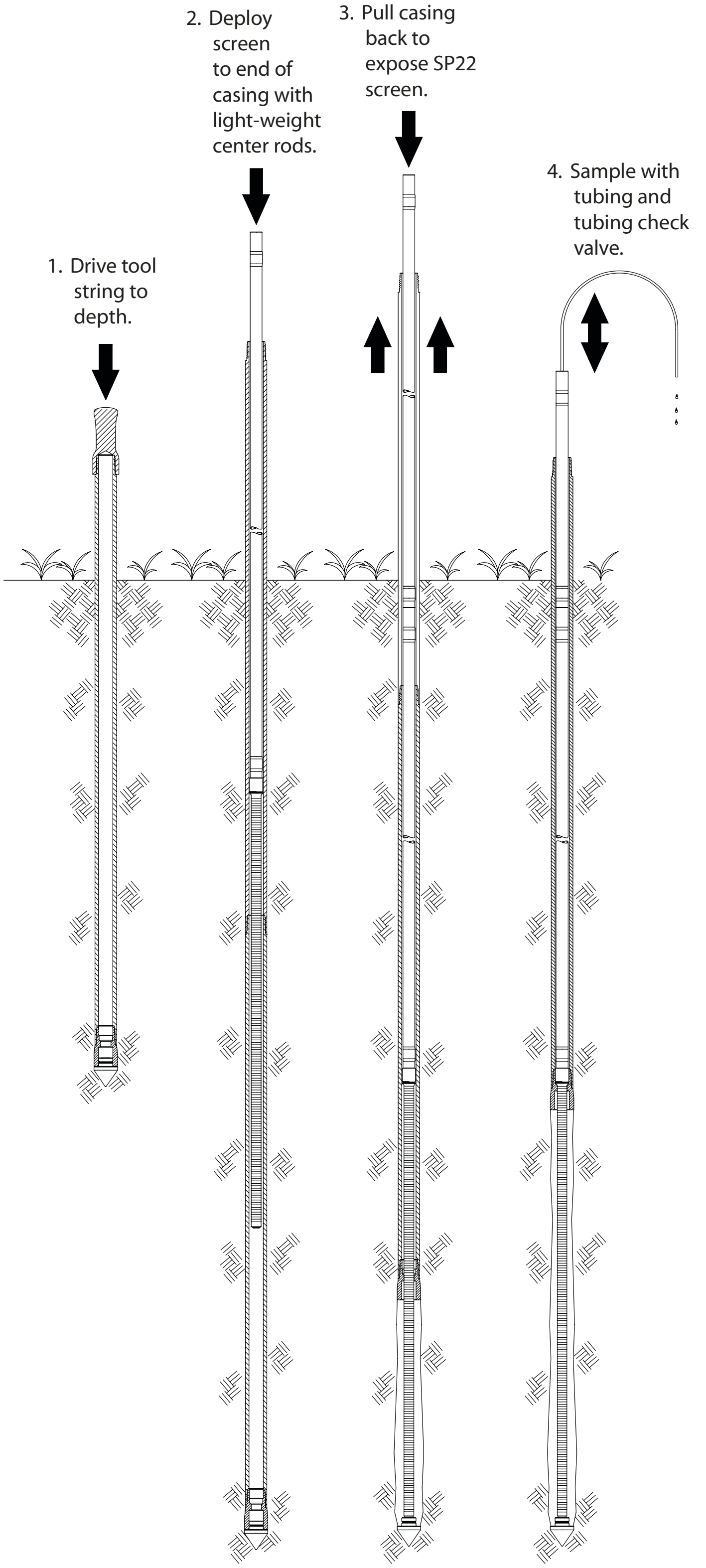

FIGURE 4.2
Screen Deployment for SP22 Sampler

4.6 Abandonment Grouting for SP22 Screens

The SP22 Sampler can meet ASTM D 5299 requirements for abandoning environmental wells or borings when grouting is conducted properly. A removable grout plug makes it possible to deploy tubing through the bottom of the SP22 screens, but the easiest method is to remove the inner string of rods; including the SP22 screen. A Grout Machine is then used to pump grout into the open probe hole as the outer casing is withdrawn. The following procedure is presented as an example only and should be modified to satisfy local abandonment grouting regulations. (Figure 4.3)

1. Maneuver the probe assembly into position for pulling.

2. High-Pressure Nylon Tubing (11633) is inserted down through the probe rods through the bottom of the expendable point holder (Fig. 4.3).

Note: *All probe rods remain strung on the tubing as the tool string is pulled. Provide extra tubing length to allow sufficient room to lay the rods on the ground as they are removed. An additional 20 feet is generally enough.*

3. Operate the grout pump while pulling the first rod with the rod grip pull system. Coordinate pumping and pulling rates so that grout fills the void left by the sampler. After pulling the first rod, release the rod grip handle, fully lower the hammer, and regrip the tool string. Unthread the top probe and slide it over the tubing placing it on the ground near the end of the tubing.

4. Repeat Step 5 until the tool string is retrieved. Do not bend or kink the tubing when pulling and laying out the probe rods. Sharp bends create weak spots in the tubing which may burst when pumping grout. Remember to operate the grout pump only when pulling the rod string. The probe hole is thus filled with grout from the bottom up as the rods are extracted.

5. Promptly clean all probe rods and sampler parts before the grout sets up and clogs the equipment.

4.7 Retrieving the Screen Point 22 Sampler

If grouting is not required, the Screen Point 22 Sampler can be retrieved by pulling the probe rods as with most other Geoprobe® applications. The Rod Grip Pull System should be used for this process as it allows the operator to remove rods without completely releasing the tool string. This avoids having the probe rods fall back downhole when released during the pulling procedure. A standard Pull Cap (33622) may still be used if preferred. Refer to the Owner's Manual for your Geoprobe® direct push machine for specific instructions on pulling the tool string.

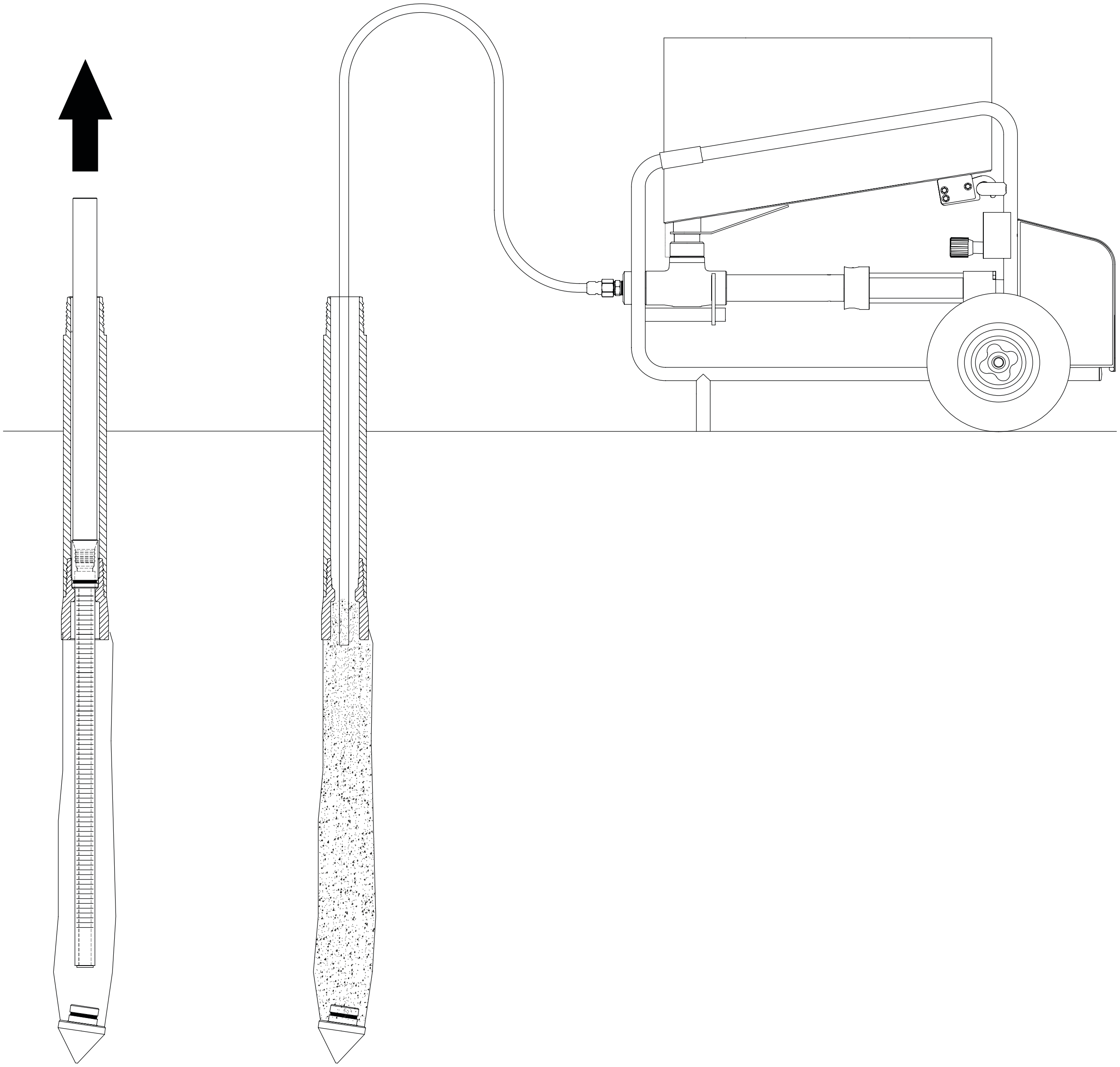

FIGURE 4.3
Abandonment Grouting for the SP22 Sampler

5.0 REFERENCES

American Society of Testing and Materials (ASTM), 2003. D6771-02 Standard Practice for Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations. ASTM, West Conshocken, PA. (www.astm.org)

American Society of Testing and Materials (ASTM), 1993. ASTM 5299 *Standard Guide for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities.* ASTM West Conshohocken, PA. (www.astm.org)

Geoprobe Systems®, 2003, *Tools Catalog, V.6.*

Geoprobe Systems®, 2006, *Model MB470 Mechanical Bladder Pump Standard Operating Procedure (SOP), Technical Bulletin No. MK3013.*

Puls, Robert W., and Michael J. Barcelona, 1996. Ground Water Issue: Low-Flow (Minimal Drawdown) Ground Water Sampling Procedures. EPA/540/S-95/504. April.

U.S. Environmental Protection Agency (EPA), 2003. Environmental Technology Verification Report: Geoprobe Inc., Mechanical Bladder Pump Model MB470. Office of Research and Development, Washington, D.C. EPA/600R-03/086. August.

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