Standard Operating Procedure for Use of Performance Audits During Regulatory Testing

U. S. EPA Region 6, Dallas, Texas

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1. EPA POINT OF CONTACT

This Standard Operating Procedure (SOP) has been developed to provide guidance on the requirements for use of performance audits during Resource Conservation and Recovery Act (RCRA) trial burns or Maximum Achievable Control Technology (MACT) comprehensive performance tests.

U.S. EPA Region 6 Audit Coordinator is Esther Coleman.

Contact information: (214) 665-8517 or by e-mail at coleman.esther@epa.gov.

2. AUDIT SAMPLE REQUIREMENTS FOR EPA METHODS

2.1 VOST (Method 0030)

The method for collection of volatile principle organic hazardous constituents (POHCs) from the stack gas effluents of hazardous wastes incinerators is the Volatile Organic Sampling Train (VOST). The VOST audit is specifically required by the EPA manual SW-846, and is described in Method 0030. When a permit applicant submits their Comprehensive Performance Test Plan (CPT), it must include the following:

a. A narrative in the QAPP which outlines specific details of their planned approach. The QAPP should be in accordance with the *Quality Assurance/Quality Control Procedures for Hazardous Waste Incineration (EPA/625/6-89/023)*. If the permit applicant does not have this EPA document, they should contact the Region 6 staff to acquire one.

b. A detailed discussion of the permit applicants' proposed procedures, describing the sampling and analysis methods to be used, and any deviations from the standard method that may be planned. This is done so that the regulatory agency can assess and make determinations as to whether the procedures, as planned, are acceptable.

c. The POHC(s) identified by the permit applicant and the expected concentration.

d. The approximate time frame for which the VOST kit and audit cylinder is needed should be indicated.

Audit Cylinder Requests. The auditee should request an audit cylinder from the Region 6 Audit Cylinder Coordinator via the VOST Audit Request Form (Enclosure 1). Upon notification that a cylinder is required, the Audit Cylinder Coordinator can provide this form electronically to the permit applicant. The Audit Cylinder Request Form allows several pieces of information to be collected. Importantly, it is where the POHC(s) and its' expected concentration is identified, and it also indicates the sampling and analytical methods to be used. When a definite test date is set, the request for an audit cylinder should be made within ten (10) days of the actual test date.

The cylinder will be sent to the facility, to arrive on the requested date, so that it can be available for the auditor and the sampling crew.

Breaking the Audit Cylinder Seal. Custody seals have been placed on the cylinder. The cylinder seal should be broken only in the presence of a government representative. If a government representative is not present, the auditor may not use the cylinder.

Audit Cylinder Sampling. The cylinder should be sampled in the presence of the auditor

before the test begins or immediately afterwards. A standard letter (Enclosure 2) stating these instructions accompanies the VOST kit and audit cylinder when it is sent. Also, a set of detailed instructions (Enclosures 3, 4 and 5) are included in the kit suitcase and the audit cylinder, respectively.

Sample Analysis Results. All sample analysis results should be supported by data from the comprehensive performance test, which is presented in the Comprehensive Performance Test Report (CPT). Justification for any problems or deficiencies should be included and addressed with the submittal of the audit results, and in the CPT. The sample analysis results should be sent to the EPA Audit Cylinder Coordinator, so that analysis of the results can be done in a timely manner. Address and telephone numbers are also included in the standard letter with the audit kit and cylinder.

2.2 Dioxins/Furans (Method 23); HCl/Cl2 (Method 26A); and Metals (Method 29)

These methods recommend the use of performance audits on the laboratory analysis.

Audit Requests. The facility should request audit materials from the EPA audit coordinator, . Research Triangle Park (RTP) has an electronic database which must be used to order audit samples.

***** The requested sample concentration for **Method 23** must be within the following range(s): 15 to 60 ng/sample.

* The requested sample concentration for **Method 26A** must be within the following range(s): 0 to 550 mg/L. Indicate the number of samples needed at this concentration.

***** Audit samples for **Method 29** can be provided in one of two containers: Ampule or Filter. Indicate the container you wish to receive. Requested concentrations **for all compounds you want included in the audit sample** should be provided (**on SOP Enclosures 6 and 7)**, along with the number of samples required at these concentrations. Please request audit for this method using the charts provided as Enclosures 6 and 7.

