TETRA TECH

June 10, 2011

Mr. Roy Crossland
START Project Officer
U.S. Environmental Protection Agency, Region 7
901 North 5th Street
Kansas City, Kansas 66101

Subject: **Quality Assurance Project Plan**
Highway 3 PCE Site, Le Mars, Plymouth County, Iowa
U.S. EPA Region 7 START 3, Contract No. EP-S7-06-01, Task Order No. 0228
Task Monitor: Todd Davis, Targeted Brownfields Assessment Coordinator

Dear Mr. Crossland:

Tetra Tech EM Inc. is submitting the attached Quality Assurance Project Plan (QAPP) for a Preliminary Assessment at the Highway 3 PCE Site in Le Mars, Iowa. If you have any questions or comments, please contact the project manager at (816) 412-1751.

Sincerely,

for David A. Zimmerman
Tom Scroggin
START Project Manager

Ted Faile, PG, CHMM
START Program Manager

Enclosures

Tetra Tech EM Inc.
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X9004.11.0228.000

QUALITY ASSURANCE PROJECT PLAN
FOR A PRELIMINARY ASSESSMENT AT THE HIGHWAY 3 PCE SITE
LE MARS, IOWA

Superfund Technical Assessment and Response Team (START)
Contract No. EP-S7-06-01, Task Order 0228

Prepared For:

U.S. Environmental Protection Agency
Region 7
Superfund Division
901 N. 5th Street
Kansas City, Kansas 66101

June 10, 2011

Prepared By:

Tetra Tech EM Inc.
415 Oak Street
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Region 7 Superfund Program
Addendum to the Generic QAPP for the Superfund Site Assessment and Targeted Brownfields Assessment Programs (July 2007)
for the Highway 3 PCE Site, Le Mars, Iowa

Project Information:

Project Name: Highway 3 PCE Site		**City:** Le Mars	**State:** Iowa
EPA Project Manager: Todd Davis		**START Project Manager:** Tom Scroggin	
Approved By:		**Prepared For:** EPA Region 7 Superfund Division	
Title: START Project Manager	Date: 6-10-11		
Approved By:			
Title: START Program Manager	Date: 6-10-11		
Approved By:		**Prepared By:** Tom Scroggin **Date:** June 2011	
Title: START QA Manager	Date: 6-10-11		
Approved By:			
Title: EPA Project Manager	Date:		
Approved By:		**Tetra Tech START Project Number:** X9004.11.0228.000	
Title: EPA Region 7 QA Coordinator	Date:		

1.0 Project Management:

1.1 Distribution List

EPA—Region 7: Todd Davis, EPA Project Manager; Diane Harris, EPA Region 7 QA Coordinator

Tetra Tech START: Tom Scroggin, Project Manager; Kathy Homer, QA Manager

1.2 Project/Task Organization

Todd Davis, of the EPA Region 7 Superfund Division, will serve as the EPA project manager for the activities described in this QAPP. Tom Scroggin, of Tetra Tech EM, Inc., (Tetra Tech), will serve as the START project manager for field activities.

1.3 Problem Definition/Background:

Description: This site-specific Quality Assurance Project Plan form is prepared as an addendum to the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated July 2007), and contains site-specific data quality objectives for the sampling activities described herein.

☒ Description attached.
☐ Description in referenced report: _____ (Title) _____ (Date)

1.4 Project/Task Description:

☒ CERCLA PA ☐ CERCLA SI ☐ Brownfields Assessment ☐ Removal Action
☐ Other (description attached): ☐ Pre-CERCLIS Screening ☐ Removal Site Evaluation

Other Description:

Schedule: Field work is scheduled to be conducted in July 2011.

☐ Description in referenced report: _____ (Title) _____ (Date)

1.5 Quality Objectives and Criteria for Measurement Data:

a.	Accuracy:	☒ Identified in attached table.
b.	Precision:	☒ Identified in attached table.
c.	Representativeness:	☒ Identified in attached table.
d.	Completeness*:	☒ Identified in attached table.
e.	Comparability:	☒ Identified in attached table.

Other Description:

*A completeness goal of 100 percent has been established for this project. However, if the completeness goal is not met, EPA may still be able to make decisions based on any or all of the remaining validated data. No "critical samples" have been identified for this project.

1.6 Special Training/Certification Requirements:

☒ OSHA 1910 ☒ Special Equipment/Instrument Operator (describe below): ☐ Other (describe below):

START field personnel will be experienced in passive soil gas, active soil gas, and direct-push technology groundwater sampling.

1.7 Documentation and Records:

☒ Field Sheets ☒ Daily Log ☒ Trip Report ☒ Area Maps ☐ Video
☒ Chain of Custody ☒ Health and Safety Plan ☐ Letter Report ☒ Photos

☒ Sample documentation will follow EPA Region 7 SOP 2420.05.
☒ Other: Analytical information will be handled according to procedures identified in Table 2.

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for the Highway 3 PCE Site, Le Mars, Iowa

2.0 Measurement and Data Acquisition:

2.1 Sampling Process Design:

☐ Random Sampling ☐ Transect Sampling ☒ Biased/Judgmental Sampling ☐ Stratified Random Sampling
☐ Search Sampling ☒ Systematic Grid ☐ Systematic Random Sampling ☒ Definitive Sampling
☐ Screening wo/ Definitive Confirmation ☐ Screening w/ Definitive Confirmation
☐ Sample Map Attached

☒ Other (Provide rationale behind each sample): See Appendix A for additional sampling information.

The proposed sampling scheme will be judgmental with definitive laboratory analysis, in accordance with the *Guidance for Performing Site Inspections Under CERCLA*, OSWER Directive #9345.1-05, September 1992. Judgmental sampling is the subjective (biased) selection of sampling locations based on historical information, visual inspection, and the best professional judgment of the sampler(s). See Appendices A and B for additional site-specific information and site maps.

