

SUBSTANTIVE POLICY STATEMENT

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STATE STATION GASEOUS EMISSIONS ANALYZER AUDIT PROCEDURE.

Contact for information: Contract Compliance Unit

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GENERAL DESCRIPTION

This procedure outlines the process for performance audits of the exhaust gas analyzers. The audit is performed by supplying known concentrations, either high (70 - 80% of full scale) or low (25 -35% of full scale) range, hydrocarbon (HC), carbon monoxide (CO), carbon dioxide (CO₂), and nitric oxide (NOX) gas to the analyzers. The value read is compared to the value of the audit gas to obtain a pass/fail determination. Pursuant to Arizona Administrative Code § R18-2-1025, each analyzer in each inspection lane must be audited at least once every other month. Additionally, this procedure is used to perform the semi-annual background discrimination and methane response audits. Background discrimination audits use trace amounts of the above gases to determine analyzers ability to read background pollutants. Methane response audits use methane gas to determine the optimization of the flame ionization detector.

AUDIT GUIDELINES AND RESTRICTIONS

Audit Frequency, Times, and Station Traffic - All analyzers at stations located in the west valley must be audited by the end of the odd numbered months (Jan, May, Jul, and Nov). All analyzers at stations located in the east valley must be audited by the end of the even numbered months (Feb, Jun, Aug, and Dec). Night audits in (Apr and Oct) will encompass the entire valley. No audits will be done in (Mar or Sept) due to night audits. All audits will be performed during station operating hours, except in April and October when constant volume sampling (CVS) systems are audited after station closing. Background discrimination and methane response audits will be performed in conjunction with propane injection audits after station closing. State Inspectors assigned shall visit stations during periods of off-peak traffic. If the station has a closed test lane and or the queue lane traffic does not exceed three vehicles per lane, the audit can be initiated. Gordon-Darby Arizona Testing (GDAT) has agreed to accommodate the audits by moving traffic from open to closed lanes.

Station Assignments – The State Inspectors assigned shall be responsible for performing an audit in the inspection lane of waiver station W23 (10210 N. 23rd Ave., Phoenix) before auditing a test station. The State Inspectors assigned shall be responsible for performing an audit in the inspection lane of waiver station W23 (10210 N. 23rd Ave., Phoenix) before auditing a test station. State Inspectors shall

audit west valley stations, M01, M02, M03, M04, M14, M15 and M17, during the months of Jan, May, July, and Nov. The State Inspectors assigned shall be responsible for performing an audit in the inspection lane of waiver station W26 (4949 E. Madison St., Phoenix) before auditing a test station. State Inspectors shall audit the east valley stations, M06, M07, M08, M09, M10, M12, M13 and M16, during the months of Feb, Jun, Aug, and Dec.

NOTE: STATION ASSIGNMENTS ARE SUBJECT TO CHANGE ACCORDING TO PROGRAM AND UNIT NEEDS.

Audit Gas - Under Contract, #EV13-0003 audit gases are purchased from GDAT. Each gas cylinder must be accompanied by a "Certificate of Analysis." The Contract Compliance Unit (CCU) shall maintain an adequate supply of audit gas so as to facilitate the performance of a complete cycle of audits with the gas required (high or low range as appropriate). The State Inspectors assigned will notify the CCU supervisor when gas supplies are low. The State Inspectors assigned shall maintain certificates of analysis for a period of one-year after the gas cylinder has been taken out of service. The certified gas values listed on the certificate shall be used to perform the audits. The certificate lists an expiration date for the certified analysis of each cylinder. Gas cylinders that have past their certified analysis expiration date shall not be used to perform audits. Gas cylinders shall not be used after cylinder pressure falls below 200 psig. Gas cylinders must be secured and capped during transit.

Audit Failures, Re-Audits, and Disputed Failures - In the event of a failing audit, a follow-up audit must be immediately performed. Prior to performing a follow-up audit the State Inspectors shall review audit procedures, and then verify the audit equipment is correctly assembled, installed and adjusted. If a second failure is recorded, a Notice of State Station Equipment Failure form shall be completed and a copy given to the station manager. **Cease auditing at stations with two lanes. Stations with three or more lanes, the State Inspector may continue to audit lanes until a second failure is recorded.** If the second lane fails the State Inspectors shall complete a Notice of State Station Equipment Failure form and cease auditing at that station. GDAT personnel should not perform adjustments or repairs to the lane equipment or audit equipment during the audit. If adjustments or repairs are performed, cease auditing and immediately contact the CCU supervisor. If GDAT personnel request a re-audit, the State Inspectors may do so only after GDAT personnel have performed repairs and completed their portion of the equipment failure form. When performing a re-audit, State Inspectors shall perform the audit and in case of failure perform a follow-up audit and complete an equipment failure form if necessary. **All re-audits are recorded on a new audit form and "re-audit" is written at the top of the form. Additionally, the failure report is attached to the re-audit form and noted in the comment section of the audit form that it is a re-audit.** Under no circumstances shall more than one re-audit be performed. Audit results that are disputed will be mediated by performing the audit in front of the CCU manager and GDAT Technical Services Manager.

