Executive Order VR-204-R
Balance Phase II EVR Systems Including ISD Systems

EXHIBIT 19
INCON ISD System Vapor Flow Meter Operability Test Procedure

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 "ARB" refers to the California Air Resources Board and the term "Executive Officer" refers to the ARB Executive Officer or his or her authorized representative or designate.

1. PURPOSE AND APPLICABILITY

1.1 This procedure is used to verify the setup and operation of the INCON ISD System Vapor Flow Meter and Dispenser Shutdown Mapping certified for use with the VST Balance Phase II EVR System installed at gasoline dispensing facilities (GDF). This procedure is applicable to ARB Executive Order (EO) VR-204-N.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

2.1 A tight fitting VST Balance Nozzle Adapter is placed on the spout of the dispensing nozzle. The VST adapter, which allows the introduction of nitrogen into the nozzle vapor collection path, is connected to the outlet side of a reference volume gas meter. The inlet side of the reference volume gas meter is connected to a flow meter (rotometer) that is attached to a high pressure nitrogen cylinder and a pressure regulator. See Figure 2. Nitrogen is introduced through both the reference volume gas meter and the INCON ISD System Vapor Flow Meter. Nitrogen flow volumes from both meters are then compared with each other to determine the accuracy of the INCON ISD System Vapor Flow Meter. This process is repeated for the remaining INCON ISD System Vapor Flow Meter equipped dispensers at the GDF.

2.2 The test is conducted with the pressure/vacuum (P/V) vent valve(s) installed on the storage tank vent pipes and the Phase I vapor poppet opened to atmosphere.

2.3 The test procedure requires no modifications to the GDF being evaluated.

2.4 The fueling point on the opposite side of the fueling point being tested must be blocked off so that dispensing is not allowed.

3. BIASES AND INTERFERENCES

3.1 Nozzle spouts that are damaged such that the VST Balance Nozzle Adapter cannot fit over the nozzle spout preclude the use of this test.

3.2 Phase I vapor poppet must be opened to allow the ullage pressure to equalize with atmosphere pressure. Failure to do so may bias the results toward noncompliance.

3.3 Drain or remove any liquid gasoline that may be in the nozzle and the vapor return path of the hose. Failure to drain this gasoline liquid will bias the test toward noncompliance.

3.4 The nominal inside diameter of the flexible hose and fittings not between 0.75 and 1.00 inches will bias the test toward noncompliance.

4. SENSITIVITY, RANGE, AND ACCURACY

4.1 The maximum rated capacity of the reference gas volume meter shall be at least 800 CFH and not greater than 3000 CFH.

4.2 The minimum rated capacity of the reference gas volume meter shall be 25 CFH.

4.3 The minimum readability of the reference gas volume meter shall be 0.01 cubic feet.

4.4 Accuracy of the reference gas volume meter, determined during calibration, will be ± 5 percent of the meter reading.

5. EQUIPMENT

5.1 **Nitrogen High Pressure Cylinder with Pressure Regulator**. Use a high pressure nitrogen cylinder capable of maintaining a pressure of at least 2000 pounds per square inch gauge (psig) and equipped with a compatible two- stage pressure regulator and a one psig relief valve. A ground strap is recommended during introduction of nitrogen into the system.

5.2 **Flow meter.** Use a flow meter (rotameter) capable of accurately measuring nitrogen flow rate of 60 cubic feet per hour (cfh).

5.3 **Pressure Measuring Device**. An electronic pressure measuring device with a full range that shall not exceed 0-10 inches of water column (WC) with a minimum accuracy of 0.5 percent of full-scale. A 0-20 inches WC device may be used provided the minimum accuracy is 0.25 percent of full-scale.

5.4 Squeeze Bulb. A rubberized or equivalent device used to increase pressure to 5.00” WC.

5.5 Balance Nozzle Adapter. Only the VST Balance Nozzle Adapter Part Number VST-STA-100 can be used to conduct to conduct this operability test. Figure 1 shows the VST Balance Nozzle Adapter.

5.6 Surrogate Spout. Only the VST Surrogate Spout Assembly Part Number VST-TSS-100 can be used to conduct the pre-test leak check. Figure 1 shows the VST Surrogate Spout Assembly.

5.7 Adapter Supply Hose. The nominal inside diameter of the flexible hose and fittings shall be between 0.75 and 1.00 inches, and the maximum length of the tubing shall be 6 feet.

5.8 Ball Valve. The nominal inside diameter of the ball valve shall be between 0.25 inch and 1.00 inch.

5.9 Nitrogen Supply Line. The nominal inside diameter of the flexible tubing and fittings shall be between 0.25” and 0.375” and the maximum length of the tubing shall be 20 feet.

5.10 Reference Gas Volume Meter. Use a Dresser Measurement Roots Meter®, or equivalent (preferably fitted with a digital readout), to measure the volumetric flow rate through the VST Balance Nozzle Adapter. The reference gas volume meter shall be calibrated within 180 days prior to conducting this procedure. The maximum allowable pressure drop(s) determined by the manufacture across the meter shall be:

For a meter with a maximum rated capacity of 1000 CFH through 3,000 CFH:
1.10 inches H2O at a flowrate of 3,000 CFH
0.05 inches H2O at a flowrate of 30 CFH

For a meter with a maximum rated capacity of 800 to 1,000 CFH:
0.70 inches H2O at a flowrate of 800 CFH
0.04 inches H2O at a flowrate of 16 CFH

5.11 Stopwatch. Use a stopwatch accurate to within 0.2 seconds.

5.12 Lubricant. Appropriate lubricant, either grease or spray lubricant, shall be used to ensure a tight seal on the interface of the nozzle and the VST Balance Nozzle Adapter.

5.13 Leak Detection Solution. Any liquid solution designed to detect gaseous leaks may be used to verify the pressure integrity of test equipment during this test.

Figure 1
VST Surrogate Spout Assembly

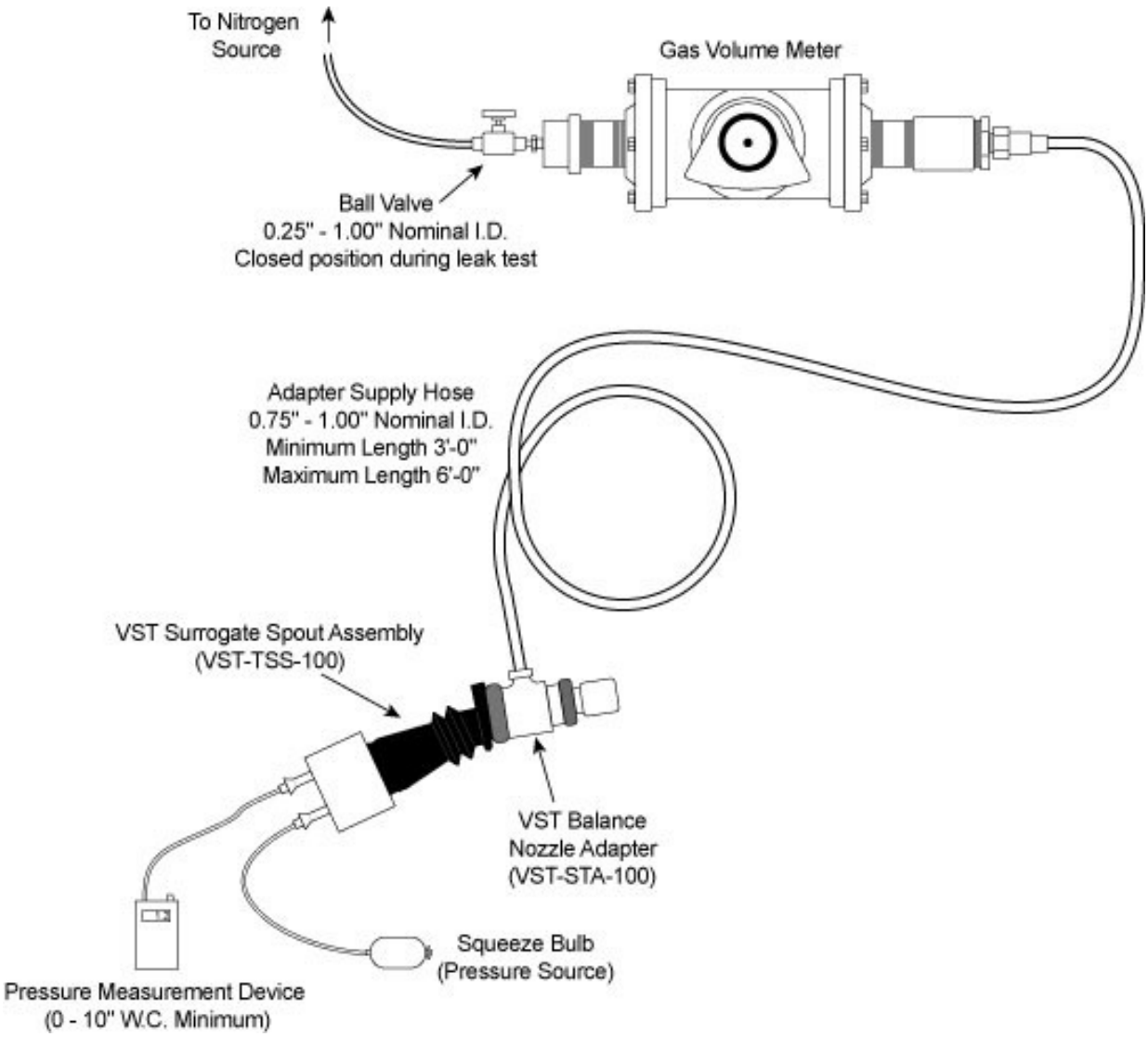
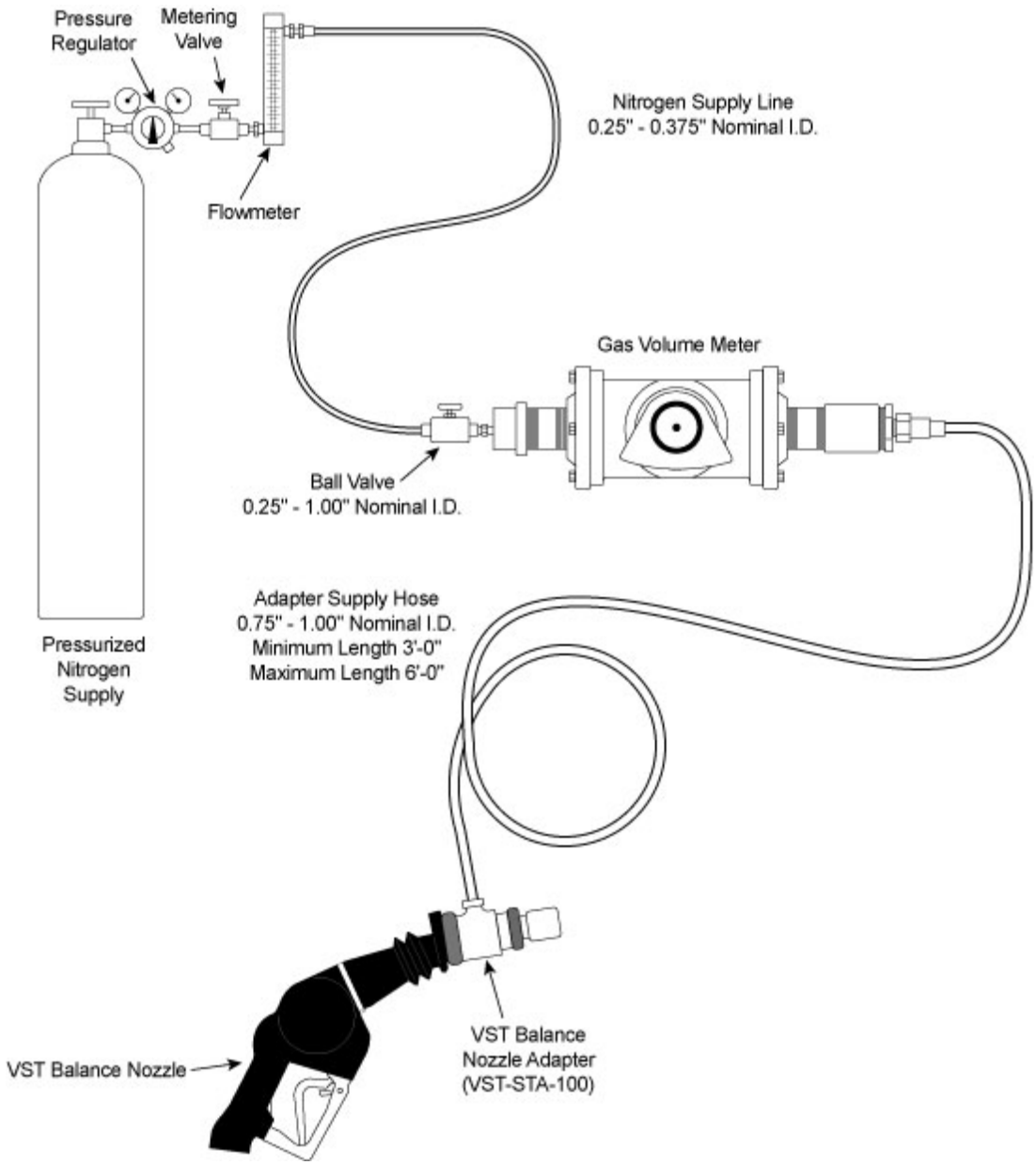


Figure 2
INCON ISD System Vapor Flow Meter Test Assembly



6. PRE-TEST PROCEDURES

6.1 Open the Phase I vapor poppet to atmosphere. Locate the Phase I EVR vapor poppet on the 87 grade tank and remove the dust cap. **Open** the vapor poppet to atmosphere by using a modified dust cap.

6.2 Verify leak integrity of test assembly. Conduct a pre-test leak check of the VST Balance Nozzle Adapter, the reference gas volume meter, and the adapter supply hose by connecting the VST Balance Nozzle Adapter to a surrogate spout as shown in Figure 1. Turn the ball valve in Figure 1 to the closed position. Raise the test assembly pressure to 5.00” ±0.50” WC using a squeeze bulb. There shall not be a pressure drop of more than 1.00” WC from the above starting pressure for 30 seconds from the start of the test. If the leak test passes, proceed with the testing. If the leak test fails, proceed to isolate the source of the leak by pressurizing the test equipment again. Apply liquid leak detector solution on interfaces and other potential leak sources and watch for the formation of bubbles. Once leak(s) are repaired, repeat the leak test procedure.

Note: Leak checks shall be conducted in a shaded area or away from direct sunlight. Leak checks may be conducted during the testing to ensure leak integrity of test equipment

6.3 Assemble the equipment as shown in Figure 2: INCON ISD System Vapor Flow Meter Test Assembly. Leave the VST Balanced Nozzle Adapter off of the nozzle at this time. Do not enable the dispenser to dispense product. Remove nozzle and utilize any method to keep the nozzle hook in the off position.

6.4 Ensure that the ground strap is properly connected to an acceptable ground.

7. TEST PROCEDURES

7.1 Prevent dispensing from all other fueling positions that share the same INCON ISD System Vapor Flow Meter being tested.

7.2 Record the INCON ISD System Vapor Flow Meter serial number and fueling position being tested on a field data sheet. An example of a typical field data sheet is provided at the end of this exhibit.

7.3 Completely drain any gasoline that may be in the nozzle and hose vapor return path by any acceptable method.

7.4 Turn the ball valve to the open position and adjust the nitrogen flow using the rotometer to 60 cfh +/- 5.0 cfh.

7.5 Once the nitrogen flow is set, turn the ball valve to the closed position to stop the flow of nitrogen through the gas volume meter. This will ensure the nitrogen flow rate is set and the nitrogen can instantaneously be activated when the ball valve is turned to the open position.

7.6 Install the VST Balance Nozzle Adapter on the appropriate nozzle as shown in Figure 2. Lubricant can be applied to the nozzle spout and the face seal or boot face (rubber boot) of the nozzle and the back of the VST Balance Nozzle Adapter if necessary.

7.7 Select Vapor Flow Accumulation on the INCON console for the appropriate fueling position. See Figures 3-8. The Accumulated Flow counter should read zero. To reset the counter, hang the nozzle up and remove.

Note: Only one fueling point and grade per dispenser needs to be tested.

7.8 Record starting value on reference meter. If using a tri-tester in Digital Roots mode, press the button to zero the meter. Simultaneously squeeze the nozzle handle to the full dispensing position and turn the ball valve to the open position to allow nitrogen to flow.

Note: If the nozzle handle is not engaging the vapor/product valves will not open within the nozzle, turn off the nitrogen flow using the ball valve; remove the Balance Nozzle Adapter from the nozzle to release the nitrogen pressure build up and repeat sections 7.8 and 7.9. Excess pressure build up in the nozzle will engage the secondary shut-off diaphragm and not allow the vapor/product valves within the nozzle to open.

7.9 Monitor the gas volume meter display. If using a tri-tester, use a stopwatch to time one minute of flow. Simultaneously stop the flow once 1.0 cubic feet (cf) +/- 0.50 cf of nitrogen is reached, or after one minute with Tri-Tester, by turning the ball valve to the closed position and also releasing the nozzle handle.

DO NOT HANG THE NOZZLE UP UNTIL YOU COLLECT THE VAPOR FLOW ACCUMULATION FROM THE INCON CONSOLE

Note: Final volume values may be biased if the ball valve and the nozzle handle are not activated at the same time. If the ball valve is open before the nozzle vapor valve leakage will occur around the nozzle boot. If this happens you must re-run the test.

7.10 Record the end meter reading from the reference gas volume meter. Calculate the total cubic feet value by subtracting the initial meter reading obtained in section 7.7 from the final meter reading in this section.

7.11 Convert the total cubic feet value to gallons using the equation on the field data sheet or section 9.1 of this procedure. Record the final vapor gallon value on the field data sheet.

7.12 Record Vapor Flow Accumulation result from INCON screen on test data sheet and print out results for test records.

Note: You must print out Vapor Flow Accumulation result from the INCON ISD console after each flow meter test for test confirmation as the INCON ISD will not save test results for later. You may print out test result after each test and at the end and after completing all flow meters verifications, strip off the print out for all flow meters and attach to data sheet.

7.14 Record the Fueling Point you are testing and write the corresponding air volume in gallons on the field data sheet. Note: The air volume is displayed in gallons.

7.15 Calculate the percent difference between the final vapor gallons reading from the reference gas volume meter and the INCON Vapor Flow Accumulation reading shown on the field data sheet using the calculations shown in Section 9 below.

Pass: If the volume percent difference between the recorded INCON ISD System Vapor Flow Meter and the reference gas volume meter is within 15%, check “Pass” on the field data sheet, and repeat the Test Procedures for the remaining INCON ISD System Vapor Flow Meter equipped dispensers at the GDF.

Fail: If the volume percent difference between recorded INCON ISD System Vapor Flow Meter and the reference gas volume meter is not within15%, then proceed to section 7.16.

7.16 Conduct the leak test in section 6.4 to evaluate the test equipment. If the equipment leak test passes proceed to section 7.17. If the test fails, repair the leak and go back to section 7.7.

7.17 Perform this test two more times and average the three readings together. If the vapor volume percent difference between the three recorded INCON ISD System Vapor Flow Meter and the three reference gas volume meter is within 15%, check “Pass” on the field data sheet.

7.18 If the operability test fails, check the fueling point and make sure the reading from the dispenser is correct. Be sure that the fueling point opposite the nozzle is hung up (i.e. hook lever closed during the test).

