



PDH Course G134

North Carolina & International Fire Codes For Storage of Flammable & Combustible Liquids At Bulk Petroleum Storage-Dispensing Facilities (INCLUDES ELECTRICAL DISCUSSION) (INCLUDES OSHA, EPA REGULATIONS)

Tim Laughlin, P.E.

Revised February 2024

PDH Center

2410 Dakota Lakes Drive
Herndon, VA 20171-2995

Phone: 703-478-6833

Fax: 703-481-9535

www.PDHcenter.com

North Carolina & International Fire Codes For Storage of Flammable & Combustible Liquids At Bulk Petroleum Storage-Dispensing Facilities

Timothy Laughlin, P.E.

Course Outline

1. Learning objectives
2. Introduction
3. Course content
4. Course summary

This course includes a multiple-choice quiz at the end.

Learning Objective

At the conclusion of this course, the student will:

- Be familiar with International Fire Code (IFC) Chapter 23 “Service Stations & Repair Garages”, Chapter 57 Flammable & Combustible Liquids, National Fire Protection Association (NFPA) pamphlets 30 and 30A, as they pertain to Aboveground Storage Tanks (ASTs) and
- Have a better understanding of the requirements and other regulatory provisions for preparing installation plans for petroleum marketing and bulk storage facilities.
- Be able to determine if certain **gasoline** storage facilities are required to install vapory recovery equipment during transport off loading and motor vehicle refueling.
- Quantified what petroleum storage facilities require a Professional Engineers Certification before building permits can be issued. (In North Carolina only, check with your state PE Board if certification is required in your state)
- Includes NFPA 70 National Electrical Code discussion for petroleum fuels at Motor Fuel Dispensing Facilities and Bulk Storage Plants.

Course Introduction

Fire codes and environmental regulations change constantly regarding the storage of Flammable & Combustible Liquids at Petroleum Marketeering Facilities. Many state building code agencies are now adopting the International Building Code (IBC) and International Fire Code (IFC) as a national code consensus takes hold. North Carolina has adopted the IBC effective January 1, 2002.

Air quality also plays a role at these facilities as EPA has mandated many states to require gasoline vapory recovery equipment to reduce Volatile Organic Compounds (VOCs) and Air Toxics (Benzene) from entering the atmosphere during loading/refueling operations.

You should also refer to NC Division of Air Quality regulations 15A NCAC 0923-0929 and 0953-0954 at <http://daq.state.nc.us/> . The NC Office of State Fire Marshal at <http://www.ncdoi.com/OSFM/>. The International Code Council (ICC) web link is <http://www.iccsafe.org/Pages/default.aspx>

Course Content: Aboveground Petroleum Storage Tank Manual & NC/IFC Fire Codes with data on U.S. EPA-NC Gasoline Vapor Recovery Regulations, U.S. EPA Spill Plan & Electrical Information.

FIRE POINT.

The lowest temperature at which a liquid will ignite and achieve sustained burning when exposed to a test flame in accordance with ASTM D 92.

Definitions from the International Fire Code (IFC)

AUTOMOTIVE SERVICE STATION.

That portion of property where flammable or combustible liquids or gases used as motor fuels are stored and dispensed from fixed equipment into the fuel tanks of motor vehicles.

FLEET VEHICLE SERVICE STATION.

That portion of a commercial, industrial, governmental or manufacturing property where liquids used as fuels are stored and dispensed into the fuel tanks of motor vehicles that are used in connection with such businesses, by persons within the employ of such businesses.

MARINE SERVICE STATION.

That portion of property where flammable or combustible liquids or gases used as fuel for watercraft are stored and dispensed from fixed equipment on shore, piers, wharves, floats or barges into the fuel tanks of watercraft and shall include all other facilities used in connection therewith.

REPAIR GARAGE.

A building, structure or portion thereof used for servicing or repairing motor vehicles.

SELF-SERVICE STATION.

That portion of a service station where liquid motor fuels are dispensed from fixed approved dispensing equipment into the fuel tanks of motor vehicles by persons other than a service station attendant.

BULK PLANT OR TERMINAL.

That portion of a property where flammable or combustible liquids are received by tank vessel, pipelines, tank car or tank vehicle and are stored or blended in bulk for the purpose of distributing such liquids by tank vessel, pipeline, tank car, tank vehicle, portable tank or container.

BULK TRANSFER.

The loading or unloading of flammable or combustible liquids from or between tank vehicles, tank cars, or storage tanks.

FLASH POINT.

The minimum temperature in degrees Fahrenheit at which a liquid will give off sufficient vapors to form an ignitable mixture with air near the surface or in the container but will not sustain combustion. The flash point of a liquid shall be determined by appropriate test procedure and apparatus as specified in ASTM D 56, ASTM D 93 or ASTM D 3278.

TANK, PRIMARY.

A listed atmospheric tank used to store liquid.

TANK, PROTECTED ABOVE GROUND.

A tank listed in accordance with UL 2085 consisting of a primary tank provided with protection from physical damage and fire-resistive protection from a high-intensity liquid pool fire exposure. The tank may provide protection elements as a unit or may be an assembly of components, or a combination thereof.

NFPA 30 2018 DEFINITION OF "FIRE RESISTANT TANK"

22.2.1 Fire-Resistant Tank. *An atmospheric aboveground storage tank with thermal insulation that has been evaluated for resistance to physical damage and for limiting the heat transferred to the primary tank when exposed to a hydrocarbon fuel fire and is listed in accordance with UL 2080, Standard for Fire Resistant Tanks for Flammable and Combustible Liquids, or an equivalent test procedure.*

Petroleum Products Fire Hazard Class

The Fire Codes have defined all petroleum products based upon their Flash Point. Flash Point is defined as the lowest temperature at which vapors from a volatile liquid will ignite momentarily upon the application of a small flame under specific conditions.

Flammable Liquid: A liquid having a flash point below 100°F and having a vapor pressure below 40 psia @ 100°F.

Class IA Liquid: Liquids with Flash Point below 73°F and Boiling Point below 100°F.

Class IB Liquid: Liquids with Flash Point below 73°F and Boiling Point above 100°F.

Class IC Liquid: Liquids with Flash Point above 73°F and below 100°F.

Combustible Liquid: A liquid having a flash point above 100°F.

Class II Liquid: Liquids with Flash Point above 100°F and below 140°F.

Class IIIA Liquid: Liquids with Flash Point above 140°F and below 200°F.

Class IIIB Liquid: Liquids with Flash Point above 200°F.

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

2306.2.3 Above-ground tanks located outside, above grade. Above-ground tanks shall not be used for the storage of Class I, II or III liquid motor fuels, except as provided by this section.

1. Above-ground tanks used for outside, above-grade storage of Class I liquids (Gasoline) shall be *listed* and *labeled* as protected above-ground tanks in accordance with UL 2085 and shall be in accordance with Chapter 57. Such tanks shall be located in accordance with below Table.

2. Above-ground tanks used for outside, above-grade storage of Class II (Diesel) or IIIA liquids shall be *listed* and *labeled* as protected above-ground tanks in accordance with UL 2085 and shall be installed in accordance with Chapter 57. Tank locations shall be in accordance with the Table below.

Exception: Other above-ground tanks that comply with Chapter 57 were approved by the fire code official.

3. Tanks containing fuels shall not exceed 12,000 gallons in individual capacity or 48,000 gallons in aggregate capacity. Installations with the maximum allowable aggregate capacity shall be separated from other such installations by not less than 100 feet.

4. Tanks located at farms, construction projects, or rural areas shall comply with Section 5706.2.

5. Above-ground tanks used for outside above-grade storage of Class IIIB liquid motor fuel shall be *listed* and *labeled* in accordance with UL 142 or *listed* and *labeled* as protected above-ground tanks in accordance with UL 2085 and shall be installed in accordance with Chapter 57. Tank locations shall be in accordance with the Table below.

6. Listed UL 142 above ground storage tanks with spill control, 1,100 gallons or less in capacity, shall be permitted to be used to store Class I liquids at fleet service stations. (Must meet min. distance requirements per last row in table)

2306.2.3.1 Kerosene storage. The provisions of Section 2306.1 shall not prohibit above-ground tanks and dispensers for K-1 kerosene in accordance with this Fire Code.

