Cover Sheet
Standard Operating Procedure

Operation Title: **Protocol for Collecting Indoor Air Samples**

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1.0 Applicability

This Standard Operating Procedure (SOP) applies to all programs in the Maine Department of Environmental Protection's (MEDEP) Division of Remediation (DR). It may be utilized by other Divisions within MEDEP, as determined by the respective Division Directors or their designees.

This SOP is not a rule and is not intended to have the force of law, nor does it create or affect any legal rights of any individual, all of which are determined by applicable statutes and law. This SOP does not supersede statutes or rules.

2.0 Purpose

The purpose of this document is to describe the MEDEP/DR procedure for collecting indoor air samples from buildings in the context of evaluating a complete vapor intrusion pathway.

3.0 Key Definitions

SUMMA® Canister: A stainless steel vessel with an internally passivated (inert) surface used to collect air samples for analyzing Volatile Organic Compounds (VOCs)

4.0 Responsibilities

All MEDEP/DR Staff must follow this procedure when performing this task. All Managers and Supervisors are responsible for ensuring that their staff are familiar with and adhere to this SOP. MEDEP/DR staff reviewing data by outside parties should ensure that this SOP (or an equivalent) was followed, depending on the specific Data Quality Objectives (DQOs) of the task.

Other MEDEP SOPs may also apply when performing this task, including, but not limited to MEDEP/DR SOP *RWM-DR-014 - Development of a Sampling and Analysis Plan* (SAP). The SAP should consider quality assurance and quality control (QA/QC) samples and measures, the specifics of which will depend on the DQOs for the task. Types of QA/QC samples are discussed in more detail in the DR Quality Assurance Plan (QAP). SAP development includes provisions for creating a Health and Safety Plan (HASP) associated with the activity, including compliance with Dig Safe notifications when disturbing soil with powered equipment or tools (i.e., not hand tools). Dig Safe notification does not include public utility clearance requests which

must be completed separately (e.g., sewer and water lines). These utility marking requests typically do not extend onto marking private property (i.e., they may only mark lines in the public right of way), so hiring a private utility marking company may be necessary, depending on site specifics. Fieldwork and data collection tasks must be properly documented in accordance with applicable MEDEP SOPs and policies.

5.0 Guidelines and Procedures

5.1 Preparation

Investigators should evaluate the potential for vapor intrusion simultaneously with indoor air sample collection or prior to indoor air sampling. Indoor air samples should not be collected without an appropriate vapor intrusion evaluation (e.g., soil gas sampling, sub-slab soil gas sampling, etc.).

5.2 Sampling Plan

A thoroughly developed Conceptual Site Model (CSM) is imperative for effective indoor air sampling. Special considerations should be made to determine the presence of preferential pathways for contamination into the building, and appropriate locations and methodology to ensure proper sampling locations are selected.

The owner of the property where the sampling is to occur must be made fully aware of and approve of the sampling event and any follow-up monitoring planned. The owner/operator of the building should identify any sub-slab utilities, foundation/column footings, vapor barriers, radon sub-slab depressurization systems, any other foundation structures, building renovations, and building contents that might impact the results or collection of indoor air samples.

Indoor air sampling is recommended during the heating season to determine potential "worst-case" vapor intrusion (generally November 1st to March 31st). If collection of indoor air sampling will become part of a routine monitoring program, it is recommended that follow-up samples be collected at the same location, unless the DQOs warrant sampling from more than one location or a different location in the building.

5.3 Scheduling

Sampling should not take place when doors and windows remain open to facilitate ventilation during warmer temperatures, unless arrangements have been made to keep them closed, as doing so may bias sample results low. If the building being sampled is a business and depending on the nature of their operations, sampling may be best conducted when they are closed (e.g., ventilation hoods not operating, doors being frequently opened to the outside, etc.). Custody seals may be considered for windows and doors during warmer weather or when building security is an issue.

5.4 Equipment

The equipment for collection of indoor air samples following this SOP may include:

- Photo-Ionization Detector (ppb level)
- Sampling Containers and flow controllers supplied by laboratory (e.g., SUMMA® Canister)
- Adjustable wrenches for connecting flow controller to SUMMA Canister Indoor Air/Sub-slab Sampling Field Sheet
- Laboratory Supplied Chain of Custody Form

Care must be given to selecting the appropriate container type and volume based on the analytes, analysis method(s), and sample collection duration, to meet the DQOs for the sampling event. Indoor air samples are generally collected to determine the potential risk to occupants of the building from vapor intrusion into the building. Only SUMMA® Canisters are discussed in this SOP as they are currently used for most sub slab soil vapor applications at MEDEP, however other types of sample containers or technologies can be considered (e.g., sorbent tubes, tedlar bags, etc.). When deciding which container to use, staff should consider the DQOs for the sample and the availability of a laboratory capable of analyzing the sample that is both state certified and capable of reaching required detection limits. Additional container types will be considered on a case-by-case basis.

SUMMA® Canisters must be ordered from a laboratory in advance of the sampling event. The canisters are received sealed and under vacuum pressure. Once opened, air is drawn in through the laboratory supplied regulator.