The proposed number of samples is a balance between cost and coverage, and represents a reasonable attempt to meet the study objectives while staying within the budget constraints of a typical Preliminary Assessment of this type.

Sample Summary Location	Matrix	# of Samples*	Analysis
Suspected source areas	Soil gas	38	PCE
Suspected source areas and affected buildings	Sub-slab Soil gas	Up to 6	VOCs
Downgradient PCE plume	Groundwater	Up to 20	VOCs

*NOTE: Number is approximate and may change depending on site conditions and access. QC samples are not included with these totals. See Table 1 for a complete sample summary.

2.2 Sample Methods Requirements:

Matrix	Sampling Method	EPA Region 7 SOP(s) or other Method
Passive Soil Gas	Soil gas samples will be collected using passive soil gas modules. These modules will be lowered approximately 3 feet (ft.) below ground surface (bgs) into pre-drilled holes as part of a grid system in the soil near suspected source areas. After a period of 10-14 days, the modules will be collected for laboratory analysis.	Guidelines for Installation and Retrieval of Passive Soil Gas Modules (Appendix C)
Active Sub-slab Soil Gas	Sub-slab soil gas samples will be collected via disposable polyethylene tubing lowered through a drill hole in the foundation. Evacuated stainless steel Summa® canisters will be used to collect soil gas samples for analysis for VOCs. Calibrated flow regulators will allow the canisters to fill over a 24-hour period.	Draft EPA SOP for Sub-Slab Sampling
Groundwater	Groundwater samples will be collected downgradient of the potential source areas, from both the alluvial aquifer and Buried Channel aquifer, in order to further delineate the geographical extent of the documented PCE plume.	EPA SOP 4230.07 & 3230.13

☐ Other Description:

2.3 Sample Handling and Custody Requirements:

☒ Samples will be packaged and preserved in accordance with procedures defined in Region 7 EPA SOP 2420.06.
☒ COC will be maintained as directed by Region 7 EPA SOP 2420.04.
☐ Samples submitted to the EPA Region 7 laboratory will be accepted according to Region 7 EPA SOP 2420.01.
☒ Other (Describe): Samples submitted to START-contracted laboratories will be accepted according to procedures established by the laboratories.

2.4 Analytical Methods Requirements:

☒ Identified in attached table.
☒ Rationale: The requested analyses have been selected based on historical information about the area and program experience with similar types of sites.
☐ Other (Describe):

2.5 Quality Control Requirements:

☐ Not Applicable
☒ Identified in attached table.
☒ In accordance with the Generic Quality Assurance Project Plan for the Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated July 2007).
☒ Field QC Samples: For this investigation, field QC samples will include three media blanks for soil gas, one Summa canister field blank for sub-slab soil gas samples, one water trip blank, one water field blank, and one water rinsate blank. The media blanks will be used to assess any VOC contamination in the sample collection media. The water trip blank will be used to assess presence of transportation-introduced contamination, while the water field blank will be used to assess contamination introduced during field sampling activities. The rinsate blank will be used to assess cross-contamination introduced from sampling equipment. Evaluation of blank samples depends on the levels of contamination found in environmental samples to determine whether environmental samples are representative.
☐ Other (Describe):

2.6 Instrument/Equipment Testing, Inspection, and Maintenance Requirements:

☐ Not Applicable
☒ In accordance with the Generic Quality Assurance Project Plan for the Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated July 2007).
☒ Testing, inspection, and maintenance of analytical instrumentation will proceed in accordance with the previously referenced SOPs and/or manufacturers' recommendations. Testing, inspection, and maintenance of field instruments will proceed in accordance with manufacturers' recommendations.

2.7 Instrument Calibration and Frequency:

☐ Not Applicable
☒ In accordance with the Generic Quality Assurance Project Plan for the Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated July 2007).
☒ Calibration of laboratory and field equipment will be performed as described in the previously referenced SOPs and/or manufacturers' recommendations.
☐ Other (Describe):

2.8 Inspection/Acceptance Requirements for Supplies and Consumables:

☐ Not Applicable
☒ In accordance with the Generic Quality Assurance Project Plan for the Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated July 2007).
☒ All sample containers will meet EPA criteria for cleaning procedures for low-level chemical analysis. Sample containers will have Level II certifications provided by the manufacturer in accordance with pre-cleaning criteria established by EPA in *Specifications and Guidelines for Obtaining Contaminant-Free Containers.*
☐ Other (Describe):

2.9 Data Acquisition Requirements:

☐ Not Applicable
☒ In accordance with the Generic Quality Assurance Project Plan for Superfund Integrated Assessment and Targeted Brownfields Assessment Program (updated July 2007).
☒ Data or information obtained previously that pertains to the area (including other analytical data, reports, photos, maps, etc., that are referenced in this QAPP) has been compiled by EPA and/or its contractor(s) from other sources. Some of that data have not been verified by EPA and/or its contractor(s); however, that unverified information will not be used for decision-making purposes by EPA without verification by an independent professional qualified to verify such data or information.
☐ Other (Describe):

2.10 Data Management:

☐ All EPA Region 7 laboratory data acquired will be managed in accordance with Region 7 EPA SOP 2410.01.
☒ Other (Describe): All data acquired by the START-contracted laboratories will be managed in accordance with procedures established by the laboratories.

3.0 Assessment and Oversight:

3.1 Assessment and Response Actions:

☒ Peer Review ☒ Management Review ☐ Field Audit ☐ Lab Audit
☐ Assessment and response actions pertaining to analytical phases of the project are addressed in Region 7 EPA SOPs 2430.06 and 2430.12.
☒ Other (Describe): Assessment and response actions pertaining to analytical phases of the project will be addressed in accordance with procedures established by the START-contracted laboratories.