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 less than 12,000	15	25*	25	15	3
Diesel, Fuel Oil & Kerosene in protected tanks (UL 2085)	Same as Gasoline 12,000 gals. max.	Same as Gasoline	*Same as Gasoline	Same as Gasoline	Same as Gasoline	Same as Gasoline
Tanks in Vaults- shall be <i>listed</i> in accordance with UL 2245 or pre-approved per 5704.2.8	0-20,000 gals.	0	0	0	0	Compartment
Other Tanks	12,000 gals.	50	50	100	50	3

***At commercial, industrial, governmental, or manufacturing establishments, (Fleet Vehicle Service Stations) where UL-2085 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) **2306.6.2.1 Tank openings.** Tank openings for aboveground tanks shall be through the top only for motor fuel tanks.

2. 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 2306.6.2.6 and 5704.2.9.6.8 requires a fixed 5-gallon spill container to 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 23 & 57 or NFPA 30 & 30A). For more information, please call Tim Laughlin at NCCPM.

3. 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 2304.3.

4. **2306.3 Security.** Above-ground tanks for the storage of liquid motor fuels shall be safeguarded from public access or unauthorized entry in an *approved* manner.

Fire Code Requirements on Double Wall ASTs

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

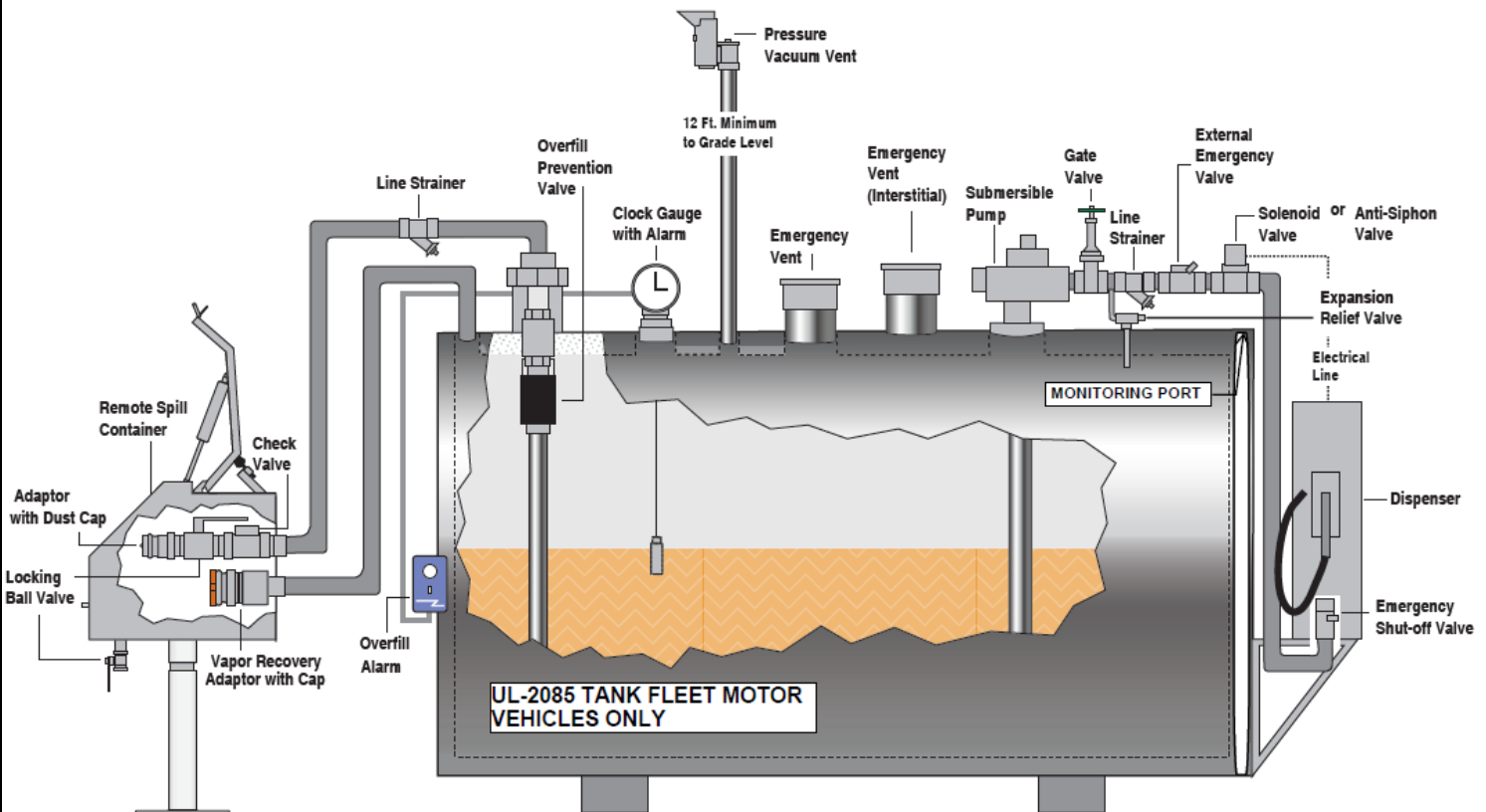
1) ASTs at public fuel dispensing facilities and private fuel dispensing facilities means shall be provided for determining the liquid level in each tank and shall be accessible to the delivery operator. Means shall be provided to sound an audible/visual alarm when the liquid level in the tank reaches 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 a normal or emergency event. Gasoline (Class I) storage for dispensing to motor vehicles must be stored in a UL 2085 protected tank unless the following exemption:

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 property 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. (See page 12 for Changes to Bulk Storage Tank Overfill Prevention Code)

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. Pressure relief devices must be installed to prevent pressure build-up caused by thermal expansion.

ABOVEGROUND UL-2085 FLEET GASOLINE FUELING



Fire Code Requirements on Public & Private Double Wall ASTs.

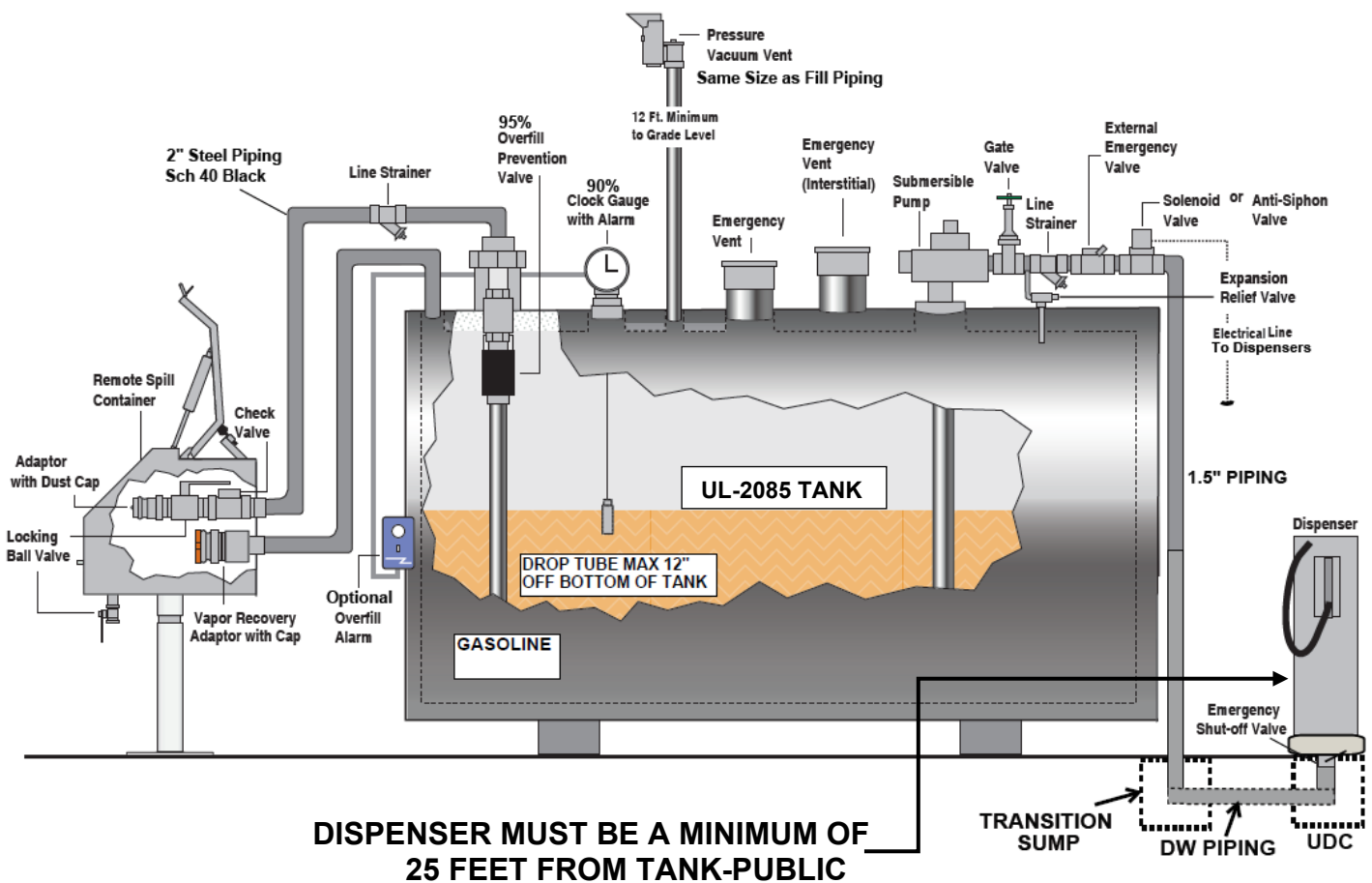
At C-stores, service stations, commercial, industrial, governmental, or manufacturing establishments, (Fleet Vehicle Refueling Facilities) where tanks are intended for fueling vehicles used in connection with their business, AST minimum distance will be accordance with the table on page 3. Gasoline storage 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 for Fleet Facilities only.

