APPENDIX 2

ENHANCED VAPOR RECOVERY TECHNOLOGY REVIEW

ISD TEST PROTOCOL

DRAFT ISD PILOT PROGRAM PERFORMANCE AND COST-EFFECTIVENESS PROTOCOL

November 19, 2001

PURPOSE

The purpose of this protocol is to evaluate the technical feasibility of an ISD system's ability to fulfill the CP-201 ISD Appendix requirements.

The ISD system shall be installed at a test site and tested by ARB and/or District staff for a minimum duration of two months, called a Trial Run. The Trial Run results will be used as data for a report describing the performance and cost-effectiveness of the ISD regulations, to be presented to the Board at the Technology Review.

The first time the ISD system detects a vapor recovery system failure, the ISD system assigns a "Warning" status, notifies the operator, but does not prohibit fueling to the affected fueling points. The "Warning" alerts the station operator to a potential failure of the vapor recovery system. If the ISD system assesses a second consecutive identical vapor recovery system failure, the ISD system assigns a "Failure" status, notifies the operator, and prohibits fueling to the affected fueling points. For the purpose of this document, an ISD "Failure" and an ISD "Warning" are used interchangeably.

BACKGROUND: ISD SYSTEM REQUIREMENTS

The ISD system requirements, as described in the CP-201 ISD Appendix, are summarized below. A description of the ISD testing to be conducted follows each ISD requirement. A description of the Challenge-Mode Testing and how to respond to a vapor recovery system failure (as identified by the ISD system) follow in separate sections.

- **Monitor and assess UST ullage pressure data**

  Determine if the ISD system measures and records the UST ullage pressure. Determine if the ISD system differentiates between and manages both UST ullage pressure data collected during phase I deliveries and UST ullage pressure data collected between Phase I deliveries.

  The ISD system should assess UST ullage pressure data with a weekly and a monthly test, as described in the CP-201 ISD Appendix. If either the weekly or monthly UST ullage pressure test fails, the ISD system should: (1) Activate an

alarm; (2) Record the event; (3) Inform the operator; (4) Prohibit dispensing to affected fueling points; (5) Provide the ability to re-enable dispensing; and (6) If re-enabled, record the event.

The ISD system should assess excessive UST pressure during Phase I deliveries, as described in the CP-201 ISD Appendix. If the excessive Phase I UST ullage pressure test fails, the ISD system should: (1) Activate an alarm; (2) Record the event; (3) Inform the operator; (4) Prohibit dispensing to affected fueling points; (5) Provide the ability to re-enable dispensing; and (6) If re-enabled, record the event.

- **Monitor vapor recovery system containment leakage**

The ISD system should detect the potential for excessive rate of vapor leakage, as described in the CP-201 ISD Appendix. If the excessive rate of vapor leakage test fails, the ISD system should: (1) Activate an alarm; (2) Record the event; (3) Inform the operator; (4) Prohibit dispensing to affected fueling points; (5) Provide the ability to re-enable dispensing; and (6) If re-enabled, record the event.

- **Monitor and assess the A/L ratios for vacuum-assist vapor recovery systems**

Determine if the ISD system measures and records the A/L ratio for each fueling point.

Determine if the ISD system assesses each fueling point's A/L with a daily and a weekly test, as described in the CP-201 ISD Appendix. If the A/L daily or weekly tests fails, the ISD system should: (1) Activate an alarm; (2) Record the event; (3) Inform the operator; (4) Prohibit dispensing to affected fueling points; (5) Provide the ability to re-enable dispensing; and (6) If re-enabled, record the event.

However, other monitoring strategies may be used provided the manufacturer demonstrates the alternative strategy is equivalent to the requirements listed in the CP-201 ISD Appendix.

- **Monitor and assess the vapor collection performance for balance vapor recovery systems**

Determine if the ISD system measures and records the vapor collection flow performance for each fueling point.