Figure 3

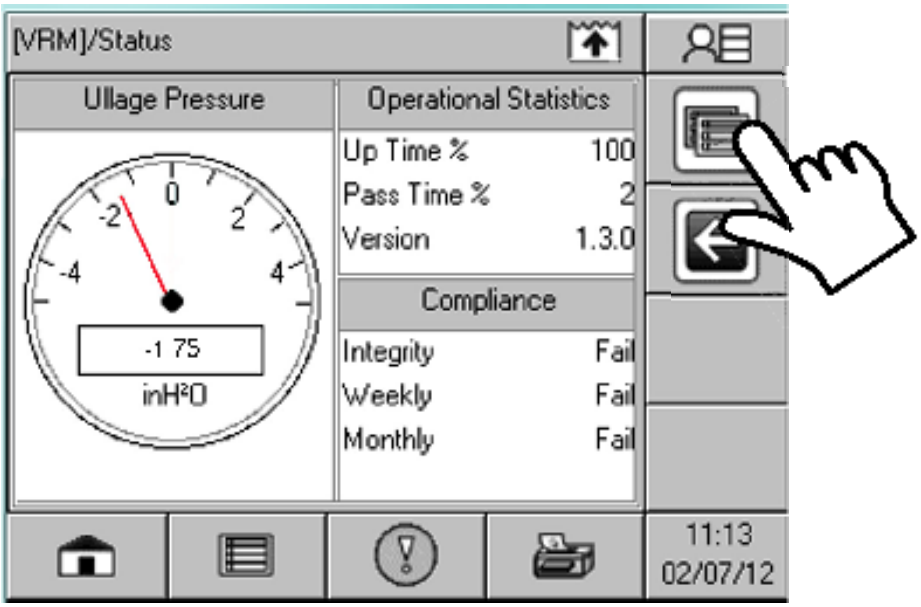


Figure 4

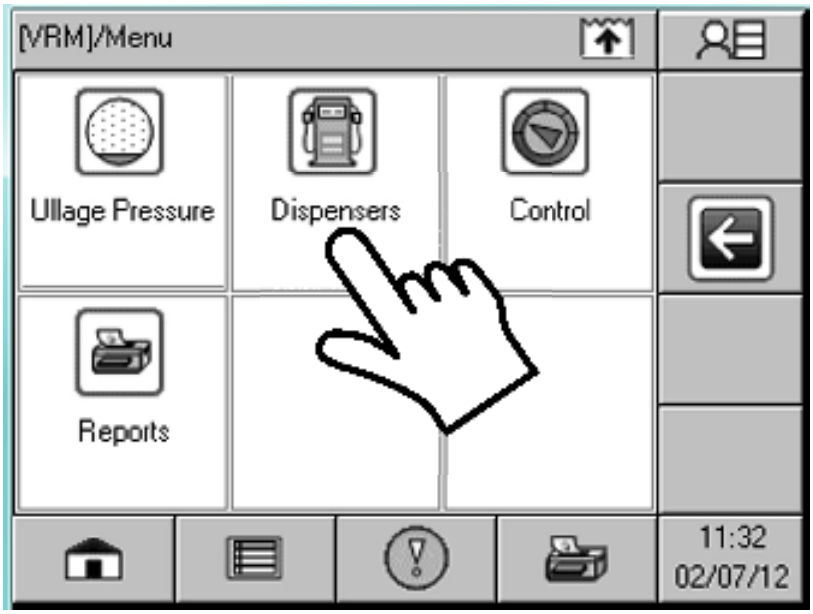


Figure 5

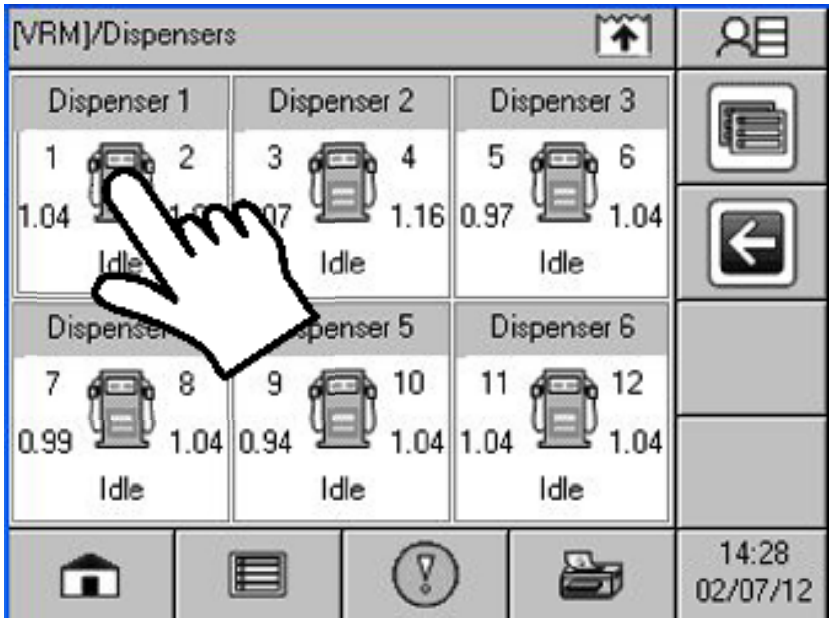


Figure 6

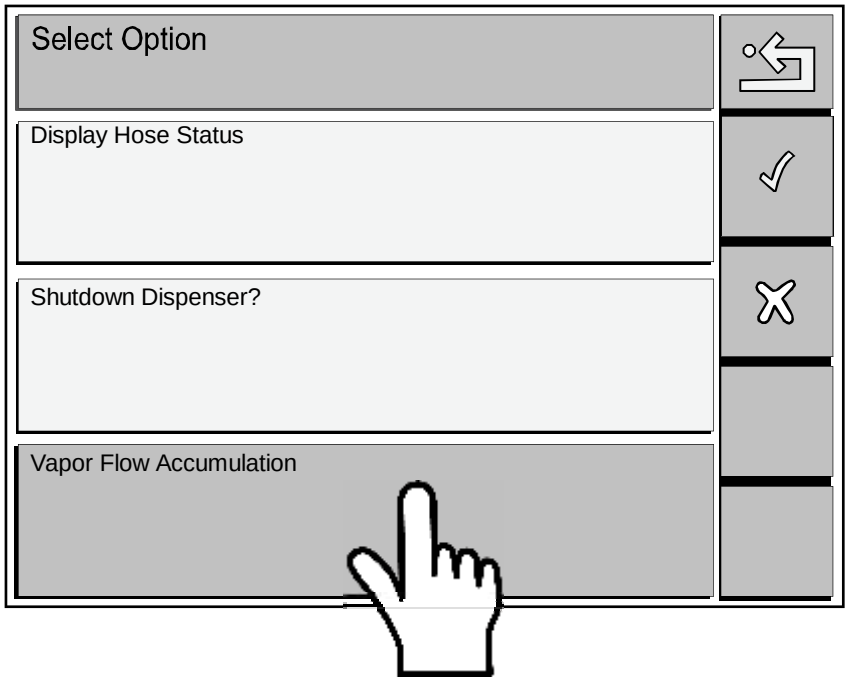


Figure 7

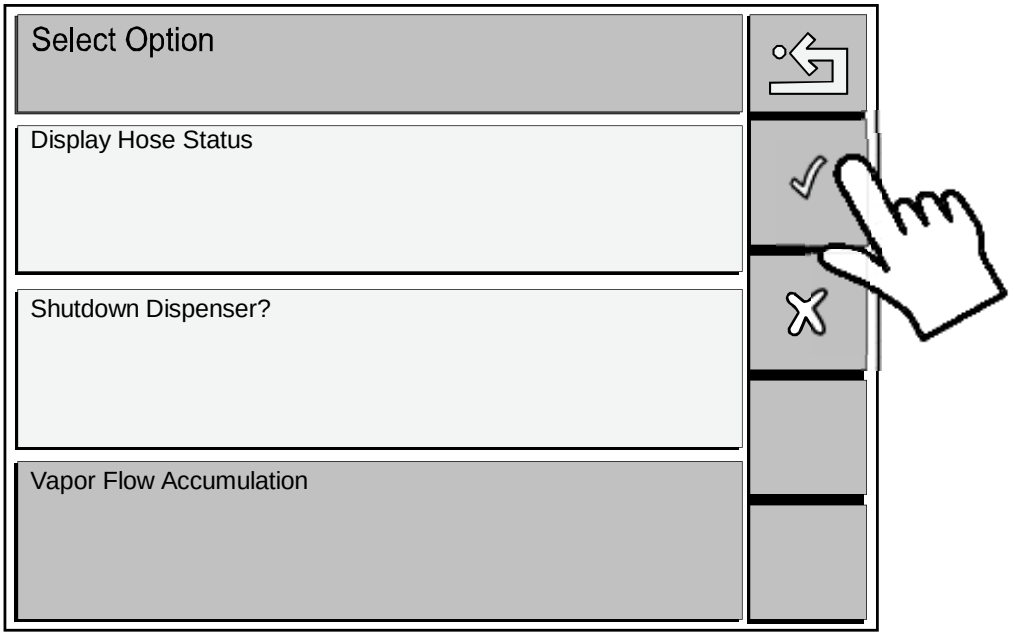
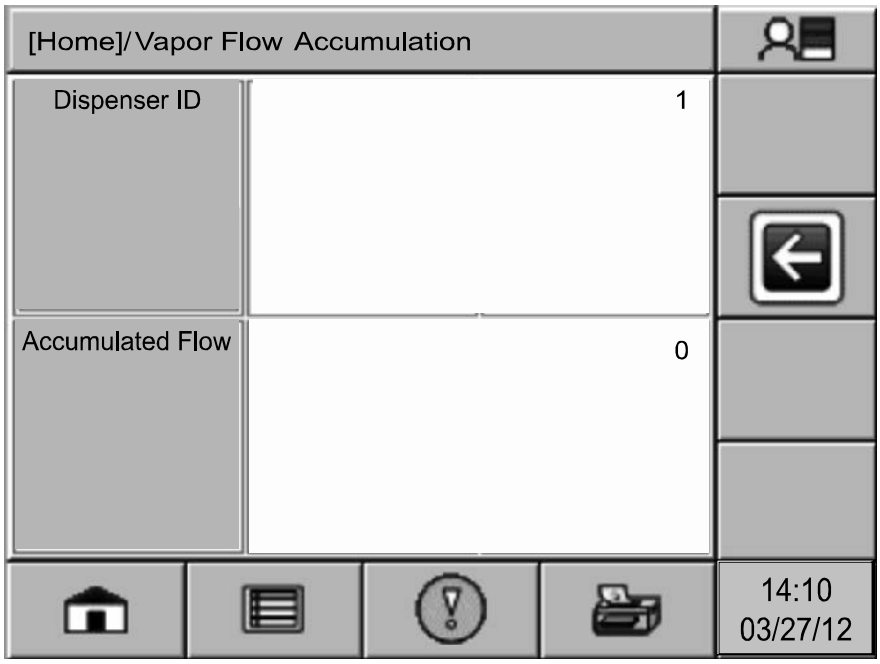

Select Option
Display Hose Status
Shutdown Dispenser?
Vapor Flow Accumulation

Figure 8


[Home]/Vapor Flow Accumulation
Dispenser ID
1
Accumulated Flow
0
14:10
03/27/12

8. POST-TEST PROCEDURES

8.1 Remove the VST Balance Nozzle Adapter and all equipment from the nozzle assembly.

8.2 A post-leak test of the equipment is not required if all the Vapor Flow Meters are within range. For the Vapor Flow Meters that are not within range, sections 7.16 – 7.17 must be conducted. The leak test in section 6 will be conducted to further evaluate the test equipment.

8.3 Close the Phase I EVR vapor poppet. Locate the Phase I vapor poppet on the 87 grade tank. Close the vapor poppet by removing the modified dust cap. Reinstall the original dust cap.

