Executive Order G-70-150-AE

Exhibit 2

Specifications for the MCS VaporVac Bootless Nozzle System

Figures 2A-1 through 2A-4 contain drawings of a typical installation of the MCS VaporVac system. Figure 2B-1 depicts the location of component parts of the MCS VaporVac system. Figures 1C-1 and 1C-22 depicts the dispenser types approved for use with the MCS VaporVac system.

Nozzles

1. 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.

Nozzle	Minimum Number of Unblocked Vapor Holes Required
Catlow ICVN	3
Emco Wheaton A4505	3
Emco Wheaton 4500	3
Husky V3	1
Husky V34 6250	N/A
OPW 11VAI-XX	4
OPW 12V	1

Any nozzle which is found to have fewer unobstructed vapor collection holes than are required is defective and shall be immediately removed from service.

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 above. The Husky V34 6250 nozzle uses a solid spout design which 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 where they can be collected by the MCS VaporVac System.

2. Nozzles shall be 100 percent performance checked at the factory, including checks of all shutoff mechanisms.

3. Nozzle Types

A. Non-booted, No Vapor Valve

1. **Emco Wheaton 4500-XX Nozzle** Fuel splash guards may be installed on the Emco Wheaton 4500-XX nozzles at the base of the spout, as shown in Figure 1A-1.

2. **Husky V3 6201-XXX Nozzle** Fuel splash guards may be installed on the Husky V3 6201-XX nozzles at the base of the spout, as shown in Figure 1A-2.

3. **OPW 11VAI Nozzle The OPW 11VAI nozzle shall use a stainless steel spout.** The stainless steel spout has a total of 18 vapor recovery holes. Figure 1A-3 shows a typical 11VAI nozzle with a stainless steel spout configuration. A fuel splash guard may be installed on the OPW 11VAI- XX nozzles at the base of the spout, as shown in Figures 1A-3.

B. Booted Nozzles With Vapor Check Valves

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

2. **Emco Wheaton A4505** A Vapor Guard (VG) shall be installed on the Emco Wheaton A4505 nozzle at the base of the spout, as shown in Figure 1A-5. Any Emco Wheaton A4505 nozzle with a VG 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.

3. **Husky V34 6250** A Vapor Splash Guard (VSG) shall be installed on the Husky V34 6200 and V34 6250 nozzles at the base of the spout, as shown in Figures 1A-3 and 1A-4.

   Damaged or Missing VSG
   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.

   Holes in VSG
   Any Husky V34 6250 nozzle 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.

4. **OPW 12VW**
   A Vapor Escape Guard (VEG) shall be installed on the OPW 12VW nozzle at the base of the spout, as shown in Figure 1A-8. 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.

Nozzle Replacement

The MCS VaporVac has one vapor pump per fueling point (dispenser side). All nozzles associated with the vapor pump must be of the same type: either a min-booted with a vapor valve (“mini-booted type”) or a non-boot nozzle without a vapor valve (“non-booted type”). Therefore, if there is more than one nozzle on a fueling point, replacement of a non-booted type nozzle with a booted-type nozzle shall require that the A/L be adjusted to the lower range, and that all other nozzles be of the same type on the fueling point. Different brands of the same nozzle type may be used on the same fueling point; nozzles requiring different A/L ranges may not be used on the same fueling point.

All new MCS VaporVac systems installed after August 1, 2000, shall use nozzles that incorporate a vapor check valve and a "mini-boot" and the A/L range for all new systems installed after August 1, 2000, shall be 1.0 ± 0.1.

Air To Liquid Ratio

1. The A/L ratio of the system measured at a flowrate between six and ten gallons per minute (6 - 10 gpm), shall be within the values listed in the following table. 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 the CARB-approved procedure TP-201.5. Alternative test procedures may be used if they are determined by the Executive Officer, in writing, to yield comparable results.
   Figure 2C-1 illustrates the correct configuration for including or excluding the shut-off port. **Figure 2C-2** includes an illustration and instructions for conducting A/L testing with the Husky 6250 nozzle.

Nozzle	Shut-off Aspirator Port	A/L Installation	A/L Ratio
Emco Wheaton 4500-XX	excluded	Figure 2C	**1.1 +/- 0.10**
Husky 6201-XXX	included	Figure 2C	
OPW 11VAI-XX	excluded	Figure 2C	
Catlow ICVN	excluded	Figure 2C	**1.0 +/- 0.10**
Emco Wheaton A4505	excluded	Figure 2D	
Husky V34 6250	excluded	Figure 2C	
OPW 12VW	excluded	Figure 2C	

NOTE: This test procedure returns air rather than vapor to the storage tank, and normally causes an increase in storage tank pressure which may result in vent emissions. This is a temporary condition due to the test and should not be considered an indication of malfunction or noncompliance.

Dispensing Rate

1. The dispensing rate for installations of the VaporVac System shall not exceed 10.0 gallons per minute at anytime. This shall be determined as specified in Exhibit 4.

Solenoid Vapor Valves

1. The VaporVac system is equipped with solenoid vapor valves. The maximum allowable leak rate for new vapor valves 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).

2. The vapor valve ensures proper operation of the system and prevents the ingestion of air into the system. Any defective vapor valve shall be immediately removed from service. The integrity of the system shall be restored by replacing the vapor valve or otherwise closing the vapor path as soon as practicable.

3. 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.

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').

Breakaway Couplings

1. Breakaway couplings are optional but, if installed, only CARB certified breakaways may be used. Breakaway couplings which do not close the vapor path may be used because the MCS VaporVac solenoid valves close the vapor path when breakaway couplings are separated.

VaporVac System

1. The MCS VaporVac shall be equipped with electronic safeguards designed to ensure that no fuel is dispensed unless the VaporVac system is operating properly. An error code is indicated on the sales display of the dispenser which identifies the problem as being related to the MCS VaporVac system.

2. The following conditions shall halt or inhibit the operation of the one side of the dispenser, with an error code indicated, while allowing the other side to operate.

   A. Excessive vapor pump motor current (possible causes include bearing failure, locked rotor, motor winding shorts or fluid in pump cavity for more time than required to clear a blockage).

   B. Failure of the vapor pump to start while fuel is being dispensed (possible causes include control electronics failure, disconnected or severed motor wiring, or locked rotor).

   C. Vapor pump activity during idle periods when no fuel is being dispensed.

   D. Maximum permissible pump speed exceeded (possible causes include loose connections in vapor path or pump malfunction).

   E. Disconnection or accidental swapping of Side A/B vapor pumps.

   F. The following conditions shall shut down the entire dispenser in a manner similar to a "dead-man switch", in that the MCS VaporVac system must actively prevent its activation. This is achieved by requiring the MCS VaporVac system to maintain a normally-closed switch, which will open should the MCS VaporVac system be taken "off-line" via various mechanisms.

      a. Failure or loss of the MCS VaporVac power supply.

      b. A.C. line fuse opens.

      c. Cabling/wiring missing or disconnected (tampering).

Pressure/Vacuum Valves for Storage Tank Vents

1. A pressure/vacuum (P/V) valve shall be installed on each tank vent. Vent lines may be manifolded to minimize the number of P/V valves and potential leak sources, provided the manifold is installed at a height not less than 12 feet above the driveway surface used for Phase I tank truck filling operations. At least one P/V valve shall be installed on manifolded vents. If two P/V valves are desired, they shall be installed in parallel, so that each can serve as a backup for the other if one should fail to open properly. The P/V valve shall be a CARB-certified valve as specified in Exhibit 1. The outlets shall vent upward and be located to eliminate the possibility of vapor accumulating or traveling to a source of ignition or entering adjacent buildings.

2. The P/V valve is designed to open at a pressure of approximately three inches water column (3" wc). Storage tank pressure which exceeds 3" wc for more than a short time may indicate a malfunctioning pressure/vacuum vent valve.

Vapor Recovery Piping Configurations

1. The recommended maximum pressure drop through the system, measured at a flow rate of 60 SCFH with dry Nitrogen gas, is 0.02 inches water column (0.03 inches wc at 60 SCFH if the measurement includes an impact valve). The maximum allowable pressure drop through the system shall never exceed one/half inch (0.5") water column at 60 SCFH. The pressure drop shall be measured from the dispenser riser to the UST with the pressure/vacuum valves installed and with the poppeted Phase I vapor connection open.

   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 is introduced into the system at the termination of the vapor return lines, prior to the test.

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 material which is listed 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 which is disconnected and open to the atmosphere. If vapor lines are manifolded, 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 2A-4. 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 manifolded 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

WARNING: Phase I fill caps should be opened with caution because the storage tank may be under pressure.

1. The Phase I system shall be a CARB-certified system which is in good working order and which demonstrates compliance with the static pressure decay test criteria contained in Exhibit 3 of this Order. Coaxial Phase I systems shall not be used with new installations of the system. **Replacement of storage tanks at existing facilities, or modifications which cause the installation of new or replacement Phase I vapor recovery equipment, are considered new installations with regard to this prohibition**. Districts may grant an exception to this prohibition for coaxial Phase I systems CARB-certified after January 1, 1994, as compatible for use with Phase II systems which require pressure/vacuum vent valves. Where installation of the MCS VaporVac system is made by retrofitting previously installed equipment, local districts may elect to allow existing coaxial Phase I systems to remain in use for a specifically identified period of time provided the following conditions are met:

    - the existing coaxial Phase I system is a poppeted, CARB-certified system capable of demonstrating compliance with the static pressure decay test as specified above; and

    - installation of the Phase II system requires no modification of the UST(s) and/or connections.

2. Spill containment manholes which have drain valves shall demonstrate compliance with the static pressure decay criteria with the drain valves installed as in normal operation. Manholes with cover-actuated drain valves shall not be used in new installations (as defined above). Manholes with cover-actuated drain valves may remain in use in facilities where installation of the MCS VaporVac system does not require modification of the tank fittings provided the facility demonstrates compliance with static pressure decay test criteria both with the cover in place and with the cover removed.

3. The Phase I vapor recovery system shall be operated during product deliveries so as to minimize the loss of vapors from the facility storage tank which may be under pressure. Provided it is not in conflict with established safety procedures, this shall be accomplished in the following manner:

    - **the Phase I vapor return hose is connected to the delivery tank and to the delivery elbow before the elbow is connected to the facility storage tank;**

    - **the delivery tank is opened only after all vapor connections have been made, and is closed before disconnection of any vapor return hoses; and**

    - **the vapor return hose is disconnected from the facility storage tank before it is disconnected from the delivery tank.**

4. Phase I deliveries shall be accomplished so as to ensure that there is at least one vapor connection between the cargo tank compartment headspace and the storage tank associated with the product delivery. There shall be no more than two product hoses used with one vapor hose connected, and no more than three product hoses used with two vapor hoses connected.

5. Storage tank vent pipes, and fill and vapor and manhole tops, shall be maintained any color which minimizes solar gain and has a reflective effectiveness of 55% or greater. 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). Examples of colors having a reflective effectiveness of 55% or greater include, but not limited to: yellow, light gray, aluminum, tan, red iron oxide, cream or pale blue, light green, glossy gray, light blue, light pink, light cream, white, silver, beige, tin plate and mirrored finish. **Existing facilities which were installed before April 1, 1996, must be in compliance with this requirement no later than January 1, 1998. Manhole covers which are color coded for product identification are exempted from this requirement.**