

## SUBSTANTIVE POLICY STATEMENT

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## STATE STATION OPACITY METER AUDIT PROCEDURE

Contact for information: Contract Oversight Unit

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### PURPOSE AND GENERAL DESCRIPTION

This procedure outlines the process for the **MONTHLY** performance audits of the opacity meters used to perform the steady state loaded and snap-acceleration (SAE J1667) diesel tests. The audit is performed by inserting an opaque filter with a known opacity value into the optical path of the opacity meter. The pass/fail determination is made by comparing the value read to the filter value.

### AUDIT GUIDELINES AND RESTRICTIONS

#### Audit Frequency, Station Assignments, and Station Traffic

Pursuant to Arizona Administrative Code 'R18-2-1025, each opacity meter must be audited once each month. The monthly opacity meter performance audits at all Area A and Area B stations will be assigned to State Inspectors on a rotating basis. The snap-acceleration opacity meters calculate the opacity value using temperature, barometric pressure, and relative humidity (ambient conditions). The sensors used to obtain the ambient conditions shall be audited **biannually**. The **biannual** ambient sensor performance audits are to be **completed during the propane injection audits**. The Contract Oversight (CO) supervisor shall be responsible for the audit schedule and coordination with Gordon-Darby Arizona Testing (GDAT).

#### Audit Reporting

At the conclusion of the audit cycle, the State Inspector assigned shall be responsible for recapping the audits. Opacity meter audits are reported by the type of opacity meter audited, the number of test lanes audited, and the number of initial failing audits. Opacity meter re-audit results, AFTER REPAIRS have been completed are IDENTIFIED as re-audits AND reported SEPERATLEY. The CO Supervisor shall report weekly the audit results in the CO WEEKLY report following the opacity meter or **biannual** ambient sensor audit cycle is completed. The CO supervisor shall also record the opacity meter audit results in a

spreadsheet each month for the CO monthly report.

### Audit Filters

Audit filter values must be near the maximum allowable opacity standards (20% loaded; 40-55% snap-acceleration). The loaded test opacity meter filters may be purchased from Melles Griot, Inc., on-line at mellesgriot.com using product number A03 FNG 041." The snap-acceleration opacity meter audit filter may be purchased from Red Mountain Engineering, Inc., 20512 Crescent Bay Drive, #102, Lake Forest, California, 92630, (949) 595-4475. The Contract Oversight Unit shall be responsible for ensuring the audit filters are replaced annually or as needed.

### Pass/Fail Limits

The allowable deviation from the filter value for both the loaded and snap-acceleration opacity meters is  $\pm 2\%$  opacity. The pass/fail limits are calculated by adding and subtracting 2 from the filter value. A filter with a value of 20.5% opacity has a pass/fail limit of 18.5 - 22.5% opacity. The deviation calculation and pass/fail determination are automatically performed and displayed on the test lanes computer screen.

### Audit Failures, Re-Audits, and Disputed Failures

**No cleaning of the optics is allowed prior to performing the loaded opacity and snap-acceleration audits. The optics will be audited in an (as presented) state.** During the audit, GDAT personnel should not perform adjustments or repairs to the opacity meters or audit equipment until a Notice of State Station Equipment Failure Report has been issued. If adjustments or repairs are performed, cease auditing and immediately contact the CO Supervisor.

In the event of a failing audit due to high or low readings or equipment malfunction, a follow-up audit must be immediately performed. Equipment malfunctions include, but are not limited to, failure to initialize, an inoperable start button, a calibration error; and error audit messages. Prior to performing a follow-up audit after an equipment malfunction, make sure the opacity equipment is correctly assembled and powered up and initialized. Prior to performing the follow-up audit after a high or low readings failure, make sure the audit filter is clean and the test equipment is correctly assembled. If a second failure is recorded, the state inspector shall complete ALL SECTIONS of the Notice of State Station Equipment Failure form. The reason for the failure should be clearly noted on the failure form. Comments other than that directly related to observations made during the audit are not authorized. **IN THE EVENT OF A FAILURE, STATE INSPECTORS MUST CEASE AUDITING THAT TYPE OF OPACITY METER AT THE STATION IF THE STATION WILL NO LONGER BE ABLE TO PERFORM INSPECTIONS.** Air quality does not improve and customer service suffers when stations issue Director's Certificates instead of performing inspections.

