

SUBSTANTIVE POLICY STATEMENT

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INSPECTION AND COMPLIANCE UNIT OPERATIONAL PROCEDURE

REGISTERED ANALYZER AND OPACITY METER AUDIT PROCEDURE

Issue Date: May 2009

Revised: July 2014 Effective Date: July 2014

A. SCOPE

An automotive repair facility may apply to the Department at no charge for registration of a non-dispersive infra-red (NDIR) HC and CO analyzer and opacity meters for adjustment of vehicles pursuant to Rule R18-2-1006. All (NDIR) emissions analyzers and opacity meters utilized by fleet inspection stations will be registered as part of the fleet permit approval. This procedure outlines the equipment requirements and methods for conducting performance audits of NDIR analyzers and opacity meters.

B. APPLICABILITY

This procedure applies to the auditing of all emissions analyzers and diesel opacity meters registered or to be registered by the Department pursuant to Rule R18-2-1027. All registered analyzers and opacity meters shall be audited by a state inspector at least once every 90 days.

C. GENERAL INFORMATION

Registered NDIR analyzers must meet the requirements of Rule R18-2-1006(F)(6)(a). (All CO and

HC emissions analyzers shall have water traps incorporated in their sample lines). Sampling probes shall be capable of taking undiluted exhaust samples from the vehicle's exhaust system. Calibration must be verified by a State inspector before an analyzer may be registered. To qualify for registration the analyzer must read the value of field calibration gases within the following tolerances:

1. Plus 0.50% CO to minus 0.25% CO in the range from 0 to 2% CO.
2. Plus 1.00% CO to minus 0.50% CO in the range from 2% to 10% CO.
3. Plus 60 PPM HC to minus 30 PPM HC in the range from 0 to 500 PPM HC when read as N-HEXANE.
4. Plus 200 PPM HC to minus 100 PPM HC in the range from 500 to 2000 PPM HC when read as N-HEXANE.

Opacity meters used for the snap acceleration test must conform to SAE J1667 specifications. If the snap opacity meter is not equipped to perform the ambient corrections the fleet must acquire the additional equipment necessary to perform the corrections: Weather Station; a program to calculate the ambient corrections. **NOTE: A state inspector shall become familiar with J1667 specifications.**

Opacity meters used for the loaded test must meet the following requirements to be registered by the Department:

1. Unit is either a full-flow or sampling type opacity meter. The opacity meter shall be a direct reading, continuous reading light extinction type using a collimated light source and photo-electric cell.
2. The fleet permit location must have a dynamometer for the inspection of light duty diesel (8500 GVW or less).
3. The accuracy tolerance for loaded and snap acceleration meter types is within plus or minus 5% opacity at any point in the range of the meter.

D. EQUIPMENT REQUIREMENTS

1. ANALYZERS:

- A. Two cylinders of calibration gases. Each cylinder shall contain a blend of carbon-monoxide, N-Hexane, and Carbon Dioxide with the balance zero grade Nitrogen. Their concentration shall be within plus or minus 1% of 300ppm hexane, 1.5% carbon-monoxide, 5.2% carbon-dioxide, 800ppm hexane, 6.0% carbon-monoxide, 5.2% carbon-dioxide determined by the Certificate of Analysis form attached to each gas bottle.
- B. A flow regulating system consisting of pressure regulators, metering valves capable of metering from shut-off to a minimum of 150 SCFH.
- C. An STP adapter (Simulated Tail Pipe Adapter).
- D. ICU forms:
 - a. Equipment Performance Evaluation Report. (Is not required in the field)
 - b. Red Tag.
 - c. Daily Log
 - d. Repair and Calibration log
 - e. Analyzer applications

2. **OPACITY METERS**

- A. A glass or gelatin neutral density filter of known and certified value. Filters have a life of approximately six months or longer depending on how well they are maintained. **(The filters are to be clean and kept out of daylight as much as possible)**
- B. Filter value for the opacity meter used for the loaded test shall be 20.5 percent; filters value for the opacity meter used for the snap test shall be between 45 to 55 percent.

E. PROCEDURE

All State inspectors shall utilize the following procedure when conducting performance audits of NDIR emissions analyzers and/or opacity meters.

1. Upon arriving at the facility the State inspector shall show identification and advise the facility owner or fleet agent the purpose of the visit, and issue the notice of inspection rights.

2. The State inspector shall verify that the facility employs either a certified technician (non-fleet) or a licensed fleet vehicle emission inspector (fleet). If the facility does not meet the personnel requirement for a certified technician (non-Fleet), the State inspector shall discontinue the audit. If the facility does not meet the personnel requirements for a licensed emissions inspector, the State inspector shall continue the audit. The State inspector shall record the deficiency on his/her daily log, Record an Administrative Red Tag (ART) on the fleet, and advise the fleet permit holder or his agent of the requirement to surrender all unused Certificates of Inspection R18-2-1019(G)(7).

If an annual fleet audit is in process continue the audit, if not proceed to Step 20.

If the facility/unit is not currently registered, the State inspector will initiate an analyzer or opacity meter application and continue the audit. The state inspector shall have the owner of sign the application. If the analyzer to be registered is a second analyzer, the state inspector will allow the fleet agent to sign the application. The owner must sign for non fleet analyzers.

3. If the facility/unit is currently registered, the inspector shall verify that the Repair and Calibration History Log (VE160) has been properly maintained. (Required monthly calibration checks have been performed and logged)

If the monthly calibration checks have not been performed or logged, the State inspector shall note the violation on his /her daily log and the fleet audit check list if the audit is performed during a fleet audit.

- a. For all, first, second and third violations, The State inspector shall note on the VE160 and the registered analyzer record card. No calibration checks performed for the month (enter the month(s) the analyzer calibration checks were not done) and date of your visit, have the agent or owner initials the VE160. Obtain a copy of the VE160 or confiscate the VE160 and initiate a new VE160 with the violation written on the new VE160. Continue the analyzer performance audit. The Department shall issue a

Notice of Opportunity to Correct Deficiencies for the first violation, and reserves the right to escalate if the violation continues within two years.

a. ON NEW UNITS, the State inspector shall initiate a VE160. The State inspector may initiate an analyzer application when requested by the fleet.

4. Ensure that the unit to be audited has been turned on and is functional with the assistance of the operator. (All NDIR analyzers require some warm-up time to reach stabilization. Only fully warmed-up units should be audited)

5. If the audit is of an NDIR analyzer, proceed to Step 6. If the audit is of an opacity meter proceed to Step 16.

6. **NDIR Analyzers:** Have the certified technician or emissions inspector perform a Zero and Span (if applicable) on the unit in accordance with the manufactures specifications. If the unit can be successfully Zeroed and Spanned, proceed to step 7. (Due to the liability factor, under no circumstances are you to perform the Zero and Span on any analyzer or opacity meter).

If the unit fails to Zero or Span properly, the inspector shall issue a Red Tag (noting deficiency), note Red Tag issuance on the daily log and the VE160, discontinue audit (of this unit), and proceed to Step 20.

7. Have operator switch the unit to the sample mode and if applicable set the unit to the proper range for the audit gas to be injected in Step 8.

8. Connect the STP adapter to the VEI gas blend No. 3 cylinder. Ensure that the metering valve is in the shut-off position, open gas cylinder valve one full turn, adjust regulator for an output pressure of 10 to 20 psig on the output gauge.

9. Insert the analyzer probe in to the STP adapter, insuring the diaphragm makes a good seal (avoids wasting gas).

10. Open metering valve slowly increasing flow until the STP pressure indicator (balloon) stands erect.

11. Observe the analyzer readout and record the final steady readings on the VE160 and the daily log. When functioning properly, peak readings should be reached within 10 seconds and the readings should be steady. **NOTE: Some of the newer analyzers will take longer to show readings and be steady. Use good judgment. If an operator's manual is**

available, you and the emissions inspector should review it. Also check your audit gas bottle pressure to ensure it is over 300PSI. If less than 300psi replace bottle and re-audit analyzer.

12. Repeat Steps 7 through 11, substituting VEI blend No. 4.

13. If the unit's response time is too long or the readings are unsteady, the state inspector shall verify proper gas flow. If the gas flow is adequate, the unit fails the audit. **NOTE: Use good judgment.** The State inspector shall issue a Red Tag noting the deficiency on the daily log and on the VE160. Discontinue the audit, or initiate an audit of another unit, or proceed to Step 20. If the unit is not Red Tagged at this point, proceed to Step 14.

14. When both VEI gases have been run, record the readings from each VEI blend on the VE160 and his/her daily log. The state inspector shall calculate the differences between the recorded readings and the actual values of the audit gases used. The State inspector shall record on the daily log if the analyzer passed or is Red Tagged. The audit values and the calculated differences shall be recorded on the VE160 in the appropriate areas, and on the EPER upon return to the office.

