Gasoline Storage Tank Air Emissions Guidance Manual

Prepared by
The ADEM Air Division Petroleum Unit

October 2019
(Previous Editions: April 2008, 2010, 2012, 2014)

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Contents

Introduction

This manual was developed by the Petroleum Unit of the Air Division of the Alabama Department of Environmental Management. It was originally developed as a guide for the personnel of the Underground Storage Tank Compliance Section in the Land Division to use while preparing to conduct a thorough and systematic inspection of the Stage I vapor balance equipment. Over time, it has proven to be a valuable compliance tool for contractors, owners, and operators of gasoline dispensing facilities. This guidance manual does not take the place of the ADEM Admin. Code r. 335-3-6-.07 (see regulation in Appendix C).

Underground Storage Tanks

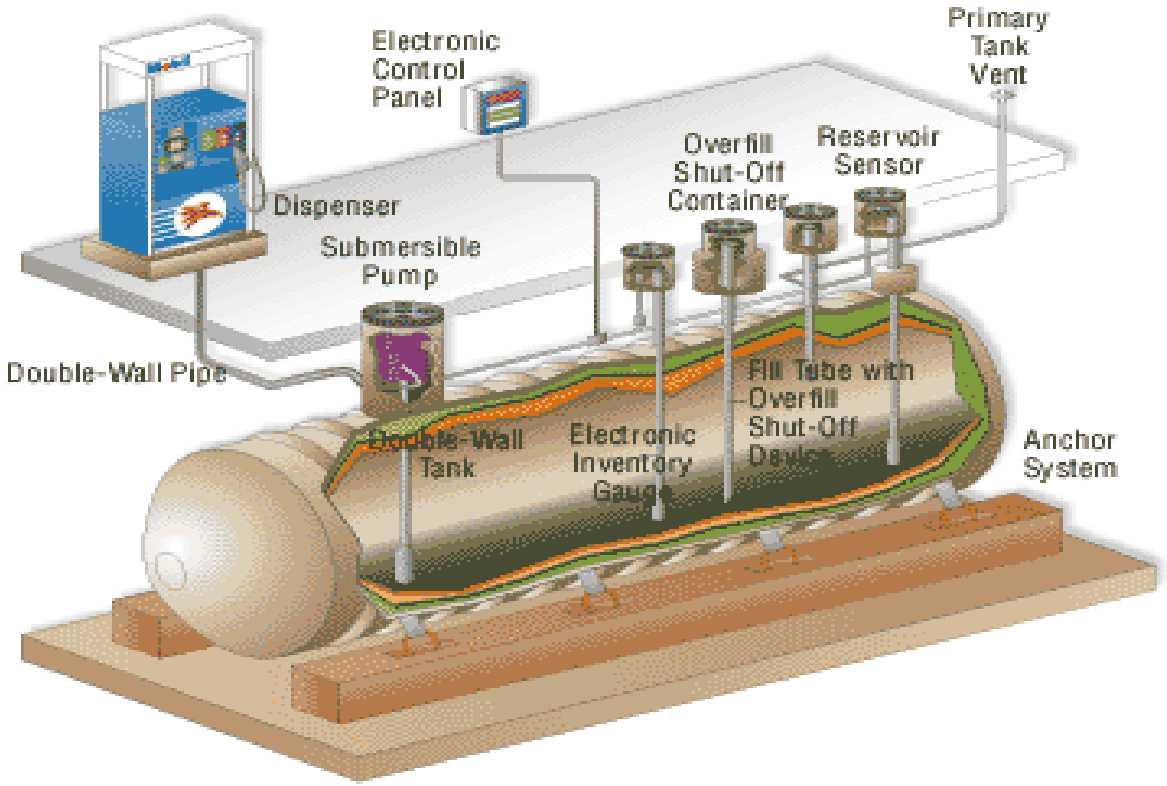
Definition

Underground storage tanks (known as USTs) are containers placed underground to hold large quantities of regulated fluid substances, most often gasoline. All piping connecting to an underground storage tank is a part of the UST system.

