

Agency of Natural Resources
Department of Environmental Conservation
Waste Management & Prevention Division
Sites Management Section
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Environmental Data Collection and Analysis Guidance

Updated: September 2024

Purpose of this document:

Appropriate characterization of environmental media and use of analytical techniques that achieve appropriate regulatory standards are vital to the evaluation of release-related risks and development of suitable corrective actions. Fulfillment of proper media sampling protocols ensures that data will be of the necessary quality to make these decisions. All proposed environmental media sampling and analysis plans must document how the proposed work will characterize contamination and follow appropriate methodology, including commonly referenced Environmental Protection Agency (EPA), American Society for Testing and Materials (ASTM), and Interstate Technology Regulatory Council ([ITRC](#)) guidance documents. The following guidance and reference documents should be incorporated into the site characterization strategies, including sampling and analysis standard operating procedures (SOPs), where applicable. All sampling work plans must follow the requirements of the Investigation and Remediation of Contaminated Properties Rule (IRule) and be pre-approved by the Secretary.

It is the expectation of the Sites Management Section (SMS) that environmental consultants incorporate the following into site investigation and cleanup of contaminated sites. Work which does not include the following methods and guidance will be rejected by the SMS.

I. Site Characterization Strategies:

Determining appropriate strategies for site investigations begin with developing a Conceptual Site Model (CSM), as described in §35-303 of the IRule. Data gaps identified in the CSM should direct the sampling strategy to ensure specific questions are answered. As additional data is collected, the CSM must be refined and used as a tool to direct next steps. The SMS' CSM guidance may be found here: [SMS CSM Guidance](#).

The objective of a site characterization is to determine the source, degree, and extent of contamination and identify risks to sensitive receptors. All sites must be characterized in accordance with acceptable industry standard methodologies. Guidance documents are available from EPA, ASTM, and [ITRC](#). SOPs must be available for review, if requested, by the Secretary.

The SMS strongly encourages the use of integrated site characterization (ISC) techniques. ISC is a strategy which should be considered for both newly discovered contaminated sites as well as sites where persistent contamination has prevented closure for years. This may be considered during various site investigation phases, per IRule §35-304(B)(6). ISC encourages characterization at a sufficient resolution to capture the effects of the heterogeneities that impact contaminant distribution, fate and transport, as well as remediation effectiveness, so that a conceptual site model can be developed ([ITRC, 2011](#)). The specific

steps in an ISC process are as follows:

- Define the problem and uncertainties in the Conceptual Site Model (CSM).
- Identify the data gaps and spatial resolution required in the investigation.
- Prepare the Data Quality Objectives (DQO) to ensure the analytical approaches can meet these objectives and regulatory standards.
- Design the data collection process.
- Select the appropriate investigative tools.
- Manage, evaluate, and interpret the data.

Although the ISC method can have a higher initial cost than traditional site characterization methods, total costs upon the completion of remedial activities are generally lower since ISC methods provide better identification of the contaminant plume, leading to the most effective remedial strategy. Some ISC characterization techniques include the following:

- Soil gas surveys
- Soil sampling
- Groundwater profiling
- High-resolution characterization tools (e.g., Membrane Interface Probe (MIP))
- Sample collection and data analysis using field labs
- Geological characterization

II. Data Quality Objectives (DQOs)

Data Quality Objectives (DQOs) are qualitative and quantitative statements of the quality of data needed to support specific decisions or regulatory actions. The DQO is a guide for effective collection and analysis of environmental data that ensures the results of the investigation will meet regulatory goals. For detailed information on the DQO process, refer to the EPA document, “Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4” at: [Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4](#).

III. Environmental Media Sampling

1. Field Screening

Field screening of environmental media can be a valuable tool during site investigations, as it can inform the onsite environmental contractors and allow decisions to be made in the field, particularly when a flexible work plan is being implemented. It is important to understand the limits of each of these methods and when quantitative data collection is necessary to verify the findings of a field instrument.