Sample Analysis Results. After the audit test has been performed, and the results analyzed, the results will be reported to the EPA audit coordinator so that it can be input into the electronic database to determine if the sample has passed or failed the audit test. All sample analysis results should be supported by data from the comprehensive performance test, which is presented in the
Comprehensive Performance Test Report (CPT). Justification for any problems or deficiencies should be included and addressed with submittal of the audit results, and in the CPT. The sample analysis results should be sent to the EPA Audit Coordinator, so that analysis of the results can be done in a timely manner.

Required information: After analysis, the following detailed list of information is required from the facility for input into the database:

a. Measured concentrations for each compound in the sample, in the units specified
c. Collection firm name
d. Collection firm address
e. Collection firm telephone number
f. Analyzing laboratory name
g. Analyzing laboratory address
h. Analyzing laboratory telephone number
i. Audit test site address
j. Audit start date
k. Audit end date (optional)

Audit Cylinder Request Form

Date:

1. **Requestor (Permit Writer)**

   _____ Tel. #_____

   _____

   _____

   _____

2. **Ship To (Organization Being Audited):** Tel. # _____

   .

3. **Date of Audit:** **Date Needed** _____

4. **Target Compound(s):**
   Target compound(s) range of concentration required (ppb):

5. **Name of individual or organization conducting sampling:**

6. **Type of Combustion Unit:** _____

7. **Audit Activity:** _____

   Sampling Method: _____ Analytical Method: _____

   [ ] VOST method for RCRA pre-trial burn
   [ ] VOST method during actual RCRA trial burn
   [ ] VOST method during actual MACT performance test
   [ ] other (explain) _____

Letter from EPA to Auditee Regarding Audit Cylinder Request

Address

Dear Auditee:

TechLaw, Inc. has been requested by the United States Environmental Protection Agency (U.S. EPA), Region 6, to provide you with one cylinder of micrograms-per-cubic-meter ($\mu g/m^3$) levels of one or more compounds in nitrogen for a **regulatory audit.** A Volatile Organic Sampling Train (VOST) kit is provided with the cylinder. Custody seals have been placed on the cylinder. Do not remove these seals until a government representative is present. If a government representative is not present, the auditee may not use the cylinder.

The U.S. EPA urges you to use only the amount of gas required to conduct the audit of your analytical system and to be certain the cylinder valve is properly closed to prevent slow loss of the contents. **The government representative is to have the cylinder and VOST kit returned as soon as possible so that other organizations may also participate in the audit program.**

You are responsible for the cylinder and kit until they are returned to TechLaw, Inc. U.S. EPA requires that you insure the cylinder and the VOST kit for $2600 and $1700, respectively, upon return shipment to TechLaw, Inc. The cylinder and VOST kit should be sent back **within 15 days of the audit date, at your cost** (prepaid, not collect) to:

ATTN: Mr. Mohamed Nur
TechLaw, Inc.
14500 Avion Parkway, Suite 300
Chantilly, VA 20151

If you are unable to return the cylinder and the kit within the duration specified, please contact Ms. Esther Coleman. **Important: Please note that the cylinder is Dangerous Goods by virtue of its pressure and should be shipped in accordance with IATA/ICAO or U.S. DOT regulations as Dangerous Goods. Not to do so may result in a fine of $25,000 at a minimum.**

The audit results are to be reported in **$\mu g/m^3$** and submitted to:

Ms. Esther Coleman
U.S. EPA Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75201

U.S. EPA would appreciate your cooperation in this regard. If you have any questions regarding the audit cylinder and kit, please feel free to call Ms. Esther Coleman at 214/665-8517.

Sincerely,

Mohamed Nur
TechLaw Project Manager

cc: E. Coleman, USEPA Region 6
D. Pandak/Dallas Files, TechLaw

Enclosure 3

Audit Cylinder Cover Letter and Instructions to Auditee

To: Auditee
From: TechLaw, Inc.

This suitcase kit is provided in conjunction with an audit cylinder which is packaged separately.

A letter accompanying the audit cylinder describes their purpose and origin.

The audit gas from the cylinder running through the kit's manifold simulates the ambient emission from the stack through your probe. Follow instructions attached to use the kit's materials for your audit.

Please return the suitcase at your cost to the following address:

TechLaw, Inc.
ATTN: Mohamed Nur
14500 Avion Parkway, Suite 300
Chantilly, VA 20151

Insure the suitcase kit for $1700.

Thank you!

INSTRUCTIONS FOR USE OF VOST AUDIT KIT

1. Assemble the support stand (base and rod). Using the clamps supplied, secure the manifold and rotometer vertically to the stand. The larger end of the manifold should be temporarily up, so that the thermometer can be inserted.