3.1A Corrective Action:

☒ Corrective actions will be at the discretion of the EPA project manager whenever problems appear that could adversely affect data quality and/or resulting decisions affecting future response actions pertaining to the area.
☐ Other (Describe):

3.2 Reports to Management:

☐ Audit Report ☒ Data Validation Report ☐ Project Status Report ☐ None Required

☒ A trip report describing the sampling techniques, locations, problems encountered (with resolutions to those problems), and summary of analytical results will be prepared by START and submitted to the EPA.
☒ Reports will be prepared in accordance with the Generic Quality Assurance Project Plan for the Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated July 2007).
☐ Other (Describe):

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4.0 Data Validation and Usability:

4.1 Data Review, Validation, and Verification Requirements:

☐ Identified in attached table.
☒ Data review and verification will be performed in accordance with the Generic Quality Assurance Project Plan for the Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated July 2007).
☒ Review and verification of data generated by the EPA Region 7 laboratory will be performed by a qualified analyst and the laboratory's section manager as described in Region 7 EPA SOPs 2430.06, 2430.12, and 2410.10.
☒ Other (Describe): Review and verification of data generated by START-contracted laboratories will be performed by a qualified START chemist.

4.2 Validation and Verification Methods:

☐ Identified in attached table.
☒ The data generated by the EPA Region 7 laboratory will be validated in accordance with Region 7 EPA SOPs 2430.06, 2430.12, and 2410.10.
☒ The EPA project manager will inspect the data to provide a final review. The EPA project manager will review the data, if applicable, for laboratory spikes and duplicates, laboratory blanks, and field blanks and duplicates to ensure the data are acceptable. The EPA project manager will also compare the sample descriptions with the field sheets for consistency, and will ensure appropriate documentation of any anomalies in the data.
☒ Other (Describe): Data generated by START-contracted laboratories will be validated by qualified START personnel.

4.3 Reconciliation with User Requirements:

☐ Identified in attached table.
☒ If data quality indicators do not meet the project's requirements as outlined in this QAPP, the data may be discarded and re-sampling or re-analysis of the subject samples may be required by the EPA project manager.
☐ Other (Describe):

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Addendum to the Generic QAPP for the Superfund Site Assessment and Targeted Brownfields Assessment Programs (July 2007)
for the Highway 3 PCE Site in Le Mars, Iowa

Table 1: Sample Summary

Project Name: Highway 3 PCE Site	**Location:** Le Mars, Iowa; See Appendix B, Figure 1	
START Project Manager: Tom Scroggin	**Activity/ASR #:** NA	**Date:** June 2011

No. of Samples	Matrix	Location	Purpose	Depth or other Descriptor	Requested Analysis	Sampling Methods	Analytical Method
38	Passive Soil Gas	Suspected Source Areas	To assess contamination in soil gas vapors that could intrude into the overlying structures	Near suspected source areas	PCE	See Appendix C	Modified Method 8260
6	Active Sub-slab Soil Gas	Beneath buildings affected by PCE plumes	To assess contamination in sub-slab soil gas vapors that could intrude into the overlying structures	Below slab	VOCs	Draft EPA SOP for Sub-Slab Sampling	TO-15
20	Water	In areas downgradient of the suspected source areas	To assess contamination in groundwater downgradient of the suspect source areas, and further delineate the extent of the groundwater plume	Between the vadose zone and underlying aquitard of the two aquifers in question	VOCs	4230.07, 4230.15	EPA Method 3230.13
QC Samples							
3	Passive Soil Gas Module	Media blank	To assess PCE contamination in sample collection media	N/A	PCE	N/A	Modified Method 8260
1	Active Sub-Slab Soil Gas	Field Blank	To assess VOC contamination potentially introduced during preliminary assessment	Ambient air	VOCs	NA	TO-15
1	Water	Trip Blank	To assess PCE contamination from transportation of samples	NA	VOCs	NA	3230.13
1	Water	Rinsate Blank	To assess PCE cross-contamination from direct-push technology (DPT) sampling equipment	NA	VOCs	NA	3230.13
1	Water	Field Blank	To assess PCE contamination potentially introduced during preliminary assessment	NA	VOCs	NA	3230.13

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for the Highway 3 PCE Site in Le Mars, Iowa

Table 2: Data Quality Objective Summary

Project Name: Highway 3 PCE Site	**Location:** Le Mars, Iowa; See Appendix B, Figure 1	
START Project Manager: Tom Scroggin	**Activity/ASR #:** NA	**Date:** June 2011

Analysis	Analytical Method	Data Quality Measurements					Sample Handling Procedures	Data Manage-ment Procedures
		Accuracy	Precision	Representativeness	Completeness	Comparability		
SOIL GAS								
VOCs	See Table 1	Per analytical method	Per analytical method	Judgmental sampling, based on professional judgment of the sampling team	100%; no critical samples have been defined	Standardized procedures for sample collection and analysis will be used.	See Section 2.3 of QAPP form.	See Section 2.10 of QAPP form.
WATER								
VOCs	See Table 1	Per analytical method	Per analytical method	Judgmental sampling, based on professional judgment of the sampling team	100%; no critical samples have been identified	Standardized procedures for sample collection and analysis will be used.	See Section 2.3 of the QAPP form.	See Section 2.10 of the QAPP form.

APPENDIX A

SITE-SPECIFIC INFORMATION FOR THE HIGHWAY 3 PCE SITE
LE MARS, PLYMOUTH COUNTY, IOWA

INTRODUCTION

The Tetra Tech EM Inc. (Tetra Tech) Superfund Technical Assessment and Response Team (START) has been tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Superfund Division to conduct a Preliminary Assessment (PA) at the Highway 3 PCE Site in Le Mars, Plymouth County, Iowa (see Appendix B, Figure 1). This PA is being conducted to assess contamination in soil gas and groundwater that may originate from a subsurface source.

This quality assurance project plan (QAPP) identifies site-specific features and addresses elements of the sampling strategy and analytical methods proposed for this PA. An assessment of the data acquired will determine if additional Superfund response is warranted.

