Vapor Recovery Test Procedure

TP- 201.2l
Test Procedure for In-Station Diagnostic Systems

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California Environmental Protection Agency
California Air Resources Board

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TP-201.2I

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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

This test procedure provides a certification method to determine whether the in-station diagnostic (ISD) requirements specified in Certification Procedure 201 (CP-201) and Certification Procedure 206 (CP-206) are met.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

Adequacy of required documentation, including, but not limited, to required test and calibration procedures, is evaluated. The accuracy and precision of measurements made by the ISD system are evaluated based on comparison of ISD system measurements to measurements made using standard test methods, including measurements (where applicable) of (1) air-to-liquid (A/L) ratio (liquid and vapor volumes), (2) vapor collection flow performance (liquid and vapor volumes), (3) central vacuum pump vacuum, (4) underground storage tank (UST) ullage pressure and pressure decay rates, (5) vapor processor function, and (6) other measurement parameters as described in CP-201. Compliance with interface and communications capabilities requirements is tested by connection to, and communication with, the system. Generation of required alarms and actions and response to manual override of interrupted dispensing, is tested by practical tests in which failures are artificially induced, or by software or electrical simulation of failure conditions, or both. Compliance with required up-time percentages is determined by review of operational data. Statistical probabilities of generating required alarms and actions and, of generating false alarms when a vapor recovery system is operating in compliance, are calculated based on accuracy and precision of ISD system measurements compared to standard test procedures and on review of the algorithms used to generate alarms and actions from sensor data.

3. BIASES AND INTERFERENCES

Biases and interferences have not been formally established.

4. SENSITIVITY, RANGE AND PRECISION

Sensitivity range and precision have not been formally established.

5. TEST EQUIPMENT

Equipment specifications are contained in the vapor recovery test procedures cited herein. Additional special equipment specifications may be included at the time of certification if deemed necessary by the Executive Officer due to the nature of a particular ISD-system design.

6. PRELIMINARY SYSTEM EVALUATION AND INSPECTION

6.1 Evaluate Required Documentation of the ISD System

Review the documentation of the ISD system provided by the manufacturer. Evaluate whether or not the documentation conforms to the requirements in CP-201 and is sufficiently clear and complete to facilitate proper and necessary installation, operation, maintenance, calibration, certification testing, and periodic performance testing of the system.

6.2 Verify Standardization of the System Interface

Verify that the ISD system interface is as required by CP-201 by connecting to the system and accessing ISD information with a computer and communications software not provided by the ISD system manufacturer.

6.3 Evaluate Required Uptime Recording and Operational History of the ISD System

Verify that the ISD records the percentage of uptime (i.e. hours and minutes elapsed while the system was fully operational) each day. Examine the record of daily up-time from the operational test period of at least 180 days. Verify that the recorded average daily up-time is 95 percent (95%) or more as required by CP-201.

6.4 Evaluate Required Recorded ISD System Reports

Verify that the ISD system generates and stores reports as required by CP-201. Review available reports and data generated during the operational test period. Note the acceptability or unacceptability of the format of stored reports and whether or not the incidence of alarms and malfunctions and the

UST system pressures seem atypical of plausible GDF vapor recovery system operations. An unusual history of UST pressure behavior, or other abnormalities may signal possible problems with the ISD system. Any abnormalities in reported data noted should be investigated as the Executive Officer may deem appropriate.

6.5 Evaluate Tampering Protection

Review those provisions of the system which prevent tampering with the system, i.e. enclosures around sensors, digital components, electrical connections, appropriate locks or seals, circuit integrity checks and alarm systems as necessary, password protection of program and data files, etc. Consider realistic scenarios and situations, common practice, historical events, cost/benefit factors, the need for access by maintenance and test personnel, etc., as deemed appropriate by the Executive Officer. Assess the adequacy of the system to resist various types of tampering including vandalism.

7. DETERMINATION OF ISD SYSTEM MEASUREMENT ACCURACY AND PRECISION

7.1 General Considerations

The procedures set out below for determination of precision and accuracy make certain assumptions regarding the physical arrangement and nature of the ISD system's sensors which may be incompatible with some future ISD system designs. If the Executive Officer finds that the methods below are inappropriate based on representations of the system manufacturer or examination of a system proposed for certification, the Executive Officer may require the system manufacturer to submit, and may approve and use, alternate procedures appropriate to the specific system design proposed for certification.

