COVER SHEET

STANDARD OPERATING PROCEDURE

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

ORIGINATOR NAME: **Becky Blais**
Quality Assurance Coordinator
Division of Remediation
Bureau of Remediation and Waste Management

APPROVALS:

Division of Remediation Director:

Carla J. Hopkins		Dec 22, 2021
Print name	*Signature*	*Date*

Bureau of Remediation and Waste Management Director:

Susanne Miller		Dec 23, 2021
Print name	*Signature*	*Date*

QMSC Chair:

Kevin Martin		Dec 23, 2021
Print name	*Signature*	*Date*

Department Commissioner:

Melanie Loyzim		Dec 23, 2021
Print name	*Signature*	*Date*

DISTRIBUTION;

( ) Division of Remediation……...By:_____Date:_____

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 is also applicable to all parties that may submit data that will be used by the MEDEP/DR.

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 use field portable organic and inorganic air monitors (PAMs), including photo ionization (PID) and multi-gas detectors.

3.0 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 procedure. MEDEP/DR staff reviewing data by outside parties are responsible for assuring that the procedure (or an equivalent) was utilized appropriately.

The **User Group Monitoring Equipment Coordinator (UGMEC)** is the staff person that is responsible for coordinating maintenance of the PAMs, determining the staff who have demonstrated sufficient training and proficiency of the equipment, and for maintaining the list of individuals who have demonstrated such proficiency and can therefore use the PAM 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 PAMs. 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 PAMs.

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

4.0 GUIDANCE AND PROCEDURES

4.1 EQUIPMENT OVERVIEW

The three uses of a PAM 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, in which soils are “screened” for the possible presence of contamination. For more information about using PID for jar or bag headspace technique, see MEDEP/DR SOP# RWM-DR-011 – Field Screening of Soil Samples Utilizing Photoionization and Flame-Ionization Detectors. This SOP outlines the protocol for using a PAM for these tasks.

The MEDEP/DR has several types of PAMs that may be used for Site Monitoring. These currently include:

- RAE Instruments MiniRAE 3000 PIDs;
- RAE Instruments ppbRAE 3000 PIDs;
- RKI Eagle and Eagle II Portable Gas Detectors; and
- MSA Altair 5 Multi-Gas Detector.

For full specifications of detection capabilities and limitations of these instruments, please refer to equipment-specific manuals, which are kept with the instrument.

4.2 THE PHOTOIONIZATION DETECTOR

Currently, the MEDEP/DR has two types of PID; RAE Instruments MiniRAE 3000s (MiniRAEs) and RAE Instruments ppbRAE 3000s (ppbRAEs). The MiniRAE is capable of sampling and measuring the concentration of certain organic and inorganic vapors at concentrations of 0.1 to 15,000 parts per million by volume (ppmv). The ppbRAE is capable of sampling and measuring the concentration of certain organic and inorganic vapors at concentrations of 1 part per billion by volume (ppbv) to 10,000 ppmv.

It should be noted that all chemicals of potential concern (COPCs) have different ionization energies and correction factors on the PIDs. Before determining that a PID is an appropriate device for sampling or monitoring, users should consult the manufacturer’s technical note on response factors to determine if the COPC is detectable with the 10.6 eV lamp that these instruments use, and what the appropriate correction factor for that COPC is when the instrument is calibrated to an isobutylene standard. **All users of PIDs must review the manual and understand the instrument completely before use.**

If site work is to be conducted in which the PID 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 MADEP/DR Oil and Hazardous Materials Specialist or by the BRWM Safety and Training Unit prior to conducting the work.

A more detailed technical discussion of the theory of operation of these PIDs, along with the operation and maintenance instructions, can be found in each instruments’ 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 RAE Instruments web site.

The PID’s 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" (See MEDEP/DR SOP# RWM-DR-011 - Field Screening of Soil Samples Utilizing Photoionization and Flame-Ionization Detectors).

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

4.3 THE RKI INSTRUMENTS EAGLE AND EAGLE II

The **Eagle I** and **Eagle II** are portable instruments designed to measure combustible gas or vapor content and the level of oxygen in air. Combustible gas is measured in percent of lower explosive limit (LEL). Oxygen is measured in percent. The meters have audible alarms to provide a warning of a change in conditions at a preset action levels.