SITE DESCRIPTION

The site involves a plume of tetrachloroethene (PCE) first detected during an April 2008 Le Mars Coal Gas Plant site investigation. Two subsequent direct-push technology (DPT) groundwater sampling campaigns were completed to assist in a Pre-Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) investigation to define the extent of the PCE plume, and trace back the migration pathway to potential source areas. Five source areas were identified during the Pre-CERCLIS investigation: a former dry cleaning operation, an active dry cleaning operation, two machine shops, and the Chicago St. Paul Minneapolis & Omaha Railroad, which passes through a potential source area at the site. The site and its potential source areas are confined by Plymouth Street (Iowa Highway 3) to the north, Central Street to the west, and Lincoln Street Southeast (SE), which passes diagonally from the southwest at Central Street to the northeast at Plymouth Street. The approximate coordinates for the center of the site are 42.792604 degrees north latitude and 93.166066 degrees west longitude.

The PCE plume was detected primarily in the upper portion of the alluvial aquifer from 25 to 29 feet below ground surface (bgs), which is underlain by a glacial till aquitard, the Buried Channel aquifer, and subsequently the Dakota Formation aquifer (HydroGeoLogic, Inc. [HGL] 2009). The plume likely originates within the above-referenced site boundaries (study area), although as noted in the HGL report, multiple PCE sources could be contributing to groundwater contamination. From the study area, the plume travels toward the northeast in the alluvial aquifer at concentrations ranging from 9.1 to 370 micrograms per liter (µg/L). PCE was also detected at three different times in one monitoring well within the Buried Channel aquifer during the long-term monitoring of the Le Mars Coal Gas Plant,

indicating possible migration between the alluvial aquifer, which flows northwest, and the Buried Channel aquifer below, which flows southeast (HGL 2009).

One intent of this PA is to identify to which of the above-referenced potential source areas, if any, the PCE plume is attributable by use of Gore-Sorber (or similar) passive soil gas sampling media. Other intents of the assessment are to undertake sub-slab vapor intrusion analysis of affected buildings overlying the PCE plume, to assess health risks to employees who work in these buildings, and to better define the extent of the PCE plume via groundwater sampling using DPT.

SAMPLING STRATEGY AND METHODOLOGY

Under the approach to this project involving phased investigation, START will conduct sampling of soil gas adjacent to and downgradient of potential source areas to assess the presence of PCE during Phase I. This will include passive soil gas sampling surrounding buildings within possible source areas of the PCE plume. The proposed sampling scheme for this project is judgmental (based on the best professional judgment of the sampling team), in accordance with the *Guidance for Performing Site Inspections Under CERCLA*, Office of Solid Waste and Emergency Response (OSWER) Directive #9345.1-05, September 1992. Soil gas sampling locations will be selected based on area of influence (AOI) of the soil gas sampling media, access to public right-of-ways and private parking lots, and access to buildings overlying the PCE plume. Proposed passive soil gas sampling locations are shown on Figure 2 of Appendix B.

Phase II of the sampling campaign will include active, sub-slab, Summa® canister soil gas sampling within buildings (identified during the Phase I sampling) where soil gases from the underlying PCE plume may be migrating into ambient air. DPT groundwater samples will also be collected to better define the migration pathway of the PCE plume and to delineate its hydrogeological extent. Phase II of the sampling will occur after START receives and assesses results from the Phase I sampling.

Sampling and analytical procedures will follow standard operating procedures (SOP) outlined in the QAPP, and will involve collection of the following samples: (1) soil gas vapors from locations near suspected source areas, (2) sub-slab soil gas vapors from beneath buildings overlying the PCE plume, and (3) groundwater samples downgradient of source areas collected using DPT. Sample locations for Phase I sampling are illustrated on Figure 2. Selection of sub-slab active soil gas sampling locations will be based on data obtained during Phase I of the investigation, and therefore these locations are not included on the attached figures. DPT groundwater sampling locations are shown on Figure 3 of Appendix B. Pertinent data will be recorded in a logbook and with photo documentation. Descriptions of the sampling strategy and procedures to be implemented are presented below.

Passive Soil Gas Sampling (Phase I)—A sampling grid with 50- by 50-foot cells will be established in the public right-of-ways starting at the intersection of Plymouth Street and Central Street. Spacing between nodes on opposing sides of Plymouth Street and Central Street will be placed at 80-foot intervals to avoid placing passive soil gas samples within the street. The nodes will be placed on sidewalks and parking areas surrounding the buildings located within the study area. At each node of the grid (38 locations), a soil gas sample will be collected using a passive soil gas module (module). These sampling grid sizes were chosen based on existing site data, anticipated aerial extent of site contaminants in the vapor phase, and the AOI of the soil gas modules.

A 0.5- to 1-inch-diameter hole will be drilled with use of an electric rotary hammer-drill at each node location to a depth of approximately 3 feet bgs. A module will then be secured to a string or cord, attached to an impermeable cork, and lowered into the hole using a stainless steel insertion rod. The cork will be tamped flush with the surface to seal the hole at locations that are not under concrete or asphalt parking areas. For locations that are under concrete or asphalt parking areas, the cork will be placed below any fill material (sand and gravel) that may be encountered immediately under the concrete or asphalt. In addition, a temporary concrete or bentonite patch will be placed over each location at a parking area or sidewalk. Following the module exposure period of 10-14 days, the module will be removed from the hole and sent to the lab for analysis. Pertinent data, including analyses to be performed and exact sample locations, will be recorded on field sheets for each sample.

