SITE INVESTIGATION WORK PLAN

One Hour Martinizing (Former)
301 Main Street
Racine, Wisconsin

Prepared For:

BMP Realty, Inc.
Mount Pleasant, Wisconsin

March 18, 2022
Project No. 1E-2109011

WDNR BRRTS No. 02-52-552198

GILES
ENGINEERING ASSOCIATES, INC.

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GEOTECHNICAL, ENVIRONMENTAL & CONSTRUCTION MATERIALS CONSULTANTS

• Atlanta, GA
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• Manassas, VA
• Milwaukee, WI

March 18, 2022

Wisconsin Department of Natural Resources
141 NW Barstow Street
Waukesha, Wisconsin 53188

Attention: Ms. Shanna Laube-Anderson
Hydrogeologist

Subject: Site Investigation Work Plan
One Hour Martinizing (Former)
301 Main Street
Racine, Wisconsin
Project No. 1E-2109011
WDNR BRRTS No. 02-52-552198

Dear Ms. Laube-Anderson:

Giles Engineering Associates, Inc. Giles has prepared this Site Investigation Work Plan in general accordance with the Wisconsin Administrative Code Ch. 716.09. We are submitting this Site Investigation Work Plan with a $1,050 review fee to petition the Wisconsin Department of Natural resources (WDNR) for their review and concurrence, prior to initiating the proposed scope of services. If there are any questions regarding the information contained herein, or if we can be of any additional service, please contact the undersigned at your convenience.

Respectfully submitted,

GILES ENGINEERING ASSOCIATES, INC.

Kelly M. Hayden
Project Manager

Kevin T. Bugel, P.G., C. P. G.
Environmental Division Manager

Distribution: Wisconsin Department of Natural Resources
Attn: Ms. Shanna Laube-Anderson (1 copy via electronic upload)

BMS Realty, Inc
Attn: Ms. Laurie Berry C/o Jason Berry (1 via email)

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SITE INVESTIGATION WORK PLAN

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1.0 INTRODUCTION

1.1 Objective and Purpose

Giles Engineering Associates, Inc. (Giles) has prepared this Site Investigation Work Plan (SIWP) on behalf of BMP Realty, Inc., the owner of the property located at 301 Main Street in the City of Racine, Racine County, Wisconsin (herein referred to as the "Site"). This SIWP was prepared in response to a release notification and subsequent "responsible party" ("RP") letter issued by the Wisconsin Department of Natural Resources (WDNR), dated August 26, 2008, and addressed to BMP Cleaners, Inc. The Site is a former dry cleaner facility that included one dry cleaning machine (DCM) that utilized and stored dry cleaning solvent (Tetrachloroethene a.k.a. Perchloroethene or PCE).

The purpose of this SIWP is to provide a written plan to specify the media to be sampled, the locations the samples will be collected, and the methods and procedures to be employed during the remaining Site Investigation. The scope of services presented in the SIWP were developed to evaluate the extent and magnitude of soil, groundwater, and soil gas contamination identified during an initial Site Investigation completed by Giles in 2021.

This SIWP was prepared in general accordance with Wisconsin Administrative Code (WAC), Natural Resources Chapter (NR) 716.09. Upon completion of the scope of services presented in the SIWP, the Site Investigation results and Giles conclusions and recommendations will be presented in a Site Investigation Report.

1.2 Location and Setting

The 0.2-acre Site is located in the NW ¼, of the SE ¼, of Section 9, Township 3 North, Range 23 East of U.S. Public Land Survey. Figure 1 illustrates the general location of the Site.

The Site consists of a single-story multi-tenant building located on the southeast corner of Main Street and 3rd Street in the City of Racine. The property is surrounded by multi-story commercial buildings with possible residential spaces on the upper levels. The Root River is located approximately 420 feet west of the Site before it bends east and drains into Lake Michigan, approximately 1,000 feet north of the Site, and Lake Michigan's Reefpoint Marina is located approximately 640 feet to the east of the Site. It should be noted that the building is located on an incline, with the ground floor of the building being at grade to the west and approximately 4 feet higher in elevation than the ground surface (parking lot) east of the building. The building was not constructed with a basement.

The former dry cleaner lease space was the northernmost unit within the on-Site building and is associated with the address 301 Main Street. The dry cleaner lease space had at one time been combined with the south adjoining space that currently has an address of 303 Main Street. The dry cleaner's former PCE storage area is therefore now located within the south adjoining lease space. Of the five tenant lease spaces within the building, only the southernmost space (307 Main Street) is currently occupied. The occupied space is approximately 55 feet south from the former DCM, and approximately 40 feet from the former PCE storage area.

2.0 PREVIOUS STUDIES

AECOM completed preliminary sampling (initial site scoping) at the Site in 2008, and Giles subsequently completed an initial Site Investigation in 2021. The soil, groundwater, and/or soil gas results from both investigations to date are summarized in Tables 1 through 3, respectively. The sample locations are shown on Figure 2, and Figures 3 through 5 include summaries of the soil, groundwater, and soil gas contamination.

2.1 AECOM Preliminary Sampling

AECOM conducted initial site scoping for the Site in 2008. AECOM's Initial Site Investigation Scoping (SIS) document, dated July 23, 2008, stated that the investigation identified PCE-impacted soil in a boring completed outside the building along the east wall. The sample was from the shallow interval, 1 to 2 feet below ground surface (bgs) and contained PCE above the NR 720 Residual Contaminant Level (RCL) for groundwater protection. Additionally, a groundwater grab sample collected from the boring contained PCE and naphthalene, with the concentration of PCE exceeding the NR 140 Preventative Action Limit (PAL). Groundwater is inferred to flow east or northeast based on surface topography and the presence of Lake Michigan and the Root River.

2.2 Giles Initial Site Investigation

Giles continued the investigation with the collection of two sub-slab soil gas samples within the former dry-cleaning facility in July of 2021 to evaluate whether contamination was present beneath the building. One sample was collected near the former DCM in the east portion of the lease space and one was collected in the central portion of the space. Review of the sample results indicated that PCE was present in the soil gas beneath the building slab at concentrations that exceed the Wisconsin Sub-Slab Vapor Risk Screening Levels (VRSLs) for small commercial properties. Based on the findings of the initial sampling, Giles recommended collecting soil and groundwater samples to identify the source of the soil gas and evaluate the extent of contamination.

Giles completed four soil borings within the former dry cleaner lease space. One boring was located near the former DCM (B-1), and the remaining three were located approximately 10 feet away to the northeast, southeast, and southwest (B-1A, B-1B, and B-1C, respectively). In addition, soil borings were completed on the east side of the building where PCE had been detected during the initial site scoping investigation in 2008 (B-2) and to the north, east, and south (B-2A, B-2B, and B-2C, respectively).

Giles collected two soil samples from each of the soil borings. Review of the boring logs for the borings completed inside the building noted 11 to 12 feet of fill material consisting of sand to silty clay with some sand. Borings competed east of the building contained 4.5 to 6 feet of fill material. Native soil consisted of silty clay with trace amounts of gravel. Groundwater was encountered at approximately 7.5 feet below ground surface in the exterior borings, however groundwater was not encountered in the borings completed within the building.

PCE was detected in the soil samples collected from each of the interior borings. Samples collected immediately below the floor slab contained PCE above the NR 720 soil RCLs for ground water protection, and samples collected from the termination depth of the borings (12 to 14 feet bgs) contained PCE above the Direct Contact RCL for non-industrial properties.

The exterior boring B-2 was completed to replicate AECOM's previous boring. The shallow soil sample collected from B-2 contained PCE and TCE above their respective Direct Contact RCLs for non-industrial properties, and the sample from the deeper interval contained PCE above the Ch NR 720 soil RCL for groundwater protection. The shallow soil samples collected from the three borings completed surrounding B-2 contained PCE above the Ch NR 720 RCL for groundwater protection, and PCE was not detected in the samples collected from the deeper intervals.

Temporary groundwater wells were installed within the interior boring near the DCM (BTW-1) and the exterior boring B-2 (BTW-2). Water did not accumulate within the interior well. The groundwater grab sample collected from BTW-2 contained PCE above the NR 140 Enforcement Standard (ES). In addition, the groundwater sample collected from BTW-2 contained Per- and polyfluoroalkyl substances (PFAS) above the current Wisconsin Department of Health Services recommended Groundwater Standards.

Based on the findings of the initial investigation, Giles determined that additional soil, groundwater, and soil gas sampling would be needed to define the degree and extent of contamination. A detailed description of Giles investigation strategy, scope of services, and schedule to complete the SI activities are presented in the subsequent sections.

3.0 TECHNCAL APPROACH

Based on the results of the initial investigations, Giles intends to limit the subsequent site investigation to chlorinated volatile organic compounds (CVOCs) analysis, which includes PCE and its breakdown products. Low-level petroleum VOCs (PVOCs) had been detected in soil and groundwater samples collected from the parking lot east of the building, however only one soil sample contained a petroleum compound above RCLs. Benzene was detected above the groundwater pathway RCL in a shallow soil sample from B-2A, however the result was flagged by the laboratory as an estimate value. Given the low-level concentrations, the presence of PVOCs in the subsurface is likely the result of a *de minimis* surface condition resulting from the use of the area east of the building as a parking lot. It is Giles' opinion that the detected concentrations of PVOCs in soil and groundwater do not pose a risk to human health or the environment, and do not pose a vapor intrusion risk to the surrounding buildings.

The differentiation in CVOC-contaminated soil intervals between the samples collected inside the building and samples collected east of the building suggests that the CVOC contamination at the

property may be the result of two separate surface spills. The spills likely resulted from product transference and/or housekeeping practices.

The samples collected from the interior borings indicated that a surface spill likely traveled downward through the coarser-grained fill material beneath the building and then collected at the fill/native interface due to the low conductivity of the underlying native clay. This is supported by PCE being detected in shallow samples beneath the slab and then detected at higher concentrations near the fill/native interface, approximately 12 and 14 feet beneath the floor slab.

Concentrations of PCE in the soil samples collected east of the building were greatest in the interval immediately below the pavement. Given the elevation difference between the interior floor slab and the exterior parking lot, the contaminated interval of 12 to 14 feet beneath the building slab corresponds to a depth of approximately 7 to 9 feet beneath the parking lot surface. However, the 7 to 9-foot interval in exterior borings did not contain PCE. Therefore, the contamination behind the building appeared to have been the result of a surface spill and not migration of the contamination from beneath the building.