9. CALCULATING RESULTS

9.1 The conversion of the cubic feet reading from the reference volume gas meter to gallons shall be calculated as shown in Equation 9-1.

$$Gallons = Cubic\ Feet \times 7.481 \quad \textbf{[Equation 9-1]}$$

Where:

Gallons	=	Nitrogen volume from the reference meter in gallons
Cubic Feet	=	Cubic feet nitrogen volume reading from reference gas volume meter
7.481	=	Conversion factor from gallons to cubic feet, or gallons per cubic foot

9.2 The percent difference between the reference gas volume meter and the INCON Vapor Flow Meter shall be calculated as shown in Equation 9-2.

$$\%Diff = \frac{ISDtotalGal - GasFlowMeterDiffGal}{GasFlowMeterDiffGal} \times 100 \quad \textbf{[Equation 9.2]}$$

Where:

%Diff	=	Percent difference between reference gas volume meter and INCON ISD System Vapor Flow Meter
ISDtotalGal	=	Total gallons of flow from the INCON ISD System Vapor Flow Meter reported as “Air” from the Vapor Flow Accumulation menu on the INCON
GasFlowMeterDiffGal	=	The difference between the initial meter reading and the final meter reading from the reference gas volume meter.*
100	=	Conversion factor, percentage

* Note: Most readings from reference gas volume meters are in cubic feet and must be converted to gallons as shown in Equation 9.1

10. DISPENSER SHUTDOWN MAPPING VERIFICATION

This is a procedure to test the shutdown feature of the INCON VRM System. The purpose is to verify the dispenser mapping for proper shutdown.

This procedure can be done from either the touch-screen or the web page.

10.1 Dispenser Shutdown Test via Touch Screen Display:

1. Navigate to the dispenser status page by the following steps:

   a. Selecting the VRM Application icon
   b. Selecting the Sub-menu icon
   c. Selecting the Dispensers icon

2. Once at the Dispenser Status page, if you touch one of the dispenser icons, a message will ask you if you want to disable that dispenser. If you press the OK button then the dispenser will shutdown.

3. Verify the Dispenser under test is disabled and fuel cannot be pumped. From the Dispenser Status page, the dispenser under test should show “Shutdown”.

4. Once verified, if you press the same Dispenser again, a message will ask if you want enable Dispenser 1. Select “Yes” and the dispenser should come back to normal *operation*.

5. If the Dispenser under test did not shutdown or the wrong dispenser shutdown, then the wiring and setup should be checked and Steps 1 - 4 run again.

6. Repeat Steps 1 - 5 for all dispensers and record the results in the Test Form.

10.2 Dispenser Shutdown Test via Web Pages

The dispenser shutdown test can alternatively be run through the web pages. The following procedure can be done from either the LCD or the web page.
From the Web Page:

1. This procedure requires administrator privileges.

2. Navigate to the dispenser status page. http://Ip_address/vrm_status.html

3. In the **Dispenser Status** column, select the Dispenser under test. A message will appear asking if you want to disable the dispenser, click “OK”.

4. Verify the Dispenser under test is disabled and fuel cannot be pumped. From the Dispenser Status page, the dispenser under test should show “Shutdown”.

5. Once verified, if you press the same Dispenser again, a message will ask if you want enable Dispenser 1. Select “Yes” and the dispenser should come back to normal operation.

6. If the Dispenser under test did not shutdown or the wrong dispenser was shutdown, then the wiring and setup should be checked and Steps 1 - 5 run again.

7. Repeat Steps 1 - 6 for all dispensers and record the results in the Test Form.

11. REPORTING RESULTS

11.1 Document test data and other information as required in the INCON ISD Operability Test Forms at the end of this document. Districts may require the use of alternate forms, provided they include the same minimum parameters as identified in the INCON ISD Operability Test Form.

12. ALTERNATE PROCEDURES

12.1 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 ARB Executive Officer, pursuant to Section 14 of the Certification Procedure CP-201.

VR-204-N: Exhibit 19
INCON ISD System Vapor Flow Meter Operability Test
Field Data Sheet

		Date of Test
Service Company Name		Service Company's Telephone
Service Technician		INCON Tech Certification #
Station Name		District Permit #
Station Address	City	State & Zip

INCON ISD System Vapor Flow			**Reference Volume Gas Meter**						
Vapor Flow Meter S/N	Fueling POS	Vapor Volume (gallons)	Start (cubic feet)	Stop (cubic feet)	Difference Cubic feet (Stop – Start)	Convert Cubic Feet To Gallons[1]	% Diff [2]	Pass	Fail

[1] *Gallons = Cubic Feet x 7.481*

[2] $\%Diff = \frac{ISDTotalGal - GasFlowMeterDiffGal}{GasFlowMeterDiffGal} X\ 100$

VR-204-N: Exhibit 19 (Continued)
INCON ISD System Dispenser Shutdown Mapping Verification
Field Data Sheet

Dispenser Mapping Test	Check	Initials
Refer to the Dispenser Shutdown Mapping Verification section of the ISD Operability Test Procedure, section 10 of this document.		
Dispenser was shutdown properly?		
Fuel was unable to be dispensed from nozzles?		
Dispenser was re-enabled from console?		
Fuel is able to be dispensed from nozzles?		