

COVER SHEET

STANDARD OPERATING PROCEDURE

OPERATION TITLE: **PROTOCOL FOR THE USE OF PORTABLE VAPOR MONITORS**

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Five Year Review No Changes Needed:

Print Name: _____ Signature: _____ Date: _____

1.0 PURPOSE

The purpose of this document is to describe the Maine Department of Environmental Protection (MEDEP), Bureau of Remediation and Waste Management (BRWM), Division of Remediation's (DR) use field portable organic and inorganic vapor monitor (PVM) with photo ionization (PID) and flame ionization (FID) detectors.

2.0 APPLICABILITY

MEDEP/DR is responsible for the investigation and remediation of hazardous substance, petroleum, and landfill sites throughout Maine. MEDEP/DR DR utilizes a variety of tools and equipment to assist in the furtherance of DR's worthy endeavors. A portable organic/inorganic vapor monitor when accompanied with a trained and experienced operator can be of assistance in investigating these sites. The two uses of a PVM in the investigation and remediation of sites are: 1) for monitoring the potential presence, levels of, or absence, of hazardous contaminants and environmental conditions that could effect the health and safety of workers; 2) utilizing the "headspace" technique, screening soils for the possible presence of contamination. This SOP outlines the protocol for using a PVM for these tasks.

The MEDEP/BRWM's SOP entitled "Site Monitoring" protocol outlines the use of such monitoring equipment; Section 5.2 of the Site Monitoring protocol states that "each user group shall develop written procedures for each model of site monitoring equipment available to its users." The MEDEP/DR is a "User Group". Currently, the MEDEP/DR has two PVMs that may be used for Site Monitoring:

- Foxboro TVA-1000 with PID and FID; and
- RAE instruments MiniRAE 3000.

Protocol for the use of PVMs for headspace field screening can be found in MEDEP/DR SOP RWM-DR-011 – Field Screening of Soil Samples Utilizing Photo-ionization and Flame-ionization Detectors. This SOP will provide the written procedures and other requirements that are outlined in the BRWM Site Monitoring Protocol.

3.0 RESPONSIBILITIES

All DSR staff must follow the procedures outlined in this SOP. All managers and supervisors are responsible for ensuring that their staff are familiar with and adhere to this procedure.

The **User Group Monitoring Equipment Coordinator (UGMEC)** (as defined in Attachment A) is an Oil and Hazardous Materials Specialist (OHMS) II division in the Site Assessment and Support Services (SASS) Unit of DSR. This staff person is responsible for maintenance of the PVMs (as outlined in Section 7 of this SOP), determining the staff who have demonstrated sufficient training and proficiency of the equipment (as defined in Section 5 of this SOP), and for maintaining the list of individuals who have demonstrated such proficiency and can therefore use the PVM for Site Monitoring and for soil field screening.

The Unit Leaders and Division Director, with input from the UGMEC, are responsible for determining which positions will be required to be a "user" of the Division's PVMs. The Unit

Leaders will be responsible for providing the funding and allowing staff the time necessary to attend the training and testing requirements for use of the PVMs.

All staff designated as “users” of the PVMs are responsible for attending the training and completing the testing requirements for use of the PVMs, as outlined in Section 5. Staff, whether they are designated as a “user” or not, will not be allowed to use the PVM until they have demonstrated their proficiency as outlined in Section 5 and received approval from the UGMEC.

4.0 OVERVIEW OF THE PORTABLE VAPOR MONITOR

Currently, the MEDEP/DR has two PVMs, a Foxboro TVA-1000 (TVA) and a RAE Instruments MiniRAE 3000 (MiniRAE). The TVA-1000 has both a FID and PID, the MiniRAE has a PID, to sample and measure the concentration of gases. A more detailed technical discussion of the Theory of operation of a PID and FID, along with the operation of the TVA and the MiniRAE, can be found in each instrument’s respective manual. A copy of the instruments’ manual is kept with each instrument. Copies of the instruction manual will be kept with the UGMEC, and can also be found online at the manufacturers (Thermo Environmental Instruments, RAE Instruments) web site.

