State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER G-70-209

Dresser/Wayne WayneVac/Arid Technologies Permeator
ORVR-Compatible Phase II Vapor Recovery System

WHEREAS, the California Air Resources Board (ARB) has established, pursuant to California Health and Safety Code sections 25290.1.2, 39600, 39601 and 41954, certification procedures for systems designed for the control of gasoline vapor emissions during motor vehicle fueling operations (Phase II EVR vapor recovery systems) in its CP-201, ***Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities*** (Certification Procedure) as last amended May 25, 2006, incorporated by reference in title 17, California Code of Regulations, section 94011;

WHEREAS, Dresser/Wayne Incorporated (Dresser/Wayne) requested and was granted certification of the WayneVac Phase II vapor recovery system (WayneVac System) pursuant to the Certification Procedure by Executive Order G-70-153, first issued on November 12, 1993, and by modifications G-70-153-AA through G-70-153-AD issued on July 14,1994, August 1, 1996, August 11, 1997 and April 3, 2000;

WHEREAS, Arid Technologies, Incorporated (Arid) requested certification of the WayneVac System with the Arid Permeator AT-150 tank pressure management system (WayneVac/Permeator System);

WHEREAS, the WayneVac/Permeator System has demonstrated compatibility when fueling vehicles equipped with onboard refueling vapor recovery (ORVR) systems;

WHEREAS, the WayneVac/Permeator System has been evaluated and shown to comply with the applicable requirements in the Certification Procedure;

WHEREAS, the Certification Procedure provides that the ARB Executive Officer shall issue an Executive Order if he or she determines that the vapor recovery system, including modifications, conforms to all of the applicable requirements set forth in the Certification Procedure;

WHEREAS, G-01-032 delegates to the Chief of the Monitoring and Laboratory Division the authority to certify or approve modifications to certified Phase I and Phase II vapor recovery systems for gasoline dispensing facilities (GDF); and

WHEREAS, I, William V. Loscutoff, Chief of the Monitoring and Laboratory Division, find that the WayneVac/Permeator System conforms with all the requirements set forth in the Certification Procedure, and results in a vapor recovery system which is at least 95

percent effective for attended and/or self-service use at gasoline service stations when used in conjunction with a ARB-certified Phase I vapor recovery system.

NOW, THEREFORE, IT IS HEREBY ORDERED that the WayneVac/Permeator System is certified to be at least 95 percent effective in attended and/or self-service mode when used with an ARB-certified Phase I vapor recovery system. Exhibit 1 contains a list of the equipment certified for use with the WayneVac/Permeator System. Exhibit 2 contains installation and performance specifications for the equipment listed in Exhibit 1. Exhibit 3 is a list of required items to consider in conducting TP-201.3 (Determination of 2 inch WC Exhibit Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities), Exhibits 4 and 5 are test procedures for determining tank pressure and air to liquid ratio, respectively. Exhibit 6 is the Warranty for Arid Technologies, Inc. Permeator tank pressure management system.

IT IS FURTHER ORDERED that WayneVac/Permeator System installations shall be limited to a maximum of 24 fueling points. The term fueling point refers to one side of a dispenser, regardless of the number of nozzles per side.

IT IS FURTHER ORDERED that compliance with the applicable certification requirements, rules and regulations of the Division of Measurement Standards of the Department of Food and Agriculture, the Office of the State Fire Marshal of the Department of Forestry and Fire Protection, the Division of Occupational Safety and Health of the Department of Industrial Relations and the Division of Water Quality of the State Water Resources Control Board is made a condition of this certification.

IT IS FURTHER ORDERED that the following requirements are made a condition of certification. The owner or operator of the WayneVac/Permeator System shall conduct, and pass, the following tests no later than 60 days after startup and at least once in each twelve month period, using the following test procedures: TP-201.3, ***Determination of 2 Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities*** (March 17, 1999), Exhibit 3, *Required* ***Items in Conducting TP-201.3, (Determination of 2 inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities)***, and Exhibit 5, ***Determination (by Volume Meter) of Air to Liquid Volume Ratio of Vapor Recovery Systems of Dispensing Facilities***. Shorter time periods may be specified in accordance with local district requirements. Notification of testing, and submittal of test results, shall be done in accordance with local district requirements and pursuant to the policies established by that district. Alternative test procedures may be used if determined by the Executive Officer, in writing, to yield comparable results.

IT IS FURTHER ORDERED that the following requirement is made a condition of certification. The owner or operator of the WayneVac/Permeator System shall conduct, and pass, the following test no later than 60 days after startup, using the following test procedure: TP-201.4, ***Dynamic Back Pressure*** (July 3, 2002). Local districts have the authority to allow conducting of Exhibit 5, ***Determination (by Volume Meter) of Air to Liquid Volume Ratio of Vapor Recovery Systems of Dispensing Facilities***, in lieu of

TP-201.4, ***Dynamic Back Pressure*** (July 3, 2002) provided that at least 2 gallons of product are introduced into the system through each dispenser riser prior to conducting the test. Notification of testing, and submittal of test results, shall be done in accordance with local district requirements and pursuant to the policies established by that district.

IT IS FURTHER ORDERED that each vapor pump and the electronic circuitry with which it is to operate shall be matched and performance checked at the factory, including verification that the vapor recovery system performance is within the range specified in the WayneVac System section of Exhibit 2 of this Order. Vapor pumps and electronic components sold separately as replacement parts shall be tested after field installation to verify that the combination results in vapor recovery system performance within the range specified in the WayneVac System section of Exhibit 2 of this Order.

IT IS FURTHER ORDERED that each nozzle approved for use with the WayneVac/Permeator System shall be performance checked at the factory, including checks of the integrity of the vapor path, as specified in Exhibit 2 of this Order.

IT IS FURTHER ORDERED that Dresser/Wayne and ARID shall provide a warranty for the components certified as part of the WayneVac/Permeator system to the initial purchaser. The warranty shall be passed on to each subsequent purchaser within the warranty period. The manufacturer of components listed in Exhibit 1 not manufactured by Dresser/Wayne or ARID shall provide a warranty to each of their components certified herein. The warranty shall include the ongoing compliance with all applicable performance standards and specifications and shall comply with all warranty requirements in Section 9.2 of the Certification Procedure. Dresser/Wayne, ARID or other manufacturers may specify that the warranty is contingent upon the use of trained installers.

IT IS FURTHER ORDERED that the certified Permeator system shall, at a minimum, be installed, operated and maintained in accordance with the ARB approved Installation, Operation and Maintenance Manual for the Arid Permeator System. A copy of this Executive Order and manual should be maintained at each GDF where the Arid Permeator System is installed with a Dresser/Wayne WayneVac System.

IT IS FURTHER ORDERED that any alteration in the equipment, parts, design, installation or operation of the system certified hereby is prohibited and deemed inconsistent with this certification unless the alteration has been submitted in writing and approved in writing by the Executive Officer or Executive order delegate.

IT IS FURTHER ORDERED that equipment defects set forth in the most recently approved ***Vapor Recovery Equipment Defects List*** (Section 94006, Title 17, California Code of Regulations) for the Dresser/Wayne WayneVac System (Executive Order G-70-153 series) are hereby incorporated for this certification.

IT IS FURTHER ORDERED that equipment listed in Exhibit 1, unless exempted, shall be clearly identified by a permanent identification showing the manufacturer's name and model number.

IT IS FURTHER ORDERED that the certification of the WayneVac/Permeator System is valid through March 31, 2009. After this date all vapor recovery systems shall comply with the applicable requirements listed in Table 2-1 of the Certification Procedure.

Executed at Sacramento, California, this 5th day of October 2006.

William V. Loscutoff, Chief
Monitoring and Laboratory Division

Attachments:

Exhibit 1	Equipment List
Exhibit 2	System Specifications
Exhibit 3	Required Items in Conducting TP-201.3, (Determination of 2 inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities)
Exhibit 4	Determination of Pressure in Underground Gasoline Storage Tanks
Exhibit 5	Determination (by Volume Meter) of Air to Liquid Volume Ratio of Vapor Recovery Systems of Dispensing Facilities
Exhibit 6	Arid Technologies, Inc. PERMEATOR Warranty

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Exhibit 1
Equipment List

Component	Manufacturer/Model	State Fire Marshal Identification Number
Tank Pressure Management System		
	Arid Permeator AT-150	004:059:001
	Emco Wheaton A4103-002 Atmospheric Vent	
Nozzles	Catlow ICVN	005:030:014
	Richards AstroVac (Figure 1A-1)	005:031:018
	Emco Wheaton A4505 (Figure 1A-2)	005:007:042
	Husky V34 Model 6250 (Figure 1A-3)	005:021:008
	OPW 12VW (Figure 1A-4)	005:008:059
Inverted Coaxial Hoses	Catlow Vapor Mate*	005:033:005
	Dayco 7282 Superflex 2000*	005:033:005
	Dayco 7292 Superflex 4000*	005:033:006
	Dayco 7246 Flex-Ever Ultimate	005:033:007
	Dayco 7253BVD Flex-Ever Ultimate	005:033:008
	Goodyear Flexsteel	005:036:002
	GT Sales/Hewitt Superflex 2000*	005:033:005
	Thermoid Hi-Vac	005:037:003
	Thermoid Hi-Vac S	005:037:004
	VST VSTaflex	005:052:001
	VST VST-CIS*	005:052:001
	* Hoses assemblies are no longer manufactured, but can still be used.	
Re-Connectable Breakaway Couplings[1]		
	Catlow AV2001	005:030:006
	Catlow AVR200S	005:030:010
	Emco Wheaton A5219-001	005:030:010

[1] If these components are installed or required by regulations of other agencies, only those components and model numbers specified above shall be installed or used.

Component	Manufacturer / Model	State Fire Marshal Identification Number
	Husky 4034	005:021:009
	Husky 5134 (re-connectable w/tool)	005:021:009
	OPW 66CAS	005:008:056
	OPW 66CIP	005:030:010
	Richards VA-50	005:031:007
	Richards VA-50B	005:031:014
Non Re-Connectable Breakaway Couplings[1]		
	Catlow IVC200S	005:030:017
	Richards VA-60 (OPW 66ISU-5100)	005:031:009
	VST-IS-SBK	005:044:008
	VST-H-SBK	005:044:008
Breakaway/Hose Combinations[1]		
	VST-IS-BK	005:044:004
Swivels	OPW 43-IS	005:008:057
	Richards MFVA	005:031:015
	Husky 4605	005:021:016
	Catlow IC3	005:030:018
Breakaway/Swivel Combinations[1]		
	Richards STVA (OPW 66ISB-5100)	005:031:016
Flow Control Units[2]	Catlow I10G-1A	005:030:013
	Healy 1301M	005:027:020
	Healy 1302M	005:027:020
	Husky 5837	005:021:012
	OPW 66FL	005:008:054
	OPW 66FD	005:008:054
	Richards FRVAD	005:031:017
	Vapor Systems Technologies (VST)	005:044:001
Breakaway/Flow Control Unit Combinations[1]		
	OPW 66FLB	005:008:055

[1] If these components are installed or required by regulations of other agencies, only those components and model numbers specified above shall be installed or used.
[2] Flow limiter is mandatory when the flow rate is greater than 10 gallons per minute to comply with US EPA requirement

Component	Manufacturer / Model	State Fire Marshal Identification Number
Pressure/Vacuum Vent Valve	Husky Model 4885	
Vapor Pump	Thomas Industries Model Number: VR-0020/991110 VR-0020R/981014	 005:055:001 005:055:001
Dispensers	Vista Series Dispensers prefix/Vxxxyz/suffix prefix = any number or letter V = V (Vista) x = any digit y = D or P D designates remote dispenser type for delivering fuel P designates suction pump for delivering fuel z = 1, 3, 4, 5, 6, 7 or 8 suffix = D1 or D2, and any combination of number(s) or letter(s) (Vista dispensers with other suffixes must be fitted with a retrofit kit as listed below) WayneVac Retrofit Kits # 918645 series (WayneVac kits) to be used with <u>either</u> # 918643 (tubing kit for non-vapor dispenser) or; # 921095 series (upper tubing kit for converting balanced piped dispensers to ½" vapor tubing) or; # 921124 series (lower tubing kit for converting balanced piped dispensers to vapor tubing) or; # 921137 series (tubing kit for converting non vapor piped dispensers to ½" vapor tubing) KITS SHALL BE USED ONLY WITH: Vista-series dispensers (same as above except no D1/D2 suffix), or Non-Vista dispensers: dxy/a9c-ef d = D (non-Vista) x = D, S, T, L or V y = 1, 2, 3, 4, 5 or 6 a = 3, 4 or 5 c = 0, 5 or 9 e = 1, 2 or 3 f = L or 3	005:019:001

Component	Manufacturer / Model	State Fire Marshal Identification Number
	WayneVac Retrofit x-918726-KIT x = 1 or 2	005:019:003

Table 1

Components Exempt from Identification Requirements

Component Name	Manufacturer	Model Number
Re-connectable Breakaway Coupling	Husky	4034 and 5134
Swivel	Husky	4605
Flow Control Unit	Healy	1301M and 1302M
Flow Control Unit	Husky	5837
Flow Control Unit	VST	Vapor Systems Technologies

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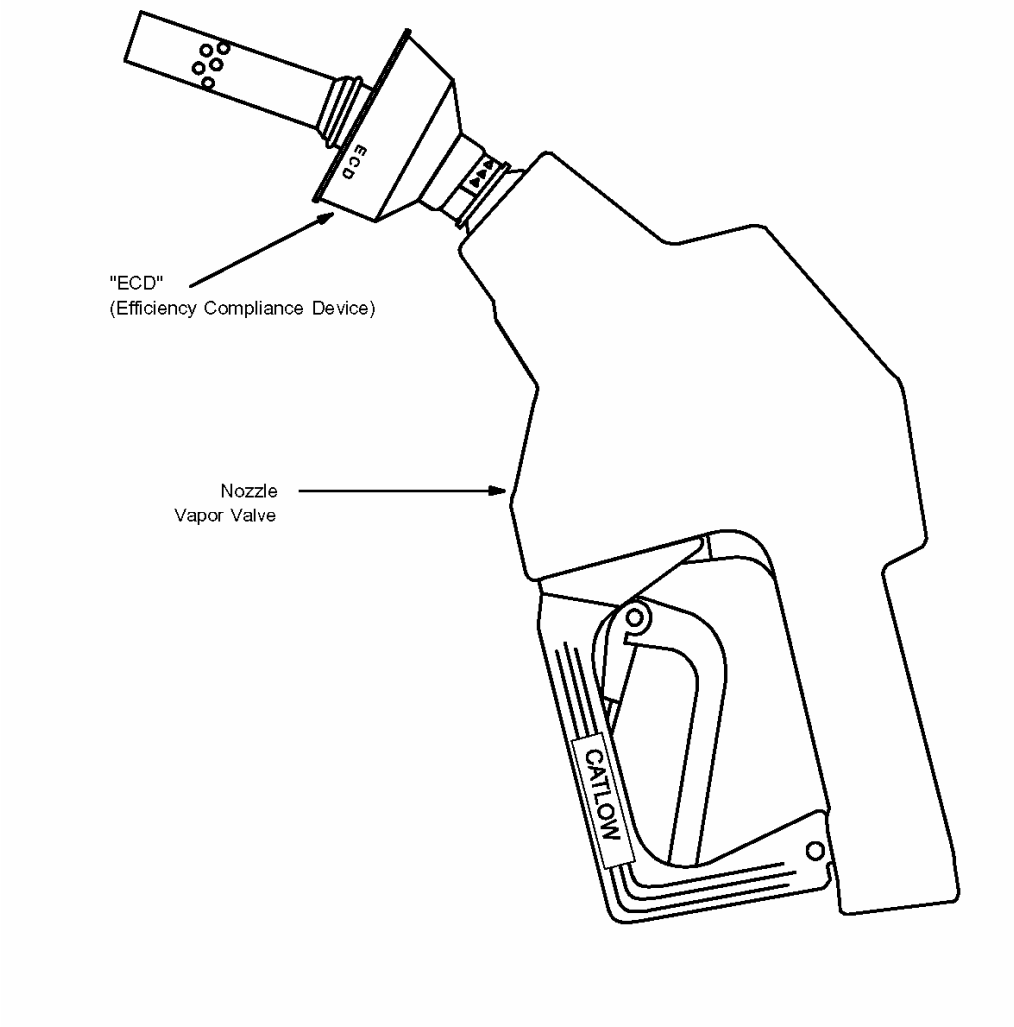
Exhibit 1
Figure 1A-1
Catlow Model ICVN Nozzle
Richards AstroVac Nozzle[3]



[3] The Richards AstroVac nozzle has the word “CATLOW” removed from the handguard

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Exhibit 1
Figure 1A-2
Emco Wheaton Model A4505 Nozzle

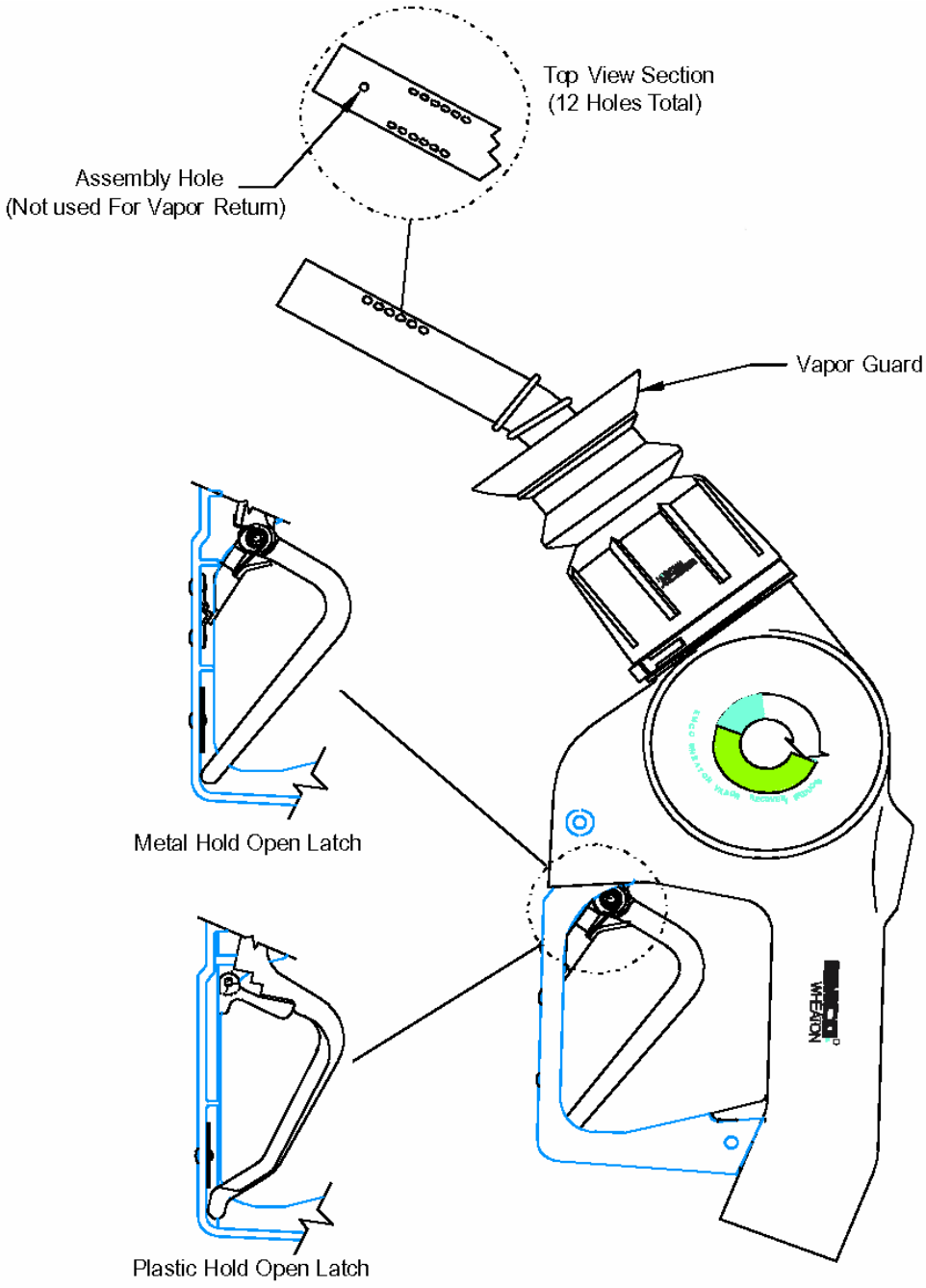

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Exhibit 1
Figure 1A-3
Husky Model V34 6250 Nozzle

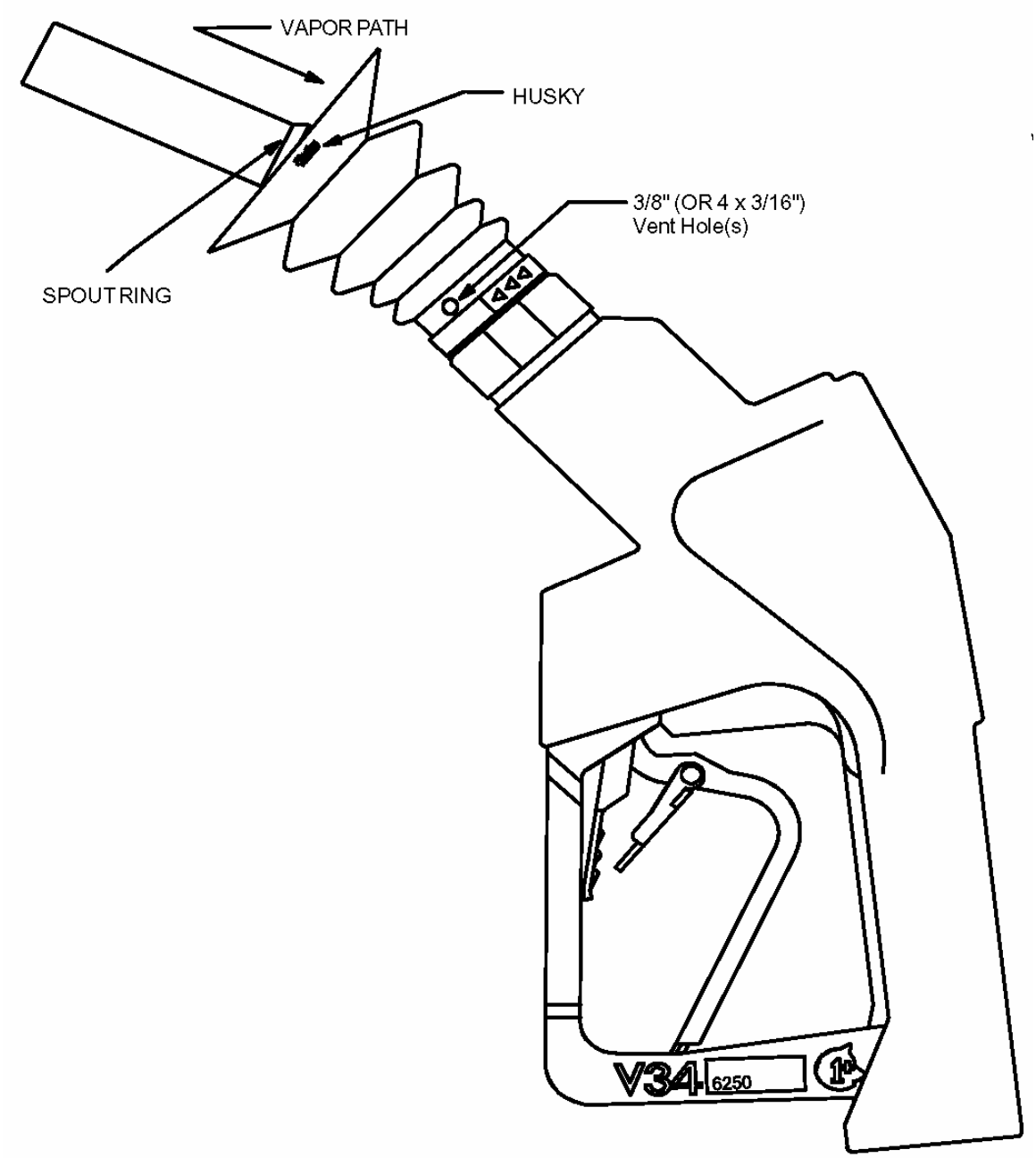

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Exhibit 1
Figure 1A-4
OPW Model 12VW Nozzle

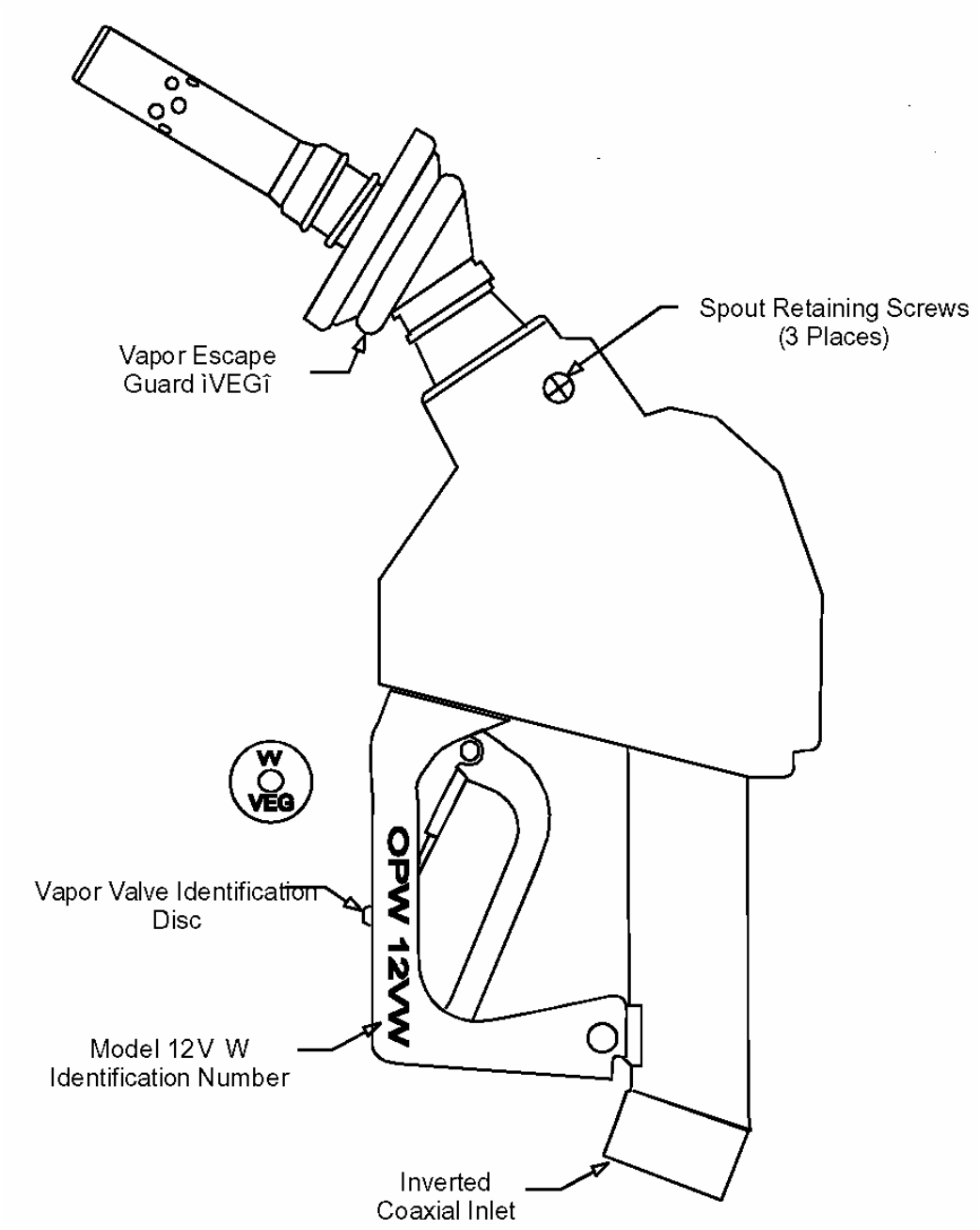

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Exhibit 2
System Specifications

Figures 2A-1 through 2A-10 contains drawings of a typical installation of the WayneVac/Permeator system. Figure 2B depicts the location of component parts of the WayneVac portion of the WayneVac/Permeator system. Figure 2C includes an illustration and instructions for conducting A/L testing with the Husky 6250 nozzle. Figures 2D-1 through 2D-3 contains drawings of typical manifold installation of one, two and three P/V Vent Valve configurations. Figure 2E contains an example of a GDF Maintenance Record.

Permeator AT-150

The Permeator AT-150 tank pressure management system processes vapor to reduce pressure in the underground storage tank (UST). Detection of a positive pressure of $+0.30 \pm 0.06$ inches water column (" wc) causes the processor to actuate. The processor runs for twenty minutes continuously. After twenty minutes, if the UST pressure is below $+0.20 \pm 0.06$, the processor shuts off. If the $+0.20 \pm 0.06$ has not been met, the processor continues to run until the UST pressure is below that limit. If this condition has been met, the processor shuts off.

1. The Permeator constantly logs oil level, processor on/off condition, vacuum level and tank pressure.

2. The Permeator Programmable Logic Controller (PLC, display) constantly monitors PLC battery level and circuit continuity.

3. WayneVac/Permeator installations shall not exceed a maximum of 24 fueling points.

4. The Permeator shall activate when the pressure of the underground storage tank exceeds 0.45 inches WC as determined by Exhibit 4, ***Determination of Pressure of Underground Gasoline Storage Tanks.*** Districts shall specify the frequency of testing.

5. A Permeator that is inoperative for more than 24 consecutive hours is considered a vapor recovery equipment defect which substantially impairs the effectiveness of the vapor recovery system.

6. Except for testing, repairs or maintenance activities, the processor shall be operating at all times.

7. Maintenance requirements for the Permeator system are provided in the Permeator Installation, Operation and Maintenance manual and are summarized in the table below:

Maintenance Interval	Maintenance
5000 hours	Drain and Replace Oil in Vacuum Pump

Nozzles

1. The VaporVac/Permeator system has one vapor pump per fueling point (dispenser side). Different brands of nozzles may be used on the same fueling point.

2. The nozzles shall have an integral vapor valve which prevents the loss of vapor from the underground storage tanks, ensures proper operation of the system and prevents the ingestion of air into the system when another nozzle which is connected to the same vapor pump is used. Any nozzle with a defective vapor valve will substantially impair the effectiveness of the other nozzles associated with the same vapor pump. Therefore, any nozzle with a defective vapor valve, and all nozzles at the same fueling point (dispenser side), shall be immediately removed from service and the vapor path shall be closed as soon as practicable.

3. Nozzles shall be performance checked at the factory, including checks of the integrity of the vapor path. The maximum allowable leak rate for the nozzle, as determined by TP-201.2B, Flow and Pressure Measurement of Vapor Recovery Equipment, shall not exceed the following:

   0.038 CFH at a pressure of two inches water column (2" wc.), and
   0.005 CFH at a vacuum of twenty-seven inches water column (approx. 1 psi).

4. Failure mode testing demonstrated that blockage of some of the vapor collection holes in the spout of the nozzle has negligible effect on the operation of the system until the number of unblocked holes is less than required below. Any nozzle that is found to have fewer than the required number of unobstructed vapor collection holes is defective and shall be immediately removed from service.

Nozzle	Minimum Number of Unblocked Vapor Holes Required
Catlow ICVN (Richards AstroVac)	3
Emco Wheaton A4505	3
Husky V34 6250	N/A*
OPW 12VW	1

* The Husky V34 6250 nozzle uses a solid spout design and does not have any vapor collection holes on the tip of the spout. Gasoline vapors are directed to the base of the spout by the VSG to be collected by the WayneVac/Permeator System.

5. **Catlow ICVN Nozzle (Richards AstroVac).** An Efficiency Compliance Device (ECD) shall be installed on the Catlow ICVN (Richards AstroVac) nozzle at the base of the spout, as shown in **Figure 1A-1**. Any Catlow ICVN (Richards AstroVac) nozzle with an ECD which is missing, or which is damaged with a slit from the base to the rim is defective and shall be immediately removed from service.

6. **Emco Wheaton A4505 Nozzle.** A Vapor Guard (VG) shall be installed on the Emco Wheaton A4505 nozzle at the base of the spout, as shown in **Figure 1A-2**. Any Emco Wheaton A4505 nozzle with a VG which is missing, or which is damaged such that at least one-eighth (1/8) of the circumference is missing, or which has cumulative damage equivalent to at least 1/8 of the circumference missing, is defective and shall be immediately removed from service.

7. **Husky V34 6250 Nozzle.** A Vapor Splash Guard (VSG) shall be installed on the Husky V34 6250 nozzle at the base of the spout, as shown in **Figure 1A-3**. Any Husky V34 6250 nozzle with a VSG which is missing, or which is damaged such that at least a one and one-half (1.5) inch slit has developed, or which has cumulative damage equivalent to at least a 1.5 inch slit, is defective and shall be immediately removed from service. Any Husky V34 6250 nozzle with a VSG which is damaged such that greater than a three-eighths (3/8) inch hole has developed, or which has cumulative damage greater than a 3/8 inch hole, is defective and shall be immediately removed from service.

8. **OPW 12VW Nozzle.** A Vapor Escape Guard (VEG) shall be installed on the OPW 12VW nozzle at the base of the spout, as shown in **Figure 1A-4**. Any OPW 12VW nozzle with a VEG which is missing, or which is damaged such that at least three-quarters (3/4) of the circumference is missing, or which has cumulative damage equivalent to at least 3/4 of the circumference missing, is defective and shall be immediately removed from service.

Air To Liquid Ratio

1. The A/L ratio of the system, measured at a flow rate between six and ten gallons per minute (6.0 – 10.0 gpm), shall be **0.90** to **1.10**. Any fueling point not capable of demonstrating compliance with this performance standard shall be deemed defective and removed from service. The A/L ratio shall be determined by using Exhibit 5, with the shut-off port excluded. Alternative test procedures may be used if they are determined by the Executive Officer, in writing, to yield comparable results. **Figure 2C** includes an illustration and instructions for conducting A/L testing with the Husky V34 6250 nozzle.

Inverted Coaxial Hoses

1. The length of hose which may be in contact with the island and/or ground when the nozzle is properly mounted on the dispenser is limited to six inches (6").

2. The maximum length of the hose shall be fifteen feet (15').

WayneVac System

1. The WayneVac system shall be equipped with electronic safeguards designed to ensure that no fuel is dispensed if the vacuum pump motor fails. Malfunction of the vacuum pump motor is indicated when more than ½ power is applied for over 10 seconds with no rotation detected. This condition shall cause the dispenser computer to recognize and error and shut down the dispenser and display an appropriate error message.

2. The vapor inlet of the WayneVac Thomas Industries vacuum pump includes an inlet filter screen to prevent the ingestion of small particles of debris into the vacuum pump that could cause it to bind. The inlet filter screen is constructed of a stainless steel 40 wire mesh material and may consist of a thumbnail, basket, concave or flat style design.

3. The WayneVac system may include a thermostat unit. The thermostat unit allows the vacuum pump to cycle continuously when the dispenser is not in use. This keeps the vacuum pump from becoming frozen in a cold environment. The thermostat is installed into one of the WayneVac pulser conduits that enters the electronic head through the dispenser vapor barrier or into the splice box on the vacuum pump motor. The temperature at the bottom of the pulser conduit or splice box is approximately ambient temperature. The thermostat wires are connected to a control board jumper connection. When the thermostat closes at around 32°F (0°C), the software activates the vacuum pump moto r to cycle continuously forward and backward. When the temperature goes above freezing, the thermostat opens and the system goes back to normal operation.

Pressure/Vacuum Vent Valves for Storage Tank Vents

1. The P/V vent valve shall be an ARB-certified valve as specified in Exhibit 1.

2. At least one pressure/vacuum (P/V) vent valve shall be installed on each tank vent. Vent lines may be manifold to minimize the number of P/V vent valves and potential leak sources, provided the manifold conforms to all applicable fire regulations. At least one P/V vent valve shall be installed on manifold vents. Figure 2D-1 shows a typical manifold configuration for a single P/V vent valve.

Figure 2D-2 shows a typical manifold configuration for two P/V vent valves. Figure 2D-3 shows a typical manifold configuration for three P/V vent valves.

Vapor Recovery Piping Configurations

1. The maximum allowable pressure drop through the system shall not exceed 0.5" water column at 60 SCFH. The pressure drop shall be measured from the dispenser riser to the UST with the P/V vent valves installed and with the poppeted Phase I vapor connection open, as specified in TP-201.4 (July 3, 2002).

   Note: The A/L test may be used to verify proper operation of the system, in lieu of measuring the pressure drop through the lines, provided that at least two gallons of product are introduced into the system through each dispenser riser.

2. All vapor return lines shall slope a minimum of 1/8 inch per foot. A slope of 1/4 inch or more per foot is recommended wherever feasible.

3. The dispenser shall be connected to the riser with either flexible or rigid materials specified by the manufacturer as acceptable for use with gasoline. The dispenser-to-riser connection shall be installed so that any liquid in the lines will drain toward the storage tank. The internal diameter of the connector, including all fittings, shall not be less than three-fourths inch (3/4").

4. All vapor return and vent piping shall be installed in accordance with the manufacturer's instructions and all applicable regulations.

5. No product shall be dispensed from any fueling point associated with a vapor line that is disconnected and open to the atmosphere. If vapor lines are manifold, this includes all fueling points in the facility.

6. The recommended nominal inside diameter of the underground Phase II plumbing is as indicated in **Figures 2A-1** through **Figures 2A-10**. Smaller vapor lines are not recommended but may be used provided the pressure drop criteria specified above are met. The vapor return lines shall be manifold below grade at the tanks as indicated in the figures.

   Exception: For installations with a vapor return line directly to only one tank, and for which a manifold on the tank vents will be used to provide part of the vapor return path to other tanks, the vent manifold may be used as an alternative to the underground manifold only in existing installations where the vapor piping is already installed, and shall not be used in "new" installations where vapor piping is being installed. For installations with dedicated vapor piping directly to each tank, the vent manifold is approved for both new and existing installations and an additional tank manifold below grade is optional but not required.

Phase I System

1. The Phase I system shall be an ARB-certified system which is in good working order and which demonstrates compliance with the static pressure decay test criteria contained in TP-201.3 (March 17, 1999).

Maintenance Records

1. Each GDF operator/owner shall keep records of maintenance performed at the facility. Such records shall be maintained on site in accordance with district requirements or policies. The records shall include the maintenance or test date, date and time of maintenance call, repair date to correct test failure, maintenance or test performed, affiliation, telephone number and name of individual conducting maintenance or test. An example of a Maintenance Record is shown in Figure 2E.

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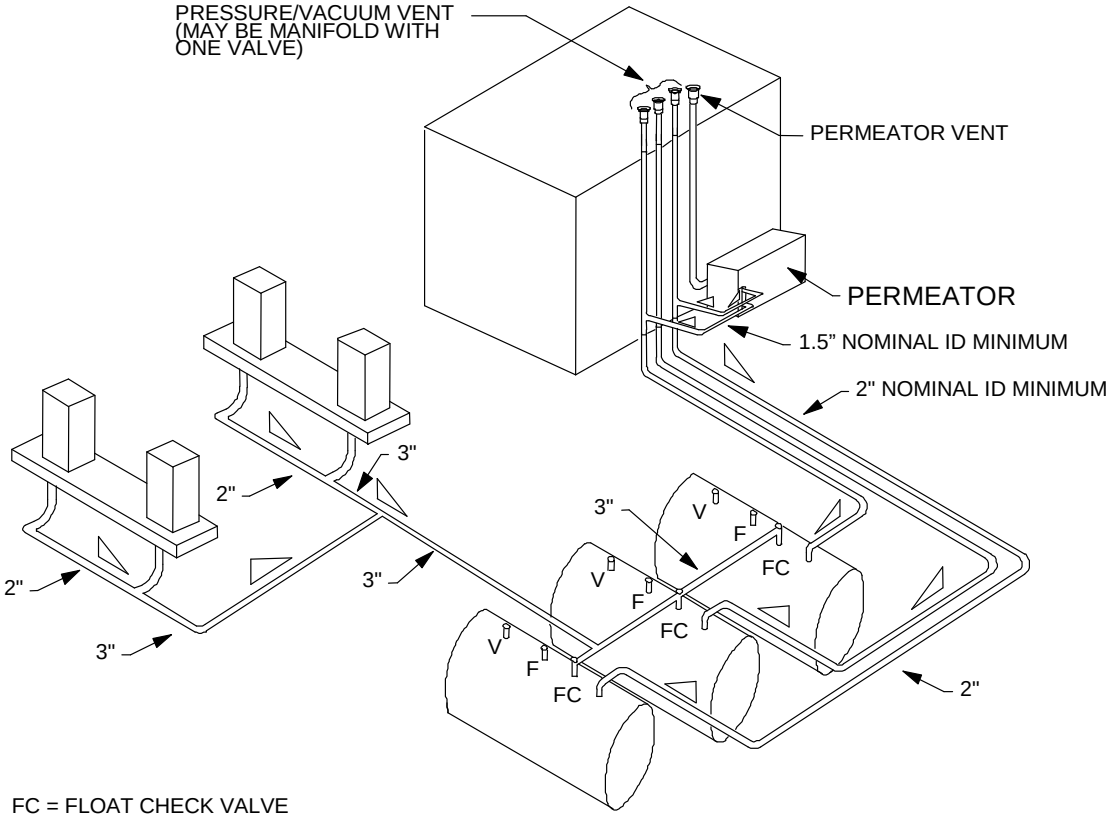
Exhibit 2
Figure 2A-1
Typical Installation of the Arid Permeator
Phase II Tank Pressure Management System
with Typical Phase II Vapor Recovery System



FC = FLOAT CHECK VALVE
F = FILL LINE
V = PHASE I VAPOR RECOVERY

NOTE:
1. ALL VAPOR/VENT LINES ARE 3" NOMINAL ID MINIMUM EXCEPT AS NOTED
2. SLOPE: 1/8" PER FOOT MINIMUM
1/4" PER FOOT PREFERED

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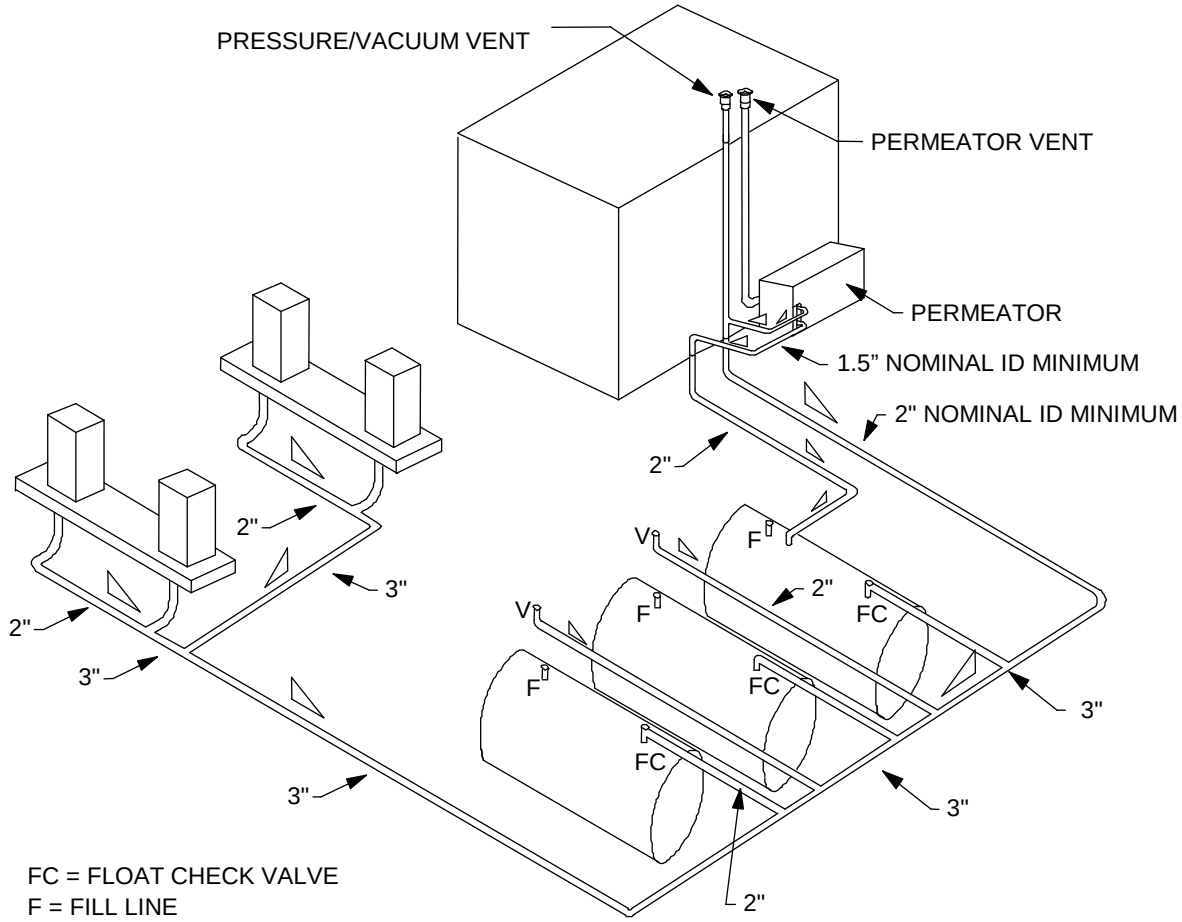
Exhibit 2
Figure 2A-2
Typical Installation of the Arid Permeator
Phase II Tank Pressure Management System
with Typical Phase II Vapor Recovery System



FC = FLOAT CHECK VALVE
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NOTE:
1. ALL VAPOR/VENT LINES ARE 3" NOMINAL ID MINIMUM EXCEPT AS NOTED
2. SLOPE: 1/8" PER FOOT MINIMUM
1/4" PER FOOT PREFERED

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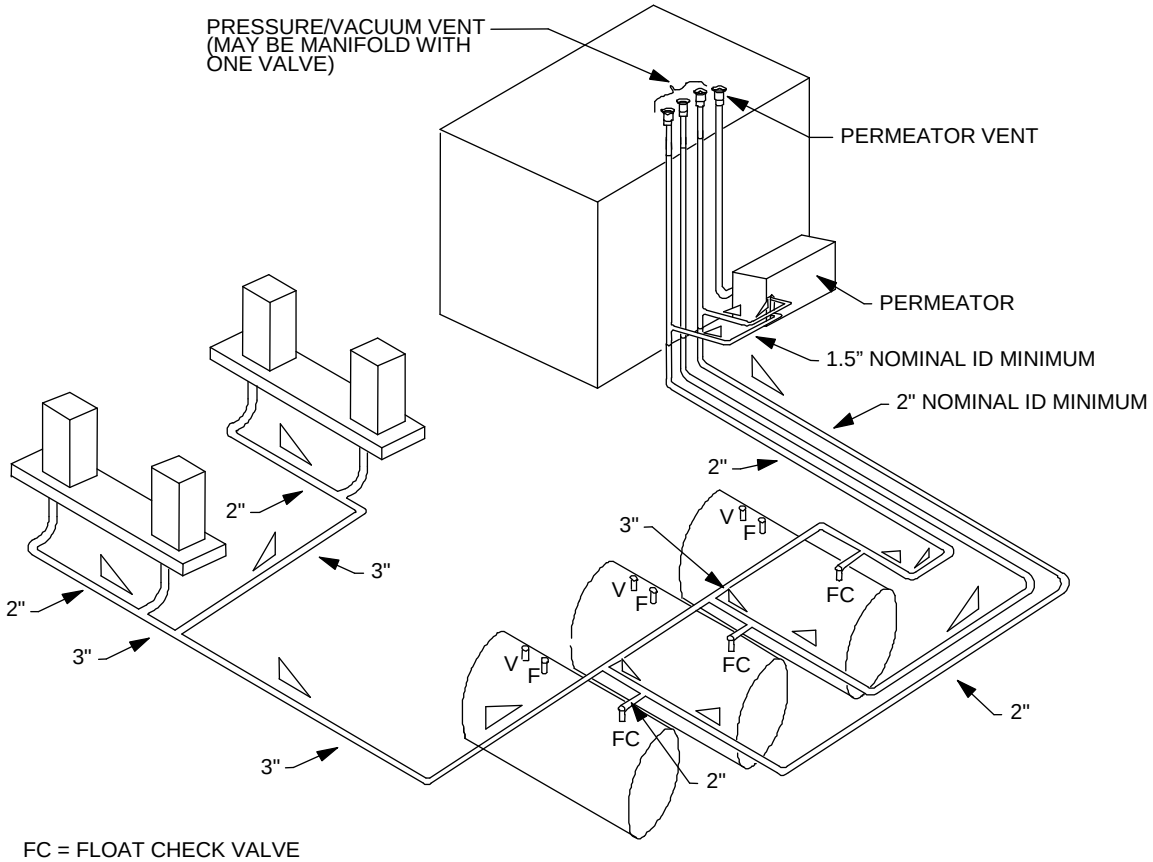
Exhibit 2
Figure 2A-3
Typical Installation of the Arid Permeator
Phase II Tank Pressure Management System
with Typical Phase II Vapor Recovery System

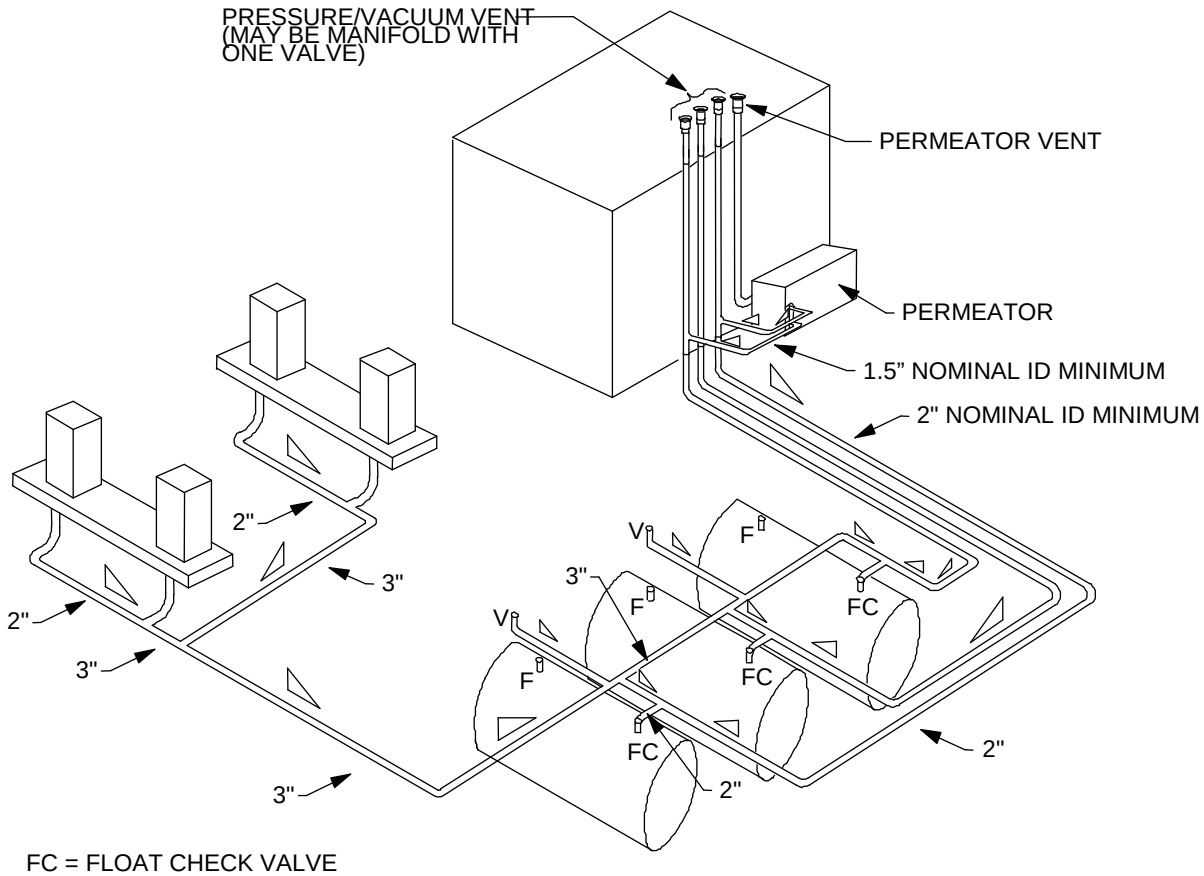


FC = FLOAT CHECK VALVE
F = FILL LINE
V = PHASE I VAPOR RECOVERY

NOTE:
1. ALL VAPOR/VENT LINES ARE 3" NOMINAL ID MINIMUM EXCEPT AS NOTED
2. SLOPE: 1/8" PER FOOT MINIMUM
1/4" PER FOOT PREFERED

Executive Order G-70-209
Dresser-Wayne WayneVac/Arid Permeator
ORVR-Compatible Phase II Vapor Recovery System

Exhibit 2
Figure 2A-4
Typical Installation of the Arid Permeator
Phase II Tank Pressure Management System
with Typical Phase II Vapor Recovery System

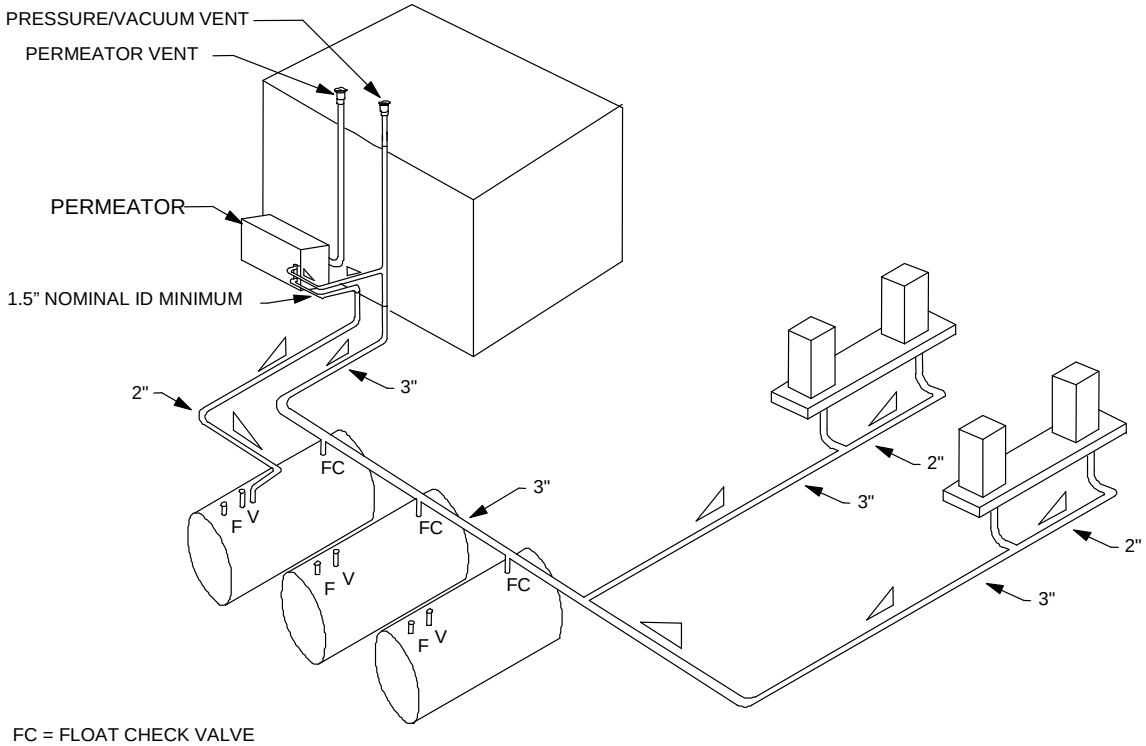


FC = FLOAT CHECK VALVE
F = FILL LINE
V = PHASE I VAPOR RECOVERY

NOTE:
1. ALL VAPOR/VENT LINES ARE 3" NOMINAL ID MINIMUM EXCEPT AS NOTED
2. SLOPE: 1/8" PER FOOT MINIMUM
1/4" PER FOOT PREFERED

Executive Order G-70-209
Dresser-Wayne WayneVac/ARID Permeator
ORVR-Compatible Phase II Vapor Recovery System

Exhibit 2
Figure 2A-5
Typical Installation of the ARID Permeator
Phase II Tank Pressure Management System
with Typical Phase II Vapor Recovery System

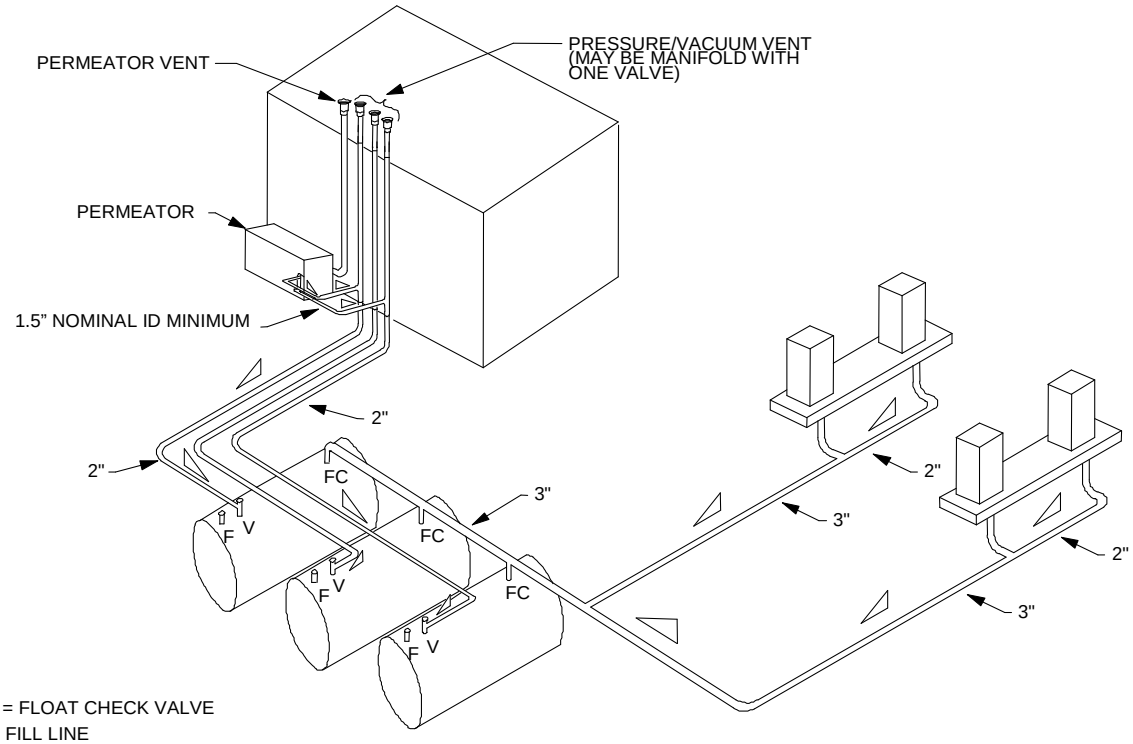


FC = FLOAT CHECK VALVE
F = FILL LINE
V = PHASE I VAPOR RECOVERY

NOTE:
1. ALL VAPOR/VENT LINES ARE 3" NOMINAL ID MINIMUM EXCEPT AS NOTED
2. SLOPE: 1/8" PER FOOT MINIMUM
1/4" PER FOOT PREFERED

Executive Order G-70-209
Dresser-Wayne WayneVac/ARID Permeator
ORVR-Compatible Phase II Vapor Recovery System

Exhibit 2
Figure 2A-6
Typical Installation of the ARID Permeator
Phase II Tank Pressure Management System
with Typical Phase II Vapor Recovery System

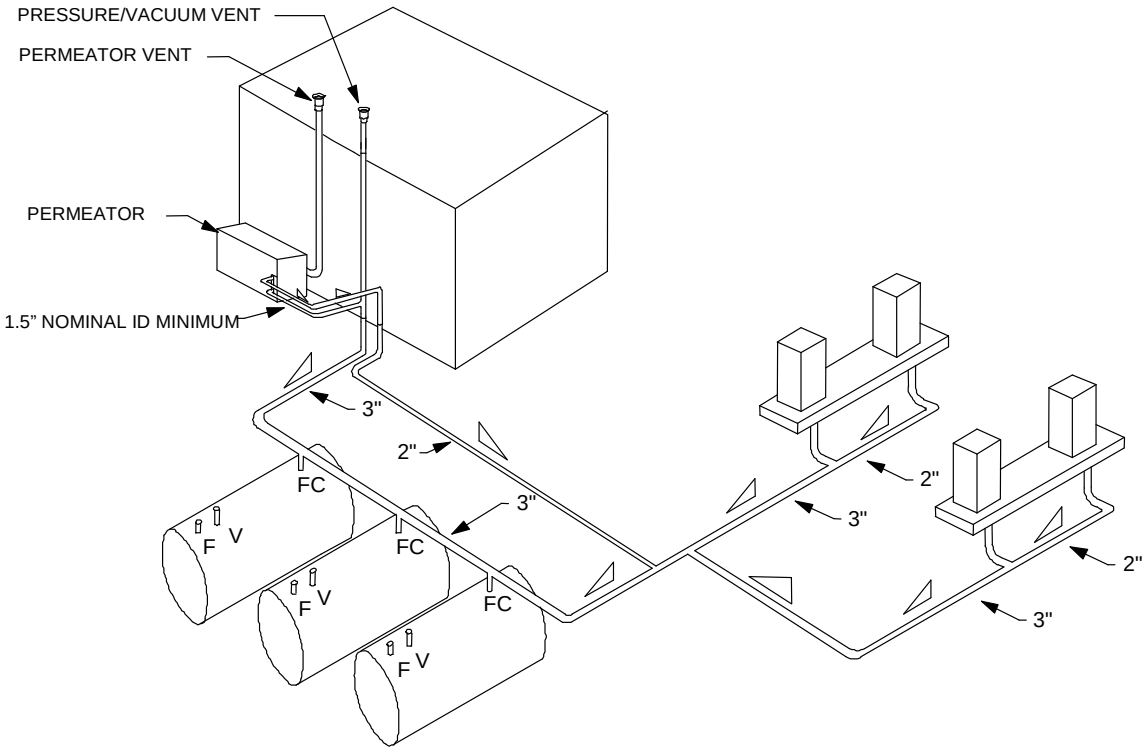


FC = FLOAT CHECK VALVE
F = FILL LINE
V = PHASE I VAPOR RECOVERY

NOTE:
1. ALL VAPOR/VENT LINES ARE 3" NOMINAL ID MINIMUM EXCEPT AS NOTED
2. SLOPE: 1/8" PER FOOT MINIMUM
1/4" PER FOOT PREFERED

Executive Order G-70-209
Dresser-Wayne WayneVac/ARID Permeator
ORVR-Compatible Phase II Vapor Recovery System

Exhibit 2
Figure 2A-7
Typical Installation of the ARID Permeator
Phase II Tank Pressure Management System
with Typical Phase II Vapor Recovery System

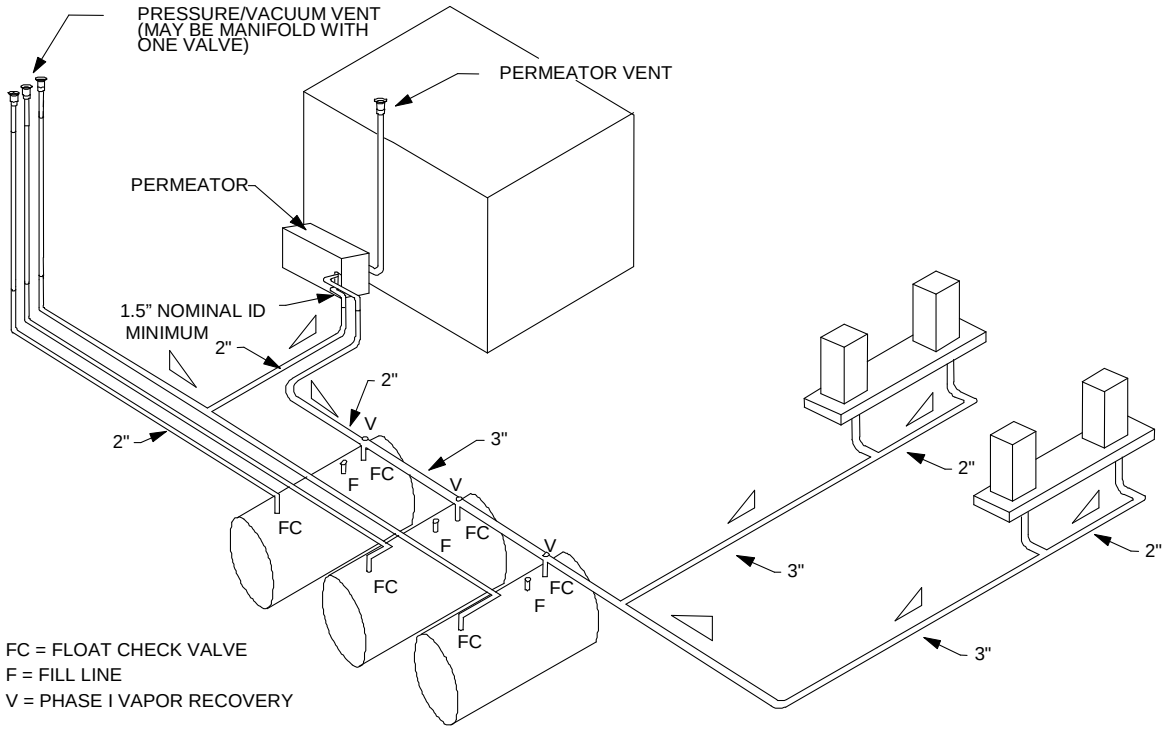


FC = FLOAT CHECK VALVE
F = FILL LINE
V = PHASE I VAPOR RECOVERY

NOTE:
1. ALL VAPOR/VENT LINES ARE 3" NOMINAL ID MINIMUM EXCEPT AS NOTED
2. SLOPE: 1/8" PER FOOT MINIMUM
1/4" PER FOOT PREFERED

Executive Order G-70-209
Dresser-Wayne WayneVac/ARID Permeator
ORVR-Compatible Phase II Vapor Recovery System

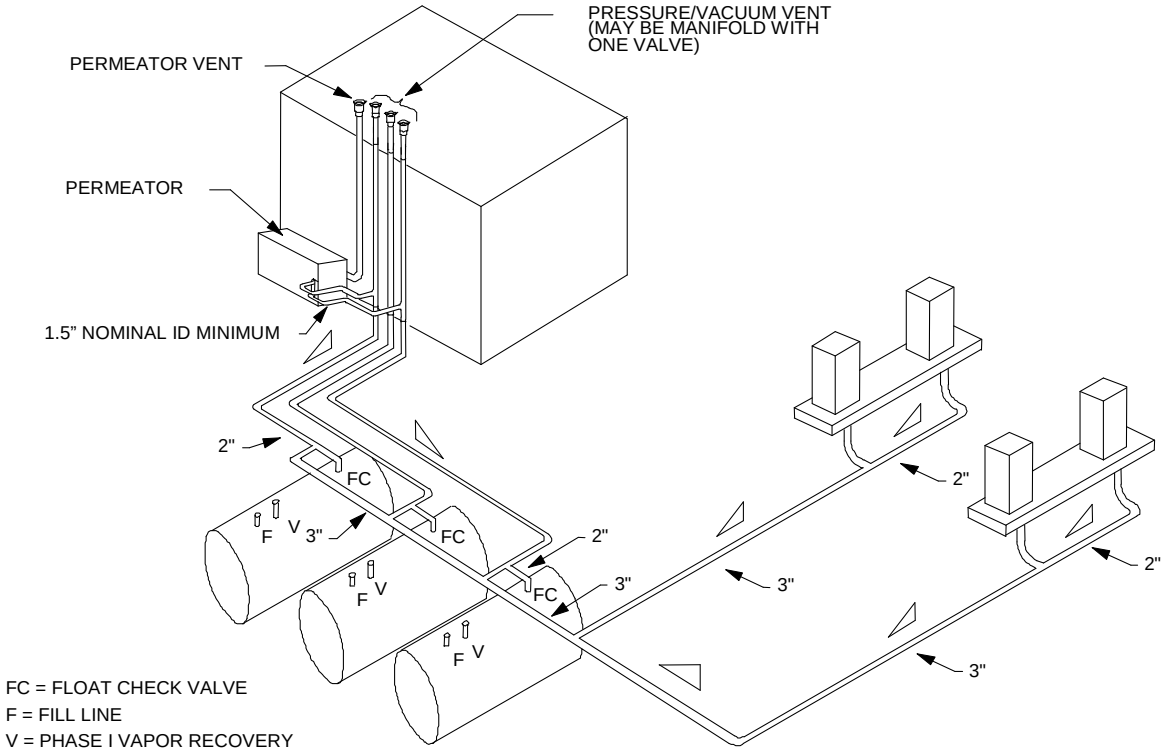
Exhibit 2
Figure 2A-8
Typical Installation of the ARID Permeator
Phase II Tank Pressure Management System
with Typical Phase II Vapor Recovery System



NOTE:
1. ALL VAPOR/VENT LINES ARE 3" NOMINAL ID MINIMUM EXCEPT AS NOTED
2. SLOPE: 1/8" PER FOOT MINIMUM
1/4" PER FOOT PREFERED

Executive Order G-70-209
Dresser-Wayne WayneVac/ARID Permeator
ORVR-Compatible Phase II Vapor Recovery System

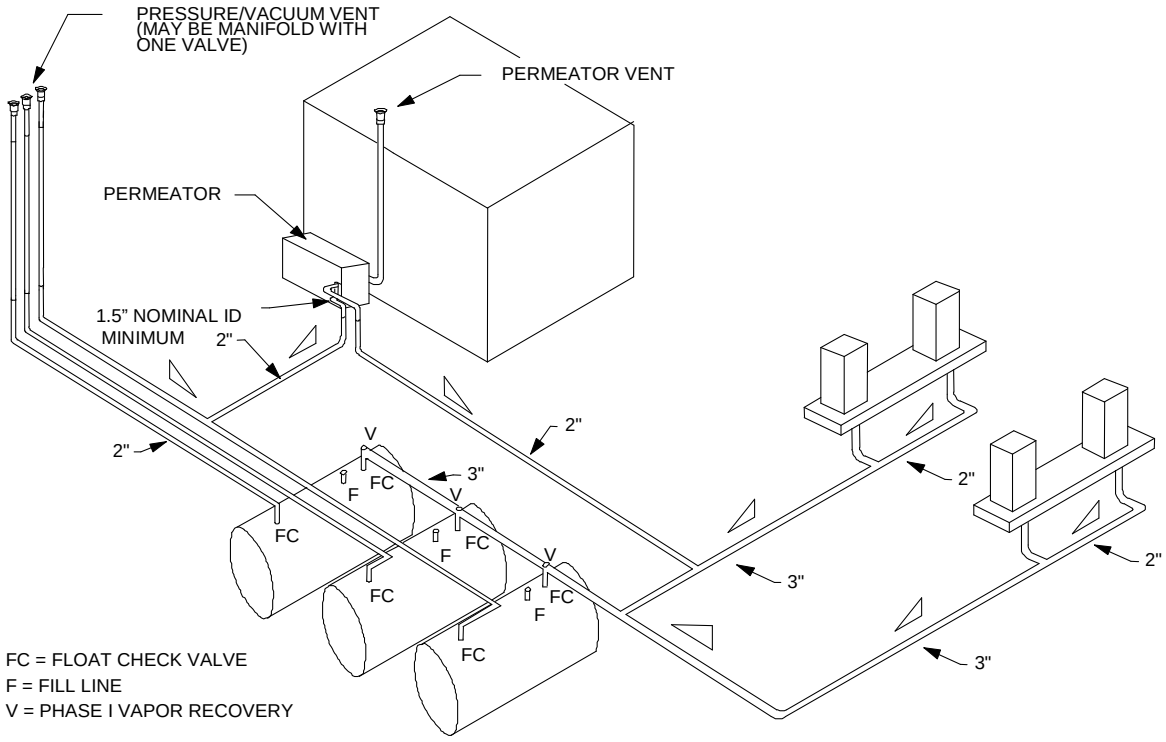
Exhibit 2
Figure 2A-9
Typical Installation of the ARID Permeator
Phase II Tank Pressure Management System
with Typical Phase II Vapor Recovery System



NOTE:
1. ALL VAPOR/VENT LINES ARE 3" NOMINAL ID MINIMUM EXCEPT AS NOTED
2. SLOPE: 1/8" PER FOOT MINIMUM
1/4" PER FOOT PREFERED

Executive Order G-70-209
Dresser-Wayne WayneVac/ARID Permeator
ORVR-Compatible Phase II Vapor Recovery System

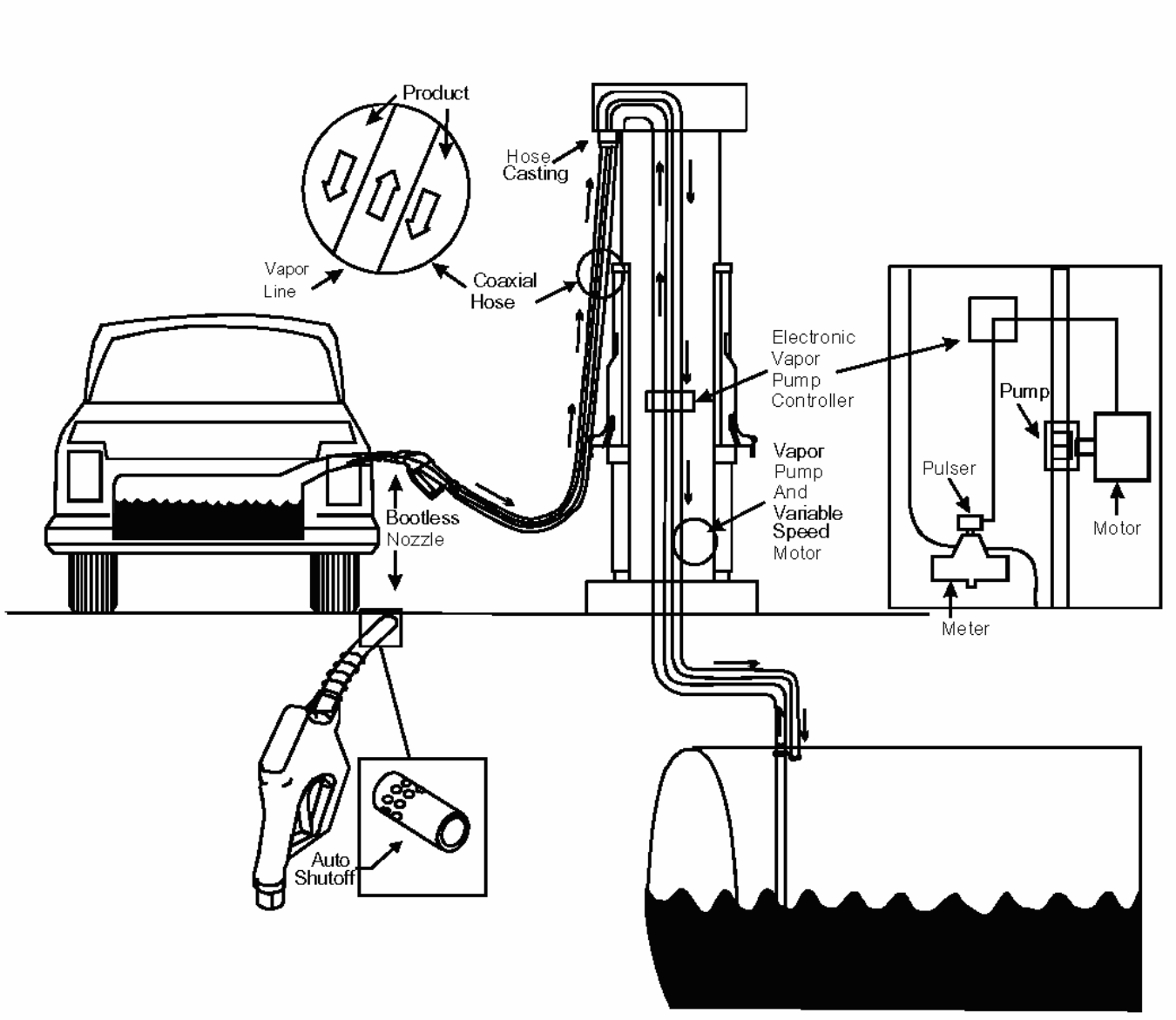
Exhibit 2
Figure 2A-10
Typical Installation of the ARID Permeator
Phase II Tank Pressure Management System
with Typical Phase II Vapor Recovery System



NOTE:
1. ALL VAPOR/VENT LINES ARE 3" NOMINAL ID MINIMUM EXCEPT AS NOTED
2. SLOPE: 1/8" PER FOOT MINIMUM
1/4" PER FOOT PREFERED

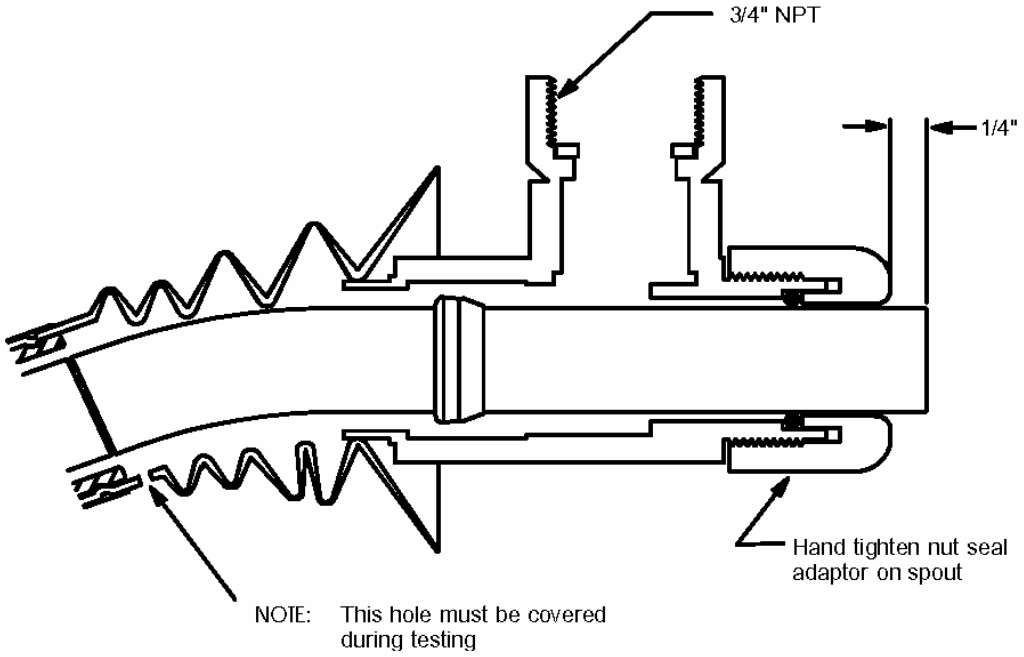
Executive Order G-70-209
Dresser-Wayne WayneVac/ARID Permeator
ORVR-Compatible Phase II Vapor Recovery System

Exhibit 2
Figure 2B
Component Parts of the Dresser-Wayne WayneVac System



Executive Order G-70-209
Dresser-Wayne WayneVac/ARID Permeator
ORVR-Compatible Phase II Vapor Recovery System

Exhibit 2
Figure 2C
Installation of the A/L Adaptor on Husky 6250 Nozzle



Instructions for use of the 6250 A/L Adaptor

1) Inspect the Vapor Splash Guard (VSG) and spout for damage. Any tears or extra holes in the VSG will reduce the accuracy of the test.

2) Slide the A/L adaptor over the spout such that 1/4" of the spout is exposed past the nut.

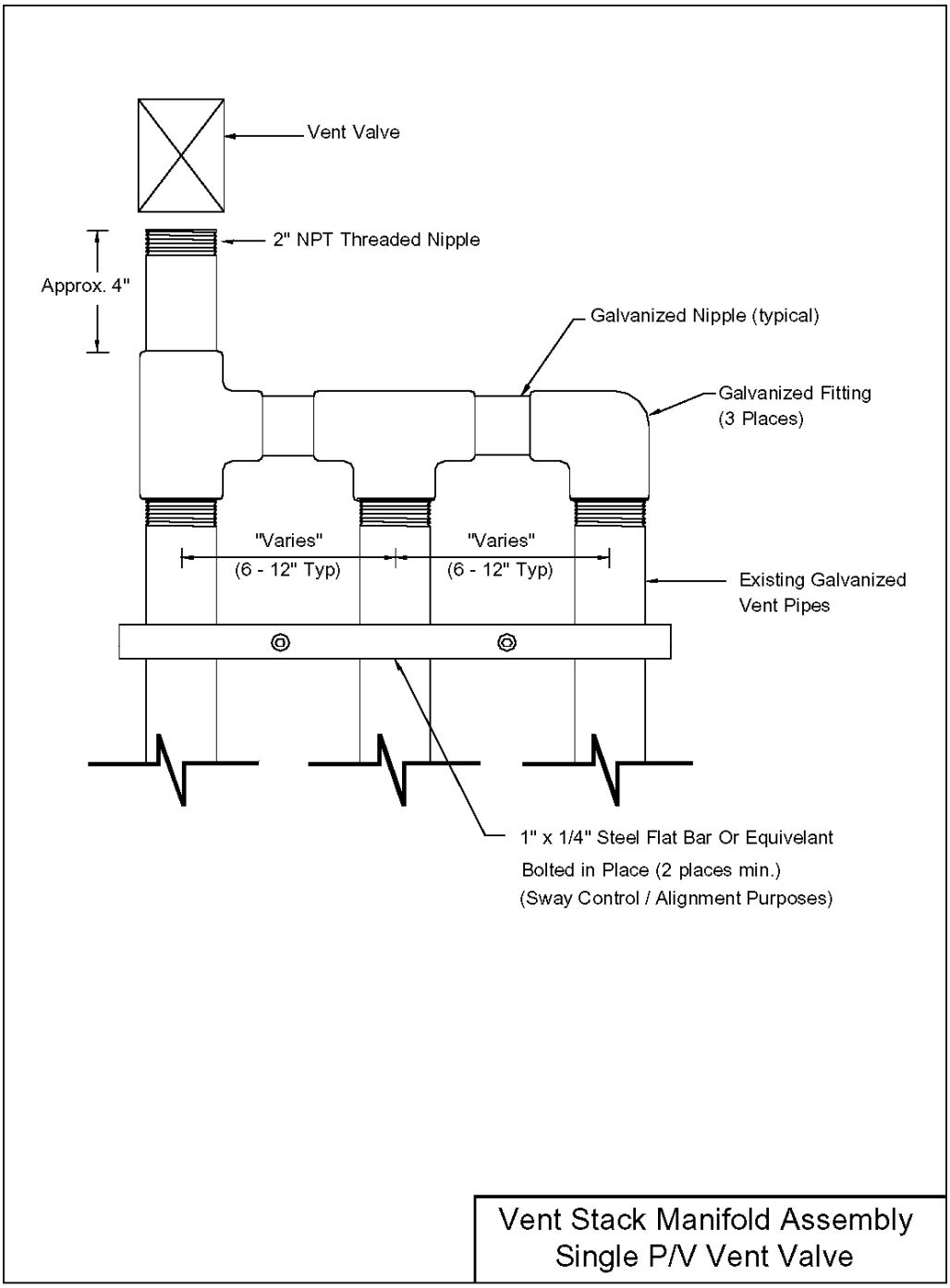
3) Hand tighten the nut. This will seal the A/L adaptor to the spout.

4) Pull the VSG up over the smallest step on the A/L adaptor. This will seal the VSG to the adaptor.

5) Using a piece of tape, seal the 1/8" hole in the cuff of the VSG.

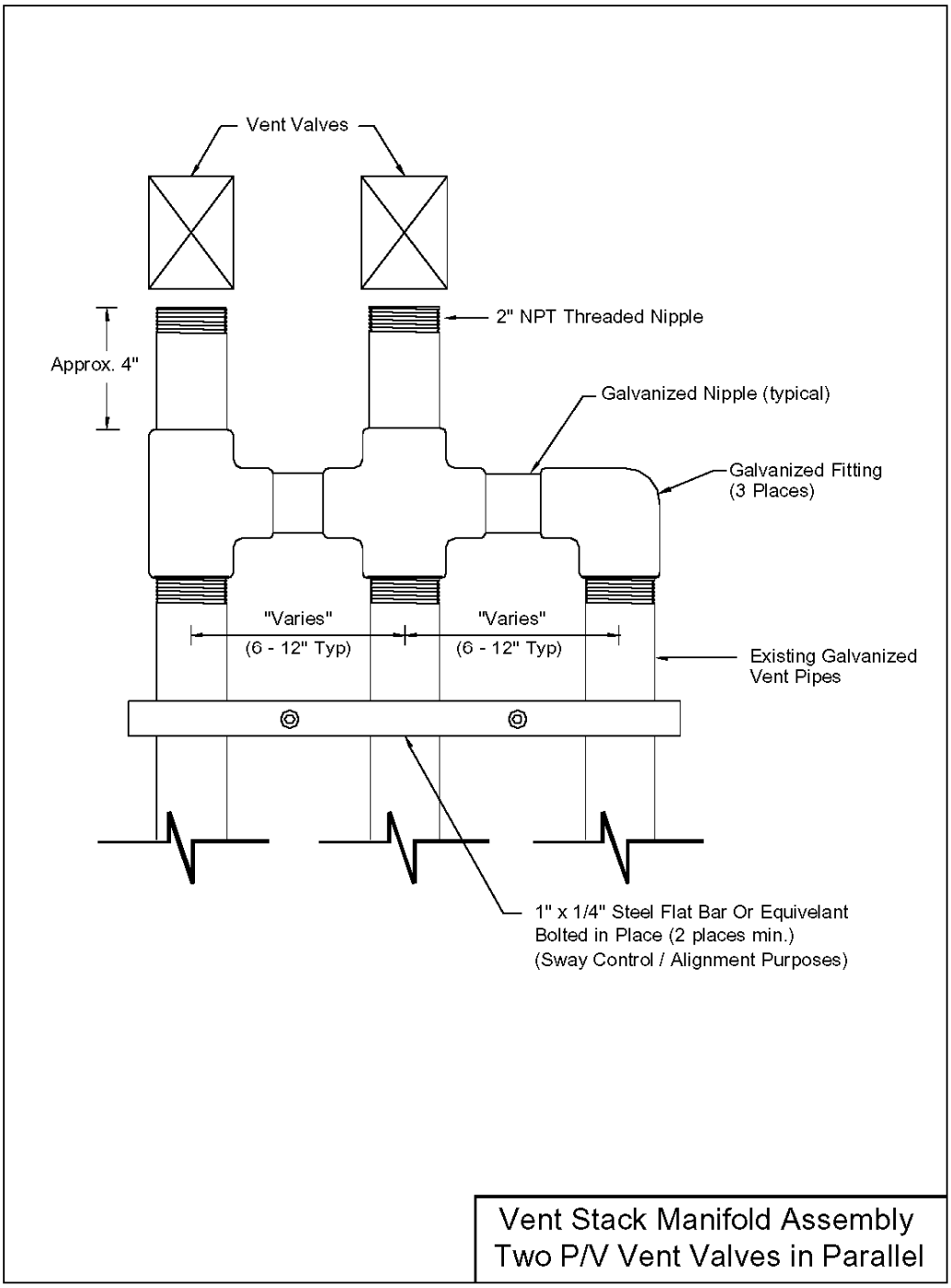
Executive Order G-70-209
Dresser-Wayne WayneVac/ARID Permeator
ORVR-Compatible Phase II Vapor Recovery System

Exhibit 2
Figure 2D-1
Typical Installation of a Single P/V Vent Valve Manifold



Executive Order G-70-209
Dresser-Wayne WayneVac/ARID Permeator
ORVR-Compatible Phase II Vapor Recovery System

Exhibit 2
Figure 2D-2
Typical Installation of a Two P/V Vent Valve Parallel Manifold



Executive Order G-70-209
Dresser-Wayne WayneVac/ARID Permeator
ORVR-Compatible Phase II Vapor Recovery System

Exhibit 2
Figure 2D-3
Typical Installation of a Three P/V Vent Valve Parallel Manifold

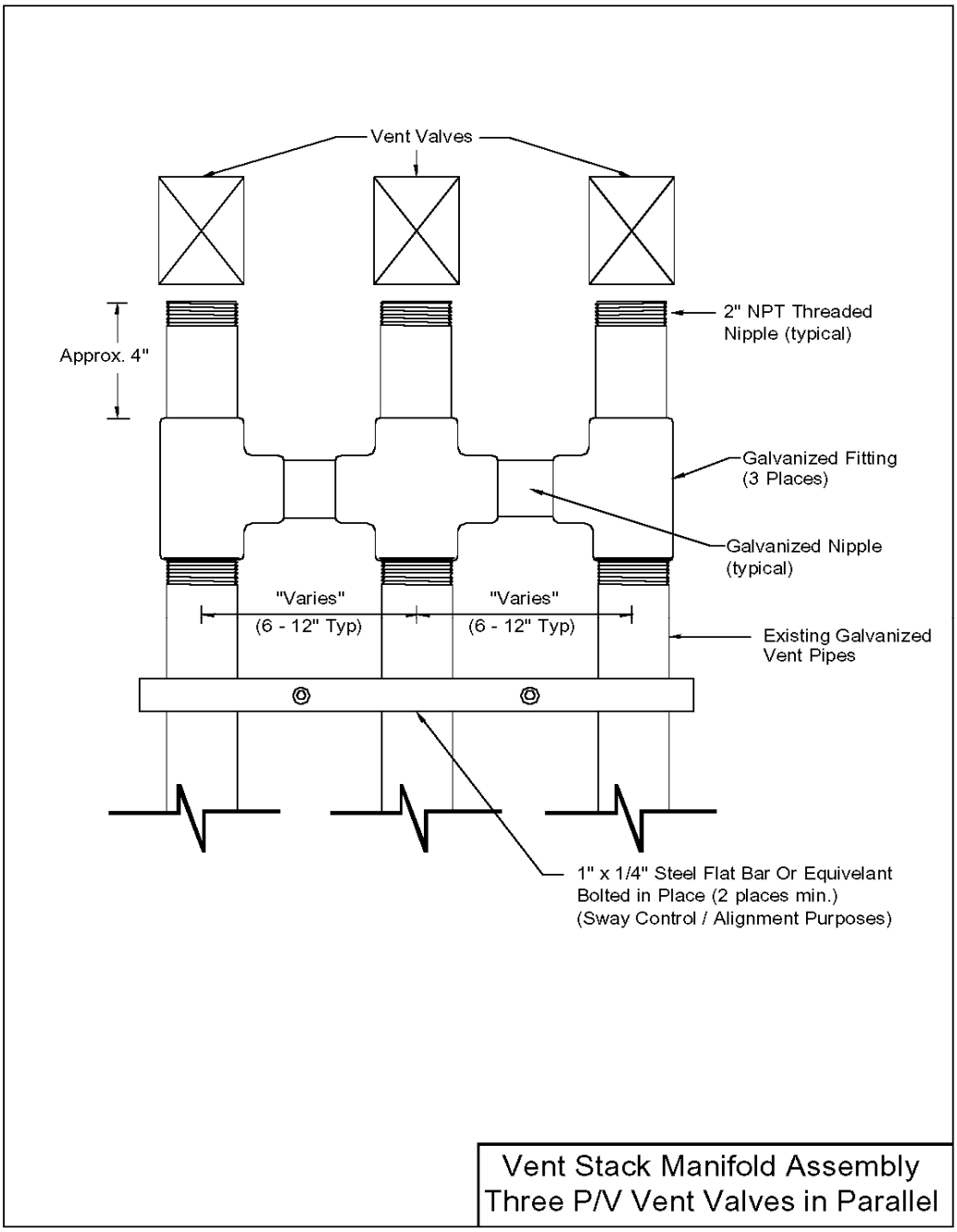


Figure 2E

Example of a GDF Maintenance Record

Date of Maintenance/ Test/Inspection/Failure (including date and time of maintenance call)	Repair Date To Correct Test Failure	Maintenance/Test/Inspection Performed and Outcome	Affiliation	Name of Individual Conducting Maintenance or Test	Telephone Number

Executive Order G-70-209
Dresser/Wayne WayneVac/Arid Permeator
ORVR-Compatible Phase II Vapor Recovery System

Exhibit 3

Required Items in Conducting TP-201.3,
(Determination of 2 inch WC Static Pressure Performance of
Vapor Recovery Systems of Dispensing Facilities)

1. Prior to conducting TP-201.3, the Manual/Off/Automatic Switch on the Control Panel must be set to the **OFF** position to permit the pressurization of the UST system.

2. Sealing of the vapor holes on the nozzle spout (such as placing a balloon or the fingers of a glove over the holes on the nozzle spout, or bagging nozzles) is **not** permitted during static pressure decay tests. Sealing of the nozzle vapor holes during a static pressure decay test may mask a defective vapor valve.

3. The Permeator residue (clean air exhaust) does not need a cap or P/V valve since there is a pneumatic valve located on the exhaust line of the Permeator membrane housing. The valve only opens when the vacuum pump is on and there is a vacuum in the membrane housing. When pressure is applied during a TP-201.3 test, pressure from the UST enters the Permeator through the inlet (feed). Everything in the Permeator up to this Pressure Relief Valve is pressurized. This includes all tubing, piping, fittings, pressure switches, pumps, cooler, separator, and membrane housing.

California Environmental Protection Agency

Air Resources Board

Vapor Recovery Test Procedure

Exhibit 4

Determination of Pressure in Underground Gasoline Storage Tanks

California Environmental Protection Agency
Air Resources Board

Vapor Recovery Test Procedure

Exhibit 4

Determination of Pressure in Underground Gasoline Storage Tanks

1. Applicability

Definition common to all certification and test procedures are in:

D-200 Definition for Vapor Recovery Procedures

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

This test procedure is used to quantify the amount of pressure present in underground gasoline storage tanks (USTs) installed at gasoline dispensing facilities (GDFs) equipped with a Phase II vapor recovery system. This procedure is applicable to underground manifold tanks equipped with pressure/vacuum (P/V) valves, a two point Phase I vapor recovery system, and 4-inch vapor adaptors.

2. Principle and Summary of Test Procedure

The pressure of the USTs is determined at the Phase I vapor recovery adaptor (dry break assembly) with a vapor coupler test assembly as shown in Figures 2 and 3 of TP-201.3 (***Determination of 2 Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities***) or dust cap test assembly. The test assembly is equipped with a center probe, which opens the dry break, and a quick connect fitting that is connected to an electronic pressure measuring device or digital manometer. The test assembly should open the dry break without venting the USTs. For the purpose of compliance determination, this shall be conducted at GDFs after commencing operation. This test can be performed while product is being dispensed into motor vehicles.

3. Range and Accuracy

3.1 The minimum full scale range for digital manometer shall be 0.00 to 4.00 inches WC. The minimum accuracy shall be ±0.5% full scale at 60 to 78 ºF, and ±1.5% full scale at 32 to 60 ºF and 78 to 104 ºF.

3.2 The temperature measuring device shall have a maximum range of 0 to 150 ºF and shall be accurate to within 2 ºF.

3.3 The stop watch shall have an accuracy of 0.1 seconds.

4. Biases and Interference's

4.1 No transfer of gasoline from any cargo tanks to the USTs shall occur within three hours prior to conducting this test.

4.2 Leaking vapor adaptors will not allow test assembly to achieve a leak tight seal.

4.3 This test shall not be conducted if A/L testing was conducted within the last 24 hours.

4.4 GDF's not capable of passing TP-201.3 shall be excluded from this test.

4.5 This test shall not be conducted if TP-201.3 was conducted within the last three hours.

4.6 Improper connection of dust cap or vapor coupler test assembly can result in accidental discharge of vapor due to positive pressure in UST's. Wait ten (10) minutes before retesting.

4.7 Temperature fluctuations during test period can result in erroneous values. All testing must be avoided when temperature differences exceeds 5° F.

5. Equipment

5.1 The dust cap test assembly shall be modified in the following manner:

5.1.1. Tap, thread, and install a ¾ inch NPT threaded probe in the center of the dust cap (Figure 1). The probe shall be of sufficient length to open approximately ½ inch of the dry break while allowing the cap to maintain a leak tight seal on the adaptor.

5.1.2. Tap, thread and install a ¼ inch NPT female quick connect fitting on the top of the dust cap, offset from the center probe (Figure 1). A Swagelok, part number SS-QC4-B-4-PM, quick connects fitting or equivalent is required.

5.1.3. Use approximately 24 inches of ¼ inch (internal diameter) clear "Tygon tubing" or equivalent to connect the manometer to the dust cap (Figure 2). Install a ¼ inch male quick connect fitting, Swagelok part number SS-QC4-5-400 or equivalent, on one end of

a ferrule stainless steel tube (1/8 inch internal diameter) of approximately 1.5 inches. Connect one end of the “Tygon tubing” to the stainless steel tube and connect the other end to the digital manometer (Figure 2).

5.2 Alternatively, the vapor coupler test assembly, Figures 2 and 3 of TP-201.3 may be used in lieu of the dust cap test assembly.

5.3 Digital Manometer (Electronic Pressure Measuring Device)

Use a 0 - 4.00 inches WC digital manometer to monitor the UST pressure with a minimum sensitivity of 0.01 inches of WC. Dwyer Series 475 Mark III model 475-00-FM (0-4.00 inches WC) Digital manometer or equivalent is required. A copy of the manufacturer’s operating instruction shall be kept with the equipment.

5.4 Vacuum Grease or Petroleum Jelly

Use commercially available vacuum grease or petroleum jelly to apply to the dust cap or vapor coupler test assembly gasket to maintain good seal.

5.5 Soap Solution mixture with spray bottle or “Snoop.”

5.6 Temperature gauge or thermometer capable of measuring ambient temperature with a resolution of 2°F.

5.7 Stop watch with accuracy of 0.1 seconds.

6 Calibration Requirements

A copy of the most current calibration shall be kept with the equipment to verify that the calibrations have been done appropriately.

6.1 Digital manometer shall be bench calibrated using a reference pressure measuring device or incline manometer. Calibration shall be performed at 20, 50, and 80 percent of full scale. Accuracy shall be within two percent at each of these calibration points. Calibration shall be conducted on a frequency not to exceed 180 days.

6.2 The temperature measurement device shall be checked at an interval not to exceed 180 days using an ice bath, ambient air, and boiling water. The accuracy of the temperature measuring device shall be checked against an NIST traceable temperature measuring device.

7 Pre Test Procedures

7.1 Turn on digital manometer and allow instrument to warm up for five minutes.

7.2 Zero out digital manometer using adjustment pod on top of instrument in accordance with manufactures instructions. Drift may be minimized by re-zeroing immediately after use by venting both pressure port to atmosphere and adjusting the knob until the display reads exactly zero.

7.3 Apply thin layer of vacuum grease or petroleum jelly to gasket located under the dust cap or vapor coupler test assembly.

7.4 Attach male quick connect fitting of pressure line to cap.

7.5 Attach digital manometer to open end of Tygon tubing.

7.6 Ensure that the power to the Permeator is on.

8 Test Procedure

8.1 Attach the dust cap or vapor coupler test assembly to the vapor adaptor (Figure 2).

8.2 Apply soap solution to the dust cap or vapor coupler test assembly and vapor adaptor and check for visual leaks.

8.3 If no leaks are detected within two minutes after applying soap solution, proceed with monitoring pressure for ten minutes and record on Form 1 the time, pressure, and whether the processor is on.

8.4 Record temperature at the beginning and end of test period on Form 1. This test will be invalid if temperature differential exceeds 5°F.

9. Reporting Results

Report pressure data and other information as required in Form 1. District may require the use of alternate forms, provided they include the same minimum parameters as identified in Form 1.

10. Alternate Procedures

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

Figure 1: Typical Modified Vapor Adaptor Dust Cap (Bottom View)

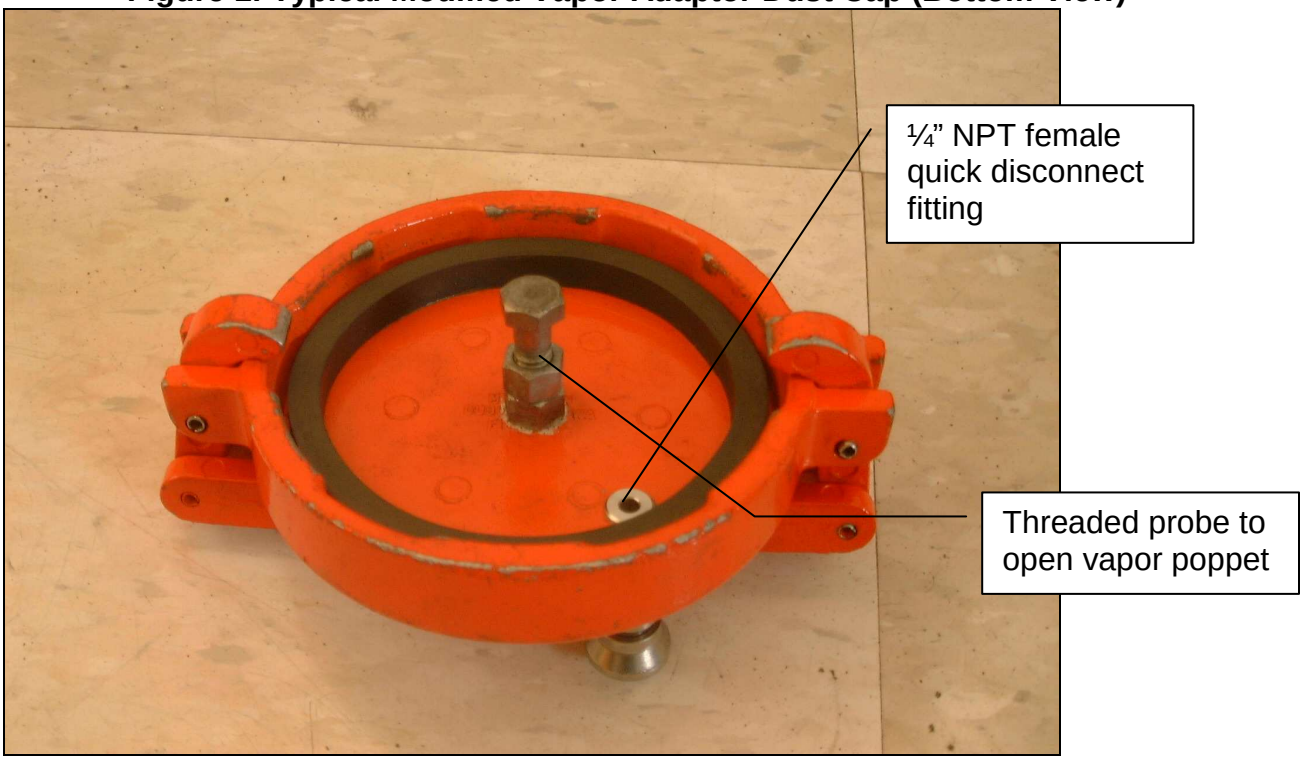


Figure 2: Typical Field Installation of UST Pressure Measurement Assembly

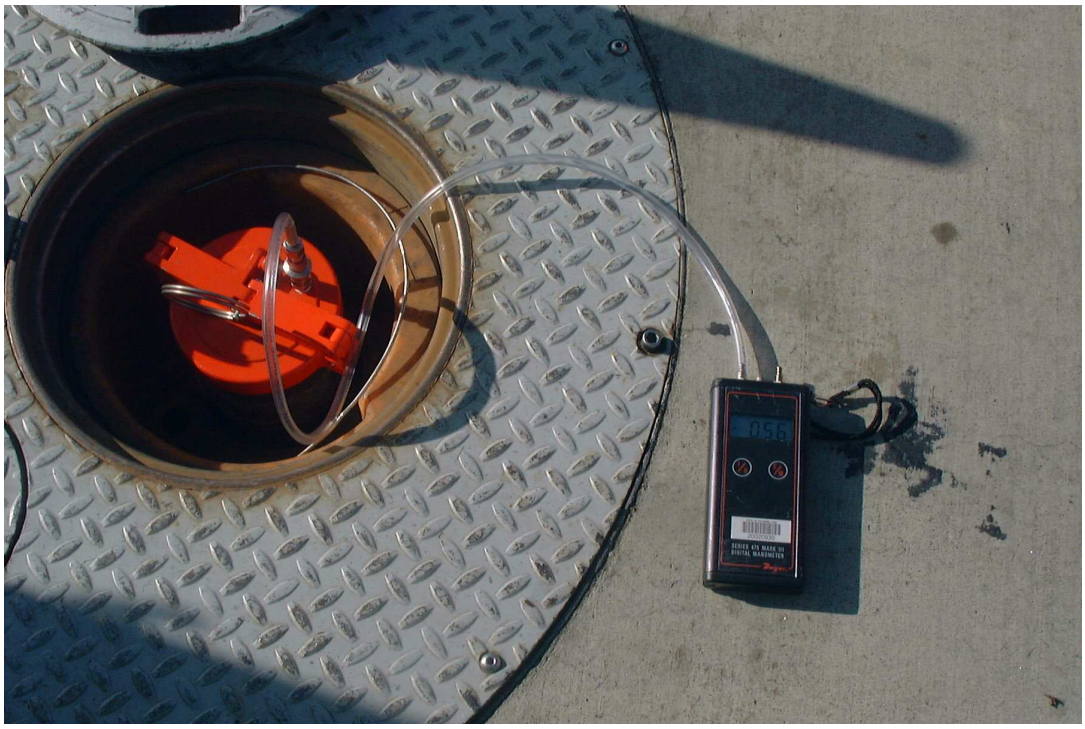


Exhibit 4 Form 1
Data Sheet for Determination of Pressure In Underground Gasoline Storage Tanks

Facility Name:		Test Time:	Test Date:
Address:			
City:			
Testing Company :		Testing Company Address	
Person Conducting Test:		Testing Company Phone Number	
Initial Ambient Temperature [ºF]:		Final Ambient Temperature [ºF]:	

Observed Underground Storage Tank Pressure

Time	Pressure (In H_2O)	Processor On?	Time	Pressure (In H_2O)	Processor On?

Comments:

California Environmental Protection Agency

Air Resources Board

Vapor Recovery Test Procedure

Exhibit 5

Determination (by Volume Meter) of
Air to Liquid Volume Ratio of
Vapor Recovery Systems of
Dispensing Facilities

California Environmental Protection Agency
Air Resources Board

Vapor Recovery Test Procedure

Exhibit 5

Determination (by Volume Meter) of Air to Liquid Volume Ratio of Vapor Recovery Systems of Dispensing Facilities

1 APPLICABILITY

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 "ARB Executive Officer" refers to the Executive Officer of the ARB or his or her authorized representative or designate.

This test procedure can be used to quantify the air to liquid volume ratio (A/L) of a vapor recovery system. This test procedure is particularly well suited to dispensing facility vapor recovery systems that use bootless nozzles with circumferential holes near the front of their spouts; but it may be adapted for other systems.

This test procedure can be used to determine the performance specification for air to liquid volume ratio of a vapor recovery system during the certification process and subsequently to determine compliance with that performance specification for any installations of such a system.

When this test procedure is used to set a performance specification for a system, any deviations from the use of the equipment and procedures specified below shall be written into the certification report for such system if it is certified. Any compliance testing of a system shall be done according to this procedure, with appropriate adjustments for such deviations.

2 PRINCIPLE AND SUMMARY OF TEST PROCEDURE

The air to liquid volume ratio (A/L) of a vapor recovery system is, for a given dispensing episode, the quotient of the volume of air collected by a nozzle and the volume of liquid dispensed by that nozzle. In principle, any equipment and

procedure which provides for the simultaneous measurement of air volume collected and liquid volume dispensed, from the same system, is a basis for determination of A/L for that system.

EXHIBIT 3 measures A/L rather than the volume ratio of vapor (mixed with air) to liquid (V/L), because doing so is much more consistent, repeatable, and less expensive. A/L testing can be coordinated with efficiency testing to yield A/L performance specifications for compliance testing.

3 BIASES AND INTERFERENCES

There are no known biases or interferences inherent to the equipment and procedures specified; however several system parameters must be monitored and controlled so that this procedure can serve its intended purpose.

3.1 Non-Repeatable or Non-Representative Test Conditions

It is possible that system components could operate during testing in such a way that results are non-repeatable or are non-representative of subsequent installations of the system. To minimize such effects, the ARB test monitor shall note any relevant operating parameters for inclusion in the certification process as conditions on certification at a particular A/L ratio.

3.1.1 Non-Repeatable Test Conditions

For example, the liquid dispensing rate can introduce bias if it is non-repeatable; for many systems, the A/L performance varies with liquid flow rate.

In the procedures below, a maximum repeatable flow rate of liquid is required. If A/L performance varies with liquid flow rate for some system, it is necessary to place an upper limit on liquid flow rate in the ARB Executive Order.

(1) **(Liquid) Fuel Pumps**

To achieve repeatability, it is necessary to control the number of simultaneous dispensing episodes from a common liquid pump during certification testing. Such number shall be a performance specification in the ARB Executive Order so that subsequent installations of the system can be consistently tested.

(2) **(Air and Vapor) Assist Pumps**

To achieve repeatability, it is necessary to control the number of simultaneous dispensing episodes served by a common assist pump during certification testing. Such number shall be a performance

specification in the ARB Executive Order so that subsequent installations of the system can be consistently tested.

3.1.2 Non-Representative Test Conditions

For example, nozzle quantities, qualities, and interactions can introduce bias if they are non-representative; for many systems, the A/L performance varies with such parameters.

In the procedures below, if more than one nozzle is served by the same assist pump, precautions are required to eliminate nozzle interactions that yield non-representative A/L performance. Within a system subject to certification testing, nozzle qualities must be representative of the nozzle qualities within subsequent installations.

To achieve representativeness, it may be necessary to control the nozzle quantities, qualities, and interactions during certification testing and subsequently by inclusion of specific requirements in the ARB Executive Order.

3.2 Condensation, Evaporation, and Other Factors

Different systems have different tendencies to condense and evaporate liquid in vapor lines. This and other factors can cause different A/L values in different modes of system operation. In consideration of such factors, the ARB Executive Officer may determine a different data collection protocol and a different data reduction protocol than the examples given in §§ 8 and 11.

4 SENSITIVITY, RANGE, AND PRECISION

The values of the determinations required by this test procedure are well within the limits of sensitivity, range, and precision of the specified equipment.

5 EQUIPMENT

Some of the equipment for testing a bootless nozzle is shown in:

Figure 1
A/L Volumetric Test Meter and

Figure 2
A/L Test Tank.

5.1 Air Volume Meter and Plumbing Hardware

The plumbing hardware shall connect the nozzle spout to a positive displacement air volume meter (e.g. Roots® meter) so that the air volume pulled into the collection holes in the spout can be measured with minimal pressure drop.

Use a calibrated positive displacement gas volume meter (e.g. a Roots meter) for measurement of volumetric flow rate through the sleeve.

Use rotary type positive displacement meter(s) with a back pressure limit (BPL) less than:

1.10 inches water column at a flow rate of 3,000 CFH down to
0.05 inches water column at a flow rate of 30 CFH for a meter with a rating over 1000 CFH and

0.70 inches water column at a flow rate of 800 CFH down to
0.04 inches water column at a flow rate of 16 CFH for a meter with a rating of or less than 1000 CFH.

Meter(s) shall be equipped with taps accommodating the following equipment:

(1) taps on the inlet side for

(a) a thermocouple with a range of 0 to 150 ℉ and

(b) a pressure gauge with a range providing absolute pressure readings within 10 to 90% of the range (more than one gauge shall be used, if necessary) and

(2) taps on the inlet and outlet sides for a differential pressure gauge with a range of 0 to < 2x BPL (i.e. full scale shall be less than twice the back pressure limit) or any other range appropriate to allow detection of a pressure drop greater than the BPL.

5.2 Liquid Volume Meter

Use the meter on the liquid dispenser.

5.3 Portable Liquid Tank

A portable tank shall be used to receive dispensed liquid. The tank shall have sufficient volume so that 7.5 gallons can be received without triggering a premature shutoff. In the development of this procedure, a 25-gallon tank was

adequate for two dispensing episodes between emptyings. The tank shall be on a wheeled cart and plumbed so that liquid received by the tank can be returned to the appropriate storage tank.

Figure 2, for example, shows an optional carbon scrubber arrangement that provides personnel protection from hazardous vapors and reduces emissions due to the performance of this test procedure.

5.4 **Stopwatch**

Use a stopwatch accurate and precise to within 0.2 seconds.

6 CALIBRATION PROCEDURE

Follow the appropriate calibration procedures from TP-201.2.

7 PRE-TEST PROTOCOL

7.1 **Location of Test Site**

Prototype systems will be located within 100 miles of Sacramento for testing. Other locations may be accepted at the discretion of the ARB Executive Officer.

7.2 **Specification of Test, Challenge, and Failure Modes**

The specification of test, challenge, and failure modes such as the number of liquid transfer episodes, volume and volumetric rate of liquid transfer, storage tank volumes, etc. shall be done according to the principles of CP-201 § 5 for the testing and evaluation of vapor recovery equipment.

8 TEST PROCEDURE

The facility and system shall be prepared to operate according to any specified test, challenge and failure modes.

The procedures below are for testing a bootless nozzle; with appropriate changes, these procedures can be used on other equipment. The procedure below shall be performed by at least two people familiar with the safety and mechanical principles of liquid dispensing equipment, especially for dispensing gasoline and other hazardous liquids.

8.1 **General A/L Test Instructions**

(1) Assemble the equipment shown in Figures 1 and 2, for example, if more than one nozzle is served by the same assist pump, all nozzles other than

the test nozzle shall be sealed vapor tight with, e.g., plastic bags and tape or rubber bands.

(2) Read and record the initial value on the air volume meter. Do not depend on using the terminal reading from a prior dispensing episode. The pressure drop across an appropriate volume meter is so low that a light breeze can change this value.

(3) Set the liquid meter and stopwatch to zero.

(4) Fully engage the dispensing lever and hold for the maximum repeatable flow rate of liquid. For most systems, there will be a brief pause before the liquid flows and is registered by the liquid meter.

(5) Start the stopwatch when the liquid meter indicates liquid flow.

(6) Attempt to dispense 7.48 gallons (one cubic foot) of liquid and simultaneously:

(a) shut off liquid flow and

(b) stop the stopwatch.

Read and record the liquid volume dispensed and the elapsed time.

(7) Read and record the final value on the air volume meter.

8.2 **Certification Test Instructions**

Different systems have different tendencies to condense and evaporate liquid in vapor lines. This and other factors can cause different A/L values in different modes of system operation. In consideration of such factors, the ARB Executive Officer may determine a different data collection protocol and a different data reduction protocol than the examples below. However, instructions must be determined before collection of final certification test data.

(1) Collect three sets of A/L test data per nozzle:

(a) from any nozzle (or nozzles) on any dispenser (or dispensers) used by the applicant for certification efficiency testing and

(b) at three flow rates (e.g. repeatable minimum, average of repeatable minimum and repeatable maximum, and repeatable maximum.

(2) Calculate the performance specification as an allowed range of A/L values

according to one of the alternatives provided in § 11.

8.3 **Compliance Test Instructions**

Different systems have different tendencies to condense and evaporate liquid in vapor lines. This and other factors can cause different A/L values in different modes of system operation. In consideration of such factors, the ARB Executive Officer may determine a different data collection protocol and a different data reduction protocol than the examples below. However, instructions may not be changed after certification.

(1) Collect one set of A/L test data per nozzle:

(2) Compare the resulting A/L value with the allowed range of A/L values given as a performance specification in the ARB Executive Order G-70-204-A.

(a) If the resulting value is in the allowed range of A/L values, the system complies.

(b) If the resulting value is not in the allowed range of A/L values, collect two more sets of A/L test data and calculate the average A/L for all three sets.

(i) If the resulting value is in the allowed range of A/L values, the system complies.

(ii) If the resulting value is not in the allowed range of A/L values, the system does not comply.

9 QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

This section is reserved for future specification.

10 RECORDING DATA

This section is reserved for future specification.

11 CALCULATING RESULTS

Different systems have different tendencies to condense and evaporate liquid in vapor lines. This and other factors can cause different A/L values in different modes of system operation. In consideration of such factors, the ARB Executive Officer may determine a different data reduction protocol than the examples below. However, all calculation protocols must be determined before collection of final

certification test data.

11.1 **A/L Values**

Calculate A/L for each test of a dispensing episode:

$$A/L = \frac{(\text{volume of air collected})}{(\text{volume of liquid dispensed})}$$

11.2 **Performance Specification**

The performance specification shall be expressed as an allowed range of A/L values. The performance specification range shall be the mean value of A/L ±10% of the mean.

11.3 **Alternative Performance Specification**

This performance specification may be used after an engineering evaluation by the ARB Executive Officer has determined that it is necessary to statistically account for the variance of A/L values for a system.

The performance specification shall be expressed as an allowed range of A/L values. The performance specification shall be the same as the 95% confidence interval for the expectation value of a single observation of A/L.

For example, assume that a nozzle was tested with the following results for A/L:

observation number	A/L
1	1.02
2	0.99
3	1.02

(1) Find the mean value of A/L.

$$\bar{x} = \frac{1.02 + 0.99 + 1.02}{3} = 1.01$$

(2) Find the sample standard deviation of the mean value of A/L.

$$s = \sqrt{\frac{(1.02 - \bar{x})^2 + (0.99 - \bar{x})^2 + (1.02 - \bar{x})^2}{(3 - 1)}} = 0.0173$$

(3) Find the 95% confidence interval for the expectation value of a single observation of A/L using Student's t Statistic and assuming a normal distribution of A/L values for all system nozzles.

Note that for three observations, there are two degrees of freedom and the Student's t Statistic is 4.303 for a 95% confidence interval.

$$95\%\ \text{c.i.} = \bar{x} \pm (t\,s) = 1.01 \pm 0.075$$

Other values of t are provided below for convenience:

number of observations	t
4	3.182
5	2.776
6	2.571
7	2.447
8	2.365
9	2.306
10	2.262
15	2.145
30	2.045

12 REPORTING RESULTS

12.1 Certification Report

12.1.1 Performance Specification

Report:

(1) the mean value of A/L,

(2) 10% of the mean value of A/L, and

(3) the mean value of A/L ± 10% of the mean.

Report (3) as the performance specification that is the allowed range of A/L values for subsequent installations of the system.

12.1.2 **Alternative Performance Specification**

Report:

(1) the mean value of A/L,

(2) the variance of the mean value of A/L, and

(3) the 95% confidence interval for the expectation value of a single observation of A/L using Student's t Statistic and assuming a normal distribution of A/L values for all system nozzles.

Report (3) as the performance specification that is the allowed range of A/L values for subsequent installations of the system.

12.2 **Compliance Test Report**

Report:

(1) the number of nozzles at the dispensing facility which do not meet the performance specification and

(2) the total number of nozzles at the dispensing facility.

Report any other system operating parameters technically pertinent to the A/L performance specification as required by the certification procedure.

13 ALTERNATIVE TEST PROCEDURES

Test procedures, other than specified above, shall only be used if prior written approval is obtained from the ARB Executive Officer. In order to secure the ARB Executive Officer's approval of an alternative test procedure, the applicant is responsible for demonstrating to the ARB Executive Officer's satisfaction that the alternative test procedure is equivalent to this test procedure.

(1) Such approval shall be granted on a case-by-case basis only. Because of the evolving nature of technology and procedures for vapor recovery systems, such approval shall not be granted in subsequent cases without a new request for approval and a new demonstration of equivalency.

(2) Documentation of any such approvals, demonstrations, and approvals shall be maintained in the ARB Executive Officer's files and shall be made

available upon request.

14 REFERENCES

This section is reserved for future specification.

15 EXAMPLE FIGURES

Each figure provides an illustration of an implementation that conforms to the requirements of this test procedure; other implementations that so conform are acceptable, too. Any specifications or dimensions provided in the figures are for example only, unless such specifications or dimensions are provided as requirements in the text of this or some other required test procedure.

Figure 1
A/L Volumetric Test Equipment

Figure 2
A/L Test Tank

FIGURE 1

A/L Test Equipment for Bootless Nozzles

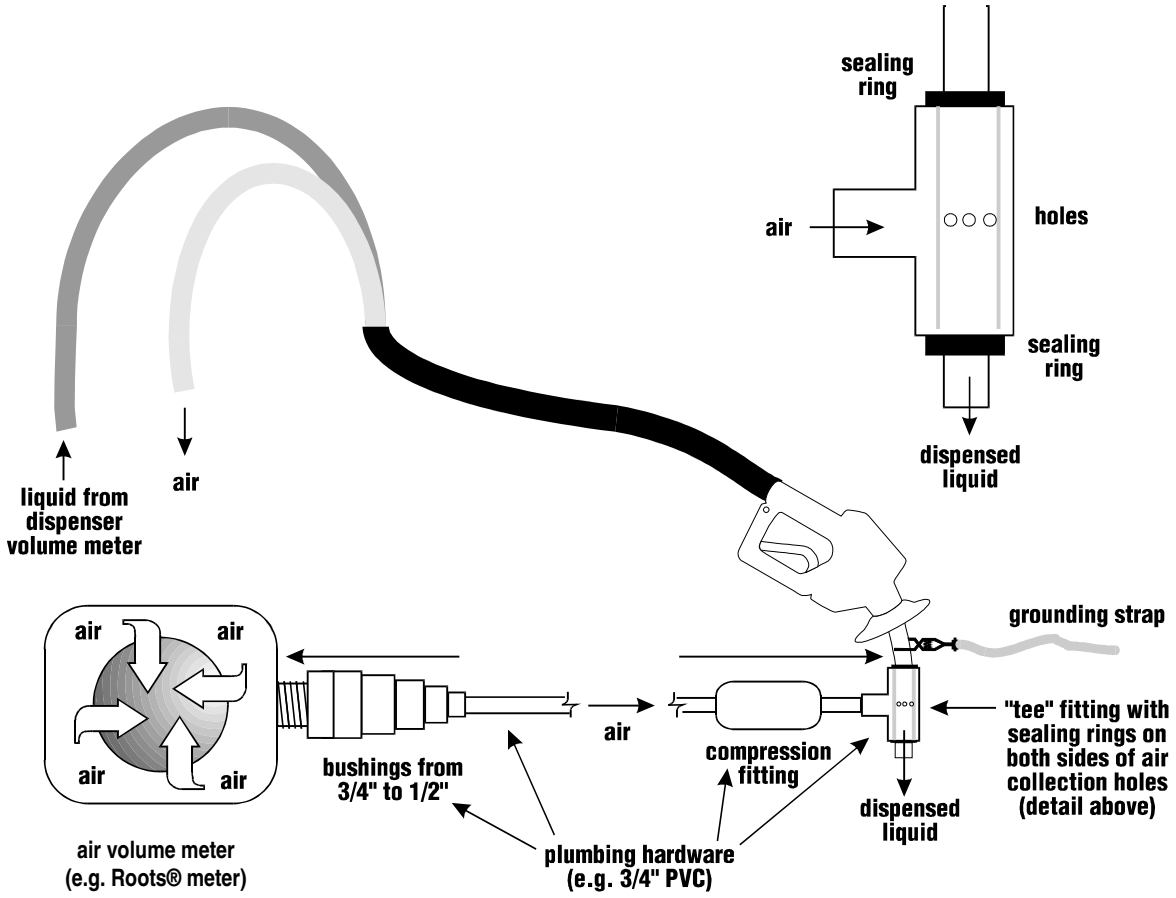


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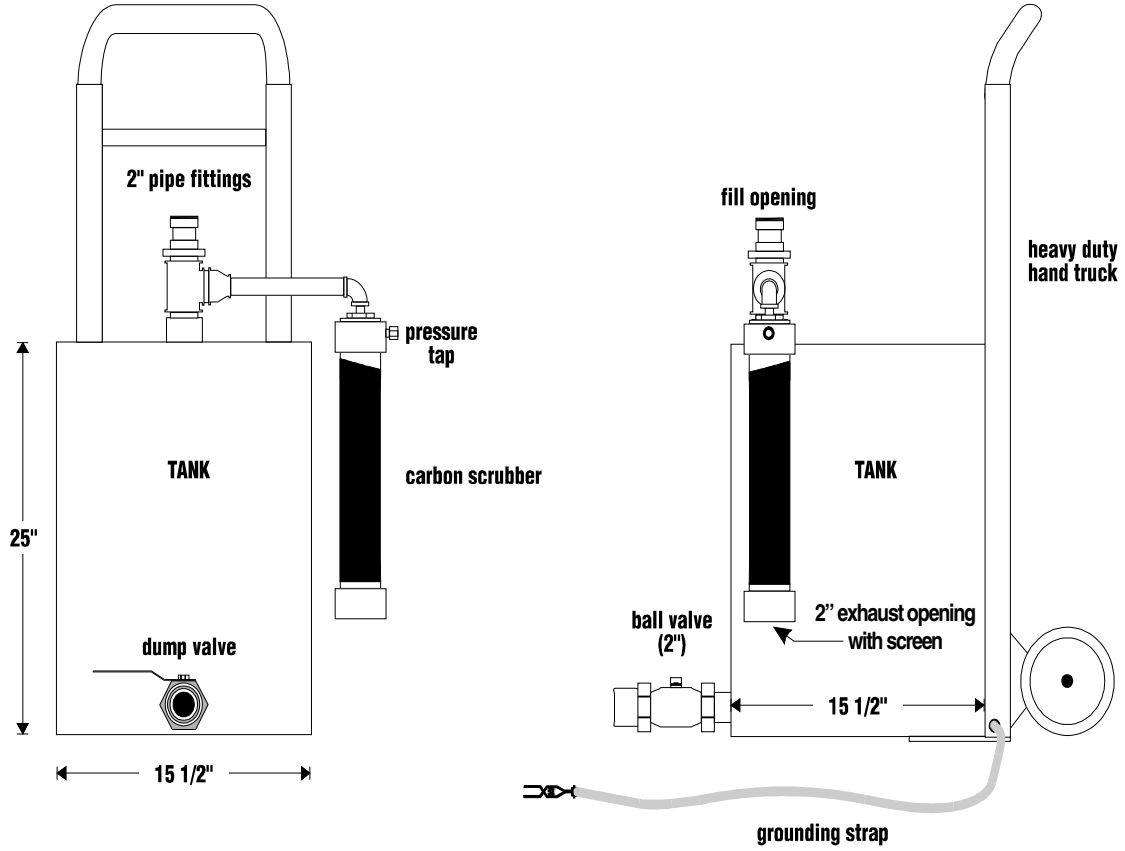
FIGURE 2
A/L Testing Tank



This design can meet the performance specifications of this procedure, any other design that meets such specifications is acceptable.

Executive Order G-70-209
Dresser/Wayne WayneVac/Arid Permeator
ORVR-Compatible Phase II Vapor Recovery System

Exhibit 6

Arid Technologies, Inc. PERMEATOR Warranty

Seller warrants to the original purchaser that the equipment to be delivered pursuant to this Agreement will be as described herein and will be free from defects in material or workmanship. Minor deviations which do not affect the performance of the equipment shall not be deemed to constitute either a failure to conform to the specifications or a defect in material or workmanship.

This warranty is a minimum of twelve (12) months from the date of installation. This warranty shall extend for a period of thirty-six (36) months from the initial date of shipment. Should any failure of conformity to this warranty appear within thirty-six (36) months from the initial date of shipment, Seller shall, upon immediate notification of such alleged failure and substantiation that the equipment has been operated and maintained in accordance with Seller's recommendations and standard industry practices, correct such defects by suitable repair or replacement at its own expense.

Seller's liability under this warranty shall cease if any major repairs to or any replacement or modification of the equipment is made by any person other than Seller's personnel or persons working under the supervision of Seller's personnel, unless authorized by Seller in writing. Further, the warranty shall cease unless the Buyer has operated the equipment in strict compliance with operating instructions and manuals, if any, provided for the equipment, and unless Buyer operates the equipment in normal use and with proper maintenance.

Even if the equipment contains components from another manufacturer and are subject to the manufacturer's warranty, Seller's liability shall not be limited to the extent of the warranty which Seller received from the manufacturer or supplier of the equipment component parts. Seller's liability shall extend to period of thirty-six (36) months from the initial date of shipment.

This warranty is expressly in lieu of any and all representations and warranties, express or implied, including any warranty of merchantability, fitness for a particular purpose or other warranty of quality, except the warranty of title. This warranty constitutes the exclusive remedy, and shall not be deemed to have failed of its essential purpose so long as Seller is willing and able to correct defects covered by the warranty in the manner prescribed. The sole purpose of this exclusive remedy shall be to provide Buyer with free repair and/or replacement in the manner and for the time period provided herein.

The entire agreement between the parties is embodied in this writing, which constitutes the final expression of the parties, and it is the complete and exclusive statement of the terms of the agreement. No other warranties are given beyond those set out in this writing.

Limitation of Liability

Seller shall not, under any circumstances, be liable for direct or indirect special damages, incidental or consequential, such as but not limited to, loss of profits, damage to or loss of other property, downtime costs of the equipment, delay expenses, overhead or capital costs, claims of Buyer's customers or activities dependent upon the equipment.

Except to the extent provided in the Limited Warranty, Seller shall not be liable for any claim or loss arising out of or related to this agreement or the equipment provided pursuant thereto, whether such claim allegedly arises or is based on contract, warranty, tort (including negligence), strict liability in tort or otherwise. Liability shall not in any event exceed the cost of the equipment upon which such liability is based.