California Environmental Protection Agency

Air Resources Board

Vapor Recovery Test Procedure

TP-201.7

CONTINUOUS PRESSURE MONITORING

Adopted: October 8, 2003

Note: This method is proposed for adoption. As authorized by title 2, California Code of Regulations, section 8, the method is shown without underline. All text is proposed for adoption.

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Definitions common to all certification and test procedures are in:

D-200 Definitions for Vapor Recovery Procedures

For the purpose of this procedure, the term "CARB" refers to the California Air Resources Board, and the term "Executive Officer" refers to the CARB Executive Officer, or his or her authorized representative or designate.

1. PURPOSE AND APPLICABILITY

The purpose of this procedure is to provide general guidelines and examples of equipment used to construct a continuous pressure monitoring system for use at a gasoline dispensing facility (GDF). It is applicable for use with those systems that require continuous pressure monitoring to meet the minimum certification requirements as described in Certification Procedure 201 (CP-201). This procedure is applicable only to those facilities using manifolded gasoline storage tanks. This procedure is used during certification.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

This procedure illustrates one example of a pressure monitoring, data acquisition system as well as the required methods for submitting data to CARB on a continuous basis.

3. BIASES AND INTERFERENCES

3.1 The location chosen to measure storage tank pressure may not represent the pressure that is present in every location of the vapor recovery system. The location used for monitoring storage tank pressure shall be at the vent pipe to provide ready access to the storage tank pressure.

3.2 Ambient temperature measurements may be biased depending on the location of the temperature probe. Ambient temperature shall be installed within a radiation shield at least five (5) feet above the surrounding grade.

3.3 Pressure Transducers installed in direct sunlight or in a location that is exposed directly to the local environment (i.e., wind, rain) can produce erroneous results and/or produce a potentially dangerous condition. All pressure transducers shall be

installed inside of a weatherproof equipment box or indoors to avoid direct exposure to ambient conditions.

4. SENSITIVITY, RANGE, AND PRECISION

4.1 Electronic Pressure Transducer. Sensitivity shall be 0.01 inches H_2O with minimum differential full-scale range of 15 inches H_2O and minimum accuracy of 0.050 percent of full-scale range. Unit shall be intrinsically safe, NEMA 4 rated.

4.2 Electronic Ambient Pressure (barometric) Transducer. Minimum sensitivity shall be 1.0 millibar (mbar) with minimum accuracy of 0.25 percent full-scale and maximum full-scale range of 1100 mbar.

4.3 Temperature Probe (optional). Maximum range of 0 to 150 ^{o}F and accurate to within two degrees farenheight (2^{o}F). Note: A radiation shield must be used for ambient measurements.

4.4 Data Acquisition System. Minimum two (2) channel capacity. Capable of storing data samples (signals sent by instruments) at a minimum frequency of at least once every five (5) seconds for a minimum of fifteen (15) days. All data acquisition system equipment shall receive approval by CARB prior to installation.

5. EQUIPMENT

5.1 Electronic Pressure Transducer. Use a differential pressure transducer, Viatran™ Model 574 or equivalent, with minimum specifications listed in Section 4 to monitor the storage tank pressure. Use intrinsically safe barriers if required by the manufacturer. The device shall provide either voltage or amperage output signals for use by the data acquisition system.

5.2 Electronic Ambient (barometric) Pressure Transducer. Use a Vaisala ™ Model PTB101B (Campbell Scientific ™) ambient pressure transducer, or equivalent to monitor the ambient pressure. The device shall be capable of sending an electronic output signal to the data acquisition system at least once every five (5) seconds.

5.3 Data Acquisition System. Use a Campbell Scientific ™ Model CR10X-2M or equivalent to store samples sent by the various instruments. Data Acquisition Systems may be of either voltage or amperage input type. Instruments should be of the same input/output type as required by the system. Data acquisition systems shall be capable of exporting data to Microsoft Excel™ 97 where individual samples can be viewed or graphed if desired. For certification testing, the Executive Officer shall pre-approve all data acquisition systems prior to installation.