FAILED EQUIPMENT MONITORING

The State Inspector shall monitor failed equipment usage via the internet for live station videos, and review test data to insure the equipment is not being used until contract requirement for SOW 4.6.2 are met.

EQUIPMENT and FORMS REQUIRED

- State Station Gas Analyzer Audit Report - J:\AQD\VEI\G.D.A.T\ CONTRACT COMPLIANCE \FORMS\MASTER FORMS\Gas Audit form
- State Station Span Gas Audit Report - J:\AQD\VEI\G.D.A.T\ CONTRACT COMPLIANCE \FORMS\MASTER FORMS\Master Span Gas Audit form
- Notice of State Station Equipment Failure Report - Blank Carbonless Paper Form
- Audit Gas: High or Low Range Tri-Blend (HC, CO, CO²) and NOX or; Background Tri Blend and NOX, and Methane.
- Gas Sample Delivery Apparatus and Tool Box
- State Station Procedures Manual

PREPARATION

Audit Gas - Prior to beginning the audit cycle, the State Inspector or compliance officer(s) assigned shall select their audit gases. The audit gas should alternate between high and low range each audit cycle. The State Inspector shall determine the upper and lower pass/fail limits. Obtain the gas cylinder serial number and gas values from the cylinder's certification tag. Remember the HC gas value is determined by multiplying the propane value by 3. Determine the upper pass value(s) by adding 4 percent of the gas value (HC, CO, CO², and NOX) to the gas value. Determine the lower pass value(s) by subtracting 4 percent of the gas value (HC, CO, CO², and NOX) from the gas value. To determine 4 percent of a value, multiply the value by .04. All values shall be calculated and rounded to the hundredth place; e.g.1.11. All values shall be entered into the GDAT system to the hundredth place as appropriate.

Forms - Prepare a Gas Analyzer Audit Report for each inspection lane in the east or west valley by completing the following: Station; Lane; Address; State Inspector; Gas Type; Cylinder S/N; Gas Value; Lower Limit; Upper Limit.

Prepare a Span Gas Audit Report for each station in the east or west valley by completing the following: Station; Address; State Inspector.

Audit Equipment Leak Test - Prior to auditing the first station, the State Inspector shall leak test the audit equipment. To perform the test, assemble the gas sample delivery apparatus as outlined below. Plug the end of the hose that connects to the analyzer audit port with the plug provided. **If the audit hose will not thread onto the audit port with your fingers discontinue audit and complete a State Station Equipment failure form noting that you cannot connect to the audit port. Because the audit was not performed, the failure report will identify a deficiency only and will not require the lane to be closed.** Continue to the next available lane. Connect the appropriate line to one of the audit gas cylinders and open the valve to ensure the system is pressurized to 10 psig. Spray each fitting with the "Snoop" leak detector provided. Bubbles will appear if a leak is present. Examine the gas sample delivery lines to ensure there are no leaks present. If leaks are found in the system, re-tighten connections and replace sample delivery lines as appropriate. After repairs, retest the system. If leaks are still present, contact the ICU Audit Supervisor.

AUDIT PROCEDURES

Arrival at the Station - Upon arrival at the station the State Inspector shall determine if station traffic will permit an audit using the guidelines specified in Audit Frequency, Times, and Station Traffic. If station traffic permits, the State Inspector shall meet with the station manager and advise that an audit

is in process.

NOTE: No zero/span or one-point is allowed prior to performing the gas analyzer audits. The gas analyzer will be audited in an (as presented) state.

Log in Procedure - Data entry for the span gas and gas analyzer audits is performed at position 1. When conducting audits, State Inspector enter data and receive messages from GDAT's computer system. Depending on if you are in windows mode or dos appliance mode, various functions are invoked via menu selections made by depressing single or multiple letter keys on the keyboard. The key(s) is identified on the screen by an underscore or line under the letter. The system also uses screen prompts, or written instructions, to guide the operator through the process. When a lane has been made available, ensure that all lane inspectors are logged off the GDAT system. Now depress "M" for managers menu, and then depress the "F8" key to bypass the Radio Frequency Interface (RFI) and enter in your password. You now should see a list of commands depress the "T" to toggle the RFI off (should say toggle RFI on). Now depress the "Esc" key to go back to the main menu, and depress the "A" key. Now put in your password followed by the "enter" key and you are now in the dos appliance menu.