7.2 A/L Ratio Measurement (Assist Systems Only)

Perform at least 15 A/L tests using TP-201.5 on each gasoline nozzle.

Calculate, as specified in the "Statistical Calculations" section 8. below, the positive and negative errors which have a five percent (5%) and a one percent (1%) chance of occurrence in any group of measurements upon which the ISD system bases generation of alarms or actions.

7.3 Vapor Flow Performance Measurement (Balance Systems Only)

Install equipment for measurement of vapor return line flow as specified in TP-201.2 (refer to figures 9 and 10 of TP-201.2, Efficiency and Emission Factor for Phase II Systems, for equipment arrangement). If multiple nozzles are served by the same ISD system sensor, install similar equipment to simultaneously measure vapor flow from each nozzle served by the ISD system sensor. Insulate or shade test equipment to prevent unnecessary changes in vapor temperature. Perform all calibrations required by TP-201.2.

Conduct TP-201.4 dynamic back pressure testing at the ISD test site's fueling points at 60 CFH of nitrogen and 80 CFH of nitrogen. The fueling point must pass the TP-201.4 test criteria before testing continues. If the fueling point fails to meet this requirement solely because of flow resistance in the test equipment and the Executive Officer determines that vapor collection performance will not be affected by the measured back pressures then the Executive Officer may waive this requirement.

Record volume flow continuously for at least 24 hours on nozzles served by the ISD system sensor.

Repeat for each ISD system sensor.

Calculate, as specified in the “Statistical Calculations” section 8. below, the positive and negative errors which have a five percent (5%) and a one percent (1%) chance of occurrence in any group of measurements upon which the ISD system bases generation of alarms or actions.

7.4 UST Pressure Measurement (Phase I and II Operations)

Install a reference pressure sensor conforming to the specifications of TP-201.7, Continuous Pressure Monitoring, and compatible with a data acquisition system at the same elevation and location as the ISD system’s sensor to ensure that no bias due to vapor density will affect comparison of measurements by the two sensors. Record pressure indicated by the reference sensor at 1-minute intervals for a period of at least one (1) week or a longer interval determined by the Executive Officer to be appropriate and until at least three (3) Phase I deliveries have occurred. Compare measured pressures to those measured by the ISD system.

Calculate, as specified in the “Statistical Calculations” section 8. below, the positive and negative errors which have a five percent (5%) and a one percent (1%) chance of occurrence in any group of measurements upon which the ISD system bases generation of alarms or actions.

7.5 Leak Rate Measurement

Conduct a series of TP-201.3, Determination of 2-Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities, leak decay tests at the ISD test site, including at least three (3) runs each day on four (4) days, scheduling test days so the ISD system will calculate at least one weekly average leak rate between each pair of successive test days. Compare leak rate predicted from this testing to the weekly average leak rate determined by the system.

Calculate, as specified in the "Statistical Calculations" section 8. below, the positive and negative errors which have a five percent (5%) and a one percent (1%) chance of occurrence in any group of measurements upon which the ISD system bases generation of alarms or actions.

7.6 Central Vacuum System Measurements

Install a reference pressure/vacuum sensor conforming to the specifications of TP-201.7 and compatible with a data acquisition system at the same elevation and location as the ISD system's vacuum sensor to ensure that no bias due to vapor density will affect comparison of measurements by the two sensors. Record pressure indicated by the reference sensor at one-minute intervals for a period of at least one week or a longer interval determined by the Executive Officer to be appropriate. Compare measured vacuum values to those measured by the ISD system.

Calculate, as specified in the "Statistical Calculations" section 8. below, the positive and negative errors which have a five percent (5%) and a one percent (1%) chance of occurrence in any group of measurements upon which the ISD system bases generation of alarms or actions.

7.7 Vapor Processor Measurements

Test procedures for evaluation of precision and accuracy of ISD systems for use with vapor recovery systems incorporating a vapor processor shall be consistent with the arrangement of the ISD system sensors and the requirements imposed on the vapor processor by any applicable executive order and shall compare ISD system measurements to measurements made using procedures, measurement systems and sensors consistent with the specifications of other CARB certification and test procedures for gasoline vapor recovery systems where applicable. Such test procedures may be established in certification testing and made part of any applicable executive order as the Executive Officer determines to be reasonable and necessary. *NOTE: The nature of the tests required will depend on the nature of the interface between the ISD system and the vapor processor. If the interface*

between the vapor processor and the ISD system is entirely digital no testing is required.

8. STATISTICAL CALCULATIONS

8.1 Calculation of Error and Normalized Error

Calculate the error and normalized error relative to the reference system of each measurement by the ISD system as follows:

$$e = V_{ISD} - V_{REF}$$

$$e_{norm} = (V_{ISD} - V_{REF})/V_{REF}$$

where

- e = error of ISD system measurement relative to reference system measurement for any pair of simultaneous measurements of the same parameter
- e_{norm} = normalized error of ISD system measurement relative to reference system measurement for any pair of simultaneous measurements of the same parameter
- V_{ISD} = value of parameter measured by ISD system
- V_{REF} = value of parameter measured by reference system

Rejection of outlier values is permissible, subject to approval of the Executive Officer, if the values are found to be physically implausible, attributable to known interfering causes, or otherwise non-representative.

8.2 Mathematical Characterization of Error Distributions

Calculate the average values of e and of e_{norm} using the following equation:

$$x_{avg} = \Sigma x_i/n$$

where Σ signifies summation of all individual values in the data set and

- x_{avg} = the average, i.e. e_{avg} or $e_{norm\ avg}$
- x_i = corresponding individual values of e or e_{norm}
- n = number of values in the data set

Calculate the sample standard deviation of e and of e_{norm} using the following equation:

$$s = (\Sigma(x_i - x_{avg})^2 / (n-1))^{1/2}$$

where Σ signifies summation of all individual values in the data set and

- s = the standard deviation (s_e or $s_{e\text{-}norm}$)

x_i = corresponding individual values of e or e_{norm}
x_{avg} = corresponding average value (e_{avg} or $e_{norm\ avg}$)
n = number of values in the data set

The calculation of averages and standard deviations for data from A/L fuelings and Vapor Collection Performance fuelings may be weighted according to gallons dispensed subject to approval by the Executive Officer.

If $s_{e\text{-}norm}$ is less than s_e/e_{avg} then $s_{e\text{-}norm}$ is a better fit to the data and should be used to calculate the one percent (1%)-probable and five percent (5%)-probable error as described in subsections 8.4 and 8.5 below. Otherwise s_e should be used, again as in subsections 8.4 and 8.5 below.

8.3 Determining the Number of Measurements "n_{ACT}" or "n_{BORD}" Upon which an ISD System Decision Is Based

The number of measurements upon which the ISD bases decisions to generate or not generate an action (i.e., an alarm or a system shut-down) influences the calculation of probable errors below and will depend on the algorithm used by the system, on the prescribed time interval related to the action, and for some actions on typical fueling activity at the facility. Intervals related to various decisions are described in subsections below. Determine the number of measurements n_{ACT} or n_{BORD} upon which each decision will be based considering all pertinent factors including the historical record of activity at the test site. In many cases n_{ACT} and n_{BORD} may be identical, but this will depend on the nature of the decision algorithm. If the Executive Officer finds that activity at the test site is not representative of a typical facility the number of measurements may be based on normal activity at a typical facility.

8.4 Calculation of Five Percent (5%)-Probable Error Magnitude

Calculate the positive (or negative) error of the average of a group of measurements (upon which a required alarm or action is based) which is likely to occur only five percent (5%) of the time (i.e., expected to NOT occur 95% of the time) using the following equation:

$$e_{ACT\text{-}5\%} = 1.645\ n_{ACT}^{-1/2}\ s$$

where
1.645 = constant equal to the z-coordinate for a one-sided 5% outside probability assuming normal distribution
$e_{ACT\text{-}5\%}$ = magnitude of the 5%-probable error of the calculated average of n_{ACT} measurements
n_{ACT} = number of measurements upon which the action is based

s = either s_e or ($s_{e\text{-}norm}\, V_{ACT}$) , as follows. If $s_e / e_{avg} < s_{e\text{-}norm}$ then use s = ($s_{e\text{-}norm}\, V_{ACT}$) where V_{ACT} is the criterion value upon which the decision to act is based. Otherwise, use s = s_e instead.