Determine if the ISD system assesses each fueling point's vapor collection flow performance with a daily test, as described in the CP-201 ISD Appendix. If the vapor collection flow performance test fails, the ISD system should: (1) Activate an alarm; (2) Record the event; (3) Inform the operator; (4) Prohibit dispensing to affected fueling points; (5) Provide the ability to re-enable dispensing; and (6) If re-enabled, record the event.

However, other monitoring strategies may be used provided the manufacturer demonstrates the alternative strategy is equivalent to the requirements listed in the CP-201 ISD Appendix.

- **Data storage requirements: Generate a monthly report listing the daily, weekly and monthly UST ullage pressure and vapor collection assessments**

  Determine if the ISD system can generate a monthly report listing the weekly and monthly UST ullage pressure test results, the daily and weekly ISD A/L test results (for vacuum-assist vapor recovery systems), the daily test results for vapor collection performance (for balance vapor recovery systems), and the number and type of "re-enable dispensing" activities for that month.

- **Data storage requirements**

  Determine if the ISD system records "Failures", as defined by the CP-201 ISD Appendix. Determine if the ISD system can store the most recent 30 days of ISD daily reports and the most recent 24 months of monthly ISD reports, as defined in the CP-201 ISD Appendix. Determine if the ISD system can store the report data despite power loss to the ISD system.

- **Prohibit dispensing from affected fueling points**

  Determine if the ISD system prohibits fueling from affected fueling points after the ISD system assess a "Failure", as defined in the CP-201 ISD Appendix.

- **Provide the ability to re-enable dispensing**

  Determine if the ISD system has the ability to re-enable dispensing to fueling points that were disabled in response to the ISD system's assessment of "Failure". Determine if the ISD system records each "re-enabling" event.

- **Provide an RS232 port to electronically download ISD data**

  Determine if the ISD system has an RS 232 serial port signal access to download ISD system data using standardized software.

- **Provide a means of testing and calibrating the ISD system**

  Determine if the ISD system manufacturer has provided a means of testing and calibrating the ISD system.

- **Be ORVR compatible**

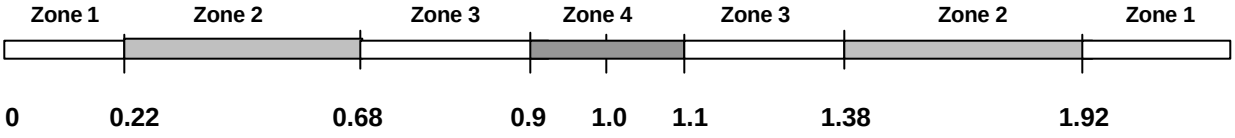
  Determine if the ISD system is ORVR compatible.

1.0 VACUUM-ASSIST TEST

1.1 A/L Ratio

The A/L ratio (as determined by TP-201.5) at a gasoline dispensing facility with a vacuum-assist vapor recovery system that has a nominal A/L ratio of 1.0 +/- 0.1 (0.9 to 1.1) can be in various "zones" as shown below:

A/L Detection Zones



Zone Number	ISD Required Assessment
1	Warning or Failure (on a daily basis)
2	Warning or Failure (on a weekly basis)
3	Warning, Failure, or Pass (the "Non-determinate Zone")
4	Pass

1.2 A/L Ratio Testing

ARB or District staff will conduct TP-201.5 A/L testing at the ISD test site's fueling points. Record the ISD system date and time, fueling point, gasoline dispensed, and A/L ratio in Table 1 below:

Table 1

Fueling Point	ISD System Date/Time	Gasoline Dispensed	TP-201.5 A/L Ratio	ISD System A/L Ratio*

*** ISD A/L ratios will be obtained later.**

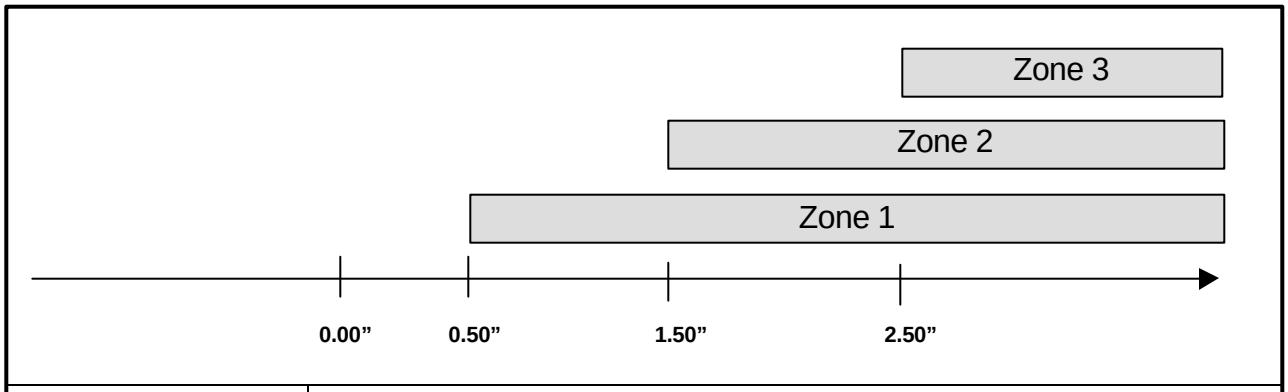
1.3 A/L Ratio Challenge Mode Testing

ARB or District staff will repeat the testing described above in Section 1.2, but will ensure that the fueling point's A/L ratios fall within A/L zones 1, 2, and 4.

1.4 Operating Pressure

The ISD system must measure the UST ullage pressure and perform a weekly and a monthly test using the data (excluding UST ullage pressure during Phase I deliveries). In addition, the ISD system must measure the UST ullage pressure during deliveries, and perform a test using exclusively Phase I delivery ullage pressure data.

Detection Zones for
Ullage Pressure (inches wcg)



Zone Number	ISD Required Assessment
1	Warning or Failure (on a monthly basis)
2	Warning or Failure (on a weekly basis)
3	Warning or Failure (during Phase I Deliveries only)

1.5 Operating Pressure Test

ARB or District staff shall measure the UST ullage pressure with a digital manometer/gauge that has a range of 0-10" and is accurate to 0.5% of full scale. Record the ISD system date and time, and the pressure measured, in Table 2 below.

Table 2

ISD System Date/Time	UST Ullage Pressure Measured	ISD UST Ullage Pressure*

*** ISD UST ullage pressure will be obtained later.**

1.6 Phase I Delivery Pressure Test

During a Phase I delivery, ARB or District staff shall measure the UST ullage pressure for the entire delivery with a digital manometer/gauge that has a range of 0-10" and is accurate to 0.5% of full scale. Record the ISD system date and time, and the pressure measured once per minute during the entire delivery in Table 3 below.

Table 3

ISD System Date/Time	UST Ullage Pressure Measured	ISD UST Ullage Pressure*

*** ISD UST ullage pressure will be obtained later.**

1.7 Vapor Recovery System Leak Rate

ARB or District staff will conduct the TP-201.3 leak decay test at the ISD test site and record the final TP-201.3 pressure and the UST ullage in Table 4 below:

Table 4

ISD System Date/Time	UST Ullage Pressure Measured (inches)	UST Ullage (gallons)	ISD Vapor Recovery System Leak Rate*