Span Gas Values Audit - Prior to performing the first gas audit of the audit cycle at a station, STATE INSPECTOR must perform the span gas values audit in all test lanes. Closing the test lane is not necessary for the audit. If the lane is open, between vehicles ask the lane inspector to "log off" temporarily, perform the audit and move to the next lane until all lanes are audited. Use the following procedure:

1. Enter Date and Time of the audit on the audit report.
2. Proceed to the station cylinder room and record the following from the high and low range tri-blend and NO_x cylinders: Cylinder S/N; Gas values from both the manufacturer's label and GDAT's label.
3. Proceed to open lane to be tested and compare the manufacturer and GDAT gas values specified on the cylinders to those entered into the data-base by:
 - a. Log-on to the computer at position 1 using the log on procedure.
 - b. One after the other, depress the "Q" key (Daily/Weekly QC), the "D" key (Daily QC), and the "T" key (Enter Gas Tags). The span gas values should now be present on the screen.
 - c. Compare the span gas value appearing on the screen to the corresponding manufacturer and GDAT gas values. GDAT may use either the manufacturer's value or their renamed value. However, only the values of one label may be used across all lanes. That is, if GDAT has chosen to use the values from the tri-blend gas manufacturer's label and the NO_x gas GDAT label in lane 1, those values must be used for all lanes. Mark the form appropriately; Pass or fail.
4. Depress the "Enter" key, the "X" key twice, and log-off.
 - a. Examine the exhaust sample collection hoses for damage. If any defects are found, describe them in the space provided.
 - b. Move to the next lane and repeat steps 1 through 4 until all lanes have been audited.
 - c. After all lanes have been audited and prior to leaving the station, discuss audit results with the station manager and obtain their signature in the "Received by" space. There is no other failure form or corrective action to be taken by the State Inspector.

Gas Analyzer Audit - A gas analyzer audit consists of verifying the analyzer serial numbers and last calibration date, performing a leak check on the calibration sample system, and auditing the analyzer

with gas of a known value. Use the following procedure:

1. Enter Date and Time of the audit on the audit report.
2. Ask the station manager to close the test lane you wish to audit.
3. Use the “201” key to open the analyzer access door and record the serial numbers of the analyzer(s) bench being audited on the audit report.
4. Log-on to the computer at position 1.
5. Obtain the last 10-point calibration date of the analyzer(s) being audited by depressing the “D” key (Calibration Dates), record the dates on the audit report, and depress the “Esc” key.
6. Perform a leak check on the analyzer calibration gas sample system by:
 - a. Cap the analyzer audit port and use a wrench to tighten it just past finger tight. Be careful not to cross-thread or over-tighten the cap.
 - b. One after the other, depress the “C” key (Cals/Audits), the “A” key (Audits), the “K” key (Leak Check), and the “A” key (Audit Port). The leak check of the sample system’s audit port is set to begin. Depress the “Enter” key and the audit will begin.
 - c. Observe the audit screens, as the system automatically performs the leak check and displays the result.
 - d. If the audit fails:
 - Remove, re-install and tighten the cap on the audit port. Be careful not to cross-thread or over-tighten the cap.
 - Depress the “A” key and leak check of the sample system’s audit port is set to begin; Depress the “Enter” key and the audit will begin.
 - Observe the audit screens, as the system automatically performs the leak check and displays the result.
 - If a second audit fails: Mark the audit report appropriately; Depress the “X” key (Exit) three times to return to the “Main Menu” screen; Log-off; Remove the cap from the audit port; Complete a Notice of State Station Equipment Failure Report; Advise the station manager of the failure, obtain their signature in the “Received by” space, and provide them with the original copy of the failure report; **Discontinue auditing at two lane stations. Continue to a second lane if there are three or more lanes.** If a second inspection lane fails the audit cease auditing, issue a Notice of State Station Equipment Failure Report; Advise the station manager of the second failure, obtain their signature in the “Received by” space, and provide them with the original copy of the failure report;
7. If the audit passes, remove the cap on the audit port, mark the audit report appropriately, and depress the “X” key (Exit) once to return to the “Audits” screen.
8. Assemble the gas sample delivery apparatus:
 - a. The line that connects to the gas cylinder using a quick disconnect should already be installed to the left side of the small regulator.
 - b. Connect the gas sample delivery apparatus to the analyzer audit port using the line that is made of small and large diameter hoses; The small diameter hose is connected to the fitting on the right side of the small regulator and the large diameter hose to the audit port.
 - c. Use a wrench to tighten all fittings just past finger tight. Be careful not to cross-thread or over-tighten the fitting.