8.5 Calculation of One-Percent (1%)-Probable Error Magnitude

Calculate the positive (or negative) error of the average of a group of measurements (upon which a required alarm or action is based) which is likely to occur only one percent (1%) of the time (i.e. expected to NOT occur 99% of the time) using the following equation:

$$e_{BORD\text{-}1\%} = 2.326\, n_{BORD}^{-1/2}\, s$$

where

2.326 = constant equal to the z-coordinate for a one-sided 1% outside probability assuming normal distribution

$e_{BORD\text{-}1\%}$ = magnitude of the 1%-probable error of the calculated average of n_{ACT} measurements

n_{BORD} = number of measurements upon which the decision is based

s = either s_e or ($s_{e\text{-}norm}\, V_{BORD}$) , as follows. If $s_e / e_{avg} < s_{e\text{-}norm}$ then use s = ($s_{e\text{-}norm}\, V_{BORD}$) where V_{BORD} is the "borderline" criterion value upon which the decision not to act is based. Otherwise, use s = s_e instead.

8.6 Calculation of Action Criterion Values V_{ACT} and Action Test Values V_T

When alarms or interruption of fueling are required at the indicated Action Criterion Values below in the presence of a five percent (5%)-probable measurement error by the ISD system. The indicated Action Test Values should be induced or simulated for the given interval, and twice the given interval where a shutdown action is required after a previous warning alarm.

The Action Criterion Value V_{ACT} is the first value which should provoke an alarm or action. The Action Test Value V_T is the value which the data acquisition system is expected to see and record five percent (5%) of the time when the system is operating such that V_{ACT} prevails. In testing the ISD system for proper generation of actions and alarms by inducing or simulating Action Criterion conditions the ISD system's data acquisition system must see and record values equal to or averaging V_T .

A/L Gross Failure (Interval = 1 day)

a. V_{ACT} = 1.75*(Upper limit of allowable A/L range); $V_T = V_{ACT} - e_{ACT\text{-}5\%}$
b. V_{ACT} = 0.25*(Lower limit of allowable A/L range); $V_T = V_{ACT} + e_{ACT\text{-}5\%}$

A/L Degradation (Interval = 1 week)
a. V_{ACT} = 1.25*(Upper limit of allowable A/L range); $V_T = V_{ACT} – e_{ACT-5\%}$
b. V_{ACT} = 0.75*(Lower limit of allowable A/L range); $V_T = V_{ACT} + e_{ACT-5\%}$

Reduced Vapor Collection Flow Performance (Interval = 2 days)
V_{ACT} = 0.50*(Volume of Fuel Dispensed); $V_T = V_{ACT} + e_{ACT-5\%}$

Central Vacuum System Failure (Interval = 20 minutes)
V_{ACT} = Lowest Vacuum (highest absolute pressure) in Certified Allowable Range; $V_T = V_{ACT} - e_{ACT-5\%}$ where it is understood that the error will result in a lower measured absolute pressure.

UST Ullage Pressure - Pressure Integrity Failure (Leakage) (Interval = 1 week)
V_{ACT} = pressure consistent with leakage at twice the maximum which would occur if the system passed a TP-201.3 test; $V_T = V_{ACT} - e_{ACT-5\%}$ where $e_{ACT-5\%}$ is calculated based on the average UST ullage pressure during the week.

Vapor Processor Malfunction (Interval = 1 day)
V_{ACT} = will be as recommended by manufacturer and approved by the Executive Officer; $V_T = V_{ACT} - e_{ACT-5\%}$

8.7 Calculation of Borderline Operation Values V_{BORD} and Action Test Values V_{BT}

No alarms or interruption of fueling are permissible at the indicated Borderline Operation Values below in the presence of a one percent (1%)-probable measurement error by the ISD system. The indicated Borderline Operation Values should be induced or simulated for the given interval, and twice the given interval where a shutdown action is required after a previous warning alarm.

The Borderline Operation Value V_{BORD} is the limit of normal operation. The Borderline Test Value V_{BT} is the value which the data acquisition system is expected to see and record one percent (1%) of the time when the system was operating at the limit of normal operation. In testing the ISD system for proper immunity to false alarms by inducing or simulating borderline conditions the ISD system's data acquisition system must see and record values equal to or averaging V_{BT}.

A/L Gross Failure (Interval = 1 day)
a. V_{BORD} = 1.00*(Upper limit of allowable A/L range); $V_{BT} = V_{BORD} + e_{BORD-1\%}$
b. V_{BORD} = 1.00*(Lower limit of allowable A/L range); $V_{BT} = V_{BORD} - e_{BORD-1\%}$

A/L Degradation (Interval = 1 week)
a. V_{BORD} = 1.00*(Upper limit of allowable A/L range); $V_{BT} = V_{BORD} + e_{BORD-1\%}$

b. V_{BORD} = 1.00*(Lower limit of allowable A/L range); $V_{BT} = V_{BORD} - e_{BORD-1\%}$

Reduced Vapor Collection Flow Performance (Interval = 2 days)
V_{BORD} = 1.00*(Volume of Fuel Dispensed); $V_{BT} = V_{BORD} - e_{BORD-1\%}$

Central Vacuum System Failure (Interval = 20 minutes)
V_{BORD} = Lowest Vacuum (highest absolute pressure) in the Normal Operating Range specified by the manufacturer and approved by the executive officer; $V_{BT} = V_{BORD} - e_{BORD-1\%}$ where it is understood that the error will result in a higher measured absolute pressure.

UST Ullage Pressure - Pressure Integrity Failure (Leakage) (Interval = 1 week)
V_{BORD} = pressure consistent with leakage at the maximum which would occur if the system passed a TP-201.3 test; $V_{BT} = V_{BORD} + e_{BORD-1\%}$ where $e_{BORD-1\%}$ is calculated based on the average UST ullage pressure during the week.

Vapor Processor Malfunction (Interval = 1 day)
V_{BORD} = will be as recommended by manufacturer and approved by the Executive Officer; $V_{BT} = V_{BORD} - e_{BORD-1\%}$

9. TESTING PROPER ISD SYSTEM OPERATION INCLUDING GENERATION OF AUTOMATIC ALARMS AND ACTIONS

9.1 General Considerations

As required in CP-201, the ISD system manufacturer shall provide a means for verifying proper operation of the ISD system.

Appropriate methods for such testing may include, depending on the nature of the ISD system and subject to approval of the Executive Officer: (1) temporary substitution of test data files reflecting failure conditions for actual data acquired and recorded by the ISD system; (2) temporary connection of special electrical equipment or components in the system's sensor circuitry to emulate failure conditions; (3) temporary modification or adjustment of the vapor recovery system which causes it to fail in a safe and controlled manner.

Testing by any of these means may require that tampering protections be bypassed, acquired data be flagged as affected by testing activity, or both.

9.2 Appropriateness of Generated Alarms

During certification testing the nature of the alarms generated by the system shall be considered and approved. Alarms which disrupt operations by virtue of being too loud or intrusive may risk being disabled by tampering. Alarms

which are not sufficiently loud or intrusive may not be recognized or acted on by operating personnel. Common practice often calls for both audible and visible alarm indications, and for the ability to silence audible alarms once they have been heard.

9.3 System Startup and Restart

Verify that information indicating a restart is stored by the system as required by CP-201 by inducing or simulating a loss of power to the system.

9.4 Sensor Failure Detection

Verify that the system has the ability to test the integrity of its sensors and that an induced or simulated sensor failure causes an appropriate system response. At a minimum the ISD system should be capable of detecting removal or disconnection of any sensor.

9.5 A/L Gross Failure Response (Assist Systems Only)

This test spans an actual or simulated period of two (2) days for failures below the acceptable A/L range, two (2) days for failures above the acceptable A/L range, and two (2) days for borderline acceptable operation.

Induce or simulate A/L failure conditions and borderline acceptability conditions as follows and verify appropriate system response; Arrange induced or simulated conditions considering the ISD system's timing of daily assessments of A/L ratio acceptability. An alarm is scheduled immediately when any daily assessment shows failure, and interruption of fueling is scheduled immediately when a second consecutive daily assessment shows failure.

At a level 75 percent (75%) above the upper A/L range limit in the presence of a five-percent (5%)-probable negative error in measurement of A/L by the ISD system, and at a level 75 percent (75%) below the lower A/L range limit in the presence of a five-percent (5%)-probable positive error in measurement of A/L by the ISD system, the system should alarm and disable fueling as scheduled. Manual re-enabling of fueling should be successful and events should be properly recorded by the system.

At the lower A/L range limit in the presence of a one-percent (1%)-probable negative error in A/L measurement by the ISD system, and at the upper range limit in the presence of a one-percent (1%)-probable positive error, the system should neither alarm or disable fueling.

9.6 A/L Degradation Response (Assist Systems Only)

This test spans an actual or simulated period of two (2) weeks for failures below the acceptable A/L range, two (2) weeks for failures above the acceptable A/L range, and two (2) weeks for borderline acceptable operation.