Purpose of Underground Storage Tanks

About 95% of all USTs store petroleum products such as gasoline or oil. The Alabama Department of Environmental Management closely regulates underground storage tanks, because leaking tanks or faulty equipment can easily contaminate groundwater or the atmosphere.

Physical Layout *



** It should be noted that this is an example of an UST system configuration. The system layout may vary from site to site.*

Stage I Vapor Balance Systems

Vapor balance system under construction

What is Stage I Vapor Balance

Stage I vapor balance refers to the capture of vapors generated during the delivery of gasoline into underground and aboveground storage tanks by a tank truck. The vapors collected in the tank truck are then transported to gasoline terminals where they are either incinerated or condensed back into liquid gasoline.

Purpose of Stage I Vapor Balance

The purpose of Stage I vapor balance systems is to reduce hydrocarbon emissions. Vapors in the tank, displaced by gasoline during refueling/reloading, are routed through a hose into the tank truck instead of being vented to the atmosphere. Stage I regulations are in place to reduce the quantity of gasoline vapors released into the atmosphere (ADEM Admin. Code r**.** 335-3-6-.07).

Types of Vapor Balance Systems

Dual Point System

Dual point systems consist of two separate tank openings. One is for the delivery of the gasoline product (the fill port). The other one is for the return of vapors to the tanker truck (the vapor recovery port).
Note: As of January 10, 2008, new facilities are required by the federal rule to install a dual point vapor balance system. EPA studies have determined that coaxial systems are not as effective as dual point systems at controlling vapors and, therefore, while continuing to be acceptable for existing stations, are unacceptable under the federal rule for new installations.

Coaxial System

Coaxial systems have only one tank opening. In this type of system, both the product and vapor hoses connect to the underground storage tank through a single connection called a coaxial boot. The coaxial boot is connected to a single port. In one hose, the product is being dropped through the inner drop tube. In the other hose, the vapors are returned to the tank truck through the outer tube.

Manifold System

Dual Point systems can be manifolded through a common header from which a single return line is connected to all of the gasoline underground storage tanks. Coaxial systems may also be manifolded to a single coaxial fill port. However, for deliveries to be made, the coaxial boot has to be connected to the port with the coaxial vapor return line for vapors to be collected from tanks without a coaxial fill port.

How to Conduct Stage I Vapor Balance Inspections

What to Check

The purpose for conducting a Stage I vapor balance inspection is to determine if the owner of the underground or aboveground tank is in compliance with State and federal rules and regulations. When conducting a thorough Stage I vapor balance inspection, the following are specific items that should be checked.

Dual Point and Coaxial Vapor Balance Systems

Table 1
Dual Point System

Equipment	Inspection Procedure	Potential Problems
Caps (Caps on top of fill port and vapor recovery port adaptors)  courtesy of www.keller.ca/opwfc.asp	• Visually inspect caps on both the fill port and vapor recovery port for damage • Twist caps on both fill port and vapor recovery port to inspect for an air tight seal	• Cap is missing, broken or cracked; insufficient space between cap and manhole cover • Gasket is missing, damaged, dry or does not fit properly • Cap does not properly fit (too big or too small) • Cap turns with hand pressure, indicating that an air tight seal is not made
Poppet Valve (vapor recovery port) 	• Slowly depress the poppet valve, check for alignment and over all condition of poppet valve	• Poppet is inoperative, off-center, rusty, chipped, does not make tight seal, has dirt or sand build-up, or is missing completely • Objects lodged in poppet valve such as rocks, etc.
Fill Port	• Visually inspect the rim of the fill tube	• Bent or gashed fill port tube
Submerged Fill Tube	• Visually inspect for presence of submerged fill tube	• Missing

Table 2
Coaxial System

Equipment	Inspection Procedure	Potential Problems
Caps (Caps on top of coaxial vapor balance system)	• Visually inspect caps on coaxial vapor balance system for damage • Twist caps on coaxial vapor balance system to inspect for an air tight seal	• Cap is missing, broken or cracked; insufficient space between cap and manhole cover • Gasket is missing, damaged, dry or does not fit properly • Cap does not properly fit (too big or too small) • Cap turns with hand pressure, indicating that an air tight seal is not made
Coaxial drop tube	• Visually inspect condition of drop tube	• Coaxial tube bent , has gashes around edges, or detached on one side • Missing
Submerged Fill Tube	• Visually inspect for presence of submerged fill tube	• Missing

Vent Pipes

The vent pipes are in place to allow vapors in the gasoline storage tanks to vent to the atmosphere only when the vapor pressure builds up in the gasoline storage tanks due to temperature changes. Vent pipes should be equipped with caps that contain pressure relief valves. As vapor pressure increases to a certain level, the pressure relief valves open to release vapors and reduce the vapor pressure to a normal level. When vapor pressure is low, the pressure relief valves remain closed so that gasoline vapors are not released. Pressure relief valves are also designed to remain closed during gasoline deliveries to ensure that all gasoline vapors are routed back to the tank truck where they can be transported to the terminal and disposed of properly. Without pressure relief valves, vent pipes release gasoline vapors without restraint, which is a violation of Air Division Stage I regulations governing gasoline dispensing facilities (ADEM Admin. Code r**.** 335-3-6-.07).
When inspecting vent pipes, you should:

- Visually inspect the cap on top of the vent pipe and make a determination whether the vent caps located on top of the vent pipes are equipped with pressure relief valves (Please reference the pictures below at the end of this section). If they are not equipped with caps that contain pressure relief valves, and only provide protection from weather and trash or are missing all together, a clear violation is indicated and should be fully documented on the inspection report. Also, take care to note the condition of the caps. They should not be bent, cracked or damaged in any way.
- The average life of a pressure relief valve ranges from 12 to 18 months. It is suggested to the owners that the pressure relief valves be replaced during routine maintenance so that vapors are not released during routine operations. Also, a clear indication of a failing pressure relief valve can be noted when vapors visibly escape the equipment when a tank truck is unloading gasoline.

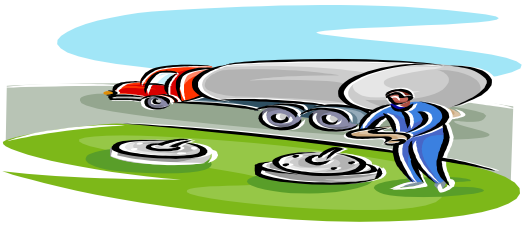
Please note that vent lines may be manifolded. This means that the vent lines from each individual tank are connected to the manifold or connected together, and one manifold vent line extends from the manifold to the vent line above the surface level. Both dual point and coaxial system vent lines may be manifolded. However, note that according to the National Fire Protection Association, gasoline and diesel tank vent lines should not be manifolded together. This is to prevent Class I (gasoline) liquids from entering tanks storing Class II (diesel) liquids, contamination, and possible change in classification of the less volatile liquid. Also, vent lines should not touch any utility lines and should be installed at least three (3) feet above the roof line or canopy.

**Example of a weather cap*

**Example of cap with a pressure relief valve*

Note the absence of a metal band at the bottom of the weather cap

Gasoline Distributor Unloading Gasoline at GDF



If you arrive at a site to conduct an inspection, and a tank truck is dropping gasoline, the following are important to check:

- Make sure that the tank truck operator is hooked up properly. This means that TWO hoses are hooked up to the ports of the underground storage tanks. One hose delivers the gasoline to the storage tank while the other collects vapors that will be transported back to the terminal to be disposed of properly. For coaxial systems, note whether the "boot" is attached.
- Make sure that hoses are securely hooked to the ports and to the tank truck.
- Make sure that the hoses are free from tears, rips, cracks or any openings that would allow vapors to escape.
- Make sure that vapors are not visibly escaping the pressure relief valves during the delivery of gasoline.
- Make sure there is a valid ADEM or Jefferson County Department of Health (JCDH) Air Sticker visibly displayed on the trailer.
- JCDH Air Stickers are accepted statewide while loading at a terminal and/or delivering to gasoline dispensing facilities; however, please note that ADEM Air Stickers are not valid to load and/or deliver in Jefferson County.

When completing the inspection report concerning gasoline distribution, be careful to note the following:

- Name of driver
- Name of company
- ADEM or JCDH Air Sticker number and expiration date
- Trailer Vehicle Identification Number (VIN)
- Name of terminal where gasoline was loaded
- Name of terminal where vapors will be delivered

Make sure all of the information required on the inspection report is completed. Be sure to provide detailed documentation of the situation. Also, when observing gasoline being dropped, please pay special attention to whether gasoline is flowing through the pipes that are connected to the ports.
If you observe gasoline being dropped inappropriately, quickly inform the driver to hook up properly. Detailed information about the violation should be recorded on the official inspection report. Please be sure to include the gasoline dispensing facility name where the violation occurred. If possible, record the facility's Air Permit number. If the Air Permit is not available, please document the address of the gasoline dispensing facility. This information should be relayed to the Petroleum Section of the Air Division as soon as possible.

Air Permit

- Permit Proviso No. 3 requires that the Air Permit be posted on site and available for inspection. If the Air Permit is not observed, please circle "No" on the inspection report. If the Air Permit is observed, please circle "Yes". Please write down the Air Permit number in the space provided, so it can be verified that it is the correct Air Permit for that facility. Also, note any changes in the current number or the current use (such as E85) of the gasoline storage tanks, as well as any other changes relevant to the Petroleum Section. If the Permit is not observed, please ask the attendant if they have any knowledge of where it may be located. If it is provided, please ask them to post the Air Permit.

Standard Color Coding for Tank Lids

A color code system is advised to assist tank truck drivers in identifying the contents of each underground storage tank. This also assists Department personnel conducting inspections in the same manner. Inspectors can use this color system to point out specific problems that are noted during the inspection process. The lids of the underground storage tanks may be color coded according to the following system:

- Regular Unleaded (87 Octane): White Lid
- Mid-Grade (89 Octane): Blue Lid
- Premium (93 Octane): Red Lid
- Vapor Recovery: Orange Lid
- Diesel: Green Lid
- Kerosene: Yellow Lid

Please note that not all gasoline dispensing facilities have the tank lids correctly color coded.

Completing Inspection Reports

- Date, facility name, facility address, county, UST facility ID#, owner of the gasoline storage tank(s), and inspector name are all essential elements in completing your inspection report.
- A **complete contact name** is also required.
- Inspection reports should be complete, orderly, neat, legible and submitted timely.

Please take caution in terminology and nomenclature used. If a problem is found, please describe the violation in the most comprehensive and concise manner. Inspection reports are legal documents that could possibly be presented in a court of law. If assistance is needed while completing the report, please contact one of the inspectors in the Petroleum Unit of the Air Division.

Exemptions

Although the UST program registers all underground storage tanks containing petroleum products, Air Division Stage I regulations apply to gasoline storage tanks only. Some tanks may be classified as exempt for different reasons (ADEM Admin. Code r. 335-3-6-.07). These tanks are not required by State and federal regulations to have vapor recovery equipment or to be permitted through the Air Division. These exemptions include:

- Tanks that contain diesel fuel
- Tanks that service watercraft only
- Tanks that contain jet fuel
- Tanks that contain kerosene
- Gasoline storage tanks that store less than 3,000 gallon
- Gasoline storage tanks that were installed or modified before October 1, 1990, and have not been modified since that time
- Facilities which dispense less than 4,000 gallons per month for the months of June, July and August

Jurisdiction

ADEM Air Division does not regulate all areas of Alabama. Jefferson County is regulated by Jefferson County Health Department, and Huntsville city limits is regulated by The City of Huntsville-Natural Resources. However, it should be noted that compliance is required statewide. The Department will pursue enforcement in these areas if necessary. Please forward all Stage I information to the Petroleum Unit so that a compliance determination can be completed. Any necessary information will be forwarded to the proper regulatory agency.

Additionally, the ADEM Air Division does not require the submittal of the initial or triannual pressure testing of gasoline storage tanks which have a monthly throughput of 100,000 gallons or more of gasoline products, as required by EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) - 40 CFR 63 Subpart CCCCCC. Please submit any initial/triannual pressure testing directly to EPA. Regulations regarding this subpart can be found on the EPA website.

APPENDICES

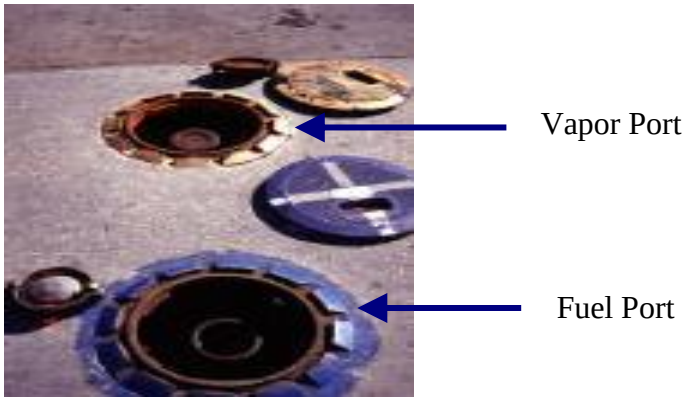
Appendix A

Stage 1 Terminology

- Manholes with covers

- Fill/Fuel Port (Coaxial)

- Fill/Fuel and Vapor Recovery Ports (Dual Point)



- Vapor Port

- Poppet Valves

- Fill & Vapor Recovery Caps

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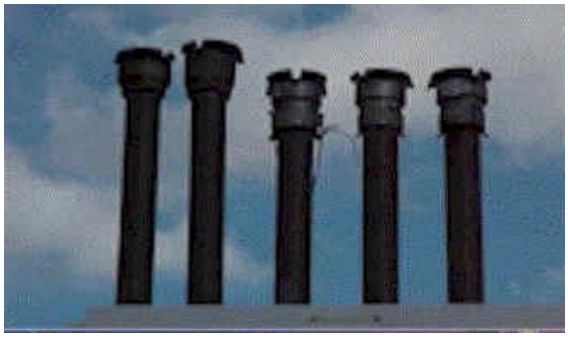
**Orange caps normally indicate a vapor port.*

*** Low profile caps may be used when there is insufficient space between the port and the manhole cover.*

- Vent Lines



- Caps with Pressure Relief Valves

**For the cap to be equipped with a pressure relief valve, it MUST have a thick metal band around the bottom.*

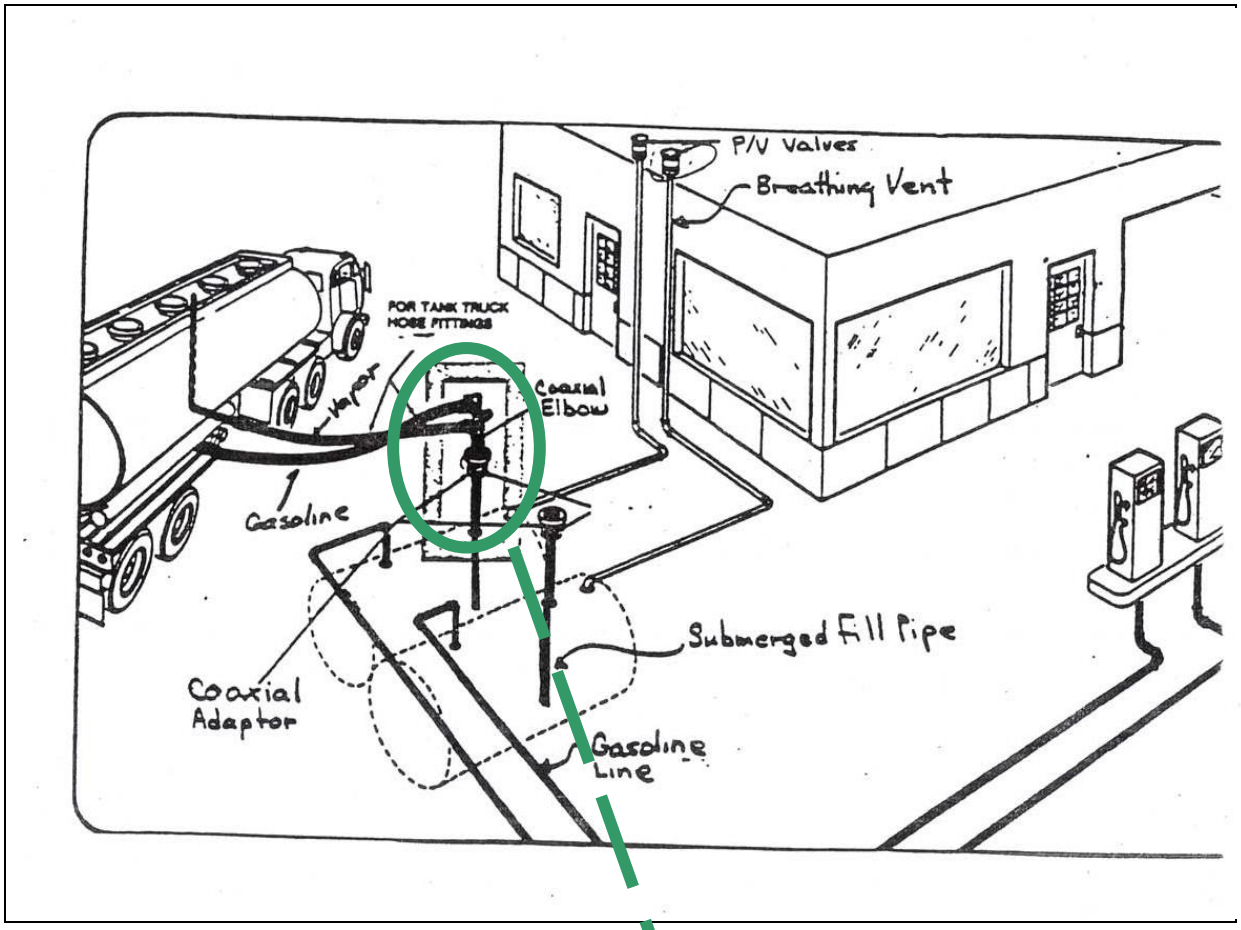
- Weather Cap

**Notice, the weather cap does NOT have the metal band around the bottom.*

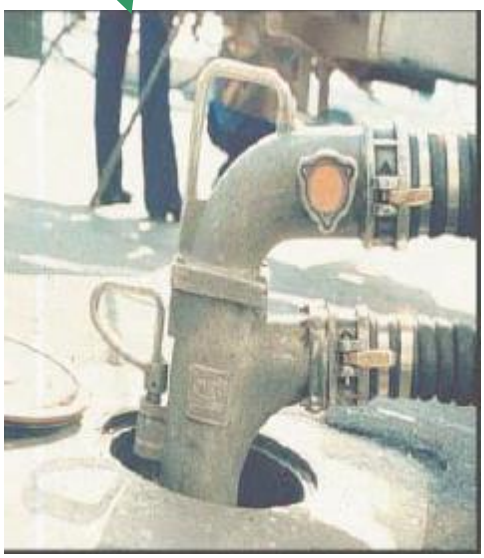
Just a Reminder…

When a truck is dropping gas, remember to always make sure that two (2) hoses are used. One hose should be attached to the fill port, and the other should be attached to the vapor port. If you see ANY fumes or smell excessive gas odors, then inspect the adaptors for proper "hook up" and check the hose wall for tears and cracks. Also, please remember to look up at the pressure relief valves if possible to check for visible vapors.

