

**State of California  
AIR RESOURCES BOARD**

**Executive Order G-70-193**

**Certification of the Hill-Vac Vapor Recovery System  
for Cargo Tank Motor Vehicle Fueling Systems**

WHEREAS, the California Air Resources Board ("the Board" or "CARB") has established, pursuant to California Health and Safety Code sections 39600, 39601 and 41954, certification procedures for systems designed for the control of gasoline vapor emissions during motor vehicle fueling operations (Phase II vapor recovery systems) in its "CP-205, Certification Procedure for Vapor Recovery Systems of Novel Facilities" (the "Certification Procedures") as adopted April 12, 1996 and as last amended March 17, 1999, incorporated by reference into Title 17, California Code of Regulations, Section 94015;

WHEREAS, the Board has established, pursuant to California Health and Safety Code sections 39600, 39601 and 41954, test procedures for determining the compliance of Phase II vapor recovery systems with emission standards in its "TP-205.2, Determination of Efficiency of Phase II Vapor Recovery Systems of Novel Facilities" (the "Test Procedures") as adopted April 12, 1996 and as last amended March 17, 1999, incorporated by reference into Title 17, California Code of Regulations, Section 94015;

WHEREAS, the California Air Resources Board ("the Board" or "CARB") has established, pursuant to California Health and Safety Code sections 39600, 39601 and 41954, certification procedures for equipment which recovers vapors emitted in association with gasoline marketing operations involving cargo tanks in its "CP-204, Certification Procedure for Vapor Recovery Systems of Cargo Tanks" as adopted April 12, 1996 and as last amended March 17, 1999, incorporated by reference into Title 17, California Code of Regulations, Section 94015;

WHEREAS, Bob Hill of the Franzen-Hill Corporation has requested, pursuant to the Certification and Test Procedures, certification of the Hill-Vac Vapor Recovery System for vacuum assisted Phase II vapor recovery for cargo tank motor vehicle fueling systems to be installed on gasoline cargo tank vehicles that are equipped with Phase I vapor recovery systems that have been certified and maintained in accordance with CARB's "CP-204, Certification Procedures for Vapor Recovery Systems of Cargo Tanks";

WHEREAS, Executive Order G-70-186 contains the certification orders for the Healy Model 400 ORVR Vapor Recovery Systems installed at gasoline facilities utilizing underground gasoline storage tank configurations;

WHEREAS, Executive Order G-70-187 contains the certification orders for the Healy Model 400 ORVR Vapor Recovery Systems installed at gasoline dispensing facilities utilizing above ground gasoline storage tank configurations;

WHEREAS, Executive Order G-70-10-A contains the certification orders for the Phase I Vapor Recovery System for Delivery Tanks Equipped for Bottom Loading and the Executive Officer has determined that the Hill-Vac System was evaluated on cargo tanks with Phase I vapor recovery systems which were consistent with the certification orders contained therein;

WHEREAS, the Hill-Vac Vapor Recovery System for Cargo Tank Motor Vehicle Fueling Systems (the Hill-Vac System) has been evaluated pursuant to the Board's Certification Procedures;

WHEREAS, Section 7 of the Certification Procedures provides that the Executive Officer shall issue an order of certification if he or she determines that the vapor recovery system conforms to all of the requirements set forth in Sections 1 through 6 of the Certification Procedures;

WHEREAS, the Executive Officer acknowledges the need for the introduction of vapor recovery systems that are compatible with vehicles having an onboard refueling vapor recovery system (ORVR vehicles);

WHEREAS, I, Michael P. Kenny, Air Resources Board Executive Officer, find that the Hill-Vac System conforms with all the requirements set forth in the Certification Procedures and results in a vapor recovery system which is at least 95 percent effective when used by cargo tank operating personnel who have read and are familiar with the information contained in the operating and maintenance instructions provided to them by the Franzen-Hill Corporation and approved by the Executive Officer; and when used in conjunction with a cargo tank Phase I vapor recovery system that has been certified and maintained in accordance with CARB's "CP-204, Certification Procedures for Vapor Recovery Systems of Cargo Tanks"; and when constructed, operated and maintained such that all the requirements contained in Exhibit 2 of this Order are met;

WHEREAS, Sections 3.4.1, 5.4 and 7 of CARB's "CP-201, Certification Procedure for Vapor Recovery Systems of Dispensing Facilities"; provide that the Executive Officer may condition the certification of any system;

NOW, THEREFORE, IT IS HEREBY ORDERED that Hill-Vac System is certified to be at least 95 percent effective when used by cargo tank operating personnel who have read and are familiar with the information contained in the operating and maintenance instructions provided to them by the Franzen-Hill Corporation and approved by the Executive Officer and when used in conjunction with a cargo tank Phase I vapor recovery system that has been certified and maintained in accordance with CARB's "CP-204, Certification Procedures for Vapor Recovery Systems of Cargo Tanks" and when constructed, operated and maintained such that all the requirements contained in Exhibit 2 of this Order are met. Fugitive emissions, which may occur when the cargo tanks are under positive pressures, have not been quantified and were not included in the calculation of system effectiveness. Preliminary compatibility of this system with onboard refueling vapor recovery (ORVR) systems has been determined. This system passed evaluation of refueling ORVR-equipped vehicles. Exhibit 1 contains a list of the equipment certified for use with the Hill-Vac System. Exhibit 2 contains installation and performance specifications for the system. Exhibit 3 contains a static pressure decay test

specifically for the Phase II piping network between the nozzle and the Healy Model 100 Jet Pumps. Exhibit 4 contains the Fill Pipe Pressure Regulation Fueling Test for the Healy Model 400 ORVR nozzle when installed on the Hill-Vac System. Exhibit 5 contains the ten-gallon per minute maximum fueling rate compliance verification procedure.

IT IS FURTHER ORDERED that the following requirements are made a condition of certification: The Hill-Vac System shall only be installed on cargo tank vehicles which are capable of demonstrating ongoing compliance with: the vapor integrity requirements contained in CARB's "CP-204, Certification Procedures for Vapor Recovery Systems of Cargo Tanks"; and with the Vapor Return Line Vacuum Integrity requirements and test procedure contained in Exhibit 3; and with the Fill Pipe Pressure Regulation Requirements and Test Procedure contained in Exhibit 2 and Exhibit 4, respectively, and with the Ten-Gallon Per Minute Maximum Fueling Rate Compliance Verification Procedure contained in Exhibit 5. The owner or operator of the cargo tank vehicle on which the Hill-Vac System is installed shall arrange for the specified test procedures to be conducted and shall demonstrate compliance with the specified performance standards no later than 60 calendar days after startup and at least once in each twelve month period thereafter. Upon request, the test results shall be made available to the local air pollution control or air quality management district(s) in which the cargo tank is used for motor vehicle fueling operations, within fifteen calendar days of the date the tests are conducted. Test results shall be submitted in the format specified by the district(s).

IT IS FURTHER ORDERED that the Hill-Vac System, as installed, shall comply with the performance standards that the test installation was required to meet during certification testing. Performance with such standards shall be determined using the CARB Test Procedures used during certification testing and the Test Procedures included as exhibits in this Order. If, in the judgment of the Executive Officer, a significant fraction of the installed systems fail to meet the specifications of this certification, or if a significant portion of the California vehicle population is found to have configurations which significantly impair the system's collection efficiency, the certification itself may be subject to modification, suspension or revocation.

IT IS FURTHER ORDERED that the Hill-Vac System shall be equipped with pressure monitoring gauges for the fuel supply pressure to the Model 100 Jet Pumps, the vapor return line vacuum level, and the pressure in the cargo tank vapor space.

IT IS FURTHER ORDERED that compliance with the certification requirements and rules and regulations of the Division of Measurement Standards of the Department of Food and Agriculture, the State Fire Marshal, and the Division of Occupational Safety and Health of the Department of Industrial Relations are made a condition of this certification.

IT IS FURTHER ORDERED that The Franzen-Hill Corporation shall provide the cargo tank owner, operator or designee with CARB-approved copies of the operation and maintenance instructions for the Hill-Vac System. Revisions to the operation and maintenance manuals are subject to approval by the Executive Officer. If the Executive Officer so orders, the Franzen-Hill Corporation shall modify the instructions and distribute revised copies to each owner or operator of a Hill-Vac System in accordance with CARB's "CP-201, Certification Procedure for Vapor Recovery Systems of Dispensing Facilities". The CARB-approved operation and maintenance

instructions shall be kept on file at the Air Resources Board to allow the local air pollution control or air quality management district(s) to verify the content of these documents if it is deemed necessary.

IT IS FURTHER ORDERED that the Franzen-Hill Corporation or an authorized representative, shall provide the cargo tank owner, operator, or designee with instructions in the proper use of the Hill-Vac System, its repair and maintenance schedules, and with a source from which system and/or component replacements can be readily obtained.

IT IS FURTHER ORDERED that the Hill-Vac System shall, at a minimum, be operated in accordance with the manufacturer's recommended maintenance intervals and shall use the manufacturer's recommended operation and maintenance procedures as approved by the Executive Officer.

IT IS FURTHER ORDERED that copies of this Executive Order and the approved operation and maintenance instructions for the Hill-Vac System shall be stored in the passenger compartment of each cargo tank vehicle on which the Hill-Vac System is installed.

IT IS FURTHER ORDERED that the Franzen-Hill Corporation shall warrant for at least one year, in writing, to the ultimate purchaser and each subsequent purchaser, that the Hill-Vac vapor recovery system is designed and constructed so as to conform, at the time of original installation or sale, with the applicable regulations and is free from defects in materials and workmanship which would cause the vapor recovery system to fail to conform with applicable regulations. The Franzen-Hill Corporation shall provide copies of the manufacturer's warranty for the Hill-Vac System to the Cargo Tank Vehicle owner or operator. Hoses, nozzles and breakaway couplings shall be warranted to the ultimate purchaser as specified above for at least one year, or for the expected useful life, whichever is longer.

IT IS FURTHER ORDERED that any alteration of the equipment, parts, design, or operation of the systems certified hereby is prohibited unless such alteration has been approved by the Executive Officer. Any unapproved alteration shall void the certification for the specific Hill-Vac System on which such alterations are present.

Executed at Sacramento, California, this 9th day of December, 1999.

\_\_\_\_\_/Signed/  
Michael P. Kenny  
Executive Officer

**Executive Order G-70-193**

**Exhibit 1  
Certified Equipment List for the  
Hill-Vac Vapor Recovery System for Cargo Tank  
Motor Vehicle Fueling Systems**

<b><u>Component</u></b>	<b><u>Manufacturer/Model</u></b>	<b><u>State Fire Marshal Identification Number</u></b>
<b>Nozzle</b>	Healy Systems Incorporated Model 400 ORVR (w/vapor valve) (see Exhibit 2, Figure 7)	005:027:023
<b>Vacuum Source</b>	Healy Systems Incorporated Model 100 Jet Pumps (2 per nozzle) (See Exhibit 2, Figures 3 & 4)	005:024:004
<b>Vacuum Relief Valve</b>	Healy Systems Incorporated Model 1258A	N/A
<b>Coaxial Hose</b>	Healy Systems Incorporated Model 75B (3/4" I. D., 75 foot maximum length) Model 88B (7/8" I.D., 75 foot maximum length)	005:027:003
<b>Hose Adapters</b>	Healy Systems Incorporated Model CX6-VV1A	005:027:019
<b>Retractable Hose Reel For Phase II Vapor Recovery</b>	Hannay Reels Incorporated Series 800, Franzen-Hill Catalog No. HVMHR (See Exhibit 2, Figure 5)	N/A
<b>Breakaway Coupler (optional)</b>	Healy Systems Incorporated Model 8701VV	005:027:016
<b>Vapor Return Line Liquid Drop Out Pot</b>	Franzen-Hill Catalog No. HVMVP (See Exhibit 2, Figure 6)	N/A
<b>Flow Control Units (if needed to limit flow until less than 10 gpm)</b>	Healy Systems Incorporated Model 1301 (for 1 1/4 " straight fitting) or Model 1302 (for M34 fittings)	005:027:020

## Executive Order G-70-193

### Exhibit 2

#### Specifications for the Hill-Vac Vapor Recovery System for Cargo Tank Motor Vehicle Fueling Systems

##### 1. Nozzle

**1.1** The Healy Model 400 ORVR nozzle shall have an operating gauge pressure range at the nozzle boot / fill pipe interface of  $-0.5$ " to  $+1.0$ " water column (WC). Pressure readings shall be taken while dispensing fuel to a certified test system or a non-ORVR equipped vehicle pursuant to Exhibit 4, "Fill Pipe Pressure Regulation Fueling Test".

**1.1.1** A fill pipe gauge pressure less than  $-1.0$ " WC or greater than  $+2.0$ " WC, measured following the test procedure in Exhibit 4, "Fill Pipe Pressure Regulation Fueling Test", is defined as an equipment defect which substantially impairs the effectiveness of the system in accordance with Health and Safety Code Section 41960.2 and is subject to district enforcement action in accordance with Health and Safety Code Section 41960.2(d).

**1.1.2** A fill pipe gauge pressure less than  $-0.5$ " WC but greater than  $-1.0$ " WC or greater than  $+1.0$ " WC but less than  $+2.0$ " WC, measured following the test procedure in Exhibit 4, "Fill Pipe Pressure Regulation Fueling Test", indicates that the equipment is not in good working order, but is not a defect specified pursuant to Health and Safety Code Section 41960.2(c) and is subject to district enforcement including action in accordance with Health and Safety Code Section 41960.2(e).

**1.2** Any nozzle installed on the Hill-Vac System shall have been performance checked by Healy Systems Incorporated at the site of manufacturing. Performance checks shall include checks of all shutoff mechanisms and the integrity of the vapor path. The leak rate of the nozzle vapor path shall not exceed the following:

0.038 CFH at a pressure of eighteen inches water column (18" WC);  
and 0.005 CFH at a vacuum of eighty-five inches water column (approximately 3 psi).

The nozzle shall be maintained in compliance with these specifications at all times.

**1.3** The nozzle boot and faceplate shall be maintained in good condition. The nozzle boot shall be replaced whenever the accumulated length of all tears (including rips, slits, cracks and etc.) exceeds 0.5" in length.

**1.3.1** A nozzle with a boot with any individual tear exceeding 0.5" in length is defined as a equipment defect which substantially impairs the effectiveness of the system in accordance with Health and Safety Code Section 41960.2(c) and is subject to district enforcement action in accordance with Health and Safety Code Section 41960.2(d).

- 1.3.2 A faceplate that is damaged such that the capability to achieve a seal with the fill pipe interface is adversely affected for 25% of the circumference of the face plate (accumulated) is defined as a equipment defect which substantially impairs the effectiveness of the system in accordance with Health and Safety Code Section 41960.2(c) and is subject to district enforcement action in accordance with Health and Safety Code Section 41960.2(d).

## **2 Reel Mounted Coaxial Hose**

- 2.1 The length of the reel mounted coaxial hose shall not exceed 75 feet.
- 2.2 A certified swivel shall be installed at the nozzle end of the coaxial hose.

## **3 Coaxial Hose Adapters**

Any coaxial hose adapters installed on the Hill-Vac System shall have been performance checked by Healy Systems Incorporated at the site of manufacturing to verify that they are vapor tight (as defined in CARB's "D-200, Definitions for Certification Procedures and Test Procedures for Vapor Recovery Systems"). Adapters shall be maintained vapor tight at all times.

## **4 Breakaway Couplings**

The installation of a breakaway coupling on the reel mounted coaxial hose is optional. However, only certified breakaways with a vapor tight valve that closes the vapor path when separated may be used.

## **5 Healy Model 100 jet pumps**

- 5.1 The Hill-Vac System shall operate with two Healy Model 100 jet pumps installed in parallel. (see Figures 3 and 4). Any Healy Model 100 jet pump installed on the Hill-Vac System shall have been performance checked by Healy Systems Incorporated at the site of manufacturing. The performance check must include verification that the jet pumps, when installed on the Hill-Vac System, can be adjusted such that the vapor recovery system performance will operate within the range specified herein. The vapor recovery system vacuum shall be checked and the jet pumps shall be adjusted, as necessary before commencing operation of the Hill-Vac System to insure that the system vacuum remains between 35" to 65" WC while gasoline is being dispensed from the nozzle.
- 5.2 No dispensing shall be allowed if either jet pump is disabled for maintenance or for any other reason. Dispensing of gasoline through the Healy Model 400 ORVR nozzle when either jet pump is disabled is defined as a equipment defect which substantially impairs the effectiveness of the system in accordance with Health and Safety Code Section 41960.2(c) and is subject to district enforcement action in accordance with Health and Safety Code Section 41960.2(d).
- 5.3 The Hill-Vac System shall be equipped with a vacuum gauge in order to manually monitor the vapor return line vacuum. The upper limit of the vacuum gauge range shall be greater than or equal to 100" WC and less than or equal to 160" WC. The gauge shall be connected to the system at the liquid drop out pot in the vapor return line (see Figures 2, 4, 6 and 9) A tee and two

ball valves may be installed at the vacuum gauge connection to facilitate accuracy checks and calibration of the gauge (see Figure 9).

- 5.4 The system shall operate within a vacuum range from 35" to 65" WC while gasoline is being dispensed from the nozzle. This vacuum range shall be determined by observing the system vacuum gauge required by Section 5.3. The specified operating range shall be posted in writing at the gauge panel.
- 5.5 The Hill-Vac System with dual jet pumps is certified for a single dispensing point only (see Figures 3 and 4). Installation of more than one nozzle per tank compartment is prohibited. If multiple nozzles are installed on the same cargo tank vehicle the entire system as depicted in figures 2 through 8 and containing all components listed in figure 1 must be duplicated on each tank compartment from which gasoline will be dispensed to motor vehicles.
- 5.6 The system shall achieve the minimum operating vacuum of 35" WC within five seconds after the system is activated for a dispensing episode. Failure to achieve the required initial vacuum for three consecutive dispensing episodes is defined as a equipment defect which substantially impairs the effectiveness of the system in accordance with Health and Safety Code Section 41960.2(c) and is subject to district enforcement action in accordance with Health and Safety Code Section 41960.2(d).
- 5.7 After the initial minimum vacuum has been reached, the system shall operate within a vacuum range from 35" to 65" WC throughout the dispensing episode. A vacuum level below 15" WC for more than three seconds after the system has reached 35" WC, measured while dispensing is occurring, is defined as a equipment defect which substantially impairs the effectiveness of the system in accordance with Health and Safety Code Section 41960.2(c) and is subject to district enforcement action in accordance with Health and Safety Code Section 41960.2(d). A vacuum level below 35" WC but greater than or equal to 15" WC for more than three seconds after the system has reached 35" WC, measured while dispensing is occurring, indicates that the equipment is not in good working order, but is not a defect specified pursuant to Health and Safety Code Section 41960.2(c), and is subject to district enforcement including action in accordance with Health and Safety Code Section 41960.2(e).
- 5.8 A vacuum level above 85" WC measured while dispensing to non-ORVR vehicles is occurring is defined as a equipment defect which substantially impairs the effectiveness of the system in accordance with Health and Safety Code Section 41960.2(c) and is subject to district enforcement action in accordance with Health and Safety Code Section 41960.2(d). A vacuum level above 65" WC but less than or equal to 85" WC measured while dispensing to non-ORVR vehicles is occurring, indicates that the equipment is not in good working order, but is not a defect specified pursuant to Health and Safety Code Section 41960.2(c), and is subject to district enforcement including action in accordance with Health and Safety Code Section 41960.2(e).
- 5.9 A one quarter inch non-restrictive ball valve shall be installed at the vapor return line connection to each Healy Model 100 jet pump (See Figures 3 and 4) so that the vacuum lines can be isolated from the cargo tank headspace for the purpose of conducting the "Vacuum Return Line Integrity Test" as specified in Exhibit 3. **The valves shall remain open at all times except when the test is being conducted.** Product dispensing when either of these valves is closed is



defined as an equipment defect which substantially impairs the effectiveness of the system in accordance with Health and Safety Code Section 41960.2(c) and is subject to district enforcement action in accordance with Health and Safety Code Section 41960.2(d). (Note: To ensure the integrity of the Phase II system during idle periods in which cargo tank pressure may be exerted on the system, the ball valves **shall not be closed** while conducting the cargo tank pressure integrity tests required by CARB's "CP-204, Certification Procedures for Vapor Recovery Systems of Cargo Tanks".

## **5.10 Fuel Supply to Jet Pumps and Nozzle**

- 5.10.1** The fuel line supplying liquid gasoline to the jet pumps shall operate in a pressure range from 27 psig to 35 psig while gasoline is being dispensed from the Healy Model 400 ORVR nozzle. The Hill-Vac System shall be equipped with a gauge to monitor the fuel supply line pressure. The gauge shall meet the specifications and calibration requirements outlined in Exhibit 2, Section 6.3. The specified operating range shall be posted in writing at the gauge panel.
- 5.10.2** If it is necessary to increase the engine speed of the cargo tank vehicle motor to provide a 27 to 35 psig line pressure in the supply line to the jet pumps the engine speed shall be increased automatically by a throttle valve actuator solenoid. The solenoid operation shall be controlled by the switch in the nozzle hood and back plate such that the engine speed increases when the nozzle is removed from the hanger and decreases when the nozzle is hanging in the idle position. (See Figures 4 and 8)
- 5.10.3** The Hill-Vac System shall be equipped with a fuel shutoff solenoid valve in the fuel line supplying gasoline to the Healy Model 400 ORVR nozzle and the Healy Model 100 Jet Pumps. This valve shall be controlled by the switch in the nozzle hood and back plate such that the valve is automatically opened when the nozzle is removed from the hanger and automatically closed when the nozzle is hanging in the idle position. (See Figures 4 and 8)
- 5.10.4** The power take off (PTO) from the vehicle drive train to the cargo tank rotary vane fuel pump shall be automatically controlled by the switch in the nozzle hood and back plate such that the PTO is activated to run the rotary vane pump when the nozzle is removed from the hanger and deactivated when the nozzle is hanging in the idle position. (See Figures 4 and 8)
- 5.10.5** All liquid gasoline supplied to the jet pumps shall pass through a fuel filter located in the gasoline supply line between the cargo tank rotary vane pump and the Healy Model 100 jet pumps. (See Figure 4)

## **6 System Monitoring Gauges**

### **6.1 Vapor Return Line Vacuum**

Each Hill-Vac System shall be equipped with a gauge to monitor the vacuum in the Phase II vapor return line. The upper limit of the vacuum gauge range shall be greater than or equal to 100 "WC and less than or equal to 160 " WC. The lower limit of the range shall be zero inches WC. The gauge shall be connected to the system at the liquid drop out pot in the vapor return line (see Figures 2, 4, 6 and 9). A tee and two ball valves may be installed at the vacuum gauge

connection to facilitate accuracy checks and calibration of the gauge (see figure 9). The calibration of the gauge shall be checked against a pressure sensing device of known accuracy (e.g. a liquid manometer or a mechanical gauge with a calibration traceable to a liquid manometer) at least once every 180 days. Calibration shall be performed at zero, 50 and 80 percent of the full scale reading of the gauge. The vapor return line vacuum gauge shall also meet the specifications and calibration requirements included in Exhibit 3 of this executive order, "Vapor Return Line Vacuum Integrity Test for the Hill-Vac System". A record of the current gauge calibration results shall be kept in the cargo tank vehicle passenger compartment at all times and made available for inspection by the local Air Pollution Control or Air Quality Management District upon request.

## **6.2 Cargo Tank Head Space Pressure Gauge**

Each Hill-Vac System shall be equipped with a gauge to monitor the pressure in the cargo tank head space. The upper limit of the pressure gauge range shall be greater than or equal to 20 "WC and less than or equal to 40 " WC. The maximum incremental graduations of the pressure gauge shall be 2 " WC. The minimum accuracy of the gauge shall be  $\pm 2$  " WC. The calibration of the gauge shall be checked against a pressure sensing device of known accuracy (e.g. a liquid manometer or a mechanical gauge with a calibration traceable to a liquid manometer) at least once every 180 days. Calibration shall be performed at zero, 50 and 80 percent of the full scale reading of the gauge. A record of the current calibration results shall be kept in the cargo tank vehicle passenger compartment at all times and made available for inspection by the local Air Pollution Control or Air Quality Management District upon request.

## **6.3 Jet Pump Fuel Supply Pressure Gauge**

Each Hill-Vac System shall be equipped with a gauge to monitor the pressure in the gasoline lines supplying liquid gasoline to the Healy Model 100 jet pumps. The upper limit of the pressure gauge range shall be greater than or equal to 60 psig and less than or equal to 100 psig. The maximum incremental graduations of the pressure gauge shall be 2 psig. The minimum accuracy of the gauge shall be  $\pm 2$  psig. The calibration of the gauge shall be checked against a pressure sensing device of known accuracy (e.g. a liquid manometer or a mechanical gauge with a calibration traceable to a liquid manometer) following the recommended procedure of the gauge manufacturer at least once every 180 days. Calibration shall be performed at zero, 50 and 80 percent of the full scale reading of the gauge. A record of the current gauge calibration results shall be kept in the cargo tank vehicle passenger compartment at all times and made available for inspection by the local Air Pollution Control or Air Quality Management District upon request.

## **7 Operators Log Requirements**

- 7.1** The owner/operator of any Hill-Vac System shall conduct a physical inspection of the equipment and manually monitor the system gauge levels during a dispensing episode at least once each day that gasoline is dispensed from the Healy Model 400 ORVR nozzle. If the initial observation indicates that either the vapor return line vacuum, the jet pump fuel supply line pressure or the cargo tank head space pressure is not within the allowable ranges specified in sections 5.4, 5.10.1 and 8.1, respectively, then the operator shall monitor and record the gauge readings during the following two dispensing episodes. All inspection results and gauge observations shall be

recorded in the System Log which must be kept in the cargo tank vehicle compartment at all times. A sample log sheet for the results of the required inspection is presented in Figure 10.

- 7.2** The owner/operator of any Hill-Vac System shall keep a written record of any event in which the vapor return line vacuum, the jet pump fuel supply line pressure or the cargo tank head space pressure fails to operate within the allowable ranges specified in sections 5.4, 5.10.1 and 8.1, respectively. The written record of such events shall be kept in a System Log which must be kept in the cargo tank vehicle compartment at all times. The written record shall identify the date and time period that the system failed to operate within specified ranges and the fuel totaling meter reading at the time that the system was first observed to be operating outside of the specified ranges. The record shall also indicate the date and time that the cargo tank operator contacted the Hill-Vac System manufacturer or authorized representative to arrange for inspections and necessary repairs. The record shall also indicate the date and time that the inspection and necessary repairs were accomplished, a description of the repairs performed, and the fuel totaling meter reading immediately following the completion of the inspection and repairs. The system log, in which the above information is to be recorded, shall be kept in the cargo tank vehicle passenger compartment at all times. Information shall be kept on file for two years and made available for inspection by the local Air Pollution Control or Air Quality Management District upon request.

## **8 Phase II Vapor Recovery System**

- 8.1** Operation of the Phase II vapor recovery system shall not cause pressure in the cargo tank headspace to exceed 18 "WC for more than five minutes (accumulated) during any sixty minute period in which gasoline has been dispensed from the Healy Model 400 ORVR nozzle. If such pressure excursions should occur, the Hill-Vac System shall be inspected and serviced by the manufacturer or their authorized representative to determine the nature of the problem and accomplish necessary repairs to the system. The maximum allowable cargo tank headspace pressure shall be posted in writing at the gauge panel. Continued operation of the Phase II vapor recovery system after the pressure in the cargo tank headspace has exceeded 18 "WC for more than five minutes (accumulated) during any sixty minute period in which gasoline has been dispensed from the Healy Model 400 ORVR nozzle is subject to district enforcement action in accordance with Health and Safety Code Section 41960.2(e).

As specified in Section 7.2, the cargo tank owner or operator shall record in a system log events of pressure greater than 18 "WC in the cargo tank headspace, which occur within any sixty minute period in which gasoline has been dispensed from the Healy Model 400 ORVR nozzle. (Note: Normal diurnal heating and cooling of the cargo tank head space while the phase II vapor recovery system has been idle may cause the cargo tank headspace pressure to reach or exceed 18 " WC. In this situation the cargo tank insulation required with the Hill-Vac System will result in lower diurnal pressure variations and resultant venting emissions than those occurring on a non-insulated cargo tank.)

## 8.2 Piping Requirements

- 8.2.1** All Phase II vapor return line plumbing connecting the Healy Model 400 ORVR nozzle to the Healy Model 100 Jet pumps shall be maintained so that it is capable of demonstrating ongoing compliance with the vapor return line vacuum integrity test that is included as Exhibit 3 of this order.
- 8.2.2** The minimum nominal line size of the Phase II plumbing shall be 0.5" between the Healy Hose Adapter (see Figure 1, item 14) and the Healy Model 100 jet pumps. The minimum nominal line size of the gasoline liquid supply line shall be 0.5" between the fuel shut off solenoid valve (see Figure 1, item 11) and the Healy Model 100 jet pumps.

## 8.3 Liquid Drop Out Pot

- 8.3.1** A liquid drop out pot with an automatic liquid removal system shall be installed at the low point in the vapor return piping (see Figures 2, 4, and 6). Liquid removal shall be accomplished by a 12 volt fuel pump which discharges liquid to the siphon port of the cargo tank rotary vane fuel pump. The 12 volt fuel pump operations shall be controlled by the switch in the nozzle hood and back plate such that the fuel pump is activated when the nozzle is removed from the hanger and deactivated when the nozzle is hanging in the idle position (See Figures 2 and 8). A rapid clicking noise will be present at the fuel pump when it is activated.
- 8.3.2** The liquid drop out pot shall be equipped with a sight gauge and drain valve to detect the presence of liquid accumulation in the liquid drop out pot. (See Figure 6) The drain valve shall be closed at all times and may only be opened if a failure of the liquid removal system requires that the liquid drop out be manually drained so that maintenance can be performed on the liquid removal system. Opening the drain valve at anytime other than when repair operations are underway is a system defect that substantially impairs the effectiveness of the system in accordance with Health and Safety Code Section 41960.2(c) and is subject to district enforcement action in accordance with Health and Safety Code Section 41960.2(d).
- 8.3.3** A one quarter inch non-restrictive ball valve shall be installed at the liquid drop out pot in the liquid removal line connected to the 12 volt electric pump (See Figure 6) so that the vacuum lines can be isolated from the cargo tank rotary vane pump siphon port for the purpose of conducting the "Vacuum Return Line Integrity Test" as specified in Exhibit 3. The valve shall remain **open** at all times except when the test is being conducted. Product dispensing when this valves is **closed** is defined as an equipment defect which substantially impairs the effectiveness of the system in accordance with Health and Safety Code Section 41960.2(c) and is subject to district enforcement action in accordance with Health and Safety Code Section 41960.2(d).

## 8.4 Dispensing Rate

The dispensing rate from the Hill-Vac System Healy 400 ORVR nozzle shall not exceed ten (10.0) gallons per minute. The dispensing rate shall be verified as specified in Exhibit 5, "Ten Gallon Per Minute Limitation Compliance Verification Procedure".

## **9 Surface Color and Insulation**

- 9.1** The entire cargo tank surface above the mounting rails shall be insulated with a minimum thickness of 2 inches rigid, seamless polyurethane foam that provides an insulating value of R-14 (See Figure 2). Exceptions to the 2 inch minimum thickness requirement include areas directly adjacent to other components mounted to the cargo tank surface and the area of limited access between the vehicle passenger compartment and the cargo tank end cap. Only these areas may be insulated with a thickness less than 2 inches; provided that the thickness is at least 1 inch and that the total area (not including the area below the cargo tank mounting rails) covered with a thickness less than 2 inches, does not exceed 20% of the total cargo tank surface area. The surface of the insulation shall be covered with an application of acrylic coating. Any breaks, cracks or holes in the insulation shall be repaired immediately in a manner which does not compromise the insulating properties or durability of the insulation.
- 9.2** All exposed Phase II vapor piping connecting the liquid drop out pot to the Healy Model 100 jet pumps (see Figure 3 and 4) shall be insulated with a minimum thickness of 0.5 inches of seamless rigid polyurethane foam or pre-formed foam pipe insulation. All exposed Phase II liquid piping connecting the fuel shutoff solenoid to the Healy Model 100 jet pumps (see Figure 3 and 4) shall be insulated with a minimum thickness of 0.5 inches of seamless rigid polyurethane foam or pre-formed foam pipe insulation. A maximum length of 16 inches (accumulated) of non-insulated piping shall be allowed as necessary to accommodate pipe fittings and varied plumbing configurations. The Hill-Vac System shall be equipped with removable covers that surround the Healy Model 100 jet pumps to reduce the solar energy transferred to the jet pumps during fuel dispensing operations. The cover shall surround the jet pumps on the top and sides with a minimum thickness of 0.5 inches of seamless rigid polyurethane foam or foam pipe insulation.
- 9.3** The exterior surface of the insulation surrounding the cargo tank, the removable jet pump covers, and the Phase II vapor return and gasoline supply piping connected the Healy Model 100 jet pumps and specified in Section 9.2, shall be painted white or off-white (with any color base) provided the reflectivity of the paint is 75 percent or better. Reflectivity shall be determined by visual comparison of the paint with paint color cards obtained from a paint manufacturer who uses the "Master Pallet Notation" to specify the paint color (i.e. 58YY 88 / 180 where the number in italics is the paint reflectivity). The owner or operator of any cargo tank vehicle on which the Hill-Vac System is installed shall make the appropriate color card available for inspection by the local air pollution control or air quality management district upon request.

## **10 Phase I System and Cargo Tank Vehicle Requirements**

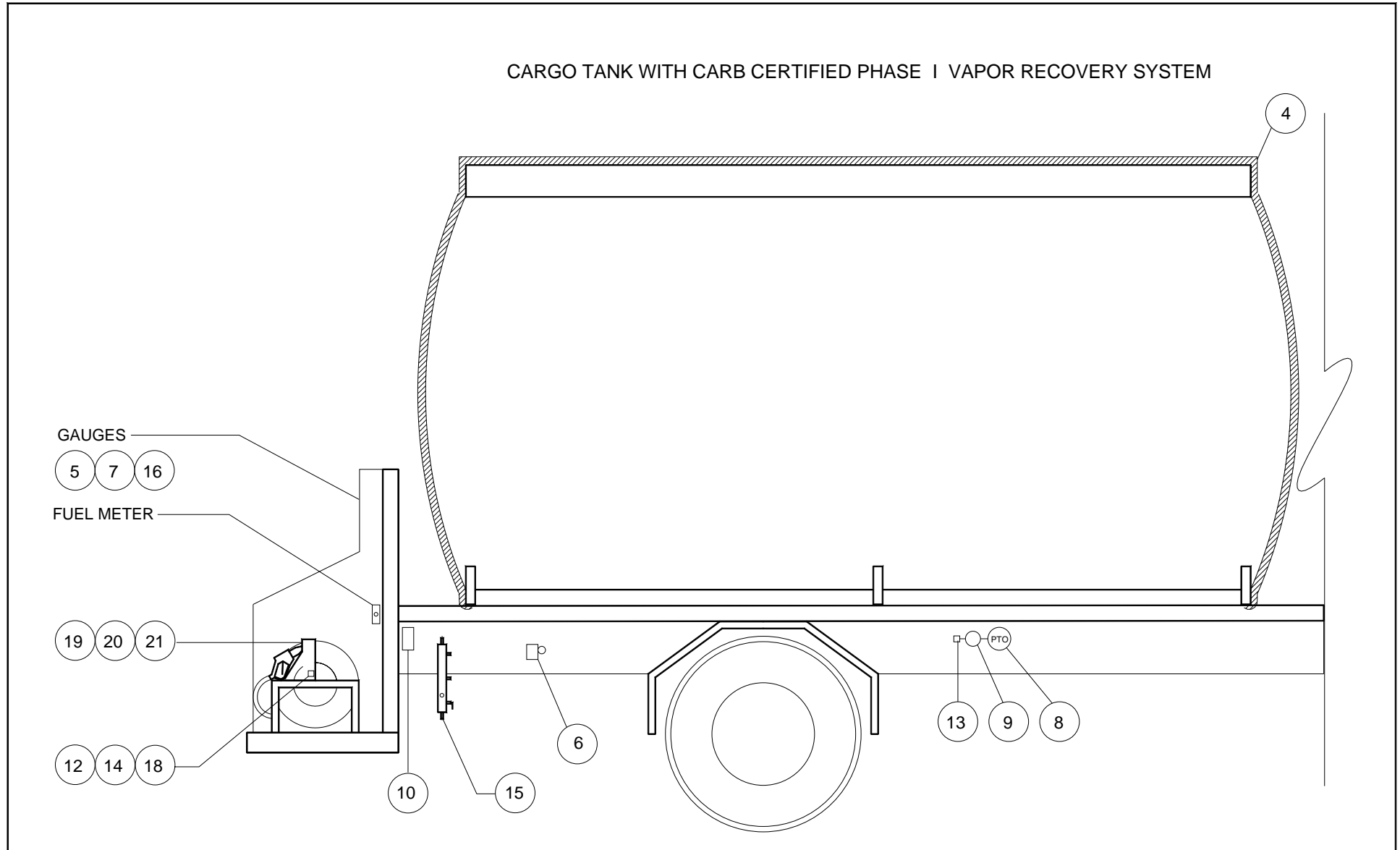
- 10.1** The Hill-Vac System may be installed and operated only on cargo tank vehicles with a Phase I vapor recovery system of a design that is certified by the ARB Executive Officer that has been certified and maintained in accordance with CARB's "CP-204, Certification Procedure for Vapor Recovery Systems of Cargo Tanks". Certification shall be verified by inspection of the documentation of certification that must be kept with the cargo tank at all times in accordance with CP-204. A current CARB certification decal shall be displayed on the cargo tank vehicle in the manner approved by the Executive Officer.

- 10.2** The Hill-Vac System shall not be installed on a cargo tank or tank compartment with a capacity greater than 5000 gallons.
- 10.3** The Hill-Vac System shall only be installed and operated on cargo tank vehicles that are equipped with an overfill protection device that will detect that the maximum capacity of the cargo tank has been reached and prevent the transfer of gasoline to the cargo tank by either closing the cargo tank vehicle internal valve or by signaling the loading rack equipment, which shall be designed to automatically close valves or shut down pumps to stop the transfer of gasoline.
- 10.4** The Hill-Vac System shall only be installed and operated on a cargo tank vehicle that is equipped with a non-resetting fuel totaling meter that is active during motor vehicle fueling operations. The meter shall have sufficient accuracy to allow for calculation of the volume of gasoline remaining in the cargo tank, thus eliminating the need to open the cargo tank dome hatch for tank gauging. (Note: Meters that are used for commercial / retail sales must meet the certification requirements and rules and regulations of the Division of Measurement Standards of the Department of Food and Agriculture.)
- 10.5** The cargo tank dome hatch shall remain closed and latched at all times. It shall not be opened for the purpose of routine tank gauging operations. It may only be opened to accomplish inspections which are necessary due to equipment failures, scheduled maintenance and repairs.
- 10.6** The cargo tank dome hatch shall not be opened at any time that the cargo tank head space pressure exceeds 2 " WC. The cargo tank headspace pressure shall be determined by observation of the gage specified in Section 6.2. To meet this requirement it may be necessary to allow the cargo tank to cool overnight before the dome hatch may be opened.

**Figure 1**  
**Component Listing**  
**Typical Hill-Vac Cargo Tank**  
**Motor Vehicle Fueling System**

LEGEND PHASE II VAPOR COMPONENTS					LEGEND PHASE II VAPOR COMPONENTS									
CATALOG NO.	AMOUNT EACH	DESCRIPTION	NO.	TOTAL	CATALOG NO.	AMOUNT EACH	DESCRIPTION	NO.	TOTAL					
HVM1/4BV	3	1/4" NON RESTRICTIVE BALL VALVE	①		HVMCR	1	CONTROL RELAY	②						
HVMH1	2	HEALY 100 JET PUMP	②		HVMTCA	1	THROTTLE CONTROL ACTUATOR SOLENOID	③						
HVMBV	1	SHUT OFF VALVE	③		EXISTING	1	MANUAL ENGINE STOP SWITCH	④						
RT-2031/115	1	SEAMLESS RIGID POLYURETHANE INSULATION & ACRYLIC COATING (2" THICKNESS)	④		EXISTING	1	MANUAL PTO SWITCH	⑤						
HVMGVAC	1	0-160 W.C. INCH VACUUM GAUGE	⑤		EXISTING	1	COIL 12 VOLT DC	⑥						
HVMGPSI	1	12 V ELECTRICAL FUEL PUMP (1 GPM) CONNECTED TO THE SIPHON CHECK VALVE #13	⑥		EXISTING	1	MANUAL HI SPEED IDLE CONTROL SWITCH	⑦						
HVMFP12VDC	1	0-100 PSI PRESSURE GAUGE FOR GASOLINE TO JET PUMP AND NOZZLE	⑦		EXISTING	1	IGNITION RELAY	⑧						
EXISTING	1	HYD MOTOR / P.T.O.	⑧		EXISTING	1	12 VOLT BATTERY	⑨						
EXISTING	1	ROTARY VANE FUEL PUMP W/ SIPHON PORT	⑨		HVMMSG	1	SIGHT GAUGE	⑩						
EXISTING	1	GASOLINE FILTER	⑩											
HVM12VDC	1	12 VDC SOLENOID FUEL SHUT OFF	⑪											
HVMHR	1	HANNAY PHASE II VAPOR RECOVERY RETRACTABLE HOSE REEL	⑫											
HVMSV	1	SIPHON CHECK VALVE	⑬											
HVMCXA	1	HEALY MODEL VV1A VAPOR ADAPTER SPLITTER VALVE	⑭											
HVMVP	1	LIQUID DROP OUT POT	⑮											
HVMVM-40	1	0-40" W.C. CARGO TANK PRESSURE GAUGE	⑯											
HVMHVCK	1	HEALY MODEL 1258A VACUUM RELIEF VALVE (-80" TO -100")	⑰											
HVMH3/4X50	1	HEALY MODEL 75B7505252 COAX VAPOR RECOVERY HOSE ( MAXIMUM LENGTH 75 FT. )	⑱											
HVMHNZ	1	HEALY 400 ORVR NOZZLE	⑲											
HVMP1	1	NOZZLE HOOD AND BACK PLATE	⑳											
HVMP2	1	WOBBLE SWITCH / NOZZLE SWITCH	㉑											
LEGEND PHASE II VAPOR COMPONENTS					<b>HILL - VAC VAPOR SYSTEM</b>			PREPARED BY: CLK/DRXW		NO.	DATE	BY	REV	PHILLIPS-HE CORPORATION 1100 North "L" Street Tulsa, Oklahoma 74104 Phone (505) 688 - 2077 FAX (505) 688 - 1467
TYPICAL MOBILE FUELER								DRAWN: JESSIE G. MARTINEZ		4	7-15-99	JGM	PARTS	
					FILE: SCE-094									

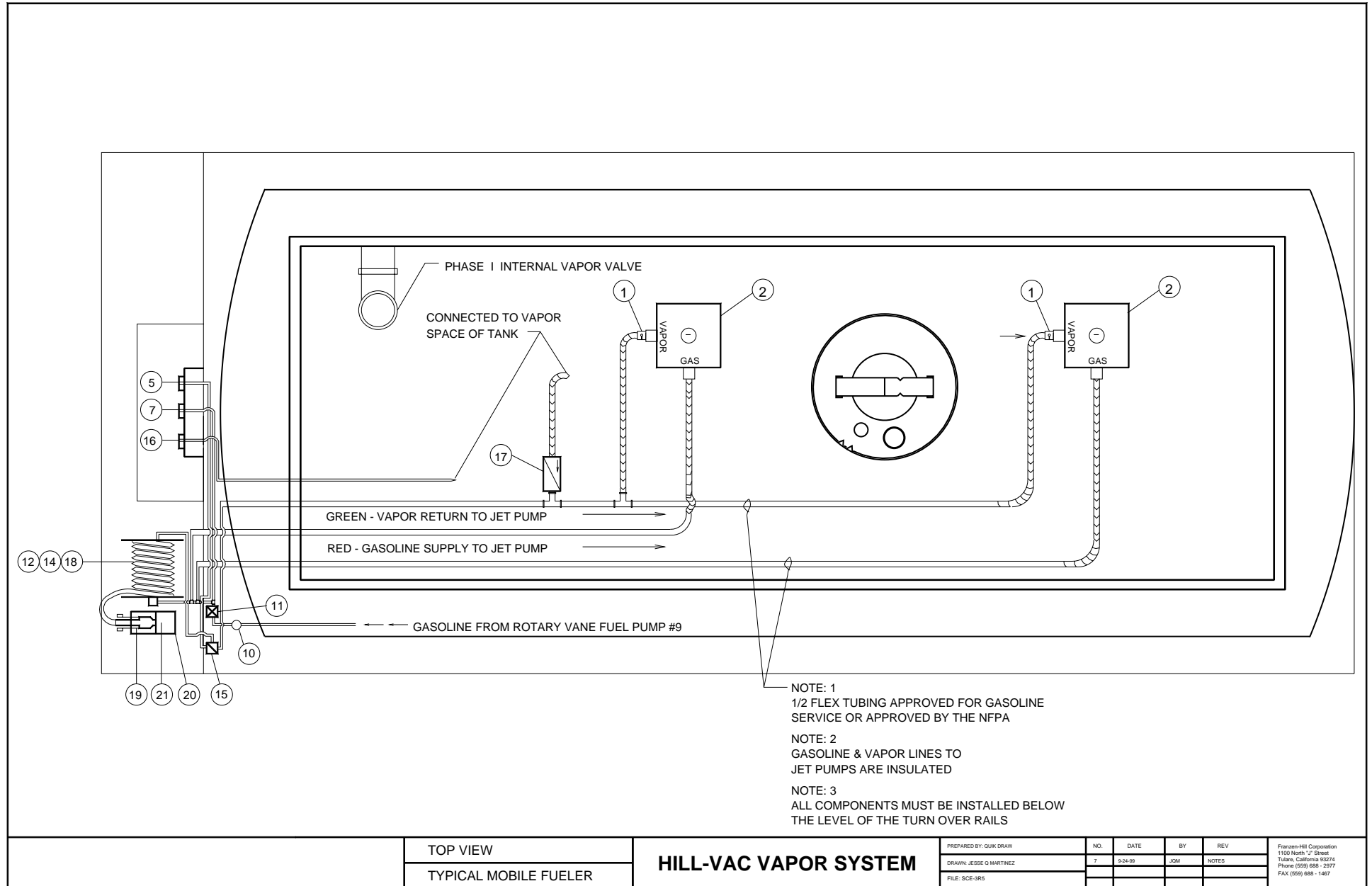
**Figure 2**  
 Side View  
 Typical Hill-Vac Cargo Tank  
 Motor Vehicle Fueling System



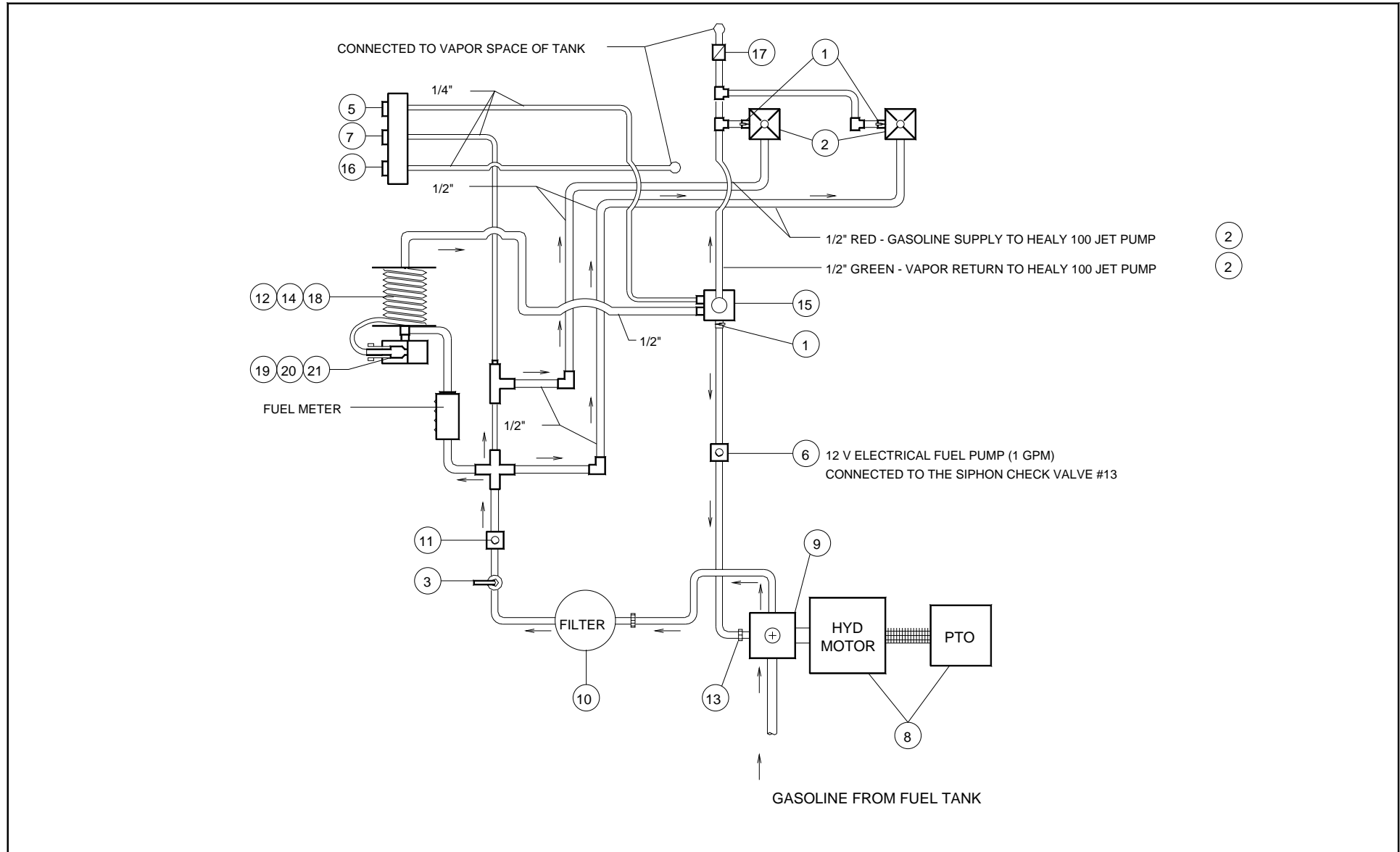
SIDE VIEW	<b>HILL - VAC VAPOR SYSTEM</b>	PREPARED BY: OLIV DRAW	NO.	DATE	BY	REV	Franzen-Hill Corporation 1100 North Z Street Turlock, California 93274 Phone (559) 688 - 2977 FAX (559) 688 - 1467
TYPICAL MOBILE FUELER		DRAWN: JESSE O MARTINEZ	4	6-18-99	JQM	PIPING/PARTS	
	FILE: SCE-1R3	5	6-28-99	JQM	PIPING/PARTS		



**Figure 3**  
 Top View  
 Typical Hill-Vac Cargo Tank  
 Motor Vehicle Fueling System

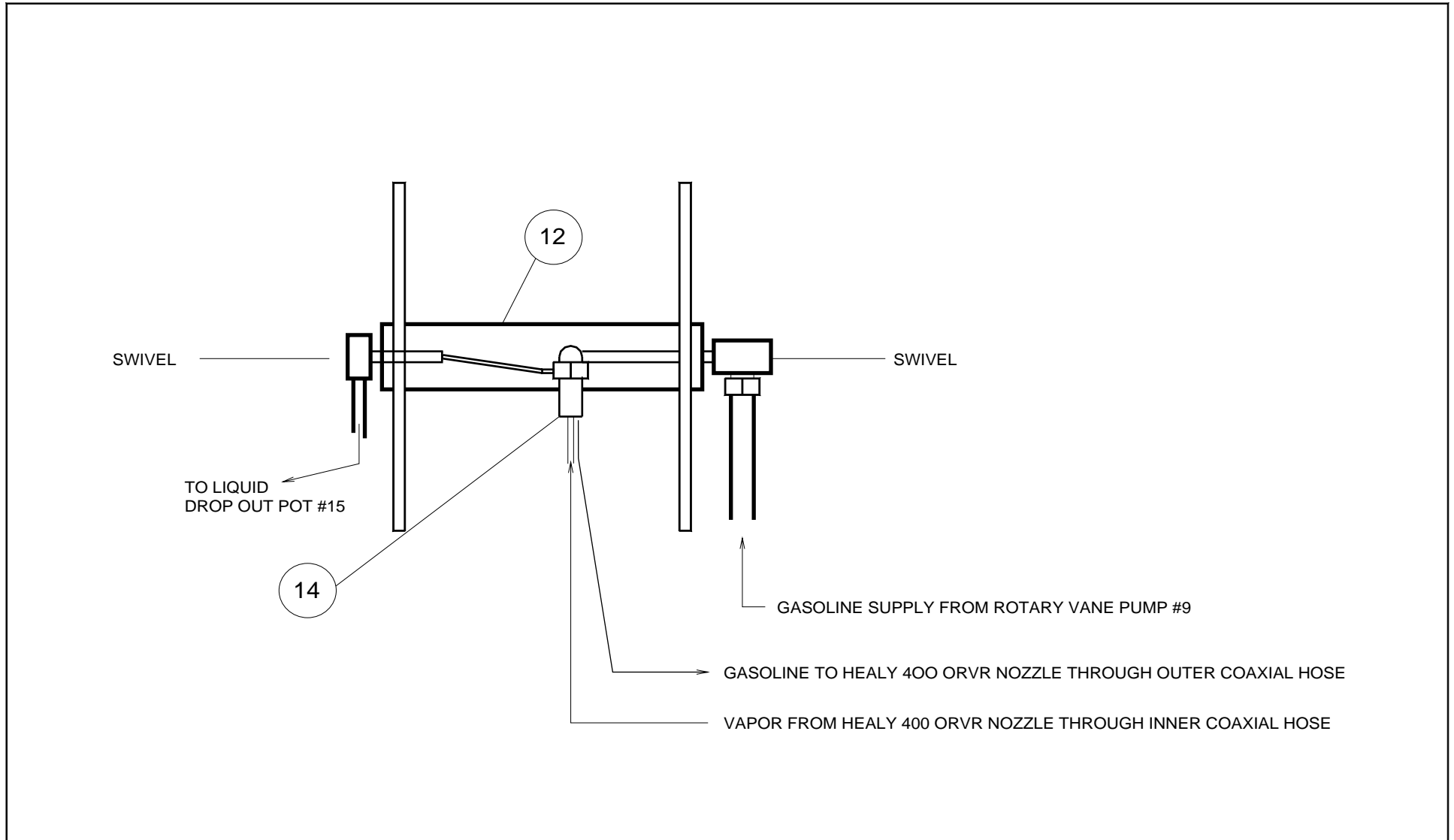


**Figure 4**  
**Gasoline and Vapor Flow Diagram**  
**Typical Hill-Vac Cargo Tank**  
**Motor Vehicle Fueling System**



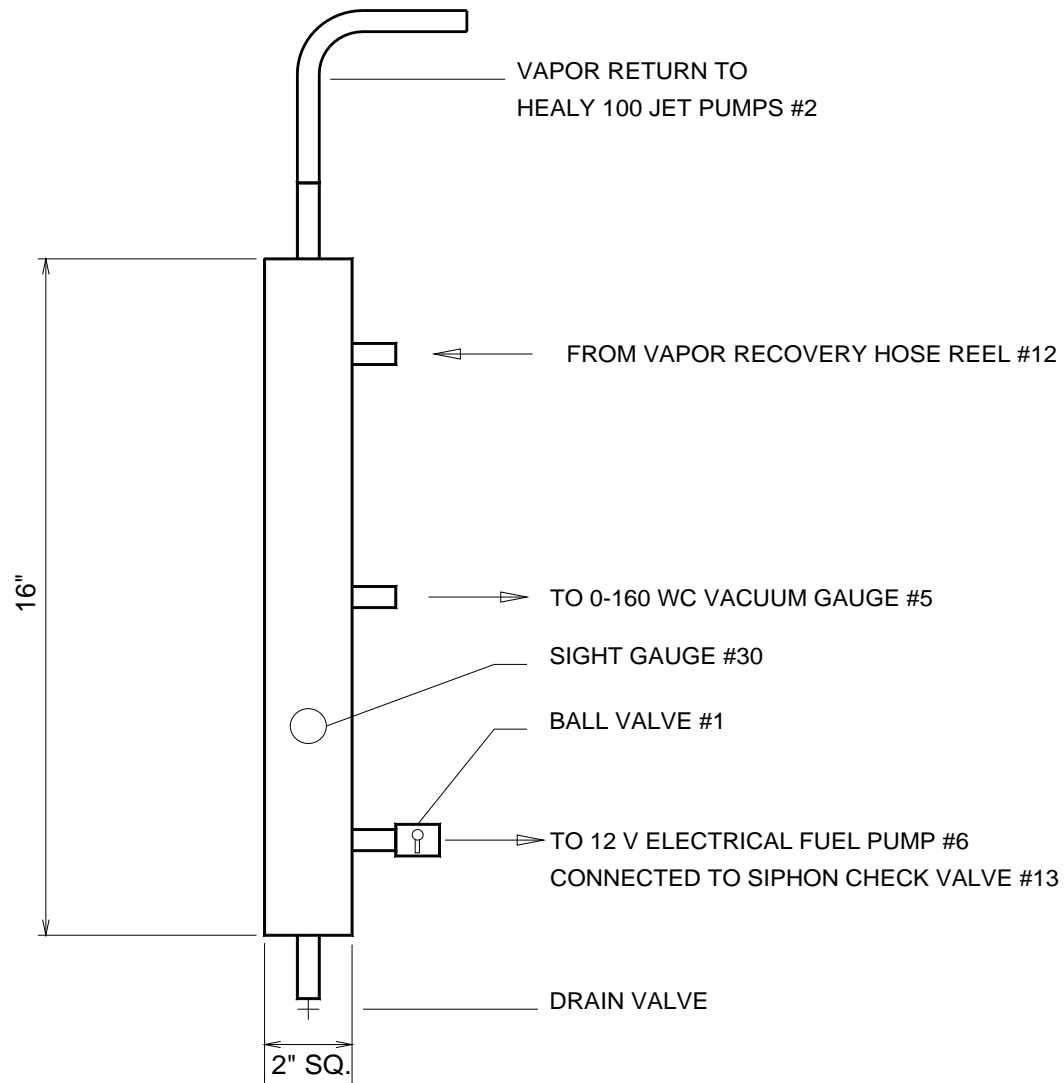
GASOLINE & VAPOR FLOW DIAGRAM	HILL - VAC VAPOR SYSTEM	PREPARED BY: QUIK DRAW	NO.	DATE	BY	REV	Franzen-Hill Corporation 1100 North "J" Street Tulare, California 93274 Phone (559) 688 - 2977 FAX (559) 688 - 1467
		DRAWN: JESSE Q MARTINEZ	5	7-8-99	JQM	PIPING/PARTS	
TYPICAL MOBILE FUELER		FILE: SCE-5R7	6	7-15-99	JQM	PIPING/PARTS	
			7	7-20-99	JQM	PIPING/PARTS	

**Figure 5**  
 Coaxial Hose Reel Detail  
 Typical Hill-Vac Cargo Tank  
 Motor Vehicle Fueling System



REEL DETAIL	<b>HILL - VAC VAPOR SYSTEM</b>				PREPARED BY: QUJK DRAW	NO.	DATE	BY	REV	Franzen-Hill Corporation 1100 North "J" Street Tubane, California 95274 Phone (559) 688-2977 FAX (559) 688-1467
					DRAWN: JESSE Q MARTINEZ	1	5-15-99	JQM	PARTS	
					FILE: SCE.6R4	2	5-28-99	JQM	PARTS	
TYPICAL MOBILE FUELER					3	7-15-99	JQM	PARTS		

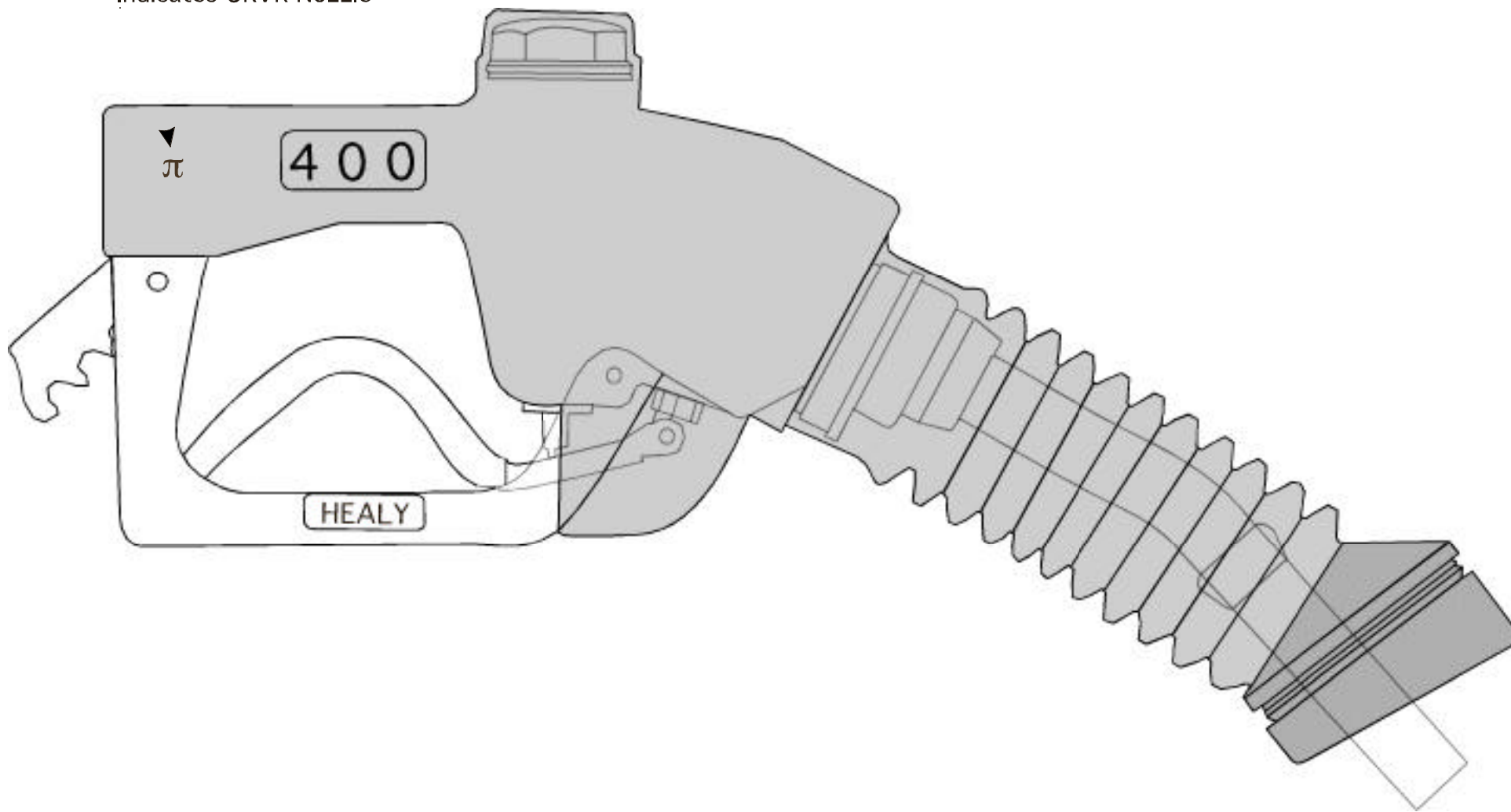
**Figure 6**  
 Liquid Drop Out Pot Detail  
 Typical Hill-Vac Cargo Tank  
 Motor Vehicle Fueling System



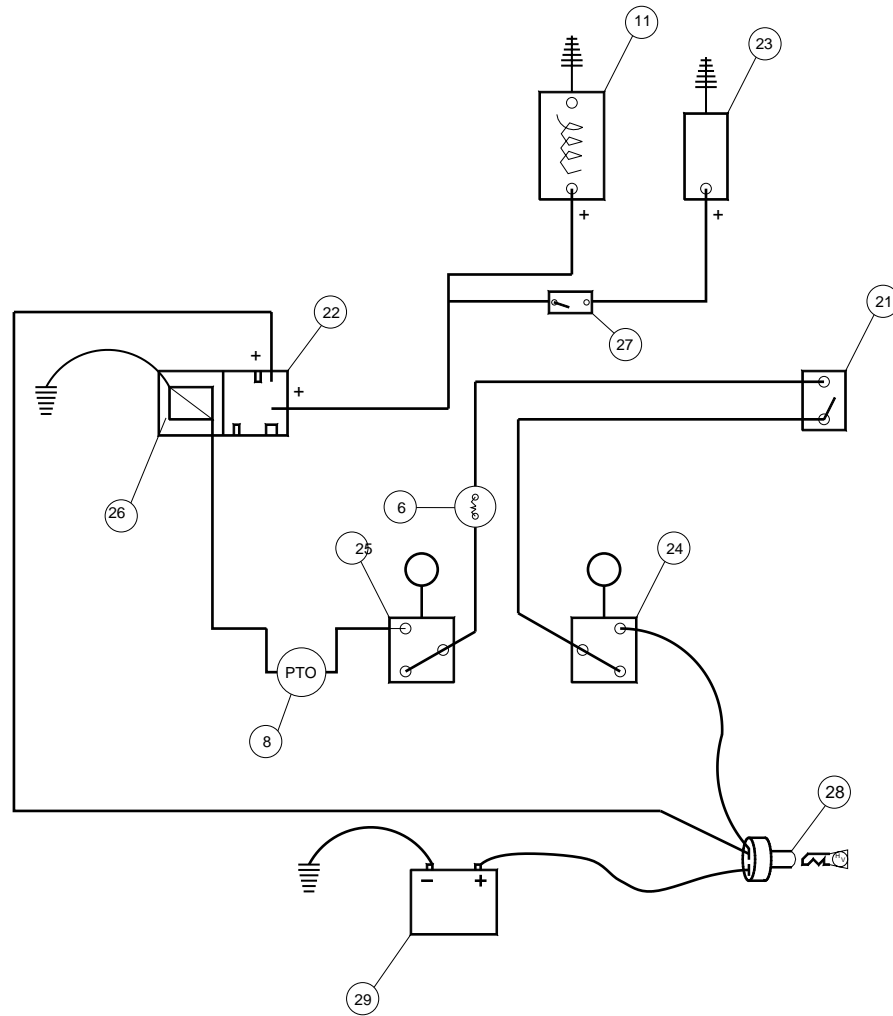
LIQUID DROP OUT POT DETAIL	<b>HILL - VAC VAPOR SYSTEM</b>	PREPARED BY: JUNK DRAW	NO.	DATE	BY	REV	Francis Hill Corporation 1100 North "J" Street Tulink, California 95274 Phone (659) 688 - 2977 FAX (659) 688 - 1467
		DRAWN: JESSE Q MARTINEZ		4	7-16-04	JQM	
TYPICAL MOBILE FUELER		FILE: SCE-484					

**Figure 7**  
Healy Systems Model 400 ORVR Nozzle  
Hill-Vac Cargo Tank  
Motor Vehicle Fueling System

Indicates ORVR Nozzle



**Figure 8**  
 Wiring Illustration for Components Controlled by Nozzle Switch  
 Typical Hill-Vac Cargo Tank  
 Motor Vehicle Fueling System

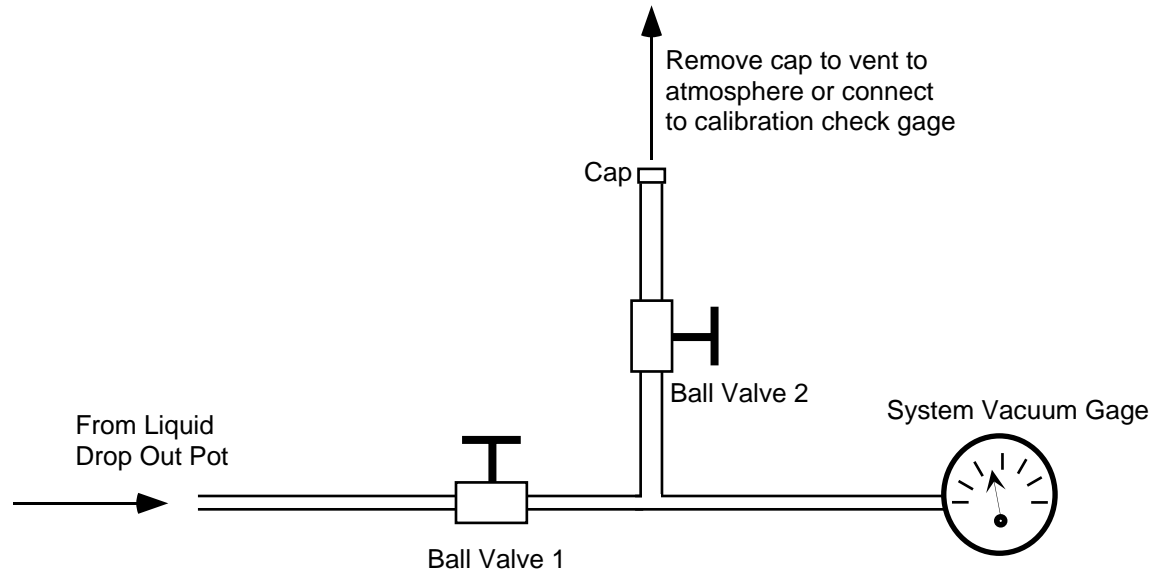


NOTE:

- THE 12 VOLT ELECTRIC FUEL PUMP, (6)
- THE MANUAL PTO SWITCH, (8)
- THE THROTTLE CONTROL ACTUATOR SOLENOID, (23)
- AND THE 3/4\" 12 VDC SOLENOID FUEL SHUT OFF (11)
- ALL MUST BE CONTROLLED BY THE
- WOBBLE SWITCH / NOZZLE SWITCH (21)

WIRING SCHEMATIC	TYPICAL MOBILE FUELER	<b>HILL - VAC VAPOR SYSTEM</b>	PREPARED BY: QLIK DRAW	NO.	DATE	BY	REV	Franzen-Hill Corporation 1100 North "L" Street Tulare, California 93274 Phone (559) 688 - 2977 FAX (559) 686 - 1467
			DRAWN: JESSE O MARTINEZ	4	6-18-99	JOM	PIRNGPARTS	
FILE: SCE-293	5	6-29-99	JOM	PIRNGPARTS				

**Figure 9**  
 Installation of Tee & Ball Valves for  
 Gage Calibration Checks  
 Typical Hill-Vac Cargo Tank  
 Motor Vehicle Fueling Systems



To simplify calibration checks of the system vapor return line vacuum gage, a ball valve and tee may be installed in the line connecting the liquid drop out pot and the vacuum gage. One leg of the tee connects the line to the gage. The second leg of the tee is connected through a second ball valve either to the atmosphere or to a calibration check gage of known accuracy. With ball valve 1 closed and ball valve 2 open to atmosphere, the zero setting of the gage may be checked and adjusted. With ball valves 1 and 2 open and the jet pumps running and a calibration check gage of known accuracy connected to the outlet of ball valve 2, the accuracy of the gage at normal operating vacuum levels can be checked. **Note:** During normal operation ball valve 1 must remain open and ball valve 2 must remain closed at all times.

\_\_\_\_\_  
Facility

\_\_\_\_\_  
Contact Name

\_\_\_\_\_  
Address

\_\_\_\_\_  
Phone Number

\_\_\_\_\_  
City, State Zip Code

\_\_\_\_\_  
System Installation Date

<b>Daily Inspection Results</b>	
Date & Time of Inspection	
Totaling Meter Reading	
Note any damage to nozzle bellows or faceplate and coaxial hose	
Note if liquid is visible in vapor return line drop out sight gauge	
Cargo Tank Pressure (" WC)	
Vapor Return Line Vacuum (" WC)	
Gasoline Supply Pressure (psig)	

<b>Maintenance Required</b>	
Date and Time Maintenance Contractor Called	
Maintenance Contractor Name and Phone	
Date Maintenance Performed	
Totaling Meter Reading On Date Maintenance Performed	

Tests Conducted During Maintenance:

Test Results (attach additional sheets as necessary):

List Components Repaired or Replaced:



**Executive Order G-70-193**  
**Exhibit 3**  
**Vapor Return Line Vacuum Integrity Test for the**  
**Hill-Vac Vapor Recovery System for**  
**Cargo Tank Motor vehicle Fueling Systems**

**1**     **Applicability**

This test procedure is used to verify the vapor tightness of the portion of the Hill-Vac System which is subjected to relatively high levels of vacuum in the nozzle, coaxial hose and the vapor return lines. A defective vapor valve, or any other defect which compromises the integrity of the vapor lines from the nozzle to the Healy Model 100 jet pumps, may cause the ingestion of air. Excess air passing through the jet pumps and into the storage tanks will increase in volume due to gasoline evaporation into the air and may cause fugitive leak emissions if the pressure in the cargo tank head space exceeds the pressure at which the cargo tank has been demonstrated to be vapor tight (18 " WC) and vent emissions if the cargo tank pressure exceeds the pressure setting of the cargo tank P/V valve (minimum setting 1 psig).

**Note:** This test is required in addition to, and not as an alternative for, the static pressure decay tests which are required pursuant to CARB's "CP-204, Certification Procedures for Vapor Recovery Systems of Cargo Tanks".

**2**     **Principle**

The vapor lines connecting the Healy Model 400 ORVR nozzle to the Healy Model 100 jet pumps are isolated from the cargo tank by closing the vapor and siphon line ball valves after activating the jet pumps and achieving the maximum vacuum attainable while no gasoline is being dispensed from the nozzle. The jet pumps are then deactivated by hanging the nozzle in the nozzle hood and back plate and the vacuum is allowed to decay. The final vacuum after five minutes is then compared to the allowable final vacuum.

**3**     **Range**

- 3.1**    If a vacuum measuring device with a mechanical readout is used, the upper limit of range of the vacuum range shall be greater than or equal to 100 " WC and less than or equal to 160 " WC. The lower limit of the vacuum range shall be zero inches WC. The maximum incremental graduations of the vacuum gauge shall be 5 " WC and the minimum accuracy of the gauge shall be five percent of full scale. The minimum diameter of the pressure gauge face shall be two inches.
- 3.2**    If a vacuum measuring device with a digital electronic readout is used, the full scale range of the device shall not exceed zero to 200 inches water column (0 - 200" WC). The device shall display the measured value to within 0.1 " WC and a minimum accuracy of two percent of full scale is required.

#### **4 Interference**

Any attempts to dispense product during the test will open the lines being tested and invalidate the results.

#### **5 Apparatus**

**5.1** Vacuum Measuring Device - Use a vacuum measuring device to monitor the decay of the vacuum level in the vapor return lines. The vacuum measuring device shall, at a minimum, be readable to  $\pm 2.5$  inches water column.

**5.2** Stopwatch - Use a stopwatch accurate to within 0.2 seconds.

#### **6 Pre-Test Procedures**

**6.1** There shall be no product dispensing during the test.

**6.2** All vacuum measuring device(s) shall be calibrated using either a reference gauge or liquid manometer. Calibration shall be performed at zero, 50 and 80 percent of full scale. Accuracy shall be within five percent at each of these calibration points. Meters shall have been calibrated within 180 days prior to use in performing this test procedure. A zero check shall be conducted immediately prior to each application of this test procedure. The zero check shall be conducted with the vacuum measuring device in the same orientation as that which will be used for pressure measurements.

**6.3** Install the vacuum measuring device to sense the vacuum in the vapor lines that will be isolated from atmosphere and the cargo tank head space.

#### **7 Testing**

**7.1** Activate the flow of gasoline through the jet pumps by removing the nozzle from the nozzle hood and back plate. (Note: The cargo tank vehicle engine must be running to energize the PTO and the rotary vane pump supplying gasoline to the jet pumps.) The jet pumps are deactivated by replacing the nozzle on the nozzle hood and back plate.

**7.2** Observe the read out on the vacuum measuring device. When the vacuum level is stable, isolate the vapor lines from the cargo tank by closing the two ball valves located at the vapor return line connections to the jet pumps and the ball valve located at the siphon line connection to the liquid drop out pot (refer to Exhibit 2, Figures 3, 4, and 6) and deactivate the jet pumps by replacing the nozzle on the nozzle hood and back plate. If a stable vacuum level is not observed after one minute of jet pump operation, or if the stable vacuum level is less than 65 " WC, deactivate the jet pumps and check for system component failures before proceeding with the test.

**7.3** Record the initial vacuum level and start the stopwatch. Record the vacuum level at one minute intervals. After five minutes, record the final vacuum level.

- 7.4** Calculate the difference between the final vacuum level and the initial vacuum level to obtain the observed change in vacuum. Record this value as the "measured DP". DP must be less than or equal to 28 " WC. (Note: The total length of one half inch nominal diameter vapor return line connecting the nozzle to the jet pumps is typically less than 100 feet on the Hill-Vac system. The allowable pressure drop of 28 "WC in five minutes corresponds to an allowable leak rate of approximately 0.02 gallons per minute, based on the total volume of 100 feet of half inch vapor return line and a typical liquid drop out pot.) If the "measured DP" is greater than 28 " WC, then an unacceptable vapor leak is evident and the system has failed. If the "measured DP" is less than 28 "WC, proceed to Section 8.
- 7.5** If the system has failed to meet the criteria set forth in Section 7.4, repair and replace defective components as necessary and repeat the test. Defective nozzles or other components may be diagnosed by bagging with bags containing air and observing collapse of the bags, or by otherwise isolating suspected components. (Note: This is only for diagnostic purposes; the test shall not be conducted with any bagged or isolated components.)

## **8 Post-Test Procedures**

- 8.1** Remove any pressure measuring devices installed for the test and plug or cap the connection point and ensure that it is leak tight.
- 8.2** Open the three ball valves which were closed to isolate the vapor return lines.

## **9 Reporting**

Report the observed initial, interim and final vacuum levels, the "measured DP" and any repairs, adjustments or component replacements that were necessary to achieve a passing result. Also report the manufacturer and model, range and accuracy, and the date of the last calibration for the vacuum measuring device utilized for the test. An acceptable reporting form is depicted in Figure 1. Documentation of the required calibrations shall be prepared and included with the test results. All information required to be recorded as stated above shall be kept on file for two years and made available for inspection by the local Air Pollution Control or Air Quality Management District upon request.

**Figure 1**

Distribution:	<b>Hill-Vac Vapor Recovery System Executive Order G-70-193</b>  <b>Vapor Return Line Vacuum Integrity Test</b>  <b>Summary of Source Test Results</b>	Job # _____  Report #: _____  Test Date: _____  Test Times: _____																																							
Operator Name & Address:	No. of Nozzles on Tank Truck: _____ Hose A Serial #: _____ Model#: _____ Length: _____ Hose B Serial #: _____ Model#: _____ Length: _____ Healy Model 400 ORVR Nozzles System A Serial #: _____ System B Serial #: _____	Phase 1 System CARB Cert. No.: _____ Expiration Date Month: _____ Year: _____  Healy Model 100 Jet Pumps Serial # 1A: _____ Serial # 2A: _____ Serial # 1B: _____ Serial # 2B: _____																																							
Representative's Name & Job Title:	Reel A Model No: _____ Serial No : _____  Reel B Model No : _____ Serial No: _____	APCD OR AQMD: Permit #: Applicable Regulations:																																							
Phone No.:																																									
Office Use Only:																																									
Test Results:  <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:70%;">Hill-Vac Vapor Recovery System</th> <th style="width:15%;">System A</th> <th style="width:15%;">System B</th> </tr> </thead> <tbody> <tr><td>1. Product Grade</td><td></td><td></td></tr> <tr><td>2. Actual Tank Capacity, Gallons</td><td></td><td></td></tr> <tr><td>3. Gasoline Volume, Gallons</td><td></td><td></td></tr> <tr><td>4. Ullage, Gallons (subtract line 3 from line 2)</td><td></td><td></td></tr> <tr><td>5. Initial Test Vacuum, " WC (Minimum 65" W.C.)</td><td></td><td></td></tr> <tr><td>6. Vacuum After 1 Minute, " WC</td><td></td><td></td></tr> <tr><td>7. Vacuum After 2 Minutes, " WC</td><td></td><td></td></tr> <tr><td>8. Vacuum After 3 Minutes, " WC</td><td></td><td></td></tr> <tr><td>9. Vacuum After 4 Minutes, " WC</td><td></td><td></td></tr> <tr><td>10. Final Vacuum After 5 Minutes, " W.C.</td><td></td><td></td></tr> <tr><td>11. Allowable Final Vacuum (subtract 28" from Line 5)</td><td></td><td></td></tr> <tr><td>12. Test Status (Pass if Line 10 &gt; Line 11) (Fail if Line 10 &lt; Line 11)</td><td></td><td></td></tr> </tbody> </table> (attach vacuum gauge make, model, range, accuracy & calibration information)	Hill-Vac Vapor Recovery System	System A	System B	1. Product Grade			2. Actual Tank Capacity, Gallons			3. Gasoline Volume, Gallons			4. Ullage, Gallons (subtract line 3 from line 2)			5. Initial Test Vacuum, " WC (Minimum 65" W.C.)			6. Vacuum After 1 Minute, " WC			7. Vacuum After 2 Minutes, " WC			8. Vacuum After 3 Minutes, " WC			9. Vacuum After 4 Minutes, " WC			10. Final Vacuum After 5 Minutes, " W.C.			11. Allowable Final Vacuum (subtract 28" from Line 5)			12. Test Status (Pass if Line 10 > Line 11) (Fail if Line 10 < Line 11)			Maintenance & Repairs:          Recommendations:	
Hill-Vac Vapor Recovery System	System A	System B																																							
1. Product Grade																																									
2. Actual Tank Capacity, Gallons																																									
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Test Company:	Cargo Tank Vehicle Identification:																																								
Name: _____	VIN #: _____																																								
Address: _____	Truck #: _____																																								
	Lic #: _____																																								
Phone No.:	Test Performed By:																																								

## Executive Order G-70-193

### Exhibit 4

## Fill Pipe Pressure Regulation Fueling Test

### 1 Applicability

This test procedure is used to verify proper operation of the nozzle boot pressure regulation unique to the Healy Model 400 ORVR nozzle when installed on the Hill-Vac System for cargo tank motor vehicle fueling systems.

### 2 Principle

The ability of the nozzle to properly regulate the fill pipe pressure during gasoline dispensing is verified while dispensing gasoline into a leak free simulated vehicle fuel tank containing gasoline and saturated vapors or into an actual non-ORVR equipped vehicle. (typically a pre-1998 model year) Pressure readings are taken with a mechanical gauge during a fueling of at least five gallons, excluding the first two gallons and last one gallon dispensed. A vacuum which exceeds 1 inch water column (WC), or a pressure which exceeds 2 inches WC, except during the first two gallons and the last gallon dispensed, indicates a defective nozzle or system.

