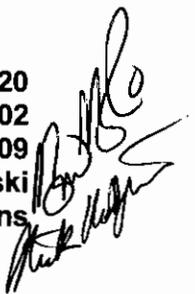


**COVER SHEET
STANDARD OPERATING PROCEDURE**

OPERATION TITLE: PROTOCOL FOR THE USE OF COMBUSTIBLE GAS AND OXYGEN METERS

**ORIGINATOR: Brian Beneski
Quality Assurance Coordinator
Division of Remediation
Bureau of Remediation and Waste Management**

Standard Operating Procedure: RWM-DR-020
Revision: 02
Effective Date: April 7, 2009
Written/Revised by: Brian Beneski
Reviewed by: Nick Hodgkins



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 of combustible gas and oxygen meters (CGO meters).

2.0 APPLICABILITY

MEDEP/DR is responsible for the investigation and remediation of hazardous substance, petroleum, and landfill sites throughout Maine. DR keeps an inventory of a variety of tools and equipment to assist in the furtherance of DR's worthy endeavors. Included in this inventory is CGO meter, designed to measure combustible gas or vapor content and oxygen levels in air. The MEDEP/BRWM's 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." A copy of this protocol can be found in Attachment A. This SOP will provide the written procedures and other requirements that are outlined in the BRWM Site Monitoring Protocol.

The MEDEP/DR is a "User Group". Currently, the MEDEP/DR has one CGO that may be used for Site Monitoring:

- RKI Instruments Eagle, with four gas sensor (Eagle). In addition to combustible gas and O₂, the Eagle currently owned by the MEDEP/DR has a methane, hydrogen sulfide, and carbon monoxide sensor.

This SOP will provide the written procedures and other requirements that are outlined in the BRWM Site Monitoring Protocol.

3.0 RESPONSIBILITIES

All DR 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 DR. This staff person is responsible for maintenance of the CGO meter (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 CGO for Site Monitoring.

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 CGO meter. 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 CGO meter.

All staff designated as "users" of the CGO meter are responsible for attending the training and completing the testing requirements for use of the CGO meter, as outlined in Section 5. Staff,

whether they are designated as a “user” or not, will not be allowed to use the CGO meter until they have demonstrated their proficiency as outlined in Section 5 and received approval from the UGMEC.

4.0 OVERVIEW OF THE CGO METER

A CGO meter is a portable instrument 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 meter has an audible alarm to provide a warning of a change in conditions at a preset action level.

4.1 THE RKI INSTRUMENTS EAGLE

A more detailed technical discussion of the Theory of operation of the Eagle, along with its operation, can be found in the Eagle’s Instruction manual. A copy of the manual is kept with 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.**

As with all field monitoring equipment, the Eagle has limitations. For example, the Eagle 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.

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 OHMS or by the BRWM Safety and Training Unit prior to conducting the work.

In addition to combustible gas and oxygen, the Eagle owned by the MEDEP/DR also has a 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.

5.0 TRAINING

5.1 TRAINING REQUIREMENTS

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

- SARA 40 hour hazardous materials site training;
- Annual 8 hour refresher training; and
- Specific training, either as part of the annual field equipment training offered jointly by DR and MEDEP/BRWM Division of Technical Services, or by the UGMEC on an individual basis.

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 CGO Meter;
- Calibrating the CGO Meter; and
- Using the CGO Meter.

The UGMEC will be responsible for maintaining a list of staff who have demonstrated proficiency and are deemed worthy enough to be a user. This list will be updated annually.

6.0 STORAGE LOCATION

The CGO meter will be kept in the DR storage room at the BRWM Storage Warehouse in the "monitoring equipment cabinet". During the winter months, the CGO Meter 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 CGO meter in which the instrument will be:

- Turned on;
- Calibrated; and
- Tested to assure that instrument is working properly.

Instructions for calibration, troubleshooting, and other specific maintenance requirements for the CGO meter can be found in the Manual "Maintenance" Section.

The CGO Meter 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 logged in the Equipment Maintenance book.

If during the course of maintenance or use the CGO Meter 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 it is working appropriately.

All monthly maintenance checks will be logged in the Monitoring Equipment Checkout Log. This log will be kept with all the monitoring equipment.

8.0 USE OF CGO METERS

8.1 PLANNING/PREPARATION

As with any field event, a sampling and analysis plan (SAP) or other remedial action work plan, 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 CGO meter is to be used for environmental monitoring, included in the SAP/ work plan and 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 or work plan; reference and guidance documents for determining levels of respiratory protection must be included.

The CGO meter will be included with the other MEDEP/DR equipment sign out; all use of the CGO meter will require signing out the equipment prior to its use. The sign out log will be kept with the other MEDEP/DR equipment sign out sheet.

8.2 FIELD USE

Use of the CGO meter and its various features is described in the Instruction Manual; Please refer to that manual for specific instructions on using the instrument. At the end of the day, the CGO meter will be decontaminated, if necessary, and the batteries recharged. Decontamination procedures can be found in MEDEP/DR SOP RWM-DR-017 – Decontamination Procedures; additional decontamination procedures may also be outlined in the events' specific work plan. Once the CGO meter is no longer needed, the instrument will be returned to its storage location. If problems were encountered during use of the instrument, the users will inform the UGMEC who will evaluate the need for possible corrective action.

As stated earlier, the CGO meter owned by MEDEP/DR also has sensors for methane, hydrogen sulfide, and carbon monoxide. Use and limitations of these features can be found in the instrument's instruction manual.

8.2.1 Calibration

The CGO meter 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 Notes and Development of a Sampling Event Trip Report). After calibration, the CGO meter should be challenged in some way to assure that it is working properly. 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 CGO meter shall be reported to the UGMEC.

During the course of the work day, the CGO meter should be recalibrated after all long work stoppages (such as lunch break). Additionally, the instrument's response should be periodically tested by challenging it with calibration gas during the work day. If the CGO Meter 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.

9.0 DOCUMENTATION

9.1 USERS LIST

The UCMEG will keep a list of qualified users for the CGO meter. This list shall be updated as new users are added.

9.2 MAINTENANCE

All maintenance activities, including monthly calibration checks, repairs, and factory/authorized service center work shall be recorded in the CGO meter log book, kept with the instrument. Use will also be recorded in the 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.