There are a number of field-portable instruments and detectors (e.g., photoionization detector (PID), flame ionization detector (FID), water quality multiparameter sensors, colorimetric test kits/immunoassay kits, portable gas chromatograph mass spectrometer (GC/MS), x-ray fluorescence (XRF), etc.) that are available to screen environmental media. Users must be well-versed in using field screening tools according to manufacturer’s instructions and applicable SOPs. Data collected with these tools which do not follow manufacturer’s instructions will be rejected by the SMS. For example, PIDs are not effective when used in wet conditions, etc. Field screening efforts are generally not suitable for comparison to regulatory environmental media standards. The proposed workplan must provide justification for the selection of field screening instruments and must describe how the data will be used to make field decisions.

The most commonly used field screening device for volatile organic compounds (VOCs) is the PID. A PID is only appropriate for use as a general screening tool to determine the presence/absence and relative levels of VOCs. When conducting site investigations, a PID may be used as part of additional site characterization methods but may not be used as a stand-alone tool for characterization purposes. A PID may be used for the direct screening of soil vapor contamination with gasoline, diesel, kerosene and #2 fuel oil. A PID is NOT sufficient for low volatility petroleum contamination such as #4, #6 or used oil, or for the identification of compound-specific VOCs. If a PID is being used to screen soil samples for VOCs, the same aliquot of soil that is agitated and screened in a Ziploc bag or other container such as a glass mason jar with secure lid **CANNOT** be reused for laboratory analysis.

2. Qualitative or Semi-Quantitative Measurements

The use of high-resolution site characterization tools (such as a Membrane Interface Probe (MIP) or Laser-Induced Fluorescence (LIF)) during site characterization is accepted and encouraged. These tools can provide rapid generation of high-density data, in some cases of both contaminant levels and lithology. They can also provide a means to identify locations and depths where quantitative data should be collected to improve or complete a conceptual site model or to allow decision making. If data is collected using these techniques, environmental media sampling will also be needed to provide quantitative data for comparison to regulatory standards.

The following references are available for guidance, where available:

- https://www.itrcweb.org/dnapl-isc_tools-selection/
 - Direct Link to Tool Selection Worksheet: https://itrcweb.org/Documents/team_DNAPL/DNAPL.xltm
- <https://clu-in.org/characterization/>
- ITRC Advanced Site Characterization Tools: <https://asct-1.itrcweb.org/>

3. Soil Sampling

A soil sampling program should be initiated to assess if any contaminants are present in soils above standards during site investigations and post-cleanup confirmatory sampling (if needed). Soil sampling data must be compared to the appropriate soil standards. However, note that the Vermont Soil Standards (VSS) are based on direct contact, and may not be appropriate for use with subsurface soils. The VSS were not developed in consideration of potential vapor intrusion or leaching to groundwater. Refer to the [Vapor Intrusion Guidance](#) to determine if soil contamination indicates a potential risk to indoor air.

Comparison to EPA Regional Screening Levels (RSLs) may be needed to determine if the soil to groundwater pathway should be evaluated. Approved evaluations to demonstrate the contaminant(s) will not cause a release to groundwater above standards (see Section III below) include using an analytical leaching procedure such as Synthetic Precipitation Leaching Procedure (SPLP), sampling of groundwater following installation of a monitoring well network, and other evaluations as approved by the Secretary. Number of samples and depth to groundwater should be considered and approved in advance.

The following references are available for guidance, where applicable:

- [EPA Regional Screening Levels \(RSLs\)](#)
- [ITRC-Incremental Sampling Methodology \(ISM-2\), 2020](#)
- [ASTM-D4547-15 Standard Guide for Sampling Waste and Soils for Volatile Organic Compounds](#)

- [US EPA Expedited Site Assessment Tools for Underground Storage Tank Sites: A Guide for Regulators \(EPA 510-B-97-001\)](#)

The appropriate method of soil sampling should be presented in the proposed workplan. Various sample collection approaches are described below.

Discrete (or Grab) Samples. Representative of one specific sample site at a single location. Discrete soil samples are required at Sites to determine the concentrations of the contaminants of concern.

Incremental Sampling Methodology (ISM): is a structured composite sampling and processing protocol that reduces data variability and provides a reasonably unbiased estimate of mean contaminant concentrations in a volume of soil targeted for sampling. ISM provides representative samples of specific soil volumes defined as decision units (DUs) by collecting numerous increments of soil (typically 30–100 increments) that are combined, processed, and subsampled according to specific protocols. DUs are defined based on an area with a common historical land use or a common proposed reuse. The SMS strongly encourages the use of ISM sampling, when appropriate. Specific protocols can be found in ITRC’s [Incremental Sampling Methodology Guidance \(ISM-2\)](#) document.

