

Standard Operating Procedure

**Collection of Ethylene Oxide Samples
Using Passive Sampling Technique**



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West Virginia Department of Environmental Protection
Division of Air Quality
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Air Quality/Air Monitoring

WVDEP-DAQ Standard Operating Procedure

for the

**Collection of Ethylene Oxide Samples
Using Passive Sampling Technique**

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1.0 Scope

1.1 Introduction

The purpose of this document is to establish a standard operating procedure (SOP) for the collection of Ethylene Oxide (EtO) samples using passive sampling technique, in ambient air. It will cover the shipping and receiving of canisters to and from the Eastern Research Group (ERG) as well as field sample collection. This SOP is intended for individuals responsible for collecting EtO samples in the WV Department of Environmental Protection- Division of Air Quality (DAQ) ambient air monitoring program.

1.2 Summary

The procedure is designed for sampling EtO in ambient air, based on the collection of whole air samples in 6 L treated stainless steel canisters to a final pressure below atmospheric. This procedure will employ passive sampling, in which a differential pressure from an evacuated canister is used to create a sample flow into the canister. The sample flow is regulated with a vacuum regulator and critical orifice to allow the canister to fill over a 24-hour period. The DAQ will use sampling equipment (canisters, vacuum regulators, critical orifice, vacuum gauges, and sample inlet probe) provided by ERG.

2.0 Definitions and Acronyms

C	Celsius
COC	Chain of Custody
DAQ	Division of Air Quality
EPA	Environmental Protection Agency
ERG	Eastern Research Group
ERPM	Environmental Resources Program Manager
EtO	Ethylene Oxide
FSP	Field Sampling Plan
ID	Identification
L	Liter
NATTS	National Air Toxics Trends Stations
QAPP	Quality Assurance Project Plan
QC	Quality Control
SOP	Standard Operating Procedure
TAD	Technical Assistance Document
WV DEP	West Virginia Department of Environmental Protection

3.0 Personnel Qualifications

Personnel assigned to collect EtO samples will meet the educational, work experience, responsibility, personal attributes, and training requirements for their positions as required by the WV DEP and the Division of Personnel.

4.0 Equipment and Supplies

- 6 L stainless steel canisters
- Stainless steel filter
- Stainless steel sample inlet
- Critical orifice
- Flow regulator
- Vacuum gauge
- ERG COC

ERG supplies all sampling equipment used in the DAQ EtO passive sampling program. The DAQ receives certified “clean” canisters from ERG that have been evacuated to a sub ambient pressure of at least -28 inches mercury. When not sampling, the canisters are capped with a brass or stainless-steel cap. Unique sample identification (ID) numbers are printed on tags attached to the canisters. Each canister also has a unique ID permanently written on canister. All ERG supplied sampling equipment is prepared in accordance with applicable ERG QAPPs and SOPs.

5.0 Shipping and Receiving

5.1 Receiving

Canisters and auxiliary sampling equipment are shipped to and from ERG via commercial carrier.

1. Shipping container is opened and the COC (Figure 6.1) removed.
2. In the Field Setup section, fill in the Received by and Date lines.
3. Verify that the ID number on COC matches ID number on canister.
4. Verify valve is closed.
5. Verify cap is secure.
6. Verify sampling equipment (canister, inlet tube, vacuum regulator and critical orifice) are in good condition.
7. Note any irregularities or issues on COC.
8. Store canister in designated secured area.

5.2 Shipping

1. Verify the COC (Figure 6.1) is completed with all pertinent information recorded.
2. Record shipping date and employee on COC.
3. Scan COC and save in designated location on the secured common drive.
4. Pack canister in shipping container.
5. Attach the shipping label and arrange for shipping.

6.0 Sample Collection

The DAQ EtO sampling program is short-term and will utilize temporary sampling sites. Canister sampling assemblies will be deployed at locations and intervals designated in the EtO FSP and EtO Study QAPP. Canister sampling assemblies will be secured to structures (e.g., fences) at the designated sites.

6.1 Sample Set Up

1. In the Field Setup section of the COC (Figure 6.1) fill in the Operator and Setup Date lines.
2. Remove cap attached to the bellows valve inlet.
3. Attach the outlet fitting of the vacuum regulator to the canister bellows valve inlet fitting.
4. Do not overtighten fitting nut. When snug by hand, another quarter turn should be sufficient.
5. Ensure plug at the inlet of vacuum controller remains tight in order to perform a leak check.
6. Perform the leak check in 6.1.1.

6.1.1 Leak Check

Leak check results and observations are written in the Comments section of COC.

1. Open and immediately close the canister valve.
2. Observe the vacuum reading on gauge.

3. If the vacuum does not change by more than 1 in Hg over 5 minutes the leak check has passed.

3.a. If this initial check fails, re-open and immediately close the canister valve (without changing anything else). This ensures the intake probe (vacuum regulator) has been purged. Several attempts may be needed to purge the intake probe by re-opening and immediately closing the canister valve.

3.b. If the vacuum change can not be maintained at less than 1 in Hg over 5 minutes, then the leak check is considered to have failed. If at any time the canister valve is opened and immediately closed and the gauge drops to zero in Hg, the leak check is considered to have failed.