### 3 Interference

Vacuum or pressure levels outside of the specified range may occur during the beginning or end of the refueling operation when properly functioning equipment is affected by the following conditions: (1) gasoline dispensed into a vehicle fuel tank which is significantly warmer than the dispensed fuel may cause a vacuum of several inches water column; and, conversely, (2) gasoline dispensed into a vehicle tank which is significantly cooler than the dispensed fuel may temporarily cause a pressure greater than 3 inches water column. The effect of the temperature differential will be most pronounced at the beginning of the fueling operation and tends to gradually disappear toward the end of the fueling operation as fuel and vapor temperatures in the vehicle fuel tank equalize.

### 4 Apparatus

**Pressure Gauge** The full scale range of the gauge shall be 1.5 inch water column vacuum to 3.5 inch water column pressure (-1.5" WC – +3.5" WC). Maximum incremental graduations of the pressure gauge shall be 0.10 inches WC and the minimum accuracy of the gauge shall be three percent of full scale (0.15" WC). The minimum diameter of the pressure gauge shall be four inches.

A zero to five inch water column gauge (e.g. Dwyer Magnehelic, model 2005) is commonly available and may be utilized by adjusting the zero setting to read 2.0 inches WC when there is no differential pressure between the high pressure and low pressure connection ports of the Maganhelic gauge (i.e. both ports open to atmosphere). The zero setting must be made with the gage in the same orientation as that which will be used for pressure measurements. With the gauge adjusted in this manner a reading of 1.0" on the gauge represents a 1.0" WC vacuum and a reading of 4.0" on the gauge represents a pressure of 2.0" WC.

**Toroid Shaped Gasket** A gasket, as depicted in Figure 2, must be used for dispensing into motor vehicles. Gaskets constructed of Viton or American National Rubber Company Stock No. ECH 4310 closed cell foam gasket material have proven effective. Before the initial use of an individual toroid shaped gasket, the gasket shall be evaluated to determine the sealing effectiveness. At least two dispensing episodes (minimum five gallons) shall be conducted on the same vehicle or test tank, one with the gasket in place and one without. A hydrocarbon monitoring instrument meeting the specifications of CARB Method 21, "Determination of Volatile Organic Compound Leaks" shall be used to measure the hydrocarbon concentration at the interface of the nozzle with the fill pipe and with the toroid shaped gasket. If the concentrations measured with and without the gasket in place differ by 10% or less the sealing capability of the gasket shall be deemed adequate for use. Other methods may be used to demonstrate the adequacy of the sealing effectiveness of the gasket with the prior written approval of the Executive Officer

- 4.1 Procedure 1 – Simulated Vehicle Fuel Tank** Use a gauge mounted on the test tank fill pipe to measure fill pipe pressure during fueling of a simulated fuel tank (see Figure 1).
- 4.2 Procedure 2 – Toroid Shaped Gasket With Actual Vehicle** Use a gauge connected to the toroid shaped gasket and mounted on a stand and placed level on the vehicle during fueling of actual vehicles (see Figure 2). A towel or pad should be placed on the vehicle to protect the painted surface from scratches or other damage.
- 4.3** The pressure measuring device shall be calibrated using a pressure sensing device of known accuracy (e.g. a liquid manometer or a mechanical gauge with a calibration traceable to a liquid manometer). Calibration shall be performed at zero, 50 and 80 percent of full scale. Accuracy shall be within two percent (2%) at each calibration point. The pressure measuring device shall have been calibrated within 180 days prior to use for this test procedure. A zero check shall be conducted immediately prior to each application of this test procedure. The zero check shall be conducted with the gage in the same orientation as that which will be used for pressure measurements.

## **5 Pre-Test Procedures**

Verify that the Hill-Vac system is maintaining the vapor return lines within the required operating range of 35" to 65" WC vacuum while gasoline is being dispensed from the nozzle.

No tears or holes are allowed on the nozzle boot or face plate.

Ensure that the high vacuum vapor return lines are leak tight (see Exhibit 3).

- 5.1 Procedure 1 – Simulated Vehicle Fuel Tank** (Figure 1).
  - a.** Position test tank next to the nozzle being tested.
  - b.** Dispense 1-2 gallons of gasoline into test tank.

- c. Remove nozzle and replace fill cap.
- d. Roll tank back and forth vigorously for thirty seconds to saturate the vapor head space in the tank.

## 5.2 Procedure 2 – Toroid Shaped Gasket With Actual Vehicle (Figure 2).

Place a towel or pad on the vehicle to protect the painted surface from scratching or other damage. Place the gauge assembly on the vehicle in a level position.

## 6 Testing

### 6.1 Procedure 1 – Simulated Vehicle Fuel Tank

- a. Remove the fill pipe cap and insert nozzle, making a seal between the nozzle boot and the test tank fill pipe opening. Dispense a minimum of five gallons of gasoline.
- b. Observe pressure gauge during fueling and record the minimum and maximum pressures observed during dispensing excluding the first two gallons dispensed and the last gallon dispensed.
- c. Repeat test for a minimum of three dispensing episodes. Drain the test tank as necessary. A suitable storage container will be required to hold the gasoline drained from the test tank. The gasoline drained from the test tank shall not be placed back in the Hill-Vac system Cargo tank during testing. The dome hatch of the cargo tank shall never be opened to transfer gasoline into the cargo tank.

### 6.2 Procedure 2 – Toroid Shaped Gasket With Actual Vehicle

- a. Remove the fill pipe cap and center the toroid shaped gasket over the vehicle fill pipe. Insert nozzle, making a seal between the nozzle boot and the toroid shaped gasket and between the toroid shaped gasket and fill pipe. Dispense at least five gallons gasoline.
- b. Observe pressure gauge during fueling and record the minimum and maximum pressures observed during dispensing excluding the first two gallons dispensed and the last gallon dispensed.
- c. Repeat test for a minimum of three dispensing episodes.

## 7 Reporting

Record observed operating levels measured for each nozzle tested along with the type, manufacturer, and model of the pressure measuring device used. Also, include the range, accuracy and date of last calibration for the pressure measuring device. Documentation of the required calibrations shall be prepared and included with the test results. Record any necessary repairs or adjustments that were performed on the Hill-Vac System or system components in order to obtain acceptable fill pipe pressure readings. All information required to be recorded, as stated above, shall be kept on file for two years and made available for inspection by the local Air Pollution Control or Air Quality Management District upon request.



Exhibit 4  
Figure 1

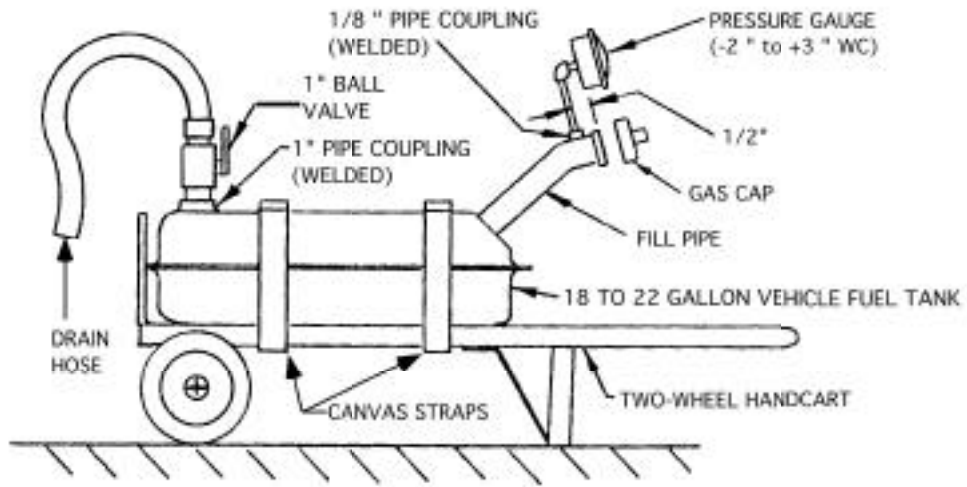
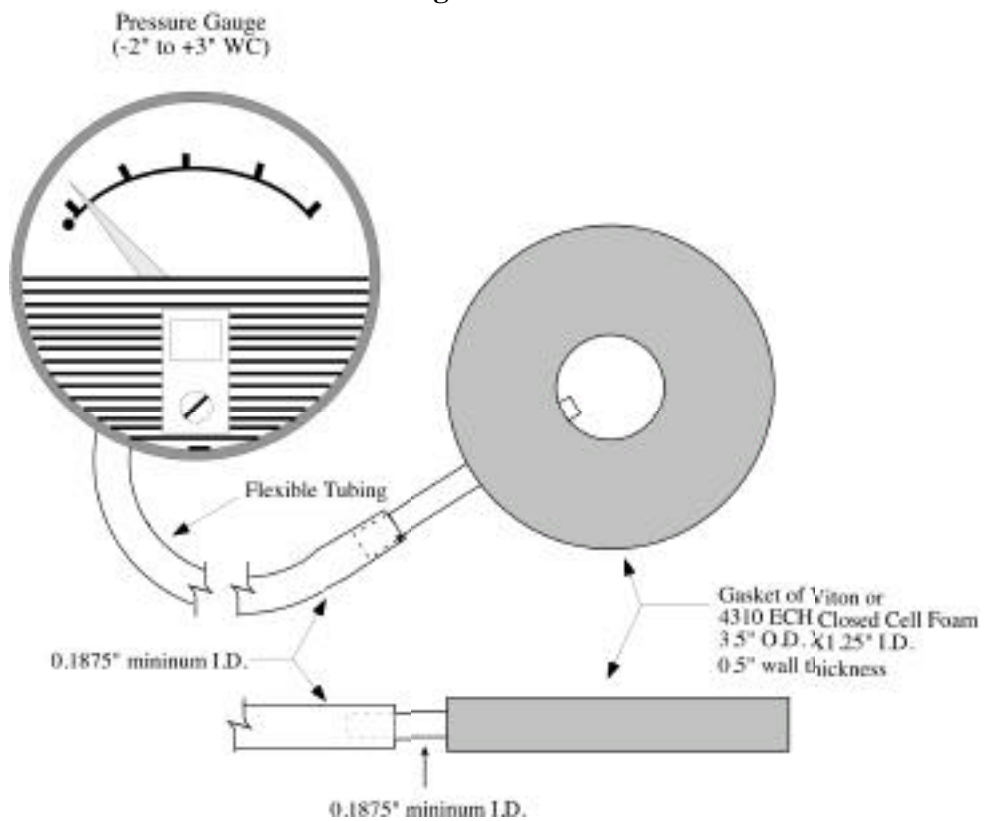


Exhibit 4  
Figure 2



**EXECUTIVE ORDER G-70-193**  
**Hill-Vac Phase II Vapor Recovery System For**  
**Cargo Tank Motor Vehicle Fueling Systems**

**Exhibit 5**

**Ten Gallon Per Minute Limitation**  
**Compliance Verification Procedure**

Compliance with the 10 gallon per minute flow rate limitation shall be determined with the following methodology.

Dispense gasoline into a vehicle or approved container. Dispensing shall be conducted in the “hand-held, wide-open” mode. Using a stopwatch accurate to at least 0.2 seconds, begin timing the dispensing rate after at least one gallon has been dispensed. This one gallon buffer is necessary due to the “slow-start” nature of some dispensers. Determine the time required to dispense 2, 3, 4, or 5 gallons of gasoline. The Hill-Vac system shall be deemed to be in compliance with the 10 gallon per minute limitations if the elapsed time meets, or exceeds, the times shown in Table 1. If the dispensing rate exceeds the allowable limit, a CARB-certified flow limiting device shall be installed.

**Table 1**  
**Verification of 10 gpm Flow Rate**

Product Dispensed, gallons	Minimum Allowable Time, seconds
2.0	11.8
3.0	17.7
4.0	23.6
5.0	29.5

**Note: The times have been corrected to**  
**allow for the accuracy of the measurement.**