Sub-Slab Soil Gas Sampling (Phase II)—Up to six active sub-slab soil gas sampling locations will be selected inside various buildings that may be potential source areas for PCE, or that may be affected by vapor intrusion. At each of these locations, sub-slab samples will be collected by penetrating the concrete floor in the basement or other accessible portion of the foundation with a rotary hammer drill and concrete bit. Disposable 0.25-inch-diameter polyethylene tubing will be lowered through the drill hole into the sub-slab material, and then the tubing annulus will be sealed with cement grout. A Swaglok® fitting will be attached to the top of the tubing to allow its connection to an evacuated Summa canister for sampling. The Summa canister will be fitted with a flow regulator to enable collection of sub-slab vapor samples over a continuous 24-hour period. Sub-slab vapor sampling will be conducted in accordance with procedures in the draft SOP for Installation of Sub-Slab Vapor Probes and Sampling Using EPA Method TO-15 to Support Vapor Intrusion Investigations. Selection of sub-slab soil gas sampling locations will be based on data obtained during Phase I of the investigation.

Groundwater Sampling (Phase II)—Groundwater samples will be collected from up to 10 temporary monitoring well locations, possibly from two depths at each location. Samples will be collected through polyethylene tubing connected to a peristaltic pump or check valve. Purge water will be disposed of on the ground surface. As each well is purged, field parameters will be monitored continuously using a water quality instrument. A water sample will be collected after all field parameters have stabilized, ensuring the sample is representative of aquifer conditions. Samples will be analyzed by the onsite HAPSITE laboratory for volatile organic compounds (VOC). Some samples will also be collected in four 40-milliliter (mL) volatile organic analysis (VOA) vials preserved with hydrochloric acid to a pH <2, and then sent to EPA Region 7 laboratory for definitive VOC analysis. Selection of groundwater sampling locations will be determined based on data obtained during Phase I of the investigation.

QUALITY CONTROL

To evaluate sample quality control (QC), three module media blanks, one Summa canister field blank, one water trip blank, one water field blank, and one equipment rinsate blank will be collected as specified in Section 2.5 of the QAPP form.

Investigation-derived waste (IDW) consisting primarily of used tubing, etc., will be disposed of as uncontaminated solid waste. Issues pertaining to decontamination of personnel and sampling equipment will be addressed in a site-specific Health and Safety Plan (HASP) to be developed by START.

ANALYTICAL METHODS

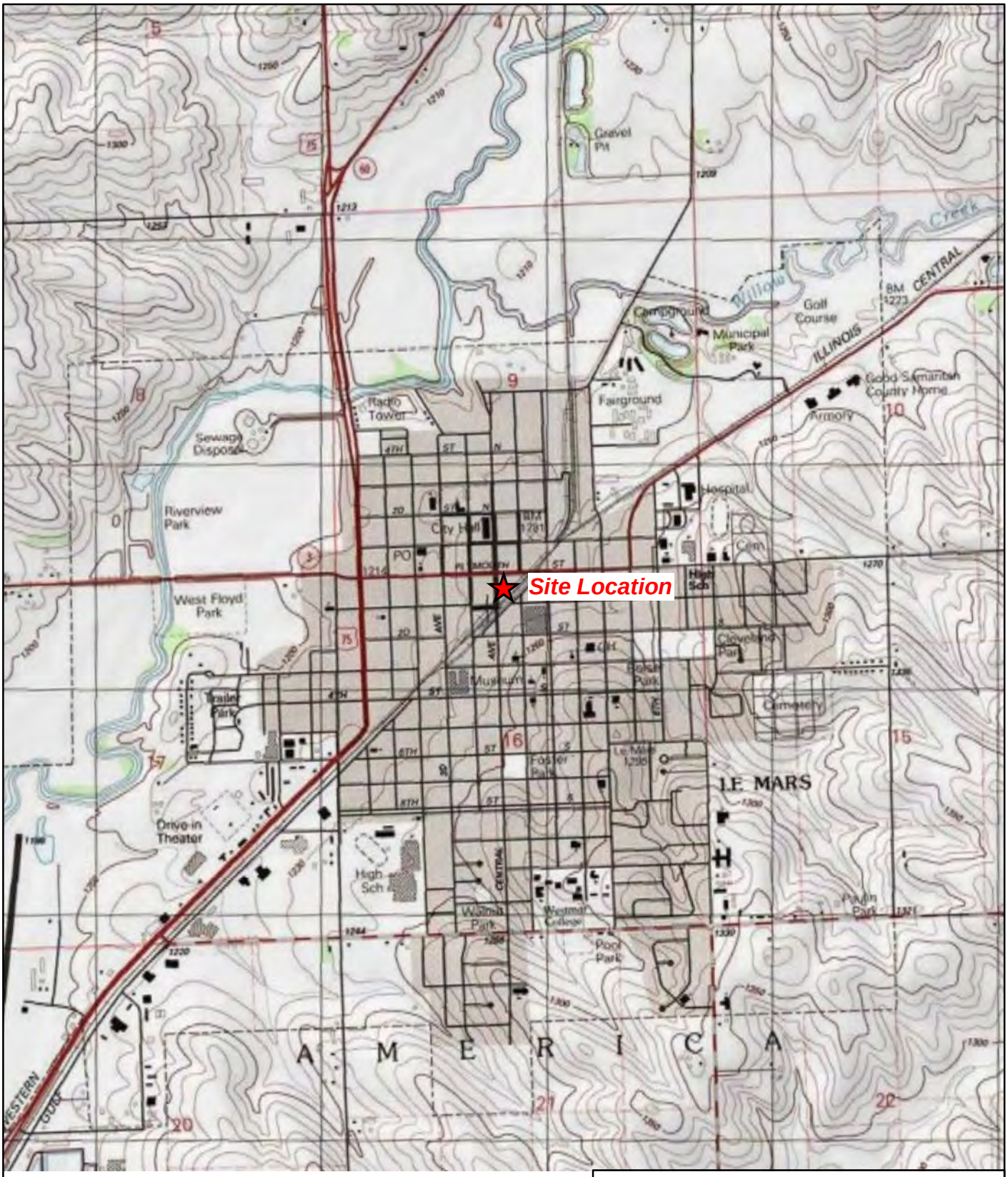
For this Preliminary Assessment, all passive soil gas modules and active sub-slab soil gas using Summa canisters will be analyzed by a START-contracted laboratory. All water samples will be analyzed by the on-site HAPSITE mobile laboratory for VOCs, and up to 20 groundwater samples will be submitted to EPA Region 7 laboratory for definitive VOC analysis by EPA SW-846 Method 8260. All samples will be analyzed according to SOPs and methods referenced on the QAPP form, with standard turnaround times requested. Appropriate containers and physical/chemical preservation techniques will be employed during the field activities to help verify that representative analytical results are obtained.

