

FIELD INSTRUCTIONS FOR THE GAS DILUTION SYSTEM MULTI-POLLUTANT AUDIT DEVICE

**IMPORTANT:
THIS AUDIT IS TO BE CONDUCTED AT THE SITE, WITHOUT ANY
SPECIAL OR UNSCHEDULED ADJUSTMENTS OR CALIBRATIONS
TO THE ANALYZERS BEING AUDITED.**

**PLEASE READ THE INSTRUCTIONS COMPLETELY
BEFORE BEGINNING THE AUDIT !!**

Please follow these instructions precisely as written. If there are any parts you do not understand, please call the NPAP Question Line at (888) 999-7320.

I. OVERVIEW

The Gas Dilution System (GDS) audit device can be used to audit CO, NO and SO₂ ambient air analyzers. A maximum of two analyzers can be audited at the same time. These instructions apply to all the audits.

Please follow the instructions in the order presented.

II. SET-UP OF AUDIT DEVICE

1. Remove the GDS and zero air system (pump, scrubbers, and tubing) from the shipping container and position them near the analyzer(s) to be audited.
2. Remove the gas cylinder from its shipping container along with the regulator, and position them near the GDS.
3. Check to ensure that you have the following materials and that they are not damaged:
 - a) GDS audit device
 - b) Zero air pump
 - c) Cylindrical cartridge (scrubber) containing silica gel (blue)
 - d) Cylindrical cartridge (scrubber) containing silica gel and hopcalite (black)
 - e) Small cylindrical cartridge containing purafil (red-brown)
 - f) Connecting tubing (teflon and plastic)
 - g) Compressed gas cylinder containing NO, SO₂ and CO
 - h) Regulator for compressed gas cylinder
4. If any of the above materials are damaged or missing, **DO NOT PROCEED WITH THE AUDIT**. Instead, contact the NPAP Question Line at (888) 999-7320. If all the equipment is undamaged and present, proceed with the audit.
5. Connect the cylinder regulator to the gas cylinder and tighten. **DO NOT OPEN** either the cylinder valve or the regulator outlet valve at this time.
6. The Swagelok stainless steel cross fitting attached to the GDS output port acts as a manifold when two analyzers are attached to it. **CAP ONE PORT OF THE CROSS IF ONLY ONE ANALYZER IS BEING AUDITED.**

(NEVER AUDIT MORE THAN TWO ANALYZERS AT THE SAME TIME)

III. GAS CYLINDER REGULATOR EQUILIBRATION

IMPORTANT: Follow the Gas Cylinder Regulator Equilibration procedure precisely as instructed. Do not use any other procedure.

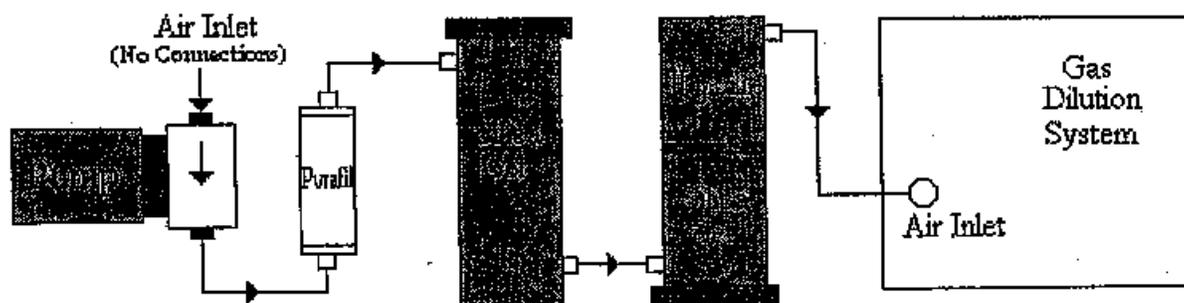
This procedure must be performed in a well ventilated area or a vent line should be attached to the regulator outlet valve.

1. Turn the regulator pressure adjustment counter-clockwise to the fully closed position.
2. Close the regulator outlet valve if it's not already closed.
3. Open and quickly close the cylinder valve, which will pressurize the inlet side of the regulator to the cylinder's pressure. It is necessary to quickly close the cylinder valve to prevent downstream contaminants from entering the cylinder.
4. Turn the regulator pressure adjustment clockwise until the output gauge reads 45 psig.
5. Open the regulator outlet valve to bleed off the regulator pressure until both gauges read zero.
6. Close the regulator outlet valve.
7. Turn the regulator pressure adjustment counter-clockwise to the fully closed position.
8. Repeat steps 3 through 7, five times.
9. After completing 5 cycles, open the cylinder valve and leave it open. Using a suitable leak detector, check for leaks at the regulator to cylinder fitting connection.

IV. GDS SYSTEM EQUILIBRATION

This procedure must be performed in a well ventilated area.