4. Record the results on COC.
5. If leak check passed, proceed to section 6.2.
6. If the leak check failed, ensure fittings are tight. If no loose fittings are found, proceed to step 9.
7. If loose fittings are found, tighten and repeat steps 1-4.
8. If test fails again, a new canister assembly must be tested.
9. Assemble new canister assembly following steps 1-5 in section 6.1 then proceed to section 6.1.1.

6.2 Sample Collection

A fully assembled leak tested canister assembly is secured to a structure at the designated site.

6.2.1 Sample Start

1. Fully open the bellows valve on canister.

2. In the Field Setup section of the COC (Figure 6.1) record “Field Initial Can Press” and circle inches of Hg.
3. Add start time to the Setup Date line in the Field Setup section of COC (Figure 6.1).
4. Note any observations and comments on COC.

6.2.2 Sample End

The DAQ has developed a procedure for canister retrieval based on guidance from ERG, the analysis laboratory, which supplies the canisters and vacuum regulators.


6.2.2.1 Sample End (Ambient Temperature Above 0 °C)

1. 24 hours after initial start time record “Field Final Can Press” and circle Hg on COC (Figure 6.1) in the Field Recovery section.
2. Close the canister bellows valve fully.
3. In the Field Recovery section of the COC (Figure 6.1) record Recovery Date and time, Sample Duration and Operator.
4. Disconnect canister from vacuum controller by unfastening the outlet fitting from canister bellows valve inlet fitting.
5. Replace and secure cap on canister bellows valve.
6. Fill in remaining pertinent information on COC.
7. Note any observations and comments on COC.

6.2.2.2 Sample End (Ambient Temperature Below 0°C)

1. 24 hours after initial start time record the pressure from vacuum controller gauge in the logbook.
2. Close the canister bellows valve fully.
3. In the Field Recovery section of the COC (Figure 6.1) record Recovery Date and Time, Sample Duration and Operator.
4. Fill in remaining pertinent information on COC.
5. Note any observations or comments on COC.
6. Return canister assembly (canister with vacuum controller attached) to the office and let stand for at least 2 hours.
7. Record “Field Final Can Press” and circle Hg on COC (Figure 6.1) in Field Recovery section and in the logbook.
8. Disconnect canister from vacuum controller by unfastening the outlet fitting from the canister bellows valve inlet fitting.
9. Replace and secure cap on canister bellows valve.

Figure 6.1 ERG COC

		<div style="border: 1px solid black; padding: 2px; display: inline-block;"> ERG Lab ID # _____ </div>
601 Keystone Park Drive, Suite 700, Morrisville, NC 27560 AIR TOXICS SAMPLE CHAIN OF CUSTODY		
Lab Pre-Sampling	Site Code: _____ City/State: _____ AQS Code: _____ Collection Date: _____ Options: SNMOC (Y/N): _____ TOXICS (Y/N): _____ METHANE (Y/N): _____ Relinquished by: _____	Canister Number: _____ Lab Initial Can. Press. ("Hg): _____ Cleaning Batch #: _____ Date Can. Cleaned: _____ Duplicate Event (Y/N): _____ Duplicate Can #: _____ Date: _____
Field Setup	Received by: _____ Operator: _____ System #: _____ Setup Date: _____ Field Initial Can. Press.: _____	Date: _____ MFC Setting: _____ Elapsed Timer Reset (Y/N): _____ Canister Valve Opened (Y/N): _____ _____ psig psia "Hg (Circle one)
Field Recovery	Recovery Date: _____ Operator: _____ Field Final Can. Press.: _____ Status: VALID VOID (Circle one)	Sample Duration (3 or 24 hr): _____ Elapsed Time: _____ _____ psig psia "Hg (Circle one) Canister Valve Closed (Y/N): _____ Relinquished by: _____ Date: _____
Lab Recovery	Received by: _____ Lab Final Can. Press.: _____ Status: VALID VOID (Circle one)	Date: _____ _____ psig "Hg (Circle one) Converted to psia: _____ Gauge: 1 2 (Circle one) If void, why: _____
Samples stored in Air Tox Lab (Room 130)		

5-2016

Comments: _____

White: Sample Traveler

Canary: Lab Copy

Pink: Field Copy

7.0 Quality Control

Quality control (QC) for the DAQ EtO sampling program consists of leak checks, collocated samples and trip blanks.

7.1 Leak Checks

Leak checks are performed as detailed in section 6.1.1.

7.2 Collocated Samples

A collocated canister assembly is set up next to the primary canister assembly using procedure detailed in section 6.0. The interval and location of collocated samples will be determined in EtO FSP.

7.3 Trip Blank

An evacuated canister is taken to a site and returned.

8.0 Data and Records Management

8.1 Data Recording

All pertinent data regarding the EtO Study canisters, except for the ERG laboratory analytical results, is recorded on the COC. ERG laboratory analytical results are recorded in accordance with their QAPP and SOP. The COC will be scanned to the DAQ secured common drive and a hardcopy retained prior to shipping of the sampled canister to ERG. ERG will complete the COC upon receipt of the canister. ERG will transmit an electronic version of the final completed COC to DAQ. The final COC will replace the DAQ's COC.

8.1.1 Logbooks

EtO Study field logbooks will be maintained to document all pertinent information relative to the EtO sampling sites and samplers. The logbooks will provide a record of field activity and any applicable site observations such as: operator, date and time the operator visits the site, QC (leak checks) and maintenance activities. All logbooks will be bound. All logbooks and COCs are subject to review for completeness and accuracy by the ERPM and AD.