Based on the unique characteristics and challenges of investigating the contamination beneath the building and to the east of the building, the investigations of these two areas require different approaches. The proposed sample locations for the interior and exterior investigations are shown on Figure 6.

3.1 Interior Investigation

To evaluate the contamination identified beneath the building slab, soil and soil gas samples will be collected inside the building. Groundwater sampling within the building itself however is not feasible due to the limitations of the sampling equipment. Water did not accumulate within the temporary well installed within the building during the three and a half weeks the well was left in place. Giles utilized a cart-mounted direct-push probe to complete the initial interior sampling. The cart probe met refusal between 12 and 14 feet beneath the building slab due to the (down-pressure) limitations of the equipment in the tight native clay. It is not possible to use larger drilling equipment inside the building due to the size of the doorways and the ceiling-height restrictions. Therefore, while additional soil samples can be collected to define the lateral extent of the contamination identified beneath the building, however, samples cannot be collected deeper than 14 feet to vertically define the extent or intersect the water table.

To provide insight into the vertical extent of contamination, Giles will complete exterior soil borings along the north side of the building. The building abuts a sidewalk known to have a number of utilities; therefore the 3rd Street Right-of-Way (ROW) is the closest accessible location for the completion of additional borings. One of these borings will be completed as a NR-141 variance well to be sampled quarterly for chlorinated volatile organic compounds (CVOCs). The NR 141-variance well will be constructed with a 1-inch diameter pre-pack screen instead of a 2-inch diameter well. The variance well will be utilized because it can be installed using direct-push equipment, which has greater maneuverability in the limited space available for drilling, and will reduce soil spoil and wastewater generated from development/purging. Giles will also install an upgradient NR 141-variance well west of the building to evaluate groundwater flowing onto the property.

Soil boring locations from the building interior will be distributed to the west and south to determine the lateral extent of CVOC-impacted soil. Soil samples will also be collected near the former PCE storage area that is currently within the south adjoining lease space. This will serve to define the southern extent of impacted soil or potentially identify a secondary source.

The vapor intrusion evaluation will be completed in a phased approach, with the sample count and locations based on the results of each previous sampling event. The first phase will include the collection of sub-slab samples from within the former dry cleaner space and the south adjoining lease space (303 Main St.). The sample distribution will be designed to establish the west and south extent of CVOC soil gas contamination and evaluate the soil gas condition beneath the former PCE storage area. Based on the results of the sample collected within the south adjoining lease space, additional sub-slab samples may be collected in the lease spaces further south. If it is established that a soil gas condition is present beneath the central portion of the building, Giles will collect an indoor air sample from the occupied lease space closest to the former dry cleaners.

A soil gas evaluation of the on-site sanitary sewer utility will also be conducted. Giles will collect a soil gas sample from the sewer cleanout within the former dry cleaners to evaluate potential soil gas contamination from solvent entering the floor drains. Should CVOC soil gas contamination be detected in the sample, an additional investigation of the utility corridor will be designed.

3.2 Exterior Investigation

Additional soil borings will be completed to define the extent of the PCE contamination identified in boring B-2. Soil borings will be completed 5 to 10 feet from borings B-2A through B-2C to determine the lateral extent of contamination. This tight configuration was based on the significant decrease in PCE concentrations between B-2 and the surrounding borings, and the location of the property lines. The vertical extent of impacted soil was defined during the initial investigation, therefore only shallow soil samples will be collected from the borings to define the lateral extent of the PCE contamination.

Each of the exterior soil borings will be completed as NR 141-variance groundwater monitoring wells. Giles intends to collect groundwater samples from the groundwater monitoring well network for CVOCs analysis on a quarterly basis. Giles will approach sampling for PFAS from these wells in a phased approach. Giles intends to collect one PFAS sample from replicated well BTW-2 to verify the presence of PFAS above the PAL. Should the result from this sampling event contain PFAS above the PAL, Giles will collect additional samples to evaluate the extent of PFAS-impacted groundwater. Based on the results of the groundwater monitoring, Giles will determine whether additional wells are necessary to define the extent of impacted groundwater.

4.0 SCOPE OF SERVICES

The following Section outlines the proposed SI scope of services and briefly describes the methods and procedures for each task performed. Detailed descriptions of the methods and procedures to be implemented during this SI are included in Appendix A.

- Complete additional soil sampling (10 soil samples):

- To define the extent of the CVOCs-impacted soil associated with the former dry cleaner space, Giles recommends that five borings (two interior, three exterior) be completed to 15 feet bgs in the following configuration:
  - Complete one soil boring 10 to 15 feet west of B-1C, towards the front of the former dry cleaning space.
  - Complete one soil boring 10 to 15 feet to the south of B-1B in the adjoining south leased space to define extent of contamination or identify a secondary source (PCE storage area).
    - Collect two soil samples from each interior boring (4 samples total). One shallow sample and one from the interval where contamination was previously identified (12-14 feet bgs).
  - Complete three borings in the parking lane within the 3rd Street ROW to define the extent of soil contamination associated with B-1 and B-1A to the north. Permits will be required from the City of Racine to complete the borings within the 3rd Street ROW.
    - Collect one soil sample from each ROW boring from the interval equivalent to where contamination was previously identified at B-1 and B-1A (approximately 9-11 feet bgs, 3 samples total).
- To define the soil impacts identified east of the building, Giles recommends that four soil borings be completed to 15 feet bgs.
  - One boring will replicate boring BTW-2, no soil samples will be collected from this boring as samples would be redundant.
  - Three borings will be completed around the replicated BTW-2, approximately 5-10 feet from previous soil borings B-2A, B-2B, and B-2C.
    - Collect one soil sample from the shallow interval at each boring (3 samples total).
- Use a Photoionization Detector (PID) to field screen the collected soil samples for organic vapors.
- Submit the collected soil samples (10 total) from the interior and exterior borings to a Wisconsin-certified laboratory for analysis of CVOCs.

- Additional groundwater sampling (6 samples per sampling event):
  - In an effort to define the extent of the CVOC and PFAS-impacted groundwater associated with the former dry cleaner space, Giles recommends that six Ch NR 141-variance pre-pack monitoring wells be installed as follows:
    - Four wells in the exterior soil borings in the parking lot behind the building
    - One well within the 3rd St ROW
    - One well on the west side of the building (upgradient from impacted area)

- Collect groundwater samples from each of the six wells on a quarterly basis for up to four quarters. Submit the collected groundwater samples to a Wisconsin-certified laboratory for analysis of:
  - First sampling event:
    - CVOCs
    - PFAS & field blank sample limited to the BTW-2 replicated well to verify the results from the initial sampling
  - Second sampling event:
    - CVOCs
    - PFAS/field blank from BTW-2 replicated well and/or additional wells if detected above PAL in previous sampling event

- Additional soil gas sampling (up to 7 samples):
  - To evaluate the extent of CVOC-impacted soil gas beneath the building, up to six permanent sub-slab Vapor Pins will be installed and sampled:
    - Soil gas samples collected from the vapor points will be submitted to a Wisconsin-certified laboratory for analysis of CVOCs
    - Initially, vapor points will be installed in the following configuration (4 samples):
      - Two Vapor Pins will replicate VP-1 and VP-2 inside the former dry cleaner space.
      - One Vapor Pin will be located at the far west end of the dry cleaner unit to determine western extent.
      - One Vapor Pin will be located within the adjoining south lease space (303 Main St.) unit to determine southern extent.
    - Should the results of the vapor sample from the south adjoining space contain CVOCs above the sub-slab VRSLs for small commercial buildings, two additional Vapor Pins will be installed and sampled, and an indoor air sample will be collected as follows:
      - Install two Vapor Pins within the space beyond the south adjoining lease space (303.5 Main St.) to determine south extent of soil gas impacts.
      - Collect one indoor air sample from the occupied lease space closest to the former dry cleaners.
    - Evaluate utility corridors (1 sample):
      - Collect a vapor sample from the sanitary sewer clean out within the dry cleaner space.

- Abandon soil borings not completed as groundwater monitoring wells in accordance with state requirements and surface with concrete or asphalt as appropriate.
- Prepare a Soil Gas Summary Report for distribution to building occupants.
- Site Investigation Report Preparation. Following completion of the SI field activities, Giles will prepare Site Investigation report to summarize the findings. This report will be submitted to the WDNR for review and concurrence with findings and conclusions of the SI. The SI will also include a Conceptual Remediation/Mitigation Action Plan.

4.1 Site Surveying

Sampling locations will be measured in and documented on a Site Plan. Site physical features, monitoring well and direct-push boring locations, and other pertinent above/under-ground features will be included. Site elevation data will be established to a temporary benchmark for future reference and elevations to the well top of casing and ground surface will be established for each temporary well.