The laboratory must certify that the canister has been appropriately cleaned prior to shipment. Laboratory certification can be done on individual canisters or from one representative can in a batch. **Indoor air sample collection personnel should request individually certified clean canisters unless DQOs allow for batch certification.** The laboratory will need to be informed as to the sample collection method used and the duration of collection time prior to shipping the SUMMA® Canisters and regulators for the sampling event. Unused canisters will be sent back to the laboratory.

With the advancement of technology, it may be possible to utilize alternative analytical methods (field laboratory methods) that are not Maine certified. Such alternatives will be considered on a case-by-case basis and will likely require confirmation with SUMMA® Canister sampling. Such alternative methods will likely be considered screening within the context of a vapor intrusion investigation, dependent on DQOs.

5.5 Sample Collection Duration

Time integrated indoor air sampling is considered the best option for evaluating potential risks associated with vapor intrusion into indoor air. Time integrated sampling is completed through the use of a flow controller or regulator that is connected to the sampling container (i.e. SUMMA® Canister). The flow regulator is calibrated by the laboratory for the desired sample duration specified by the sampler at the time the order is placed. The standard sample collection duration for indoor air sampling is 24 hours when utilizing SUMMA® canisters, regardless of exposure scenario (residential or commercial) because the objective is to collect a representative sample of the air in the building. However, this duration can be modified based on DQOs and location specific conditions. The SAP (SAP) should specify the desired sample duration, and any changes due to location specific conditions should be clearly noted in the sample documentation and communicated in the summary report. Depending on the sample program, it may be necessary to obtain permission for the change in sample duration before the samples are collected.

Together, the sample duration, list of analytes, laboratory methods, DQOs, QA/QC measures), and desired reporting limits will determine the

appropriate sample type and volume.

6.0 Sample Collection Procedure

6.1 Connect flow control regulator assembly to canister. Using the appropriate fittings (e.g. Swagelok® or similar compression nuts) connect the controller assembly to the canister and tighten using two adjustable wrenches. Tighten snugly but do not overtighten. Note that some laboratories supply "quick connect" fittings that connect and release, which substitute threaded fittings with compression nuts.

6.2 Select appropriate canister location based on DQOs. Ensure location avoids drafts from windows and doors, especially if the building is occupied. Generally, select a location within the breathing zone to determine potential risk exposure to human receptors.

6.3 Record appropriate information. Use the Indoor Air Field Sheet (attached) to record building conditions, sample canister and flow controller identification numbers, as well as ambient and pre-sample concentrations from field screening instruments as appropriate. Make an accurate sketch of the building interior with notations that describe the exact location(s) of the canister(s). If a PID screening is conducted, record interior PID readings on the interior sketch. Note the storage of household chemicals, lubricants, petroleum burning boilers or furnaces, or other products that may influence indoor air sample results). If possible, ask the building occupant if they utilize any chemicals in the house that may influence results (e.g., paints or solvents used in hobbies), or if anyone smokes in the house. Use a camera to visually document the interior of the sample location(s).

6.4 Open the sample canister valve and record time and pressure in can. Record the Sample Initiation Time and Initial Vacuum on the Indoor Air Field Sheet and on the Chain of Custody Form for each canister.

6.5 Retrieve SUMMA® Canister(s) after sampling period is complete. Efforts should be made to shut off the canister valve while there is still a negative pressure vacuum in the canister (between -1 and -4 inches of mercury) to prevent sample loss. It is important not to allow the canister to equilibrate to atmospheric pressure during the sampling period. Allowing the canister to reach an ambient pressure may invalidate the data since the lab cannot confirm whether the canister is faulty. If the lab receives the canister with a

vacuum on it, it confirms the canister has not leaked after the sample was collected, indicating the canister has not leaked. Due to variability in flow rates, try to return to retrieve canister approximately 23 hours after start of sampling. It is also important to collect sufficient sample volume for the laboratory to meet the DQOs for the sampling event. Therefore, it may be necessary to contact the laboratory to determine the appropriate vacuum reading in case the flow controller malfunctions and closes during sampling.

6.6 Record final vacuum and sample end time and post sampling PID concentration of ambient air. Record this information on the Indoor Air Field Sheet.

7.0 References

- **EPA's Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air (EPA, June 2015)**
- **DEP's Supplemental Guidance for Vapor Intrusion of Chlorinated Solvents and other Persistent Chemicals (February 5, 2016)**

ATTACHMENT A

Indoor Air Field Sheet

Site Name:	
Town:	
Date:	
Sample I.D.:	
Project Manager:	
Sampling Personnel:	
Collection Device:	(Summa Can) (Other)
Sample Type:	(Indoor Air) (Other)
Sampling Location:	
Foundation Floor Type:	(Dirt) (Concrete)
Foundation Wall Type:	(Concrete) (Block) (Stone) (Brick) (Slab on Grade)
Sump Hole:	(Yes) (No)
Penetrations in Floor:	(Sewer) (Water) (Gas) (Cracks) (Drains)
Penetrations in Wall:	(Sewer) (Water) (Gas) (Electric) (Cracks)
Suspected COCs:	(Petroleum) (Solvents)
Cannister I.D.:	
Flow Control I.D.:	
Flow control rate:	
PID Reading	
Sample Initiation Time/date:	
Initial Vacuum:	
Sample End Time/date:	
Final Vaccum:	

Sample Location Sketch

Notes/Observations: