**Executive Order VR-102-A**

**Exhibit 5**

**Leak Rate of Drop Tube Overfill Prevention Device**

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 State of 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 quantify the pressure integrity of a Drop Tube Overfill Prevention Device installed in a Phase I drop tube on two-point Phase I systems. When applicable, this procedure shall also be used to quantify the leak rate of a Spill Container Drain Valve when the drain valve exits liquid directly into the drop tube.

This procedure is applicable only to those gasoline dispensing facilities (GDF) equipped with a Drop Tube Overfill Prevention Device. This procedure is used during certification and in the determination of compliance with the performance specification for the maximum allowable leakrate as defined in the Certification Procedure 201 (CP-201).

## 2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

A cap, compatible for use on a Phase I product adaptor is modified to allow the installation of a flow meter and pressure gauge. Nitrogen flow is then introduced and pressure measured. If the resulting, one-minute final pressure is greater than or equal to 2.00 inches $H_2O$ at the specified flow rate, the device is verified to be in compliance.

In the case where both a Drop Tube Overfill Prevention Device and Drop Tube/Drain Valve Assembly are installed, each device shall be tested individually in order to verify compliance of each component. In this instance, the components shall be isolated from each other with use of an inflatable plumber's bladder.

## 3. BIASES AND INTERFERENCES

**3.1** Missing or defective gaskets on the Phase I product adaptor, or a loose adaptor, may bias the results towards non-compliance. This bias is eliminated by testing the Phase I product adaptor for leaks prior to final determination of the compliance status of the Overfill Prevention Device.

**3.2** Refueling during the test may bias the results. No vehicle refueling or bulk deliveries to adjacent tanks at the facility shall occur during testing.

**3.3** Product levels less than four (4) inches above the highest opening at the bottom of the submerged drop tube may bias the test toward noncompliance.

**3.4** Positive gauge pressure in the storage tank headspace may bias the results towards compliance. Ensure that the storage tank does not contain positive pressure with use of a Pressure Relief Adaptor and pressure gauge as described in Section 5.

**3.5** Liquid levels in the drop tube above the location of the overfill protection device will bias the results toward compliance. Ensure that the liquid level is below the level of the Overfill Prevention Device.

**3.6** Leaks in the test equipment will bias the results toward non-compliance. Prior to testing conduct a leak check of the test equipment. Leak detection solution may also be used during the test to verify the absence of leaks in the test equipment.

**3.7** Use of this procedure to quantify the leak rate of Spill Container drain valves that drains liquid into the ullage space of the storage tank instead of directly into the drop will yield invalid results. Ensure that the drain valve exits directly into the drop tube prior to establishing the proper flow rate.

## 4. SENSITIVITY, RANGE, AND PRECISION

**4.1** Flow Metering Device (i.e., Rotameters). Minimum sensitivity shall be 15 ml/min (.005 CFH) with a maximum full-scale range of 300 ml/min and minimum accuracy of $\pm$ 5 percent. The device scale shall be a minimum of 150mm (5.91 inches) tall to provide a sufficient number of graduations for accurate readability.

**4.2** Mechanical Pressure Gauge. Maximum full-scale range shall be 5.00 inches $H_2O$ with minimum accuracy of +/- 2.0 percent of full-scale. The minimum sensitivity of 0.01 inches $H_2O$. The diameter of the pressure gauge face shall be 4 inches.

**4.3** Electronic Pressure Gauge. Sensitivity shall be 0.01 inches $H_2O$ with a maximum full-scale range of 20 inches $H_2O$ and minimum accuracy of +/- 2 percent full-scale.

## 5. EQUIPMENT

**5.1** Drop Tube Test Assembly and Cap. Use a product dust cap or Cam Lock™ fitting compatible with the Phase I product adaptor. The cap shall be equipped with a minimum of two pressure taps in which to connect a pressure gauge and flowmeter. An example of a Drop Tube Test Assembly is shown in Figure 1. An example of a Drop Tube Test Cap is shown in Figure 2.

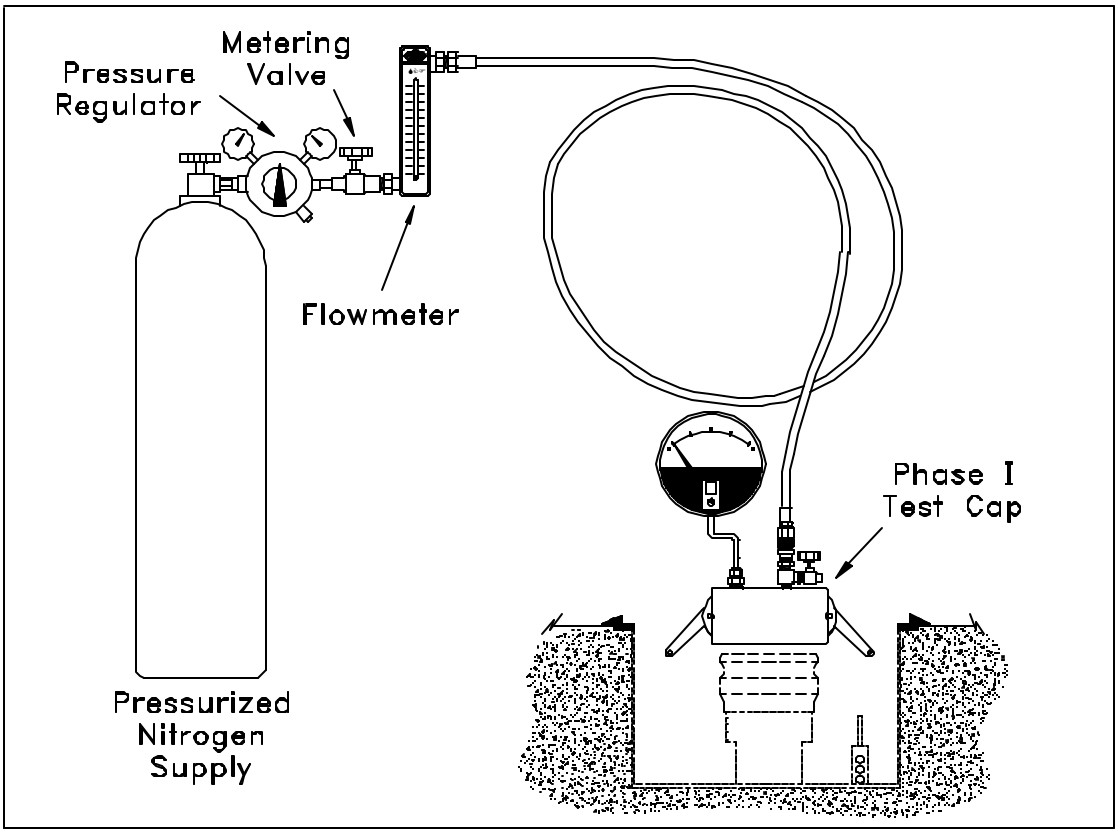
**5.2** Flow Meter (Rotameter). Use an Aalborg Flow Meter, tube number 032-41C or equivalent with minimum specifications in Section 4 to measure or introduce flow.

**5.3** Pressure Gauge. Use a Dwyer Model 475 Mark III Series electronic pressure gauge or equivalent, to measure the pressure inside of the drop tube. If a mechanical pressure gauge is desired, use a Magnahelic Model 2000-0 or equivalent that

conforms to the minimum specifications listed in section 4 to measure the pressure inside of the drop tube during testing.

**5.4** Pressure Relief Adaptor. Use a compatible vapor recovery elbow of modified vapor recovery dust cap to depress the vapor recovery poppet and relive any positive headspace pressure in the underground tank. Rags, screwdrivers or other devices not intended to mate with the vapor recovery adaptor cam and groove shall not be used to depress the vapor recovery poppet.

**Figure 1**
**Drop Tube Test Assembly**




**5.5** Nitrogen. Use commercial grade gaseous nitrogen in a high-pressure cylinder, equipped with a single-stage pressure regulator and one psig pressure relief valve.

**5.6** Stopwatch. Use a stopwatch accurate to within 0.10 seconds to time the pressurizing of the drop tube and the one minute flow stabilization.

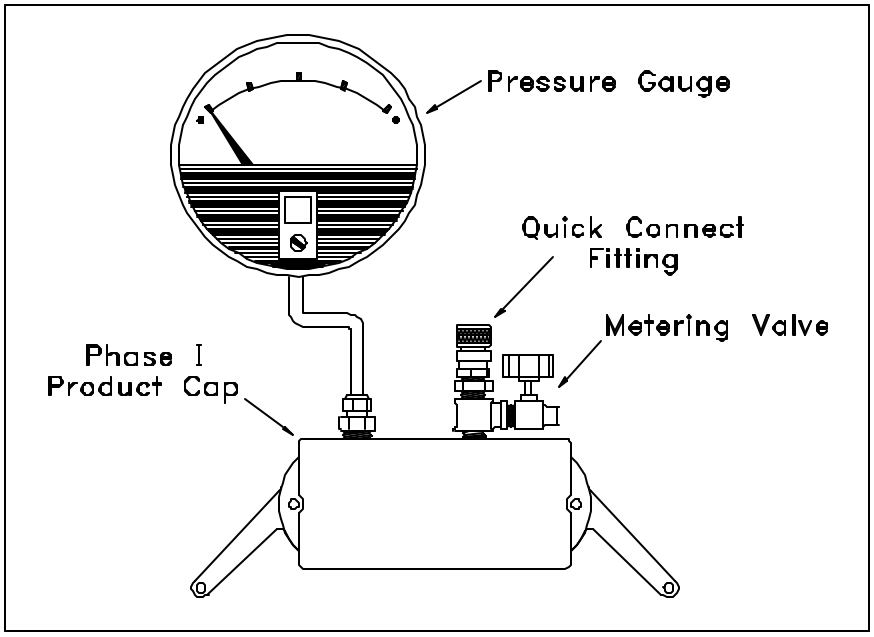
**5.7** Leak Detection Solution. Any commercial liquid solution designed to detect vapor leaks may be used to verify that no leaks are present in the Drop Tube Test Assembly.

**5.8** Inflatable Plumber's Bladder. Use a "three-four" (3-4) inflatable plumber's bladder and extension hose equipped with a safety chain as shown in Figure 3 to isolate the drain valve from the Overfill Prevention Device when applicable. The safety ring must be removable, allowing the tester place a Drop Tube Test Cap on the product adaptor following inflation.

**5.9** Traffic Cones or Caution Tape. Use traffic cones or caution tape to encircle the area containing the Phase I manholes while the test is being conducted.

**5.10** Tank Gauging Stick. Use a tank gauging stick to verify that the liquid level is at least four (4) inches above the highest opening at the bottom of the submerged drop tube. The tank gauging stick shall be equipped with a non-sparking "L" bracket at the end.

**Figure 2**
**Drop Tube Test Cap**




## 6. PRE-TEST PROCEDURES

**6.1** The flow meter and pressure gauge shall be calibrated within 180 days prior to conducting testing. The flow meter shall be calibrated for use with nitrogen. Calibrations shall be conducted in accordance with **CARB calibration methodology for flow meters, Appendix D of Air Monitoring Quality Assurance, Volume VI, Standard Operating Procedures for Stationary Source Emission Monitoring and Testing, January 1979**.

**6.2** All pressure measuring device(s) shall be bench calibrated using a reference gauge, incline manometer or NIST traceable standard at least once every six (6) months.

Calibration shall be performed at 20, 50, and 80 percent of full scale. Accuracy shall be within five (5) percent of each of these calibration points.

**6.2** Place the traffic cones or caution tape around the perimeter of the Phase I containment boxes, allowing sufficient space to safely conduct the test.

**6.3** Remove the lids of the Phase I containment boxes. Visually determine that the drop tube is equipped with an Overfill Prevention Device.

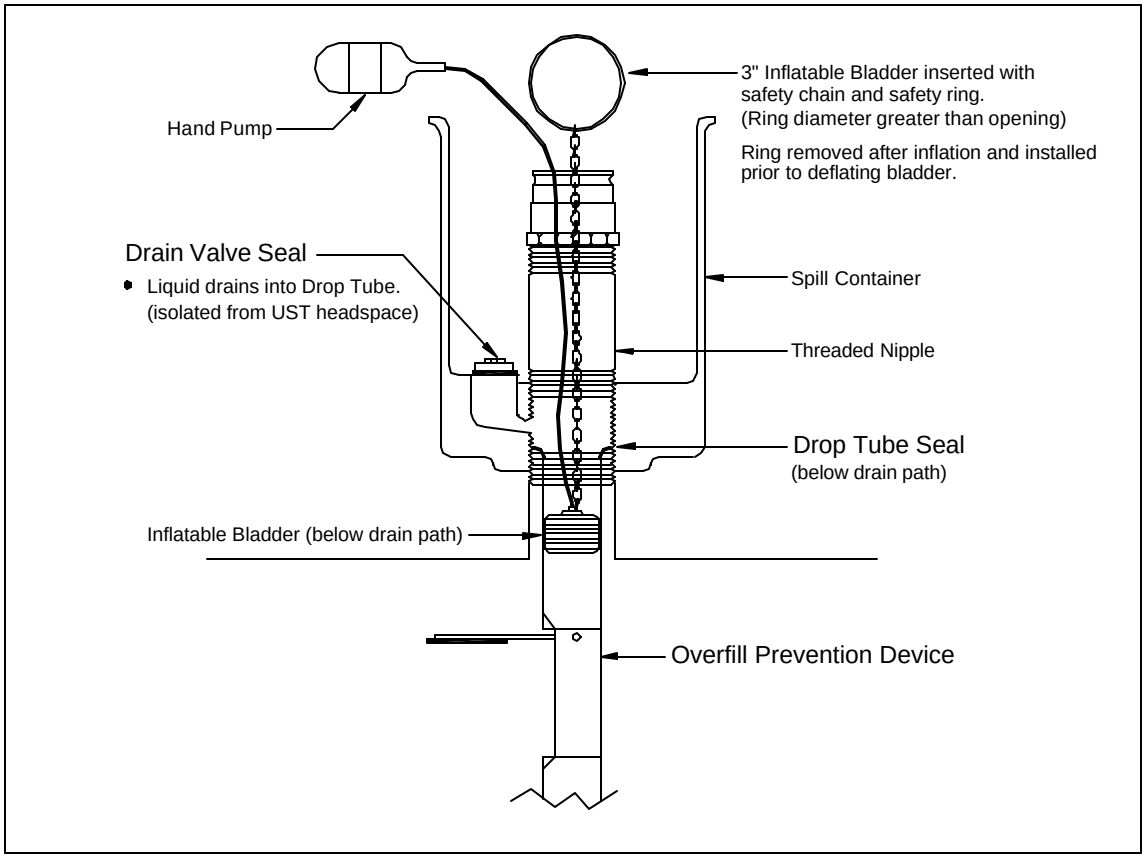
**6.4** Inspect the Phase I product adaptor to ensure that the gasket is intact and that the adaptor is properly tightened to the Spill Container riser.

**6.5** Verify that the liquid level in the storage tank is at least four (4) inches above the highest opening at the bottom of the submerged drop tube using the tank gauging stick.

**6.6** Inspect the drain valve configuration. Determine whether the drain valve drains liquid directly into the drop as shown in Figure 3. Verification of both the Drop Tube Overfill Prevention Device and Drain Valve configuration is required in order to determine the test method.

**Figure 3**

**Inflatable Bladder Installation and Depiction of Components**



## 7. TEST PROCEDURE

**7.1** If the drain valve from Section 6.6 exits liquid directly into the drop tube, carefully install the inflatable plumber's bladder ("3 - 4 model") into the drop tube below the drain valve and above the overfill prevention device and inflate. Once inflated, carefully remove the safety ring, allowing the chain to rest on top of the bladder. If the drain valve does not exit liquid directly into the drop tube, proceed to 7.2.

**7.2** Connect the Drop Tube Test Cap to the Phase I product adaptor as shown above in Figure 1. Connect the nitrogen supply line to the inlet of the flow meter.

