EPA SUPERFUND PROGRAM
RECORD OF DECISION
BILLINGS PCE SUPERFUND SITE
OPERABLE UNIT 1
BILLINGS, YELLOWSTONE COUNTY, MONTANA

PREPARED BY:

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 WYNKOOP STREET
DENVER, COLORADO 80202

SECTION I: DECLARATION

Site Name and Location

Site Name: Billings PCE
Site Location: Billings, Yellowstone County, Montana
CERCLIS ID#: MTD986073252

The U.S. Environmental Protection Agency (EPA) is issuing this Record of Decision (ROD) for remediation of the Operable Unit 1 (OU1) Billings PCE Superfund Site (Site) in Billings, Yellowstone County, Montana, which includes a 1,100-acre groundwater contamination plume. The official National Priorities List (NPL) site name is "Billings PCE" due to the presence of tetrachloroethene (PCE) at the Site. The Site extends from 15th St W and Industrial Ave to the northeast and into and through the downtown area, to the intersection of N 18th St and Minnesota Ave (Figure 1). OU1 addresses migration of site-related contaminants from contaminated groundwater, soil and soil vapor to indoor air, through vapor intrusion (VI) within residential and commercial structures in downtown Billings, Montana.

Statement of Basis and Purpose

This decision document presents the Selected Remedy for OU1 of the Site, which was chosen by the EPA in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The Selected Remedy addresses the human health risks associated with VI but not the sources of contamination or risks associated with direct contact with contaminated groundwater, soil or soil vapor.

This decision is based on the information contained in the Administrative Record (AR) file for this Site. The AR index identifies each of the items upon which the selection of the remedial action is based. The AR file is available for review at the Billings Public Library[1] in Billings, Montana and at the EPA Region 8 Records Center in Helena, Montana. Site information and the AR can also be accessed online through the EPA Site webpage.[2]

The Montana Department of Environmental Quality (DEQ) is the support agency and concurs with the Selected Remedy for OU1. The state's concurrence letter, dated May 15, 2026, is included in Appendix A.

Assessment of Site

[1] The Billings Public Library is located at 510 N Broadway, Billings, MT, 59101.

[2] The Site webpage is https://www.epa.gov/superfund/billings-pce.

The response action selected in this ROD is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. Pollutants or contaminants from this Site may present an imminent and substantial endangerment to public health or welfare.

Description of the Selected Remedy

The OU1 Selected Remedy addresses indoor air contamination from VI at properties within the Site. The Site has been divided into three OUs, and EPA will address OU2 and OU3 through separate, future decision documents. EPA anticipates selecting a remedy for OU2 that addresses the contaminated soil and contaminated groundwater associated with the primary source area. Subsequently, EPA anticipates selecting a remedy for OU3 that addresses the contamination at the remaining suspected source areas and site-wide groundwater.

The OU1 Selected Remedy consists of monitoring, institutional controls, outreach and various engineering controls. This Selected Remedy will be implemented at residential and commercial properties within the Site to achieve the OU1 Remedial Action Objectives (RAOs). Each aspect of the remedial action is described below:

> Monitoring – Monitoring includes pre-sample surveys of eligible structures followed by sampling of environmental media to identify structures where remedial action is required and to evaluate effectiveness of the vapor mitigation systems. It is estimated that 4,200 structures within the Site are currently eligible for sampling and evaluation. Multiple rounds of sampling are recommended based on site conditions and State of Montana and EPA VI guidance. Structures that are eligible for VI mitigation systems will undergo baseline and post-installation sampling as well as periodic long-term monitoring for operation and maintenance (O&M).
>
> Engineering Controls – Engineering controls will utilize various remedial technologies and process options to mitigate VI. Sub-slab depressurization is the most practical, effective and common VI engineering control. Therefore, the OU1 remedial action will give preference to sub-slab depressurization systems (SSDS). A variety of other remedial technologies and process options may be needed in rare instances; these are described in subsequent sections below.
>
> Institutional Controls – Governmental controls, including city ordinances and deed notifications, will be implemented at OU1. The purpose of the OU1 institutional controls is to ensure the remedy remains protective, future development is equipped with protective engineering controls and that all residents are aware of the contamination and EPA remedy opportunities. Table 9 describes the selected institutional controls.

To facilitate remedy implementation, OU1 has been divided into three remedy areas: A, B and C (Figure 2). EPA defined these areas based on concentrations of site contaminants in groundwater, soil vapor, the utility corridor and indoor air. Each area is described in greater detail in subsequent sections below.

Post-installation inspections, maintenance and monitoring will continue until the cumulative risk presented by all remaining site-related contaminants in soil vapor, soil and groundwater are

below a 1E-5 cancer risk level and the non-cancer hazard index is less than or equal to 1 (based on target organ effects). The estimated cost of implementing the OU1 Selected Remedy is $42,821,000 over 35 years. The actual duration of the OU1 remedy is estimated to be 35 years, as it is dependent upon the completion status of OU2 and OU3, but most of the remedy can be implemented within 10 years. EPA expects this OU1 Selected Remedy will address immediate risks to human health. The Selected Remedy for OU1 does not address source materials constituting principal threats at the Site. These source materials will be addressed in the OU2 ROD and OU3 ROD.

Statutory Determinations

The Selected Remedy for OU1 is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate for this limited-scope remedial action, is cost-effective and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. The OU1 Selected Remedy does not satisfy the statutory preference for treatment as a principal element of the remedy because it does not treat the contaminated groundwater or soil – the location of the residual source material. Permanent solutions for remediating the source material will be addressed in future operable units.

Due to the remedy resulting in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action to ensure that the Selected Remedy continues to provide adequate protection to human health and the environment.

Data Certification Checklist

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the AR file for this Site.

- Contaminants of concern (COCs) and their respective concentrations (Section 7.3, Table 2)
- Baseline risk represented by the COCs (Section 7)
- Cleanup levels established for COCs and the basis for these levels (Section 12.2, Table 8)
- Remediation of source materials constituting principal threats (Section 11)
- Current and reasonably anticipated future land use assumptions (Section 6)
- Potential land use that will be available as a result of the Selected Remedy (Section 6)
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate and the number of years over which the remedy cost estimates are projected (Section 12.3)
- Key factors that led to selecting the remedy (Section 12)

Federal Authorizing Signatures

This Record of Decision documents the selected remedial action to address the contamination at the Billings PCE Superfund site, Operable Unit 1.

The following authorized official at EPA Region 8 approves the Selected Remedy as described in this Record of Decision.

CYRUS WESTERN

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Date: 2026.06.02 14:03:10 -06'00'

Cyrus Western
Regional Administrator
U.S. Environmental Protection Agency, Region 8

State of Montana Authorizing Signatures

This Record of Decision documents the selected remedial action to address the contamination at the Billings PCE Superfund site, Operable Unit 1.

The following authorized official at the Montana Department of Environmental Quality approves the Selected Remedy as described in this Record of Decision.

Sonja Nowakowski

Digitally signed by Sonja Nowakowski
Date: 2026.06.02 16:54:32 -06'00'

Sonja Nowakowski
Director
Montana Department of Environmental Quality

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Table of Contents

SECTION II: DECISION SUMMARY

1.0 Site Name, Location and Description

The Billings PCE Superfund Site (CERCLIS ID# MTD986073252) is located in Billings, Yellowstone County, Montana. The Site extends from 15th St W and Industrial Ave to the northeast and into and through the downtown area, to the intersection of N 18th St and Minnesota Ave (Figure 1). The Site is an approximately 1,100-acre contaminated groundwater plume and has been divided into three Operable Units (OUs). This Record of Decision (ROD) presents the Selected Remedy for OU1. EPA is the lead agency for Site activities, and Montana Department of Environmental Quality (DEQ) is the support agency. The remedial action cleanup work at the Site is being conducted on a fund-lead basis.

Groundwater and soil at the Site have been contaminated due to historical releases of contaminants, which have led to the contamination of soil vapor and indoor air in some locations. The OU1 Contaminants of Concern (COCs) include: 1) tetrachloroethene (PCE), 2) trichloroethene (TCE), 3) cis-1,2-dichloroethene (cis-1,2-DCE), 4) chloroform, 5) isopropanol and 6) naphthalene. The Site consists of four suspected PCE source areas (SPSs) from historical dry-cleaning, or industrial and commercial operations. EPA sampling data confirms site-related groundwater contaminants that affect, or could affect, indoor air quality through vapor intrusion (VI). This occurs when volatile chemicals in contaminated groundwater or subsurface soil form vapors which can then move from groundwater into soil vapor, and then into the indoor air of overlying buildings through cracks in foundations or other openings. Direct contact with COCs may also occur if the contaminated shallow groundwater level rises, and this water then enters basements of overlying structures.

2.0 Site History and Enforcement Activities

Historically, dry cleaners and other industrial and commercial operations within the Site released chlorinated solvents (such as PCE and TCE) directly onto the ground, into septic systems, or down sewer drains, which led to the contamination of soil and groundwater. These chlorinated solvents and other site-related compounds readily form vapors, which can contaminate the indoor air of overlying structures through VI.

Several of the COCs identified at OU1, including chloroform, isopropanol and naphthalene, were not commonly used in dry-cleaning services but are used in, or created by, many other industries and chemical processes. Chloroform can result from using chlorine in drinking water. Naphthalene is found in products like mothballs, pest repellents, asphalt and gasoline. Isopropanol is commonly used in cleaning agents, hand sanitizers and cosmetic products. These contaminants were detected sporadically in groundwater but more frequently in soil vapor and indoor air samples. During the evaluation of VI risk at the Site, EPA reviewed monitoring data pertaining to all site-related contaminants that demonstrated sufficient volatility and potential for health risk via VI. Based on existing knowledge of the Site and past sampling results, and to succinctly illustrate the extent to which VI has the potential to occur at the Site, EPA has focused the discussion of this ROD on PCE and TCE, which are the most prevalent and widespread COCs.

There are four SPSs at the Site (Figure 1). Descriptions of each SPS are below:

- SPS-1: A dry-cleaning facility operated at SPS-1 from 1961 through 1981. While PCE contamination has been detected in soil and groundwater, EPA sampling data indicates the extent of contamination is not a significant VI source.

- SPS-2: A dry-cleaning facility operated at SPS-2 from approximately 1965 through 1993, resulting in PCE releases to the environment. EPA sampling data shows high concentrations of PCE in soil, groundwater, soil vapor and as a dense non-aqueous phase liquid or “DNAPL,” at this source area. SPS-2 is the primary source of PCE releases at the Site.

- SPS-3: A dry-cleaning facility operated at SPS-3 until at least 1973 resulting in PCE releases to the environment. EPA sampling data showed that the PCE levels below the building’s foundation exceeded EPA removal management levels for a commercial structure. In 2023, EPA installed a sub-slab depressurization system (SSDS) at SPS-3 to address vapor intrusion.

- SPS-4: During EPA’s recent groundwater investigations, EPA sampling data revealed high concentrations of PCE at this location, indicating a distinct but currently unidentified source. EPA is further investigating SPS-4 as part of OU3.

EPA and DEQ have conducted multiple investigations and enforcement actions across the Site. These investigations supported characterization of source area contamination, groundwater contamination and VI. EPA also conducted removal actions at the Site that prevented migration

of contaminants from source areas and reduced indoor-air concentrations of volatile chemicals at structures with the highest concentrations of contaminants in indoor air.

The primary source of environmental releases at the Site occurred at SPS-2 between 1965 and 1993. EPA has reason to believe that PCE and PCE-containing fluids were emptied from dry-cleaning equipment located in the northern part of the building and were allowed to flow across the concrete floor into a floor drain. The contents within the floor drain were then discharged into a dry well, consisting of a two-foot diameter concrete pit with a soil floor, located to the east alley of the building. The dry well may have been associated with a reportedly active French drain. In 1970, a drain line was installed connecting the facility to a city storm drain that bypassed the dry well. In 1975, DEQ's predecessor, Montana Department of Health and Environmental Sciences directed the business owner to abandon the floor drains and recover and properly dispose of PCE waste generated at the facility. In 1993, the dry-cleaning washers were removed, and the facility is now used exclusively for commercial laundry services.

Below is a timeline of additional EPA and DEQ actions that occurred at the Site before listing on the National Priorities List (NPL):

- 1993 – Montana Department of Health and Environmental Services (now DEQ) completed a preliminary assessment and issued a "no further action" determination for the Site, given that the aquifer was not being used as a drinking water source, and VI was not considered an exposure pathway at the time.

- 1999 to 2001 – DEQ completed a site investigation to evaluate groundwater contamination and VI. DEQ determined there was PCE contamination in groundwater downgradient of the Site, and the presence of indoor air contaminants in some buildings that overlay the contaminated groundwater.

- 2003 – DEQ completed soil and groundwater sampling to investigate another source area, currently known as SPS-3.

- 2006 - DEQ requested that EPA perform an "Emergency Removal Evaluation of Billings PCE Groundwater" in an April 24, 2006, letter to EPA. The site area defined by DEQ at the time of the letter was approximately 500 acres and included several potential sources.

- 2006 to 2007 - EPA issued two CERCLA section 104(e) information requests to two dry-cleaning facilities (the Companies) in downtown Billings, Montana. The first was sent on December 13, 2006, requesting operational information, and the second, sent on November 14, 2007, requested additional information relating to insurance coverage and financial hardship. Based on the Companies' response to the first section 104(e) letter, EPA established that the Companies used PCE solvents in dry cleaning operations at the SPS-2 location since the mid-1960s and continued that usage until approximately 1993. On May 17, 2007, EPA issued a general notice letter informing the Companies that they were considered Potentially Responsible Parties (PRPs) under CERCLA.

- 2006 to 2008 – EPA completed nine separate mobilizations between May 2006 and July 2008 as part of a removal assessment. The removal assessment identified conditions

existing at the Site that presented a threat to public health or welfare or the environment that met the criteria for initiating a CERCLA removal action.

- 2008 – EPA conducted a CERCLA removal action at the Site involving the excavation, treatment and disposal of contaminated soil at SPS-2, injection of chemical oxidants into groundwater to assist in the degradation of chlorinated solvent contamination and installation of a non-permeable barrier wall around the most contaminated groundwater. Sub-slab depressurization systems (SSDS) were installed at seven structures near SPS-2 to mitigate VI.

- 2010 to 2016 – Post-removal site monitoring included periodic site inspections and seven rounds of groundwater sampling.

- 2012 - EPA filed a Superfund Lien on the property located at SPS-2.

- 2014 - EPA and the Companies reached an Ability to Pay Settlement. Pursuant to the 2014 Consent Decree, the Companies were required to implement institutional controls (ICs) on the property. In April 2024, the Companies recorded a Declaration of Institutional Controls at SPS-2. The ICs include soil excavation restrictions, well prohibitions, residential construction prohibitions, requirements for vapor mitigation and groundwater impact prohibitions.

- 2017 to 2019 – DEQ completed site-wide investigations and issued a Remedial Investigation (RI) Report in 2019 that characterized the nature and extent of COCs in groundwater, surface and subsurface soil, soil vapor, indoor air and stormwater/surface water. Multiple sources of COCs were investigated (SPS-1, SPS-2, SPS-3 and SPS-4). The report determined that concentrations of PCE in surface and subsurface soil at some of the source areas exceeded the leaching to groundwater screening levels. It was also concluded that the VI pathway was complete at some structures.

- 2020 - EPA conducted groundwater sampling and indoor air sampling at six buildings as part of an expanded site investigation in support of the NPL listing.

- 2021 – EPA added the Site to the NPL with full support from the city of Billings and DEQ. Listing on the NPL made available federal Superfund funding for investigation and remedial-action cleanup work.

After the Site was listed on the NPL, the EPA remedial Superfund team referred several properties to the removal program due to sampling results indicating unacceptable levels of actual or potential risk from vapors in the sub-slab, indoor air or both. In 2023 and 2024, the EPA removal program conducted a CERCLA time-critical removal action involving the installation of SSDS at 28 structures, including 2 commercial properties, 25 residential properties and the Billings Central Catholic High School. EPA removal program installed SSDS in all 28 structures, with a blower fan inducing a sufficient radius of influence to mitigate COCs from underneath the structures using one mitigation point.

After the Site was listed on the NPL, EPA conducted additional indoor/crawlspace air, soil vapor, groundwater and subsurface soil investigations. These investigations are discussed below and are included in the Administrative Record (AR). Based on the sampling and analysis performed by EPA at the Site, VI is considered to pose an unacceptable risk to human health.

3.0 Community Participation

EPA has actively engaged with the Billings community since 2007 when EPA began the CERCLA removal action. Community involvement has included website postings, direct mailings, telephone conversations, focus group collaborative meetings, newspaper notices and community update meetings. Additionally, EPA has developed a Community Involvement Plan for the Site, which outlines the Agency's goals for involving the community during the Superfund remedial process.

Most recently, EPA engaged with the community during biannual Site sampling, an indoor air investigation and the OU1 Proposed Plan release. The OU1 Focused Feasibility Study (FFS), OU1 Proposed Plan and the OU1 AR were released to the public in July 2025. The OU1 FFS, Proposed Plan and AR can be found on the Site webpage, the information repository at the Billings Public Library, or at the EPA Montana Superfund Records Center[3]. The notice of availability and public meeting information were published in the *Billings Gazette*. The 60-day public comment period on the Proposed Plan was held from July 28, 2025, to September 26, 2025. EPA held a public meeting on the OU1 Proposed Plan at the Billings Public Library on August 27, 2025. During the meeting, EPA Remedial Project Managers presented the OU1 Preferred Alternative and provided an opportunity for official public comment. Public comments were collected via email and at the community meeting during the official public comment period. EPA has responded to the comments received during the public comment period in the Responsiveness Summary section of this ROD (Section III).

Billings PCE is located in an urban area with mixed-use zoning. In recent years, EPA has issued numerous Comfort/Status Letters to prospective buyers and lenders to encourage redevelopment and reuse of potentially contaminated properties at the Site. These letters are intended to provide the interested party with information EPA has about a specific property and any statutory provisions, or Agency policies that may apply. This information is intended to help the interested party make informed decisions regarding acquisition and productive reuse of property.

[3] The EPA Montana Superfund Records Center is located at 10 W 15th St, Suite 3200, Helena, MT, 59626.

4.0 Scope and Role of Operable Unit or Response Action

The Site has been divided into three OUs:

- OU1 addresses indoor air contamination from VI at properties within the Site. OU1 is the subject of this ROD.
- OU2 addresses the source area associated with the contaminated soil at SPS-2, and contaminated groundwater at and immediately downgradient of SPS-2 (Figure 1).
- OU3 addresses the contamination at the remaining suspected PCE source areas, SPS-1, SPS-3 and SPS-4 (Figure 1), and site-wide groundwater contamination.

OU1, the subject of this ROD, addresses indoor air contamination related to VI. Establishing OU1 as a medium-specific OU, performing time-critical removal actions, and expediting the OU1 FFS and OU1 ROD have decreased the timeframe for implementing the OU1 remedy to effectively and efficiently protect human health and the environment. By addressing OU1 first, EPA can prioritize human health risks associated with VI and therefore protect human health for the entire duration of the site-wide remedy. Investigations of OU2 and OU3 source areas and groundwater are ongoing.

5.0 Site Characteristics

5.1 Physical Characteristics and Land Use

The Site is located in Billings, Yellowstone County, Montana. Billings is the largest city in Montana with an estimated population of 121,483 as of 2024. The Site is approximately 1,100 acres, spanning several mixed-use neighborhoods. It is estimated that 2,676 residential properties and 1,516 commercial properties are potentially affected by Site contaminants.

OU1 encompasses a broad variety of urban land uses (Figure 3). The Site primarily includes commercial, residential, mixed-use and light industrial zoning. The northeastern edge of the plume extends into the Central Business District. Multiple parks and public spaces are located adjacent to or within the OU1 boundary. Land uses include commercial businesses, residences, schools, streets, parks, industrial or manufacturing businesses, a railroad corridor and municipal rights-of-way.

5.2 Climate and Topography

The city of Billings is within the Great Plains physiographic province and has a semi-arid continental climate. Downtown Billings is approximately 3,100 feet above mean sea level and is characterized by dry, hot summers and cold, dry winters. Mean annual precipitation is 15 inches per year with nearly half of this occurring between March and June. Mean daily high temperature is 58 degrees Fahrenheit (°F); this ranges from 32°F in January to 87°F in July. Over 60 inches of annual average snowfall occurs in Billings with nearly all this occurring between October and April. The soil freeze depth ranges anywhere between 36 and 42 inches, and most utility lines are approximately 6 feet below ground surface.

The topography of the Site is relatively mild and grades to the east toward the Yellowstone River. The dominant drainage system within Billings is the Yellowstone River, which is the primary public drinking-water supply source. Numerous small drainage systems and creeks run through the Site to the Yellowstone River; however, these are all ephemeral and likely do not exert a strong influence on groundwater conditions. Most of the Site's surface area is covered with asphalt and concrete, which results in high runoff and minimal infiltration.