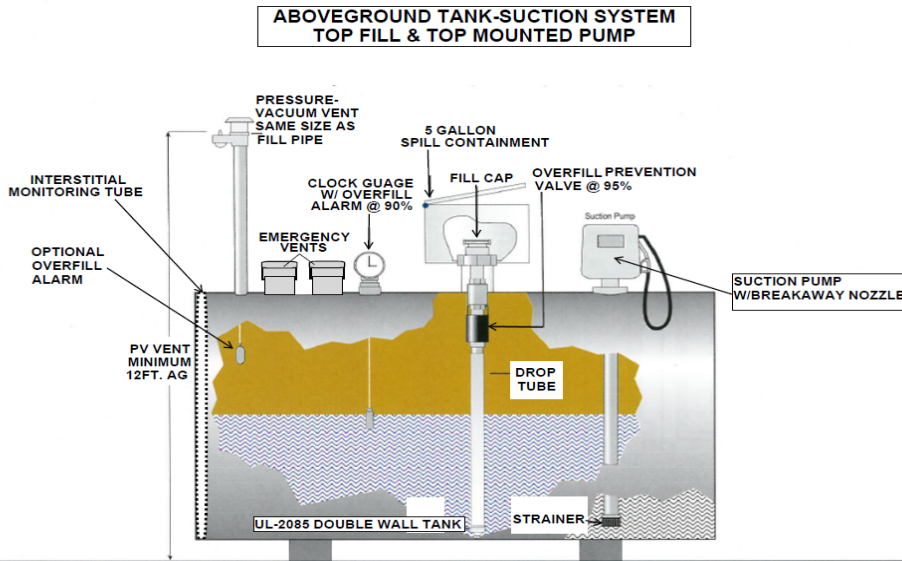
"Fire Resistant Tanks" are tanks that meet UL Standard 2080 or equivalent standard under the new definition of NFPA 30A, 2018 edition. You can install Fire Resistant Tanks for aboveground use in accordance with the latest editions of NFPA 30A at Fire Officials prior approval, under "Alternative Design" 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 2306.2.3.1 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.

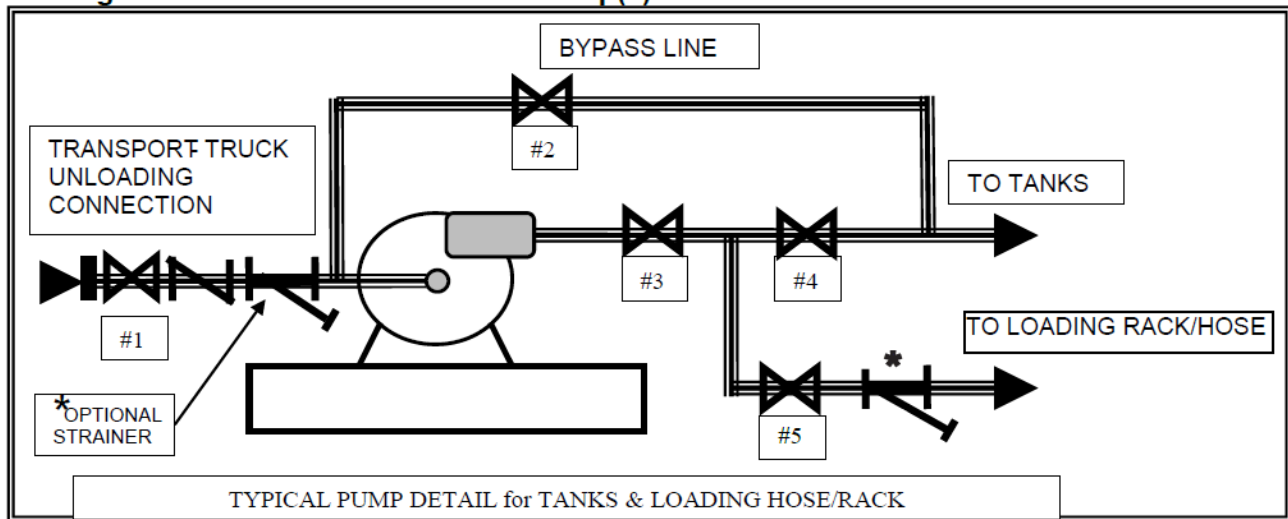
For pressurize underground piping, a piping leak detector/tee (ALLD) must be installed downstream of the Solenoid Valve.

Aboveground Fuel Storage - Pressure System





Aboveground Bulk Tank with Remote Pump(s)



Valve Schedule and Sequence of Operations:

- I) Transport Unloading: Open Valves #1, #3 and #4, Close Valves #2 and #5. Turn the pump on. NOTE: Special care shall be considered that loading operations to tank wagon vehicles cannot occur during transport off-loading. Additional Check Valves may be added to prevent flows opposite arrow direction.
- II) Loading Rack Operations: Close Valves #1 and #4, Open Valves #2, #3 and #5.
- III) Valve Schedule:

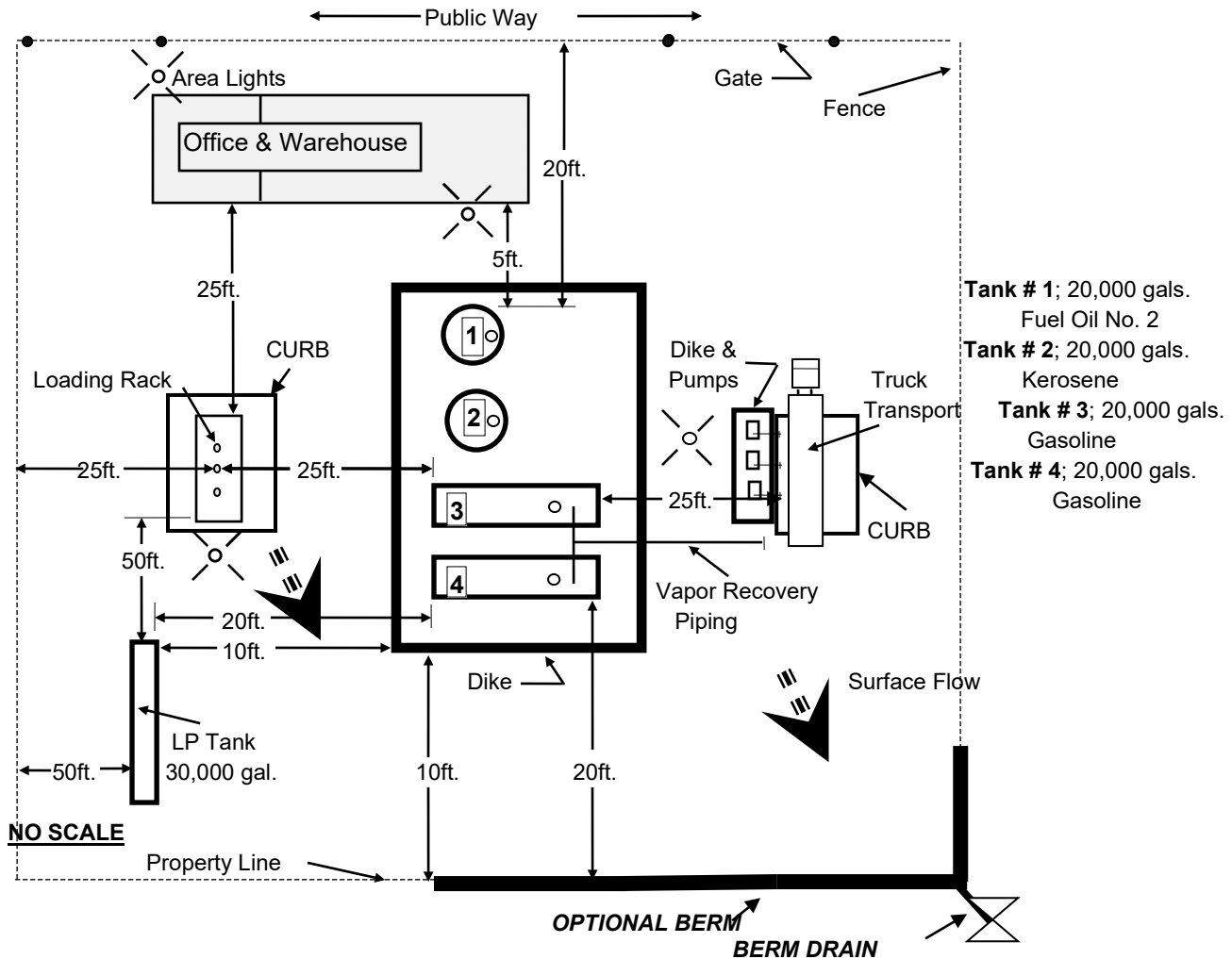
- #1 Transport unloading valve normally closed, during loading rack operations.
- #2 Bypass pump valve normally open, during loading rack operations.
- #3 Pump discharge valve normally open, during loading rack & tanker unloading operations (OPTIONAL).
- #4 Pump discharge/tank valve, normally closed during loading rack operations.
- #5 Loading valve normally open, during loading rack operations.

NOTES: Positive displacement pumps shall be provided with pressure relief that discharges back to the tank, pump suction, or other suitable location or shall be provided with interlocks to prevent overpressure. Flexible connectors are used in piping systems wherever the connection would be subject to movement or vibration in normal use. Examples include connections between pumps and fixed piping and at piping headers where connections are made and broken. Piping systems shall contain valves to operate the system properly and to isolate the equipment in the event of an emergency. Piping systems in connection with pumps shall contain valves to properly control the flow of liquid both in normal operation and in the event of an emergency. Check valves are required only if backflow is possible. Liquid in any exposed portion of a pipe expands as ambient temperature increases and as a result of solar heating. Normally, thermal expansion is accommodated in the storage system. If a portion of exposed piping is blocked in at both ends by closed valves, however, thermal expansion results in an increase in pressure. Thermal blocking can result in dramatic increases in pressure with consequent leaks at fittings, joints, and seals. In extreme cases, thermal blocking has been known to cause failure of gaskets and seals and, in some cases, rupture of the piping.

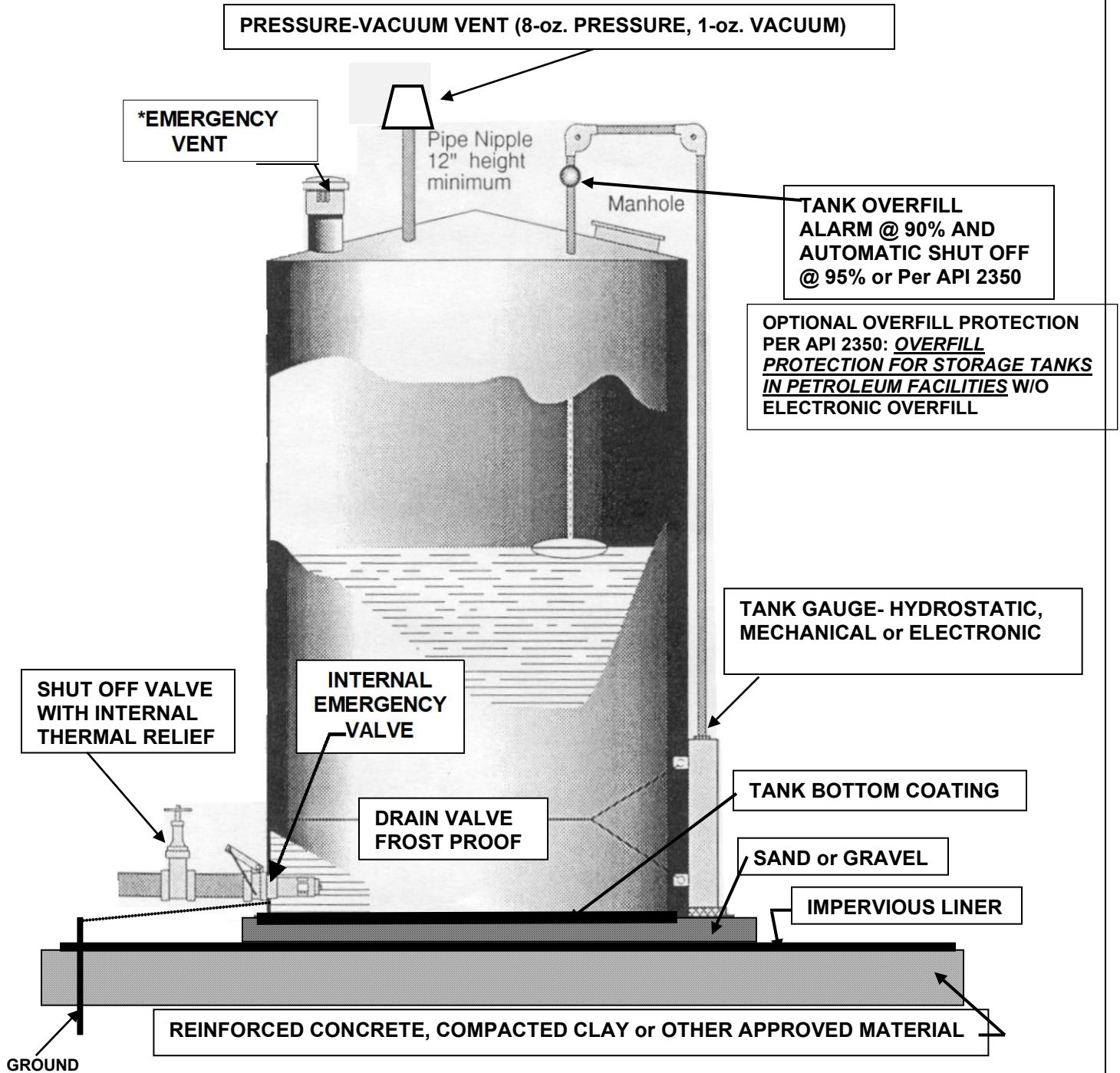
Bulk Plant Fire Code AST's Minimum Distance Requirements

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 should be at least 3 feet from dike wall if under 6ft in height. 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 fireproof 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 2306.6.2.6 and 5704.2.9.6.8 requires a fixed 5-gallon spill container to 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 or in accordance with API 2350. 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.

SDS Data on Common Petroleum Products

The below table describes data one can find from a Safety Data Sheet (SDS). SDS's can be as long as 12 pages and contain much more data than given below. The below information is typical and taken from specific SDS's. For specific information on name brand products, one should review the name brand products SDS's.

The table of information is based on the following. 1) Density is at 60 degrees F. 2) Most petroleum products have flash points that have a degree range, for safety considerations please use the lowest flash point. 3) NFPA-704 color code is rated on numbers with 0 being the least cause for concern and 4 being the most cause for health and safety concerns. (B) stands for blue and is health rating, (R) stands for red and is fire rating, (Y) stands for yellow is for reactivity rating. 4) Gasolines contains no oxygenates and is standard RVP.

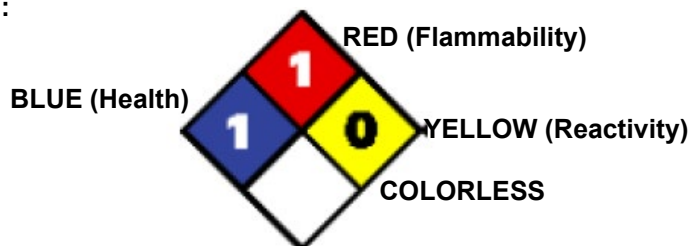
Chemical Type	Flash Point °F	Density lbs./gal.	Shipping DOT ID #	CAS #	NFPA-704 color code	Hazard Class
Gasoline 89 octane	-44	6.26	1203	8006-61-9	B-2, R-4, Y-0	Flammable
Diesel # 2	120-180	7.15	1993	68476-30-2	B-2, R-2, Y-0	Combustible
K-1 Kerosene	122-150	6.92	1223	8008-20-6	B-1, R-2, Y-0	Combustible
# 2 Fuel Oil	120-180	7.15	1993	68476-30-2	B-0, R-2, Y-0	Combustible
Motor Oil 10W-30	401	7.33	none	64741-88-4	B-0, R-1, Y-0	Combustible
Antifreeze Ethylene-Glycol	235	9.38	none	107-21-1	B-3, R-1, Y-0	non-flammable
Gasoline 87 octane	-44	6.23	1203	8006-61-9	B-2, R-4, Y-0	Flammable
Lube Oil 90 W	360	7.53	none	mixture	B-1, R-1, Y-0	Combustible
Soy Oil (B-100) Fatty Acid Ester	266 min.	7.3	none ID # 144920	Methyl Soyate: 67784-80-9; most common	B-0, R-1, Y-0	Combustible
Ethanol (200 proof)	50-60	6.5	1170	64-17-5	B-0, R-3, Y-0	Flammable
Propane Liquid or Gas	-156	4.2	1978	74-98-6	B-1, R-4, Y-0	Flammable Gas

NC/IFC FIRE CODE NFPA 704 LABELING

In accordance with Chapter 50, of the NC Fire Code, section 5003.5, 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 motor oil (10W30) as follows.

NFPA® Hazard Rating:



You can determine your most hazardous substance by checking your Safety Data Sheets (SDS). This regulation, also required by OSHA's Community Right to Know rules, covers all bulk plants and gasoline dispensing facilities.

Reuse or Abandonment of ASTs per Fire Code (IFC)

Consideration to exclude/exempt ASTs from the upcoming US EPA Spill Prevention Control & Countermeasure Plan (SPCC) requires that the AST be disconnected from the piping system. The AST

shall be emptied, safeguarded and cap at piping connection point with a blind flange or other approved measure to protect the inside of the tank.

From 2018 IFC Code

5704.2.13.2 Above-ground tanks. Above-ground tanks taken out of service shall comply with Sections 5704.2.13.2.1 through 5704.2.13.2.3.

5704.2.13.2.1 Temporarily out of service. Aboveground tanks temporarily out of service shall have all connecting lines isolated from the tank and be secured against tampering.

Exception: In-place fire protection (foam) system lines.

5704.2.13.2.2 Out of service for 90 days. Aboveground tanks not used for a period of 90 days shall be safeguarded in accordance with Section 5704.2.13.1.2 or removed in accordance with Section 5704.2.14.

Exceptions:

1. Tanks and containers connected to oil burners that are not in use during the warm season of the year or are used as a backup heating system to gas.

2. In-place, active fire protection (foam) system lines.

5704.2.13.2.3 Out of service for one year. Aboveground tanks that have been out of service for a period of one year shall be removed in accordance with Section 5704.2.14.

Exception: Tanks within operating facilities.

5704.2.14.2 Disposal.

Tanks shall be disposed of in accordance with federal, state and local regulations.

5704.2.15 Maintenance. Above-ground tanks, connected piping and ancillary equipment shall be maintained in a

safe operating condition. Tanks shall be maintained in accordance with their listings. Damage to above ground tanks, connected piping or ancillary equipment shall be repaired using materials having equal or greater strength and *fire resistance* or the equipment shall be replaced or taken out of service.

Emergency Venting is Required on All Tanks Storing Gasoline & Distillate Fuels & Some Hydraulic/Lubrication Oils

From UL-142 Steel Aboveground Tanks for Flammable and Combustible Liquids and NC Fire Code. Emergency venting is for Aboveground Storage Tanks that store Gasoline, Diesel, Kerosene, Fuel Oil (NA on Residential Fuel Tanks) and in some cases Hydraulic and Lubrication Oils (tanks under 12,000 gallons). **Do not tighten manhole bolts on tanks that use manholes for emergency venting. Do not attach anything to manholes that are used as emergency venting.**

UL-142 Section 8 Venting:

8.1 Each primary containment tank and each compartment of a compartment tank shall have provision for both normal and emergency venting. The openings for these vents shall be located at the top of the tank. The interstitial (annular) space of a secondary containment tank shall have provision for emergency venting. The opening for this emergency vent shall be located at the top of the secondary containment and shall terminate vertically above the top of the primary tank. These vent openings shall be in addition to the fill, withdrawal, and liquid level gauge openings.

8.2 The normal venting shall be sized in accordance with Table 8.2 and shall be at least as large as the filling or withdrawal connection, whichever is larger, but in no case less than 1-1/4 inch (30 mm) nominal inside diameter.

8.3 The provision for emergency venting shall be:

- a) An opening that complies with the requirements in 8.4 and is provided for that purpose only or
- b) A manhole with cover as described in 8.8 – 8.10 and a vent opening for normal venting complying with the requirements in 8.11.

8.8 A manhole in the top of a tank, with a cover constructed so as to lift under internal pressure such that the pressure in the tank cannot exceed a gauge pressure of 2.5 psig (17.2 kPa) may serve for emergency venting. Where emergency venting is provided by such manhole and cover, the tank shall include a vent opening for normal venting in accordance with the requirements in 8.11.

8.9 Emergency venting in accordance with 8.8 may be obtained by an arrangement such that the cover of a manhole not less than 16 inches (0.4 m) in diameter can be lifted vertically not less than 1-1/2 inches (38 mm) under conditions requiring emergency venting.

8.10 A long bolt manhole intended for emergency venting shall comply with Figure 9.1, except that the number of bolts and the number of holes may be reduced to one-half the number specified in Table 9.1. The bolts shall have an unthreaded section so that the cover can lift a minimum of 1-1/2 inches (38 mm).

NORMAL VENTING: MUST BE SIZED BASED ON FILL/WITHDRAWAL RATES.**(Same Size as Fill Piping for ASTs per UL)**

Gasoline: Pressure/vacuum (PV) vent valves shall be installed on the storage tank vent pipes. The pressure specifications for PV vent valves shall be a positive pressure setting of 2.5 to 6.0 inches of water and a negative pressure setting of 6.0 to 10.0 inches of water. The total leak rate of all PV vent valves at an affected facility, including connections, shall not exceed 0.17 cubic foot per hour at a pressure of 2.0 inches of water and 0.63 cubic foot per hour at a vacuum of 4 inches of water.

Typical Distillate Fuel Ranges: **PRESSURE = 2 to 16-oz./in² or 3.46 to 27.68 inches water column; VACUUM = 0.50 to 1 oz./in²**

NC/IFC Fire Code Changes Bulk Storage Tank Overfill Prevention Code

The NC-IFC Fire code on Flammable and Combustible Liquids storage tanks has changed the requirements on new bulk storage tanks under chapter 57 at bulk plants. This change does not apply to tanks used for the storage and dispensing of motorized equipment motorized vehicles under Chapter 23 or to tanks not located at the facilities listed below.

5704.2.7.5.8 Overfill prevention. An *approved* means or method in accordance with Section 5704.2.9.7.5 shall be provided to prevent the overfill of all Class I, II and IIIA liquid storage tanks. Storage tanks in refineries, bulk plants or terminals regulated by Section 5706.4 or 5706.7 shall have overfill protection in accordance with API 2350. An *approved* means or method in accordance with Section 5704.2.9.7.5 shall be provided to prevent the overfilling of Class IIIB liquid storage tanks connected to fuel-burning equipment inside buildings.

Exception: Outside above-ground tanks with a capacity of 1,320 gallons (5000 L) or less.

The American Petroleum Institute (API) recommended practice 2350 "Overfill Protection for Storage Tanks in Petroleum Facilities" is now required for all new bulk plant tanks after January 1, 2009.

Paraphrased from API 2350-Attended facilities (bulk plants) where electronic overfill detectors are not installed on tanks. Written procedures for product receipt shut down and diversion shall be developed by facility operator in accordance with API 2350.

Installation of electronic overfill detectors are not required for attended bulk plants. It is the facility operator's decision on whether or not to install electronic systems.

The US EPA SPCC regulations do require electronic overfill prevention or equivalent environmental protection as prescribed by professional engineer.

Disaster Planning for Petroleum Storage Facilities

On September 16, 1999, Hurricane Floyd devastated Eastern NC. Floods created by two consecutive hurricanes in the fall of 2004 created severe damage throughout western NC. Many flooded areas were beyond the 500-year floodplain. For those of us involved in the design, construction and operation of fueling facilities, the effects of Hurricanes and Tropical Storms sound an alarm that there are serious problems that require attention. Disaster preparedness is knowing what to do both before and after the disaster and can be divided into four stages: (1) installation; (2) routine maintenance; (3) between the warning and the disaster (if time allows); and (4) after the disaster.

The latest edition of PEI RP200, Recommended Practices for Installation of Aboveground Storage Systems for Motor Vehicle Fueling, Section 2.16 "Emergency Planning"- It states: "In areas subject to flooding, make provisions to prevent tanks from floating. In areas subject to hurricanes or other significant storm events, make provisions to secure tanks against anticipated wind loading.... In all cases, consideration should be given to containment of releases."

In considering anchorage of USTs in areas subject to flooding, PEI RP100 states: "The calculation of tank buoyancy should be based on worst case conditions, that is, water level at finished grade and the tank empty."

PEI's RP-800 RP for the Installation of Bulk Storage Plants, Section 4.11 requires anchoring for tanks in flood plains and plan on the accumulation of rainwater within a dike can cause tanks to float.

The NC Building Code requires the following: (from NFPA 30) **22.5.2.5-** Where a tank is located in an area subject to flooding, provisions shall be taken to prevent tanks, either full or empty, from floating during a rise in water level up to the established maximum flood stage. (See 21.7.3.)

21.7.3 Storage Tanks in Areas Subject to Flooding.**21.7.3.1 Water Loading.**

21.7.3.1.1 The filling of a tank to be protected by water loading shall be started as soon as floodwaters are predicted to reach a dangerous flood stage.

21.7.3.1.2 Where independently fueled water pumps are relied on, sufficient fuel shall be available at all times to permit continuing operations until all tanks are filled.

21.7.3.1.3 Tank valves shall be locked in a closed position when water loading has been completed.

21.7.3.2 Operating Instructions. Operating instructions or procedures to be followed in a flood emergency shall be available to personnel identified in 21.7.3.3.

21.7.3.3 Personnel Training. Personnel relied on to carry out flood emergency procedures shall be informed of the location and operation of valves and other equipment necessary to affect the intent of these requirements.

Responding to warnings:

For hurricanes and floods, however, there may be enough advance warning to take some actions without jeopardizing personal safety and protection. If time allows:

- Record manual or automatic tank gauge readings of the tank before you take it out of service.
- Check fill caps and adapters for tightness, and make sure they are locked in place.
- Check any other possible openings where water could enter, including the interstitial space of a double wall tank.
- If there is a ball valve or other block valve on the product piping at the submerged pump, close and secure it.
- At the dispensers, close all impact/emergency valves by tripping the lever. Even if your dispensers do not get submerged, the force of flood waters or other floating objects could knock dispensers loose.
- Turn off all power to pumps and dispensers, automatic tank gauges and other components.
- For USTs, the product level in the tank does not matter as long as you are sure they have adequate anchorage to prevent floating. Consider filling the tanks with product if you are uncertain that your tanks are anchored. However, the risk you take is that no matter what you do, you cannot ensure the integrity of the system, and water may enter the tanks and displace product into the environment.
- If there is any possibility that flood levels could reach higher than the tank vents (12 feet), extend them with PVC pipe or other means.
- Unit aboveground storage tanks (steel tanks mounted in their own steel containment dikes) should have the dike drainage valves opened. This will allow flood waters to enter the diked area to help keep the unit tank from moving. (Close drain ASAP after flood event)

Aboveground Storage Tank(s) Registration & State Fire Code Required Permits

The North Carolina/IFC Fire Code, Chapter 1, Administration, section **105.6.17 Flammable and combustible liquids require** a mandatory operational permit the following:

- To operate tank vehicles, equipment, tanks, plants, terminals, wells, fuel-dispensing stations, refineries, distilleries and similar facilities where flammable and *combustible liquids* are produced, processed, transported, stored, dispensed or used.
- To place temporarily out of service (for more than 90 days) an underground, protected above-ground or above-ground flammable or *combustible liquid* tank.
- To change the type of contents stored in a flammable or *combustible liquid* tank to a material that poses a greater hazard than that for which the tank was designed and constructed.
- To manufacture, process, blend or refine flammable or *combustible liquids*.
- To engage in the dispensing of liquid fuels into the fuel tanks of motor vehicles at commercial, industrial, governmental or manufacturing establishments.
- To utilize a site for the dispensing of liquid fuels from tank vehicles into the fuel tanks of motor vehicles, marine craft and other special equipment at commercial, industrial, governmental or manufacturing establishments.

From NC/IFC FIRE CODE: 105.7.8 Flammable and combustible liquids. A construction permit is required:

1. To install, repair or modify a pipeline for the transportation of flammable or *combustible liquids*.
2. To install, construct or alter tank vehicles, equipment, tanks, plants, terminals, wells, fuel-dispensing stations, refineries, distilleries and similar facilities where flammable and *combustible liquids* are produced, processed, transported, stored, dispensed or used. Maintenance performed in accordance with this code is not considered an installation, construction or alteration and does not require a permit.
3. To install, alter, remove, abandon or otherwise dispose of a flammable or *combustible liquid* tank.

The Local Authority having Jurisdiction (AHJ) has the authority to require permits required under 105.7.7. 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 653/650 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 necessary.

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 especially important to inspect all ASTs for corrosion, especially ones over 20 years old.

Corporate Farm 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 1,320 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 57, section 5706.2. ASTs over 1,100 gallons may also be excluded from complying with section 5704.2. Farm heating oil tanks **should** comply with NFPA 31 and the NC Fire Code section 603.3.

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 restrictors 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 stopwatch 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 stopwatch 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.

NC/IFC Fire Code Allows Latch-Open or Latchless Devices on Hose Nozzles Based on Type of Facility

The motoring public detests 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 NC Fire Code (IFC) allows the use of latch-open devices for use on island types of self-service gasoline dispensers. The Code is as follows:

From NC Fire Code:

2306.7.6 Fuel delivery nozzles. A *listed* automatic-closing type hose nozzle valve **with or without a latch-open device shall be provided on island-type dispensers used for dispensing Class I, II or IIIA liquids.**

Overhead-type dispensing units 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 latch-open device is allowed to be used on overhead-type dispensing units where 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.

2306.7.6.1 Special requirements for nozzles. Where dispensing of Class I, II or IIIA liquids is performed, a *listed* automatic-closing-type hose nozzle valve shall be used incorporating all of the following features:

1. The hose nozzle valve shall be equipped with an integral latch-open device.
2. When the flow of product is normally controlled by devices or equipment other than the hose nozzle valve, the hose nozzle valve shall not be capable of being opened unless the delivery hose is pressurized.

If pressure to the hose is lost, the nozzle shall close automatically.

Exception: Vapor recovery nozzles incorporating insertion interlock devices designed to achieve shutoff on disconnect from the vehicle fill pipe.

3. The hose nozzle shall be designed such that the nozzle is retained in the fill pipe during the filling operation.
4. The system shall include *listed* equipment with a feature that causes or requires the closing of the hose nozzle valve before the product flow can be resumed or before the hose nozzle valve can be replaced in its normal position in the dispenser.

SECTION 2310 MARINE MOTOR FUEL-DISPENSING FACILITIES

2310.3 Dispensing. The dispensing of liquid fuels at marine motor fuel-dispensing facilities shall comply with Sections 2210.3.1 through 2210.3.5.

2310.3.1 General. Wharves, piers or floats at marine motor fuel-dispensing facilities shall be used exclusively for the dispensing or transfer of petroleum products to or from marine craft, except that transfer of essential ship stores is allowed.

2310.3.2 Supervision. Marine motor fuel-dispensing facilities shall have an attendant or supervisor who is fully aware of the operation, mechanics and hazards inherent to fueling of boats on duty whenever the facility is open for business. The attendant's primary function shall be to supervise, observe and control the dispensing of Class I, II or IIIA liquids or flammable gases.

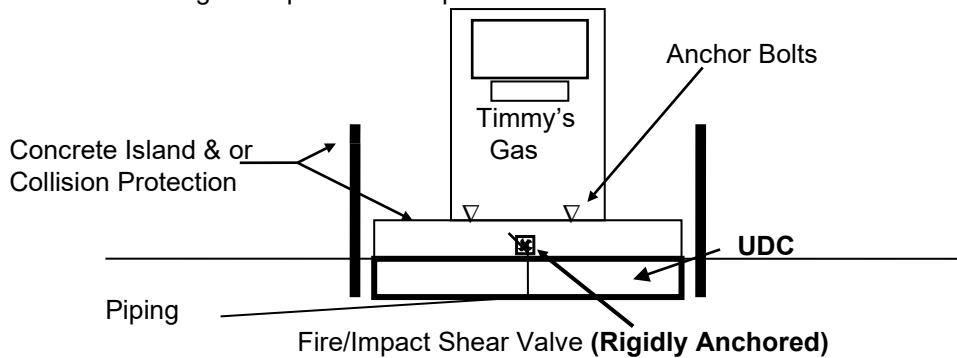
2310.3.3 Hoses and nozzles. **Dispensing of Class I, II or IIIA liquids into the fuel tanks of marine craft shall be by means of an *approved*-type hose equipped with a *listed* automatic-closing nozzle without a latch-**

open device. Hoses used for dispensing or transferring Class I, II or IIIA liquids, when not in use, shall be reeled, racked or otherwise protected from mechanical damage.

2310.3.4 Portable containers. Dispensing of Class I, II or IIIA liquids into containers, other than fuel tanks, shall be in accordance with Section 2204.4.1.

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 2306.7.3 requires that all dispensers to be firmly and securely fastened to the island or ground. Also, NC Fire Code section 2306.7.4 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 (minimum of 6 inches in height) or otherwise protected against collision damage in accordance with NC Fire Code section 312. Dispensers shall be in a position where a vehicle cannot strike it that is out of control descending a ramp or other slope.



IFC/NC Fire Code Require Emergency Disconnect Switches at all Public Motor Fuel Dispensing Facilities

Since the mid 1980's all service stations, convenience stores, and other motor fuel dispensing facilities have been required to install emergency disconnect switch.

IFC Fire Code Section 2303.2 Emergency disconnect switches.

An approved, clearly identified and readily accessible emergency disconnect switch shall be provided at an approved location, to stop the transfer of fuel to the fuel dispensers in the event of a fuel spill or other emergency. An emergency disconnect switch for exterior fuel dispensers shall be located within 100 feet (30 480 mm) of, but not less than 20 feet (6096 mm) from, the fuel dispensers. For interior fuel-dispensing operations, the emergency disconnect switch shall be installed at an approved location. Such devices shall be distinctly labeled as: EMERGENCY FUEL SHUTOFF. Signs shall be provided in approved locations.

IFC/NC FIRE CODE Requires Annual Testing of Dispenser Emergency Shutoff Valve.

The code language is as follows: 2306.7.4 Dispenser emergency valve.

An approved emergency shutoff valve designed to close automatically in the event of a fire or impact shall be properly installed in the liquid supply line at the base of each dispenser supplied by a remote pump. The valve shall be installed so the shear groove is flush with or within 0.5 inch (12.7 mm) of the top of the concrete dispenser island and there is clearance provided for maintenance purposes around the valve body and operating parts. The valve shall be installed at the liquid supply line inlet of each overhead-type dispenser. Where installed, a vapor return line located inside the dispenser housing shall have a shear section or approved flexible connector for the liquid supply line emergency shutoff valve to function. Emergency shutoff valves shall be installed and maintained in accordance with the manufacturer's instructions, tested at the time of initial installation and tested at least yearly thereafter in accordance with Section 2305.2.2.

2305.2.2 Emergency shutoff valves. Automatic-closing emergency shutoff valves required by Section 2306.7.4 shall be checked not less than once per year by manually tripping the hold-open linkage.

Aboveground Flammable & Combustion Liquids Plastic Flex Piping including Aboveground Marina Dock Piping.

UL-1369 "Standard For Aboveground Piping For Flammable And Combustible Liquids" 2020 latest edition. The new 2024 NC Fire Code that is scheduled to become effective on January 1, 2025, and will include UL-1369 referenced standard in NC Fire Code Chapter 57, Table 5703.6.2. The NFPA 30/30A has added this standard. NCDEQ DWM UST section may require this piping standard at Marinas with USTs.

UL-1369 requirements cover primary, secondary, and coaxial types of aboveground pipes intended for transfer and containment of specific flammable and combustible liquids and fuels or fuel components (and vapors thereof) identified in this Standard, at their manufacturing, processing and distribution facilities, commercial (public) or fleet (private) motor vehicle fueling stations or similar fuel dispensing applications, and piping systems for fuel supply of generators, burners or similar equipment.

These pipes may be flexible or rigid types constructed with metallic, nonmetallic, or composite materials in single continuous or multiple joined lengths with integral end fittings in nominal sizes from 0.5 in to 6.0 in diameters, and are typically intended for use in the following applications:

- a) General aboveground use either directly on or suspended above the ground, such as piping between tanks and dispensers or within buildings, such as fuel supply lines to rooftop generators or basement boilers, which may include short lengths routed in below grade containment sumps and underground chase pipe where accessible, but not where directly buried;
- b) Special aboveground uses that requires an additional evaluation for a specific purpose, such as marinas, and where specific liquids or extreme environments are not represented by the general test liquids and expected exposures conditions.

OmegaFlex DoubleTrac UGF-FSP or Brugg Pipe Systems, FLEXWELL®-HL are both approved by UL-1369. For Omega Flex AG UL-1369 piping, it must have continuous monitoring leak detection systems. Upon a detection of piping failure/interstice leak:

• Automatic flow restrictor; or Automatic flow shutoff; or Continuous alarm system. Continuous alarm systems may consist of leak detection sump sensors/piping interstitial monitoring systems that upon detection of liquids in the containment sumps will provide notification to marina operator and shut down pumping (submersible turbine pumps-STPs) systems. Additionally, per UL1369 Section 13.g.5, pipe marking shall include "Continuous Interstitial Monitoring Required Over Complete Secondary Length".

At this time, it is our understanding that Brugg Pipe FLEXWELL®-HL may have different or less stringent continuous monitoring requirements & has a two-hour fire rating per UL 1369.

To earn the UL-1369 designation, manufacturers must meet or exceed specification and testing criteria, including but not limited to: • Pressure Testing • Physical Testing (Drop, Puncture, Impact, Torque, Pull, Crush & Bend) • Severe Corrosion Resistance • Tide Cycle Testing • UV Exposure • Fire Resistance (min. 30 minutes @ 1,800 °F) • Fuel Compatibility • Anchorage & Support.