**7.3** With no vehicle refueling, open the nitrogen supply and adjust the nitrogen flow rate to 0.42 CFH (200 ml/min) and proceed to 7.3.

**7.4** Start the stopwatch for a maximum of 5 minutes or until the pressure gauge reads 2.10 inches $H_2O$. Record the pressurization time on the data sheet and proceed accordingly as follows:

**7.4.1** If the pressure did not reach 2.10 in. $H_2O$ within 5 minutes, the device does not comply with the maximum allowable leak rate.

**7.4.2** If the pressure reached 2.10 inches $H_2O$ within 5 minutes reduce the nitrogen feed to the maximum allowable leak rate listed in CP-201 for the device and observe the pressure gauge for 1-minute. If the 1-minute final pressure is less than 2.00 inches $H_2O$ the device does not comply with the maximum allowable leak rate.

**7.5** Record the one-minute final pressure on the data sheet.

**7.6** If preliminary testing was conducted for a Drop Tube/Drain Valve Assembly, carefully remove the inflatable plumbers bladder installed in 7.1 using the safety ring and re-conduct this procedure pursuant to sections 7.2 through 7.5 for the Drop Tube Overfill Prevention Device.

## 8. POST-TEST PROCEDURES

**8.1** Carefully remove the Drop Tube Test Cap from the Phase I adaptor. Store all test equipment in a protected, safe location to prevent damage to the instruments.

**8.2** Reinstall the safety ring and deflate the inflatable plumber bladder, if used.

**8.3** Replace the caps on the appropriate Phase I adaptors, and the appropriate lids on the Spill Containers.

**8.4** Remove the traffic cones from the Phase I area.

**8.5** If the steady-state pressure was not equal to 2.00 inches $H_2O$ and the flow meter could not quantify the flow rate of the leak, Equation 9-1 may be used to determine the leakrate at 2.00 inches $H_2O$.

## 9. CALCULATING RESULTS

**9.1** If the flow rate of nitrogen was at the upper limit of the flow meter and the measured pressure never reached 2.00 inches $H_20$, but was greater than 0.0 inches $H_2O$, the actual leak rate at a pressure of 2.00 inches $H_2O$ shall be calculated as follows:

$$Q_{2.00} = (2.00)^{1/2}\left[\frac{Q_{actual}}{(P_{actual})^{1/2}}\right] \qquad \text{Equation } 9-1$$

Where:

$Q_{2.00}$ = Leak rate at 2.00 inches $H_2O$, cubic feet per hour (CFH)
$Q_{actual}$ = Actual introduction rate of nitrogen, cubic feet per hour (CFH)
$P_{actual}$ = Actual measured steady-state pressure at $Q_{actual}$, inches $H_2O$
2.00 = Pressure, inches $H_2O$

## 10. REPORTING RESULTS

Report the results of the quantification of leak rate on Form 1. Districts may require the use of alternate Forms provided they include the same parameters identified on Form 1.

## 11. ALTERNATE PROCEDURES

This procedure shall be conducted as specified. Modifications to this test procedure shall not be used to determine compliance unless prior written approval has been obtained from the Executive Officer, pursuant to Section 14 of Certification Procedure CP-201.

## Form 1

## Drop Tube Overfill Prevention Device and Drop Tube/Drain Valve Assembly Data Sheet

| | | |
|---|---|---|
| Facility: | Test Date: | Tester(s): |
| Address: | City: | Zip Code: |
| Overfill Prevention Make & Model: | Spill Container Make & Model: | |
| Date of Last Flowmeter Calibration: | Date of Last Pressure Device Calibration: | |

### Test Results

| Product Grade | Time Required to Pressurize to 2.10 in. $H_2O$ (seconds) | Pressurization Flow Rate (CFH) (both devices) | Device: | | Device: | |
|---|---|---|---|---|---|---|
| | | | 1-Minute Final Pressure (in. $H_2O$) | Flow Rate (CFH) | 1-Minute Final Pressure (in. $H_2O$) | Flow Rate (CFH) |
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