5.3 Regional Geology and Hydrogeology

The city of Billings is bound by 300- to 500-foot sandstone bluff outcrops (Eagle Sandstone) north and south of the city, locally referred to as the Rimrocks. The Eagle Sandstone formation is a light brown and gray sandstone ranging in thickness from 100 to 350 feet. The sandstone is water-bearing but yields less than 10 gallons per minute. Underlying the Eagle Sandstone is the Telegraph Creek Shale formation, a sandy shale with interbedded sandstone with sandstone bedding increasing in thickness near the contact between the shale and the overlying Eagle Sandstone. The Telegraph Creek Shale formation is approximately 150 feet thick and is not considered a water bearing unit with water yields less than 10 gallons per minute. Throughout the entire Site, the Telegraph Creek Shale formation is the first encountered bedrock.

The Yellowstone River flows west to east between the bluffs and provides the dominant alluvial processes impacting the alluvial geology within the Site. The upper geologic unit consists primarily of fine-grained sediments (sandy silts and clays) in the upper 15 feet below ground surface (ft bgs). Within the primary fine-grained soil matrix, heterogeneous coarser-grained deposits of silty sand form lenses. The upper alluvium overlies a coarser-grained, more-homogenous sand and gravel layer that extends from approximately 15 to 30 ft bgs. This lower alluvium is typically under saturated conditions. The sand and gravel layer is underlain by shale bedrock at approximately 30 ft bgs. The alluvial aquifer does not currently serve as a drinking water source for the city of Billings. However, shallow domestic wells are present throughout the Site, some of which are used as a source of irrigation water for home gardens and lawns.

5.4 Groundwater Investigations

Since 2021, EPA and its contractors have mobilized semi-annually to collect groundwater samples from existing monitoring wells and domestic irrigation wells. Samples were collected following EPA approved Sampling Analysis Plans/Quality Assurance Project Plans (SAPs/QAPPs). Groundwater samples were collected in accordance with EPA *Low-flow (Minimal Drawdown) Groundwater Sampling* procedures that include low-flow well purging using a peristaltic pump. Samples were collected directly from the peristaltic pump and sent to the laboratory for analysis.

Various COCs were detected throughout OU1 groundwater, with PCE (ranging from non-detect to 56,200 ug/L) and TCE (ranging from non-detect to 1,930 ug/L) being the most widespread. While some locations had levels below or mostly below DEQ-7 human health standards for PCE and TCE of 5 ug/L, most wells showed detections above these regulatory limits. Wells within the SPS-2 source area had the highest concentrations of PCE and TCE. PCE groundwater concentrations indicate that residual, dense non-aqueous phase liquid (DNAPL) is likely present in the SPS-2 source area. Other related contaminants, including cis-1,2-DCE, were also detected, with some locations within the SPS-2 source area exceeding DEQ-7 human health standards. Chloroform, isopropanol and naphthalene were detected in the groundwater, but less frequently.

The primary source of COCs relevant to VI in OU1 is contaminated shallow groundwater. Additional vapor sources include COCs absorbed into soil and in the form of DNAPL near the SPSs. COC concentrations in groundwater generally follow the east-northeasterly groundwater flow direction, with the highest concentrations near SPS-2. As part of recent EPA VI and groundwater investigations, site-specific residential and commercial target groundwater concentrations (TGCs) were calculated for PCE and TCE (Table 1). TGCs are Site specific concentrations of a volatile chemical in groundwater that if exceeded, indicate the potential for VI at levels posing an unacceptable human health risk.

Groundwater sampling results from 2022 and 2023 were compared to EPA residential and commercial TGCs to create groundwater isocontours for PCE (Figure 4) and TCE (Figure 5). The area where EPA's sampling results show exceedances of residential TGCs for PCE (10 micrograms per liter (µg/L)) and TCE (0.9 µg/L) extends approximately 1.5 miles from SPS-2 downgradient to monitoring well BPGP50. EPA sampling results also show that PCE and TCE have been detected above the residential TGC in monitoring well MW-115, which is approximately 130 feet downgradient of monitoring well BPGP50. This plume appears

disconnected from the main plume associated with SPS-2 and indicates a separate source area at SPS-4. In 2024, EPA installed soil vapor probes near BPGP50 to help delineate the soil vapor plume and provide recommendations for locations to install future groundwater monitoring wells. Vadose zone thickness throughout the Site is between 9 and 15 feet. Thus, the vertical distance between buildings and contaminated groundwater is at most 15 feet for buildings with slab-on-grade construction and is less for buildings with basements.

EPA sampling data shows exceedance of the residential TGCs for both PCE and TCE up- and cross-gradient of SPS-2 and 2,800 feet downgradient of SPS-1 at monitoring well MW-128 indicating a residual plume hydraulically downgradient of SPS-1 (Figures 4 and 5). Further investigation and sampling is recommended for OU3 to delineate the groundwater plume downgradient of SPS-1 and bound the plume downgradient of SPS-4.

5.5 Indoor Air Investigations

There have been five VI investigations performed between 2022 and 2024 that included indoor air sampling. Indoor air sampling has been conducted using Beacon Environmental passive sorbent samplers, stainless steel Summa canisters, or the EPA Trace Atmospheric Gas Analyzer (TAGA) mobile laboratory. The TAGA mobile laboratory can measure indoor air samples in real-time which can help with identifying potential indoor air sources during sampling.

EPA sampled some structures more than once and at different times of a year which is referred to as temporal or seasonal sampling. This is a critical component of VI investigation and designed to account for fluctuating contaminant concentrations in sub-slab soil vapor and indoor air. A single sampling event is generally considered insufficient to characterize potential risk because factors such as soil moisture, groundwater levels and building ventilation changes (e.g., home heating vs. cooling seasons) can lead to significant temporal variability in contaminant concentrations.

Through EPA VI investigations, the Agency confirmed that some buildings that sit on top of the contaminated shallow groundwater are being contaminated with volatile COCs. The indoor air in some of these buildings is contaminated through the subsurface to indoor air VI pathway. EPA sampling data shows that Site COCs are present in indoor air at concentrations exceeding health based cleanup levels (Figure 6).

5.6 Soil Vapor Investigations

The five indoor air investigations performed between 2022 and 2024 also included soil vapor sampling. Sub-slab soil vapor samples were collected from structures with suitable slab foundations by installing a vapor port through the slab and collecting a sample using a Summa canister. For structures that did not have slab foundations or suitable conditions for installing a vapor port, soil vapor samples were collected outside of the structures. Exterior soil vapor samples were collected by drilling a soil boring, installing a sample probe and deploying a Beacon passive sampler within the probe. Soil vapor sampling included the installation and sampling of semi-permanent and temporary soil vapor probes.

Soil vapor results from the 2022 and 2023 sampling events were compared to Preliminary Remediation Goals (PRGs) to evaluate locations and frequency of soil vapor exceedances above risk-based levels for PCE and TCE (Figure 7). High COC concentrations in soil vapor generally follow the east-northeasterly groundwater flow direction downgradient of SPS-2 through the East Central Billings residential neighborhood with most soil vapor samples in that area exceeding the PCE and TCE PRGs (Figure 7). Soil vapor exceedances of the PRGs indicate the potential for unacceptable risks from VI.

5.7 Multiple Lines of Evidence Conclusions

Based on multiple lines of evidence from evaluating soil, groundwater, soil vapor and indoor air sampling results, the following are key observations drawn from 2022-2025 EPA investigations:

- The highest concentrations of COCs in indoor air, and the largest number of cases with a complete VI pathway, are primarily located hydraulically downgradient (northeast) of SPS-2, along the centerline of groundwater flow, between SPS-2 and Division Street.
- COC concentrations exceeding PRGs in sub-slab soil vapor in this area downgradient of SPS-2 consistently indicate the potential for unacceptable risks from VI exposure.
- Although EPA indoor air sampling results from 2022 through 2024 indicate the highest concentrations are primarily located downgradient of SPS-2, soil vapor and indoor air exceedances of PRGs in the downtown core, near SPS-4, and south of 1st Avenue S., near Highland Park indicate the potential for VI in these areas.
- The eastern boundary of the groundwater plume is not fully characterized near SPS-4 (the northeast leading edge), where unexpectedly high COC soil vapor concentrations have been detected, and limited data are available. Further investigation and sampling is recommended to further delineate the groundwater plume for OU3.
- Vadose zone soils across OU1 consist primarily of fine sand and fines (silt and clay), with a small percentage of coarser-grained sediments (gravel and sand). The air-filled porosity across OU1 vadose zone is sufficient to support diffusive transport of vapors between the water table and the atmosphere.

5.8 Conceptual Site Model

VI is a potential human exposure pathway - a way people may encounter hazardous vapors while performing day-to-day indoor activities. A VI pathway is considered complete when:

- An underground source of vapor-forming chemicals exists.
- A transport pathway exists for underground vapor-forming chemicals to reach indoor air.
- One or more of the vapor-forming chemicals found underground are also detected in indoor air.

- People are present in the building or will be present in the future when the vapor-forming chemicals are or may be present.

If one or more of these conditions is currently absent and is expected to be absent in the future, the VI pathway is considered incomplete and will not likely result in human exposure due to VI. At Billings PCE OU1, the VI pathway is considered complete.

Some chemicals that cause VI are present in household and industrial chemical products. If these products are kept inside the building, they can also cause indoor air contamination. These same chemicals can also be in outdoor air for reasons unrelated to the Site. Vapor intrusion investigations look at multiple lines of evidence to determine whether indoor air contamination is caused by underground sources, as opposed to indoor or outdoor background sources.

There are three primary transport routes that vapors can follow to enter a building (Figure 8):

- Subsurface Diffusion and Advection into Buildings: Both diffusive and advective transport can cause vapors to volatilize from source materials, migrate through the vadose zone, enter through cracks or other openings of the building foundation and mix with indoor air. Diffusive transport is driven by vapor concentration gradients, moving from areas of high concentration (such as a source area) to areas of low concentrations (such as the soil vapor beneath a structure). Advective transport is driven by pressure gradients, migrating from areas of higher pressure (the soil vapor) to areas of lower pressure (indoor air). This is the most common cause of VI in OU1.

- Direct Water Infiltration: When contaminated groundwater infiltrates a structure, for example, through flooding or a sump, contaminants can volatilize directly from the groundwater into the indoor air. While not as common as the previous transport pathway, several structures where VI investigations were completed for OU1 showed that groundwater may occasionally enter the basement.

- Sewer Gas Infiltration: When sewer pipes or other conduits are located through areas of contamination, vapor-phase or dissolved-phase COCs may enter the pipes through joints, cracks, or other openings. These pipes can act as preferential pathways for contaminants to migrate into structures connected to these pipes. At the Site, concentrations of COCs in sewer gas are greater than indoor air concentrations indicating the sewer gas infiltration pathway is potentially complete within OU1.

Factors that affect the extent and magnitude of VI include, but are not limited to:

- Source strength: Areas of higher concentrations of COCs in groundwater or soil will have higher concentrations of COCs in the vapor-phase directly above the source. The concentrations of vapor-forming chemicals in groundwater and soils vary based on location across the Site and are typically highest near SPS-2.

- Distance from the source to the building: The greater the distance a vapor must travel to reach a building, the more likely the COC concentrations will be reduced due to attenuation. The vertical distance between a building and contaminated groundwater

can vary based on seasonal groundwater fluctuations and building construction. The distance is typically at most 15 feet for buildings with slab-on-grade or crawl space construction and is less than that for buildings with basements.

- Soil characteristics: Various soil characteristics such as percent moisture, porosity, grain size and organic carbon content can have an impact on vapor mobility and attenuation. The soil characteristics observed across OU1 support diffusive transport of vapors between the water table and the atmosphere.

- Meteorological conditions: VI is usually greater during cold temperatures due to closed windows and doors and heated air rising and escaping from upper levels, drawing air from lower levels – known as the stack effect. The strength of this effect is dependent on the difference between indoor and outdoor air temperatures.

- Use of heating, ventilation and air conditioning (HVAC) units: Depending on operation, HVAC systems can either increase or decrease VI through creating positive or negative pressure gradients. Some HVAC equipment can decrease VI by adding air to pressurize the building or providing sufficient outdoor air exchange to dilute vapors in the indoor air. Use of HVAC equipment may also increase VI by decreasing air pressure inside the building, through elements like exhaust fans, which can pull vapors from under the building into the indoor air.

- Building conditions: A building with many cracks in the foundation or walls may allow more vapors to enter than a building with a more intact foundation. Most of the homes immediately downgradient of SPS-2 were built before 1970. Cracks in the foundation and walls were documented at many structures in the pre-sample surveys completed between 2022 and 2024 and during installation of soil vapor pins.

6.0 Current and Potential Future Land and Water Uses

OU1 encompasses a broad variety of urban land uses, including commercial businesses, residences, schools, streets, industrial or manufacturing businesses, a railroad corridor and municipal rights-of-way. Properties along Montana Avenue and the railroad corridor, are generally zoned Light Industrial and Heavy Commercial (Figure 3). Properties located further from these corridors are typically zoned for Residential and Residential Multi-Family use. The northeastern edge of the groundwater plume extends into the Central Business District. Multiple parks and public spaces are also located adjacent to or within the groundwater plume boundary. The city of Billings does not use shallow groundwater as a source for its drinking water supply, and there is currently no known use of contaminated, shallow groundwater for drinking water.

7.0 Summary of Site Risks

Human health and ecological risk assessments are an important part of the Superfund process. These risk assessments help EPA determine whether and to what extent remedial action is needed at Superfund sites. In 2025 EPA completed a Baseline Human Health Risk Assessment (HHRA) for OU1 to determine the potential for current and future effects of exposure to COCs via inhalation on human health if no further actions were taken to address the VI pathway at the Site. The OU1 HHRA provides the basis for action and identifies the contaminants and exposure pathways that need to be addressed by remedial action. Future risk assessments for OU2 and OU3 will evaluate public health risks associated with other exposure pathways such as drinking contaminated groundwater, exposure to soils irrigated with shallow groundwater, utility workers' exposure to contaminated soil and groundwater, as well as risks to ecological receptors.

EPA utilizes a four-step process to estimate human health risk at a Superfund site:

1. Analyze Contamination
2. Assess Potential Health Hazards
3. Estimate Exposure
4. Characterize Site Risk

In Step 1, EPA analyzes the concentrations of contaminants found at a site using two types of data to determine exposure from VI:

- Site-specific indoor air or crawlspace air results: VI exposures occur through breathing contaminated indoor air. Indoor air results are the most direct way to evaluate exposures and risks.

- Site-specific sub-slab soil vapor results: People are not exposed to sub-slab soil vapor directly. To use sub-slab soil vapor data in a risk assessment, risk assessors estimate the reduction in vapor concentrations or dilution that occurs when vapors below the slab enter a building and mix with indoor air.

In Step 2, EPA evaluates the potential human health hazards of contamination by looking at information from human or animal toxicity studies. EPA evaluates both cancer and non-cancer health effects to assess this potential toxicity.

In Step 3, EPA considers the different ways that people might be exposed to the potentially hazardous contaminants identified in Steps 1 and 2, the concentrations that people might be exposed to; and the potential frequency and duration of exposure. Using this information, EPA calculates a reasonable maximum exposure scenario, which portrays the highest level of exposure that could reasonably be expected to occur.

In Step 4, EPA brings together the information from Step 2 and Step 3 to evaluate if there is the potential for unacceptable risk at the Site that warrants further action to protect human health.

EPA estimates risk for cancer and non-cancer health effects as described below.

7.1 Cancer Risks

The likelihood of a person developing cancer from exposure to cancer-causing chemicals at a Superfund site is generally expressed as an excess lifetime cancer risk. For example, an excess lifetime cancer risk of "one in ten thousand" means that for every ten thousand people that could be exposed over their lifetime, one extra case of cancer may result from exposure to Site contaminants. One extra case of cancer means that one more person could get cancer during their lifetime than would normally be expected from all other causes. Lifetime cancer risks were evaluated assuming time-weighted exposures beginning as a child and extending into adulthood.

For carcinogens, EPA considers excess lifetime cancer risks between one-in-one million (1 in 1,000,000 or 1E-6) and one-in-ten thousand (1 in 10,000 or 1E-4) to be within the acceptable risk range. For OU1, EPA has selected one-in-one-hundred thousand (1 in 100,000 or 1E-5) as the threshold risk value for evaluating unacceptable risk at the Site, and for calculating cleanup levels. This is the same risk value that DEQ uses for VI cleanups across the state.

7.2 Non-Cancer Risks

For non-cancer risks, EPA compares the following two factors:

1. The concentration of a chemical that is unlikely to cause an adverse, non-cancer, human-health effect. For inhalation exposure pathways like VI, this is known as the reference concentration.

2. The amount of the same chemical that a person could be exposed to at a site. Typically, this is averaged over a long period of exposure. For inhalation exposure pathways like VI, this is known as the exposure point concentration.

EPA calculates a "hazard quotient" for each potential contaminant by dividing the exposure point concentration by the reference concentration. The hazard quotient is interpreted as follows:

1. If the exposure point concentration is greater than the reference concentration, the hazard quotient will be greater than one. This means that adverse non-cancer health effects are possible.

2. If the exposure point concentration is less than the reference concentration, the hazard quotient will be less than one. This means that adverse non-cancer health effects are not likely.

EPA also calculates a hazard index, which is the sum of hazard quotients for chemicals that affect the same part of the human body. EPA sets a target hazard index of one when evaluating and implementing remedies for environmental contamination at a site. This means that for a hazard index greater than one, adverse non-cancer health effects are possible.

7.3 Risk Assessment Findings

The main findings from the human health risk assessment are:

- The VI pathway is complete in at least 13 of the sampled structures that were not mitigated as part of the 2023 – 2024 removal action. The VI pathway may be complete in numerous others that have not been sampled, demonstrating that people are or may be exposed to site-related contaminants by inhaling them in indoor air.
- There are unacceptable risks identified at the Site in indoor air and sub-slab soil vapor based on estimated risks for both non-cancer and cancer human health effects. Of the residential structures, 76 of the 168 evaluated in the HHRA (45%) exceeded a non-cancer hazard quotient of 1; of these, 15 (9%) also had cancer risks exceeding 1E-4. Of the commercial structures, 7 of the 22 evaluated in the HHRA (32%) exceeded a non-cancer hazard quotient of 1; of these, 3 (14%) also had cancer risks exceeding 1E-4.

7.4 Identification of Chemicals of Concerns

There are twelve primary risk drivers identified[4] for OU1. Of the identified primary risk drivers, six contaminants are selected as COCs, requiring remedial response for the Site OU1[5]. The six contaminants include chloroform, cis-1,2-DCE, isopropanol, naphthalene, PCE and TCE.

EPA selected these six COCs to be addressed by the OU1 remedial action because:

- They have been detected in sub-slab soil vapor and/or indoor air at concentrations indicative of a complete VI pathway. This information supports the conclusion that impacts to indoor air are site-related and not due to indoor or other outdoor sources.
- They are sufficiently widespread and show elevated risks in indoor air and sub-slab soil vapor.

Based on the evaluation of the Site risks, the response action selected in this Record of Decision is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

[4] For a thorough explanation on all twelve identified primary risk drivers, please reference the HHRA and the OU1 FFS in the AR listed on the EPA Site webpage.

[5] EPA's PRG Memorandum provides additional detail regarding EPA's decision to carry forward these six COCs. See the OU1 PRG Memo in the AR listed on the EPA Site webpage.

8.0 Remedial Action Objectives

The remedial action selected in this OU1 ROD is necessary to protect the public health or welfare or the environment from the actual or threatened releases of hazardous substances to the environment. The OU1 remedial action is intended to quickly achieve a significant reduction in human health risk posed by VI.

Remedial action objectives (RAOs) are goals specific to media, exposure routes, or COCs for protecting human health and the environment. They are based on unacceptable risks, anticipated current and future land use, objectives of the action and expectations and statutory requirements.

The following OU1 RAOs have been established to address VI risks at the Site:

- Prevent exposure of current and future occupants of structures to COC-contaminated vapors above cleanup standards.
- Prevent the migration of COCs from subsurface media into indoor air to achieve concentrations below cleanup standards for building occupants.

When achieved, these RAOs will address Site risks by preventing exposure to COCs in indoor air at concentrations posing unacceptable risk to human health.

9.0 Description of Alternatives

EPA evaluated two remedial alternatives to meet the OU1 RAOs and reduce people's exposure to site-related contamination in indoor air. Below is a summary of the two remedial alternatives that EPA evaluated.

Alternative 1: No Action

Alternative 2: Appropriate Vapor Intrusion Mitigation

9.1 Alternative 1 – No Action

EPA is required to evaluate a "no-action" alternative when considering potential remedial actions for a Superfund site as a baseline for comparative analysis purposes. Including a No Action alternative is a regulatory requirement that provides clear communication to stakeholders of the effects of inaction and establishes a baseline for comparing costs and benefits of other alternatives. Under Alternative 1, no further action would be taken to address VI at the Site. Based on EPA and DEQ investigations it is expected that this No-Action alternative would allow occupants in affected buildings to be potentially exposed to site-related contamination in indoor air at concentrations that represent unacceptable levels of risk to human health.

9.2 Alternative 2 – Appropriate Vapor Intrusion Mitigation

Alternative 2 includes monitoring, institutional controls and various engineering controls to meet the OU1 RAOs. The remedial actions associated with Alternative 2 are described in detail in Table 3 and include the following actions:

- Monitoring – Monitoring includes sampling of environmental media to identify structures where remedial action is required and to evaluate effectiveness and ensure continued functionality of the vapor mitigation systems.
- Engineering Controls – Engineering controls include using various remedial technologies and process options to mitigate VI. Table 3 lists the available technologies and process options that may be used as appropriate based on structure conditions.
- Institutional Controls – Institutional controls are non-engineered instruments, such as administrative and legal rules, that help minimize the potential for exposure to contamination and/or protect the integrity of a remedial action. For Alternative 2, institutional controls include governmental controls such as city ordinances and deed notifications (Table 4). Please refer to Table 4 for a list of the proposed institutional controls.

Sub-slab depressurization is the most practical, effective and common VI engineering control; therefore, the OU1 remedial action will give preference to sub-slab depressurization. Alternative 2 also includes a variety of other remedial technologies and process options that may be needed in rare instances (Table 3). For example, dewatering of basements may be needed if contaminated groundwater is in direct contact with a basement slab or foundation, perhaps through flooding, or a crawlspace may need to be encapsulated with a vapor barrier to allow for extraction of vapors from beneath the barrier.

9.2.1 Remedy Areas

Under Alternative 2, the Site is divided into three remedy areas, A, B and C, to facilitate remedy implementation (Figure 2).

EPA defined these areas based on concentrations of COCs in groundwater, soil vapor, sub-slab soil vapor and indoor air. For Alternative 2, the remedial action is proposed to be implemented in the three remedy areas as follows:

Area A:

- Encompasses 155 acres, including approximately 706 residential and 39 commercial structures.
- This area is the main area of VI concern because it follows the centerline of high groundwater and soil vapor COC concentrations and includes most PRG exceedances in indoor air and sub-slab soil vapor samples.
- All residential structures in Area A will be eligible for VI mitigation systems without the need for pre-mitigation sampling to determine whether a VI mitigation system is required.
- All commercial structures in Area A will be eligible for sampling. Indoor air and sub-slab soil vapor sampling results will be compared to the OU1 cleanup goals to determine if a VI mitigation system is needed. This is because the cleanup goals for commercial structures are higher than residential cleanup goals.
- EPA will perform direct outreach in Area A to notify tenants and owners of the availability of pre-mitigation sampling and VI mitigation systems.

Area B:

- Encompasses 395 acres, including 723 residential and 741 commercial structures.
- There are some PRG exceedances in indoor air samples and sub-slab soil vapor samples in Area B, but to a lesser extent than in Area A.
- All structures in Area B will be eligible for sampling to determine the need for VI mitigation systems. Indoor air and sub-slab soil vapor sampling results will be compared to OU1 cleanup goals to determine if VI mitigation systems are necessary.
- EPA will emphasize outreach with property owners and tenants in Area B to secure consent for access for sampling.

Area C:

- Encompasses 550 acres, including 1,247 residential and 736 commercial structures.
- There were only sporadic PRG exceedances in indoor air samples and sub-slab soil vapor samples in Area C.

- All structures in Area C will be eligible for sampling. Indoor air and sub-slab soil vapor sampling results will be compared to OU1 cleanup standards to determine if VI mitigation systems are necessary.

- EPA will inform residents and tenants in Area C of sampling opportunities via informational devices such as fact sheets, public meetings and outreach efforts.

Alternative 2 also includes periodic maintenance and monitoring of the VI mitigation systems in Areas A, B and C to evaluate system effectiveness and ensure continued functionality. VI mitigation technologies only reduce risk while the system is operating, so access to the systems for routine inspection and maintenance will be required for all installed systems. This includes VI mitigation systems that will be installed as part of the OU1 remedy and the VI mitigation systems that were previously installed by the EPA removal program. All structures that have a VI mitigation system installed as part of the OU1 remedial action will have pre-sample surveys and baseline sampling performed prior to installation as well as system performance monitoring after installation to evaluate system effectiveness. Periodic long-term monitoring and maintenance will also be performed to ensure continued functionality until the final Site remedy is complete.

EPA understands community concerns about running hundreds of VI mitigations systems concurrently and the potential impacts on outdoor air. Therefore, as a part of Alternative 2, and in alignment with federal and state VI guidance, EPA will consider installing granular activated carbon filters on VI mitigation systems effluent as a process option. For residential structures outside of Area A and all commercial structures, EPA will consider sampling and air dispersion modeling to determine if effluent filtration is needed. If effluent filtration is needed, EPA will include replacing and maintaining the filters as part of the operation and maintenance of the remedy.

10.0 Comparative Analysis of the Alternatives

The NCP identifies nine evaluation criteria for evaluating remedial alternatives. The purpose of this evaluation is to promote consistent identification of the relative advantages and disadvantages of each alternative, thereby guiding selection of remedies that offer the most effective and efficient means of achieving site cleanup goals. There are two threshold criteria that a remedial alternative must meet to be eligible for selection, five balancing criteria to help identify trade-offs between alternatives, and two modifying criteria that are evaluated after public comment. All nine criteria are described in Table 5, and a discussion of how each alternative meets or does not meet each criterion is below. Additionally, a summary of alternative compliance with each criterion is presented in Table 6.

10.1 Overall Protection of Human Health and the Environment

Alternative 1 (No Action) would provide no improvement over current conditions and no risk reduction and therefore would not be protective of human health or the environment. Alternative 1 does not meet the threshold criterion of overall protection of human health and the environment and is therefore not eligible for selection. For this reason, Alternative 1 is not assessed further.

Alternative 2 (Appropriate VI Mitigation) would protect structure occupants from exposure to site-related vapors in indoor air by mitigating VI. However, Alternative 2 will not address the source of contaminated soil vapor (contaminated groundwater, soil or DNAPL). These sources will be addressed under OU2 and OU3 remedial action. Therefore, Alternative 2 is intended to protect human health from the VI pathway but does not address the source areas and groundwater that are being investigated under OU2 and OU3. EPA believes that the VI mitigation systems may no longer be necessary once OU2 and OU3 are addressed. The actual duration of the OU1 remedy is estimated to be 35 years until the OU2 and OU3 remedies are completed. Alternative 2 is protective of human health with respect to risks associated with the VI pathway.

10.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

ARARS are the specific environmental standards under federal and state environmental law that apply to the remedial action of OU1. The mitigation components of Alternative 2 would trigger ARARs including:

- Waste characterization and, if applicable, solid and hazardous waste management requirements for any materials generated as part of VI mitigation installation.

- Discharge limits and pre-treatment requirements if mitigation requires discharge of groundwater collected in sumps to surface waters (likely through city of Billings sanitary or stormwater sewers).

The OU1 ARARs are listed in Appendix B. The resources and expertise needed to comply with these ARARs are available, and there are no technical or administrative impediments to compliance. Thus, Alternative 2 will comply with ARARs.

10.3 Long-term Effectiveness and Permanence

Alternative 2 (vapor intrusion mitigation, monitoring and institutional controls) will not achieve long-term effectiveness and permanence because this remedial alternative does not reduce or eliminate the sources of vapor-forming chemicals. If Alternative 2 was the only remedial alternative implemented at the Site, residual risks would remain as soon as the VI mitigation systems were turned off. However, if the VI mitigation systems are maintained and continuously operated as intended, building occupants will be protected from unacceptable VI exposures and risks for the duration of the remedy.

EPA will address contaminated groundwater, soil and source areas as part of the OU2 and OU3 remedies, which will be designed to achieve long-term effectiveness and permanence at the Site.

10.4 Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

Alternative 2 will not significantly reduce the toxicity, mobility or volume of hazardous substances through treatment. Alternative 2 is designed to mitigate occupant exposure to COCs in indoor air primarily by preventing VI. The most common engineering control, SSDS, functions by interrupting the pathway between subsurface contaminants and indoor occupants. The systems do not treat or reduce the overall volume, toxicity or mobility of contaminants in the subsurface, but rather redirect the vapors from entering the structure. At some structures, based on location and sampling results, effluent filters may be used in conjunction with mitigation systems. This will provide some treatment due to the capturing of vapors in granular activated carbon, reducing the total volume and mobility of contaminants at the Site.

10.5 Short-term Effectiveness

Alternative 2 could be implemented at impacted structures within a reasonable timeframe after the ROD is signed. The installation of each individual SSDS can be completed in less than one day at residential structures and can take up to one week for the installation of larger commercial systems. If other engineering controls are necessary, implementation of the remedy per property may require more time.

EPA expects that within the first five years of the remedy period, most buildings where VI occurs, or has the potential to occur, will be identified and appropriately addressed through public outreach efforts for sampling access and then sampling. The timeframe to implement Alternative 2 is dependent upon owner and occupant interest and willingness to allow access for sampling and installation of VI mitigation. No case studies were found to provide data on rate of acceptance for pre-emptive VI mitigation, and it is unknown how much interest there will initially be. Therefore, if interest exceeds the capacity of EPA's contractor, criteria may need to be developed to prioritize the order of installations. While the criteria will be developed as part of the remedial action, factors such as age of occupants, length of time occupants have lived in the structure, age of structure, use of basement and integrity of the foundation will be considered. If a structure qualifies for a VI mitigation system, it will be installed based on the priority criteria.

Once a SSDS is installed, the system begins to work immediately to mitigate VI. The effectiveness of SSDS has been demonstrated through sampling systems that have been installed at the Site as part of previous EPA removal actions. Comparing post-mitigation sampling with pre-mitigation sampling results for these systems shows a reduction in contaminant concentrations in indoor air. SSDS and most VI mitigation technologies collect and divert sub-slab soil vapor to the roofline of the property. Given the large number of VI mitigation systems that will be installed for residential structures in Area A, effluent vapors will be treated using adsorption material such as granular activated carbon to prevent vapors from accumulating in outdoor air.

The implementation of Alternative 2 would not be expected to result in short-term risks to the community, the workers installing the VI mitigation systems, or the general environment. Any potential threats to the workers from encountering site-related contaminants during VI system installation would be evaluated and mitigated by preparation, implementation and adherence to a health and safety plan.

10.6 Implementability

Due to structure conditions that vary by building, the appropriate Alternative 2 remedial action for each building will be determined on a case-by-case basis. Therefore, the degree of implementability will vary by building. Despite this, Alternative 2 is generally considered to be readily implementable. Implementability of SSDS has already been demonstrated by successful installations at 35 buildings within OU1, and these systems have demonstrated reductions in contaminant concentrations in indoor air. Poor slab and HVAC conditions, as noted at some buildings at the Site, may make implementation of various VI mitigation processes more difficult. Further, larger scale buildings like commercial buildings, require greater engineering and planning. Services, equipment and materials for implementing appropriate VI mitigation are generally readily available, and the remedial technologies included as options are generally proven effective.

No permits or other regulatory approvals are needed for most process options[6] (Table 3) and therefore will not be obtained. Depending on the complexity of the modification, permits are obtainable at the request of the property owner. If management of solid and hazardous waste is necessary, sufficient commercial resources are available to characterize and manage the waste.

Alternative 2 includes various process options (Table 3) that provide EPA with flexibility when implementing VI mitigation systems at a given building. For example, if EPA determines that a SSDS is insufficient to protect human health and the environment at a specific property, then EPA can utilize the other available process options to reach adequate protection. Overall, the number of new buildings being sampled or mitigated is expected to decrease as the number of building owners that have either accepted or declined sampling and mitigation reaches a steady state. Some new buildings will continue to be added as properties change ownership, or owners

[6] For more information regarding the permit exclusion, please reference CERCLA 42 U.S. Code § 9621(e).

provide new access for sampling and VI mitigation. Such instances will likely be few, relative to the initial sampling and mitigation efforts.

10.7 Cost

A net present worth analysis was conducted for the OU1 FFS and resulted in an estimated present worth cost of $33,608,000 and a 2024 value of $42,821,000 over 35 years[7]. Multiple components of the Selected Remedy were included in this cost estimation, including an estimated cost for system installation. Based on the calculations, EPA estimated each residential SSDS to cost $14,100 and each commercial/large scale SSDS system to cost $98,200. The actual duration of the OU1 remedy is unknown but was estimated to be 35 years until the entire site-wide remedy is complete. Since the cost of the remedy is highly dependent on tenants' and owners' willingness to allow EPA access for monitoring and installation, there is a high level of uncertainty associated with the number of structures that will have a VI mitigation system installed by the EPA in the cost estimate. For this reason, the estimated cost is an order-of-magnitude engineering cost estimate that is expected to be within –30 to +50 percent of the actual project cost. The full capital costs, annual O&M costs and present worth costs are presented in Table 7.

10.8 State Agency Acceptance

As the state support agency, DEQ has expressed support for Alternative 2 for the OU1 remedial action as described in this ROD. The DEQ concurrence letter is included in Appendix A.

10.9 Community Acceptance

The public comment period was open for 60 days, and comments were received via email and during the formal comment session at the public meeting. The community generally supports Alternative 2. EPA's response to the public comments is included in Section III of this ROD – the Responsiveness Summary. The public comment transcript is also available in the AR.

[7] See Appendix D of the OU1 FFS for detailed line items and basis for the cost estimate.

11.0 Principal Threat Wastes

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (40 CFR §300.430(a)(1)(iii)(A)). Principal threat waste is source material considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water or air, or acts as a source for direct exposure. Contaminated groundwater is generally not considered to be a source material.

This response action does not address source materials constituting principal threats because the focus of OU1 is on the mitigation of a VI pathway, and not the source material. The selected remedial action in this ROD solely addresses the human exposure route from VI of site-related contaminants into buildings from contaminated groundwater or other site-related subsurface sources of contamination. Soil vapor is neither a source material nor a principal threat waste.

12.0 Selected Remedy

12.1 Summary of the Rationale for the Selected Remedy

EPA selects *Alternative 2 – Appropriate Vapor Intrusion Mitigation* as the remedy for OU1 because it represents the best balance among alternatives with respect to the evaluation criteria, given the limited scope of the remedial action. Additionally, Alternative 2 is the only alternative that meets the threshold criteria: Overall Protection of Human Health and the Environment and Compliance with ARARs. The installation of appropriate VI mitigation systems will protect human health and the environment by preventing site-related contaminants from entering indoor air at levels that pose an unacceptable risk to human health and comply with ARARs. The Selected Remedy is readily implementable and will be expeditiously effective at a reasonable cost.

12.2 Description of Selected Remedy

The Selected Remedy for OU1 consists of monitoring, engineering controls, institutional controls and outreach, as described in Section 9.2. Table 9 details the selected institutional controls, including ordinances by the city of Billings. If the ordinances are not established as intended, EPA will implement alternative institutional controls in lieu of the ordinances. The purpose of the OU1 institutional controls is to ensure the remedy remains protective, future development is equipped with protective engineering controls, and that all residents are aware of the contamination and EPA remedy opportunities.

Sub-slab depressurization is the most practical, effective and common VI engineering control; therefore, the OU1 Selected Remedy will give preference to SSDS. Alternative 2 also includes a variety of other remedial technologies and process options that may be needed in rare instances (Table 3). For example, dewatering of basements may be needed if contaminated groundwater is in direct contact with a basement slab or foundation, perhaps through flooding, or a crawlspace may need to be encapsulated with a vapor barrier to allow for extraction of vapors from beneath the barrier. Property owners may choose to install their own SSDS system to mitigate vapors, but EPA is not able to reimburse those costs. Owner-installed systems would remain the property owner's responsibility and would not be eligible for EPA/DEQ long-term monitoring and maintenance. However, properties with a pre-existing SSDS may be eligible for indoor air sampling and other engineering controls (Table 3) if necessary.

EPA will require signed Consent for Access forms granting EPA and/or its authorized representatives' access to a property to inspect, monitor and maintain a SSDS. The Consent for Access form will also request that property owners refrain from activities that would interfere with the SSDS performance. Outreach to the community will continue to be a Site priority. EPA will contact owners and tenants directly, typically through personalized emails, phone calls, face to face or other methods, regarding availability of SSDS without additional sampling. Letters and fact sheets regarding availability of sampling and SSDS, if warranted based on sampling, will be distributed to inform the community of the opportunity for sampling. Fact sheets will also provide a Site update on the remedy status of OU1.

Table 8 lists the applicable residential and commercial indoor air and soil vapor cleanup standards for the OU1 Selected Remedy. The cleanup standards for COCs in indoor air were calculated using the EPA Vapor Intrusion Screening Level (VISL) calculator, assuming standard equations and default exposure parameters for the residential and worker scenarios. The PRGs were calculated using a cumulative noncancer hazard index of one and a total excess lifetime cancer risk of 1E-5, and the lower (i.e. more health protective) of the two was selected as the cleanup standard for each COC. Each cleanup standard was rounded to two significant figures when > 100 $\mu g/m^3$, or one significant figure when < 100 $\mu g/m^3$. Residential cleanup standards are lower than the commercial cleanup standards because, on average, people spend more time in residential buildings than in commercial buildings.

Additionally, sub-slab soil vapor cleanup standards (Table 8) were developed by applying a default attenuation factor to the indoor air cleanup standard to determine the soil vapor concentration beneath a structure that would correspond to the indoor air cleanup standard. VI mitigation will be necessary if sampling shows that soil vapor concentrations exceed the cleanup standards.

12.3 Summary of the Estimated Remedy Costs

A net present worth analysis was conducted for the OU1 FFS and resulted in an estimated remedial action capital cost of $18,578,000, estimated remedial design capital cost of $5,434,000 a present worth cost of $33,608,000, and a 2024 value cost of $42,821,000 over 35 years[8] (Table 7). The cost estimate evaluated remedial design, remedial action and O&M costs over the duration of the remedy. Remedial design costs included costs associated with pre-mitigation monitoring to determine eligibility for a mitigation system and any mitigation system design. Remedial action costs included baseline sampling, mitigation system installation, post-mitigation monitoring for the Operational and Functional (O&F) determination and the cost to implement institutional controls. O&M costs included costs necessary to ensure or verify the continued effectiveness of the remedial action once a mitigation system has been determined to be O&F and transferred to the state to manage O&M. The cost estimate for each individual remedy component is included in Table 7.

It was assumed that SSDSs with effluent filtration would be the preferred method for VI mitigation for the cost estimate. EPA estimated each residential SSDS with effluent filtration to cost $14,100 and each commercial/large scale SSDS with effluent filtration to cost $98,200, not including any associated sampling or design costs. The cost estimate assumed that 60% of residential structures in Area A would allow EPA access for installation of mitigation systems and that 30% of the total number of structures eligible would allow EPA access for sampling to determine if VI mitigation is needed.

The actual duration of the OU1 remedy is estimated to be 35 years until the entire site-wide remedy is complete. Since the cost of the remedy is highly dependent on tenant and owner's

[8] See Appendix D of the FFS for detailed line items and basis for the cost estimate.

willingness to allow EPA access for monitoring and installation, there is a high level of uncertainty associated with the number of structures that will have a VI mitigation system installed by EPA. For this reason, the estimated cost is an order-of-magnitude engineering cost estimate that is expected to be within –30 to +50 percent of the actual project cost.

12.4 Expected Outcomes of the Selected Remedy

EPA expects the following outcomes after the OU1 Selected Remedy is implemented:

- The VI mitigation systems that are installed will effectively reduce the indoor air concentrations of COCs and lower human health risks to acceptable levels.
- The monitoring and maintenance of mitigation systems included in the Selected Remedy will keep the systems operating effectively until subsurface contamination is sufficiently remediated.
- Long term institutional controls, such as city of Billings ordinances for new construction, notifications to rental tenants, land use changes and deed notifications at properties that deny sampling or the installation of a SSDS or other process option (Table 9) will help minimize the potential for human exposure to contamination and protect the integrity of the Selected Remedy.

In addition to the expected outcomes of the Selected Remedy, EPA will continue community outreach with residents in the city of Billings. This is to ensure all residents are aware of sampling and mitigation offerings.

13.0 Statutory Determinations

Under CERCLA §121 and the NCP (40 CFR §300.430(f)(5)(ii)), EPA must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the toxicity, mobility, or volume of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the Selected Remedy meets these statutory requirements.

13.1 Protection of Human Health and the Environment

The Selected Remedy required by this ROD will be protective of human health and the environment. Protection of human health will be achieved by installing VI mitigation systems at properties where EPA has determined that VI of site-related contaminants into indoor air poses an unacceptable risk to human health. The VI mitigation systems will prevent site-related contaminants in vapor form from migrating from the subsurface into indoor air at concentrations which represent a threat to human health. Long-term O&M, institutional controls and outreach will ensure there are few disruptions to the remedy, new risks are not introduced to the Site and all residents are aware of the availability of sampling and mitigation systems.

