

	U.S. EPA Region 8 Response Section Sampling and Analysis Plan			
	<b>Site Name</b>	Billings PCE	<b>SSID</b>	08ME
	<b>City, State</b>	Billings, MT	<b>Response Site</b>	<a href="https://response.epa.gov/site/links_list.aspx?site_id=15883">https://response.epa.gov/site/links_list.aspx?site_id=15883</a>
	<b>On-Scene Coordinator</b>	Joe Payne and Joyel Dhieux	<b>Contract TO/TD</b>	68HE0820F0071/2071-2302-02
	<b>Create Date</b>	2/27/2023	<b>Revised Date</b>	
	<b>Response Type</b>	<input type="checkbox"/> OPA <input checked="" type="checkbox"/> CERCLA <input type="checkbox"/> Stafford <input type="checkbox"/> Other: [EXPLAIN] <input type="checkbox"/> ER <input type="checkbox"/> RSE <input type="checkbox"/> TCRA <input type="checkbox"/> NTCR <input checked="" type="checkbox"/> Other: RV		
	This sampling and analysis plan (SAP) was prepared under the Region 8 Response Section Programmatic Quality Assurance Project Plan. The SAP will cover key components, and supplement information may be found in other site documentation, such as the site-specific data management plan and contracting documentation. For programmatic documentation, please refer to the <a href="https://response.epa.gov/RECORDS">Response.epa.gov/RECORDS</a> site-specific response site or ask the on-scene coordinator for more information.			

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**1. SAP APPROVALS AND PROJECT TEAM**

SAP Approvals Table		
Organization and Title	Name	Signature and Date
EPA DAO (OSC/TOCOR)	Joe Payne and Joyel Dhieux	
START QA REVIEWER	Kevin Scott	 04/19/2023
START PROJECT MANAGER	David Berestka	 04/20/2023
ERRS RESPONSE MANAGER	John Walters	

**2. PROJECT MANAGEMENT AND BACKGROUND**

**2.1. Project Task and Organization**

Organization	Title	Name and Contact	SAP Recipient
EPA	OSC	Joe Payne and Joyel Dhieux	<input checked="" type="checkbox"/>
ERRS (ER)	Response Manager	John Walters	<input type="checkbox"/>
START (Tetra Tech)	Project Manager	David Berestka (david.berestka@tetrattech.com)	<input checked="" type="checkbox"/>
	Data Manager	Suddha Graves (suddha.graves@tetrattech.com)	<input checked="" type="checkbox"/>
	SAP Author	Chandler Broome (chandler.broome@tetrattech.com)	<input checked="" type="checkbox"/>
	QA Reviewer	Kevin Scott (kevin.scott@tetrattech.com)	<input checked="" type="checkbox"/>
	Quality Assurance Manager	Rob Tisdale (rob.tisdale@tetrattech.com)	<input checked="" type="checkbox"/>

**2.2. Site Description**

The Billings PCE Site consists of an 860-acre contaminated shallow groundwater plume that extends from 715 Central Avenue (the primary source area) approximately 3 miles east-northeast and into downtown Billings, Montana. Overlying the groundwater plume are 298 residential, 4 schools, 8 condominiums, and 179 commercial properties. The contaminated groundwater plume contains chlorinated solvents, mainly tetrachloroethene (PCE) and degradation byproduct such as trichloroethene (TCE), cis-1,2-dichloroethene, and vinyl chloride, from historic area dry cleaning businesses. The site is listed on the National Priorities List and is currently undergoing remedial investigation/feasibility study (RI/FS). Vapor

mitigation systems are being installed at residences where indoor air or soil gas concentrations exceed screening standards and where the resident agrees to a vapor mitigation system installation.

Proposed Site Schedule			
Activity	Estimated Start Date	Estimated Completion Date	Comments
SAP Submittal and Approval	4/12/23	4/20/23	
HASP Submittal and Approval	2/27/23	3/2/23	
Mobilization	4/23/23	4/23/23	Single day mobilization
Soil Gas Sampling	4/24/23	4/25/23	
Demobilization	4/26/23	4/26/23	Single day demobilization
Data Review and Verification	4/26/23	5/17/23	Weekly; throughout entire project

### 2.3. Site Map and Figure

See Attachment 1 for the site map, which shows the site location and residences at which soil gas sampling will be conducted.