2. Connect the heat controller to the tape and adjust the dial to heat the manifold to approximately 100°C.

   On assemblies with 1" tape (closely wrapped), a setting of 5 is sufficient to attain 100°C.

   On assemblies with ½" tape (loosely wrapped), a setting of 7 - 7 ½ is required.

3. After the manifold temperature has become stable, remove the thermometer, invert the manifold (larger end down) and attach the shorter 3/8" OD tubing by sliding the end with tygon piece over the glass.

4. Attach the 1/8" tubing (union end) to the 1/4" Teflon nut with the Teflon ferrules on the opposite end of the manifold.

5. Attach regulator to cylinder and then attach output of cylinder regulator to 1/8" Teflon tubing.

6. Attach long piece of 3/8" Teflon tubing to output side of rotometer and vent this to a suitable place (i.e. - exhaust hood).

7. Adjust the regulator to start the gas flow. The audit kit supplied rotometer is downstream of the manifold and is used to monitor excess gas flow.

8. The rotometer will present negligible back pressure to the manifold. ΔP for 5 L/min is 1 inch of water column.

9. After sampling is completed, allow the manifold to cool, disassemble and repackage the audit kit into the case. Remember to include the Teflon nut on the end of the manifold. Loosely coil the tubing and place it on top of the repackaged kit.

10. Ship the case back at your cost.

VOST AUDIT KIT INVENTORY

QUANTITY	DESCRIPTION
1	Glass manifold with Teflon nut and Teflon ferrules
1	Heating tape (wrapped around manifold)
1	1/8" Teflon tubing (about 3 ft) with 1/8" brass nut on each end and 1/4" to 1/8" reducing union on one end
1	Regulator, single stage, high purity, 350 CGA fitting
1	3/8" Teflon tubing, “short” with 3/8" brass Swagelok nut on one end and tygon tubing on the other end
1	Rotometer, 3/8" Swagelok male connectors on both ends
1	3/8" Teflon tubing, “long” with 3/8" brass Swagelok nut
1	1/4" Ultra-torr fitting
1	Dial thermometer, °C
2	Two-prong extension clamps
2	Right-angle clamp holders, aluminum thumbscrew type
1	Base support, 4" x 6"
1	Rod for base support, 1/16" diameter, 18" long
1	Cylinder clamp support with nylon strap
1	Heat tape controller
1	Fiberbuilt shipping case

Please notify me at once if an item is missing or defective.

Thank you for carefully repackaging all items!

Mohamed Nur (703) 818-3244

Enclosure 4

INSTRUCTIONS FOR SAMPLING AND ANALYSIS OF VOLATILE POHC FROM QUALITY ASSURANCE AUDIT CYLINDERS USING THE BAG TECHNIQUE

1.0 PURPOSE

This audit is intended to assess and document the accuracy and precision of the principle organic hazardous constituents (POHC) using the bag technique during regulatory audits at hazardous waste burning facilities. The audit can also be used to determine the proficiency of the source testing organization prior to the actual performance tests.

2.0 PRINCIPLE

A gas sample containing POHC is drawn from an audit gas cylinder into a bag. The collected POHC are analyzed by gas chromatography according to the method specifications and procedures.

3.0 AUDIT MATERIAL (GAS CYLINDERS)

The audit material is contained in gas cylinders. A maximum of 5 L of audit gas is to be used for each test run. A single-stage gas regulator, 1/4" male/female glass joints, and Teflon tubing are supplied for use with the gas cylinder.

4.0 PROCEDURES

The following step-by-step procedures should be used for sample collection and analysis using the bag technique:

Step A. Evacuate the bag with a vacuum pump and fill the bag with approximately 5 L of organic-free nitrogen from a gas cylinder. Tedlar bags are recommended. Determine the hazardous constituents of interest by gas chromatography. Report the concentrations determined a Blank Value 1. The blank value must be not more than twice the detection limit. If it is higher, the bag cleaning procedure should be repeated.

Step B. After the blank analysis, evacuate the bag with a vacuum pump and fill the bag with approximately 5 L of gas from the audit cylinder. The 1/4" male/female glass joints that are supplied should be used as connections to the bag and the audit cylinder. Minimum Teflon tubing should be used. Determine the POHC of interest by gas chromatography. Report the concentrations of each constituent as Analysis Result 1.