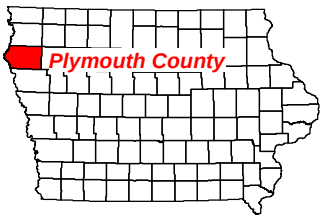
REFERENCES

HydroGeoLogic, Inc., (HGL). (2010). Pre-CERCLIS Assessment Report, Highway 3 PCE Site, Le Mars, Iowa. May 14.

APPENDIX B

FIGURES





N

0 1,000 2,000

Feet

Source: USGS Le Mars, Iowa 7.5 Minute Topo Quad, 1985

Highway 3 PCE Site
Le Mars, Iowa

Figure 1

Site Location Map

TETRA TECH EM INC.

Date: 06/02/11 Drawn By: Nick Wiederholt Project No: X9004.L.11.0228.000

X:\GIS\9004\0228\000\Projects\mxd\Figure1.mxd

Legend

- Gore-sorber sample location
- State highway
- Street
- Tetrachloroethene (PCE) plume

N

0 75 150

Feet

Source: Bing Maps Aerial Imagery Web Mapping Service, 2010; HSIP Gold, 2007

X:\G\900\04\0228.000\Projects\mxd\Figure2.mxd

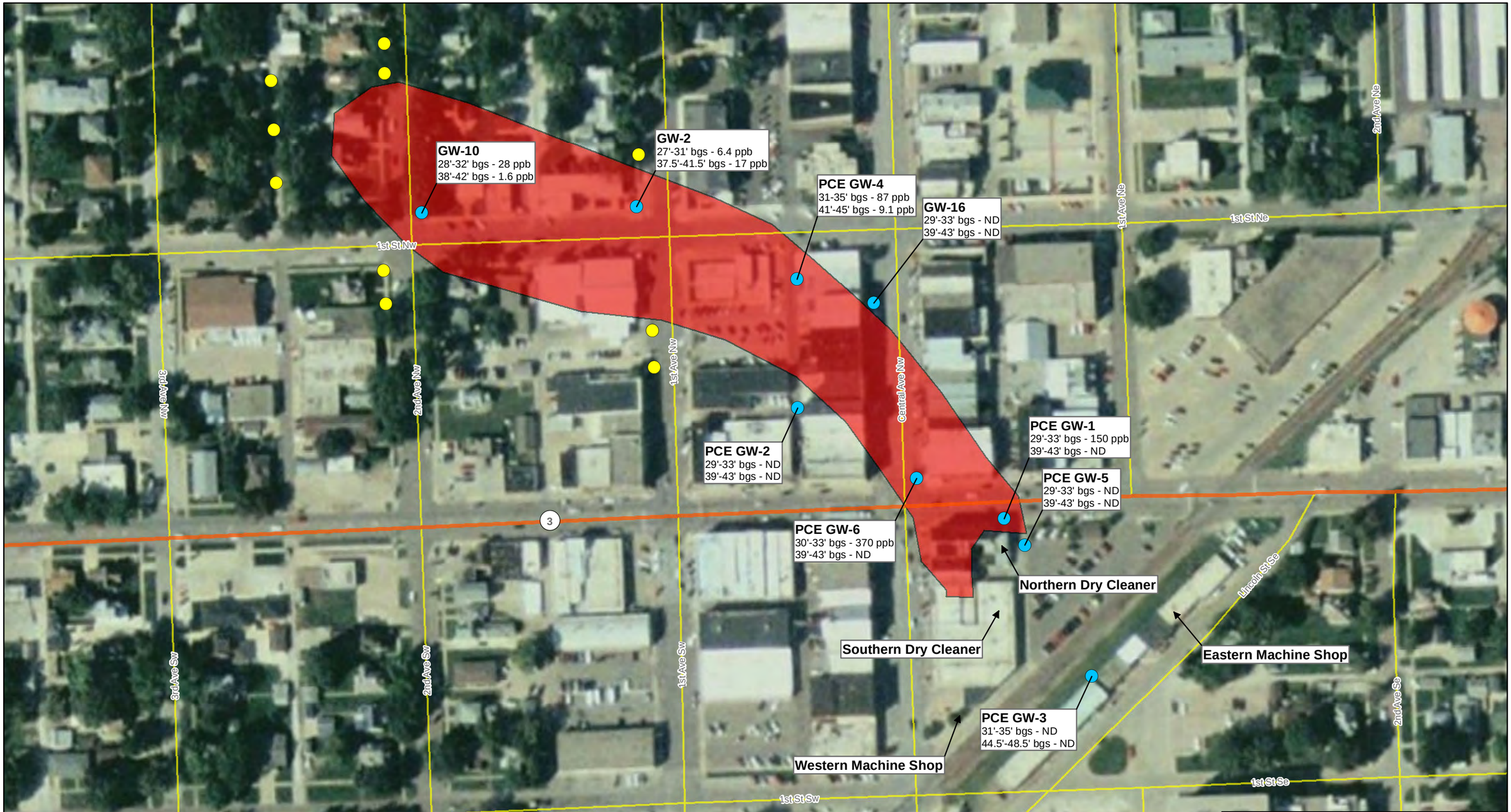
Highway 3 PCE Site
Le Mars, Iowa

Figure 2

Gore-sorber Sample Location Map

TETRA TECH EM INC.