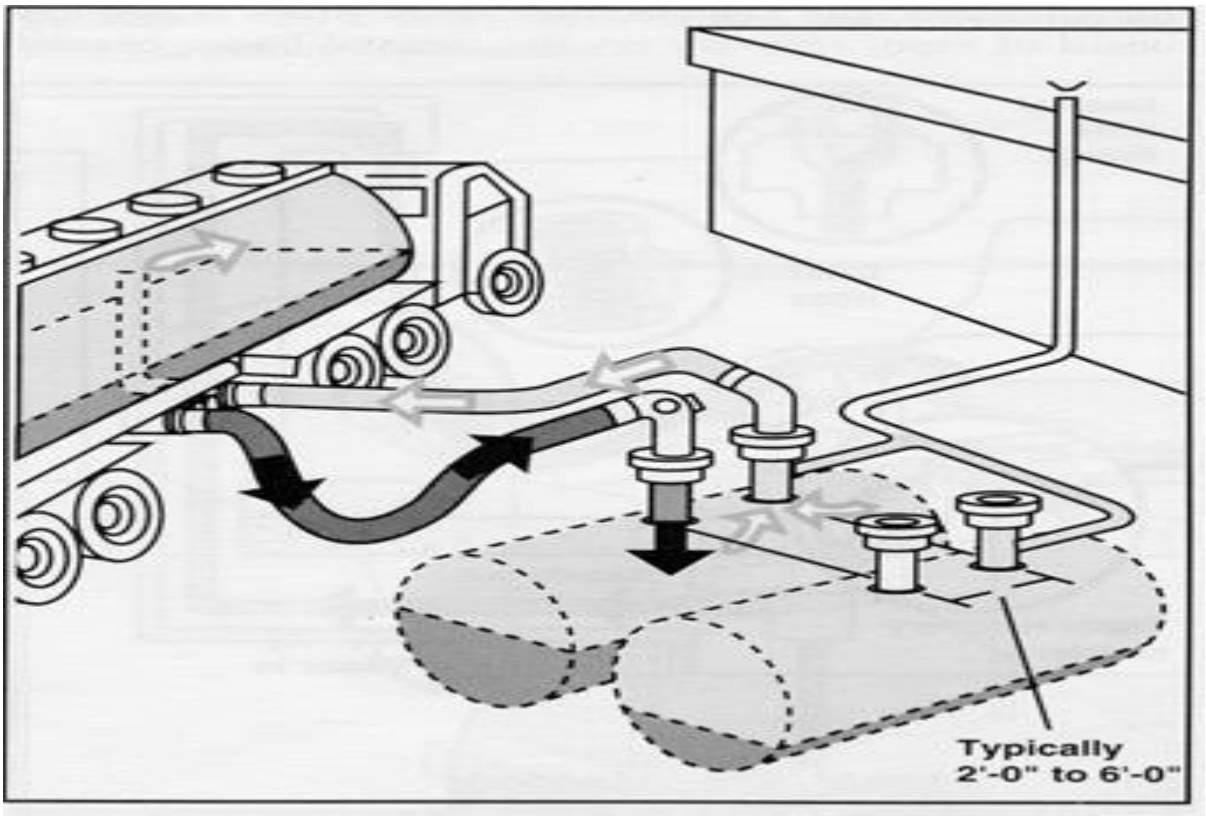
Coaxial- Single Point



Drawing courtesy of OPW, Inc.



Dual Point



Drawing courtesy of Northwest Clean Air Agency

Appendix B

Definitions

1) Gasoline: A petroleum distillate which is a liquid at standard conditions and has a true vapor pressure greater than four pounds per square inch absolute at twenty degrees $C^{o,}$ and is used as a fuel for internal combustion engines.

2) Gasoline Dispensing Facility: According to ADEM Admin. Code R. 335-3-6-.07(1)(b) is any outlet where gasoline is dispensed to motor vehicle gasoline tanks from stationary storage tanks.

3) Gasoline Tank Truck: According to ADEM Admin. Code R. 335-3-6-.07 (1)(a) shall mean tank trucks or trailers equipped with a storage tank and used for the transport of gasoline from sources of supply to stationary storage tanks of gasoline dispensing facilities.

4) Leak Free: A liquid leak of less than four drops per minute.

5) Stage I: Gasoline vapor recovery during all gasoline marketing transfer operations except motor vehicle refueling.