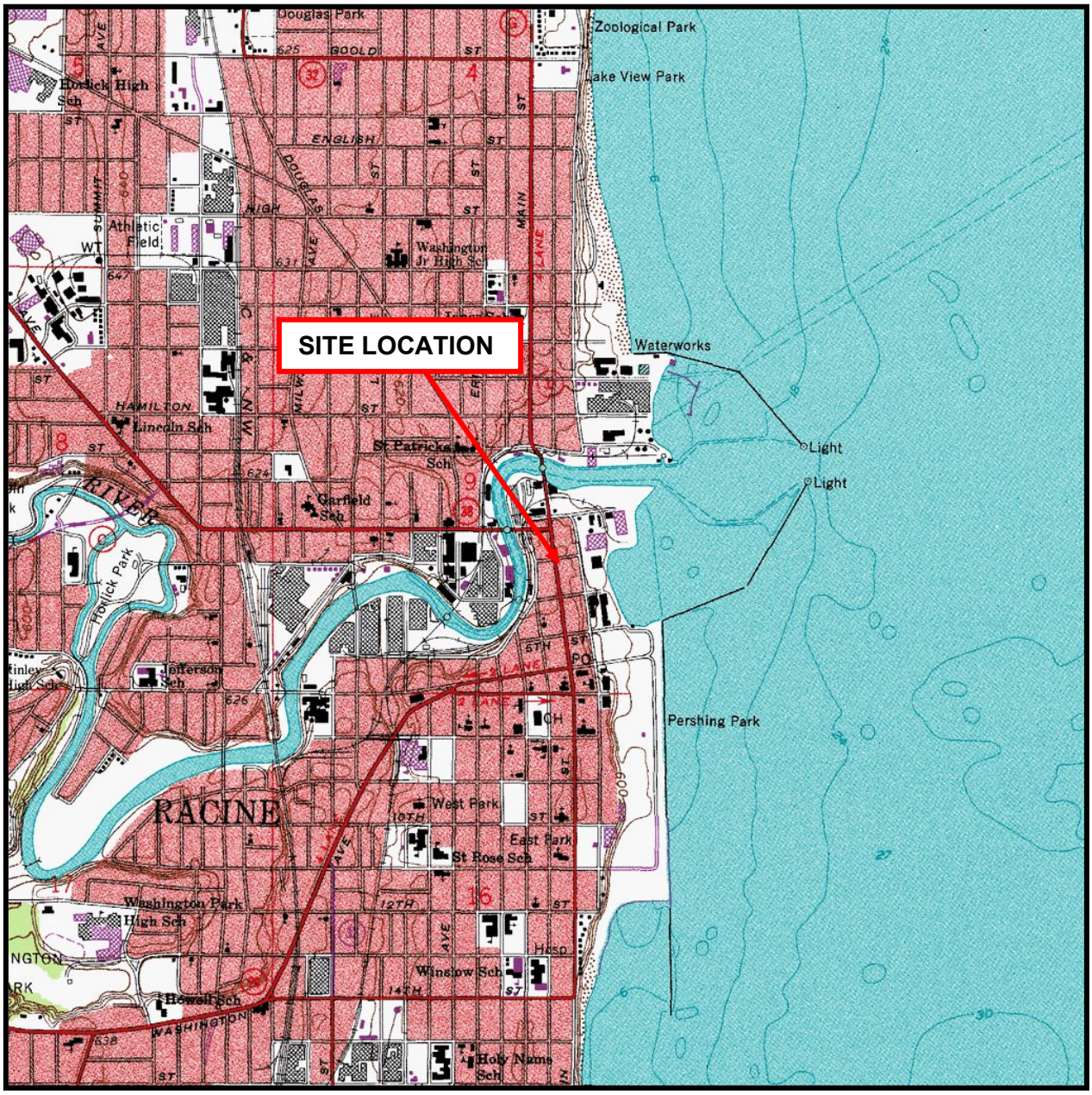
4.2 Investigative Waste

Development and purge water generated during the SI will be containerized and stored within the secured former dry cleaner space until disposal arrangement can be made. Disposal of the purge/wastewater will include creating a profile and arranging for transport of the material to a licensed waste disposal facility.

5.0 SCHEDULE

Giles anticipates two weeks to initiate the first soil gas sampling event. Initiating the utility location, drilling, and soil and groundwater sampling work is dependent upon ability to obtain a permit from the City of Racine for the ROW borings. Once permits have been procured, Giles anticipates completing the soil borings and installing the groundwater monitoring wells within three weeks. Giles anticipates a ten to fifteen working day turnaround time for laboratory results. The SI activities, as listed, are expected to take up to 13 months to complete due to the quarterly groundwater monitoring. We will provide copies of the final SIR within eight weeks after receipt of the laboratory results from the final sampling event.

FIGURES



Source: USGS *Racine South, Wisconsin* 7.5-Minute Series (topographic) Quadrangle Map (1958, revised 1976)

Scale: 1:24,000
Contour Interval: 10 Feet

FIGURE 1

SITE LOCATION

One Hour Martinizing (Former)
301 Main Street
Racine, Wisconsin
Project No. 1E-2109011

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NOTES:

1.) PROPERTY LINES ARE APPROXIMATE BASED ON A RACINE COUNTY GIS MAP.

2.) INTERIOR LAYOUT IS APPROXIMATE BASED ON FIELD OBSERVATIONS.

N
W E
S

0 10' 20'

APPROXIMATE SCALE

LEGEND:

B-1	SOIL BORING
B-1/BTW-1	SOIL BORING / TEMPORARY WELL
VP-1	SOIL GAS POINT (PROJECT NO. 1E-2108003)
301 MAIN	BORING / TEMP WELL (BY AECOM)
	FORMER DCM
	FORMER PCE STORAGE AREA
	PROPERTY LINE
	CATCH BASIN
	MANHOLE
	LIGHT POLE

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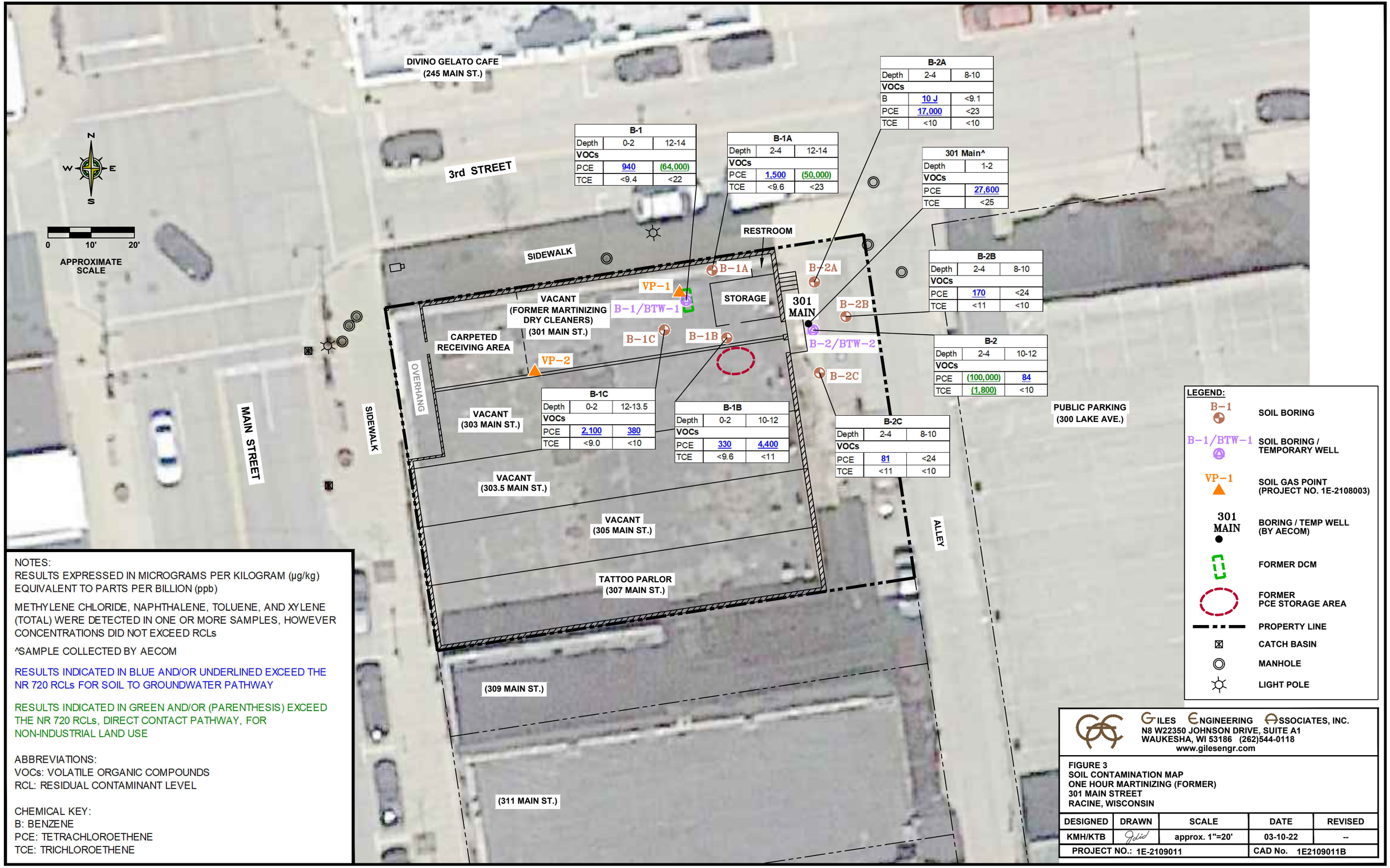
FIGURE 2
SITE MAP
ONE HOUR MARTINIZING (FORMER)
301 MAIN STREET
RACINE, WISCONSIN

DESIGNED	DRAWN	SCALE	DATE	REVISED
KMH/KTB		approx. 1"=20'	03-09-22	--

PROJECT NO.: 1E-2109011 CAD No. 1E2109011A



B-1		
Depth	0-2	12-14
VOCs		
PCE	940	(64,000)
TCE	<9.4	<22

B-1A		
Depth	2-4	12-14
VOCs		
PCE	1,500	(50,000)
TCE	<9.6	<23

B-2A		
Depth	2-4	8-10
VOCs		
B	10 J	<9.1
PCE	17,000	<23
TCE	<10	<10

301 Main^	
Depth	1-2
VOCs	
PCE	27,600
TCE	<25

B-2B		
Depth	2-4	8-10
VOCs		
PCE	170	<24
TCE	<11	<10

B-2		
Depth	2-4	10-12
VOCs		
PCE	(100,000)	84
TCE	(1,800)	<10

B-1C		
Depth	0-2	12-13.5
VOCs		
PCE	2,100	380
TCE	<9.0	<10

B-1B		
Depth	0-2	10-12
VOCs		
PCE	330	4,400
TCE	<9.6	<11

B-2C		
Depth	2-4	8-10
VOCs		
PCE	81	<24
TCE	<11	<10

LEGEND:

- B-1 — SOIL BORING
- B-1/BTW-1 — SOIL BORING / TEMPORARY WELL
- VP-1 — SOIL GAS POINT (PROJECT NO. 1E-2108003)
- 301 MAIN — BORING / TEMP WELL (BY AECOM)
- FORMER DCM
- FORMER PCE STORAGE AREA
- PROPERTY LINE
- CATCH BASIN
- MANHOLE
- LIGHT POLE

NOTES:
RESULTS EXPRESSED IN MICROGRAMS PER KILOGRAM (µg/kg) EQUIVALENT TO PARTS PER BILLION (ppb)

METHYLENE CHLORIDE, NAPHTHALENE, TOLUENE, AND XYLENE (TOTAL) WERE DETECTED IN ONE OR MORE SAMPLES, HOWEVER CONCENTRATIONS DID NOT EXCEED RCLs