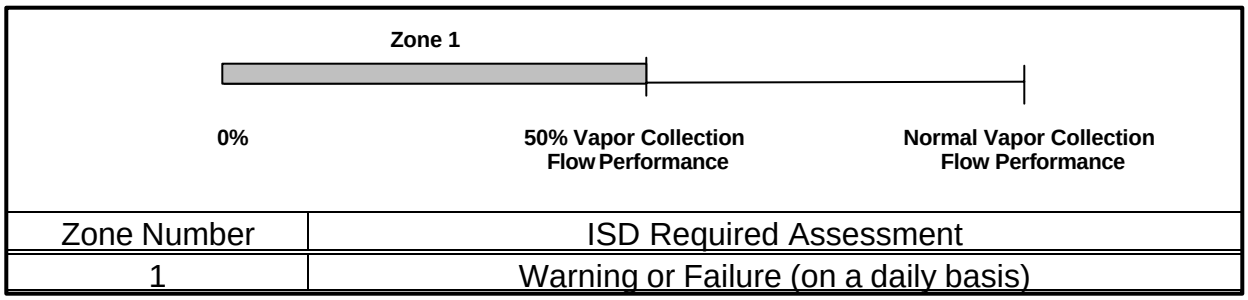
*** ISD vapor recovery system leak rate will be obtained later.**

2.0 BALANCE TEST

2.1 Balance Flow Performance

Balance vapor recovery systems must measure or detect less than 50% vapor collection flow performance as shown below:

Vapor Collection Flow Performance Zone



Zone Number	ISD Required Assessment
1	Warning or Failure (on a daily basis)

2.2 Dynamic Backpressure Test

- ARB or District staff will conduct TP-201.4 Dynamic Backpressure testing at the ISD test site's fueling points at 60 CFH of nitrogen and 80 CFH of nitrogen. Record the dynamic backpressures in Table 5 below.

- Dispense gasoline into a vehicle that is not ORVR equipped. During fueling, ensure the nozzle face seal makes a tight seal with the vehicle fillpipe. Record the ISD System date and time, fueling point, and gasoline dispensed in Table 5 below.

- Replace the nozzle back into the dispenser cradle to complete the fueling event.

- With the hose vapor path drained prior to each fueling event, dispense gasoline into additional vehicles that are not ORVR equipped. During fueling, ensure the nozzle face seal makes a tight seal with the vehicle fillpipe. Replace the nozzle back into the dispenser cradle. Record the ISD System date and time, fueling point, and gasoline dispensed in Table 5 below.

Table 5

Fueling Point	ISD System Date/Time	Dynamic Backpressure (Inches) @ 60 CFH N2	Dynamic Backpressure (Inches) @ 80 CFH N2	Gasoline Dispensed	ISD System Flow Performance*

*** ISD system flow performance will be obtained later.**

2.3 Dynamic Backpressure Challenge Test

- ARB or District staff will conduct TP-201.4 Dynamic Backpressure testing at the ISD test site's fueling points at 60 CFH of nitrogen and 80 CFH of nitrogen. Record the dynamic backpressures in Table 5.