5.4 Solar Panel (if required). Use a Campbell Scientific ™ MSX20R, 20-watt solar panel or equivalent to power a gel cell battery that will run the data acquisition system and instruments. This arrangement will run off of the solar panel during daytime hours and off of the battery during the night. In some instances, equipment may be located indoors or at a location where regular 110-volt power is available.

5.5 Cellular Modem (if required). Use a Campbell Scientific ™, Raven II ™ CDPD Cellular Digital Modem or equivalent to send information from the data acquisition system to a field office. In some instances, equipment may be stored indoors or at a location where regular phone access or regular download capability is available.

5.6 Equipment Case (if required). Use a weatherproof equipment case, Campbell Scientific ™ or equivalent, to protect the data acquisition system and/or system components from the environment. Equipment cases may be of gel-coated fiberglass, PVC, or metal design depending on preference. In some instances, equipment may be stored indoors and may not require the use of an equipment case. When selecting an equipment case and location, consideration should be given to minimize the possibility of tampering, vandalism, or accidental shut-off.

5.7 Leak Decay Test Equipment. Assemble a set of test equipment as specified in TP-201.3, Determination of 2-Inch WC Status Pressure Performance of Vapor Recovery Systems of Dispensing Facilities, to verify the leak integrity of the test facility.

5.8 Pressure Port Fitting. Use a 2-inch diameter by 4-inch long factory threaded nipple in which to monitor storage tank pressure. The nipple shall be drilled and tapped with a ¼-inch pipe thread in order to connect a pressure without modifying the GDF.

6. PRE-TEST PROCEDURES

These methods are not inclusive with respect to specifications (e.g., equipment and supplies) and procedures essential to its performance. Persons using these methods should have a thorough knowledge of gasoline, gasoline vapor recovery systems, and source sampling methods. Particular care should be exercised in the area of safety and equipment operation in the presence of gasoline vapor and potentially explosive atmospheres.

6.1 Ensure that all of the gasoline storage tanks installed at the facility are manifolded by conducting a Determination of Vapor Piping Connections to Underground Gasoline Storage Tanks (Tie-Tank Test) in accordance with Test Procedure TP-201.3C. For facilities that do not have manifolded underground storage tanks, applicants shall submit a monitoring plan to the Executive Officer for approval. If approved, the applicant shall implement the plan.

6.2 Install the Data Acquisition System and transducers in a weatherproof enclosure, or equivalent, in accordance with the manufacturer recommendations. A liquid trap should be installed just prior to the inlet of the pressure transducer to avoid condensation inside of the pressure line or transducer.

6.3 Choose a location to mount the equipment and/or equipment case. The case shall be located at a position not to interfere with normal station operation and shall be installed in accordance with the California Occupational Safety and Health (OSHA), the California State Fire Marshal, and any other local or state fire ordinances. Responsibility for contacting, approving, and meeting all local and state ordinances

or regulations for installing such a system is the burden of the person(s) installing the monitoring equipment.

6.4 Install a pressure port. Drill and tap a 2-inch diameter by 4-inch long NPT threaded nipple with a ¼-inch NPT female thread. Use a Parker ™, or equivalent, ¼-inch pipe to ¼-inch tube fitting to connect the pressure line. Using a gasoline resistant pipe sealant or Teflon™ tape, install the drilled and tapped nipple into a 2-inch threaded female coupler and torque to approximately 40 foot-pounds. Using a non-hardening thread sealant or Teflon ™ tape, thread the coupler/nipple assembly onto the vent pipe. Torque to approximately 40 foot-pounds.

6.5 Install the Pressure/vacuum Vent Valve onto the threaded nipple in accordance with the manufacturer's recommended installation procedures.