Composite Samples. Non-discrete soil samples composed of more than one specific aliquot collected at various sampling points. **Composite samples are not acceptable as part of site characterization** (except as described in the ITRC Incremental Sampling Methodology document (ISM-2)). Composite samples may be acceptable for waste characterization analysis for proper disposal as per certified disposal facility requirements.

- [ASTM-D6051-15 Standard Guide for Composite Sampling and Field Subsampling for Environmental Waste Management Activities](#)

Soil Excavations. For soils that are excavated for stockpiling and/or treatment, samples of the native material remaining in the ground must be collected and submitted for laboratory analysis in order to demonstrate that the full extent of contamination was removed, unless post-excavation sampling is not required as part of the Corrective Action Plan (CAP) or Soil Management Plan (SMP). This approach will be allowed when the area of soil contamination has been thoroughly characterized and the CAP or SMP calls for over excavation of the contaminated soils. The decision to excavate contaminated soils must be based on a combination of soil analytical data, soil screening data, and visual and olfactory evidence. The number and locations of post-excavation samples for laboratory analysis will be addressed in the SMP work plan, CAP, or through communication with the SMS Project Manager. Analytical methodologies will be determined by the contaminant(s) of concern and addressed in the work plan.

4. Groundwater Sampling

The method of sample collection and materials used will depend on the site conditions and contaminants of concern. The objective is to obtain representative formation samples (low turbidity) from either temporary well points or monitoring wells for physical and chemical analyses. SMS preference for groundwater collection is to follow the EPA Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells (see reference below). Specific details must be provided on well construction and sample collection methods, per applicable EPA guidance below. Field sheets from purging and parameter stabilization should be provided in the report. A list of acceptable parameter stabilization criteria for low-flow sampling is provided in Table 2. If low-flow

methods are unable to be utilized, justification for using other groundwater collection methods must be provided, as well as confirmation that the alternate method will result in the collection of a representative groundwater sample.

The following references are available for guidance, where applicable:

- [ASTM \(D5092M-16\) – Reapproved 2010: Standard Practice for Design and Installation of Groundwater Monitoring Wells](#)
- [EPA Design and Installation of Monitoring Wells, January 2018](#)
- [ASTM \(D4448-01\) – Reapproved 2013: Standard Guide for Sampling Groundwater Monitoring Wells](#)
- [ASTM \(D6452\) Guide for Purging Methods for Wells Used for Groundwater Quality Investigations](#)
- [ASTM \(D6517\) Guide for Field Preservation of Groundwater Samples](#)
- [EPA Low Stress \(low flow\) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, September 2017](#)
- [ITRC-Protocol for Use of Five Passive Samplers to Sample for a Variety of Contaminants in Groundwater, February 2007](#)

Metals Analysis. Metals analysis must be for total metals analysis and should follow the EPA Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedure (see reference above). Dissolved metals concentrations cannot be compared to regulatory standards. Filtered groundwater samples are not acceptable.

Well Screens

Monitoring wells as traditionally constructed (i.e., with 10 ft screens) may not be useful as a primary characterization tool because of vertical and volumetric averaging of contaminant concentrations associated with this type of sampling. It is important to understand the site geology and incorporate this understanding into developing an appropriate groundwater characterization plan.

5. Water Supply Sampling

Potentially impacted or threatened drinking water supplies must be sampled to determine the presence of contamination. The sampler must determine where the sample is to be collected, typically closest to the source of the water supply. This is usually at the spigot located before the pressure tank (if a spigot is present), or at the kitchen or bathroom tap, if the pressure tank is not accessible. VOC concentrations will be reduced throughout the distribution system if a pressure tank is present, therefore it is important to draw fresh water into the tank before sampling.

Always sample prior to water treatment, including sediment filters if present, and note if treatment was bypassed during sampling.

It is sometimes possible to sample directly from the source when the source is a shallow dug well. Care must be taken to prevent coliform contamination of the water supply from the sampling equipment (example: sampling standing water in a shallow dug well or in a cistern). The next best option is to sample from a faucet or valve after the pump and prior to the pressure tank. In the case of a gravity feed, the first faucet into the house is the next best to sampling the source itself.

Photos should always be collected of all sampled water sources and of the sample location, to include close-up photos and notable features in the surrounding area. Property owners should be interviewed to collect any relevant information related to the well construction, if known. See the attached **Water Supply Field Collection Form (Attachment 1)** as a guide for collecting relevant water source information.

The following sampling procedures must be utilized, unless otherwise approved by the Secretary:

1. If sampling from a faucet in a kitchen or bath, remove any filters, aerators, or screens present on faucet. If sampling from a valve, sample directly into containers. Collect samples directly into appropriate sample bottles (check with EPA sampling methodology to ensure proper sampling container is used). Tap water should be purged prior to sample collection to flush stagnant water from the plumbing system and to ensure the sample is representative of the aquifer. In many cases this can be achieved by running the faucet for 10 to 15 minutes. Monitoring water quality parameters and temperature for stabilization during purging is useful to ensure that fresh water is being collected. The size of the pressure tank and extent of the piping from the water source should also be considered, especially if the water is not regularly used. Another factor to consider is the physical and chemical properties of the contaminants of concern. The exact purging time or process should be included in the consultant's SOPs and/or the work plan to be approved by the SMS before the sample is collected.
2. If sampling from a shallow dug well, utilize a peristaltic pump if the sampler cannot reach the water supply. Place sample directly into appropriate sample bottles from sampling device. Ensure no contamination from tubing or bottles. Report any deficiencies in water supply protection that may be present (example: "door to spring house off hinges"), or surrounding area land use practices that may impact the supply.

6. Vapor intrusion (sub-slab, indoor air, and ambient air)

The potential for vapor intrusion (VI) exists at any site where there has been a release of VOCs near a building and may present a risk for any future buildings constructed above or near a contaminated area. Please see the separate [VTDEC Vapor Intrusion Guidance](#) for more details.

The following references are available for guidance, where applicable:

- [ITRC Petroleum Vapor Intrusion, October 2014](#)
- [ITRC Vapor Intrusion Pathway: Investigation Approaches for Typical Scenarios, January 2007](#)
- [ITRC Vapor Intrusion Pathway: A Practical Guideline, January 2007](#)
- [ITRC Vapor Intrusion Mitigation, January 2021](#)
- [OSWER 9200.2-154 Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air](#)
- [EPA 510-R-15-001 Technical Guide for Addressing Petroleum Vapor Intrusion at Leaking Underground Storage Tank Sites](#)

7. Surface Water and Sediments

If a surface water body has been identified as a threatened or impacted sensitive receptor, further characterization may be appropriate. To evaluate the risk to surface water, sampling data should be compared to the [Vermont Water Quality Standards](#). The following reference is available for guidance,

where applicable:

- [VT DEC Recommended Guidelines for Evaluating Contaminants to Adversely Affect Aquatic Biota](#)

8. Sampling frequency

Required sampling frequency is dictated by site specific characteristics and conditions. However, the SMS has general sampling frequency recommendations that are expected to be used as a starting point and are outlined on **Table 1** of this document.

9. Evaluating the soil to groundwater pathway

Site investigations require that the hazardous material distribution, transport mechanisms, and migration pathways be evaluated in all impacted and potentially impacted media, which includes groundwater impacts from the leaching of contaminants from soil. In circumstances when groundwater samples are not collected to determine impacts from soil, contaminant concentrations in soil may be compared to the most current EPA Regional Screening Levels (RSLs) Resident Soil to Groundwater value. When an exceedance of this value occurs, the pathway must be further evaluated to determine if there is an exceedance or potential exceedance of a groundwater standard. Approved evaluations include using an analytical leaching procedure such as Synthetic Precipitation Leaching Procedure (SPLP) to demonstrate the contaminant(s) will not cause a release to groundwater, sampling of groundwater following installation of a monitoring well network; and other evaluations as approved by the Secretary.

10. Monitoring well decommissioning

Groundwater monitoring wells are required to be properly abandoned in accordance with the [Water Supply Rule](#) prior to site closure. Well abandonment must be performed by a Vermont licensed well driller or monitoring well driller. Prior to closing, all wells must be cleared of any materials which might interfere with effective closing. As much of the casing as possible should be removed. The well must be completely filled with grout or other material to render the bore hole at least as impervious as the surrounding native material. The type of material used to fill the well by the licensed well driller varies depending on the depth of the well and where it is terminated (bedrock or unconsolidated material).

11. Laboratory Analysis

The contaminants of concern at a site will dictate which analytical method is most appropriate for different media. References to specific laboratory methods are subject to change. EPA Methods referenced below must be used unless an updated or alternative method is approved or requested by the Secretary.

CONTAMINANTS OF CONCERN	ANALYSIS*
Volatile Organic Compounds (VOCs)	Initial sampling including petroleum sites: EPA Method 8260 Subsequent petroleum site sampling rounds following Secretary approval: VT Petroleum List** Drinking water supplies: EPA Method 524.2 Soil gas and indoor air: EPA Method TO-15 or 8260
Ethylene Dibromide (EDB)	EPA Method 524.2 when water supplies potentially at risk
Semi-volatile Organic Compounds (SVOCs)	EPA Method 8270; Selective Ion Monitoring (SIM)
Polycyclic Aromatic Hydrocarbons	EPA Method 8270; SIM

(PAHs)	
Polychlorinated Biphenyls (PCBs)	EPA Method 8082 with Soxhlet extraction; EPA Method 1668A Analytical method used will depend on reported parameters, detection limit, media, and potentially degree of weathering. Method TO-10A for indoor air and soil gas
Dioxins/Furans	EPA Method 8280 or 8290
Metals	EPA SW-846 methods
Total Petroleum Hydrocarbons (TPH)	Soil analysis ONLY upon approval of the Secretary (see guidance below): EPA Method 8015 Diesel Range Organics (DRO) or Gasoline Range Organics (GRO).
Development Soils disposal characterization or soil leaching potential	EPA Method 1312 Synthetic Precipitation Leaching Procedure (SPLP)
Per- and polyfluoroalkyl substances (PFAS)	EPA Method 537.1 or 533 for drinking water supplies; EPA Method 1633 to test for 40 PFAS compounds in wastewater, surface water, groundwater, soil, biosolids, sediment, landfill leachate, and fish tissue; EPA Method 1621 to measure the aggregate concentration of organofluorines (molecules with a carbon-fluorine bond) in wastewater.
1,4 Dioxane	EPA Method 522 (SPE and SIM GC/MS) for groundwater

* For those chemicals not listed, use current EPA approved method

** Vermont Petroleum List: Benzene, toluene, ethylbenzene, xylenes, total trimethylbenzene, naphthalene, methyl tert-butyl ether (MTBE)

12. Guidance on TPH

No soil standard is provided in the IRule for Total Petroleum Hydrocarbons (TPH), therefore analytical data for TPH will not be used directly for risk assessment. TPH data may be collected if the information will help refine the conceptual site model during a site investigation or provide information that will be needed to select remedial options. For example, TPH data can be used to help characterize contaminant mass and distribution, and chromatograms can be useful to determine the type of material present and degree of weathering. TPH analysis can also be useful in determining vapor intrusion risk to structures or for some corrective action technologies. Justification for performing TPH analysis must be provided in a work plan.

Additional information about evaluating TPH data is available here: <https://tphrisk-1.itrcweb.org/>.

13. QA/QC requirements

Minimum QA/QC for a sample delivery group, per IRule Subchapter 3: A trip blank or field blank, a duplicate sample, chain of custody documentation, and documentation of the laboratory's QA/QC samples analyzed in addition to site specific media samples. Additional QA/QC requirements may be necessary and must be part of an approved work plan.

14. Reporting

The laboratory reporting limit (RL) must be below the applicable standard. If the RL is above a standard, the Secretary may require that additional samples be analyzed using a method providing an RL below the

applicable standard. Non-detect (ND) results must be reported as below test method RL, with the RL reported. Any non-detect result with a RL that is greater than the standard is considered a detected contaminant equivalent to the RL.

15. Toxicity Equivalence Quotients (TEQ)

Some chemicals are members of the same family or group and have been shown to exhibit similar toxicological properties; however, each chemical may differ in the degree of toxicity (EPA, 2019). In some such instances, a toxicity (sometimes referred to as toxic) equivalency factor (TEF) or relative potency factor (RPF) must be applied to convert the reported concentration of each member of the group to a toxicity (sometimes referred to as toxic) equivalent concentration (TEQ) or to toxic equivalents (TE) relative to the toxicity of the index chemical for the group. The index chemical is assigned a TEF or RPF of 1. Total TEQ or TE can be compared to risk-based values derived for the index chemical or assessed using as any other single chemical in a quantitative risk assessment.

The following contaminants must be reported as Toxicity Equivalence Quotients (TEQs):

Polycyclic Aromatic Hydrocarbons (PAHs). Soil analytical results for PAHs must be reported as a TEQ to benzo(a)pyrene. The TEQ to benzo(a)pyrene is the sum of adjusted concentrations of seven individual PAHs using relative potency factors available on the VDH website here: [Vermont General Screening Values for Soil \(healthvermont.gov\)](https://healthvermont.gov) For PAH compounds that are non-detect, a value equal to one half the reported method detection limit (MDL) shall be used for calculating the TEQ. Sediment analytical results for PAHs must be compared to individual PAHs.

Dioxins, furans, and dioxin-like PCBs. Must be reported as a TEQ to 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD). The Toxicity Equivalence Factors (TEF) to be used by the laboratory during analysis are available on the VDH website here: [Vermont General Screening Values for Soil \(healthvermont.gov\)](https://healthvermont.gov). Laboratory results must include the 2,3,7,8-TCDD values and raw concentrations reported for each individual dioxin-like compound.

Polychlorinated Biphenyls (PCBs). PCBs must be reported as individual congeners, homologs, or Aroclors. The sum of all homologs is also referred to as Total PCBs and can be directly compared to the Vermont Soil Standard. If PCBs are reported as individual congeners, dioxin-like congeners should be segregated; weighted using the TEFs available on the VDH website here: [Vermont General Screening Values for Soil \(healthvermont.gov\)](https://healthvermont.gov) and assessed in conjunction with TCDD-TEQ. The remaining congeners would be summed and assessed as Total PCBs. If results are analyzed as PCB Aroclors, analytical results shall be totaled, and the Total PCBs can be directly compared to the Vermont Soil Standard or applicable indoor air standards.

Approval signature:

Date: 9/12/2024



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Table 1. Baseline Expectations for Sampling Frequency

Environmental Media	Site Management Phase	General frequency guidelines	Notes
Groundwater	Initial Site Characterization	Iterative process, using a variety of techniques, to define the degree and extent of contamination.	Consider parameters that typically influence water quality such as seasonal variation and proximity to surface water.
	Long-term monitoring (e.g., at compliance points)	Sample monitoring wells quarterly for one year; decrease to semi-annual, then annual	Unless evidence suggests either more or less sampling is necessary (ex: localized release where an impact to groundwater is investigated but no contamination is found in initial sampling. In this instance it may be appropriate to sample only two rounds and either reduce sampling to semi-annual or move to closure.)
Drinking water supply	Initial results exceed standard	Resample to confirm exceedance	Consider use of bottled water while data is confirmed/trend established
	Initial results show a detection below standard	When a detection is reported and sample results are within 25% of the standard, monitor quarterly to establish trends for one-two years, then decrease to semi-annual, then annual based on results	Consider use of bottled water while data is confirmed, trend established. Prior to discontinuing sampling, non-detect results for four sampling events, over the course of one year or two years.
Indoor air	Initial site characterization	Collect during at least two seasonally disparate times (e.g., warm and colder-weather months).*	Once IA impact is confirmed (generally after a confirmatory sampling round if detected levels were low, or immediate if levels are high), remedy is implemented.
	Post-remediation monitoring	Following remediation efforts, quarterly monitoring for one year to confirm remedy is effective.	Type of monitoring and frequency is largely dependent of site-specific conditions and chosen remedy. See VTDEC VI Guidance (https://dec.vermont.gov/sites/dec/files/wmp/Sites/06.2022.VI .complete.guidance.pdf)
Sub-slab soil vapor	Initial Site Characterization	If results are marginally below the standard, collect during at least two seasonally disparate times (e.g., warm and colder-weather months).*	Once an exceedance is confirmed, move on to assess VI pathways and/or mitigate

Table 1. Baseline Expectations for Sampling Frequency

Environmental Media	Site Management Phase	General frequency guidelines	Notes
Sub-slab soil vapor	Post-remediation sampling	Quarterly for one year	If no impact to IA but above VI standards, sampling may be discontinued.
LNAPL	Initial Site Characterization	<p>Iterative process, using a variety of techniques to define the degree and extent of contamination.</p> <p>Trace amounts may be mitigated w/absorbents and monitored 1/mo until contamination better understood/characterized. 1/8"+ may be monitored weekly/biweekly until source is better understood/characterized.</p>	<p>See https://lnapl-3.itrcweb.org/ and https://lnapl-3.itrcweb.org/wp-content/uploads/2018/02/table_4_2.pdf</p>
	Post-remediation sampling	Sampling strategy and frequency based on performance metrics for remedy	https://lnapl-3.itrcweb.org/5-lnapl-concerns-remedial-goals-remediation-objectives-and-remedial-technology-groups/#5_5
DNAPL	Initial Site Characterization	Iterative process, using a variety of techniques to define the degree and extent of contamination.	https://projects.itrcweb.org/DNAPL-ISC_tools-selection/
	Post-remediation sampling	DNAPL is the least commonly monitored media because DNAPL is difficult to locate and collect. Monitoring programs may include groundwater sampling, soil gas sampling, etc.	<p>See ITRC IDSS-1 Chapter 5. Developing a Monitoring Approach (https://itrcweb.org/teams/projects/integrated-dnapl-site-strategy)</p>

*At schools where indoor air concentrations of PCBs are within 25% of the School Action Level, sample quarterly or on a schedule approved by the Secretary. Sample until data shows stable or declining trends below a background value of 22.5 ng/m³ (VTDEC, 2020).

Table 2. Stabilization Criteria for Groundwater Sampling via Low-flow Techniques

Parameter	Criteria
Turbidity	10% for values greater than 5 NTU, if three turbidity values are less than 5 NTU, consider the values as stabilized
Dissolved Oxygen (DO)	10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized
Specific Conductance	3%
Temperature	3%
pH	+/- 0.1 unit
Oxidation/Reduction Potential (ORP)	+/- 10 millivolts

Source: 2017 Low-Stress (Low-flow) SOP: <https://www.epa.gov/sites/default/files/2017-10/documents/eqasop>

ATTACHMENT 1. WATER SUPPLY FIELD COLLECTION FORM

SAMPLE E911 ADDRESS			
SAMPLER(S)		DATE/TIME	
OWNER NAME		E-MAIL	
ADDRESS (IF DIFFERENT)		TELEPHONE	
RENTAL?	YES NO	E-MAIL	
TENANT NAME		TELEPHONE	
WATER SUPPLY TYPE	SPRING OVERBURDEN BEDROCK UNKNOWN	WELL LOCATION (I.E. FRONT YARD, CELLAR...)	
DATE OF INSTALLATION		TAKE A PICTURE OF THE WELL TAG (IF THE WELL HAS ONE)	
GPS COORDINATES	LAT:	WELL TAG NUMBER	
	LONG:	DRILLER ID#	
WATER SOFTENER	YES NOTYPE:	ONSITE SEPTIC?	YES NO UNKNOWN
WATER FILTER	YES NOTYPE:	SEPTIC LOCATION	
SAMPLE LOCATION	PRESSURE TANK SPIGOT OUTSIDE SPIGOT KITCHEN FAUCET OTHER: _____	AERATOR REMOVED?	YES NO NONE PRESENT
PURGING TIMES	START: SAMPLE TIME:	ODOR?	YES NO DESCRIBE:
SAMPLE ID:		COLOR?	YES NO DESCRIBE:

SAMPLE AREA INVENTORY/USE:

NOTES (INCLUDE WELL DEPTH IF KNOWN, OTHER TREATMENT, CONDITION OF THE WELL CAP OR SPRING HOUSE, PROXIMITY TO POTENTIAL SOURCES OF CONTAMINATION, ETC.):

SITE SKETCH SHOWING GENERAL LOCATION OF SUPPLY WELL, HOUSE, SEPTIC, ROAD:

