

**Above-Ground Petroleum Storage Tank  
Manual & NC Fire Codes  
With data on NC Gasoline Vapor Recovery  
&  
EPA Spill Plan Information**

By

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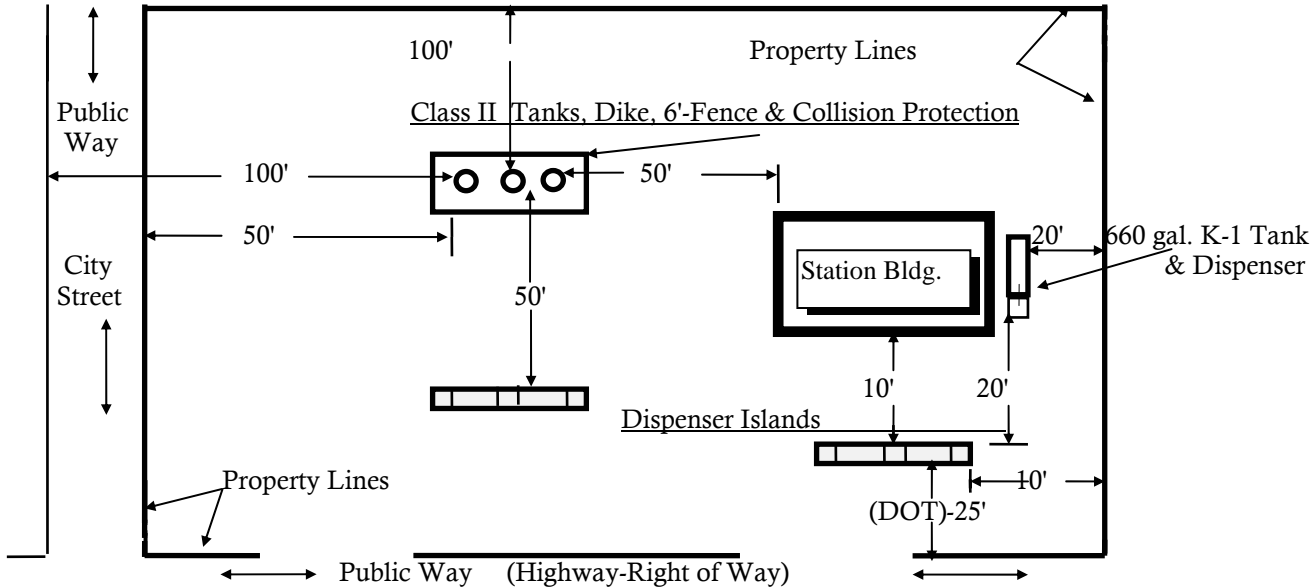
Tim Laughlin, PE  
Technical Director

Last update October 1, 2004

# Fire Code Requirements of ASTs at Fleet Stations / C-Stores

The below drawing tries to clarify the minimum distance requirements for Aboveground Storage Tanks (ASTs) at public & private c-stores/service stations/marinas. This requires at least 40,000 square feet of area to install AST's at c-stores. Bear in mind that all new installations required fire code permits and professional engineers' seal. This change reflects the new International Fire Code effective in NC on January 1, 2002.

**TYPICAL STORE LAYOUT**



NO SCALE

All tanks must be UL labeled with maximum individual capacity of 12,000 gals., with total capacity limited at 48,000 gals.

Liquid & Tank Type	Individual Tank Capacity (gallons)	Min. Distance From Nearest Important Building on Same Property (Feet)	Min. Distance From Nearest Fuel Dispenser	Min. Distance From Nearest Lot Line Which is or can be built upon, Including Opposite side of public way	Min. Distance From Nearest Side of Public Way	Min. Distance Between Tanks
Gasoline only allowed in protected tanks (UL2085)	Less than or equal to 6,000	5	25*	15	5	3
	Greater than 6,000	15	25*	25	15	3
Diesel, Fuel Oil & Kerosene in protected tanks (UL 2085)	Same as Gasoline	Same as Gasoline	*Same as Gasoline	Same as Gasoline	Same as Gasoline	Same as Gasoline
Other Tanks	All	50	50	100	50	3

\*At commercial, industrial, governmental, or manufacturing establishments, (Fleet Vehicle Service Stations) where tanks are intended for fueling vehicles used in connection with their business, no minimum distance shall be required of the dispenser for gasoline, diesel, kerosene and fuel oil tanks.

1. You can install Gasoline ASTs under 1,100 gallons at Fleet Accounts in accordance with the latest edition of NFPA-30A. See Code change dated March 11, 2003, Volume V, NC Fire Code-Section 2206.2.3 ADD NEW SECTION: **Fleet Vehicle Service Stations: 5. Aboveground storage tanks 1,100 gallons or less in capacity, may be used to store Class I liquids at fleet vehicle service stations in accordance with NFPA 30A.**

- Small Kerosene tanks (K-1) less than 660 gallons are exempt from the distance requirements and are installed per 2002 NC Fire Code section 2206.2.3.1.
- Tanks also require liquid level gages and to alert attendant during unloading when tank reaches 90% of capacity alarm **and** stop product flow when the tank reaches 95% of capacity. The transport must be at least 25 feet from the tanks when unloading gasoline and 15 feet with diesel. NC Fire Prevention Code (IFC) Sections 2206.6.2.6 and 3404.2.9.6.8 requires a fixed 5 gallon spill container be attached to the fill pipe on top of tanks or portable spill containment will be allowed for tanks will remote fill connections. There are more requirements too numerous to enclose here (see NC Fire Code Chapters 22 & 34 or NFPA 30 & 30A). For more information please call Tim Laughlin at NCPMA. (10-1-04)

## Fire Code Requirements on Single Wall ASTs

The below typical drawing is for single wall tanks installed at public service stations, private installations and bulk petroleum storage tanks. A dike or some other form of secondary containment must be installed to provide for spill control.

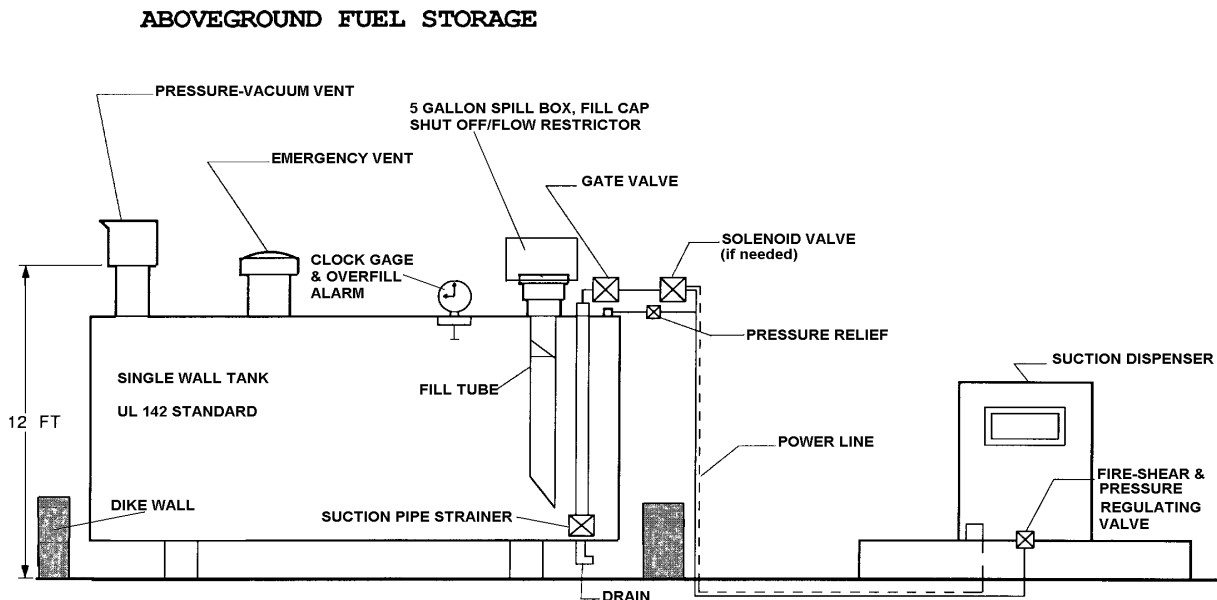
**1) ASTs at public fuel dispensing facilities and private fuel dispensing facilities** means shall be provided for determining the liquid level in each tank and shall be accessible to the delivery operator. Means shall be provided to sound an audible/visual alarm when the liquid level in the tank reaches 90 percent capacity. Means shall also be provided to automatically stop the flow of liquid into the tank at 95 percent capacity. These provisions must not interfere with the normal operation of the normal or emergency vent. Gasoline (Class I) storage for dispensing to motor vehicles must be stored in a UL 2085 protected tank. **At Fleet Vehicle Service Stations: Aboveground storage tanks 1,100 gallons or less in capacity, may be used to store Class I liquids at fleet vehicle service stations in accordance with NFPA 30A.**

When the tank is at an elevation that produces a gravity head on the dispensing device, the tank outlet shall be equipped with a control device (such as a normally closed solenoid valve or properly designed check valve) that will prevent gravity flow in the event of piping or dispenser failure.

**2) ASTs installed at Bulk Petroleum Plants** means shall be provided for determining the liquid level in each tank and shall be accessible to the delivery operator. Means shall be provided to sound an audible/visual alarm when the liquid level in the tank reaches 90 percent capacity. Means shall also be provided to automatically stop the flow of liquid into the tank at 95 percent capacity. These provisions must not interfere with the normal operation of the normal or emergency vent.

Pressure relief devices must be installed to prevent pressure build-up caused by thermal expansion. The local authority having jurisdiction may grant alternate design considerations in accordance with NFPA –30 & 30A or NC Fire Code as the governing installation code.

Unattended service stations (Card Locks) with ASTs must be approved by the local authority having jurisdiction along with all emergency controls to provide a reasonable degree of safety in the absence of an attendant. See NC Fire Code section 2204.3

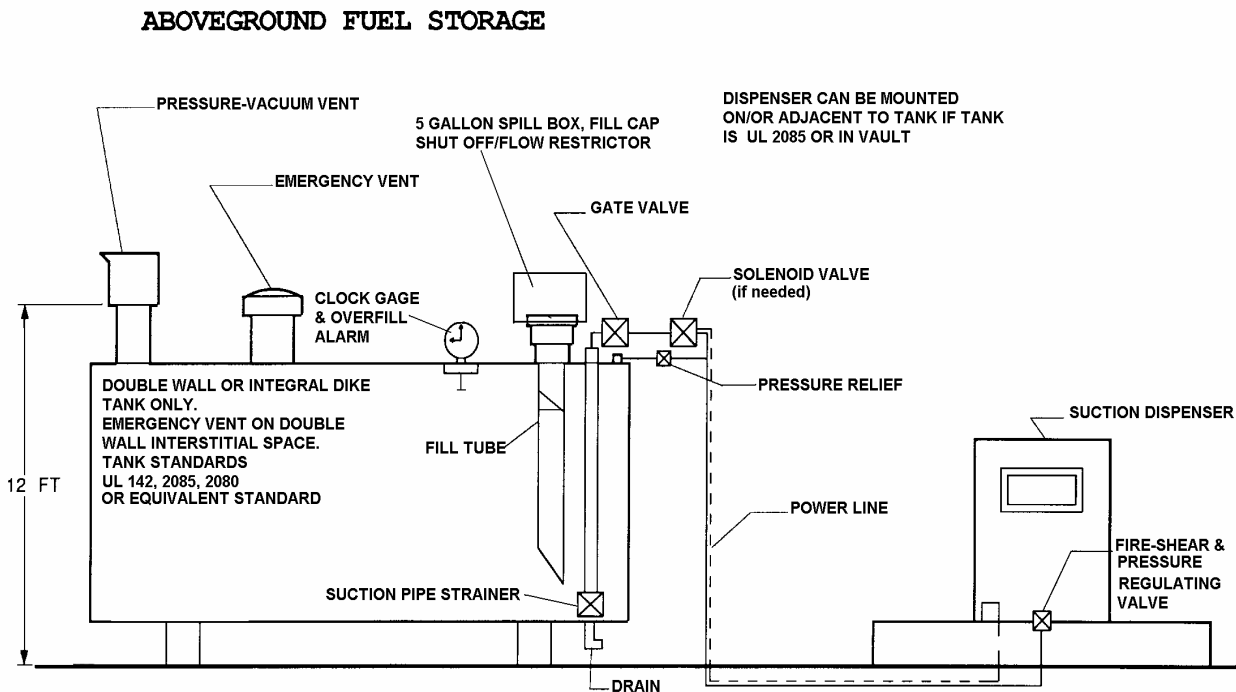


# Fire Code Requirements on Public & Private Double Wall ASTs.

At c-stores, service stations, commercial, industrial, governmental, or manufacturing establishments, (Fleet Vehicle Refueling Facilities) where tanks are intended for fueling vehicles used in connection with their business, AST minimum distance will be accordance with the table on page 2. Gasoline storage for dispensing to motor vehicles is only allowed from a “**Fire Protected Tank, (UL2085) or Vaulted Tank** and no minimum distance is required of the dispenser. **At Fleet Vehicle Service Stations: Aboveground storage tanks 1,100 gallons or less in capacity, may be used to store Class I liquids at fleet vehicle service stations in accordance with NFPA 30A.**

“**Fire Resistant Tanks**” are tanks that meet UL Standard 2080 or **equivalent standard** under the new definition of NFPA 30A, 2003 edition. You can install **Fire Resistant Tanks** for aboveground use in accordance with the latest editions of NFPA 30A at Fire Officials prior approval, under “Alternative Design” requirements. All other requirements must be met.