^SAMPLE COLLECTED BY AECOM

RESULTS INDICATED IN BLUE AND/OR UNDERLINED EXCEED THE NR 720 RCLs FOR SOIL TO GROUNDWATER PATHWAY

RESULTS INDICATED IN GREEN AND/OR (PARENTHESIS) EXCEED THE NR 720 RCLs, DIRECT CONTACT PATHWAY, FOR NON-INDUSTRIAL LAND USE

ABBREVIATIONS:
VOCs: VOLATILE ORGANIC COMPOUNDS
RCL: RESIDUAL CONTAMINANT LEVEL

CHEMICAL KEY:
B: BENZENE
PCE: TETRACHLOROETHENE
TCE: TRICHLOROETHENE

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FIGURE 3
SOIL CONTAMINATION MAP
ONE HOUR MARTINIZING (FORMER)
301 MAIN STREET
RACINE, WISCONSIN

DESIGNED	DRAWN	SCALE	DATE	REVISED
KMH/KTB		approx. 1"=20'	03-10-22	--
PROJECT NO.: 1E-2109011			CAD No. 1E2109011B	

ABBREVIATIONS:
DTW: DEPTH TO WATER FROM TOP OF CASING
VOCs: VOLATILE ORGANIC COMPOUNDS
PAL: PREVENTATIVE ACTION LIMIT
ES: ENFORCEMENT STANDARD

CHEMICAL KEY:
PCE: TETRACHLOROETHENE
PFHxS: PERFLUOROHEXANESULFONIC ACID
PFOS: PERFLUOROOCTANESULFONIC ACID
PFOA: PERFLUOROOCTANOIC ACID
*PFAS (6): PFAS CONCENTRATIONS COMBINED PER WISCONSIN DEPARTMENT OF HEALTH SERVICES

NOTES:
VOC RESULTS EXPRESSED IN MICROGRAMS PER LITER (µg/L) EQUIVALENT TO PARTS PER BILLION (ppb)

PFAS RESULTS EXPRESSED IN NANOGRAMS PER LITER (ng/L) EQUIVALENT TO PARTS PER TRILLION (ppt)

^SAMPLE COLLECTED BY AECOM

NAPHTHALENE WAS DETECTED IN BTW-2, HOWEVER THE CONCENTRATION DID NOT EXCEED THE PAL

RESULTS INDICATED IN BLUE AND/OR (PARENTHESISED) EXCEED THE NR 140 PAL

RESULTS INDICATED IN RED AND/OR UNDERLINED EXCEED THE NR 140 ES

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FIGURE 4
GROUNDWATER ISOCONCENTRATION MAP
ONE HOUR MARTINIZING (FORMER)
301 MAIN STREET
RACINE, WISCONSIN

DESIGNED	DRAWN	SCALE	DATE	REVISED
KMH/KTB	KTB	approx. 1"=20'	03-10-22	--
PROJECT NO.: 1E-2109011			CAD No. 1E2109011C	

NOTES:
VOC RESULTS EXPRESSED IN MICROGRAMS PER CUBIC METER (ug/m^3)

TRICHLOROETHENE AND CARBON DISULFIDE WERE DETECTED, HOWEVER CONCENTRATIONS WERE ESTIMATE VALUES BELOW RESIDENTIAL VRSLs

RESULTS INDICATED IN BLUE AND/OR (PARENTHESISED) EXCEED THE SUB-SLAB VRSL FOR RESIDENTIAL AND SMALL COMMERCIAL LAND USE

ABBREVIATIONS:
VOCs: VOLATILE ORGANIC COMPOUNDS
VRSLs: VAPOR RISK SCREENING LEVELS

CHEMICAL KEY:
PCE: TETRACHLOROETHENE

GILES ENGINEERING ASSOCIATES, INC.
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FIGURE 5
SUB-SLAB VAPOR INTRUSION MAP
ONE HOUR MARTINIZING (FORMER)
301 MAIN STREET
RACINE, WISCONSIN

DESIGNED	DRAWN	SCALE	DATE	REVISED
KMH/KTB		approx. 1"=20'	03-10-22	--
PROJECT NO.: 1E-2109011			CAD No. 1E2109011D	

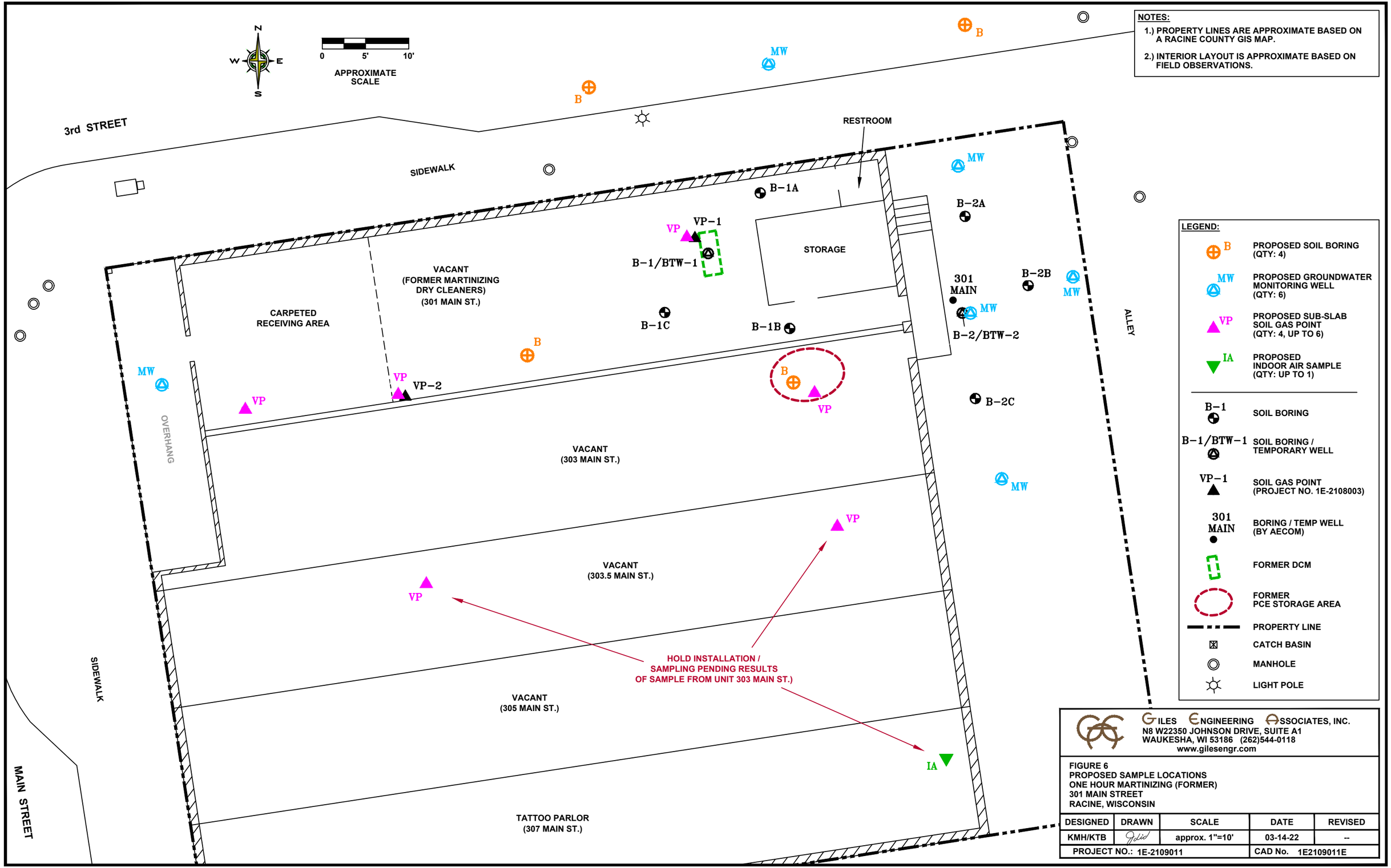

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FIGURE 6
PROPOSED SAMPLE LOCATIONS
ONE HOUR MARTINIZING (FORMER)
301 MAIN STREET
RACINE, WISCONSIN

DESIGNED	DRAWN	SCALE	DATE	REVISED
KMH/KTB	JCH	approx. 1"=10'	03-14-22	--
PROJECT NO.: 1E-2109011			CAD No. 1E2109011E	

TABLES

Table 1
Soil Analytical Results

One Hour Martinizing (Former)
301 Main Street
Racine, Wisconsin
BRRTS Number 02-52-552198
Project Number 1E-2109011

Sample Location	Inside the Building								Outside the Building									NR 720 RCLs[1]		
	B-1		B-1A		B-1B		B-1C		301 Main^	B-2		B-2A		B-2B		B-2C				
Sample Depth (feet bgs)	0-2	12-14	2-4	12-14	0-2	10-12	0-2	12-13.5	1-2	2-4	10-12	2-4	8-10	2-4	8-10	2-4	8-10			
Sample Date	10/12/21	10/12/21	10/12/21	10/12/21	10/12/21	10/12/21	10/12/21	10/12/21	6/18/08	10/12/21	10/12/21	10/12/21	10/12/21	10/12/21	10/12/21	10/12/21	10/12/21			
Saturated/Unsaturated (S or U)	U	U	U	U	U	U	U	U	U	U	S	U	S	U	S	U	S	Soil to Groundwater Pathway	Direct Contact Pathway[2]	
Fill/Native (F or N)	F	N	F	N	F	F	F	N	F	F	N	F	N	F	N	F	N		Non-Industrial Land Use	Industrial Land Use
PID (instrument units)	1.7	84.2	4.6	30.5	2.2	2.2	5.3	2.3	0	35.0	3.0	8.2	3.2	6.3	3.8	6.7	3.4			
Detected VOCs (µg/kg)																				
Benzene	<8.4	<19	<8.6	<21	<8.5	<9.7	<8.0	<9.2	--	<20	<9.3	10 J	<9.1	<9.9	<9.3	<9.4	<9.3	5.1	1,600	7,070
Methylene Chloride**	100 J	<220	120 J	280 J	110 J	110 J	98 J	<100	<25	220 J	110 J	<100	100 J	160 J	140 J	150 J	<100	2.6	61,800	1,150,000
Naphthalene	<19	<44	<20	<47	<19	<22	<18	<21	<25	60 J B	<21	24 J B	<21	59 J	S	<21	<21	658	5,520	24,100
Tetrachloroethene (PCE)	940	(64,000)	1,500	(50,000)	330	4,400	2,100	380	27,600	(100,000)	84	17,000	<23	170	<24	81	<24	4.5	33,000	145,000
Toluene	<8.5	<20	17	<21	<8.6	<9.7	<8.0	<9.2	--	38	<9.4	9.4 J	<9.2	<10	<9.4	<9.4	<9.4	1,107	818,000	818,000
Trichloroethene (TCE)	<9.4	<22	<9.6	<23	<9.6	<11	<9.0	<10	<25	(1,800)	<10	<10	<10	<11	<10	<11	<10	3.6	1,260	8,410
Xylenes, Total	<13	<29	<13	<31	<13	<15	<12	<14	--	36 J	<14	<14	<14	<15	<14	<14	<14	3,960	260,000	260,000

Notes:

[1]Wisconsin Administrative Code Natural Resources Chapter (NR) 720 Residual Contaminant Levels **(RCLs)** obtained from the Wisconsin Department of Natural Resources (WDNR) "RCL spreadsheet", last updated December 2018.

[2]Direct Contact RCLs only apply to soil samples collected within four feet of the ground surface

PID: Photoionization Detector
VOCs: Volatile Organic Compounds
µg/kg: Micrograms per kilogram; equivalent to parts per billion (ppb)
J: Result is an estimate value (detected between the laboratory method detection limit and reporting limit)
B: Analyte detected in the laboratory method blank
**The analytical laboratory report (J206744-1) stated that the detected concentrations of methylene chloride were due to suspected laboratory contamination
<xx.x: Result detected below the method detection limit of x
xx.x: Underlined results exceed the Soil to Groundwater Pathway RCL
(xx.x): Parenthesized results exceed the Non-Industrial Direct Contact RCL

Table 2
Groundwater Analytical Results

One Hour Martinizing (Former)
301 Main Street
Racine, Wisconsin
BRRTS Number 02-52-552198
Project Number 1E-2109011

Sample Location	**BTW-1**	**301 Main^**	**BTW-2**	**NR 140[1] (µg/L)**	
Sample Date	11/5/21	6/18/08	11/5/21	**PAL**	**ES**
Depth to Water (Ft below TOC)	DRY	--	7.5		
Detected VOCs (µg/L)					
Naphthalene	--	5.5	0.44 J	**10**	**100**
Tetrachloroethene (PCE)	--	*(3.0)*	**8.4**	**0.5**	**5**

Notes:

[1]Wisconsin Administrative Code Natural Resources Chapter (NR) 140 Public Health Groundwater Quality Standards, updated January 2020

PAL: Preventive Action Limit

ES: Enforcement Standard

TOC: Top of Casing

VOCs: Volatile Organic Compounds

µg/L: Micrograms per Liter; equivalent to parts per billion (ppb)

J: Result is an estimate value (detected between the laboratory method detection limit and reporting limit)

-- : No sample collected

(xx.x) : Italic/parenthesized results exceed the NR 140 Preventive Action Limit

xx.x: Bold/underlined results exceed the NR 140 Enforcement Standard

^Sample Collected by AECOM

Table 2 (Continued)
Groundwater Analytical Results - PFAS

One Hour Martinizing (Former)
301 Main Street
Racine, Wisconsin
BRRTS Number 02-52-552198
Project Number 1E-2109011

Sample Location	**BTW-1**	**BTW-2**	**Proposed NR 140 Standards[1] (ng/L)**	
Sample Date	11/5/2021	11/5/21	**PAL**	**ES**
Depth to Water (Ft below TOC)	DRY	7.5		
Detected PFAS (ng/L)				
6:2 FTS (Fluorotelomer sulfonic acid)	--	6.9	**NS**	**NS**
PFBS (Perfluorobutanesulfonic acid)	--	1.4 J	**90,000**	**450,000**
PFBA (Perfluorobutanoic acid)	--	6.6	**2,000**	**10,000**
PFHpA (Perfluoroheptanoic acid)	--	5.0	**NS**	**NS**
PFHxS (Perfluorohexanesulfonic acid)	--	*(5.0)*	**4**	**40**
PFHxA (Perfluorohexanoic acid)	--	9.5	**30,000**	**150,000**
PFNA (Perfluorononanoic acid)	--	0.47 J	**3**	**30**
PFOS** (Perfluorooctanesulfonic acid)	--	*(4.1)*	**2**	**20**
PFOA** (Perfluorooctanoic acid)	--	*(17)*	**2**	**20**
PFPeS (Perfluoropentanesulfonic acid)	--	0.40 J	**NS**	**NS**
PFPeA (Perfluoropentanoic acid)	--	8.3	**NS**	**NS**
PFAS (6)**	--	**21.1**	**2**	**20**

Notes:

[1]Wisconsin Department of Health Services (DHS) recommended Groundwater Standards (Cycle 10 [June 2019] and Cycle 11 [November 2020]).

PAL: Preventive Action Limit

ES: Enforcement Standard

TOC: Top of Casing

PFAS: Per- and Poly-fluoroalkyl Substances

ng/L: Nanograms per Liter; equivalent to parts per trillion (ppt)

**DHS recommends a combined standard for NEtFOSE, NEtFOSAA, NEtFOSA, FOSA, PFOS, and PFOA

J: Result is an estimate value (detected between the laboratory method detection limit and reporting limit)

-- : No sample collected

NS: No Standard Established

<xx.x: Result concentration was detected below the method detection limit of x

(xx.x) : Italic/parenthesized results exceed the proposed NR 140 Preventive Action Limit

xx.x: Bold/underlined results exceed the proposed NR 140 Enforcement Standard

Table 3
Soil Gas Analytical Results

One Hour Martinizing (Former)
301 Main Street
Racine, Wisconsin
BRRTS Number 02-52-552198
Project Number 1E-2108003

Sample Location	**VP-1**	**VP-2**	**Sub-Slab VRSL^ (µg/m^3)**		
			Land Use		
Sample Depth	Sub-slab	Sub-slab	**Residential**	**Small Commercial**	**Large Commercial / Industrial**
Sample Date	8/5/2021	8/5/2021			
Detected VOCs (µg/m^3)					
Carbon disulfide	27 JB	19 JB	**24,000**	**100,000**	**310,000**
Tetrachloroethene (PCE)	**(14,000)**	**(8,200)**	**1,400**	**5,800**	**18,000**
Trichloroethene (TCE)	67 J	21 J	**70**	**290**	**880**

Notes:
VRSL: Vapor Risk Screening Level
VOCs: Volatile Organic Compounds
µg/m^3: Micrograms per cubic meter
NS: No Established Standard
J: Result is an estimate value (detected between the laboratory method detection limit and reporting limit)
B: Compound was detected in the method blank and in the sample
(xx.x): Parenthesized results exceed the sub-slab VRSL for both Residential and Small Commercial land use
^VRSLs were obtained/calculated from the Wisconsin Vapor Quick Look-Up Table based on the May 2021 US EPA Regional Screening Levels. VRSLs are based on a Target Risk for Carcinogens of 1 x 10^{-5} and a Target Hazard Quotient for Non-Carcinogens of 1.

APPENDIX A

Giles Field Standard Operating Procedures

Field
Standard Operating Procedures

Field Note Documentation

Completion of Soil Borings

Field Screening and Visual Soil Classification

Soil Sample Collection and Analyses

Monitoring Well Installation and Development

Groundwater Level Measurements

Groundwater Quality Measurements

Groundwater Sample Collection and Analyses

Decontamination

Sub-Slab Soil Gas Collection

Indoor Air Collection

Chain-of-Custody

GILES
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Standard Operating Procedures
For
Field Note Documentation

Giles site visits under this QAPP require the completion of the documentation of the site visit in a dedicated project field book. The dedicated field book will be kept in the project file at the respective Giles office. The field book/notes will supplement field forms. **Note: Field notes are not intended to substitute for the completion of all Giles field forms**. Field notes are used to document the following;

- Chronological account of the field day,
- Objectives for the day,
- Phone discussions,
- Changes in scope or methodologies,
- Site conditions,
- Weather conditions,
- Subcontractor and subcontractor personnel,
- Times onsite and times offsite for applicable personnel,
- Site visits and discussions with client personnel or regulatory personnel,
- Photographs taken,
- Equipment calibration results (if in-field re-calibration is necessary),
- Health and safety meeting proceedings or incidents, if any,
- Other pertinent information such as tons removed, trucks leaving site, gallons pumped, feet drilled, bailers used, samples collected, drums left onsite, etc.
- Cross-reference the field forms completed for that event. Examples of field forms to be completed will include the following;
    - *Record of Subsurface Exploration,*
    - *Photoionization Detector Calibration Documentation,*
    - *Summary sheet for groundwater sampling,*
    - *Natural attenuation parameters*.

    Other forms such as *Giles Equipment Billing (Unit Rates), Expense* forms, in-house drilling forms, and WDNR forms, (i.e.; Monitoring Well Construction, Development, Well/Drillhole/Borehole Abandonment, and Groundwater Monitoring Well Information) will be finalized at the office, immediately following field activities.

On a per day and per site basis, field notes will always be started on the left hand page of the field note book. The title block of each daily site entry will start with the following;

Date;
Project Name:
Project Number:
Objective for the day:
Giles personnel:
Subcontractor name, personnel, and arrival time:
Current weather conditions (and if they drastically change during the day):
Arrival time onsite:

Following the title block data, the field note entries then document the site activities on a chronological basis, beginning each entry with the time of the day. Field notes will adhere to the following guidelines.

- Notes will be legibly printed or typed into a lap top computer.
- If pages are skipped to start on the left-hand page, a strike through of the skipped page will be made with one line diagonally across the page, and the strike through will be initialized and dated by the person making the strike through.
- All pages will be numbered in the upper right-hand corner of each page and will be labeled 1/6 or 1 of 6, indicating page 1 of 6 pages per one day.
- No lines will be skipped.
- The documentation will be in pen, and must be made immediately after activity, measurement, or event.
- An error in documentation will be struck through with a single line and initialized.
- The pages will be initialized and dated at the bottom of each page by the person taking notes.
- The field notes will be finalized before leaving the site on a daily basis.
- Figures are drawn on the right-hand page and adhere to the following guidelines.
    1. The plan view North arrow and scale (if applicable) must be put in upper right-hand corner of page.
    2. Dimensions should be shown on the figure.
    3. Monitoring well/soil boring locations must be put on figure with a minimum of 2 dimensions (X,Y coordinates) to permanent points (i.e.; building corners),
    4. The figures must show at minimum; approximate property lines, buildings (dimensioned), monitoring well/soil boring locations, pavement/grass areas, tree lines, known utility/UST locations, overhead obstructions (i.e.; power lines), manhole locations, and surface water impoundment areas.
    5. Offsite adjacent properties integral to the site activities, such as adjacent surface waters, may be required on site figure.