After a failure, GDAT technical repair personnel or station managers may be allowed to perform repairs to the opacity meter and request a re-audit of the failed equipment. State Inspectors may perform the re-audit, only after GDAT personnel have completed their portion of the equipment failure form. When performing a re-audit, in case of failure, perform a follow-up audit and if necessary complete a Notice of State Station Equipment Failure form. Under no circumstances shall more than one re-audit be performed. **NOTE: Management**

**may clean the optics after a failure notice is issued. (Continue to the next station and/or lane) Re-audits, pass or fail are identified on the audit form and re-cap form separate from the regular audits and a separate total.**

Audit results that are disputed will be mediated by performing the audit in front of the CO Supervisor and GDAT Technical Services Manager.

## EQUIPMENT REQUIRED

### Loaded and Snap-Acceleration Opacity Meter Performance Audits:

Loaded Opacity Meter Filter Assembly  
Snap-Acceleration Opacity Meter Filter Assembly  
Lens Cleaning Solution and Cloth  
State Station Opacity Meter Audit Report  
Notice of State Station Equipment Failure Report  
State Audit Traffic Cone

## PREPARATION

### Audit Filters

Prior to performing the first opacity meter performance audit of each month, the audit filters must be cleaned. When cleaning the filters only use lens cleaning solution and lens cleaning cloths. At all times, the audit filters must be protected from direct sunlight. Prior to performing the first opacity meter performance audit of each month, GDAT shall be allowed to examine the audit filters and compare the audit filter's named value against the value read by their test bench equipment. To initiate the audit filter examination, contact GDAT technicians the week prior to the audits and make an appointment. If GDAT declines an examination, note that fact on the Notice of State Station Equipment Failure form when an opacity meter fails with either high or low readings. If GDAT disagrees with the named filter value, contact the CO Supervisor for resolution.

### Forms

Prepare an Opacity Meter Audit Report for each station in Area A by completing the "Station No.," "Address," "State Inspector," portions of the form. Record the type of filter, either "Wager" or "Red Mountain," and the audit filter values in the "Audit Filter Description" section of the form. Using the pass/fail limit described, and audit filter values agreed upon with GDAT, calculate the pass/fail limits and record them in the "Pass/Fail Limits" section of the form.

## AUDIT PROCEDURES

### Arrival at the Station

Upon arrival at the station, State Inspectors shall immediately perform the Vehicle Inspection Report (VIR) Accuracy Audit. After performing the VIR Accuracy Audit, the State Inspector

shall meet with the station manager and advise that an opacity meter audit is in process.

### Performing Log On

When conducting audits, State Inspectors enter data and receive messages from GDAT's computer system. Data entry for the opacity meter audits is performed at position 1, the computer terminal adjacent the dynamometer and customer waiting booth. Various functions are invoked via menu selections made by depressing a single letter key on the keyboard. 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 the lane is in the main menu mode to start the process.

### Loaded Opacity Meter Audit

The audit consists of verifying the loaded opacity meter works in each test lane of the station and correctly reads the audit filter within the specified pass/fail limits. Each station is equipped with two loaded opacity meters. Each opacity meter is audited as a unit. Cables, read heads or other opacity meter parts may not be interchanged during the audit. Complete a Notice of State Station Equipment Failure for each opacity meter that is not functional during the audit. Perform the audits using the following procedure:

Enter the time and date on the audit report.

Move and connect the loaded opacity meters to lanes 1, 2, and 3 as applicable. The opacity meter cart has a long cord and will reach to the computer terminal. Before beginning the audit in a lane, move both as close to one another as possible, to prevent wasted time and energy walking back and forth.