The PVMs most basic use is the measurement of organic and inorganic vapors in air. From this, two specific tasks can be completed:

- 1) atmospheric monitoring to determine the potential presence, levels of, or absences of hazardous contaminants and environmental conditions that could affect the health and safety of workers at a field site.
- 2) Screening of soil for the presence of volatile organic compounds (VOCs) in the field utilizing the “Jar Headspace Technique” (DSR SOP DR#011 outlines the protocol for field screening utilizing the Jar Headspace Technique).

Additionally, the PVM may be used as a general screening tool for the presence of VOCs when investigating hazardous substance sites.

As with all field monitoring equipment, the PVM has limitations based on general limitations of the detectors, both PIDs and FIDs. PIDs can only detect material that is “photoionizable” relative to the lamp in the detector. FIDs can only detect substances that can be burned in a hydrogen flame, primarily organic materials. All users must research the compounds that are likely to be of concern at the site and make sure the PVM (whether the TVA or MiniRAE) will be able to detect them. The respective instrument’s instruction manual provides a detailed description of what can and cannot be detected by the specific PVM, and in the case of a PID, with its specific energy lamp.

If site work is to be conducted in which the PVM is to be used as a monitoring device, a site and event specific Health and Safety Plan and a Filter Respirator Selection Guide must be completed, reviewed and approved by an OHMS or by the BRWM Safety and Training Unit prior to conducting the work.

A description of the protocol for the screening of soils utilizing the Jar Headspace technique can be found MEDEP/DR SOP RWM-DR-011 – Field Screening of Soil Samples Utilizing the Jar Headspace Technique.

5.0 TRAINING

5.1 TRAINING REQUIREMENTS

In order to be a designated user of the TVA or MiniRAE, each user must undergo the following training:

- SARA 40 hour hazardous materials site training;
- Annual 8 hour refresher training; and
- TVA and/or MiniRAE specific training, either as part of the annual field equipment training as offered jointly by DSR and MEDEP/BRWM Division of Technical Services, or other training approved by the UGMEC.

5.2 TESTING REQUIREMENTS

Additionally, all users must undergo a “User Proficiency Test” given by the UGMEC annually. This test will consist of each user conducting, at a minimum, the following tasks:

- Turning on the PVM;
- Preparing the PVM for use;
- Calibrating the PVM;
- Using the PVM to “Sniff” a variety of samples; and
- Turning off the unit, and hooking up to the charger.

The UGMEC will be responsible for maintaining a list of staff that have demonstrated proficiency and are deemed worthy enough to be a user, and documented in the log book. This list will be updated annually.

6.0 STORAGE LOCATION

The TVA and MiniRAE will be kept in the DSR storage room at the BRWM Storage Warehouse in the “monitoring equipment cabinet”. During the winter months, the TVA and MiniRAE may be moved to the UGMEC office for winter maintenance and upkeep.

7.0 MAINTENANCE

- Once a month the UGMEC (or their designee) will conduct a maintenance check of the PVM, in which the PVM will be:
 - Turned on;
 - Calibrated;
 - Tested to assure that PVM is working properly;
 - Run for several hours to discharge batteries; and
 - Recharged.

Instructions for calibration and troubleshooting for the TVA and MiniRAE can be found in instruments respective manual

The TVA and MiniRAE shall be returned to its manufacturer or other authorized service center every three years, at a minimum, for cleaning, testing, and calibration. As with all maintenance and repair activities, a record of such work shall be kept with the UGMEC.

If during the course of maintenance or use the TVA and/or MiniRAE is not functioning correctly and cannot be fixed to the satisfaction of the UGMEC, the instrument will be tagged with a "Do Not Use, Broken" tag, until it has been fixed and/or has otherwise been determined that the PVM is working appropriately.

All monthly maintenance checks will be logged in a monitoring equipment log book kept with each individual instrument.