Standard Operating Procedure
for
Completion of Direct-Push Soil Borings

Soil borings will be advanced with a direct-push unit to retrieve a soil sample from a desired depth interval and/or install a temporary well for groundwater sample collection. The direct-push unit uses a 1 or 2-inch diameter Macrocore sampler to reach the top of the desired sampling depth. Once the sampler is positioned at the desired depth, a soil sample obtained with the Macrocore sampler lined with an acetate liner. To push the soil sample into the liner, the rod is advanced 2 or 4 feet with a hydraulically driven percussion hammer.

When the liner containing soil is brought to the surface and removed from the Macrocore sampler, the liner is cut open to allow access to the soil. Soil retrieved from the liner is used for PID/FID screening and visual classification (*Standard Operating Procedure for Field Screening and Visual Soil Classification)* and collection of soil sample for laboratory analyses (*Standard Operating Procedure for Soil Sample Collection and Analyses)*.

Prior to reinserting the Macrocore sampler for retrieval of another soil sample, the Macrocore sampler will be decontaminated to prevent cross-contamination between the sampling intervals. A new plastic liner will be inserted into the Macrocore sampler to be advanced to the top of the next sample interval. The sampling procedure will be repeated at 2- or 4-foot continuous depth intervals until the end of each direct-push boring.

The information collected during direct-push advancement will be presented on the final borehole logs. The logs will include information on sampling intervals and other pertinent information related to the direct-push activities. Soil investigative waste management and disposal will follow the Standard Operating Procedure for Investigative Derived Waste.

Standard Operating Procedure
for
Field Screening and Visual Soil Classification

A portion of each soil sample will be screened for organic vapors, using a photoionization detector (PID) or a flame ionization detector (FID). The volatile vapor scan technique with either a PID or FID is a field screening method used to assess the presence of total volatile compounds. The PID will typically be equipped with a 10.6 electron-volt (eV) lamp. However, this may vary depending upon contaminant type anticipated. The PID will be zeroed, using ambient air, and then calibrated with 100 parts per million (ppm) isobutylene gas (benzene equivalent) in accordance with the manufacturers specifications prior to use. The PID calibration data will be recorded on the *Photoionization Detector Calibration Documentation* form.

At the discretion of the Giles project manager, an FID may be used instead of the PID. An FID must be rented, and subsequently calibrated to the manufacturer's specifications prior to use in the field for the first time and daily thereafter.

Note: This SOP for Soil Sample Field Screening and Soil Sample Collection must be applied to all sites regulated by the Wisconsin Department of Natural Resources (WDNR). This protocol may not be approved or recognized as an acceptable SOP for soil sample screening/sampling in other states and therefore, should be re-evaluated for other states, or when the EPA has regulatory jurisdiction.

This protocol has been adopted with consideration given for field-time constraints, reducing the amount of hazardous waste (methanol) generated, and unnecessary use/waste of glass-ware. However, this protocol can only be implemented properly if the field technician allows adequate time to perform the following tasks correctly. The Giles technician, being the environmental technician onsite, is the manager of the field activity, and the drilling crew must adhere to the speed the field representative dictates. Environmental field screening and soil sample collection will always dictate the work (drilling) rate. If work rate problems arise, contact the Giles project manager immediately.

- Prior to drilling each borehole, prepare heavy-duty re-sealable containers (i.e. zip-lock bags) freezer bags for each soil sample interval anticipated to be collected per boring. The re-sealable container will be used for field screening. With a ball point pen (avoid indelible large markers), write the sample interval depth on the bags (ie; 0-2, 2-4, etc.). Laboratory supplied glassware will be provided for samples to be submitted for analysis.

- Once the drilling crew provides the split-spoon or sleeve sample (interval of soil), a representative portion of the entire spoon length will be collected and split into replicate portions and placed in the laboratory supplied glassware and re-sealable container. The laboratory samples will be immediately placed in a sample cooler on ice, and cooled to 4 degrees Celsius; the re-sealable container will be placed in a location to promote volatilization. Volatilization will occur by warming the sample, preferably to room temperature if possible.

- The split portion of the interval will be classified by Giles field personnel in general accordance with the Unified Soil Classification System (USCS) guidelines.

- Once the boring has been completed and the split soil samples have been containerized for field screening and potential laboratory analysis, field screening will be performed. Field screening will be performed by inserting the probe end of the PID into re-sealable container. The PID should register a stable value within 5 seconds. Avoid subjecting the PID unit to excessive moisture by using a moisture trap on the probe end at all times. After removing the PID probe from the sample, allow the PID several seconds to return to background prior to subjecting the instrument to the next field screening sample. Measure and record the readings of the field screening soil samples one after another.

- Based on the field screening results and the field protocol determined by the Project Manager, select the split portion of the sample intervals for laboratory analysis preparation from the cooler. Follow the SOP for Soil Sample Collection and Analyses.

- The samples not selected for laboratory submittal and the field-screened samples will be managed in the same manner as the soil cuttings.

Soil samples should be containerized within 30 minutes of collection from the split spoon or sleeve sample. Again note the lamp of a PID may become saturated and produce false (high) readings if subjected to high repeated moisture. Moisture traps should always be used and then be replaced after use.

Upon completion of soil classification of each soil sample, the soil sample description will be logged on the soil boring log. The description of each soil sample interval will include information on soil type, gradation, color, moisture content, field PID/FID readings, sample recoveries, N values (if applicable), total boring depth, and whether a well/piezometer was installed. Sample intervals where the soil was collected for laboratory analysis will be clearly marked on the logs. The appearance of the soil samples and any incidental odors will also be noted on the logs.

Standard Operating Procedure
for
Soil Sample Collection and Analyses

The results of soil sample field screening combined with visual and olfactory observations will aid in selecting samples for laboratory analysis. The select soil samples will be submitted to a laboratory for analyses as required by the sampling plan. Depending on suspected contaminants at a specific site, these analyses may include volatile organic compounds (VOCs)

Upon opening of the sampling device (e.g., split-spoon or plastic liner), the soil sample will be split for organic vapor field screening and collection of laboratory analyses, in accordance with the SOP for Field Screening and Visual Classification. The recovered soil will be partitioned in the sampling device and will be placed in two re-sealable containers per interval. One re-sealable container will be immediately placed in a cooler and stored at 4 degrees Celsius. The second re-sealable container per interval will be set aside for field screening. This will provide temporary sample preservation while field screening is performed on the replicate portion of the sample. Sticks, rocks, and large debris will be removed from the sample aliquots sent to the laboratory. A new pair of Nitrile gloves will be worn for the handling of each sampling interval.

The soil sample collection, storage, and transportation will be performed in general accordance with USEPA, and/or Wisconsin Department of Natural Resources (WDNR) specifications and follow standard Chain-of-Custody (COC) requirements (including keeping samples in a refrigerator or on ice in a cooler).

Certain soil analyses require that a specific amount of soil be weighed in the field before placing in the sample container. To weigh appropriate amount of soil, the field scale will be used. Prior to use, the scale will be properly calibrated in accordance with the calibration procedure described in the *Standard Operating Procedure for Use of Field Equipment*. Calibration will be recorded in a field book or on the appropriate form.

Specific requirements for sample container type, preservative, and holding times are discussed in the following section of this SOP and summarized in Table 1, attached. Please note that the type of containers may vary for different laboratories. The following section describes the specific container types.

<u>VOCs</u>
Soil samples collected for the VOC analysis will be preserved with methanol, which must be noted on the Chain-of-Custody. The soil samples must be preserved with methanol using one of the following techniques:

<u>Standard Soil Sample Collection - Immediate Methanol Preservation</u>.
After field screening, collect soil into tarred VOC vials and preserve immediately with methanol. Store samples on ice or at 4 ^{o} C. Vials should be shipped in an upright position. Vials should also be placed in separate “zip lock” bags to limit the potential for cross contamination. Field personnel should be aware that laboratories use a variety of vial tare methods, so it is important to use only vials supplied by the specific laboratory.

The sample containers designated for laboratory analyses will be labeled and identified by sample number, date and time of collection, sample depth interval, analyses to be performed, and the project number. The same information will be recorded on the COC.

Table 1. Sample Container, Preservation, and Holding Time Requirements for Select Soil Analyses.

Analysis	**Container**	**Preservation**	**Holding Time**
VOCs	1-2oz glass jar	Methanol & Cool to 4^{o} C	14 days

Table 2. QA/QC Sample Requirements

QA/QC Sample Type	**Frequency of Sample Analysis**	**Details**
Methanol Trip Blank	1 blank per sampling event	To prepare the methanol trip blank sample, field personnel will transfer methanol from a premeasured vial to an empty, but tarred, vial. (This QA/QC sample is not required for samples preserved with methanol in the laboratory.)

Standard Operating Procedure
for
Monitoring Well Installation and Development

Monitoring wells will be installed in a manner that permits the screened interval to intercept the water table through seasonal water table level fluctuations. Monitoring wells will be constructed of 0.01-inch slotted, 1-inch diameter (1-inch for the outer diameter), flush-threaded, Schedule 40 polyvinyl chloride (PVC) pre-packed screen. The screen will be 10 feet in length for monitoring wells. The riser pipe will consist of Schedule 40, flush threaded PVC. A 4-inch long flush threaded, Schedule 40 PVC cap will be placed on the bottom of the monitoring well screens.

The annular space surrounding each well screen will be backfilled with clean, well-sorted silica sand as a filter between the formation material and the well screen. Monitoring wells will be constructed inside of the direct-push boring. Care will be taken to properly place an additional continuous filter pack between the well screen and the borehole wall. The filter packs will extend approximately 1 to 2 feet above the top of the well screens. The top of the filter pack will be measured with a weighted measuring tape for depth confirmation.

A bentonite seal, 2 to 3 feet thick, will be placed in the annular space above the filter pack. The seal will be composed of commercially-manufactured bentonite chips. The bentonite will be slowly poured through the hollow-stem augers to minimize the potential for bridging. The finished bentonite surface will be measured with a weighted measuring tape for depth confirmation. The well screen will be positioned so as to intercept the chemicals of concern or assess the hydrogeologic properties of the saturated zone.

Granular bentonite will be placed above the bentonite seal to the ground surface. The bentonite will be slowly poured to minimize the potential for bridging. The bentonite will be backfilled until it is observed near the ground surface.

During well construction, a cap will be installed at the top of the riser to prevent material from entering the well. A flush-mount (road box) type, protective casings will be used in high traffic areas. A compression cap will be installed on monitoring wells, completed with a road box; the protective casing cover will be bolted in place.

Monitoring Well Development

The Monitoring wells will be developed following well installation.

The objectives of the well development are to:

- assure that groundwater enters the well screen freely, thus yielding a representative groundwater sample and water level measurement;
- remove fine-grained sediment in the filter pack and the nearby formation adjacent to the filter pack to minimize groundwater sample turbidity and silting of the well; and,

Well development will consist of purging with a peristaltic pump until the well no longer yields water.

Standard Operating Procedure
for
Groundwater Level Measurements

Static water level measurements will be made using a Solinst Model 102 groundwater level indicator (or equivalent) prior to groundwater monitoring well development, purging, down-hole groundwater quality measurements and groundwater sample collection.

- The groundwater level indicator will be decontaminated before and after each measurement location with a solution of water/Alconox solution and 2 water rinses.
- Monitoring wells will be opened and allowed to equilibrate for a minimum of 10 minutes prior to measurements.
- The depth to groundwater within each well will be recorded at the time the measurement is completed.
- The measurement shall be made referenced to a mark in the PVC top of casing, which is also indicated by a mark made on the northern most edge of the top of the casing.
- Groundwater measurements will be recorded to the nearest 0.01–foot.
- The data will be recorded in the filed notes. The notes will contain the following information: monitoring well number, time and date of the measurement, depth to groundwater from top of casing, location of the site, weather conditions, and any additional observations noted (i.e. well protector top condition).

Standard Operating Procedure
for
Groundwater Sample Collection and Analyses

Groundwater samples will be submitted to a laboratory for analyses as required. The analysis will consist of volatile organic compounds / chlorinated volatile organic compounds analysis (VOCs/CVOCs) and per- and polyfluoroalkyl substances (PFAS).

Groundwater samples will be collected using a peristaltic pump fitted with new ¼-inch outer diameter disposable polyethylene and silicone tubing. The tubing will be extended to the bottom of the well then lifted approximately 6 inches. Water will be pumped at the lowest rate practicable during purging and sampling. The wells will be purged for several minutes, and the volume of water evacuated during purging will be recorded. The wells will be allowed to recharge prior to sampling. Samples will be collected within 24 hours of purging.

PFAS samples will be collected first. Special considerations are required when collecting PFAS samples:

- Do not handle any packaged food or drinks around the sampling site.
- No pre-packaged food, chemical ice packs, fast food wrappers or containers
- ZipLoc® resealable plastic storage bags are allowable.
- All PFAS sample containers must be laboratory-supplied and made of HDPE or polypropylene. Caps must be unlined and made of HDPE or polypropylene (no Teflon® -lined caps)
- Bottles must be pre-labeled before arrival at the sampling site; mark labels with a ball-point pen only, NO markers.
- Field equipment must not contain Teflon® (aka PTFE) or LDPE materials.
- All sampling materials must be made from stainless steel, HDPE, acetate, silicone, or polypropylene.
- No waterproof field books can be used.
- No plastic clipboards, binders, or spiral hard cover notebooks can be used.
- No adhesives (i.e. Post-It® Notes) can be used
- Sharpies and permanent markers not allowed; regular ball point pens are acceptable.
- Aluminum foil must not be used.
- Keep PFAS samples in a sealed ZipLoc bag within the cooler, away from sampling containers that may contain PFAS.
- Coolers filled with regular ice only
- Use laboratory-supplied “PFAS-free” water on-site for decontamination of sample equipment. No other water sources to be used.
- Only Alconox and Liquinox can be used as decontamination materials.
- New nitrile gloves must be used during sample collection. Care must be taken to ensure the gloves have not come into contact with PFAS-containing materials. Therefore, gloves should be taken from a new/unopened box and used immediately or placed in a sealed ZipLoc bag. Hands must be washed thoroughly before any handling of gloves.
- Be aware that PFAS are contained in many personal care products and clothing, so care must be taken to ensure that sampling equipment does not come into contact with potential PFAS-containing materials.

The date and time of sample collection among other pertinent information (i.e., project number, sample identification number, and analysis requested) will be recorded on the sample container and on the sampling log. The groundwater sample collection, storage, and transportation will be performed in general accordance with ASTM and WDNR specifications and will follow standard COC requirements. The specific requirements for sample container type, preservative, and holding times are discussed in the following section of this SOP and summarized in Table 1, attached. Please note that the type of containers may vary for different laboratories. The

following section describes the specific container types that are currently provided by the laboratory.

PFAS

Wash hands thoroughly with PFAS-free soap and clean water prior to putting on new nitrile gloves. Do not touch potentially PFAS-containing surfaces after washing or after putting on gloves. Care must also be taken to ensure the sample tubing has not come into contact with PFAS-containing materials. Each sample requires two laboratory-supplied 250-ml HDPE containers be filled to the neck from the discharge tubing. Close containers securely. Place containers in sealed ZipLoc® bags and into a cooler with ice.

Field blanks will be collected when sampling for PFAS. To collect the field blank, locate the laboratory-supplied Reagent Water. The Reagent Water container will be pre-filled with PFAS-free water and is preserved with Trizma. Locate the empty container labeled “Field Blank”. Open both containers near the sample location and proceed to transfer contents of the “Reagent Water” container into the “Field Blank” container.

VOCs

Groundwater collected for VOCs will be collected in three laboratory-supplied, 40-ml glass vials with septa-style lids preserved with hydrochloric acid. Tip the container at a slight angle and allow a slow, steady stream of water to run down its inner wall. Fill the sample container until the water forms a positive meniscus at the vial rim, then immediately replace the cap. Invert the sample container and tap it lightly to check for bubbles. If bubbles are present, fill a new sample container. Trip blank sample will also be analyzed for VOCs to serve as QA checks (see Table 2, attached).

The groundwater samples collected for laboratory analysis will be placed on ice in a cooler immediately following collection. Samples accompanied by COC will be picked up from the Giles office by the laboratory courier the next day. Overnight storage must be at a minimum temperature of 4^{o}C (i.e., on ice or in a refrigerator).

Groundwater generated as a part of purging will be contained in labeled drums/buckets and temporarily staged pending receipt of groundwater analytical results. If the analytical results indicate the water contains detectable concentrations of contaminants; the containerized groundwater will be disposed of in the sanitary sewer system (if approved) or off site by a licensed waste hauler. If groundwater does not contain any detectable contaminants, it will be dispersed on site (thin spread on pavement). Due to small quantity, the groundwater evacuated from temporary wells set in Geoprobe boreholes will be dispersed on site.

Table 1. Sample Container, Preservation, and Holding Time Requirements for Select Groundwater Sample Analyses.

Analysis	Container	Preservation	Holding Time
PFAS	2-250 ml, HDPE	Cool to 4° C	14 days
VOCs	3-40 ml, glass vials	HCL, cool to 4° C	14 days

Table 2. QA/QC Sample Requirements

QA/QC Sample Type	Frequency of Sample Analysis	Details
Trip Blanks	1 trip blank per cooler containing samples for VOC analysis	Trip blank is a laboratory-prepared blank containing DI water. The trip blank will be submitted for VOC analysis to assess potential contamination during sample container shipment and storage.
Field Blanks	1 field blank per day collected for PFAS analysis	Field blank is a background atmospheric blank sample. The field blank consists of laboratory reagent grade (contaminant-free) water that is exposed to the atmosphere where the water sampling is taken place. The field blank will be submitted for PFAS analysis to assess the potential for background contamination during sampling. Additional analyses may be requested depending on Site conditions.

Standard Operating Procedure
for
Decontamination

The objective of decontamination is to limit false positives and potential cross-contamination by the removal of contaminants from environmental investigation/remedial equipment and personal protective equipment (PPE), or directly from the field technician's body. Decontamination will serve two purposes for the Giles field technician prior to sampling; equipment decontamination, and personnel decontamination. For high profile projects, a regulatory agency may require that an equipment rinsate blank be submitted to verify that decontamination procedures adequately remove contaminants from sampling equipment. Personnel decontamination procedures are used in order to protect Giles field personnel from accidental absorption, ingestion, and inhalation of residual contaminants, to which the field technician may have become exposed and to prevent false positives through cross-contamination.

Giles environmental field activities will be performed wearing Level-D PPD. Level D PPE includes a minimum standard of steel-toed shoes or boots, full length pants, and nitrile/latex gloves. Level D PPE may also include wearing a hard hat, long-sleeve shirt, hearing, and eye protection. Disposable coveralls will be made available to field personnel if warranted. When site activities include the handling or exposure to potentially contaminated soil/groundwater, decontamination proceedings such as hand washing (soap and warm water), should take place prior to taking breaks where food or drink may be consumed. Soil/sludge should be removed from boots prior to leaving site. Disposable PPE should be removed and containerized onsite. Onsite personnel decontamination stations should be made available whenever possible. Equipment decontamination stations should not be used for personal decontamination.

Equipment (ie; water level indicators, down-hole measuring devices) will be decontaminated between sampling points (ie; monitoring wells). Multiple equipment uses while at a same monitoring point do not require decontamination. Decontamination should be conducted with a stationary set of wash buckets positioned outside the work area. Equipment decontamination should include a minimum of three separate 5-gallon bucket wash/rinse cycles. The first bucket should contain a De-ionized (DI) water/Alconox detergent solution (or equivalent), in which scrub brushes will be used to clean residual debris from the instrument. The following two buckets are rinses. If equipment appears unclean, repeat the procedure, and replace decontamination water with clean water. Cleaned equipment shall be placed on clean plastic sheeting for immediate use. If use is prolonged the equipment should be dried, and stored in the equipment case. Water used for decontamination should be replaced with clean water at minimum, on a daily basis. Depending upon the severity of contamination to which the equipment is being exposed, several water changes may be required daily.