1. Close test lane by placing "State Audit" traffic cone in the middle of the lane entrance.  
**NOTE:** The audit may be performed between vehicles if safe to do so.
2. Log onto the computer terminal at position 1; The main menu screen will appear.
3. Depress the "S" key (Service).
4. Depress the "P" key (Opacity)
5. Record the unit serial number displayed on the Opacity Meter Audit Report.
6. Press the "ESC" key (Escape) to return to the main menu.
- 7 One after the other, depress the "I" key (Cals/Audits), the "F8" key (to bypass RFI), then enter in your code, and the "A" key (audits), then the "O" key (opacity).
8. The "Opacity Audit" data entry screen will appear. Enter the filter value and depress the "F2" key. .
9. Make sure the path between the ears of the opacity meter read head is clear.
10. The screen will instruct you to "CLEAR PATH PRESS START." Press the "F2" key.
11. Calibration results will be automatically displayed. Any reading over 100 is acceptable. Passing results will not contain the message "Passing," press the "Enter" key and continue. Failing results will contain the message failing and require a second attempt. Ensure the opacity meter is correctly connected and depress the "Enter" key. If the calibration fails again, complete a Notice of State Station Equipment Failure form and skip to step 14.
8. The screen will instruct you to "PLACE FILTER PRESS "F2". Ensure the filter assembly is securely placed between the ears of the opacity meter read head and press the "F2" key. "Audit in progress" will automatically appear on the computer screen while the opacity meter reads the audit filter.

After the opacity filter value has been determined, the results of the audit will automatically be displayed on the computer screen. Record the "Calculated Value" on the audit report. If

the audit fails, repeat steps 3 through 10. If the audit fails again, complete a Notice of State Station Equipment Failure form.

When all audits have been performed, depress the “X” key (Exit) until you return to the main menu screen and press the cal/audit upload “P” key to log off.

Move to the next inspection lane along with the loaded opacity meter cart and perform steps 1 through 11 until all inspection lanes have been audited.

### Snap-Acceleration Opacity Meter Audit

The audit consists of verifying each snap-acceleration opacity meter at the station and correctly reads the audit filter within the specified pass/fail limits. The snap-acceleration opacity meters are not portable and are typically mounted at position 1 in the test lanes furthest from the station’s office. Each station, with the exception of station M04 (5302 W. Roosevelt St., Phoenix) are equipped with two snap-acceleration opacity meters. Station M04 is equipped with three snap-acceleration opacity meters. Each snap-acceleration opacity meter is audited as a unit. Cables, read heads, or other opacity meter parts may not be interchanged during the audit. Complete a Notice of State Station Equipment Failure for each opacity meter that is not functional during the audit. Perform the audits using the following procedure:

1. Close test lane by placing “State Audit” traffic cone in the middle of the lane entrance.  
**NOTE:** The audit may be performed between vehicles if safe to do so.
2. Connect the snap opacity read head to the fitting on the side of the analyzer cabinet.
3. Log onto the computer terminal at position 1; The main menu screen will appear.
4. Depress the “S” key (Service).
5. Depress the “P” key (Opacity)
6. Record the unit serial number displayed on the Opacity Meter Audit Report.
7. One after the other, depress the “I” key (Cals/Audits), the “F8” key (to bypass RFI), then enter in your code, and the “A” key (audits), then the “S” key (snap).
8. The screen will display the message “Make Sure The Filter Is Out Of Sensor Head.” Make sure that nothing is obstructing the snap-acceleration opacity meter’s light path and depress the “F2” key.
9. Insert the audit filter into the read head and depress the “F2” key.
10. The message “Audit in Progress” will automatically appear on the computer screen while the opacity meter reads the audit filter.
11. When prompted, remove the audit filter from the read head and depress the “Enter” key.
12. The audit results of the audit will be displayed on the computer screen. Record the audit value on the audit report. If the audit fails, repeat steps 2 through 8. If the audit fails again, complete a Notice of State Station Equipment Failure form. Depress the “F2” key to continue.
13. When all audits have been performed, depress the “X” key (Exit) until you return to the main menu screen and press the cal/audit upload “P” key to log off.
14. Remove the “State Audit” traffic cone and open the test lane. Unless the audit failed, move to the next inspection lane and perform steps 1 through 10 until all inspection lanes have

been audited.

15. 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 of all forms.

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 State Inspector shall provide a copy of the test equipment’s failing results to the station manager. Additionally, the contractor’s calibration audit of the failing equipment shall be provided to the Department within three calendar days after the equipment is return to service.

Upon receipt of the contractor’s calibration audit a State Inspector shall schedule a visit to the station and perform an audit of the equipment. All audit procedures will be followed, including completion of an audit form and if necessary a failure notice. The Contract Oversight Supervisor will be notified when State Station Equipment fails a Re-Audit. The Contract Oversight Supervisor will maintain the data of all re-audits for future reference. The audit shall be identified as a performance re-audit and reported in the State Inspector’s monthly report. The Contract Oversight supervisor shall report the audit(s) in the Contract Oversight monthly report.