Please see the typical installation drawing below.

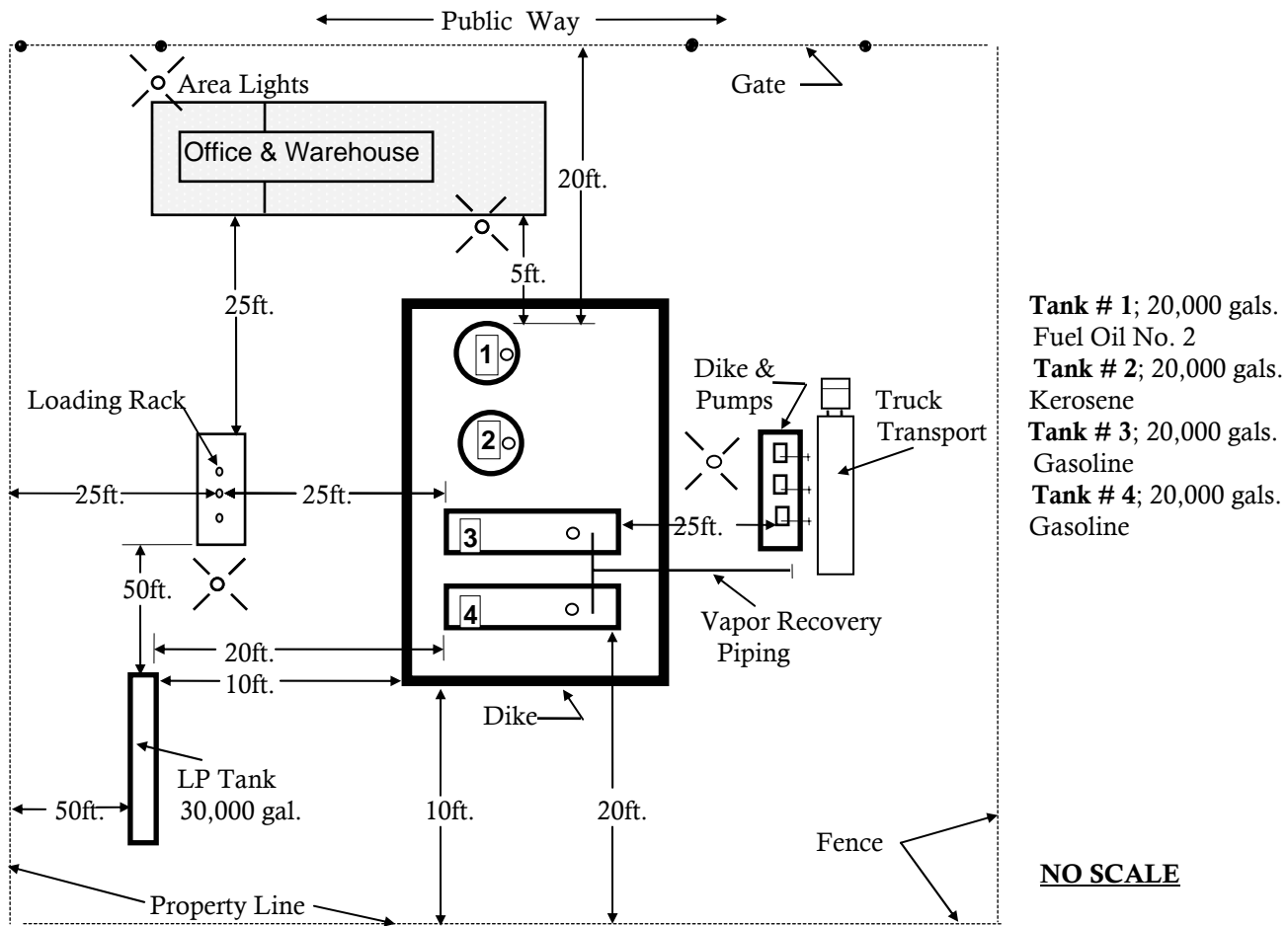


Small K-1 secondary containment type tanks at service stations need only comply with NC Fire Code section 2206.2.3.1 and K-1 piping connections below the liquid level need an internal emergency shear valve installed. Rain shields on integral diked tanks are considered to need emergency venting.

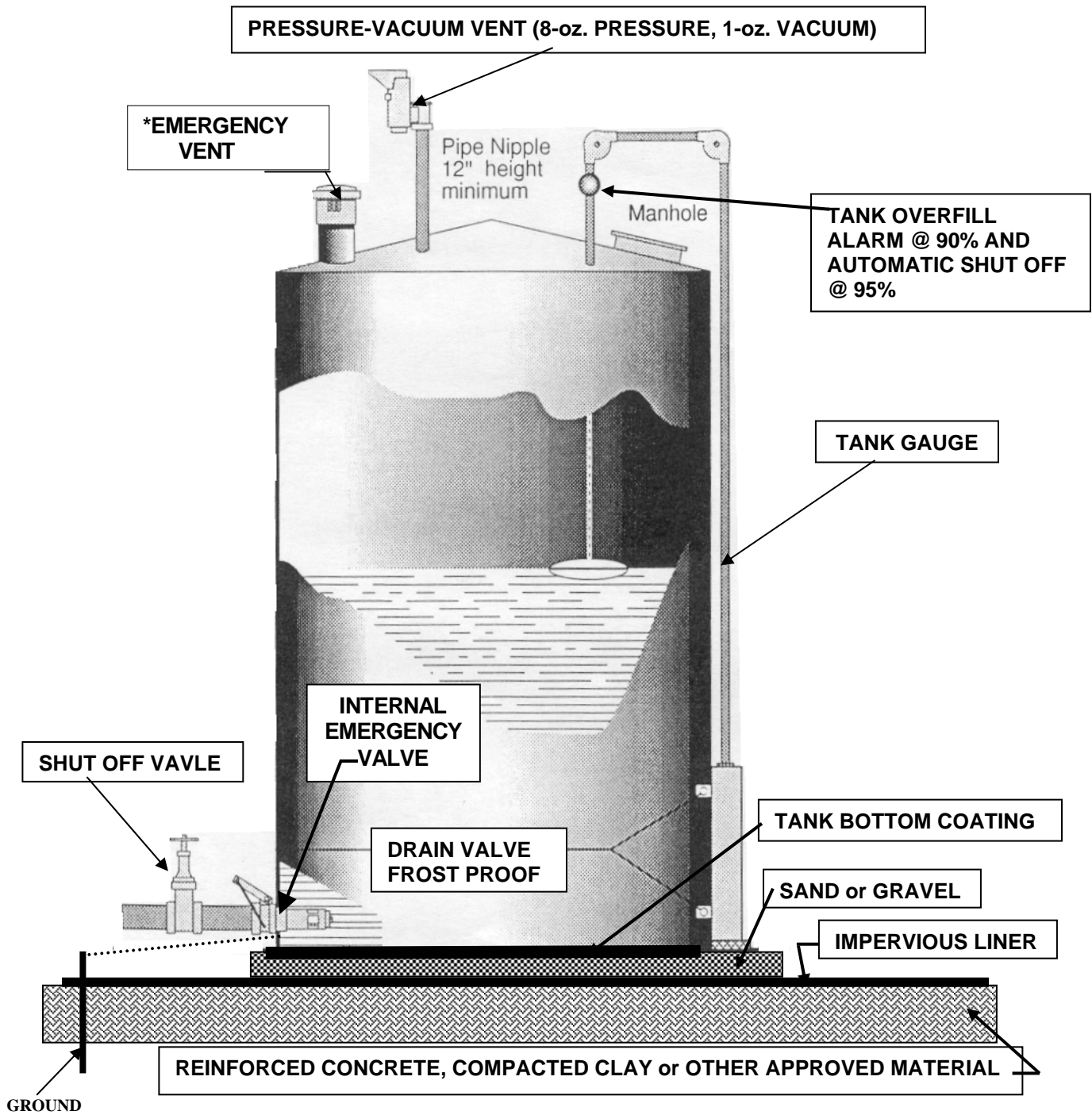
# Bulk Plant Fire Code AST's Minimum Distance Requirements

NFPA-30 and NC Building and Fire Codes govern the installation and distance requirements for bulk petroleum plants. NFPA-58 governs the installation of bulk LP-Gas tanks. The distances given are based on the quantity and type of petroleum products stored, other petroleum quantities would give different distance requirements. All tanks must be a minimum of 3 feet apart and at least 3 feet from dike wall. The dike floor must be sufficiently impervious by concrete, compacted clay, or other materials to prevent petroleum seepage in the event of a spill. Truck transports need at least a 50-foot turning radius and should not have to back-up on the property. Loading and unloading areas must be 25 feet away from tanks for Class I liquids (gasoline) and 15 feet away for Class II liquids (distillate) unless separated by fire proof barrier.

**TYPICAL BULK PLANT INSTALLATION LAYOUT**



# ABOVEGROUND BULK PLANT TANK



\*Emergency relief venting consists of a manufactured emergency vent to relieve at approximately 2.5 psig pressure, or refer to liftable manhole covers, large diameter vents or weak roof to shell welds if either of these alternatives is used. NC Fire Prevention Code (IFC) Sections 2206.6.2.6 and 3404.2.9.6.8 requires a fixed 5 gallon spill container be attached to the fill pipe on top of tanks or portable spill containment will be allowed for tanks with remote fill connections.

Each tank must have a lockable valve on its main flow connection. Overfill prevention must be installed and engineered to nearly a fail-safe status. Overfill prevention must be tested at regular intervals.

Water shall not pool around tank bottom. Horizontal tanks must be installed on approved foundations and masonry supports, fire protected steel supports are allowed.

## ***Aboveground Storage Tank(s) Registration***

Reminder: North Carolina General Statute 143-215.96 requires the registration of "Oil Terminal Facilities". An Oil Terminal Facility is defined as any non-retail facility storing more than 21,000 gallons of petroleum product. This would include all bulk plants in North Carolina. This is an old regulation and most of you have already complied with it.

AST owners are required to submit the following information for registration:

- Complete name of owner & operator of the facility together with addresses and telephone numbers;
- Number of employees of the facility and principal officers; Maps or sketches to show property lines of the facility & location of nearby watercourses or bodies of water; and
- Procedures for the prevention of oil spills.

Your SPCC Plan can be used to meet these requirements. For a copy of the Oil Terminal Facility registration form check NCPMA's web site in the members' only section at <http://www.ncpma.org/>. Or download from NC Groundwater's page at [http://gw.ehnr.state.nc.us/Acrobat%20Docs/AST\\_registration.pdfunder](http://gw.ehnr.state.nc.us/Acrobat%20Docs/AST_registration.pdfunder).

## ***State Fire Code Required Permits***

The North Carolina Fire Code, Chapter 1, Administration, section 105.6.17 requires permits to be issued regarding the storage and handling of flammable and combustible liquids. Permits for the following: For the storage of flammable and combustible liquids in stationary storage tanks or the alternation, removal, abandon, place temporarily out of service, or otherwise dispose of an underground or any type aboveground tank. Storage of Class I (gasoline) products in excess of 5.0 gallons in any dwelling or other place of human habitation, or in excess of 10.0 gal, outside a building. Storage, handling or use of Class II or Class III liquids in excess of 25.0 gal. in a building or in excess of 60.0 gal, outside a building, except for fuel oil used in connection with oil burning equipment.

The storage or use of flammable liquids in the fuel tank of a motor vehicle, motorboat, aircraft, mobile power plant or heating equipment are excluded from permitting requirements. No person shall engage in the business of delivering flammable or combustible liquids from tank vehicles without a permit. No person shall remove gasoline and diesel from underground storage tanks used for fueling motor vehicles (by any means other than stationary dispenser pumps) without a permit. To change the content of a tank from combustible to flammable liquid requires a permit.

Bear in mind that only certain Jurisdictions may or may not require the above permits. It is also important to remember that the NC State Board of Registration for Professional Engineers and Land Surveyors require that a Professional Engineer (PE) seal all plans regarding ASTs/USTs Installations, piping, ancillary equipment upgrades, and vapor recovery system installations. Small Tanks of 1,100 gals. or less capacity for commercial or non-commercial purposes and tanks used for storing heating oil for consumptive use on the premises where stored and the storage of Class IIIB combustibles are excluded from the PE rule.

## ***API 653 Storage Tank Inspections***

American Petroleum Institute (API) standards 650 and 653 normally applied to aboveground petroleum storage tanks above 50,000 gallons and built on site. ASTs below 50,000 gallons are normally built at a factory site and are generally Underwriters Labs certificate. API 650 inspections can be used for both classifications.

How often, and to what detail, petroleum storage tanks should be inspected varies greatly. What is stored in the tank... Corrosion rate... location... risk... conditions at previous inspection... local regulations... to name a few. Normally, tanks that are constructed according to API 650 and are in service in mild conditions should be inspected according to a schedule set up at the time of construction and a record kept of such inspections, including and modifications or change of service. A detailed history of tank modifications and repairs is a must.

**EXTERNAL:** Routine in service inspections shall be conducted monthly. A close visual inspection from the ground will be conducted each month. The inspection may be conducted by the owner/operator who is thoroughly familiar with the facility and its operation. (SEE SPCC PLAN) The inspector should look for; leaks... bulges... corrosion... settlement... breaks in coating... insulation and appurtenances... monitor cathodic protection systems.

**SCHEDULED INSPECTIONS:** Scheduled external inspections shall be performed by an API 653 inspector at intervals not to exceed five years or at the quarter corrosion point, whichever is less. The API inspector will perform all the inspections as above. The corrosion rate will be determined, and grounding devices will be tested.

**INTERNAL:** Internal inspections are performed primarily to check the bottom plates for corrosion and leaks. Internal inspections are scheduled according to the corrosion rate, but not to exceed twenty years.

In December, 1996, three ASTs at three different bulk plants in NC failed and released product due to internal and external corrosion. All of these tanks were below 50,000 gallons and one of these tanks was of the horizontal type that did not touch the ground. It is very important to inspect all ASTs for corrosion, especially ones over 20 years old.

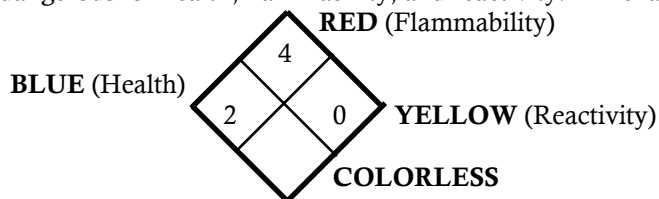
## ***Farmers ASTs May be Regulated by Fire Codes***

Heating oil tank installations on farms are excluded from the NC Fire Codes & NFPA Pamphlet 31. However, farmers who lease/rent their farms to others or who have farms within the jurisdiction of any municipality are required to meet NC and/or NFPA Fire Codes. Any tank greater than 660 gallons is required to have secondary containment and a spill plan under Federal EPA regulations. Regarding a May 15, 2002, memo from the NC Dept. of Insurance, Farmers who store motor fuel for dispensing to vehicles from aboveground storage tanks less than 1,100 gallons in storage capacity **may be excluded** from the fire code requirements of NC Fire Code Chapters 34, section 3406.2. *ASTS over 1,100 gallons may also be excluded* from complying with section 3404.2. Farm heating oil tanks **should** comply with NFPA 31 and the NC Fire Code section 603.3.

## ***NC FIRE CODE NFPA 704 LABELING***

In accordance with Chapter 22, of the NC Fire Code Volume 5, section 2201.3.4, all facilities that store, handle, or use hazardous materials in quantities in excess of the exempt amounts must post visible hazard identification signs as specified in the National Fire Protection Association's code 704. These Square-on-point colored signs must be posted at all entrances where hazardous materials are used or stored. Generally your most hazardous material will dictate the number codes as follows.

Each color will have a number from 0 (zero) to 4 (four) with zero meaning no harm under certain fire conditions and four meaning extremely dangerous for health, flammability, and reactivity. An example sign for gasoline as follows.



You can determine your most hazardous substance by checking your Material Safety Data Sheets (MSDS). This regulation, also required by OSHA's Community Right to Know rules, covers all bulk plants and gasoline dispensing facilities. To order the appropriate signs, these phone numbers can be called 1-800-442-3633, 1-800-243-6642, 1-800-327-6868, and 1-800-521-7000.

## ***U.S. EPA 10 GALLON PER MINUTE (GPM) NOZZLE REGULATION***

US EPA regulation 40 CFR 80.22 (j) states that all retailer and wholesaler purchaser-consumer who dispenses gasoline or methanol into a motor vehicle at a facility handling more than 10,000 gallons of gasoline a month must limit the gasoline nozzle flow to 10 GPM by July 1, 1996. All gasoline dispenses handling under 10,000 gallons of gasoline per month must comply with this rule by January 1, 1998. Flow limits or flow restricters must be installed in each case where the gasoline dispensing nozzle flow rates are greater than 10 GPM. The US EPA will enforce this regulation with their own inspectors, and violators can be fined up to \$25,000 per violation plus economic benefit. This rule is designed to control ambient air pollution (spit back) from motor vehicles during refueling and help the on-board vapor recovery canister being implemented on new motor vehicles starting with model year 1998.

**NOZZLE FLOW RATE TESTING.** A procedure for flow rate testing to be followed by **Federal EPA Inspectors** follows. Basically the dispenser closest to the tanks or pumps will be used for the test. Testing procedure is basically measuring the time to dispense 2.00 gallons of fuel with a digital stop watch that can read to the least 0.01 seconds into a calibrated 5 gallon proving fuel container.

**TEST PROCEDURE:** **1)** If no vehicles are fueling, use the 5 gallon container. Start the stop watch when the dispenser indicates 1.00 gallons dispense. **2)** Carefully measure the time with the stopwatch that it takes to dispense exactly 2.00 gallons of fuel. (i.e., stop the stopwatch when the dispenser indicates 3.00 gallons dispensed) **3)** If the time is greater than 11.8 seconds, there is no violation. (there is a 0.2 second test tolerance) **4)** If the time is less than or equal to 11.8 seconds repeat the test for another 2.00 gallons. If the second test is either less than or equal to 11.8 seconds, use the 5.0 gallon container to verify the accuracy of the dispenser meter. If the volume dispensed, when the meter shows 5.00 gallons, is more than 6 cubic inches over or under the five gallon mark, note this on the inspection form. If the volume of the container is 5.00 gallons or greater, note as a violation. If the volume is less than the 5.00 gallons by 6 cubic inches, conduct the test on another dispenser unit. The following volumes and times may be used; 2.00gals.@11.8 sec., 3.00gals.@17.7 sec., 4.00gals.@ 23.6 sec., 5.00gals.@29.5 sec.



## ***FIRE CODE ALLOWS LATCH-OPEN DEVICES ON HOSE NOZZLES***

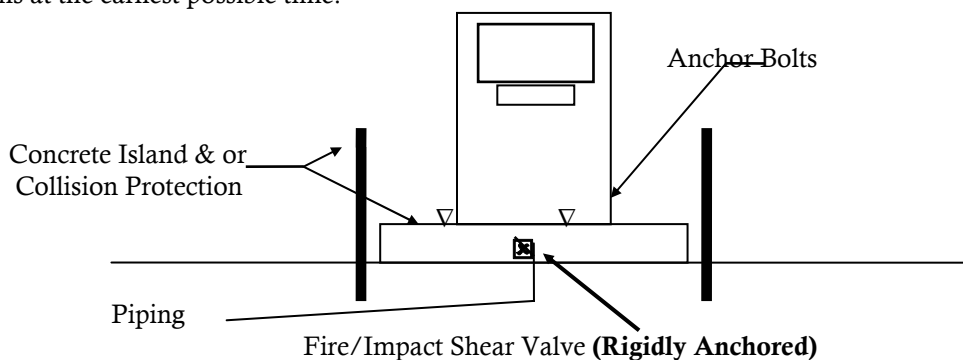
We have received many calls lately regarding latch-open devices for island type gasoline dispensers. The motoring public detest standing in the rain, wind or snow to manually hold open the gasoline nozzle to deliver fuel to their vehicle. Some people have used various devices at hand (Bic-Lighters, gas caps, cola cans) to defeat the latchless nozzles. This in turn would override the automatic-closing nozzle while the customer shopped or cleaned their windshield. Some individuals have marketed a device that holds open the nozzle for one's personal use and many others have "homemade" devices. Keep in mind that some local ordinances may prevent latch-open devices, always check with the local Fire Official. The 2000 NC Fire Code (IFC) allows the use of latch-open devices for use on island types self-service gasoline dispensers. The Code is as follows:

### **SECTION 2206.7 Fuel-Dispensing systems for flammable & combustible liquids.**

- **2206.7.6** A listed automatic-closing type hose nozzle valve, with or without latch-open device, shall be provided on island-type dispensers used for the dispensing of Class I II or IIIA liquids.
- **2206.7.6.1** At any installation where the normal flow of product may be stopped other than by the hose nozzle valve, such as at pre-pay stations, the systems shall include listed equipment with a feature that causes or requires the closing of the hose nozzle valve before product flow can be resumed or before the hose nozzle valve can be replaced in its normal position in the dispenser; or the hose nozzle valve shall not be equipped with a latch open device.
- **2206.7.6** Overhead-type dispensing devices shall be provided with a listed automatic-closing type hose nozzle valve without a latch-open device. *Exception; A listed automatic-closing type hose nozzle valve with a latch-open device may be used if the design of the system is such that the hose nozzle valve will close automatically in the event the valve is released from a fill opening or upon impact with a driveway.*
- **2209.3.3** Dispensing nozzles used at marine service stations shall be of the automatic-closing type without a latch-open device.
- **2204.4.2** A hose nozzle valve used for dispensing Class I liquids into a container shall be manually held open during the dispensing operation.

## ***FIRE CODE DISPENSER REQUIREMENTS***

We have received reports that some dispensers are being moved, jarred, or jilted by various accidents. When this happens the Fire/Impact valve not properly installed will sometimes not operate as designed and will spill petroleum products. The NC Fire Code section 2206.7.3 requires that all dispensers to be firmly and securely fastened to the island or ground. Also, NC Fire Code section 2206.7.4 requires that the Fire/Impact shear valve shall be **rigidly anchored** to the island or other secure methods for it to work properly. The shear section of the Fire/Impact shear valve should be installed within 1/2 inch of the dispenser island level. All dispensers shall be mounted on a concrete island or otherwise protected against collision damage in accordance with NC Fire Code section 312. Dispensers shall be located in a position where a vehicle cannot strike it that is out of control descending a ramp or other slope. It is NCPMA's advice that all dispensers that are not properly anchored or have an improper Fire/Impact valve installed, correct these problems at the earliest possible time.



## ***NC DOT Right of Way Dispenser Pump Setbacks.***

NC DOT Right of Way set back requirements can be found in the "Policy on Streets and Driveway Access" manual. Pages 52 and 76 of this manual discusses gasoline dispenser set back requirements from DOT Right of Way. Set Backs (G) - Set backs, G, of gasoline pump islands parallel to the pavement edge shall be a minimum of 25 feet outside the highway right-of-way. Set backs of gasoline pump islands not parallel to the pavement edge shall be a minimum of 50 feet outside the highway right-of-way. The Manual can be downloaded at

[http://www.doh.dot.state.nc.us/preconstruct/highway/dsn\\_srvc/value/manuals/](http://www.doh.dot.state.nc.us/preconstruct/highway/dsn_srvc/value/manuals/)

## ***International Building Codes Now in Effect in NC***

The 2002 edition of the North Carolina Building codes is the International Building Codes (IBC) with North Carolina amendments. The new International Fire Code (IFC) and International Electrical Code (IEC) are now in effect in NC.

It is our understanding that the new IFC is not a retrofit code, that is to say, all existing system in compliance with pervious codes would be “grandfathered” in. As far as references to NFPA 30 & 30A, can still be used as long as local code enforcement agencies pre-approve the installation. You can submit an “Alternative Design” to the local code agencies and use NFPA 30 or 30A if approved.

## ***SPILL PREVENTION CONTROL AND COUNTERMEASURE PLANS***

The US EPA Federal Regulation 40 CFR part 112 requires that a Spill Prevention Control and Countermeasure Plan (SPCC) be prepared for all onshore and offshore oil storage facilities that have discharged (spilled) oil or could reasonably be expected to discharge oil that would likely reach “navigable water”. The requirement for the SPCC Plan applies to non-vehicle or non-pipeline facilities involving storage facilities where any single above ground tank is larger than 1,320 gallons or the aggregate total above ground storage is over 1,320 gallons. There are virtually no exemptions or exceptions from the applicability requirement, according to the EPA and most plants are included.

The SPCC Plan must be certified by a registered engineer, signed for validation by an authorized representative of the applicable facility, and all provisions described in the Plan must be fully implemented. The plan must be kept on file at the facility if it is attended at least eight hours daily. NCPMA’s Technical Director will assist (for a fee) in preparation of SPCC Plans. Contact NCPMA for further details.

### **Outline of SPCC Plan**

- A. GENERAL DESCRIPTION**
- B. DESCRIPTION OF SPILL EVENTS WITHIN PAST 12 MONTHS**
- C. SPILL PREDICTIONS: DIRECTIONS, RATE OF FLOW, QUANTITY**
- D. GENERAL REQUIREMENTS: CONTAINMENT, DIVERSIONARY STRUCTURES**
- E. ALTERNATIVE STRONG OIL SPILL CONTINGENCY PLAN**
- F. SPECIFIC REQUIREMENTS**
  - 1. Drainage from containment structures
  - 2. Oil Storage Tanks
  - 3. Facility Transfer Operations
  - 4. Loading and Unloading Facilities
  - 5. Inspection and Test Records
  - 6. Security
  - 7. Personnel Training and Spill Prevention Procedures
  - 8. Precipitation Release Schedule

### **APPENDICES**

- 1. Plot Drawing of Facility and Map
- 2. Certification of Substantial Harm Criteria Form

## ***Engineering Services Provide by NCPMA***

NCPMA’s Technical Director will provide engineering services for NCPMA members and non-members as time allows.

There are discounts available for more than one service. The fees for these services are as follows:

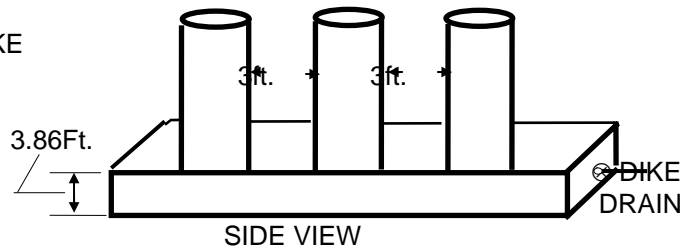
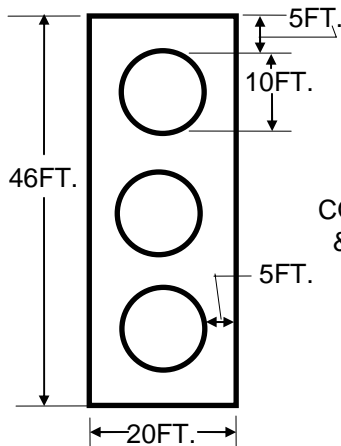
<b>Service</b>	<b>NCPMA Member Fee</b>	<b>Non Member Fee</b>
<b>EPA Spill Plan Preparations (in State)</b>	<b>\$750.00</b>	<b>\$1500.00</b>
<b>EPA Spill Plan Amendments (in State)</b>	<b>\$250.00</b>	<b>\$500.00</b>
<b>NCDA Propane Fire Safety Analysis</b>	<b>\$1000.00</b>	<b>\$1500.00</b>
<b>NC Fire Code Engineering Permit Plans for Tanks</b>	<b>\$75.00 per hour</b>	<b>\$100.00 per hour</b>

## ***SECONDARY CONTAINMENT VOLUME REQUIREMENTS FOR ASTs***

The US EPA has established regulations requiring spill prevention and control for aboveground storage tanks greater than 1,320 gallons or two tanks with total capacity greater than 1320 gallons. Secondary containment can be

dikes, berms, remote impounding or other various means. Dikes and berms must hold the single largest tank plus 10 percent for rainwater allowances. Another design criterion that can be used is the single largest tank plus the freeboard allowance factor. The freeboard allowance in NC is typically the minimum dike wall height to contain the single largest tank volume plus 6 inches. The dike floor is required to be coated, lined or has impermeable earth to prevent seepage.

PLAN VIEW



Consider the above drawing and example dike volume design procedure. We have three 20,000 gal. vertical tanks. Tanks are 10 Ft. in Diameter with a radius of 5 Ft., 5 Ft. from dike walls and 3 Ft. from each other. For our example we will add ten percent to the single largest tank which would equal 22,000 gals. Convert gallons to cubic feet by dividing gallons by 7.48 gals./cubic Ft. Therefore, 22,000 gals. ÷ 7.48 = 2942 Cubic Feet. The minimum area of the pad is 20 Ft. X 46 Ft. = 920 Square Feet. The other two tanks must be taken into consideration for their displacement area by calculating  $\pi \times \text{radius squared} \times 2$  tanks. Therefore,  $3.14 \times 5^2 \times 2 = 157 \text{ Ft.}^2$  Net dike available area,  $920 \text{ Ft.}^2 - 157 \text{ Ft.}^2 = 763 \text{ Ft.}^2$  To determine dike wall height, divide  $2942 \text{ Ft.}^3$  by  $763 \text{ Ft.}^2 = 3.86 \text{ Ft.}$  or 3 Ft. 11 inches high.

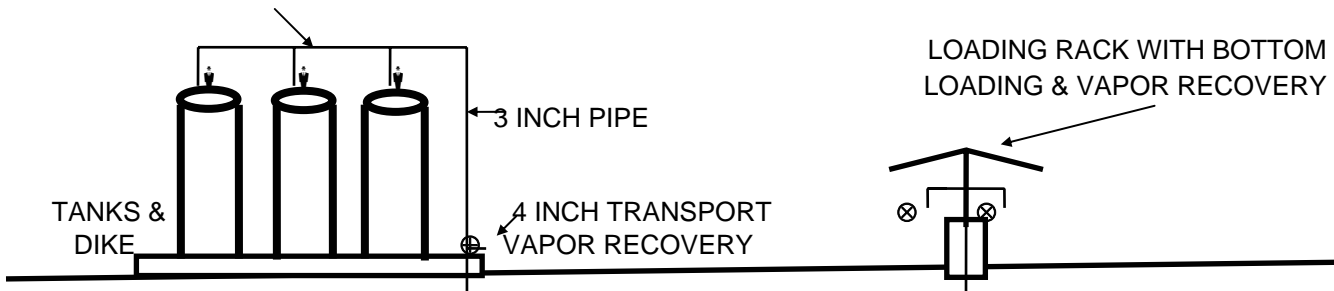
Tanks should be kept at a minimum of 3 feet from the toe of the dike wall. Calculations for horizontal tanks would follow the same procedure. Horizontal tank ends must be kept a minimum of 3 feet inside dike wall.

### ***BENZENE VAPOR RECOVERY RULE AT BULK GASOLINE PLANTS***

On November 1, 1996 all Bulk Gasoline plants that have average daily throughputs greater than 2,500 gallons based on 312 days per year may be required to have vapor recovery at the loading rack. If over gasoline throughput, two criteria must be met to be determined if loading rack (outgoing) vapor recovery is required, Housing Density and County. (1) For Bulk Gasoline plants that are located in one of the following counties; **Alamance, Buncombe, Cabarrus, Catawba, Cumberland, Davidson, Durham, Forsyth, Gaston, Guilford, Mecklenburg, Orange, New Hanover, Rowen, and Wake**, and if the housing density is more than 50 residences within a one square mile area of the loading rack, then vapor recovery is required by Nov. 1, 1996. (2) In all other counties, the specified limit on housing density is 100 residences. All bulk gasoline plants over 4,000 gal. per day throughput gasoline must have vapor recovery on the outgoing without regard to housing density or location. All bulk gasoline plants must have vapor recovery on the incoming side regardless of gasoline throughput. Only UL rated pipe (plastic, fiberglass, or metal) can be used for vapor recovery. Underground piping should slope to a liquid trap in the event of gasoline vapor condensation. It has been estimated that cost of installation is between \$20,000 to \$45,000 for an average bulk plant with three tank wagons, plus maintenance cost estimated at \$1,000 per year.

### **TYPICAL BULK PLANT LAYOUT**

MANIFOLD VAPOR RECOVERY PIPING & PRESSURE-VACUUM VENTS



## ***OHSA Confined Space Entry Program & New SPCC***

Many of you may be using contractors at your AST facilities to meet the new EPA SPCC regulations to integrity test tanks. Host Employee (that's you) must ensure that OHSA Confined Space Entry Program is properly conducted by your subcontractors. Under Federal Regulation 29 CFR 1910.146(a) "Confined space" means a space that: (1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and (2) Has limited or restricted means for entry or exit (for example, **tanks**, vessels, silos, storage bins, hoppers, vaults, and **pits** are spaces that may have limited means of entry.); and (3) Is not designed for continuous employee occupancy. **All dikes, berms, and remote impounding areas that are used for petroleum secondary containment and that have walls over 4 feet in height are consider OHSA Confined Spaces.**

**1910.146(c)(1)** The employer shall evaluate the workplace to determine if any spaces are permit-required confined spaces.

**1910.146(c)(2)** If the workplace contains permit spaces, the employer shall inform exposed employees, by posting danger signs or by any other equally effective means, of the existence and location of and the danger posed by the permit spaces. NOTE: A sign reading DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER or using other similar language would satisfy the requirement for a sign.

**1910.146(c)(7)** A space classified by the employer as a permit-required confined space may be reclassified as a non-permit confined space under the following procedures:

**1910.146(c)(7)(i)** If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space, the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated.

**1910.146(c)(7)(ii)** If it is necessary to enter the permit space to eliminate hazards, such entry shall be performed under paragraphs (d) through (k) of this section. If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated.

**1910.146(c)(7)(iii)** The employer shall document the basis for determining that all hazards in a permit space have been eliminated, through a certification that contains the date, the location of the space, and the signature of the person making the determination. The certification shall be made available to each employee entering the space or to that employee's authorized representative.

**1910.146(c)(7)(iv)** If hazards arise within a permit space that has been declassified to a non-permit space under paragraph (c)(7) of this section, each employee in the space shall exit the space. The employer shall then reevaluate the space and determine whether it must be reclassified as a permit space, in accordance with other applicable provisions of this section.

**1910.146(c)(8)** **When an employer (host employer) arranges to have employees of another employer (contractor) perform work that involves permit space entry, the host employer shall:**

**1910.146(c)(8)(i)** Inform the contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program meeting the requirements of this section;

**1910.146(c)(8)(ii)** Apprise the contractor of the elements, including the hazards identified and the host employer's experience with the space, that make the space in question a permit space;

**1910.146(c)(8)(iii)** Apprise the contractor of any precautions or procedures that the host employer has implemented for the protection of employees in or near permit spaces where contractor personnel will be working;

**1910.146(c)(8)(iv)** Coordinate entry operations with the contractor, when both host employer personnel and contractor personnel will be working in or near permit spaces, as required by paragraph (d)(11) of this section; and

**1910.146(c)(8)(v)** Debrief the contractor at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in permit spaces during entry operations.

For a complete review of the regulations go to the below web site:

[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=9797](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9797)

### ***STAGE I & STAGE II CONTROLS***

**15A NCAC, 2D-.0928 Stage I** vapor recovery is required on all service stations/gasoline dispensing facilities that have annual throughputs greater than 50,000 gallons per year. All gasoline tanks and tankers must be submerged

filled or bottom loaded regardless of gasoline throughput. Submerged fill tubes can be 12 inches off the bottom of the tank if the tank has a poppeted vapor recovery adapter. Farm and residential tanks of not more than 2000 gallons may use a portable submerged fill tube. If an unpoppeted vapor recovery adapter is used, the unpoppeted vapor recovery adapter shall be replaced with a poppeted vapor recovery adapter when the tank is new, replaced or upgraded. Where vapor recovery lines are manifolded, then poppeted vapor adapters are to be used. No more than one tank is to be loaded at a time if the manifolded vapor lines are less than 2.5 inches in size. Vent lines must have pressure release valves. Exemptions include stationary tanks of not more than 2000 gallons which were in place before July 1, 1979, and stationary tanks not over 550 gallons in place after June 30, 1979, (submerged fill tubes required). Effective date is November 1, 1992, and July 1, 1994.

**15A NCAC, 2D-.0953 & .0954, Stage Two** vapor recovery systems effective June 30, 1994. Stage Two vapor return piping applies to all applicable gasoline dispensing facilities in the following original ozone non-attainment areas: **Wake, Davidson, Durham, Forsyth, Guilford, Mecklenburg, and Gaston counties, the Dutchville Township in Granville county and the area of Davie County that is bounded by the Yadkin River, Dutchman's Creek, NC Highway 801, Fulton Creek and back to the Yadkin River.** The complete underground piping must be installed for any applicable facilities in the above areas that are built after June 30, 1994, or when tanks are removed, replaced or upgraded (piping included) after June 30, 1994. When a new tank is added, the new tank shall comply with this rule. All stage two systems must be California Air Resources Board (CARB) certified for 95% vapor recovery efficiency. The following are exemptions from this rule:

- Any facility dispensing 10,000 gallons of gasoline per calendar month.
- Any facility dispensing 50,000 gallons of gasoline or less per calendar month and is an independent small business marketer of gasoline (ISBM).
- Any facility dispensing gasoline exclusively for refueling marine vehicles, aircraft, farm equipment, and emergency vehicles.

If any of the above exemptions are exceeded for any given month, you are required to comply with this rule. Burden of proof for eligibility of exemption is upon the owner and adequate records for an exemption must be kept for two years.

The specifications of the vapor return piping shall conform to the following:

- Stage II piping on vacuum assisted systems must have a separate opening to the tank.
- Stage II piping must be installed from the tanks to the dispensers on new installations.
- Pipe diameters must meet manufacturer specifications, or in accordance with regulations.
- All piping must slope back to the tank.

Within 30 days after installation of the vapor return piping, the owner or operator of the facility shall submit reports of the following tests to be completed as described in EPA-450/3-91-022b. One of the following tests must be performed to determine leak rates for gasoline vapors; Bay Area Source Test Procedure ST-30, or San Diego Test Procedure TP-91-1. To determine pipe installation flaws such as kinks or constrictions, one of the following tests must be performed: Bay Area Source Test ST-27, Dynamic Back Pressure, or San Diego Test Procedure TP-91-2, Pressure Drop vs. Flow/Liquid Blockage Test. The owner or operator must give notice by telephone to the DAQ Regional Office at least five business days before backfilling the trenches, and at least ten business days before the testing is started. The owner, operator and test contractor shall report all test failures to the DAQ Regional Office within 24 hours.

The state has also adopted contingency measures for above ground Stage II controls in the event of an ozone violation.