To further reduce cross-contamination, and by using prior site data, measurements with field equipment should always progress from the least contaminated monitoring point to the most contaminated. The sampling order should be established prior to the site visit. Cross-contamination can also be prevented using disposable sampling equipment, which does not require decontamination. Disposable sampling equipment is intended for retrieval of one sample and cannot be reused to collect from a second sampling point.

Personnel Decontamination

Field personnel will adhere to the following procedure with respect to personal decontamination:

- Perform decontamination when leaving the contaminated area, during breaks, and at the end of the field day.
- If available, wash boots, gloves, and outer PPE in Alconox solution, then rinse with water. If disposable latex booties or Tyvex coverall suits are worn, rinse with water, remove, and discard.
- Wear the required minimum PPE.
- Wash hands/face before handling food or drink.
- Do not eat or drink while in the work zone or while wearing contaminated PPE.
- Do not use equipment decontamination stations for personal decontamination.
- At the end of the work day, shower entire body.

Equipment Decontamination

The field technician will adhere to the following procedure with respect to soil sampling equipment (split-spoons, spatulas, etc.) decontamination:

- Scrape soil from sample device.
- Decontamination of the sampling equipment occurs between each sampling and at the end of every working day.
- Wash sample barrel in water/Alconox solution or equivalent, then rinse with tap water, and final rinse with DI water.
- Place on plastic sheeting and allow to air dry or wipe with clean paper towel.
- Depending upon the severity of the contamination for which the equipment is exposed, disposal of decontamination solution will be site-specific, and may involve disposal/thinspreading onsite, or containerization for future disposal.

Monitoring Equipment Decontamination

The field technician will adhere to the following procedure with respect to the decontamination of monitoring equipment:

- Always progress the sample point order from least contaminated to most contaminated location.
- Decontamination of the monitoring equipment occurs between each sampling location, and at the end of every working day.
- In between each measurement location, wash equipment in water/Alconox solution or equivalent, then rinse with tap water, and final rinse with DI water.
- Place on plastic sheeting and allow to air dry or wipe with clean paper towel.
- Depending upon the severity of the contamination for which the monitoring equipment is exposed, disposal of spent decontamination solutions will be site-specific, and may involve disposal onsite, or containerization for future disposal.

Drill/Geoprobe Rig and Drill/Geoprobe Equipment Decontamination

The drill rig and drilling equipment will be decontaminated between boring locations by washing surfaces that have been in contact with soil and groundwater using a mixture of Alconox soap and water.

Standard Operating Procedure
for
Chain-of-Custody

Custody procedures will be used to record and document the custodial possession of samples during the project. The sample media requiring custody procedures includes soil, groundwater, air, and vapor samples that are submitted to a laboratory for chemical analyses. The samples are considered in custody, if they are:

- In person's possession;
- In view of the person after being in their possession;
- Sealed in a manner that they cannot be tampered with after having been in physical possession;
- In a secure area restricted to authorized personnel.

A Giles Chain-of-Custody (COC) form (or a laboratory-provided form) will be used to ensure that the proper custody procedures have been followed for the samples collected and submitted to the laboratory.

Upon collection, samples will be cataloged on the Giles COC form using the sample identification designation and/or number. In addition, the date and time of collection, the number of containers for each type of sample, the type of sample preservation, and the type of analyses requested will be recorded on the COC form. A separate COC will accompany each cooler or shipping container containing samples at all times.

The COC form will be sealed in a plastic bag and placed inside the sample container for transportation to the laboratory. Upon relinquishing the sample container to the laboratory (or the laboratory courier), Giles field personal will transfer custody of the samples to laboratory personnel by signing and dating the bottom of the COC form. Giles field personnel will retain one copy of the COC form. The original COC will be sent to the laboratory with the samples.

The completed original copy of the COC will be included with the final laboratory report.

Standard Operating Procedure
for
Sub-Slab Soil Gas Sample Collection

Complete a utility locate to identify the likely entry points of water, gas, electrical, and sewer lines outside of the building. If necessary, consult with the owner or contract a plumber and electrician to provide a recommendation for safe locations to drill through the slab. Install the sub-slab vapor probes in the concrete slab but not into the subgrade soil. Sub-slab vapor probes installed using the following procedure:

1) Drill a 1.5-inch diameter hole to 1.75-inch depth in the concrete slab or the equivalent thickness of the coupling to ensure the probe is flush with the surface of the concrete.

2) Clean the hole with a vacuum cleaner and damp towel to remove the cutting debris prior to drilling a 5/8-inch hole in the center of the 1-inch hole.

3) Drill the 5/8-inch bit 1-inches below the bottom of the concrete slab to create an open cavity and prevent the probe from plugging.

4) Clean the hole with a bottle brush, vacuum cleaner, and damp towel to ensure a good seal between the slab and the coupling.

5) Drive a preassembled Vapor Pin into the hole using a deadweight hammer.

6) Construct a water dam around the Vapor Pin and monitor the water level for at least 5 minutes to ensure no leaks are present.

Following installation of the sub-slab vapor probes, samples will be collected using the following procedure:

1) The laboratory will ship a 6-liter canister with a canister specific flow regulator (200 - milliliters per minute) and associated fittings, Teflon tubing, and particulate filter for each sample. The canister and associated sample equipment are intended for one use and should not be switched or used multiple times with other air sample equipment. The 6-liter canister will be shipped from the laboratory with a recorded vacuum of approximately 25 to 30 pounds per square inch (psi).

2) Attach a gauge to record the initial vacuum in the canister and compare to the laboratory supplied vacuum recorded at the time of canister shipment. Record the initial pressure reading. The initial vacuum should be between 23 to 26 psi and should not deviate more than 10% from the laboratory supplied vacuum. If the initial vacuum is less that 23 psi or has lost more than 10%, the canister should be rejected and returned to the laboratory.

3) Attach the canister specific flow regulator that is supplied by the laboratory and cap the end of the flow regulator with the supplied brass cap. Perform a shut-in test to test the seal between the flow regulator and the canister. To start shut-in test open

the canister valve fully, then turn the valve in the closed direction until there is slight resistance. If the pressure drops, close the valve and retighten the fitting, and complete the shut-in test. If the pressure does not drop, open the valve to start the test. To start sampling open the canister valve fully, then turn the valve in the closed direction until there is slight resistance.

4) Construct a sample train consisting of new, one time use Teflon tubing from the vapor probe to a T-fitting. Note that all tubing and fitting between the vapor probe and canister will be of new materials, one time use.

5) Purge the Teflon tubing using a syringe or PID

6) Open the valve on the canister to collect the air sample. Record the time, date and initial vacuum at the start of the sampling. To start sampling open the canister valve fully, then turn the valve in the closed direction until there is slight resistance. Note that the final canister pressure should be less than atmospheric pressure.

7) After the sample period is complete, record the time, date, and final vacuum, close the canister valve; remove the regulator and pressure gauge. Do not over tighten the canister valve. Replace the end cap on the canister. Note that there should be 5 and 10 psi of vacuum remaining in the canister ensure a constant flow rate was used. As specified by the laboratory, the canister vacuum must be below 10 psi, but above 1 psi at the completion of the test. Contact the project manager if the final canister vacuum is outside of this range to determine if the sample should be rejected.

8) After the air sample has been collected, the canister should be packaged in the same manner as received and sent to the laboratory within one day of collection. The samples with COC will be shipped 2nd day delivery unless otherwise directed by the project manager.

Standard Operating Procedure
for
Indoor Air Sample Collection

Indoor air samples will be collected in a 6-liter summa-type canister fitted with a regulator to sample the indoor air for an 8 hour period of time. An 8 hour sampling duration would be used in commercial and industrial settings, whereas a 24 hour sampling duration would be used in a residential setting. The canister should be placed in the basement or lowest floor of the building at a location away from windows, sources of other air disturbance, and high moisture areas and chemical storage. The sample procedure is detailed as follows:

Pre-sample Evaluation

Complete the indoor air building survey and sampling form. Evaluate the site for potential background contaminant sources. If there are possible background contaminant sources, contact the project manager immediately to determine if steps can be taken to avert contamination from background sources (ie. recent cleaning, painting, smoking, chemical storage, cleaning products, etc.) It may be necessary to remove background sources and complete the air sampling at a later date.

Sample Procedure

1) The laboratory will ship a 6-liter canister with a canister specific flow regulator and associated fittings, Teflon tubing, and particulate filter for each sample. The canister and associated sample equipment are intended for one use and should not be switched or used multiple times with other air sample equipment. The 6-liter canister will be shipped from the laboratory with a recorded vacuum of approximately 25 to 30 pounds per square inch (psi).

2) Attach a gauge to record the initial vacuum in the canister and compare to the laboratory supplied vacuum recorded at the time of canister shipment. Record the initial pressure reading. The initial vacuum should be between 25 to 30 psi and should not deviate more than 10% from the laboratory supplied vacuum. If the initial vacuum is less than 25 psi or has lost more than 10%, the canister should be rejected and returned to the laboratory.

3) Attach the canister specific flow regulator that is supplied by the laboratory and cap the end of the flow regulator with the supplied brass cap. Perform a shut-in test to test the seal between the flow regulator and the canister. To start shut-in test open the canister valve fully, then turn the valve in the closed direction until there is slight resistance. If the pressure drops, close the valve and retighten the fitting, and complete the shut-in test. If the pressure does not drop, open the valve to start the test. To start sampling open the canister valve fully, then turn the valve in the closed direction until there is slight resistance.

4) Connect the Teflon tubing to the flow regulator. Tape the intake end of the tubing to a wall near the suspected source area. Intake height should be between approximately 5 to 6 feet above the floor to be representative of breathing level.

5) The date, start time of sample collection, among other pertinent information (i.e., project number, sample identification number, and analysis requested) will be recorded on the sample container and on the sampling log. The air sample collection, storage, and transportation will be performed in general accordance with ASTM and WDNR specifications and will follow standard COC protocol.

6) After the sample period is complete, record the final vacuum, end time, date, and close the canister valve; remove the regulator and pressure gauge. Do not over tighten the canister valve. Replace the end cap on the canister. Note that there should be between 1 and 5 psi of vacuum remaining in the canister ensure a constant flow rate was used. Contact the project manager if the final canister vacuum is outside of this range to determine if the sample should be rejected.

7) After the air sample has been collected, the canister should be packaged in the same manner as received and sent to the laboratory within one day of collection. The samples with COC will be shipped 2nd day delivery unless otherwise directed by the project manager.