Date: 06/08/11 Drawn By: Nick Wiederholt Project No: X9004.L11.0228.000



Legend

- Previous groundwater sampe location
- Proposed groundwater sample location
- State highway
- Street
- Tetrachloroethene (PCE) plume
- bgs Below ground surface
- ' Feet
- ND Non-detected result
- ppb Parts per billion

N

0 75 150

Feet

Source: Bing Maps Aerial Imagery Web Mapping Service, 2010; HSIP Gold, 2007

X:\GIS\9004\0228.003\Projects\mxd\Figure3.mxd

Highway 3 PCE Site
Le Mars, Iowa

Figure 3

Groundwater Sample Location Map

TETRA TECH EM INC.

Date: 06/08/11 Drawn By: Nick Wiederholt Project No: X9004.L.11.0228.000

APPENDIX C

GUIDELINES FOR INSTALLATION AND RETRIEVAL OF PASSIVE SOIL GAS MODULES

Soil Gas & Sub-slab Soil Gas Sampling
Storage, Installation and Retrieval Guidelines

NOTE: If you have any questions regarding installation and retrieval, please call:
Jay Hodny, Jim Whetzel or Hilary Tretheway
(410) 392-7600

GENERAL

Always obtain utility clearance before any subsurface sampling.

Soil Gas & Sub-slab Soil Gas

For soil gas sampling, the GORE™ Modules can be placed on the surface under a cover or installed to any depth, in uncased or cased holes, and can include vertical profiling. The installation hole is sealed effectively against air infiltration with natural cork which is impermeable to gases and liquids. The prescribed practice is to place the passive sampler (i.e., the adsorbent) at the desired sampling depth. Generally, for soil gas sampling, depths of three feet or more are favored to minimize the effects of surface and near-surface variables (e.g., soil temperature, barometric pressure, air pollution, natural organic content) on the soil gas signal of interest.

Similarly, subslab soil gas can be collected by placing the module at the slab/soil interface, at depth beneath the slab, or both, in permanent or temporary installation holes. The installation hole is advanced through the slab, and sealed with the cork after module insertion. Alternatively, exterior subslab sampling can be achieved by advancing the installation hole at an angle to reach beneath the slab from the outside of the structure.

For soil gas and subslab soil gas sampling, the installation is flush with the surface with no sampling equipment remaining on the surface. Site activities (e.g., dry cleaner, refinery, aircraft runway operations, etc.) can continue uninterrupted.

Site activities which may disturb the natural soil gas migration should not be conducted during the time when the GORE™ Modules are in the subsurface. Such activities include, but are not limited to, installation/operation of soil vapor extraction systems, drilling (e.g., air-rotary), excavation, air sparging, etc.

The following items are provided by Gore:

- recyclable, cardboard shipping container(s), partitioned box(es) containing individually numbered GORE™ Modules - (DO NOT DISCARD SHIPPING CONTAINER OR PARTITIONED BOXES),
- insertion rod (please return after use; bundle sections together with a rubberband do not use tape),
- corks with screw eyes,
- string,
- Chain of Custody and Installation/Retrieval Log
- custody seals
- these instructions.

STORAGE

GORE™ Modules are carefully cleaned, sealed, and stored after manufacturing. They must remain sealed in their vials in the shipping boxes until deployment and after retrieval. **DO NOT** store near potential sources of organic vapors such as petroleum fuels and exhaust, solvents, adhesives, paints, etc.

REQUIRED TOOLS/SUPPLIES

A narrow diameter hole (approximately 1/2 to 1-inch; 2.5cm) is drilled or driven to the desired sampling depth. Simple hand tools such as a slam bar or rotary hammer drill are used to create the installation hole in soil. A hammer drill or similar coring tool is required to advance the hole through a slab. Direct-push or auger-type tools are usually needed for deeper installations.

Additional tools (to be supplied by the customer) required for installation may include:

- equipment to lay out and mark sample locations (scaled map, measuring tapes, pin flags, GPS unit);
- disposable gloves and equipment decontamination supplies
- slide hammer/tile probe (slam bar) or electric rotary hammer drill (AC power outlet or portable generator and extension cords) with carbide-tipped bits or augers (1/2 to 1-inch; 2.5cm diameter, three feet; 1 meter or more, in length).
- Optional: concrete patching material

If sample locations need to be hidden to prevent damage/loss by vandalism or animals, push the cork farther into the hole, place a metal washer or nut on top of the cork, and cover with soil and sod. Use a metal detector to locate modules for retrieval.

Natural cork is impermeable to gases and liquids, providing an effective seal against infiltration of ambient air. For additional security, a thin layer of concrete patching material can be applied over the cork.

The following vendors supply installation hole drilling equipment. The information is provided as a courtesy and does not represent any endorsement of these products or suppliers:

Item	Supplier	Phone No.
* Slide Hammer/Tile Probes	Forestry Supplies	(800) 647-5368
* Carbide Drill Bits (36" long)	1. Kerfoot Technologies, Inc. 2. the Blade Runner	1. (508) 539-3002 2. (610) 444-6708
* Rotary Hammer Drill	SKILL-BOSCH Power Tools	(800) 334-5730

* Art's Manufacturing Supply (dba AMS) has all these items (800) 635-7330

TRIP BLANKS

An additional number (specified) of GORE™ Modules are included as trip blanks. The customer selects which modules to be used/treated as trip blanks, and notes this on the Chain of Custody and Installation/Retrieval Log. These modules remain unopened, travel to and from the site during installation and retrieval, while in storage away from Gore's facility, and in transit to/from Gore's facility.