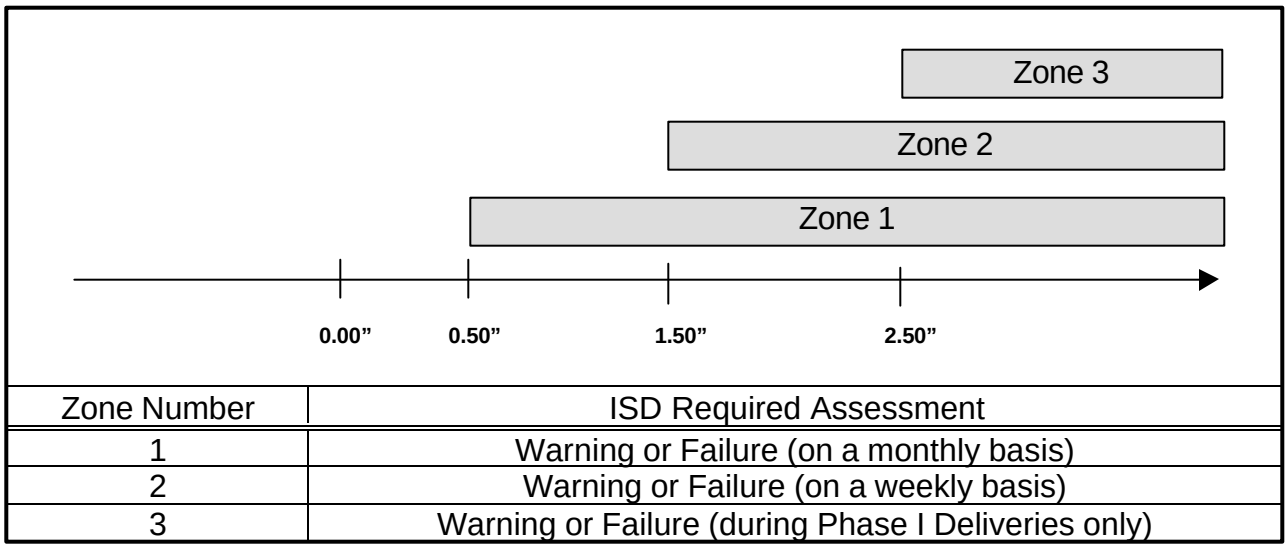
- Dispense gasoline into a vehicle that is not ORVR equipped. During fueling, ensure that less than 50% of the normal vapor flow is collected. Record the ISD system date and time, fueling point, and gasoline dispensed in Table 5.

- Hang the nozzle back into the dispenser cradle to complete the fueling event.

2.4 Operating Pressure

The ISD system must measure the UST ullage pressure and perform a weekly and a monthly test using the pressure data (excluding UST ullage pressure during Phase I deliveries). In addition, the ISD system must measure the UST ullage pressure during deliveries, and perform a test using the delivery ullage pressure data.

Detection Zones for
Ullage Pressure (inches wcg)



Zone Number	ISD Required Assessment
1	Warning or Failure (on a monthly basis)
2	Warning or Failure (on a weekly basis)
3	Warning or Failure (during Phase I Deliveries only)

2.5 Operating Pressure Test

ARB or District staff shall measure the UST ullage pressure with a digital manometer/gauge that has a range of 0-10" and is accurate to 0.5% of full scale. Record the ISD system date and time, and the pressure measured in Table 6 below.

Table 6

ISD System Date/Time	UST Ullage Pressure Measured	ISD UST Ullage Pressure*

*** ISD UST ullage pressure will be obtained later.**

2.6 Phase I Delivery Pressure Test

During a Phase I delivery, ARB or District staff shall measure the UST ullage pressure for the entire delivery with a digital manometer/gauge that has a range of 0-10" and is accurate to 0.5% of full scale. Record the ISD system date and time, and the pressure measured once per minute during the entire delivery in Table 7 below.

Table 7

ISD System Date/Time	UST Ullage Pressure Measured	ISD UST Ullage Pressure*

*** ISD UST ullage pressure will be obtained later.**

2.7 Vapor Recovery System Leak Rate

ARB or District staff will conduct the TP-201.3 leak decay test at the ISD test site and record the final TP-201.3 pressure and the UST ullage in Table 8 below:

Table 8

ISD System Date/Time	UST Ullage Pressure Measured (inches)	UST Ullage (gallons)	ISD Vapor Recovery System Leak Rate*

*** ISD vapor recovery system leak rate will be obtained later.**

CENTRAL VACUUM VAPOR RECOVERY SYSTEMS

A procedure to evaluate an ISD system for a central vacuum vapor recovery system must be developed specifically for each vapor recovery system based on the system's Executive Orders and operating principles.

PROCESSOR VAPOR RECOVERY SYSTEMS

A procedure to evaluate an ISD system for a processor vapor recovery system must be developed specifically for each vapor recovery system based on the system's Executive Orders and operating principles.

NOVEL VAPOR RECOVERY SYSTEMS

A procedure to evaluate an ISD system for a novel vapor recovery system must be developed specifically for each vapor recovery system based on the system's Executive Orders and operating principles.