13.2 Compliance with Applicable or Relevant and Appropriate Requirements

This remedial action is limited in scope and cleanup values were based upon the risk-based PRGs outlined in the PRG memo, following the conclusions of the OU1 HHRA. This section, in combination with Appendix B, details the ARARs regarding the OU1 Selected Remedy.

ARARs are state or federal cleanup standards, controls, or provisions that specifically address the hazardous substances, remedial action being taken, location, or other site circumstance (“applicable” requirements) as well as those standards, controls or provisions that do not directly or fully address specific site activities but address similar situations or problems likely to be encountered as determined on a site-specific basis (i.e., ”relevant and appropriate” requirements). Federal ARARs are those requirements under any federal environmental law. State ARARs are those requirements that are more stringent or broader in scope than federal requirements. Appendix B includes a federal ARARs table and a separate state ARARs table. Requirements that are not federal or state requirements, are not environmental in nature, or are not substantive, are not ARARs. An ARAR may be either “applicable” or “relevant and appropriate,” but not both. If there is not a specific federal or state ARAR for a particular remedial action, or if the existing ARARs are not considered sufficiently protective, then other criteria or guidelines may be identified for consideration and used to ensure the protection of public health and the environment.

ARARs fall into three categories: chemical-specific, location-specific and action-specific. The Appendix B ARARs tables also includes to-be-considered (TBC) criteria which are non-promulgated advisories, criteria, or guidance issued by federal or state governments that are not

legally binding but are used in conjunction with ARARs. The TBC materials identified for OU1 include DEQ's *Vapor Intrusion Guide* and *Effluent Vapor Modeling Guidance*.

13.2.1 Chemical-Specific ARARs

Chemical-specific ARARs are usually health- or risk-based numerical values or methodologies used to determine acceptable concentrations of chemicals that may be found in or discharged in the environment.

EPA and DEQ have identified chemical-specific state ARARs for the OU1 Selected Remedy. No federal chemical-specific ARARs were identified for the OU1 remedy. State chemical-specific ARARs related to effluent concentrations or point-source discharges that may result from implementation of the OU1 remedy (for example, during construction or installation of systems that require dewatering) are described in detail in Appendix B. Compliance with groundwater-related ARARs is outside the scope of the OU1 ROD and will be addressed under OUs 2 and 3.

EPA has the resources and expertise needed to comply with these ARARs and there are no technical or administrative impediments to compliance. Thus, EPA has determined that the Selected Remedy will comply with chemical-specific ARARs.

13.2.2 Location-Specific ARARs

Location-specific requirements are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in particular locations. No federal or state location-specific ARARs were identified for the OU1 Selected Remedy.

13.2.3 Action-Specific ARARs

Action-specific ARARs are usually technology- or activity-based requirements or limitations on actions involving the management of hazardous substances. State and federal action-specific ARARs relating to transportation and disposal of hazardous and solid waste and dewatering for the OU1 remedy are identified in detail in Appendix B.

EPA has the resources and expertise needed to comply with these ARARs and there are no technical or administrative impediments to compliance. Thus, EPA has determined that the Selected Remedy will comply with action-specific ARARs.

13.3 Cost Effectiveness

The Selected Remedy is cost-effective because it represents a reasonable expenditure of funds relative to the benefits achieved. The NCP requires that "a remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (See the NCP at 40 CFR §300.430(f)(1)(ii)(D)). In evaluating this requirement, EPA evaluated the overall effectiveness of the alternative that satisfied the threshold criteria (i.e., was both protective of human health and the environment and ARAR-compliant) by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, or volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of the Selected

Remedy was determined to be proportional to its cost; therefore, the Selected Remedy represents a reasonable value for the funds expended.

13.4 Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

The Selected Remedy is not intended to be a permanent solution. The Selected Remedy does not use alternative treatment (or resource recovery) technologies to the maximum extent practicable. The focus of the OU1 ROD is addressing indoor air risks associated with the VI pathway. EPA has determined that the only viable alternative for OU1 is to prevent contaminated soil vapors from entering impacted properties through monitoring and installation of VI mitigation systems. Future remedial actions for OU2 and OU3 are expected to provide a permanent solution, as they will address the underlying cause of VI of site-related contaminants into buildings at the Site.

13.5 Preference for Treatment as a Principal Element

The Selected Remedy does not satisfy the statutory preference for treatment as a principal element of the remedy because the source material is not addressed through the OU1 Selected Remedy.

13.6 Five-Year Review Requirements

CERCLA §121(c) and the NCP (40 CFR §300.430(f)(5)(iii)(C)) provide the statutory and legal basis for conducting five-year reviews. Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

14.0 Documentation of Significant Changes from Preferred Alternative of Proposed Plan

The Proposed Plan for the Site was released for public comment on July 28, 2025. The Proposed Plan identified the Preferred Alternative to address properties where VI of site-related contaminants to indoor air poses an unacceptable risk to human health. The Proposed Plan public comment period ran from July 28 to September 26, 2025. CERCLA Section 117(b) and NCP Section 300.430(f)(5)(iii) require an explanation of any significant changes from the remedy presented in the Proposed Plan that was published for public comment. Based on review of the written and oral comments submitted during the public comment period, and EPA's review of the Proposed Plan, EPA has determined that some changes to the remedy, as originally identified in the Proposed Plan, are necessary or appropriate.

The first change is the issuance of a final ROD instead of an interim ROD. Upon review, EPA determined the Selected Remedy adequately addresses VI mitigation for the long-term and is protective of human health. The decision to issue a final ROD reflects this determination and ensures the remedy will be implemented consistently throughout OU1 remedial action. While the OU1 Selected Remedy is limited to the VI pathway, it is now considered the final remedy for OU1.

Additionally, EPA has refined ICs. Specifically, EPA determined that the proposed outreach ICs are best categorized as an outreach method and are not enforceable through an IC. EPA also clarified that the rejection of access to sample a property will result in a deed notification after multiple attempts. This additional IC was originally inferred in the Proposed Plan ICs table (Table 4) but is now clarified in Table 9. All aspects of the proposed ICs were retained throughout the Selected Remedy, and the distinction did not affect the cost estimates.

SECTION III: RESPONSIVENESS SUMMARY

In accordance with CERCLA Section 117, 42 U.S.C. Section 9617, EPA released the Proposed Plan and Administrative Record (AR) on July 28, 2025, and the public comment period ran through September 26, 2025, to allow interested parties to comment on the Proposed Plan. EPA held a public meeting regarding the Proposed Plan on August 27, 2025, at the Billings Public Library in Billings, Montana. Approximately 85 people attended the public meeting, including residents, members of the city council, staff from the Montana Department of Environmental Quality (DEQ) and local business owners.

EPA received written comments during the public comment period and there was also an opportunity to make verbal comments at the public meeting. A copy of the comments received, along with a written transcript of the public meeting, are included in the AR for the Site. This Responsiveness Summary provides both a summary of the public comments EPA received regarding the Proposed Plan and EPA's response to those comments.

Numerous comments were similar and focused on a limited number of topics. In addition, many of the comments required comprehensive responses. Therefore, comments were addressed by subject. Many of these subjects are interrelated and readers are urged to review the Responsiveness Summary in its entirety and read the ROD.

1.0 Human Health Risk

Commenters sought guidance on exposure pathways and health protections, including the safety of private well water used for home grown produce and vapor intrusion (VI) contamination to produce, past and planned EPA/State public health monitoring and interim measures to reduce indoor air risks pending permanent remedies. Commenters also inquired about protection for sensitive populations, as well as how to test indoor air and well water and where to find applicable health-based standards for air and water. Finally, they also asked about the local high school's inclusion in the remedy.

EPA Response:

Private wells within the Site boundary should not be used for drinking water by people, pets or livestock as it is not a potable source. Skin contact with well water should also be avoided. However, well water may be used to irrigate lawns, gardens and fruit trees as the chlorinated solvents are highly volatile and largely move from water into the air, leaving little to be taken up or retained by produce. Contaminant levels are even lower with spray irrigation.

EPA has completed a baseline human health risk assessment for OU1 (Section 7.0) to determine the current and future effects of contaminants on human health. EPA intends to continue monitoring conditions and to conduct ongoing indoor air sampling as part of the Selected Remedy. Residents may contact EPA to request sampling at their property. For personal health concerns, EPA recommends consulting your physician or local health department. The Montana Department of Public Health & Human Services is currently conducting a Public Health Assessment that will evaluate potential site-related exposures, which will be posted on the Site's webpage when complete. Additional information on health effects of hazardous substances found at Superfund sites is available on the ATSDR website[9].

Cleanup standards for vapors in indoor air are provided in Table 8. Preliminary remediation goals for groundwater at OU2 will be released in the OU2 Proposed Plan. In the meantime, relevant drinking water standards can be found in Montana DEQ-7[10] and on the EPA website.[11] Until permanent vapor mitigation systems are installed, residents can reduce potential indoor air risks by sealing foundation cracks, removing or relocating indoor sources of volatile chemicals and increasing ventilation. Please see EPA's vapor intrusion resources for more guidance[12].

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[9] Agency for Toxic Substances and Disease Registry (ATSDR)'s webpage: Toxicological Profiles

[10] Montana DEQ-7: https://deq.mt.gov/files/Water/WQPB/Standards/PDF/DEQ7/DEQ-7.pdf

[11] National Primary Drinking Water Regulations: https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations

[12] More information about vapor intrusion: https://www.epa.gov/vaporintrusion

The high school located within the Site boundary has been sampled multiple times, and a vapor mitigation system was installed in 2024. All properties with an EPA installed vapor mitigation system will receive ongoing maintenance and monitoring.

2.0 Mitigation Systems and Other Proposed Remedies

Commenters focused on implementation and quality assurance of vapor intrusion mitigation, the homeowner's role in remedy sign-off, whether residents can install their own systems and be reimbursed and how slab heaving and cracks could affect system performance. They also asked what systems will look like, what long-term maintenance entails and who pays for electricity, whether existing radon systems could mask solvent contamination and why groundwater cannot simply be pumped and treated instead of (or in addition to) vapor mitigation.

EPA Response:

EPA implements a comprehensive process to ensure the effectiveness of vapor mitigation systems. EPA specifies the scope and required materials, certified contractors install systems and post-installation verification testing confirms indoor air meets cleanup standards. EPA and DEQ will continue periodic monitoring to ensure long-term performance and will stay in regular contact with property owners. The property owner's role includes granting long term access for sampling, installation and monitoring, notifying EPA of operational issues and not tampering with the systems.

Property owners may choose to install their own radon/vapor mitigation system to mitigate vapors, however, EPA is not able to reimburse those costs. Owner-installed systems would remain the property owner's responsibility and would not be eligible for EPA/DEQ long-term monitoring and maintenance. EPA does not recommend specific vendors, but DEQ maintains a list of available radon mitigation providers.[13] In Billings, expansive clay soils can result in slab heaving and cracking and potentially reduce mitigation efficiency as systems rely on sealed barriers. Therefore, filling cracks is included in the Selected Remedy, indoor air will be tested after installation to verify performance and ongoing monitoring, and maintenance will identify and address issues if they arise.

Maintenance will include checking fan operation (e.g., via a manometer), inspecting pipes and seals, ensuring vents are clear, changing carbon filters and periodically testing indoor air. Property owners must provide long-term access and pay the electricity costs to run the fan, roughly equivalent to a 75watt lightbulb operating continuously. Mitigation systems typically consist of piping and a fan that draws air from beneath the slab and vent it above the roofline, which is similar to a radon mitigation system (Figure 9). This ROD addresses immediate human health concerns associated with indoor air contamination at OU1. Groundwater remediation will be evaluated and addressed under subsequent OU2 and OU3 remedial actions.

[13] DEQ Radon information: https://deq.mt.gov/energy/Programs/radon

3.0 Real Estate

Commenters asked about disclosure requirements for sellers and real estate professionals and whether prospective buyers are being adequately informed about the Site. They also sought clarity on how the Superfund designation may affect local property values and marketability.

EPA Response:

Under State law, Montana Code Annotated § 70-20-502, sellers must provide a disclosure statement to prospective buyers identifying any adverse material facts that concern residential property and of which the seller has actual knowledge.

EPA does not offer specific property value trend assessments, and we advise consulting local real estate agents, lenders, appraisers, assessors and relevant local government offices for current market information.

EPA has been engaging the local realtor community through meetings and education sessions about the Site. The ROD also recommends city of Billings ordinances requiring vapor intrusion mitigation in new construction and requiring owners to notify tenants about sampling availability, results and mitigation installations. If an owner denies access for mitigation or post-mitigation monitoring, EPA may file a deed notice to inform future owners about the availability of sampling and mitigation.

4.0 History, Next Steps and Timelines

Commenters requested expedited testing and clear, predictable timelines for implementing the remedy, noting some homes haven't been tested since 2007 and that uncertainty is already affecting property transfers and values. They also asked for a transparent accounting of past actions, clarification on the site-wide remedy sequence, and acknowledgement that impacts may persist for decades.

EPA Response:

EPA acknowledges the community's urgency. The intent of the OU1 ROD is to expedite the mitigation of VI while investigation and planning for the source area and groundwater continue. Implementation of the Selected Remedy will occur in an order of priority. Additional details on the priority order are provided in Section 10.5.

In 2008, under CERCLA removal authority, EPA installed sheet pile to contain the contaminated groundwater near the main source area (SPS-2) and conducted soil excavation and groundwater amendment injections to decrease contamination. In 2023–2024, EPA installed vapor mitigation systems at 25 homes, a high school and two businesses. These removal actions only partially addressed Site contamination. EPA is now proceeding under CERCLA remedial action authority to address remaining contamination.

Site-wide cleanup will occur in phases. OU1 addresses the most pressing human health concern - exposure to Site related vapors. OU2 will address residual contamination from the predominant

source at 7th and Central Avenue (soil, soil vapor and groundwater). OU3 will address additional potential sources and resulting groundwater contamination. After remediation, EPA and DEQ will conduct regular monitoring to confirm the Selected Remedy meets cleanup standards. Superfund cleanups are a long-term effort, but this phased approach will reduce risk as quickly as possible while maintaining long-term protectiveness.

5.0 Availability of Information

Commenters asked about transparency and access to information, including whether property owners will receive written vapor testing results, whether results will be publicly available, how to obtain the public meeting materials presented and where the published Record of Decision will be provided. They also expressed frustration that questions were not answered during the public meeting and asked why residents were not informed of the Superfund site earlier.

EPA Response:

EPA provides written vapor testing results to property owners and historical results are available in data summary reports and the OU1 Focused Feasibility Study. To protect privacy, names and addresses are redacted. Property owners and tenants can contact EPA for past results for their specific property. The public can access the public meeting presentation and OU1 Proposed Plan on the Billings PCE Superfund site website.[14] Once final, the ROD will be posted electronically on the Site webpage, placed in the Site repository at the Billings Public Library and hard copies can also be requested from EPA. Interested community members are encouraged to join the email mailing list on the website for updates.

Questions and comments submitted during the Proposed Plan public comment period are addressed in this Responsiveness Summary, and EPA staff were available for individual discussion before and after the Proposed Plan public meeting. EPA has conducted outreach since 2006, including public meetings, newspaper and radio notices, mailings, emails and web postings. EPA remains committed to ongoing community engagement.

6.0 Support for Alternative 2

Commenters expressed appreciation for the RPMs' efforts and communication, encouraged neighbors to participate in the non-invasive indoor air sampling and voiced support for installing mitigation systems in residential buildings. They also urged more proactive, direct outreach (e.g., mailed flyers) and noted that broader notification should have begun earlier.

EPA Response:

[14] Please visit https://www.epa.gov/superfund/billings-pce.

EPA acknowledges and appreciates the supportive comments regarding the RPM's work and on-going communication. EPA also acknowledges the expressed support for installing mitigation systems in all residential buildings.

TABLES

Table 1: Residential Targeted Groundwater Concentrations

Chemical	Abbreviation	Screening Level (µg/L)
Tetrachloroethene	PCE	10
Trichloroethene	TCE	0.9

Table 2: Preliminary Remediation Goals for COCs

Chemical	Abbreviation	Residential Indoor Air (µg/m^3)	Residential Soil Vapor (µg/m^3)	Commercial Indoor Air (µg/m^3)	Commercial Soil Vapor (µg/m^3)
Tetrachloroethene	PCE	42	1,390	175	5,840
Trichloroethene	TCE	1.0	35	4.4	146
cis-1,2-Dichloroethene	cis-DCE	21	695	88	2,920
Isopropanol	None	209	6,950	876	29,200
Naphthalene	None	0.4	14	1.8	60
Chloroform	None	0.6	20	2.7	89

Table 3: Process Options Associated with Alternative 2

Process Option	Description	Alternative 1: No Action	Alternative 2: Appropriate Vapor Intrusion Mitigation
Institutional Controls	See Table 4	Not a process option	Included as a process option

Process Option	Description	Alternative 1: No Action	Alternative 2: Appropriate Vapor Intrusion Mitigation
Monitoring - Air Sampling and Analysis and Visual Inspections	Sampling indoor air, crawlspace air and sub-slab soil vapor in structures to assess the need for vapor intrusion mitigation. Sampling indoor air, crawl space, sub-slab soil vapor, or vapor intrusion mitigation system effluent in structures where vapor intrusion is being mitigated. Outdoor air will also be sampled during indoor air investigations. Visual inspections and testing of the vapor intrusion mitigation systems will be periodically conducted.	Not a process option	Included as a process option
Sealing the Vapor Entry Points	Involves filling cracks in the floor slab and gaps around pipes and utility lines in basement walls or pouring concrete over unfinished dirt floors.	Not a process option	Included as a process option
Sub-Slab Depressurization	A mitigation system that creates negative pressure below a building's concrete slab to prevent vapors from entering. This is achieved by using a fan to draw air from beneath the slab and vent it outdoors, effectively preventing vapors from migrating into the building. Sub-slab depressurization systems are typically installed by cutting holes in the slab, installing PVC pipes and connecting them to a fan.	Not a process option	Included as a process option
Sub-Membrane Depressurization	A method of actively drawing air from under a vapor barrier in a crawlspace. It works by encapsulating the crawlspace with a plastic liner, creating a space for a fan to pull air from below the liner and venting it outside. This process creates negative pressure, drawing contaminants out from under the barrier.	Not a process option	Possibly a process option

Process Option	Description	Alternative 1: No Action	Alternative 2: Appropriate Vapor Intrusion Mitigation
Block Wall Depressurization	A mitigation method used in homes with concrete block foundations. It works by creating a vacuum within the hollow spaces of the block wall to draw out vapors and vent them to the outside preventing them from entering the home through these voids.	Not a process option	Possibly a process option depending on structure conditions
Drain Tile Depressurization	A mitigation method that utilizes an existing drain tile system to create a vacuum that draws vapors from the soil and vents it outside, preventing it from entering a home or building. This method involves creating negative pressure within the drain tile network, essentially acting as an underground ventilation system.	Not a process option	Possibly a process option
Sewer Vapor Depressurization	A mitigation method used in locations where contaminant vapors are entering through the sewer pipes. It works by reducing the pressure of sewer vapors within a plumbing system or subsurface area, typically using a fan installed at the outlet of the main sewer vent, to prevent vapors from entering a building.	Not a process option	Possibly a process option
Exterior Subsurface Soil Depressurization / Soil Vapor Extraction	A method used to mitigate vapor intrusion by creating negative pressure beneath a building's foundation, thereby drawing vapors away from the structure and venting it outdoors.	Not a process option	Possibly a process option
Sump or Drain Tile Dewatering System	Uses perforated pipes, typically made of plastic, to collect and remove excess water from soil, often used to prevent basement flooding. These systems route water to a collection point like a sump pit, where a sump pump removes it.	Not a process option	Possibly a process option

Process Option	Description	Alternative 1: No Action	Alternative 2: Appropriate Vapor Intrusion Mitigation
Granular Activated Carbon (GAC) Indoor Air Treatment	A treatment process that uses loose granules of activated carbon to remove contaminants by adsorption from indoor air. GAC is highly porous, providing a large surface area for trapping chemicals, organic compounds and other pollutants.	Not a process option	Possibly a process option
Granular Activated Carbon (GAC) Effluent Air Treatment	Uses GAC filtration to remove contaminants from the effluent of other treatment technologies before venting to outdoor air.	Not a process option	Included as a process option
Actively Increase Structure Ventilation	Adds fresh air into a building to dilute contaminants in indoor air. Can be used with or without heat or energy recovery ventilation.	Not a process option	Possibly a process option
Indoor Air Pressurization	Refers to increasing the air pressure inside a building or room relative to the air pressure outside. Maintaining slightly positive pressure helps prevent contaminants from entering the building.	Not a process option	Possibly a process option
Active or Passive Sub-Slab Ventilation	Primarily applicable to new structures, perforated piping is set in the foundation to direct vapors from under the building to vent above the roofline of the structure to outdoor air. It can use passive ventilation, or a fan may be added for active ventilation.	Not a process option	Possibly a process option
Vapor Barriers	Consist of a thin layer of impermeable material, typically polyethylene sheeting, included in building construction to prevent vapors from entering a building.	Not a process option	Possibly a process option

Table 4: Proposed Institutional Controls for Alternative 2

Institutional Controls	Remedy Area A[1]	Remedy Area B[1]	Remedy Area C[1]
City of Billings ordinance requiring vapor intrusion mitigation measures for new construction.	Yes	No	No

City of Billings ordinance requiring owners to notify tenants regarding availability of sampling, sampling results and mitigation system installations.	Yes	No	No
City of Billings ordinance or policy prompting notification to EPA of land use changes (e.g. commercial to residential) or building permit applications that may affect vapor intrusion mitigation systems.	Yes	No	No
Consent for Access Forms granting EPA, DEQ and/or its authorized representatives access to a property to inspect, monitor and maintain a vapor intrusion mitigation system.	Yes, if the structure has a vapor intrusion mitigation system	Yes, if the structure has a vapor intrusion mitigation system	Yes, if the structure has a vapor intrusion mitigation system
Consent for Access Forms requesting that property owners refrain from activities that would interfere with the vapor intrusion mitigation system's performance.	Yes, if the structure has a vapor intrusion mitigation system	Yes, if the structure has a vapor intrusion mitigation system	Yes, if the structure has a vapor intrusion mitigation system
Deed Notification - If access is denied by the property owner for the installation of vapor intrusion mitigation systems or for post-mitigation monitoring, EPA intends to apply a **deed notification** informing affected parties of the decision and continued availability of vapor intrusion mitigation system installation and/or monitoring.	Yes, for all residential structures and commercial structures where sampling has determined mitigation is needed and property owner has denied access	Yes, for structures where sampling has determined mitigation is needed and property owner has denied access	Yes, for structures where sampling has determined mitigation is needed and property owner has denied access
Direct outreach - Reaching out to owners and tenants directly, typically through personalized emails, phone calls, face to face or other methods, regarding availability of vapor intrusion mitigation systems without additional sampling.	Yes, for residential structures only	No	No
Outreach - Letter and fact sheet regarding availability of sampling and vapor intrusion mitigation systems, if warranted based on sampling.	Yes, for commercial structures only[2]	Yes	Yes
Outreach - Fact sheet reporting on the status of the OU1 remedy.	Yes	Yes	Yes

Notes

- [1] See Figure 2.
- [2] Because mitigation systems will be available to residential structures, sampling to determine the occurrence and magnitude of vapor intrusion is not needed. Sampling to establish baseline conditions and operating and maintaining mitigation systems will be completed as necessary.