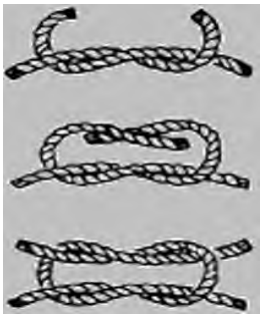
MODULE INSTALLATION

- The sample grid can be laid out beforehand (recommended) or during the module installation. Do not use spray paint or similar materials to mark locations, or drill through locations marked with spray paint.
- To facilitate the installation of the modules, it is recommended that the string and corks be prepared prior to going to the field. As an example, for a three foot installation, cut a piece of the supplied string to a length of approximately 7.0 feet or 2.25 meters. Tie the ends of the string together using a non-slip knot (square knot is suggested, Figure 1). Pass the looped string through the eyelet in the cork and pull it back through itself. Wrap the remainder of the string around the cork and secure the string/cork combination with a rubber band. The cork and cord are now ready to attach to the module after the installation hole is created.

Square knot instructions (Figure 1)

1. *Take an end of the string in each hand.*
2. *Pass the left-hand string over the right-hand string and wrap it around the right-hand string.*
3. *Take the string end that is now in your right hand, place it over the string end in your left hand and wrap it around that string.*
4. *Pull the string carefully to tighten the knot.*

Figure 1. Square Knot



- **We do not recommend installation of modules within 15 feet (5 meters) of monitoring wells, utility trenches or other conduits, unless that is the sampling objective.** These features may act as preferential pathways for soil vapor migration. The results may not be representative of the subsurface contamination.
- Drive/drill the narrow installation hole at the desired pre-marked location. In sandy soils, occasionally the hole will collapse after the drill or tile probe is removed. Adding deionized water to the sandy soil will temporarily compact the soil and keep the hole open for module insertion.
- Wearing clean surgical gloves, remove module from the numbered jar and re-seal the jar. The barcode on the jar lid should correspond with the serial number on the module - please verify.
- Attach the string and cork to the module by passing the looped string through the loop on the module and pull the string/cork back through itself.
- Place the insertion rod into the pre-cut pocket at the base of the module and lower the assembly into the hole. If you encounter resistance remove the module and ream the hole and re-insert the module.
- Once deployed to the desired depth, press the insertion rod against the side of the hole and twist slightly to release the module. Remove the rod and push any excess cord into the hole and plug it with the cork.
- Indicate the module number, date and time of installation and any pertinent comments on the installation/retrieval log. Write the module serial number on the site map adjacent to the appropriate map location.
- **To minimize sample location errors, it is preferable to record the GORE™ Module serial number on the field map. However, if another sample numbering system is used, information relating the sample number system to the GORE™ Module serial numbers must be provided either on the Installation and Retrieval Log, or in a separate table.**
- Clean the tile probe or drill bit and the insertion rod prior to use at the next location. Replace the surgical gloves as necessary.
- Following module installation, the modules selected as **trip blanks** should be kept in the sample box provided and stored as described above in "STORAGE" until sampler retrieval.

MODULE RETRIEVAL

- Following the module exposure period identify and check each location in the field using the site map.
- Remove the cork with a penknife, screwdriver or corkscrew. Grasp the cord and pull the module from the ground; **verify the module ID number**. Cut off and discard the cork and cord. Place the entire module into its labeled jar and secure the lid.
- **Use caution when screwing down the lid on the sample jars. Clean any soil/debris from the threads of the jar and lid, and make sure no part of the module is pinched between the jar and lid. Be sure the seal is tight. Over-tightening may cause breakage.**
- **Affix a custody seal to the side of the jar and jar lid. Do not cover the barcode with the seal.**
- Place the jar in the supplied partitioned box.
- Complete the module retrieval date/time on the Installation/Retrieval log.

PACKAGING FOR RETURN

- Place boxes with modules back into outer shipping container using appropriate packing materials to protect fragile contents.
- **Do not** use Styrofoam "peanuts" as packing material. Bubble packing is acceptable.
- Label box to indicate fragile contents.
- There is no need to return the shipment in coolers with ice.
- **Return the GORE™ Modules, insertion rod and paperwork (preferably by overnight courier) to**:

Screening Modules Laboratory
W.L. Gore & Associates, Inc.
100 Chesapeake Blvd.
Elkton, MD 21921
Phone: (410) 392-7600
Attn: NOTIFY LAB IMMEDIATELY UPON DELIVERY!!

IMPORTANT: Samples should not be shipped for weekend or holiday delivery.

Soil Gas and Sub-slab Soil Gas Sampling

Slide hammer

Rotary hammer drill

Initial insertion

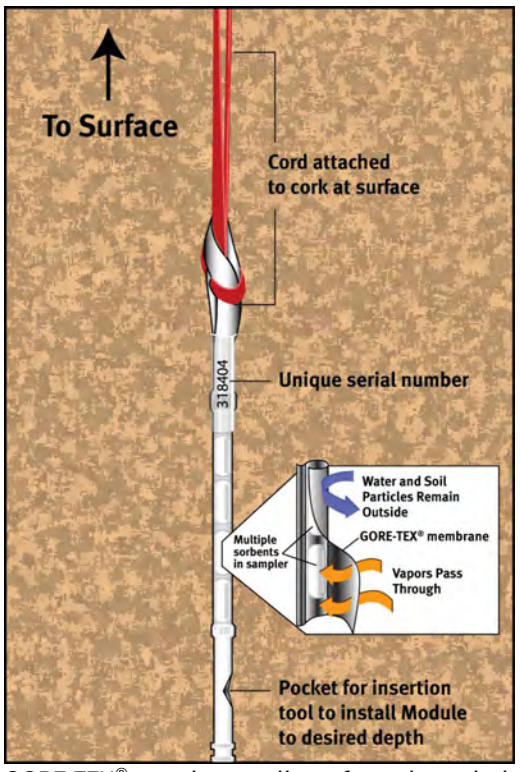
After insertion,
impermeable cork sealed

Initial insertion into permanent sampling port.

Angle beneath slab.

Rotary hammer drill

Note: Dry cleaner operations continue, no obstructions on surface after installation.



GORE-TEX® membrane allows for unimpeded migration of soil gas to adsorbent, while protecting the adsorbent from liquid water and soil.

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