### 2.4. Project Definition Background

The Montana Department of Environmental Quality (MDEQ) completed a preliminary assessment of the site from 1992–1993. The preliminary assessment findings were “no further action” based on lack of drinking water usage of the affected aquifer. Subsequent field investigations were conducted by MDEQ in 1994. MDEQ conducted a Comprehensive Environmental Response, Compensation, and Liability Act site investigation in 1999 and 2001. The MDEQ site investigation revealed an east-northeast trending groundwater contaminant plume and potential indoor air contamination associated with the groundwater contamination. In 2007, the U.S. Environmental Protection Agency (EPA) conducted a removal action that included removing and disposing of contaminated soil, injecting chemicals to help reduce groundwater contamination, and installing a barrier wall around the most highly contaminated groundwater. EPA also installed vapor mitigation systems at seven structures overlying the contaminated groundwater plume. Since that time, the EPA Region 8 remedial team has been documenting plume characteristics through the RI/FS. In 2019, MDEQ issued a remedial investigation report to document the current nature and extent of contamination, if other sources were contributing to contamination, and if vapor intrusion was continuing to occur. Groundwater contaminant concentrations did decrease after EPA’s removal work, but the shallow groundwater plume remains contaminated above Montana’s human health standards.

In spring 2022, an indoor air study was completed under the EPA remedial program in several residential homes within the site. Both indoor air samples and sub-slab vapor intrusion air samples were collected. Sample results were found to be in exceedance of human health standards in

multiple homes when compared to EPA’s indoor air vapor intrusion screening levels, indoor air vapor intrusion removal management levels, and sub-slab vapor action levels (SSAL). PCE levels found in the nine homes ranged from 0.41 to 130 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) in indoor air and 1,400 to 9,900  $\mu\text{g}/\text{m}^3$  in sub-slab air. Based on the sampling results, EPA has determined that at least nine of these homes require immediate prioritization for the installation of vapor mitigation systems. The Superfund Technical Assessment and Response Team supported the installation of vapor intrusion systems in residential homes at the site and will conduct effectiveness sampling following system installation.

**2.4.1. Project Problem Statement**

Vapor intrusion has been documented at nine subject residences and vapor mitigation systems have been installed. Post-installation soil gas sampling is being conducted to evaluate the effectiveness of the installed vapor mitigation systems. Soil gas sampling will be conducted approximately 6 to 7 weeks after installation of the vapor mitigation systems. Soil gas sampling will be conducted at one additional residence (120 Wyoming Avenue) at the request of the EPA remedial project manager to obtain updated soil gas concentration. Soil gas sampling will not be conducted at one residence with a vapor mitigation system (205.5 Terry Avenue) because no Vapor Pin sub-slab soil gas monitoring point exists because of a highly deteriorated concrete slab in which a Vapor Pin could not be reliably installed.

**2.4.2. Quality Objectives**

Incident/Project Objectives	Data Quality Objectives	Data Category				Action Number
		Screening	Screening + Confirmation	Definitive	Other/Comments	
(1) Sub-slab soil gas sampling for vapor mitigation effectiveness evaluations	Collect sub-slab soil gas samples to evaluate potential vapor intrusion and threats to residents and assess the relative range of concentration of contaminants to verify that operation of vapor mitigation systems perform their intended function	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Soil gas sampling is being conducted at same locations and methods as previous soil gas sampling to evaluate vapor mitigation system effectiveness	1
(2) Vapor Pin integrity evaluation	Measure helium concentration in collected soil gas samples to quantify concentration of helium that migrated from the helium shroud through the sub-slab and into the soil gas sample to evaluate the integrity of the Vapor Pin	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Helium analysis is being conducted to evaluate the integrity of the Vapor Pin sub-slab soil gas monitoring points	2
(3) Helium shroud helium concentration confirmation	Use Dielectric Technologies MGD 2002 helium detector to measure concentration of helium within helium shroud to confirm that helium shroud has proper helium concentration of 20 to 50 percent by volume	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Helium screening is being conducted to confirm proper helium concentration within helium shroud.	3

**2.5. Site Specific Training – PQAPP and HASP Will Be Followed**

As described under the EPA Region 8 programmatic quality assurance project plan (PQAPP) and site-specific health and safety plan (HASP).

**3. DATA GENERATION AND ACQUISITION ELEMENTS**

Site-specific data elements are identified below and standard practices and needs are described and outlined in the scientific data management plan (SDMP). Any deviations will be noted below in the site narrative.

**3.1. Sampling/Monitoring Process and Design**

<input type="checkbox"/>	Random Sampling	<input type="checkbox"/>	Transect Sampling	<input checked="" type="checkbox"/>	Biased/Judgement Sampling
<input type="checkbox"/>	Systematic Random Sampling	<input type="checkbox"/>	Search Sampling	<input type="checkbox"/>	Systematic Grid
<input type="checkbox"/>	Screening with Definitive Confirmation	<input checked="" type="checkbox"/>	Definitive Sampling	<input type="checkbox"/>	Screening w/o Definitive Confirmation
<input type="checkbox"/>	Stratified Random Sampling	<input type="checkbox"/>	Incremental Sampling	<input type="checkbox"/>	Other

Sampling Narrative:

One soil gas sample will be collected from an existing Vapor Pin at each of the eight residences in which a vapor mitigation system has been installed and has a Vapor Pin and one additional residence with no vapor mitigation system for a total of nine residences. One duplicate sample will also be collected from one of these locations. Grab soil gas samples will be collected using batch-certified, stainless-steel 1-liter summa canisters and a 200-milliliter-per-minute grab sample flow controller. Soil gas samples will be collected from existing Vapor Pin sub-slab sample points using a helium shroud for leak detection.

All sampling location data shall adhere to the SDMP and be recorded in a compliant manner.

Residences with existing Vapor Pins to be sampled are shown on Figure 1 and listed in Section 3.2.

Field duplicates will be collected at a rate of 10 percent. With nine sample locations, one field duplicate will be collected. Field blank, matrix spike / matrix spike duplicates, and other quality control samples are not suitable for summa canister sampling. The laboratory will conduct a method blank analysis to confirm that the laboratory equipment is not contaminated. Data validation will be completed on analytical data (specifying the data validation level agreed upon by EPA) and that validated data will be compared to SSALs.

### 3.2. Analytical Sampling Methods

Obj #	Analysis	Number of Samples	Locations	Matrix	Sampling Method/SOP	Analytical Method/SOP	Descriptor
1	VOCs by EPA Method TO-15.	9 (+ 1 duplicate)	Existing Vapor Pin at each of the following residences with vapor mitigation systems: 11 Custer Avenue (R006) 214 Custer Avenue (R092) 408 Howard Avenue (R026) 314 Miles Avenue (R054) 317 Miles Avenue (R056) 406 Miles Avenue (R067) 212 Terry Avenue (R046) 239 Terry Avenue (R049) Residence with no vapor mitigation system: 120 Wyoming Avenue (R008)	Soil Gas	<a href="#">#1704, SUMMA Canister Sampling, Revision 1.0</a>  <a href="#">#2042 Soil Gas Sampling, Revision 1.0</a>	EPA TO-15	N/A
2	Helium by EPA-3C Mod	10 (+ 1 duplicate)	Each Vapor Pin listed above	Soil Gas	<a href="#">#1704, SUMMA Canister Sampling, Revision 1.0</a>  <a href="#">#2042 Soil Gas Sampling, Revision 1.0</a>	Helium by EPA-3C Modified	N/A

Region 8 primarily uses standard operating procedures (SOP) developed by the Environmental Response Team (<https://response.epa.gov/sop>), but any new Region 8 Response Section SOPs will be developed following EPA Guidance for Preparing Standard Operating Procedures QA/G-6 (EPA/600/B-07/001) and the Regional Overarching SOPs. Additional support with regard to sampling methods can be obtained from SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, or through Environmental Services.

### 3.3. Monitoring/Screening Methods

Obj #	Analyte/Parameter	Type	Location	Matrix	Instrument	Action Levels*	Action to be Taken
3	Helium	Targeted	Helium shroud	Air	Dielectric Technologies MGD 2002	Confirm that helium shroud contains 20 to 50 percent helium	Increase / decrease helium concentration in shroud as needed to achieve project goals

\* Please reference standard/generic action levels, such as [RMLs](#), [RSLs](#), [NIOSH](#), [AEGLS](#), etc.  
If site-specific action levels exist, reference accordingly in the table and provide any supplemental documentation in the site files.

### 4. DATA QUALITY INDICATORS AND DATA ACCEPTABILITY CRITERIA

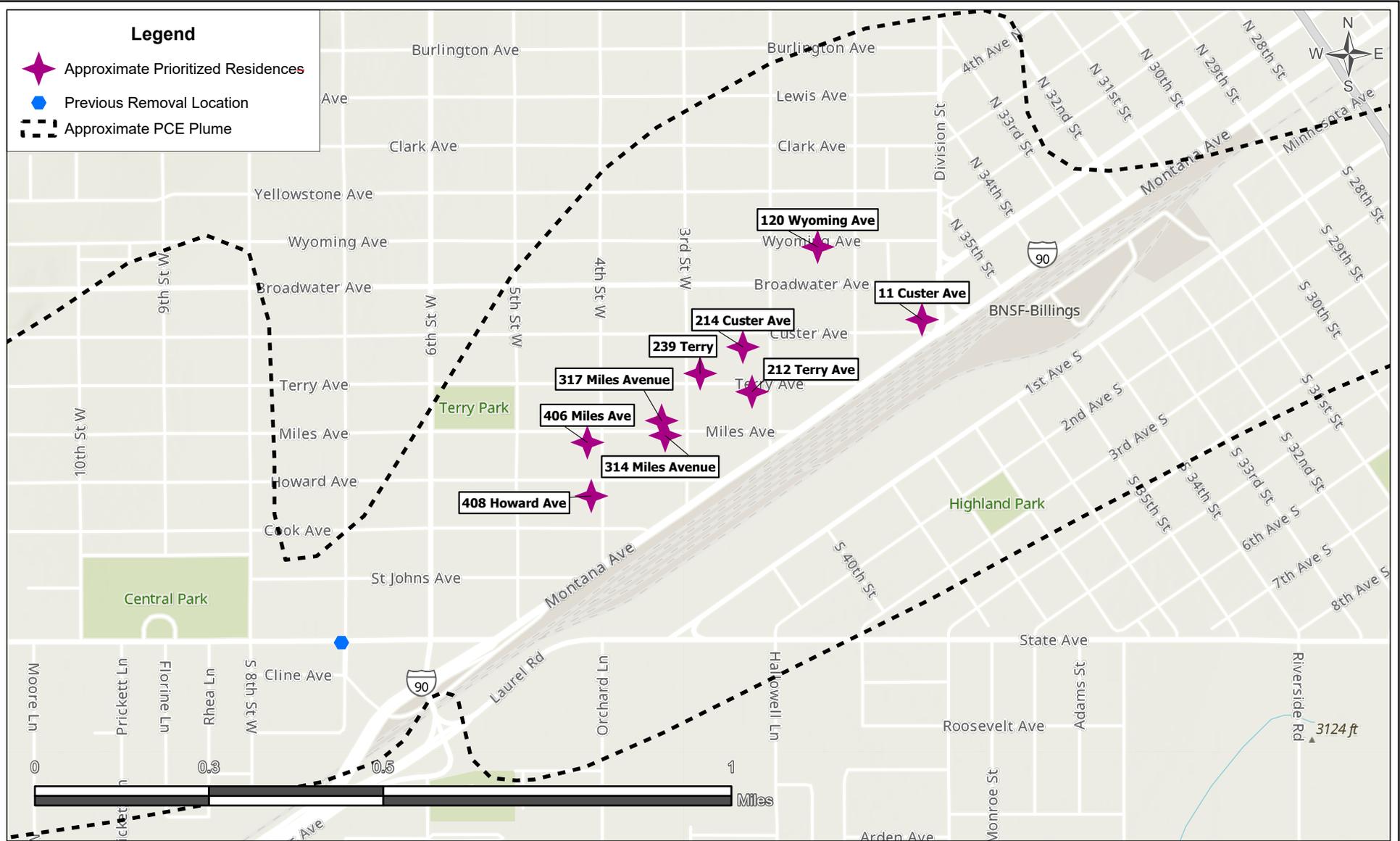
Project Goal(s) for Completeness:					
Analyte / Parameter	Analytical Method/SOP	Precision	Accuracy	Sensitivity/Quantitation Limits	Other Requirements
VOC	Method TO-15	Per analytical method (lab QC stated by method requirements); per PQAPP field duplicate criteria	Per analytical method (lab QC stated by method requirements)	Per analytical method in PQAPP	N/A
Helium	Method 3C Modified	Per analytical method (lab QC stated by method requirements); per PQAPP field duplicate criteria	Per analytical method (lab QC stated by method requirements)	Per analytical method in PQAPP	N/A

### 5. RECONCILIATION WITH PQAPP

PQAPP Section	Deviation(s)
None	None

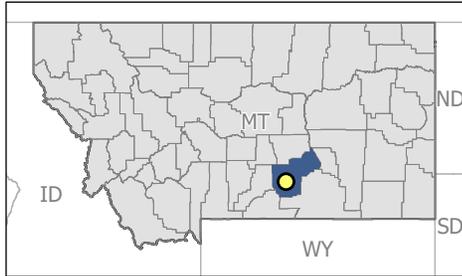
**6. DOCUMENT REVISION HISTORY**

Date	Version	Author(s)	Description of Change
4/20/2023	0	Chandler Broome	Initial draft of SAP
Click here to enter a date.			



**Notes:**  
 Soil gas sample to be collected from existing Vapor Pin in each residence.  
 Modified from U.S. Environmental Protection Agency, 2023. Action Memorandum Billings PCE Site. March

**Source:**  
 Background: ESRI Topographic World Imagery  
 Locations: EPA Region 8 START V (Tetra Tech)  
 Spatial Reference: WGS 1984 Web Mercator Auxiliary Sphere Coordinate System



United States Environmental Protection Agency  
 Region 8 START V  
 TD: 2071-2302-02

**Tetra Tech**

Analyst: M. Caldwell  
 Date: 4/17/2023

**Billings PCE**  
 Billings, Yellowstone County, Montana

**Figure 1**  
**Site Location and Residential Soil Gas Sampling Locations**