6.6 All pressure measuring device(s) shall be bench calibrated using a reference gauge, incline manometer, or NIST traceable standard following installation. Calibration shall be performed at 20, 50, and 80 percent of full scale. Accuracy shall be within five (5.0) percent at each of these calibration points. Both ambient pressure and ambient temperature shall be recorded at the time of calibration and a calibration report shall be presented to CARB prior to commencing the data acquisition period.

6.7 Verify that each of the instruments and the data acquisition system are functioning properly. This may be accomplished either by downloading a specific time interval of data in which separate recordings were taken by pre-calibrated instruments and compared. Or, by observing real-time recordings from the data acquisition system and comparing to pre-calibrate instruments.

6.8 Conduct a leak decay test in accordance with TP-201.3 to ensure that the system is operating in compliance and that no leaks were introduced with the installation of the data acquisition system or its components. Verify that the data acquisition is recording properly while pressurizing the system in order to conduct testing.

6.9 Bleed off the excess pressure introduced into the system from conducting TP-201.3 for a maximum of one (1) minute.

7. TEST PROCEDURE

7.1 Start the Data Acquisition System and begin recording samples from the instruments at least once every five (5) seconds.

7.2 At an intervals not to exceed once every fifteen (15) days, download the data acquisition system without disrupting the data collection process and without disrupting normal station operation. Brief time periods of data disruption may be acceptable with prior notification and approval by the Executive Officer. Excessive downtime may require additional monitoring days.

7.3 Submit the data to the Executive Officer in Microsoft Excel™ 97 as described in Section 9 of this procedure. Data shall be submitted using one worksheet to store individual data points. An additional worksheet(s) shall used to view samples in a

graphical format. Multiple graphs/worksheets may be required in order to view finer detail or specific events.

7.4 Continue to collect storage tank and ambient pressure samples at a minimum frequency of once every five (5) seconds for the remainder of the specified interval.

8. POST-TEST PROCEDURES

8.1 Download any remaining information that may be stored in the data acquisition system memory. Verify that each of the instruments and the data acquisition system are functioning properly as described in subsection 6.7. Both ambient pressure and ambient temperature readings shall be recorded at the time of the calibration check and a calibration report shall be submitted to the Executive Officer.

8.2 Power off each of the instruments. Disconnect all wiring, connections, and cables.

8.3 Remove all cables, leads, wire ties, phone, or power cords, etc. Ensure that no wire ties used for securing leads are left attached to the GDF.

8.4 Remove the data acquisition system and equipment case, if used. Ensure that the facility is in its original state, i.e., as it was prior to installing the data acquisition system.

8.5 Remove the pressure/vacuum (PV) valve from the 2-inch nipple and remove the nipple and coupler. Clean the vent pipe threads with a wire brush and ensure that the vent pipe was not damaged during installation or removal. Repair vent pipe if necessary.

8.6 Install the PV valve on the vent pipe in accordance with the manufacturer's recommended installation instructions and torque value.

8.7 Conduct a leak decay test in accordance with TP-201.3 to ensure that the system is operating in compliance following removal of the data acquisition system. Make any repairs if necessary and re-test until the station is operating in compliance.

8.8 Bleed off the excess pressure introduced into the system from conducting TP-201.3 for a maximum of one (1) minute.

9. REPORTING RESULTS

Report the results obtained from the data acquisition system to the Executive Officer on a continuous interval not to exceed once every 15 days. Data shall be submitted in Microsoft Excel™ 97 where one worksheet is used for individual data points and a separate sheet(s) is used to provide a graphical display. In some instances, multiple graphs and worksheets may be required in order to view fine details or specific events.

Verify that the data format and submittal process are acceptable to the Executive Officer prior to submitting results. Alternate methods of submitting data may be acceptable pending prior Executive Officer approval.

10. ALTERNATE PROCEDURES

This procedure shall be conducted as specified. Modifications to this procedure shall not be used unless prior approval has been obtained from CARB, pursuant to Section 14 of Certification Procedure CP-201.

Figure 1

Example of A Data Acquisition System Installed At Vent Pipes