15. If any of the calculated differences exceed the allowable tolerances as detailed in paragraph C, the state inspector shall issue a Red Tag (noting deficiency) and record the issuance on the VE160 and daily log. Proceed to Step 20.

16. **Opacity Meters:** The inspector shall have the unit operator Zero and Span the unit in accordance with the manufacturer's specifications. If the unit can be successfully Zeroed and/or Spanned, proceed to step 17. If the unit fails to Zero or Span properly, the State inspector shall issue a Red Tag (noting deficiency), note Red Tag issuance on Opacity Repair and Calibration Log and daily log, discontinue audit (of this unit), or initiate an audit of another unit or proceed to Step 20.

17. Insert the opacity audit filter into the collimated light path of the detector assembly. Hold the filter against the emitter side smoke deflector (disk). The filter **MUST** be perpendicular to the axis of the collimated light path. If the filter is canted or slanted, light may be reflected or refracted and the audit results compromised. The inspector should avoid performing the audit in direct sun light to preclude possible interference from extraneous light.

18. While maintaining the audit filter in the proper position, observe the unit readout and record the peak reading on the Opacity Repair and Calibration Log. Reading should be steady. If excessive noise is observed, (unsteady readings) the State inspector shall issue a RED TAG, record the issuance on the Opacity Repair and Calibration Log and daily log,

discontinue the audit initiate an audit of another unit or proceed to Step 20. If the reading is stable proceed to Step 19.

19. Record the audit filter value on the Opacity Meter Repair and Calibration Log. If the recorded reading is greater or less than the audit filter value plus the tolerance (plus or minus 5% of the filter value), the unit fails the audit. The state inspector shall issue a Red Tag and record the issuance on the Opacity Meter Repair and Calibration Log and daily log and proceed to Step 20.

20. **Exit Interview**: The inspector will conduct an exit interview following completion of an audit. The facility owner or agent shall be advised of the final audit results and status of each unit audited. Red Tags shall be issued at this time. The State inspector shall have the facility owner or agent, when possible sign for receipt of any Red Tags on the daily log.

NOTE: If an analyzer fails during the fleet annual audit the State inspector shall continue with the fleet audit.

If all (by type- gas or diesel) of the registered units at a Fleet Inspection Station have been Red Tagged as being out of tolerance, the State inspector shall administratively Red Tag the fleet (ART), and record the serial numbers of all unused Certificates of Inspection (COI) and date of the last used COI on the State inspectors daily log. The fleet holder or agent shall be advised of the ART status, and instructed that inspections (by type) cannot be performed until at least one of the registered units has been cleared by a State inspector or Certified Analyzer Repair Person.

F. **Equipment Performance Evaluation Report (EPER)** Upon return to the office the State inspector shall transfer from his/her daily log to the EPER on file for each registered analyzer all of the analyzers or opacity meter performance data and note the status as pass or red tag (RT) for each. The EPER is given to the state inspector that maintains the monthly log. The state inspector that maintains the monthly log shall record the analyzer pass fail status on the monthly log by analyzer type. The state inspector shall write pass or fail on the EPER in red ink and file the EPER.

G. CLEARING OF RED TAGS

Red tagged units may **ONLY** be cleared for service by a State inspector or a Certified Analyzer Repair Person (R18-2-1028) following satisfactory completion of a performance audit as described herein.

The Inspection and Compliance units in both Tucson and Phoenix shall conduct a re-audit of all analyzers that have had Red Tags removed by Certified Analyzer Repair Persons. The goal is to re-audit 100 percent of all analyzers and opacity meters cleared by repair persons within five working days of receipt of the cleared Red Tag. This will provide an assurance

that Certified Repair Persons are properly clearing units as prescribed in Rule R18-2-1027. WHEN AN ANALYZER OR OPACITY METER FAILS THE FLEET HAS THE OPTION OF USING A LOANER UNTIL THEIR ANALYZER IS REPAIRED AND THE RED TAG CLEARED. THE STATE INSPECTOR WILL USE THE PROCEDURES OUTLINED IN THIS PROCEDURE TO ENSURE THE ACCURACY OF THE ANALYZER OR OPACITY METER. THE ANALYZER NUMBER AND THE WORD "LOANER" SHALL BE RECORDED ON THE DAILY LOG.