Table 5: Alternative Evaluation Criteria

Threshold Criteria: Alternatives must meet these criteria to be eligible for selection.
1. Overall Protection of Human Health and the Environment:
Will the alternative provide adequate protection of human health and the environment against unacceptable risk?
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs):
Will the alternative comply with all ARARs of federal and state environmental statutes or justify a waiver?
Primary Balancing Criteria: These criteria are used to weigh major trade-offs among alternatives.
3. Long-Term Effectiveness and Permanence:
Will the alternative be able to provide reliable, long-term protection with minimal residual risk?
4. Reduction of Toxicity, Mobility, or Volume through Treatment:
Will the alternative use treatment technologies that reduce the hazardous substances' toxicity, mobility, or volume?
5. Short-Term Effectiveness:
How quickly can the alternative protect against unacceptable risk, and will it come with adverse impacts to workers, the community or the environment?
6. Implementability:
Can the alternative be easily implemented, considering technical and administrative issues and availability of services and materials?
7. Cost:
What are the estimated capital and annual operation and maintenance costs? If costs are accrued over time, what would the present value of the total cost be, accounting for inflation? Costs are expected to be accurate within a range of +50% to -30%.
Modifying Criteria: These criteria allow for state and community participation in alternative selection
8. State Agency Acceptance:

Does DEQ concur with the alternative?
9. Community Acceptance:
Does the public agree with the alternative?

Table 6: Alternative Compliance with Criteria

Evaluation Criteria	Alternative 1: No Action	Alternative 2: Appropriate Vapor Intrusion Mitigation
Threshold Criteria:		
1. Overall Protection of Human Health and the Environment	Not protective	Protective
2. Compliance with ARARs	Not assessed, alternative does not meet threshold criteria.	Complies with ARARs
Primary Balancing Criteria:		
3. Long-Term Effectiveness and Permanence	Not assessed, alternative does not meet threshold criteria.	Poor until the OU2 and OU3 remedies are planned, implemented and eventually, completed.
4. Reduction of Toxicity, Mobility, or Volume through Treatment	Not assessed, alternative does not meet threshold criteria.	Alternative 2 is designed to mitigate occupant exposure in indoor air primarily by treating vapor intrusion.
5. Short-Term Effectiveness	Not assessed, alternative does not meet threshold criteria.	Excellent because the minimal short-term risks to the community, the workers installing the vapor intrusion mitigation systems, or the general environment can be mitigated via a Health and Safety Plan and adherence to the plan.
6. Implementability	Not assessed, alternative does not meet threshold criteria.	Readily implementable, but varies by structure
7. Cost	Not assessed, alternative does not meet threshold criteria.	Estimated to be $33,608,000 over 35 years

Modifying Criteria:		
8. State Agency Acceptance	Not assessed, alternative does not meet threshold criteria.	DEQ supports Alternative 2.
9. Community Acceptance	Not assessed, alternative does not meet threshold criteria.	The community generally supports Alternative 2 based on comments received in the public comment period.

Table 7: Alternative 2 Cost Summary[15]

Cost Type	Item	Notes and References	First Five-year Review Period Cost	Second Five Year Review Period Cost		Third Five Year Review Period Cost		Fourth Five Year Review Period Cost		Fifth Five Year Review Period Cost		Sixth Five Year Review Period Cost		Seventh Five Year Review Period Cost		35- year Total
				Fraction of First FYR Period Cost	Cost	Fraction of First FYR Period Cost	Cost	Fraction of First FYR Period Cost	Cost	Fraction of First FYR Period Cost	Cost	Fraction of First FYR Period Cost	Cost	Fraction of First FYR Period Cost	Cost	
Capital / Remedial Design	Pre-Mitigation System Monitoring (sampling and analysis)	Table D-1	$2,547,000	30%	$764,100	30%	$764,100	15%	$382,050	15%	$382,050	5%	$127,350	5%	$127,350	$5,094,000
Capital / Remedial Design	Vapor Mitigation System Design	Table D-1	$170,000	40%	$68,000	20%	$34,000	16%	$27,200	12%	$20,400	8%	$13,600	4%	$6,800	$340,000
Capital / Remedial Action	Vapor Mitigation System Installation (Including Baseline Sampling and Effluent Filtration)	Table D-2	$5,461,600	40%	$2,184,640	20%	$1,092,320	16%	$873,856	12%	$655,392	8%	$436,928	4%	$218,464	$10,924,000
Capital / Remedial Action	Post-Mitigation System Performance Monitoring, Sampling and Optimization	Table D-2	$1,665,600	40%	$666,240	20%	$333,120	16%	$266,496	12%	$199,872	8%	$133,248	4%	$66,624	$3,332,000
Capital / Remedial Action	Institutional Controls (Deed Notifications and Access Agreements)	Table D-3	$523,600	7.5%	$39,270	7.5%	$39,270	7.5%	$39,270	7.5%	$39,270	7.5%	$39,270	7.5%	$39,270	$760,000
Capital / Remedial Action	Institutional Controls (Governmental - City Ordinance)	Table D-3	$17,800	7.5%	$1,340	7.5%	$1,340	7.5%	$1,340	7.5%	$1,340	7.5%	$1,340	7.5%	$1,340	$26,000
Capital / Remedial Action	Institutional Controls (Informational Tools)	Table D-3	$105,500	75%	$79,125	50%	$52,750	50%	$52,750	50%	$52,750	50%	$52,750	50%	$52,750	$449,000
O&M	Operation and Maintenance - Institutional Controls (Deed Notifications and Access Agreements)	Table D-4	$0	7.5%	$39,270	7.5%	$39,270	7.5%	$39,270	7.5%	$39,270	7.5%	$39,270	7.5%	$39,270	$236,000
O&M	Operation and Maintenance - Institutional Controls (Governmental - City Ordinance)	Table D-4	$0	7.5%	$1,340	7.5%	$1,340	7.5%	$1,340	7.5%	$1,340	7.5%	$1,340	7.5%	$1,340	$9,000
O&M	Operation and Maintenance - Annual Inspections - Newly Installed Systems	Table D-4	$53,500	40%	$21,400	20%	$10,700	16%	$8,560	12%	$6,420	8%	$4,280	4%	$2,140	$107,000
O&M	Operation and Maintenance - Annual Inspections - Long-Term Monitoring	Table D-4	$0	100%	$237,600	140%	$332,640	160%	$380,160	176%	$418,176	188%	$446,688	196%	$465,696	$2,281,000
O&M	Operation and Maintenance - Analytical Sampling	Table D-4	$0	100%	$1,032,300	100%	$1,032,300	100%	$1,032,300	100%	$1,032,300	100%	$1,032,300	100%	$1,032,300	$6,194,000
O&M	Operation and Maintenance - Effluent Filter Recharge	Table D-4	$0	100%	$288,000	140%	$403,200	160%	$460,800	176%	$506,880	188%	$541,440	196%	$564,480	$2,765,000
O&M	Operation and Maintenance - Routine Repairs	Table D-4	$0	100%	$13,600	100%	$13,600	100%	$13,600	100%	$13,600	100%	$13,600	100%	$13,600	$82,000
Capital / Remedial Action	Mitigation (Other Mitigation Technologies)	Table D-5	$300,000	40%	$120,000	20%	$60,000	16%	$48,000	12%	$36,000	8%	$24,000	4%	$12,000	$600,000

[15] This cost summary is from the OU1 Focused Feasibility Study. All notes, references and calculation explanations can be found in the OU1 Focused Feasibility Study.

Cost Type	Item	Notes and References	First Five-year Review Period Cost	Second Five Year Review Period Cost		Third Five Year Review Period Cost		Fourth Five Year Review Period Cost		Fifth Five Year Review Period Cost		Sixth Five Year Review Period Cost		Seventh Five Year Review Period Cost		35- year Total
				Fraction of First FYR Period Cost	Cost	Fraction of First FYR Period Cost	Cost	Fraction of First FYR Period Cost	Cost	Fraction of First FYR Period Cost	Cost	Fraction of First FYR Period Cost	Cost	Fraction of First FYR Period Cost	Cost	
Periodic Cost / Remedial Action	Remedial Action Work Plan, Contracts Management and Reporting (for each 5-year cycle task order).	Professional estimate	$300,000	100%	$300,000	100%	$300,000	100%	$300,000	100%	$300,000	100%	$300,000	100%	$300,000	$2,100,000
Periodic Cost / Remedial Action	Preliminary and Final Closeout Report	Professional estimate	$0	--	$0	--	$0	--	$0	--	$0	--	$0	--	$40,000	$40,000
Periodic Cost / Remedial Action	Five Year Review	Professional estimate	$50,000	100%	$50,000	100%	$50,000	100%	$50,000	100%	$50,000	100%	$50,000	100%	$50,000	$350,000
		Remedial Design Capital Subtotal	$2,717,000		$832,100		$798,100		$409,250		$402,450		$140,950		$134,150	$5,434,000
		Remedial Action Capital Subtotal	$8,424,100		$3,440,615		$1,928,800		$1,631,712		$1,334,624		$1,037,536		$780,448	$18,578,000
		O&M Subtotal	$53,500		$1,633,510		$1,833,050		$1,936,030		$2,017,986		$2,078,918		$2,118,826	$11,672,000
		Subtotal	**$11,194,600**		**$5,906,300**		**$4,560,000**		**$3,977,000**		**$3,755,100**		**$3,257,500**		**$3,033,500**	**$35,684,000**
		Contingency (20%)	$2,239,000		$1,181,300		$912,000		$795,400		$751,100		$651,500		$606,700	$7,137,000
TOTAL ALTERNATIVE COST (2024 DOLLARS)			**$13,433,600**		**$7,087,600**		**$5,472,000**		**$4,772,400**		**$4,506,200**		**$3,909,000**		**$3,640,200**	**$42,821,000**
TOTAL ALTERNATIVE COST (Present Value)			**$12,784,800**		**$6,109,400**		**$4,272,200**		**$3,374,700**		**$2,886,100**		**$2,267,600**		**$1,912,600**	**$33,608,000**
		Project year used in present value calculation:	2.5		7.5		12.5		17.5		22.5		27.5		32.5	
		2023 Real Discount Rate:	2%													

Notes:

EA = each, i.e., per structure
HR = hourly
LS = lump sum
% = percent

1. Costs presented have an accuracy of +50% to -30% and are suitable for comparing alternatives.
2. No government taxes or contractor bonds are included
3. Not all line items are required for each process option
4. Discount rate of 5% applied to present worth analysis, in accordance with EPA's 1988 *Guidance for Conducting Remedial Investigations and* Feasibility Studies Under CERCLA, Interim Final.
5. While EPA guidance requires engineering, administrative and operations and maintenance expenses be separated from direct capital costs, these expenses were included to reflect the estimated costs for each process option

Table 8: Residential and Commercial Indoor Air and Soil Vapor Cleanup Standards

Chemical	Abbreviation	Residential Indoor Air ($\mu g/m^3$)	Residential Soil Vapor ($\mu g/m^3$)	Commercial Indoor Air ($\mu g/m^3$)	Commercial Soil Vapor ($\mu g/m^3$)
Tetrachloroethene	PCE	40	1,400	180	5,800
Trichloroethene	TCE	1	40	4	150
cis-1,2-Dichloroethene	cis-DCE	20	700	90	2,900
Isopropanol	None	210	7,000	880	29,000
Naphthalene	None	0.4	10	2	60
Chloroform	None	0.6	20	3	90

Table 9: Selected Remedy Institutional Controls

Institutional Controls	Remedy Area A[1]	Remedy Area B[1]	Remedy Area C[1]
City of Billings ordinance requiring vapor intrusion mitigation measures for new construction.	Yes	No	No
City of Billings ordinance requiring owners to notify tenants regarding availability of sampling, sampling results and mitigation system installations.	Yes	No	No
City of Billings ordinance or policy prompting notification to EPA of land use changes (e.g. commercial to residential) or building permit applications that may affect vapor intrusion mitigation systems.	Yes	No	No
Deed Notification - If access is denied multiple times by the property owner to sample indoor air prior to determining a vapor intrusion mitigation system is necessary or for the pre-sample survey, EPA intends to apply a **deed notification** informing affected parties of the decision and continued availability of vapor intrusion mitigation sampling and system installation.	Yes, for all residential structures and possibly for commercial structures	Possible – Dependent upon available data	Possible – Dependent upon available data
Deed Notification - If access is denied by the property owner for the installation of vapor intrusion mitigation systems or for post-mitigation monitoring, EPA intends to apply a **deed notification** informing affected parties of the decision and continued availability of vapor intrusion mitigation system installation and/or monitoring.	Yes, for all residential structures and commercial structures where sampling has determined mitigation is needed and property owner has denied access	Yes, for structures where sampling has determined mitigation is needed and property owner has denied access	Yes, for structures where sampling has determined mitigation is needed and property owner has denied access

Not an Institutional Control, but necessary for the Selected Remedy:

Method	Remedy Area A[1]	Remedy Area B[1]	Remedy Area C[1]
Consent for Access Forms granting EPA, DEQ and/or its authorized representatives access to a property to inspect, monitor and maintain a vapor intrusion mitigation system.	Yes, if the structure has a vapor intrusion mitigation system	Yes, if the structure has a vapor intrusion mitigation system	Yes, if the structure has a vapor intrusion mitigation system
Consent for Access Forms requesting that property owners refrain from activities that would interfere with the vapor intrusion mitigation system's performance.	Yes, if the structure has a vapor intrusion mitigation system	Yes, if the structure has a vapor intrusion mitigation system	Yes, if the structure has a vapor intrusion mitigation system
Direct outreach - Reaching out to owners and tenants directly, typically through personalized emails, phone calls, face to face or other methods, regarding availability of vapor intrusion mitigation systems without additional sampling.	Yes, for residential structures only	No	No

Note

- [1] See Figure 2.

FIGURES

Figure 1: Site Map

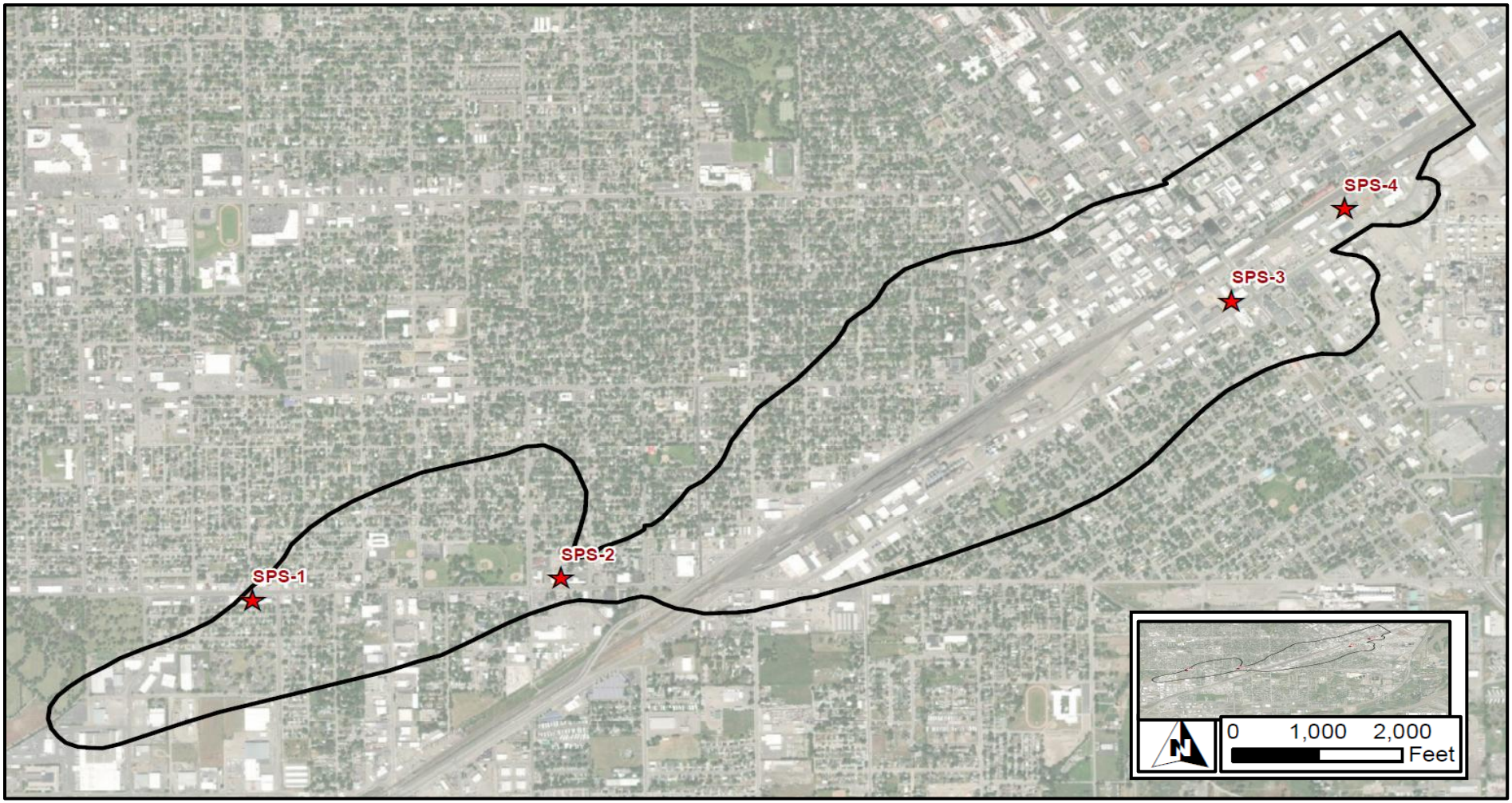
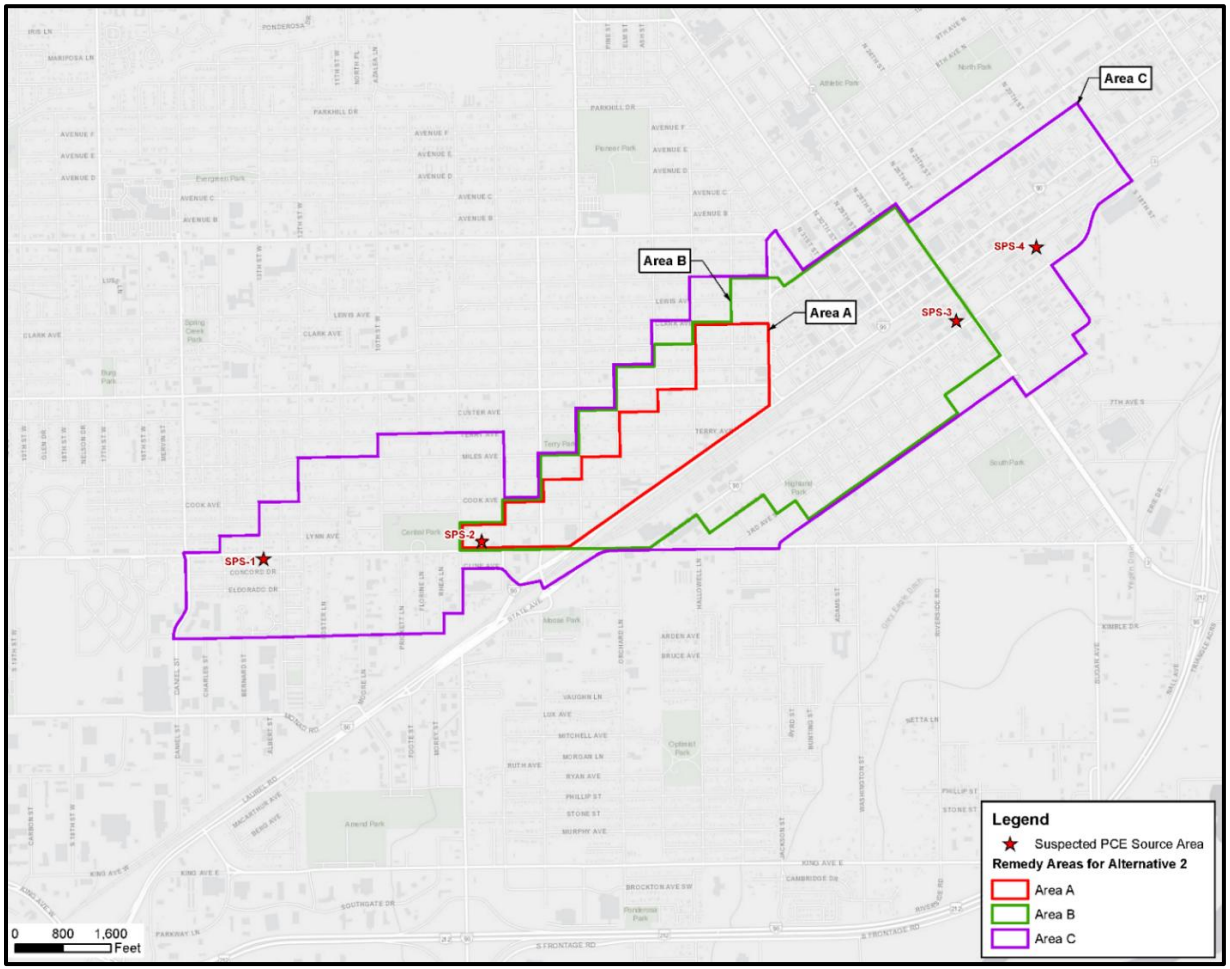


Figure 2: Remedy Areas for Alternative 2[16]



[16] The remedy areas map can be viewed on the Site webpage: https://www.epa.gov/superfund/billings-pce

Figure 3: Zoning Map

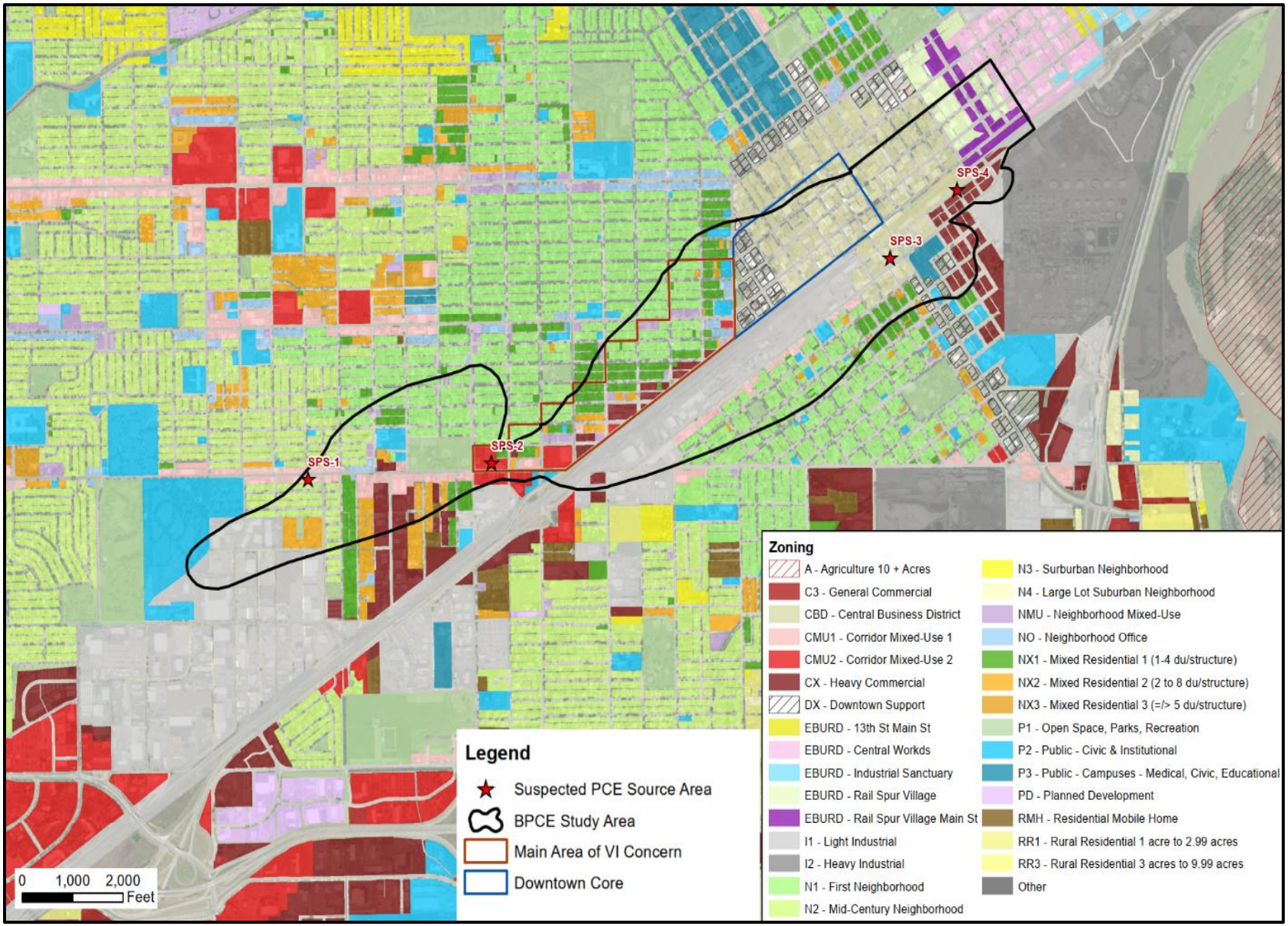


Figure 4: PCE Concentrations in Groundwater (2022 and 2023)

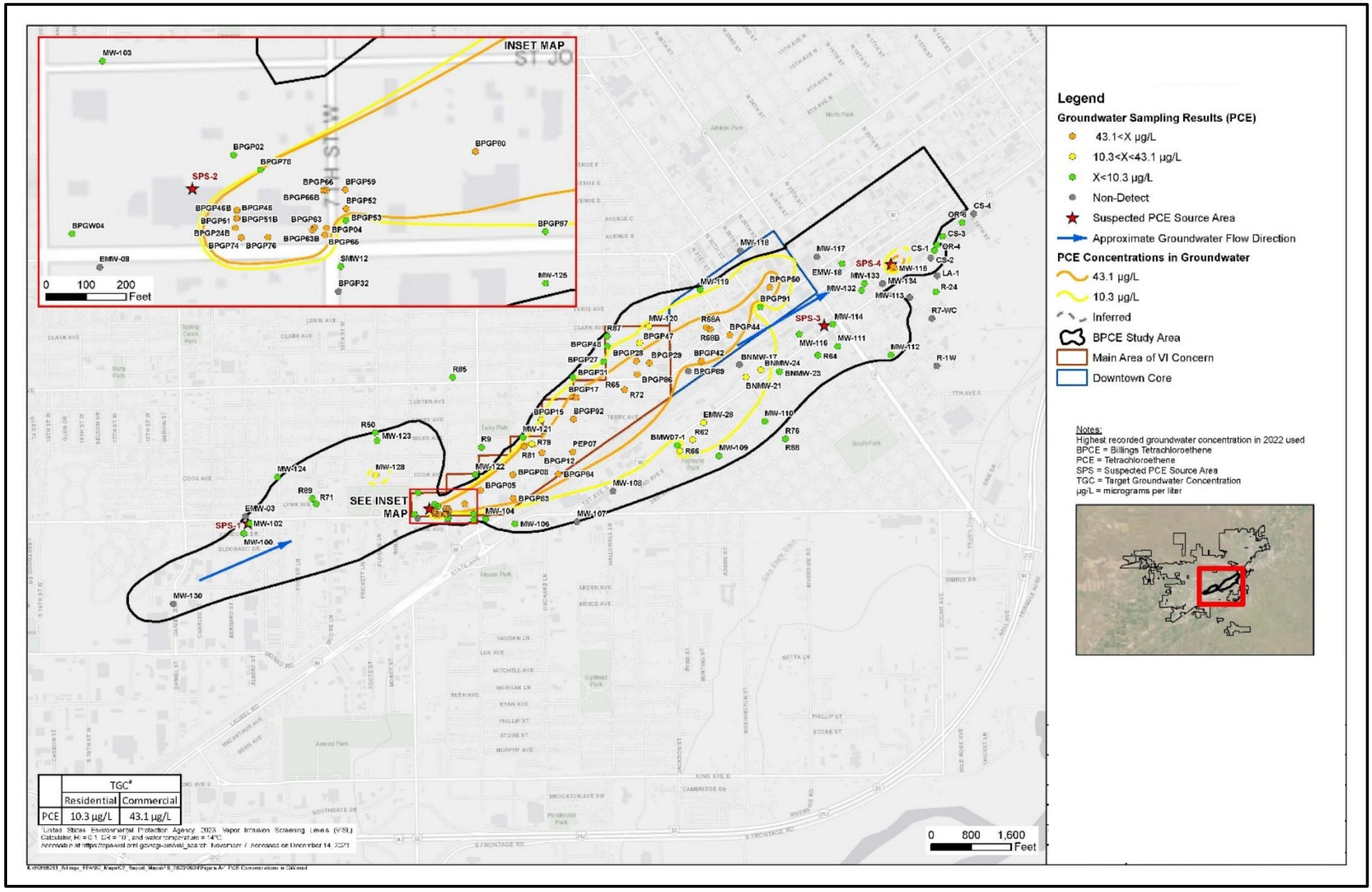


Figure 5: TCE Concentrations in Groundwater (2022 and 2023)

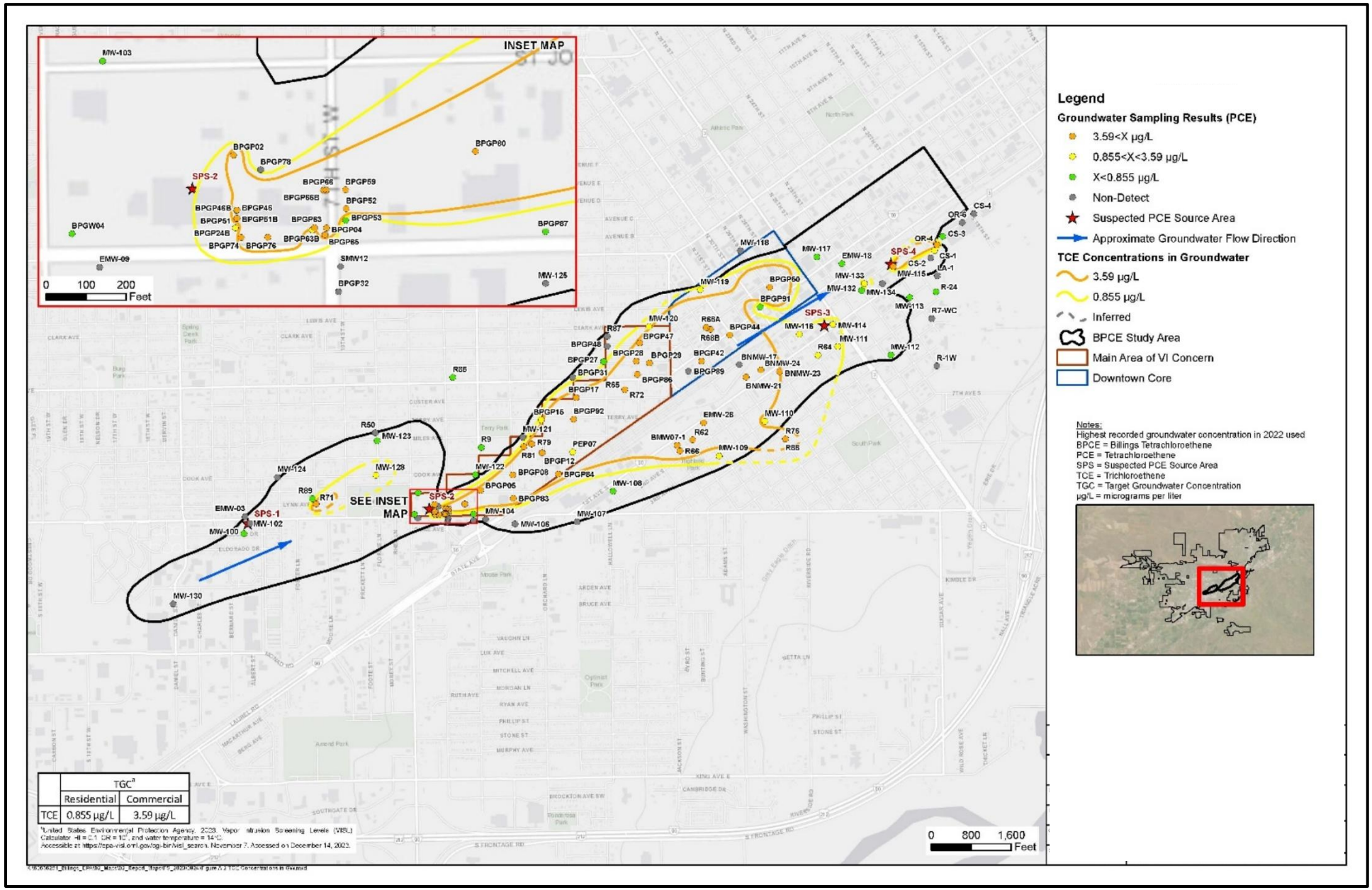


Figure 6: PCE and TCE Indoor Air Results (2022 and 2023)

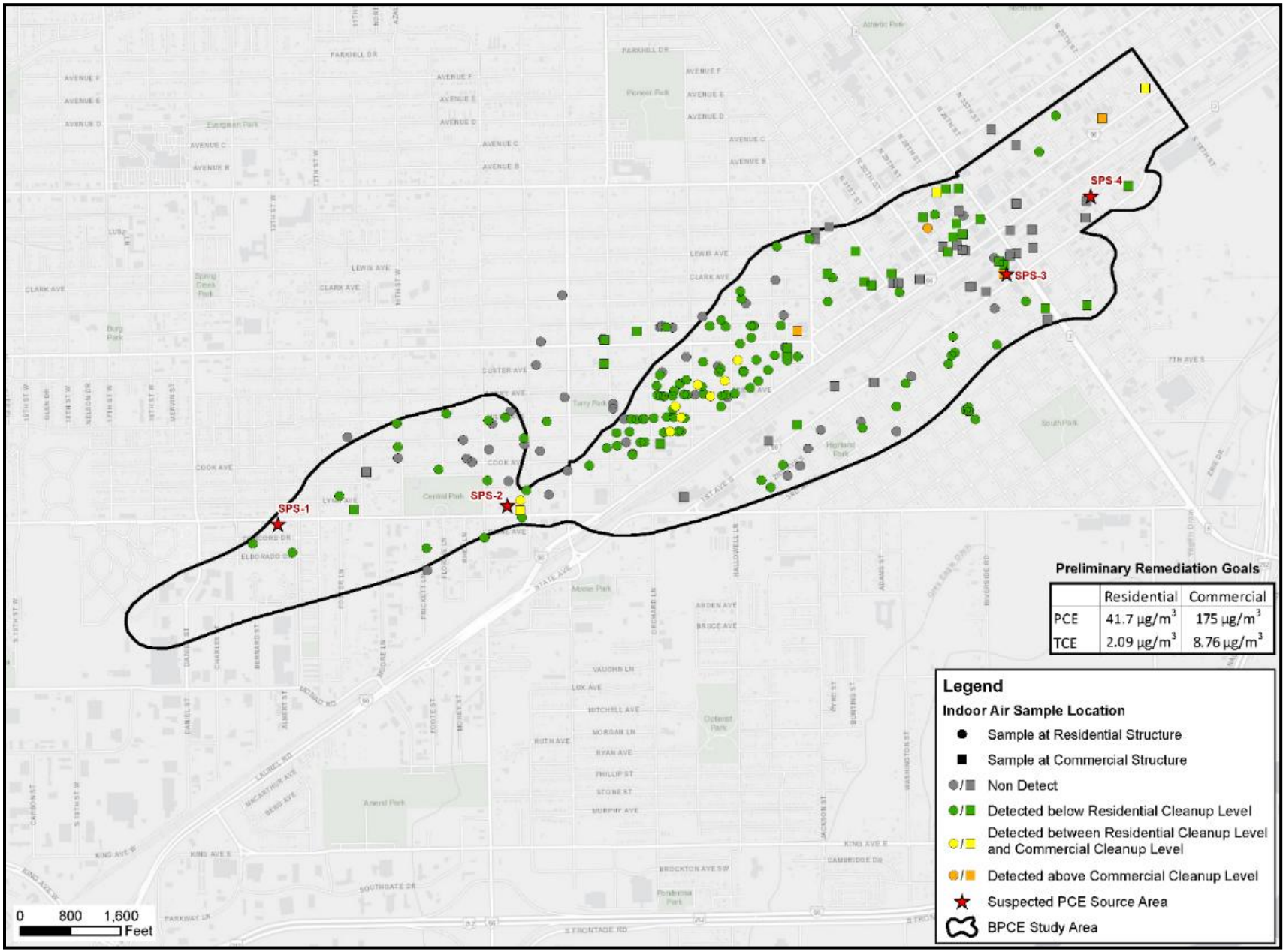


Figure 7: PCE and TCE Soil Vapor Results (2022 and 2023)