9. Depress the “G” key (Gas). This will bring up the “Gas Audit” screen that allows the State Inspectors to select the gas to be delivered for the audit. Depress the following keys:
 - “T” key (Tri-Blend) for High or Low Range, or Background Discrimination audits of the HC, CO, and CO² analyzers.
 - “N” key (NOX) for High or Low Range, or Background Discrimination audits of the NOX analyzer.
 - “M” key (Methane) for the Methane Response audit.
10. The system will zero itself and ask you to enter the gas value(s). Depress the “Enter” key after each gas value has been entered. Remember gas values are calculated, rounded, and entered to the hundredth place if applicable.
11. The system will ask you to ensure audit gas is flowing:
 - Connect the hose with the quick disconnect to the gas cylinder.
 - Adjust the gas cylinder regulator until the pressure reads 10 psig.
 - Adjust the magnehelic regulator until the pressure reads 5 to 7 inches of water.
 - Press the “Enter” key and the system will begin the audit.
 - The pressure at that magnehelic may decay during the audit; Continue to adjust regulator and ensure the pressure remains at 5 inches of water minimum.
12. When the audit is complete, the system will automatically display the audit results:
 - Record the calculated value and deviation percent. When a “Tri-Blend” gas is used the HC, CO and CO² results will be displayed individually. Press the “Enter” key after recording the calculated value and deviation percent for each gas.
13. Compare the calculated values to the corresponding upper and lower limits; Values outside these limits are failing, values inside or equal to the limits are passing. Mark the audit report appropriately.
14. If the audit fails repeat steps 9 through 13. If a second failure is noted, complete a Notice of State Station Equipment Failure form and continue to step 15. If the audit passes, continue to step 15.
15. Log off of the lane computer and press the cal/audit upload “P” to log off.
Now depress “M” for managers menu, and then depress the “T” to toggle the RFI on (should say toggle RFI off). Now depress the “Esc” key to go back to the main menu,
16. Repeat steps 9 through 14 for each audit gas until all audits in the station lanes have been performed.
17. The State Inspector may audit the next available test lane if this can be done and remain compliant with Audit Guidelines and Restrictions. Before leaving the station, discuss audit results with the station manager and obtain their signature in the “Received by” space of all audit and audit failure forms.

Background Discrimination Audits - Background discrimination audits are performed semi-annually by delivering a sample of HC, CO, and CO², or NO_x, audit gas to the analyzer and recording the results. Because only trace amounts of HC, CO, and CO², or NO_x are used during the background discrimination audits, we do not use a traditional pass/fail standard. The analyzer must simply read above zero (#0.01) to pass. If the analyzer reads zero (0.00), the analyzer fails. It is not necessary to perform the span gas audit in conjunction with the background discrimination audits. To perform the audit, follow steps 1 through 17 outlined above in the Gas Analyzer Audit Procedure. Because these are performed after station closing, it is not necessary to stop the audits if a lane fails.

Methane Response Audits - Methane response audits are performed semi-annually on all HC analyzers. The audit consists of delivering a methane gas sample of approximately 50 ppm to the

analyzer and comparing the result to the pass/fail limits. The pass/fail limits for the methane response audit is different from other gas audits because the lower limit is the gas' certified value. The upper limit is determined by multiplying the methane gas value by 1.3. For example: A gas with a certified value of 50 ppm has a lower limit of 50 and an upper limit of 65 ($50 \times 1.3 = 65$). It is not necessary to perform the span gas audit in conjunction with the methane response audits. To perform the audit, follow steps 1 through 17 outlined above in the Gas Analyzer Audit Procedure. Because these are performed after station closing, it is not necessary to stop the audits if a lane fails.

Reporting - State Inspectors shall report any failures to the Contract Compliance Supervisor daily and the audit results weekly to the Contract Compliance Supervisor.

Equipment Failure Re-Audits - Pursuant to Arizona Administrative Code R18-2-1025, the compliance officer shall provide a copy of the analyzer's failing results to the station manager. Additionally, the contractor's calibration audit of the analyzer shall be provided to the Department within three calendar days after the analyzer's return to service. Upon receipt of the failure report and the contractor's calibration audit a State Inspector shall schedule a visit to the station and perform an audit. The audit shall be identified as a re-audit performance audit and reported in the State Inspector's monthly report.