In addition to combustible gas and oxygen, the **Eagle I** owned by the MEDEP/DR also has methane, hydrogen sulfide, and carbon monoxide meters. The methane and hydrogen sulfide function can be useful for landfill investigations, and the carbon monoxide meter for screening during use of generators, or the use of other combustion engines. Operation of these functions can be found in the instruction manual.

In addition to combustible gas and oxygen, the **Eagle II** owned by the MEDEP/DR also has a PID and carbon dioxide meters. The PID and CO2 functions are particularly useful for soil and sub-slab vapor sampling. Operation of these functions can be found in the instruction manual.

As with all field monitoring equipment, the Eagles have limitations. For example, they will not indicate the combustible gas content in an inert gas background, atmospheres containing less than 10% oxygen, or a reducing atmosphere. The limitations and other general warnings and cautions for the Eagle use can be found in the instruction manual.

A more detailed technical discussion of the theory of operation of the Eagle and Eagle II, along with their operation, can be found in their respective instruction manuals. A copy of the manual is kept with each instrument. Additional copies of the instruction manual will be kept with the UGMEC and can also be found online at the manufacturers (RKI Instruments) web site. **All users of the Eagle must review the manual and understand the instrument completely before use.**

If site work is to be conducted in which the Eagle 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 MEDEP/DR Oil and Hazardous Materials Specialist or by the BRWM Safety and Training Unit prior to conducting the work.

4.4 THE MSA ALTAIR 5 MULTI-GAS METER

The **MSA Altair 5 IR** is a portable instrument designed to monitor hazardous conditions in air: combustible gas, expressed in percent of lower explosive limit (LEL); oxygen is measured in percent by volume; and carbon dioxide in percent by volume. The meters have audible alarms to provide a warning of a change in conditions at a preset action levels.

As with all field monitoring equipment, the Altair 5 IR has limitations. For example, it will not indicate the combustible gas content in an inert gas background, atmospheres containing less than 10% oxygen, or a reducing atmosphere. It is not approved for use in oxygen-rich atmospheres above 21.5%. The limitations and other general warnings and cautions for the Altair 5 IR use can be found in the instruction manual.

A more detailed technical discussion of the theory of operation of the Altair 5 IR along with its operation can be found in the instruction manual. A copy of the manual is kept with the instrument. Additional copies of the instruction manual will be kept with the UGMEC and can also be found online at the manufacturers (MSA Safety) web site. **All users of the Altair 5 IR must review the manual and understand the instrument completely before use.**

If site work is to be conducted in which the Altair 5 IR 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 MEDEP Oil and Hazardous Materials Specialist or by the BRWM Safety and Training Unit prior to conducting the work.

5.0 TRAINING

5.1 TRAINING REQUIREMENTS

In order to be a designated user of any portable air monitoring equipment, each user must undergo the following training:

- SARA 40-hour hazardous materials site training;
- Annual 8-hour refresher training; and
- Training specific to the instrument to be used, either as part of the annual field equipment training as offered jointly by MEDEP/DR 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 PAM;
- Preparing the PAM for use;
- Calibrating the PAM;
- Demonstration that the user knows the use and limitations of the instrument and will be able to unsure safe conditions at a site with the instrument, 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. This list will be updated annually.

6.0 STORAGE LOCATION

The PAMs will be kept in the MEDEP/DR storage room at the BRWM Storage Warehouse in the equipment storage room. A sign-out sheet for reserving PAMs and other equipment is maintained by the UGMEC, and users are responsible for signing out any equipment they intend to use.

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 PAM is working properly;
- Run for several hours to discharge batteries; and
- Recharged.

Instructions for calibration and troubleshooting for the PAMs can be found in instrument's respective manual.

The UGMEC (or their designee) shall return the PAMs 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 PAM 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 PAM 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 MEDEP/DR SOP# RWM-DR-014 – Development of a Sampling and Analysis Plan.