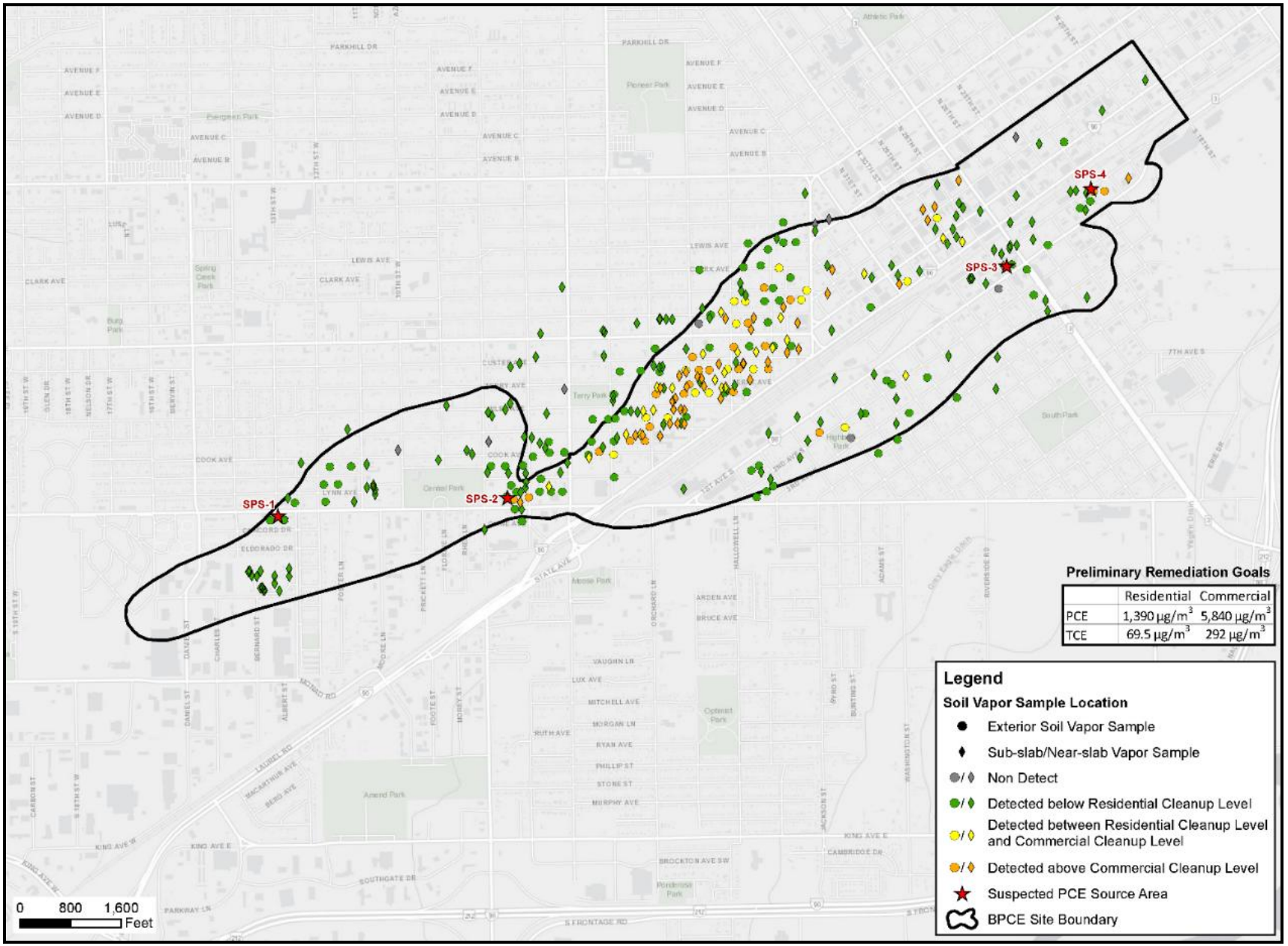


Figure 8: Generic Vapor Intrusion Model

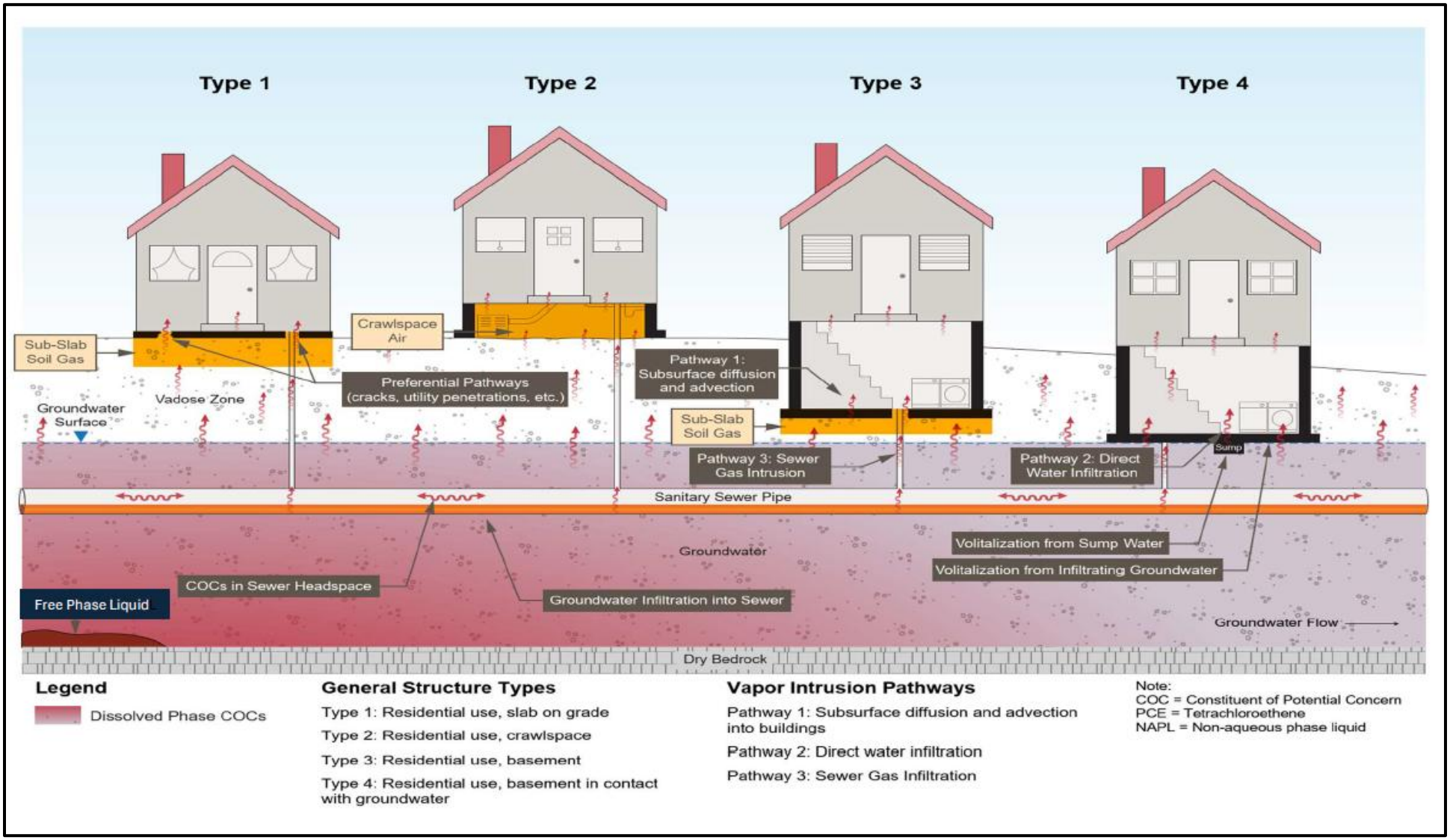
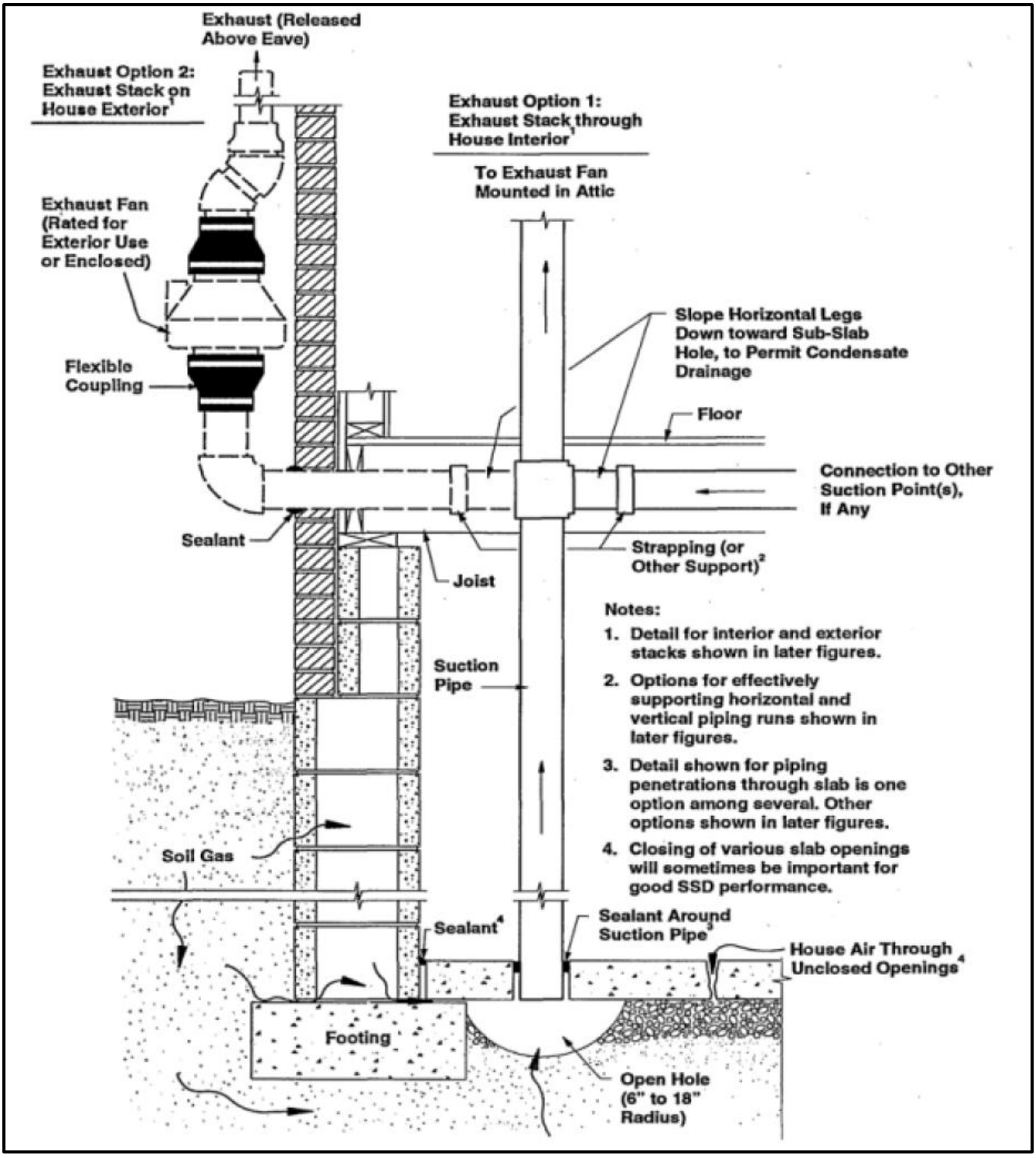


Figure 9: Generic Sub-Slab Depressurization System



APPENDICES

Appendix A: Montana Department of Environmental Quality Concurrence Letter

DEQ
Montana Department
of Environmental Quality

May 15, 2026

Cyrus Western, Regional Administrator
U.S. Environmental Protection Agency, Region 8
1595 Wynkoop Street
Denver, CO 80202-8917

RE: State Concurrence for the Record of Decision for Billings PCE Superfund Site Operable Unit 1, Billings, Yellowstone County, Montana

Dear Mr. Western:

The Montana Department of Environmental Quality (DEQ) concurs with the Record of Decision (ROD) for Operable Unit 1 (OU1) of the Billings PCE Superfund Site in Billings, Yellowstone County, Montana. DEQ has served as the state support agency throughout development of the OU1 remedy, and DEQ concurs with EPA's selection of Alternative 2, Appropriate Vapor Intrusion Mitigation, as set forth in the ROD. The Selected Remedy is consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and, to the extent practicable, the National Contingency Plan.

The OU1 Selected Remedy addresses human health risks associated with vapor intrusion into residential and commercial structures in the vicinity of downtown Billings by installing appropriate vapor intrusion mitigation systems (with a preference for sub-slab depressurization), supported by monitoring, institutional controls, and outreach. The ROD provides that the Selected Remedy will protect human health and the environment for this limited-scope action by preventing site-related contaminants from entering indoor air at levels that pose an unacceptable risk, while future operable units will address contaminated groundwater, soil, and other source materials.

DEQ supports the Selected Remedy because it is protective of human health, readily implementable and provides short-term effectiveness. The Selected Remedy includes a practical framework for identifying affected structures, installing appropriate vapor intrusion mitigation systems, conducting long-term monitoring and maintenance, and implementing institutional controls to help protect the integrity of the remedy. The ROD further provides that the Selected Remedy complies with applicable or relevant and appropriate federal and state requirements for OU1 and will be subject to five-year review because hazardous substances will remain on-site above levels allowing for unlimited use and unrestricted exposure.

DEQ has reviewed the ROD, including the Responsiveness Summary and the ARARs, and is in concurrence for the reasons outlined in this letter. DEQ appreciates the collaborative work between EPA and DEQ on OU1 and looks forward to continuing to work with EPA during remedial design, remedial action, and long-term operation and maintenance for this remedy.

Sincerely,

Sonja Nowakowski
Director
Montana Department of Environmental Quality

CC: Honorable Greg Gianforte, Montana Governor
Rachel Green, Montana Governor's Office
U.S. Senator Steve Daines
U.S. Senator Tim Sheehy
U.S. Representative Ryan Zinke
U.S. Representative Troy Downing

Appendix B: Federal and State ARARs

Appendix B-1: Federal ARARs

Preliminary Notes:
State and federal requirements must be substantive in nature to qualify as ARARs. On-site portions of response actions need only comply with "substantive" aspects of ARARs rather than any corresponding "administrative" requirements. Substantive requirements typically are those requirements that pertain directly to actions or conditions in the environment. Administrative requirements typically are those mechanisms that facilitate the implementation of the substantive requirements of a statute or regulation and include the approval of, or consultation with, administrative bodies, issuance of permits, documentation, reporting, recordkeeping and enforcement.[17]

The summary statements in the "Requirement" column for each identified ARAR should not be relied upon exclusively in ascertaining the full requirement. Please refer to full version of the applicable state or federal law, as codified.

Chemical-Specific ARARs
Chemical-specific ARARs are usually health- or risk-based numerical values or methodologies used to determine acceptable concentrations of chemicals that may be found in or discharged to the environment.

None

Location-Specific ARARs
Location-specific requirements are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in special locations.

None

Action-Specific ARARs
Action-specific requirements are technology- or activity-based requirements or limitations or actions taken with respect to hazardous substances.

[17] *See* Memorandum from Larry Douchand to Superfund National Program Managers re: "Documenting Applicable, or Relevant and Appropriate Requirements in Comprehensive Environmental Response, Compensation, and Liability Act Response Action Decisions" at p. 10-11 (Mar. 1, 2023), available at https://semspub.epa.gov/work/HQ/100003166.pdf

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
Regulation | Pretreatment (Clean Water Act)			
Activities resulting in discharges to a POTW	Discharges to a POTW may not cause "pass through" or "interference" ***§ 403.5 National pretreatment standards: Prohibited discharges.*** ***(a)(1) General prohibitions.*** *A User may not introduce into a POTW any pollutant(s) which cause Pass Through or Interference. These general prohibitions and the specific prohibitions in paragraph (b) of this section apply to each User introducing pollutants into a POTW whether or not the User is subject to other National Pretreatment Standards or any national, State, or local Pretreatment Requirements.*	**Applicable*** *The substantive requirements of this provision would only apply to RA activities that involve dewatering.	40 C.F.R.§403.5(a)(1)
Activities resulting in discharges to a POTW	Certain discharges to a POTW are prohibited. ***§ 403.5 National pretreatment standards: Prohibited discharges.*** **(b)** ***Specific prohibitions.*** *In addition, the following pollutants shall not be introduced into a POTW:* ***(1)*** *Pollutants which create a fire or explosion hazard in the POTW, including, but not limited to, wastestreams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21;*	*The substantive requirements of this provision would only apply to RA activities that involve dewatering.	40 C.F.R.§403.5(b)

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
	(2) *Pollutants which will cause corrosive structural damage to the POTW, but in no case Discharges with pH lower than 5.0, unless the works is specifically designed to accommodate such Discharges;* ***(3)*** *Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW resulting in Interference;* ***(4)*** *Any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a Discharge at a flow rate and/or pollutant concentration which will cause Interference with the POTW.* ***(5)*** *Heat in amounts which will inhibit biological activity in the POTW resulting in Interference, but in no case heat in such quantities that the temperature at the POTW Treatment Plant exceeds 40 °C (104 °F) unless the Approval Authority, upon request of the POTW, approves alternate temperature limits.* ***(6)*** *Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;* ***(7)*** *Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems;* ***(8)*** *Any trucked or hauled pollutants, except at discharge points designated by the POTW.*		

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
Regulation | Hazardous Waste (Resource Conservation and Recovery Act)			
Storage of solid waste	Must comply with certain storage requirements for solid waste. ***40 CFR 243.200-1*** *(a) All solid wastes (or materials which have been separated for the purpose of recycling) shall be stored in such a manner that they do not constitute a fire, health, or safety hazard or provide food or harborage for vectors, and shall be contained or bundled so as not to result in spillage. All solid waste containing food wastes shall be securely stored in covered or closed containers which are nonabsorbent, leakproof, durable, easily cleanable (if reusable), and designed for safe handling. Containers shall be of an adequate size and in sufficient numbers to contain all food wastes, rubbish, and ashes that a residence or other establishment generates in the period of time between collections. Containers shall be maintained in a clean condition so that they do not constitute a nuisance, and to retard the harborage, feeding, and breeding of vectors. When serviced, storage containers should be emptied completely of all solid waste.* *(e) Waste containers used for the storage of solid waste (or materials which have been separated for recycling) must meet the standards established by the American National Standards Institute (ANSI) for waste containers as follows: Waste*	**Applicable*** *The substantive requirements of this provision would only apply to RA activities that involve generation of solid waste.	40 CFR 243.200-1(a) and (e)

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
	Containers—Safety Requirements, 1994, American National Standards Institute, ANSI Z245.30-1994; and Waste Containers—Compatibility Dimensions, 1996, American National Standards Institute, ANSI Z245.60-1996.		
Characterization of solid waste	Must determine if solid waste is listed as a hazardous waste in Subpart D of 40 C.F.R. Part 261. ***40 CFR § 262.11 Hazardous waste determination and recordkeeping.*** *A person who generates a solid waste, as defined in 40 CFR 261.2, must make an accurate determination as to whether that waste is a hazardous waste in order to ensure wastes are properly managed according to applicable RCRA regulations. A hazardous waste determination is made using the following steps:* ***(a)** The hazardous waste determination for each solid waste must be made at the point of waste generation, before any dilution, mixing, or other alteration of the waste occurs, and at any time in the course of its management that it has, or may have, changed its properties as a result of exposure to the environment or other factors that may change the properties of the waste such that the RCRA classification of the waste may change.*	**Applicable*** *The substantive requirements of this provision would only apply to RA activities that involve generation of solid waste.	40 C.F.R.§262.11(a)
Characterization of solid waste	Must determine if solid waste is excluded from regulation under 40 C.F.R.§261.4.	**Applicable*** *The substantive requirements of this	40 C.F.R.§262.11(b)

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
	40 CFR § 262.11 Hazardous waste determination and recordkeeping. *A person who generates a solid waste, as defined in 40 CFR 261.2, must make an accurate determination as to whether that waste is a hazardous waste in order to ensure wastes are properly managed according to applicable RCRA regulations. A hazardous waste determination is made using the following steps:* ***(b)** A person must determine whether the solid waste is excluded from regulation under 40 CFR 261.4.*	provision would only apply to RA activities that involve generation of solid waste.	
Characterization of solid waste	Must determine whether the solid waste is identified in subpart C of 40 C.F.R. part 261 by either: (1) Testing the waste according to the methods set forth in subpart C of 40 C.F.R. part 261, or according to an equivalent method approved by the Administrator under 40 C.F.R.§260.21; or (2) Applying knowledge of the hazard characteristic of the waste in light of the materials or the processes used. ***40 CFR § 262.11 Hazardous waste determination and recordkeeping.***	**Applicable*** *The substantive requirements of this provision would only apply to RA activities that involve generation of solid waste.	40 C.F.R.§262.11(d)

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
	A person who generates a solid waste, as defined in 40 CFR 261.2, must make an accurate determination as to whether that waste is a hazardous waste in order to ensure wastes are properly managed according to applicable RCRA regulations. A hazardous waste determination is made using the following steps: ***(d)*** *The person then must also determine whether the waste exhibits one or more hazardous characteristics as identified in subpart C of 40 CFR part 261 by following the procedures in paragraph (d)(1) or (2) of this section, or a combination of both.* ***(1)*** *The person must apply knowledge of the hazard characteristic of the waste in light of the materials or the processes used to generate the waste. Acceptable knowledge may include process knowledge (e.g., information about chemical feedstocks and other inputs to the production process); knowledge of products, by-products, and intermediates produced by the manufacturing process; chemical or physical characterization of wastes; information on the chemical and physical properties of the chemicals used or produced by the process or otherwise contained in the waste; testing that illustrates the properties of the waste; or other reliable and relevant information about the properties of the waste or its constituents. A test other than a test method set forth in subpart C of 40 CFR part 261, or an equivalent test method approved by the Administrator under 40 CFR 260.21, may be used as part of a person's knowledge to determine whether a solid waste exhibits a characteristic of hazardous waste. However, such tests do not, by*		

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
	themselves, provide definitive results. Persons testing their waste must obtain a representative sample of the waste for the testing, as defined at 40 CFR 260.10. ***(2)** When available knowledge is inadequate to make an accurate determination, the person must test the waste according to the applicable methods set forth in subpart C of 40 CFR part 261 or according to an equivalent method approved by the Administrator under 40 CFR 260.21 and in accordance with the following:* ***(i)** Persons testing their waste must obtain a representative sample of the waste for the testing, as defined at 40 CFR 260.10.* ***(ii)** Where a test method is specified in subpart C of 40 CFR part 261, the results of the regulatory test, when properly performed, are definitive for determining the regulatory status of the waste.*		
Characterization of solid waste	Must refer to Parts 261, 262, 264, 265, 266, 268, and 273 of Chapter 40 for possible exclusions or restrictions pertaining to management of the specific waste. ***40 CFR § 262.11 Hazardous waste determination and recordkeeping.*** *A person who generates a solid waste, as defined in 40 CFR 261.2, must make an accurate determination as to whether that waste is a hazardous waste in order to ensure wastes are properly managed according to applicable RCRA regulations.*	**Applicable*** *The substantive requirements of this provision would only apply to RA activities that involve generation of hazardous waste.	40 C.F.R.§262.11(e)