8.0 USE OF PORTABLE VAPOR MONITORS

8.1 PLANNING/PREPARATION

As with any sampling event, a sampling and analysis plan (SAP) and a health and safety plan (HASP) must be developed. Protocol for the development of a SAP and HASP can be found in DSR's SOP #014 – Development of a Sampling and Analysis Plan.

If the PVMs are to be used for environmental monitoring, included in the SAP/HASP will be a description of the monitoring procedures to be used to monitor the presence and concentration of hazardous contaminants potentially on site. Health safety levels of chemical vapors can be found in various OSHA, NIOSH, and USEPA websites and guidebooks, and manufacturers of respiratory protection equipment. Up to date information must be obtained to assure appropriate respiratory protection decisions are made. The need and requirements for respiratory protection must be addressed in the sampling plan; reference and guidance documents for determining levels of respiratory protection must be included.

The PVMs will be included with the other MEDEP/DR equipment sign out; all use of the TVA and MiniRAEs will require signing out the equipment beforehand.

8.2 FIELD USE

Use of the TVA and MiniRAE and its various features is described in the Instruction Manual. These manuals are found with the instrument itself, and an additional copy is kept by the UGMEC. Please refer to instruments manual for specific instructions on using these instruments.

8.2.1 Calibration

The TVA and MiniRAE shall be calibrated, as described in the Instruction Manual, prior to any use. This calibration shall be documented in the official field notebook for the event for which it is to be used (Documentation protocol for field calibration and all field activities can be found in SOP DR#013 – Documentation of field Notes and Development of a Sampling Event Trip Report. After calibration, the instrument should be allowed to "sniff" a substance that will cause it to react to assure that it is working properly (a "Sharpie" type magic marker, for example). If the instrument does not appear to be working IT MUST NOT BE USED FOR HEALTH

MONITORING PURPOSES. Another instrument must be used, or the work not conducted until functioning monitoring equipment is available. All problems with the functioning of the instrument shall be reported to the UGMEC.

During the course of the work day, the instrument should be recalibrated after all long work stoppages (such as lunch break). Additionally, the TVA's response should be periodically tested by challenging it with calibration gas. If the instrument does not read within 15% of the calibration gas, it should be recalibrated. All recalibration and meter challenges must be documented in the field notebook.

8.1.2 Monitoring

Use of the PVMs for environmental monitoring in the field will be as outlined in the SAP/HASP for the specific project. Any deviations from the SAP/HASP will be documented in field notes.

If the PVM is being used for Headspace Screening of soil, refer to SOP RWM-DR-011 – Field Screening of Soil Samples Utilizing Photoionization and Flame Ionization Detectors.

8.1.3 End of Site Work

At the end of the day, the instrument will be decontaminated, if necessary, and the batteries recharged. Decontamination procedures can be found in MEDEP/DR SOP RWW-DR-017 – Decontamination Procedures; additional decontamination procedures may also be outlined in the SAP/HASP. Once the instrument is no longer needed and its batteries charged, the instrument will be returned to its storage location. If problems were encountered during use of the PVM, the users will inform the UGMEC who will evaluate the need for possible corrective action.

9.0 DOCUMENTATION

9.1 USERS LIST

The UGMEC will keep a list of qualified users for the PVM, and recorded in the instrument log book. Users will be updated on an annual basis.

9.2 MAINTENANCE

All maintenance activities, including monthly calibration checks, repairs, and factory/authorized service center work shall be recorded in the Instruments Log book.

All use shall be recorded in the Instruments log book.

9.3 FIELD DOCUMENTATION

All sampling activities must be documented as outlined in MEDEP/DR SOP RWN-DR-013 - Documentation of Field Notes and Development of a Sampling Event Trip Report. Due to the nature of environmental monitoring, it may be necessary (or just easier) to develop specific forms or use forms generated EPA, contractors, or other agencies for record keeping. Use of forms not bound by field books is discussed in SOP DR#013. Specialized forms should be

outlined in the SAP. Specialized forms should be printed on waterproof paper to prevent damage during field use.