If the PAMs 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 PAMs will be included with the other MEDEP/DR equipment sign out; all use of the PVMs will require signing out the equipment beforehand.

8.2 FIELD USE

Use of the PAMs and their various features are 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 PVMs 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 MEDEP/DR SOP# RWM-DR-013 - Documentation of Field Activities and Development of A 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 a PID, 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 workday, the instrument should be recalibrated after all long work stoppages (such as lunch break). Additionally, the PAM'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.

8.2.2 MONITORING

Use of the PAMs 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 PAM is being used for Headspace Screening of soil, refer to MEDEP/DR SOP# RWM-DR-011 – Field Screening of Soil Samples Utilizing Photoionization and Flame-Ionization Detectors.

8.2.3 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# RWM-DR-017 – Equipment Decontamination Protocol; 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 PAM, the users will inform the UGMEC who will evaluate the need for possible corrective action.

9.0 DOCUMENTATION

9.1 USERS LIST

The UCMEG will keep a list of qualified users for the PAM and recorded in the instrument logbook. 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 Instrument's Logbook. All use shall be recorded in the Instruments logbook.

9.3 FIELD DOCUMENTATION

All sampling activities must be documented as outlined in MEDEP/DR SOP# RWM-DR-013 - Documentation of Field Activities and Development of A 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 MEDEP/DR SOP# RWM-DR-013. Specialized forms should be outlined in the SAP. Specialized forms should be printed on waterproof paper to prevent damage during field use.

019-Portable Air Monitors-FINAL-2021 - B Blais

Final Audit Report 2021-12-23

Created:	2021-12-20
By:	Lindsay Caron (LINDSAY.ER.CARON@MAINE.GOV)
Status:	Signed
Transaction ID:	CBJCHBCAABAAVtvThg_rVJ3VstOaitlT1keq9TJa6l17

"019-Portable Air Monitors-FINAL-2021 - B Blais" History

Document created by Lindsay Caron (LINDSAY.ER.CARON@MAINE.GOV)
2021-12-20 - 2:54:05 AM GMT- IP address: 198.182.163.115

Document emailed to Carla J. Hopkins (carla.j.hopkins@maine.gov) for signature
2021-12-20 - 2:55:15 AM GMT

Email viewed by Carla J. Hopkins (carla.j.hopkins@maine.gov)
2021-12-22 - 4:48:27 PM GMT- IP address: 104.47.65.254

Document e-signed by Carla J. Hopkins (carla.j.hopkins@maine.gov)
Signature Date: 2021-12-22 - 5:16:31 PM GMT - Time Source: server- IP address: 67.253.120.113

Document emailed to Susanne Miller (susanne.miller@maine.gov) for signature
2021-12-22 - 5:16:33 PM GMT

Email viewed by Susanne Miller (susanne.miller@maine.gov)
2021-12-23 - 3:51:01 PM GMT- IP address: 104.47.64.254

Document e-signed by Susanne Miller (susanne.miller@maine.gov)
Signature Date: 2021-12-23 - 3:51:14 PM GMT - Time Source: server- IP address: 184.153.146.117

Document emailed to Kevin Martin (kevin.martin@maine.gov) for signature
2021-12-23 - 3:51:15 PM GMT

Email viewed by Kevin Martin (kevin.martin@maine.gov)
2021-12-23 - 6:33:06 PM GMT- IP address: 104.47.65.254

Document e-signed by Kevin Martin (kevin.martin@maine.gov)
Signature Date: 2021-12-23 - 6:34:11 PM GMT - Time Source: server- IP address: 73.16.27.248

Document emailed to Melanie Loyzim (melanie.loyzim@maine.gov) for signature
2021-12-23 - 6:34:12 PM GMT

Email viewed by Melanie Loyzim (melanie.loyzim@maine.gov)

2021-12-23 - 7:16:20 PM GMT- IP address: 104.47.64.254

Document e-signed by Melanie Loyzim (melanie.loyzim@maine.gov)

Signature Date: 2021-12-23 - 7:16:31 PM GMT - Time Source: server- IP address: 198.182.163.121

Agreement completed.

2021-12-23 - 7:16:31 PM GMT