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
	A hazardous waste determination is made using the following steps: ***(e)*** *If the waste is determined to be hazardous, the* generator *must refer to parts 261, 264, 265, 266, 267, 268, and 273 of this chapter for other possible exclusions or restrictions pertaining to* management *of the specific waste.*		
Generation of hazardous waste	Must determine generator status under 40 C.F.R.§262.13 ***40 CFR § 262.13 Generator category determination.*** *A generator must determine its generator category. A generator's category is based on the amount of hazardous waste generated each month and may change from month to month. This section sets forth procedures to determine whether a generator is a very small quantity generator, a small quantity generator, or a large quantity generator for a particular month, as defined in § 260.10 of this chapter.* *(a) Generators of either acute hazardous waste or non-acute hazardous waste.* *(b) Generators of both acute and non-acute hazardous wastes.* *(c) When making the monthly quantity-based determinations required by this part, the* generator *must include all* hazardous waste *that it generates, except* hazardous waste *that:*	**Applicable*** *The substantive requirements of this provision would only apply to RA activities that involve generation of hazardous waste.	40 C.F.R.§262.13

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
	(d) In determining the quantity of hazardous waste generated in a calendar month, a generator need not include: *(e) Based on the generator category as determined under this section, the generator must meet the applicable independent requirements listed in § 262.10. A generator's category also determines which of the provisions of §§ 262.14, 262.15, 262.16 or 262.17 must be met to obtain an exemption from the storage facility permit, interim status, and operating requirements when accumulating hazardous waste.* *(f) Mixing hazardous wastes with solid wastes* NOTE: Please refer to full version of the applicable federal law, as codified.		
Generation of hazardous waste	Must comply with hazardous waste generator requirement, which vary depending on generator status, including: waste determination, waste accumulation, recordkeeping, and tracking under 40 C.F.R. § 262 Subparts A-D, M ***40 CFR Part 262 - PART 262—STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE*** *Subpart A—General (§§ 262.1 - 262.18)* *Subpart B—Manifest Requirements Applicable to Small and Large Quantity Generators (§§ 262.20 - 262.27)* *Subpart C—Pre-Transport Requirements Applicable to Small and Large Quantity Generators (§§ 262.30 - 262.35)*	**Applicable*** *Applicable based on generator status. The substantive requirements of this provision would only apply to RA activities that involve generation of hazardous waste.	40 C.F.R. § 262 Subparts A-D, M

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
	Subpart D—Recordkeeping and Reporting Applicable to Small and Large Quantity Generators (§§ 262.40 - 262.44) *Subpart M—Preparedness, Prevention, and Emergency Procedures for Large Quantity Generators (§§ 262.250 - 262.265)* NOTE: Please refer to full version of the applicable federal law, as codified.		
Transportation of Hazardous Waste	In the event of a discharge of hazardous waste during transportation, the transporter must take appropriate immediate action to protect human health and the environment (e.g., notify local authorities, dike the discharge area). ***40 CFR § 263.30 Immediate action.*** ***(a)*** *In the event of a discharge of hazardous waste during transportation, the transporter must take appropriate immediate action to protect human health and the environment (e.g., notify local authorities, dike the discharge area).*	**Applicable*** * The substantive requirements of this provision would only apply to RA activities that involve transportation hazardous waste.	40 C.F.R. §263.30(a)
Transportation of Hazardous Waste	A transporter must clean up any hazardous waste discharge that occurs during transportation or take such action as may be required or approved by Federal, State, or local officials so that the hazardous waste discharge no longer presents a hazard to human health or the environment. ***40 CFR § 263.30 Immediate action.***	**Applicable*** * The substantive requirements of this provision would only apply to RA activities that involve	40 C.F.R. §263.30(b)

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
	(b) *If a discharge of* hazardous waste *occurs during* transportation *and an official (State or local government or a Federal Agency)* acting *within the scope of his official responsibilities determines that immediate removal of the waste is necessary to protect human health or the environment, that official may authorize the removal of the waste by* transporters *who do not have EPA identification numbers and without the preparation of a* manifest.	transportation of hazardous waste.	
Transportation of Hazardous Waste	A transporter must clean up any hazardous waste discharge that occurs during transportation or take such action as may be required or approved by Federal, State, or local officials so that the hazardous waste discharge no longer presents a hazard to human health or the environment. ***40 CFR § 263.31 Discharge clean up.*** *A transporter must clean up any hazardous waste discharge that occurs during transportation or take such action as may be required or approved by Federal, State, or local officials so that the hazardous waste discharge no longer presents a hazard to human health or the environment.*	**Applicable*** * The substantive requirements of this provision would only apply to RA activities that involve transportation of hazardous waste.	40 C.F.R. §263.31
Disposal of hazardous waste	Certain hazardous wastes are restricted from land disposal. Must determine if land disposal restrictions apply under 40 C.F.R.§268.1 ***§ 268.1 Purpose, scope, and applicability.***	**Applicable*** * The substantive requirements of this provision would only apply to RA activities that	40 C.F.R.§268.1(a) and (b)

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
	(a) *This part identifies hazardous wastes that are restricted from land disposal and defines those limited circumstances under which an otherwise prohibited waste may continue to be land disposed.* ***(b)*** *Except as specifically provided otherwise in this part or part 261 of this chapter, the requirements of this part apply to persons who generate or transport hazardous waste and owners and operators of hazardous waste treatment, storage, and disposal facilities.*	involve disposal of hazardous waste.	
Disposal of hazardous waste	Certain hazardous wastes are exempt from the land disposal restrictions (40 C.F.R.§268). ***§ 268.1 Purpose, scope, and applicability.*** ***(e)*** *The following hazardous wastes are not subject to any provision of part 268:* ***(1)*** *Waste generated by very small quantity generators, as defined in § 260.10 of this chapter;* ***(2)*** *Waste pesticides that a farmer disposes of pursuant to § 262.70;* ***(3)*** *Wastes identified or listed as hazardous after November 8, 1984 for which EPA has not promulgated land disposal prohibitions or treatment standards;* ***(4) De minimis*** *losses of characteristic wastes to wastewaters are not considered to be prohibited wastes and are defined as losses from normal material*	**Applicable*** * The substantive requirements of this provision would only apply to RA activities that involve disposal of hazardous waste.	40 C.F.R.§268.1(e)

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
	handling operations (e.g. spills from the unloading or transfer of materials from bins or other containers, leaks from pipes, valves or other devices used to transfer materials); minor leaks of process equipment, storage tanks or containers; leaks from well-maintained pump packings and seals; sample purgings; and relief device discharges; discharges from safety showers and rinsing and cleaning of personal safety equipment; rinsate from empty containers or from containers that are rendered empty by that rinsing; and laboratory wastes not exceeding one per cent of the total flow of wastewater into the facility's headworks on an annual basis, or with a combined annualized average concentration not exceeding one part per million in the headworks of the facility's wastewater treatment or pretreatment facility.		

To Be Considered:

US EPA, Regional Screening Levels (updated regularly), found at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables.

US EPA, Management of Investigation Derived Waste, April 22, 2023, found at: https://www.epa.gov/quality/management-investigation-derived-waste.

Appendix B-2: State ARARs

Preliminary Notes:
State and federal requirements must be substantive in nature to qualify as ARARs. On-site portions of response actions need only comply with "substantive" aspects of ARARs rather than any corresponding "administrative" requirements. Substantive requirements typically are those requirements that pertain directly to actions or conditions in the environment. Administrative requirements typically are those mechanisms that facilitate the implementation of the substantive requirements of a statute or regulation and include the approval of, or consultation with, administrative bodies, issuance of permits, documentation, reporting, recordkeeping and enforcement.[18]

The summary statements in the "Requirement" column for each identified ARAR should not be relied upon exclusively in ascertaining the full requirement. Please refer to full version of the applicable state or federal law, as codified.

Chemical-Specific ARARs

Chemical-specific ARARs are usually health- or risk-based numerical values or methodologies used to determine acceptable concentrations of chemicals that may be found in or discharged to the environment.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Media	**Requirement**	**Prerequisite**	**Citation(s)**
Regulation | Surface Waters			
Criteria for discharges to surface waters	Shall not engage in certain prohibited discharges. ***Rule Title: GENERAL PROHIBITIONS*** ***Department: Environmental Quality*** ***Chapter: Water Quality*** ***Subchapter: Surface Water Quality Standards and Procedures***	**Applicable*** *The substantive requirements of this provision would only apply	ARM 17.30.637

[18] *See* Memorandum from Larry Douchand to Superfund National Program Managers re: "Documenting Applicable, or Relevant and Appropriate Requirements in Comprehensive Environmental Response, Compensation, and Liability Act Response Action Decisions" at p. 10-11 (Mar. 1, 2023), available at https://semspub.epa.gov/work/HQ/100003166.pdf

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Media	**Requirement**	**Prerequisite**	**Citation(s)**
	ARM 17.30.637 GENERAL PROHIBITIONS *(1) State surface waters must be free from substances attributable to municipal, industrial, agricultural practices or other discharges that will:* *(a) settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines;* *(b) create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter), or globules of grease or other floating materials;* *(c) produce odors, colors, or other conditions as to which create a nuisance or render undesirable tastes to fish flesh or make fish inedible;* *(d) create concentrations or combinations of materials which are toxic or harmful to human, animal, plant, or aquatic life; and* *(e) create conditions which produce undesirable aquatic life.* *(2) No wastes may be discharged and no activities conducted such that the wastes or activities, either alone or in combination with other wastes or activities, will violate, or can reasonably be expected to violate, any of the standards.* *(3) Until such time as minimum stream flows are established for dewatered streams, the minimum treatment requirements for discharges to dewatered receiving streams must be no less than the minimum treatment requirements set forth in ARM 17.30.1203.* *(4) Treatment requirements for discharges to ephemeral streams must be no less than the minimum treatment requirements set forth in ARM 17.30.1203. Ephemeral streams are subject to ARM 17.30.635 through 17.30.637, 17.30.640, 17.30.641, 17.30.645, and 17.30.646 but not to the specific water quality standards of ARM 17.30.620 through 17.30.629.* *(5) Pollution resulting from storm drainage, storm sewer discharges, and non-point sources, including irrigation practices, road building, construction, logging practices, over-grazing, and other practices must be eliminated or minimized as ordered by the department.*	to RA activities that involve dewatering.	

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Media	**Requirement**	**Prerequisite**	**Citation(s)**
	Available at: http://www.mtrules.org/gateway/RuleNo.asp?RN=17%2E30%2E637		
Regulation | Ground Waters			
Criteria for maintaining Class I ground waters	Shall meet human health standards listed in Circular DEQ-7 for Class I ground waters, as follows: • PCE: • TCE: • C_5-C_8 Aliphatics • C_9-C_{12} Aliphatics • Chloroform: 70 µg/L ***Rule Title: CLASSIFICATIONS, BENEFICIAL USES, AND SPECIFIC STANDARDS FOR GROUND WATERS*** ***Department: Environmental Quality*** ***Chapter: Water Quality*** ***Subchapter: Montana Ground Water Control System*** ***17.30.1006 CLASSIFICATIONS, BENEFICIAL USES, AND SPECIFIC STANDARDS FOR GROUND WATERS*** *(1) Class I ground waters are those ground waters with a natural specific conductance less than or equal to 1,000 microSiemens/cm at 25°C.* *(a) The quality of Class I ground water must be maintained so that these waters are suitable for the following beneficial uses with little or no treatment:* *(i) public and private water supplies;* *(ii) culinary and food processing purposes;* *(iii) irrigation;* *(iv) drinking water for livestock and wildlife; and* *(v) commercial and industrial purposes.*	**Applicable*** *The substantive requirements of this provision would only apply to RA activities that involve dewatering.	ARM 17.30.1006(1)

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Media	**Requirement**	**Prerequisite**	**Citation(s)**
	(b) Except as provided in ARM 17.30.1005(2) , a person may not cause a violation of the following specific water quality standards in Class I ground water: *(i) the human health standards for ground water listed in DEQ-7;* *(ii) for concentrations of parameters for which human health standards are not listed in DEQ-7, no increase of a parameter to a level that renders the waters harmful, detrimental, or injurious to the beneficial uses listed for Class I water. The department may use any pertinent credible information to determine these levels; and* *(iii) no increase of a parameter that causes a violation of the nondegradation provisions of 75-5-303 , MCA.* *Available at: http://www.mtrules.org/gateway/ruleno.asp?RN=17.30.1006*		

Action-Specific ARARs

Action-specific requirements are technology- or activity-based requirements or limitations or actions taken with respect to hazardous substances.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
Regulation | Water Quality			
Activities resulting in point source discharges to State surface waters	Point source discharges shall meet certain effluent limitations or standards of performance. ***Rule Title: EFFLUENT LIMITATIONS AND STANDARDS OF PERFORMANCE*** ***Department: ENVIRONMENTAL QUALITY***	**Applicable*** *The substantive requirements of this provision would only apply to RA activities that involve dewatering.	ARM 17.30.1207(1) Cross-references: 40 CFR Chapter I, Subchapter N

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
	Chapter: WATER QUALITY ***Subchapter: Montana Pollutant Discharge Elimination System (MPDES) Standards*** ***17.30.1207 EFFLUENT LIMITATIONS AND STANDARDS OF PERFORMANCE*** *(1) Permits issued to point source dischargers, other than POTWs, must include effluent limitations or standards of performance applicable to the point source that are set forth in 40 CFR Chapter I, Subchapter N, as provided below:* *(a) for existing sources, effluent limitations representing the degree of effluent reduction attainable by the application of:* *(i) the best practicable control technology currently achievable (BPT) for all pollutants;* *(ii) the best available technology economically achievable (BAT) for toxic and nonconventional pollutants; and* *(iii) the best conventional pollutant control technology (BCT) for conventional pollutants;* *(b) for new sources, new source performance standards (NSPS) reflecting the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge.* *Available at*: http://www.mtrules.org/gateway/ruleno.asp?RN=17.30.1207 ***Note*:** Under CERCLA, a permit is not required, per paragraph (1).		
Regulation | Monitoring Wells			
Abandoning monitoring wells	Shall comply with certain requirements for abandoning monitoring wells. ***Rule Title: ABANDONMENT*** ***Department: NATURAL RESOURCES AND CONSERVATION***	**Applicable*** *The substantive provisions of this	ARM 36.21.810(1), (2)(a), (c), (d), (3), (4)

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
	Chapter: BOARD OF WATER WELL CONTRACTORS ***Subchapter: Monitoring Well Construction Standards*** ***36.21.810 ABANDONMENT*** *(1) Wells which have not been monitored for more than three years shall be deemed abandoned unless written permission is obtained from the board to maintain the well.* *(2) Monitoring wells that have outlived their useful purpose shall be abandoned by one of the following methods:* *(a) if the casing and screen are left in place, the casing and screen shall be sealed from the bottom up by the following methods:* *(i) using a pump and hose or tremie pipe to conduct the sealing material to the bottom of the well; or* *(ii) by filling the casing and screen with bentonite pellets or chips placed in a manner that will prevent bridging. Metal casings shall be cut off three feet below the ground surface and the last three feet backfilled with naturally occurring soils;* *(b) the department recommends that the casing be removed in all possible instances. If the casing and/or screen are removed, the hole shall be filled with sealing material, concrete, or bentonite pellets or chips from the bottom up, as the casing and/or screen is removed. From six to three feet from the surface, bentonite shall be added to the well. The last three feet shall be filled with naturally occurring soils;* *(c) the sealing material shall be bentonite pellets or chips, bentonite clay grout, neat cement grout, or concrete. The material may contain nonbiodegradeable fluidizing admixtures, provided they will not contaminate the groundwater. Sealing materials which settle shall be topped to provide a continuous column of grout to within three feet of the surface; or* *(d) other methods for abandonment with prior board approval.* *(3) For flowing wells, the abandonment procedures outlined in ARM 36.21.671 shall apply.*	requirement would only apply to RA activities that involve abandonment of existing groundwater wells.	

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
	(4) A properly abandoned well shall not produce water nor serve as a channel for movement of water. *Available at*: http://www.mtrules.org/gateway/RuleNo.asp?RN=36%2E21%2E810 ***Note*:** Under CERCLA, board permission and approval is not required, per paragraph (1) and (2)(d).		
Statute | Montana Hazardous Waste Act			
Disposing used oil or hazardous waste	Shall not unlawfully dispose of used oil or hazardous waste. ***TITLE 75. ENVIRONMENTAL PROTECTION*** ***CHAPTER 10. WASTE AND LITTER CONTROL*** ***Part 4. Hazardous Waste Management*** ***75-10-422. Unlawful disposal.*** *It is unlawful to dispose of used oil or hazardous waste, as defined in this part or by rule, without a permit or, if a permit is not required under this part or rules adopted under this part, by any other means not authorized by law.* *Available at*: https://leg.mt.gov/bills/mca/title_0750/chapter_0100/part_0040/section_0220/0750-0100-0040-0220.html ***Note***: Under CERCLA, a permit is not required.	**Applicable*** *The substantive requirements of this provision would only apply to RA activities that involve disposal of used oil or hazardous waste	Section 75-10-422, MCA
Disposing used oil or hazardous waste	Shall not unlawfully dispose of used oil or hazardous waste. ***TITLE 75. ENVIRONMENTAL PROTECTION*** ***CHAPTER 10. WASTE AND LITTER CONTROL*** ***Part 4. Hazardous Waste Management***	**Applicable*** *The substantive requirements of this provision would only apply to RA activities	Section 75-10-422, MCA

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
	75-10-422. Unlawful disposal. *It is unlawful to dispose of used oil or hazardous waste, as defined in this part or by rule, without a permit or, if a permit is not required under this part or rules adopted under this part, by any other means not authorized by law.* *Available at*: https://leg.mt.gov/bills/mca/title_0750/chapter_0100/part_0040/section_0220/0750-0100-0040-0220.html ***Note***: Under CERCLA, a permit is not required.	that involve disposal of used oil or hazardous waste	
Transporting hazardous waste	Shall comply with certain requirements when transporting hazardous waste. ***ARM 17.53.702 (3)*** *For at least three years after the date the hazardous waste was accepted by the initial transporter, copies of the manifest, as required under 40 CFR 263.22(a), must be maintained on file at the transfer facility location for all hazardous waste shipments that are transported to a transfer facility.* ***ARM 17.53.702 (4)*** *In addition to the notices and reports required by 40 CFR 263.30 in the event of discharges of hazardous waste during transportation, the transporter shall also notify the department by immediately contacting the Montana hazardous materials emergency response system (406) 324-4777).*	**Applicable*** *The substantive requirements of this provision would only apply to RA activities that involve transporting hazardous waste.	ARM 17.53.702(3) and (4) Cross-reference: 40 C.F.R. 263.30 40 C.F.R. 263.31

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
Generating Hazardous Waste	Shall comply with applicable provisions of 40 C.F.R Part 262 as adopted and incorporated by reference, except as otherwise provided in ARM 17.53.602.	**Applicable*** *The substantive requirements of this provision would only apply to RA activities that involve generation of hazardous waste.	ARM 17.53.601 Cross reference: 40 CFR § 262.11(a), (b), (d), (e) 40 CFR § 262.13 40 CFR § 262 Subparts A-D, M
Disposal of hazardous waste	Shall comply with applicable provisions of 40 C.F.R. Part 268 as adopted and incorporated by reference pertaining to land disposal regulations, except as otherwise provided in ARM 17.53.1102.	**Applicable*** *The substantive requirements of this provision would only apply to RA activities that involve disposal of hazardous waste.	ARM 17.53.1101 Cross reference: 40 CFR § 268.1(a) and (b), (e)

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) BILLINGS PCE OU1 ROD			
Action	**Requirement**	**Prerequisite**	**Citation**
Regulation | Montana Solid Waste Management Act			
Transporting solid waste	Shall transport solid waste in such a manner as to prevent its discharge, dumping, spilling, or leaking from the transport vehicle. **Rule Title: TRANSPORTATION** **Department: ENVIRONMENTAL QUALITY** **Chapter: SOLID WASTE MANAGEMENT** **Subchapter: Refuse Disposal** **17.50.523 TRANSPORTATION** (1) Solid waste must be transported in such a manner so as to prevent its discharge, dumping, spilling, or leaking from the transport vehicle. *Available at*: http://www.mtrules.org/gateway/RuleNo.asp?RN=17%2E50%2E523	**Applicable*** *The substantive requirements of this provision would only apply to RA activities that involve transporting solid waste.	ARM 17.50.523

To Be Considered:

Montana Department of Environmental Quality – Montana Vapor Intrusion Guide (September 2021), found at MontanaVI_Guide_FINAL.pdf (mt.gov).

Montana Department of Environmental Quality – Effluent Vapor Modeling Guidance (April 2020), found at Effluent Vapor Monitoring Guidance April 2020.pdf (mt.gov)

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