1. Connect the section of 1/8" teflon tubing from the cylinder regulator to the POLLUTANT IN bulkhead fitting on the GDS. Tighten both connections.
2. Open the black handled valves 1, 2, and 3 on the GDS.
3. Open the regulator outlet valve on the gas cylinder regulator and adjust the regulator output pressure to 45 psig, ± 5 psig. Check the 1/8" tubing connections for leaks.
4. Open the red handled purge valve for 5 seconds.
5. Adjust the pollutant pressure regulator on the GDS to 40 psig and allow the GDS to equilibrate for 15 minutes.
6. While the pollutant gas is equilibrating, assemble the zero air system according to the diagram below using the sections of 1/4" plastic tubing provided. Connect the zero air system to the AIR IN bulkhead fitting on the GDS.
7. After the 15 minute GDS equilibration is completed, plug the pump power cord into a 110 volt AC outlet. Turn ON the pump if it has a power switch.



Zero Air System

8. Adjust the air regulator on the GDS to 18 psig.
9. Adjust the gas regulator on the GDS to 26 psig.
10. Equilibrate the audit system for 5 additional minutes.
11. With valves 1, 2, and 3 still in the open position, hold the red handled purge valve in the open position for 5 seconds. Repeat this step 3 times.

V. AUDIT PROCEDURES

NOTE: When auditing only one instrument, cap off one port of the stainless steel cross, making sure that only one port of the cross is vented to atmosphere.

1. Connect a piece of tubing to the top port of the cross and vent it to a safe place. **CAUTION: Keep this piece of tubing as short as possible.**
2. Select the appropriate valve combination for the first point as shown on the data sheet. **NOTE: Open only the valves indicated - the other should be closed. Open is up, closed is down.**
3. Check the air and pollutant gauges on the GDS to insure that they are still on the correct settings as specified in steps IV-8 and IV-9 (18 psig and 26 psig). Tap the gauges gently and re-adjust if necessary.
4. Connect the 1/4" Teflon sample line from the analyzer(s) being audited to one of the ports of the manifold.
5. Allow the analyzer(s) to sample the gas mixture until stable reading is obtained.

NOTE: If a stable reading is not obtained after 20 minutes, disconnect the sample line from the analyzer(s) and repeat sections III and IV.

6. To ensure that equilibration times are kept to a minimum, run the audit concentrations in the following order. However, the zero point may be run first if you desire. Note that point 4 is a rerun of point 1. It will be used only to provide an internal QC of the system and will not be used in the determination of your results.

POINT	VALVES OPEN
1	1,3
2	2,3
3	3
4	1,3
Zero	All Closed

7. Using the appropriate data form, report the results for each valve combination in the space provided, paying close attention to the units. (NO and SO₂ in ppb, CO in ppm)

NOTE:

WE DO NOT MAKE ANY CORRECTIONS TO YOUR AUDIT RESULTS WHEN WE PERFORM OUR LINEAR REGRESSION. IF YOU ROUTINELY MAKE ANY CORRECTIONS TO YOUR DATA BASED ON ZERO DRIFT OR ZERO OFFSET, YOU MUST MAKE THE CORRECTIONS BEFORE SENDING YOUR AUDIT RESULTS TO US.

8. Be sure to include all of the required information in the spaces provided.
- The complete 9-digit AIRS monitor ID code for SLAMS/NAMS sites. (Identify non-SLAMs/NAMS sites with a code of your choice in the same space.)
 - A unique monitor serial number or other ID number is required so data can be matched with the exact instrument audited.
 - The cylinder number.
 - The date of the audit.
 - The site barometric pressure.
 - All other information requested.
9. Return the completed data forms in the enclosed pre-addressed envelope. Please DO NOT send the data with the audit device or gas cylinder.

VI. PACKING INSTRUCTIONS

1. After all audits have been completed, disconnect the audit sample line(s) from the analyzer(s). Shut off the regulator outlet valve of the gas cylinder and disconnect the 1/8" teflon tubing at the regulator.
2. Close the cylinder valve.
3. Bleed the regulator and bring all gauge needles to ZERO.
4. Disconnect all tubing and place it inside the shipping container.
5. Make sure all the valves inside the GDS are closed, then secure the cover of the GDS.
6. Remove the regulator from the cylinder and cap the regulator inlet and outlet fittings with the supplied caps.
7. Repack the regulator, cylinder, zero air system and GDS in their shipping containers and return them using the enclosed pre-addressed labels. See the enclosed letter for specific shipping instructions.

Conversion Factors

$$\text{ppm} \times 1000 = \text{ppb}$$

$$\text{in Hg} \times 25.4 = \text{mm Hg}$$

$$\text{millibars of Hg} \times .75006 = \text{mm Hg}$$

$$(\text{°F} - 32) \times .5556 = \text{°C}$$