Proceed as for the Gross Failure checks above but with A/L 25 percent (25%) outside certified range rather than 75 percent (75%) outside certified range and considering that the assessment interval is one (1) week rather than one (1) day.

9.7 Reduced Vapor Collection Flow Performance (Balance Systems Only)

This test spans an actual or simulated period of two (2) days for failures below the acceptable vapor collection flow performance level and two (2) days for borderline acceptable operation.

Induce or simulate reduced vapor collection flow and borderline acceptability conditions as follows and verify appropriate system response. Arrange induced or simulated conditions considering the ISD system's timing of daily assessments of vapor collection flow performance acceptability. An alarm is scheduled immediately when any daily assessment shows failure, and interruption of fueling is scheduled immediately when a second consecutive daily assessment shows failure.

With vapor collection flow performance 50 percent (50%) below the minimum certified level and a five-percent (5%)-probable positive error in ISD system measurement of vapor collection flow the system should alarm and disable fueling as scheduled. Manual re-enabling of fueling should be successful and events should be properly recorded by the system.

With vapor collection flow performance at the minimum certified level for the vapor recovery system and a one-percent (1%)-probable negative error in measurement of vapor collection flow by the ISD system the system should neither alarm nor disable fueling.

9.8 Central Vacuum System Failure (Systems so equipped only)

This test spans an actual or simulated period of 20 minutes for failures and 20 minutes for borderline acceptable conditions.

Induce or simulate a Central Vacuum Unit failure. The ISD system should alarm and disable fueling after 20 minutes. Manual re-enabling of fueling should be successful and events should be properly recorded by the system.

If detection of failure depends on quantitative measurements made by the ISD system, the Executive Officer shall specify an appropriate definition of borderline operating conditions. When such conditions are induced or

simulated and a one-percent (1%) probable worst-case (positive or negative as applicable) error exists in quantitative measurements made by the ISD system the system should not alarm or interrupt fueling.

9.9 UST Ullage Pressure - Pressure Integrity Failure (Leakage) Response

This test spans an actual or simulated period of two (2) weeks for failures where leakage exceeds the criteria as specified and two (2) weeks for borderline acceptable operation.

Induce or simulate unacceptable and borderline acceptable leakage of the vapor recovery system as described below, or UST ullage pressure behavior indicative of such leakage as the Executive Officer may find appropriate. Arrange induced or simulated conditions considering the ISD system's timing of weekly assessments of leakage based on UST ullage pressure. An alarm is scheduled immediately when any weekly assessment shows failure, and interruption of fueling is scheduled immediately when a second consecutive weekly assessment shows failure.

If leakage occurs at a rate twice the maximum that would occur if the system passed a TP-201.3 test and a five-percent (5%)-probable negative error in measurement of the leak rate is present, the system should alarm and interrupt fueling as scheduled. Manual re-enabling of fueling should be successful and events should be properly recorded by the system.

If leakage occurs at a rate equal to the maximum that would occur if the system passed a TP-201.3 test and a one-percent (1%)-probable positive error in measurement of the leak rate is present, the system should neither alarm nor interrupt fueling.

9.10 Vapor Processor Malfunction Response (Systems So Equipped Only)

This test spans an actual or simulated period of two (2) days for failures where vapor processor malfunction is indicated and two (2) days for borderline acceptable operation (if applicable).

Induce or simulate a vapor processor malfunction. Arrange induced or simulated conditions considering the ISD system's timing of daily assessments of vapor processor function. An alarm is scheduled immediately when any daily assessment shows malfunction, and interruption of fueling is scheduled immediately when a second consecutive daily assessment shows malfunction.

The system should alarm and disable fueling as scheduled when a malfunction is induced or simulated.

If detection of malfunction depends on quantitative measurements made by the ISD system, the Executive Officer shall specify an appropriate definition of borderline failure conditions. When such conditions are induced or simulated and a 5-percent (5%)-probable worst-case (positive or negative as applicable) error exists in quantitative measurements made by the ISD system the system should alarm and interrupt fueling as scheduled.

If detection of malfunction depends on quantitative measurements made by the ISD system, the Executive Officer shall specify an appropriate definition of borderline acceptable operating conditions. When such conditions are induced or simulated and a one-percent (1%)-probable worst-case (positive or negative as applicable) error exists in quantitative measurements made by the ISD system the system should not alarm or interrupt fueling.

10. ALTERNATIVE TEST 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 obtained from the CARB Executive Officer pursuant to CP-201 or CP-206.