6) Throughput: The amount of petroleum products passing through a facility.

7) Transport tank: A container used for shipping gasoline over roadways.

8) Vapor Balance System: According to ADEM Admin Code R. 335-6-.07 (1)(c) is a vapor tight system that transfers the vapors displaced from the stationary storage tanks to the gasoline tank truck.

9) Vapor Control System: A system designed and operated to reduce or limit the emission of gasoline vapors into the ambient air.

10) Vapor Tight: Exhibiting no vapor leaks.

Appendix C

ADEM Admin. Code r. 335-3-6-.07

335-3-6-.07 Gasoline Dispensing Facilities - Stage I.

(1) For the purpose of this rule, the following definitions apply:

(a) "Gasoline Tank Truck" shall mean tank trucks or trailers equipped with a storage tank and used for the transport of gasoline from sources of supply to stationary storage tanks of gasoline dispensing facilities.

(b) "Gasoline Dispensing Facility" shall mean any outlet where gasoline is dispensed to motor vehicle gasoline tanks from stationary storage tanks.

(c) "Vapor Balance System (Stage I)" means a vapor-tight system that transfers the vapors displaced from the stationary storage tanks to the gasoline tank truck.

(2) This rule will apply to all gasoline dispensing facilities that commenced construction after October 1, 1990. This rule also applies to any gasoline dispensing facility whose tank or tanks are replaced, upgraded, modified, reconstructed, altered, or removed after October 1, 1990 except;

(a) transfers made to storage tanks or gasoline dispensing facilities equipped with floating roofs or their equivalent;

(b) transfers made to stationary gasoline storage tanks of less than 11,356 liters (3,000 gallons) capacity;

(c) stationary gasoline storage containers of less than 2,082 liters (550 gallons) capacity used exclusively for the fueling of implements of husbandry, provided the containers are equipped with a submerged fill pipe.

(d) any new or modified existing facility, regardless of tank upgrade, with an actual or expected throughput of gasoline of less than 4,000 gallons per month for the months of June, July, and August during full operation, provided that all gasoline storage tanks that are not exempted under subparagraphs (a), (b), and (c) of this paragraph are equipped with a submerged fill pipe.

(3) No owner or operator may transfer, cause, or allow the transfer of gasoline from any gasoline tank truck into any stationary storage tank subject to this rule, unless the tank is equipped with a submerged fill pipe and the vapors displaced from the storage tank during filling are processed by a vapor control system in accordance with paragraph (4) of this rule.

(4) The vapor control system required by paragraph (3) of this rule shall include one or more of the following:

(a) a vapor balance system (Stage I) between the stationary storage tank and the gasoline tank truck and a system that will ensure the vapor line is connected before gasoline can be transferred into the tank; or

(b) a refrigeration condensation system or equivalent designed to recover at least ninety percent (90%) by weight of the organic compounds in displaced vapor; or (c) a system demonstrated to have control efficiency equivalent to or greater than provided under subparagraph (4)(b) above and approved by the Director.

(5) Each owner or operator of a gasoline dispensing facility subject to this rule shall:

(a) not permit the transfer of gasoline between a gasoline tank truck and a stationary storage tank unless the gasoline tank truck complies with rule 335-3-6-.20 and the vapor control system is connected and operating in accordance with paragraph (4) of this rule;

(b) maintain written records of the monthly throughput quantities in gallons and types of petroleum distillates in all stationary storage tanks; and

(c) make available to representatives of the Director upon request copies of all records required under subparagraph (b) of this paragraph and retain the records for a minimum of two (2) years after the date on which the documents were made.

(6) No owner or operator of a gasoline dispensing facility subject to this rule shall cause or allow gasoline to be spilled, discarded in sewers, stored in open containers, or handled in any other manner that would result in evaporation of the gasoline to the atmosphere.

(7) Regardless of the applicability exemption under subparagraph (2)(d) of this rule, all gasoline dispensing facilities that are subject to this rule shall maintain the system in proper working order in accordance with this rule even if the facility's average monthly throughput of gasoline decreases to less than 4,000 gallons.

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