Step C. Evacuate the bag contents and fill the bag with organic -0free nitrogen. After three minutes, evacuate the bag contents and fill the bag again with nitrogen. After three minutes, repeat the evacuation procedure and fill the bag with 5 L of nitrogen. Determine the concentration of the bag contents by gas chromatography and report the measured concentration as Blank Value 2. The blank value must not be more than twice the detection limit. If it is higher, the bag cleaning procedure should be repeated.

Step D. Evacuate the bag contents and fill the bag with approximately 5 L of gas from the audit cylinder. Determine the POHC of interest by gas chromatography. Report the concentrations determined as Analysis Result 2.

Step E. Repeat Step C and report the measured concentration of the bag contents as Blank Value 3. The blank value must not be more than twice the detection limit. If it is higher, the bag cleaning procedure should be repeated.

Step F. Evacuate the bag contents and fill the bag with approximately 5 L of gas from the audit cylinder. Determine the POHC of interest by gas chromatography. Report the concentrations determined as Analysis Result 3.

5.0 SAMPLE ANALYSIS

Follow the procedures described in the method used for sample analysis, calibration, and calculations. Submit the results to the Project Officer and to the audit supervisor for evaluation.

Enclosure 5

INSTRUCTIONS FOR SAMPLING AND ANALYSIS OF VOLATILE POHC FROM QUALITY ASSURANCE AUDIT CYLINDERS USING THE VOLATILE ORGANIC SAMPLING TRAIN

1.0 PURPOSE

This audit is intended to assess and document the accuracy and precision of the volatile organic sampling train (VOST) when used during comprehensive performance tests at hazardous waste burning facilities. This audit also can be used to determine the proficiency of source testing organizations prior to the actual performance tests.

2.0 PRINCIPLE

A gas sample containing principle organic hazardous constituents (POHC) is passed from an audit gas cylinder into a glass manifold and is used in place of the test site stack sample. While the POHC gas is being passed in to the glass manifold, a major portion of the gas is drawn through a VOST according to the method specifications and procedures. The collected POHC are analyzed by thermal desorption, purge and trap, and gas chromatography/mass spectrometry (GC/MS) (see Method 5040).

3.0 APPARATUS

3.1 Glass Manifold

A glass manifold is supplied. One side of the glass manifold is connected with Teflon tubing to the audit cylinder. The other end of the glass manifold should be connected with Teflon tubing to a rotometer and the excess gas from the rotometer should be vented into a hood. The glass manifold is heated to 100°C with heat tape. The heat tape, rotometer, and Teflon tubing are also supplied. One port of the glass manifold should be connected to the VOST probe with 1/4" male/female glass joints (see the enclosed diagram).

3.2 VOST Components

The sampling train component parts, except for the glass manifold, are the same as those used for VOST.

3.3 Analysis

Refer to the method specifications and procedures for the VOST method.

4.0 AUDIT MATERIAL (GAS CYLINDER)

The audit material is supplied in gas cylinders. A maximum of 50 L of gas is to be used for each test run. A single-stage gas regulator is supplied for use with the gas cylinder.

5.0 PROCEDURES

5.1 Sampling

5.1.1 Preparation of VOST

All train components should be cleaned and assembled as described in the VOST method use.

5.1.2 Sample generation

The gas sample from the audit cylinder is passed through the glass manifold at a flow rate of 2 L/min for 3 minutes to condition the glass system. A glass rotometer is supplied to measure the flow rate at the end of the glass manifold. The VOST probe then should be connected to one port of the glass manifold with 1/4" male/female joints and the probe should be purged with audit gas for an additional 2 minutes so that the probe is purges of ambient air before initiation of sample collection. This can be accomplished either by attaching a pump to a three-way stop-cock above the first condenser and drawing audit gas through the probe via the three-way stop-cock or by any other suitable method.

5.2 SAMPLE COLLECTION

After leak-checking and conditioning the glass probe, sample collection is accomplished by opening the valve at the inlet to the first condenser, turning on the pump and sampling at a rate of 0.5 L/min for up to 20 minutes or 1.0 L/min for 10 minutes. The sampling rate is measured with the rotometer which is part of the VOST. The volume of sample for any pair of the traps should not exceed 10 L. The temperature of the gas stream at the inlet to the first sorbent cartridge must be maintained at 20°C during sample collection.

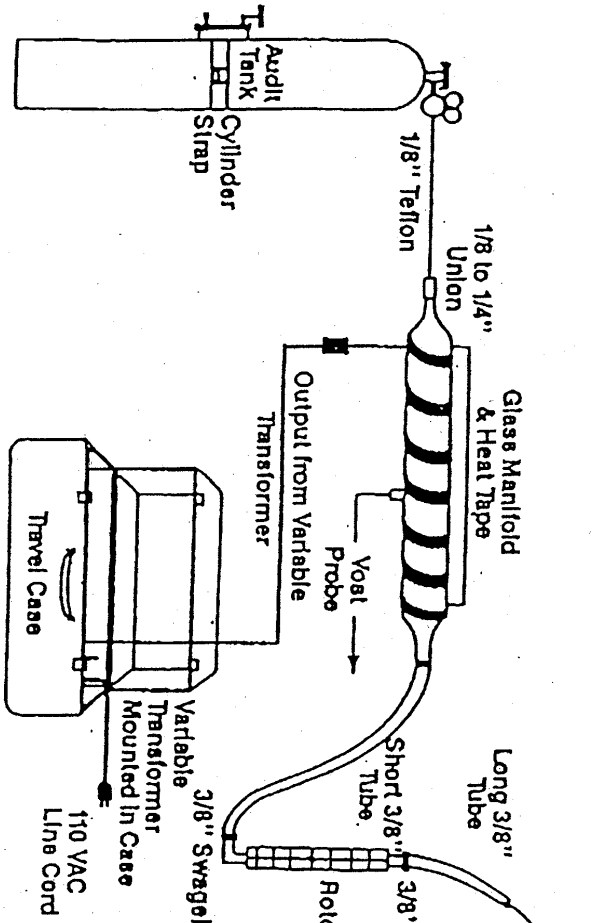
After the collection of sample, the train is leak-tested using the procedures described in the method used. If leak-test criteria as described in the method are not met, the samples should not be analyzed. If leak-test criteria are met, the train is returned to atmospheric pressure, the two sorbent cartridges are removed, the end caps are replaced, and analysis of cartridges is performed.

Repeat the sample collection procedure two more times with two new pairs of sample cartridges in the VOST, collect the same volume of sample each time, and perform the analysis.

5.3 SAMPLE ANALYSIS

Follow the procedures described in the method for sample analysis, calibration, and calculations. Report the amount of each constituent in the three samples and the blank values to the EPA Audit Coordinator for evaluation.

Audit Kit for VOST



Enclosure 6

Available concentration ranges for compounds included in the ampule for the audit sample for Method 29 (Metals)

A default sample container has been set for each compound.

Compound	Target Range Available	Requested Concentration
antimony(Sb)	0 to 20 µg/mL (ppm)	
arsenic(As)	0 to 25 µg/mL (ppm)	
barium(Ba)	0 to 20 µg/mL (ppm)	
beryllium(Be)	0 to 12 µg/mL (ppm)	
cadmium(Cd)	0 to 18 µg/mL (ppm)	
chromium(Cr)	0 to 25 µg/mL (ppm)	
cobalt(Co)	0 to 8 µg/mL (ppm)	
copper(Cu)	0 to 12 µg/mL (ppm)	
lead(Pb)	0 to 150 µg/mL (ppm)	
manganese(Mn)	0 to 18 µg/mL (ppm)	
mercury(Hg)	0 to 400 ng/mL (ppb)	
nickel(Ni)	0 to 40 µg/mL (ppm)	
selenium(Se)	0 to 18 µg/mL (ppm)	
silver(Ag)	0 to 12 µg/mL (ppm)	
thallium(Tl)	0 to 14 µg/mL (ppm)	
zinc(Zn)	0 to 40 µg/mL (ppm)	

Indicate the number of samples required at these concentrations: _____

Enclosure 7

Available concentration ranges for compounds included in the filter for the audit sample for Method 29 (Metals)

A default sample container has been set for each compound.

Compound	Target Range Available	Requested Concentration
Silver	0 to 240 µg	
antimony(Sb)	0 to 300 µg	
arsenic(As)	0 to 425 µg	
beryllium(Be)	0 to 100 µg	
cadmium(Cd)	0 to 330 µg	
chromium(Cr)	0 to 310 µg	
cobalt(Co)	0 to 150 µg	
copper(Cu)	0 to 220 µg	
lead(Pb)	0 to 500 µg	
manganese(Mn)	0 to 250 µg	
nickel(Ni)	0 to 330 µg	
selenium(Se)	0 to 350 µg	
thallium(Tl)	0 to 250 µg	

Indicate the number of samples required at these concentrations: _____