Per UL1369 Section 12.5 exception #2, requirements for all aboveground piping for flammable and combustible liquids are required to be continuously monitored for interstitial leaks. (continuous secondary monitoring) To be considered a UL-1369 compliant installation, Omega Flex double-wall piping is required to be continuously monitored. This can be accomplished with sensors connected to the facility ATG system, or by stand-alone sensor systems.

Vehicle Impact Protection for Tanks & Dispensers-

From NC Fire Code:

2306.4 Physical protection. Guard posts complying with Section 312 or other *approved* means shall be provided to protect above-ground tanks against impact by a motor vehicle unless the tank is *listed* as a protected above-ground tank with vehicle impact protection.

2306.7.3 Mounting of dispensers. Dispensing devices, except those installed on top of a protected above-ground tank that qualifies as vehicle-impact resistant, shall be protected against physical damage by mounting on a concrete island 6 inches (152 mm) or more in height, or shall be protected in accordance with Section 312. Dispensing devices shall be installed and securely fastened to their mounting surface in accordance with the dispenser manufacturer's instructions. Dispensing devices installed indoors shall be located in an *approved* position where they cannot be struck by an out-of-control vehicle descending a ramp or other slope.

SECTION 312 VEHICLE IMPACT PROTECTION

312.1 General. Vehicle impact protection required by this code shall be provided by posts that comply with Section 312.2 or by other *approved* physical barriers that comply with Section 312.3.

312.2 Posts. Guard posts shall comply with all of the following requirements:

1. Constructed of steel not less than 4 inches (102 mm) in diameter and concrete filled.
2. Spaced not more than 4 feet (1219 mm) between posts on center.
3. Set not less than 3 feet (914 mm) deep in a concrete footing of not less than a 15-inch (381 mm) diameter.
4. Set with the top of the posts not less than 3 feet (914 mm) above ground.
5. Located not less than 3 feet (914 mm) from the protected object.

312.3 Other barriers. **Barriers, other than posts specified in Section 312.2, that are designed to resist, deflect or visually deter vehicular impact commensurate with an anticipated impact scenario shall be permitted where approved.**

Basically, other barriers example would involve a head on impact from a 3,200-pound vehicle, with a velocity of 5 MPH at 3 feet above grade and the barrier wall/guard rail may move up to 6 inches or be destroyed. The barrier wall would be constructed of steel reinforced formed concrete walls (4000 psi @ 6 inches thick) or steel reinforced solid fill concrete block walls (8 inches thick) or steel guard rails. Barrier walls shall be installed on steel reinforced footing (24 inches wide x 14 inches thick) buried at least 24 inches below grade on compacted earth.

Tank Vehicles and Vehicle Operation Fire Codes

5706.5.4 Dispensing from tank vehicles and tank cars.

5706.5.1.1 Location. Bulk transfer and process transfer operations shall be conducted in approved locations. Tank cars shall be unloaded only on private sidings or railroad-siding facilities equipped for transferring flammable or combustible liquids. Tank vehicle and tank car transfer facilities shall be separated from buildings, above-ground tanks, combustible materials, lot lines, streets, alleys or public ways by a distance of 25 feet (7620 mm) for Class I liquids and 15 feet (4572 mm) for Class II and III liquids measured from the nearest position of any loading or unloading valve. Buildings for pumps or shelters for personnel shall be considered part of the transfer facility.

5706.5.1.18 Security. Transfer operations shall be surrounded by a noncombustible fence not less than 5 feet (1524 mm) in height. Tank vehicles and tank cars shall not be loaded or unloaded unless such vehicles are entirely within the fenced area. **Exceptions:**

1. **Motor vehicle service stations complying with [Chapter 23](#).**
2. **Installations where adequate public safety exists because of isolation, natural barriers or other factors as determined appropriate by the code official.**
3. **Facilities or properties that are entirely enclosed or protected from entry.**

5706.6 Tank vehicles shall be designed, constructed, equipped and maintained in accordance with NFPA 385 and [Sections 5706.6.1](#) through [5706.6.4](#).

5706.6.1.2 Leaving vehicle unattended. The driver, operator or attendant of a tank vehicle shall not remain in the vehicle cab and shall not leave the vehicle while it is being filled or discharged. The delivery hose, when attached to a tank vehicle, shall be considered to be a part of the tank vehicle.

5706.6.1.3 Vehicle motor shutdown. Motors of tank vehicles or tractors shall be shut down during the making or breaking of hose connections. If loading or unloading is performed without the use of a power pump, the tank vehicle or tractor motor shall be shut down throughout such operations.

5706.6.1.5 Overfill protection. The driver, operator or attendant of a tank vehicle shall, before making delivery to a tank, determine the unfilled capacity of such tank by a suitable gauging device. To prevent overfilling, the driver, operator or attendant shall not deliver in excess of that amount.

5706.6.2.1 Parking near residential, educational and institutional occupancies and other high-risk areas. Tank vehicles shall not be left unattended at any time on residential streets, or within 500 feet (152 m) of a residential area, apartment or hotel complex, educational facility, hospital or care facility. Tank vehicles shall not be left unattended at any other place that would, in the opinion of the fire chief, present an extreme life hazard.

5706.6.2.2 Parking on thoroughfares. Tank vehicles shall not be left unattended on a street, highway, avenue or alley.

5706.6.4 Fire protection. Tank vehicles shall be equipped with a fire extinguisher complying with [Section 906](#) and having a minimum rating of 2-A:20-B:C. During unloading of the tank vehicle, the fire extinguisher shall be out of the carrying device on the vehicle and shall be 15 feet (4572 mm) or more from the unloading valves.

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. Setbacks 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 <https://connect.ncdot.gov/projects/Roadway/RoadwayDesignAdministrativeDocuments/Policy%20on%20Street%20and%20Driveway%20Access.pdf>

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 facilities 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. NCPDM's Technical Director will assist (for a fee) in the preparation of SPCC Plans. Contact NCPDM 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

US EPA SPCC 40 CFR 112 Underground Piping Connected to any Regulated AST:

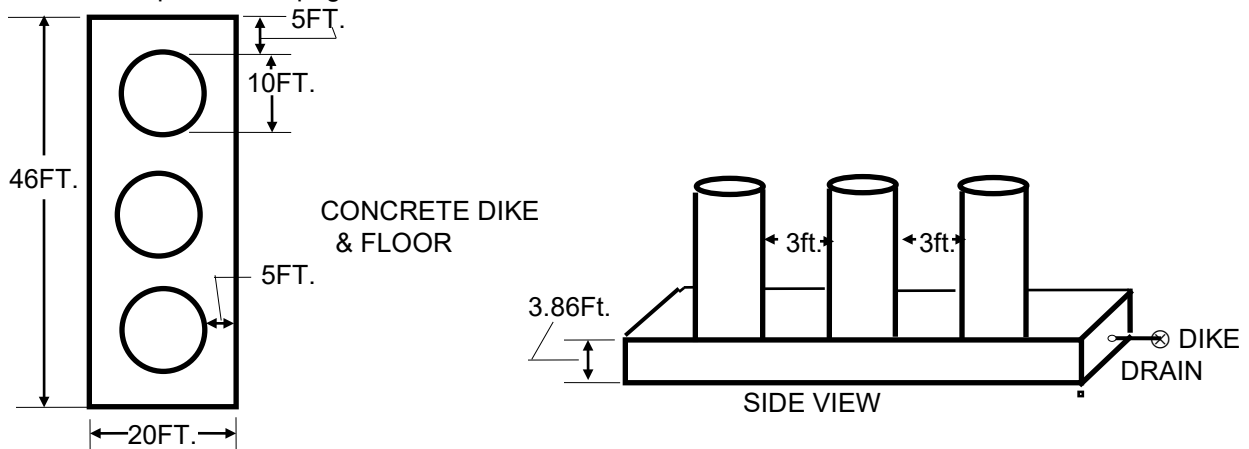
To prevent a discharge to navigable waters or adjoining shorelines, the SPCC rule requires that all piping (including buried piping) comply with the general secondary containment requirements contained in §112.7(c).

Any new or replaced underground piping (after 8-16-02) will meet the same standards as UST Regulation 40 CFR Part 280 or NC standards. Typically, any new underground piping installed after August 16, 2002, from any regulated facility AST must be corrosion resistant & should be double wall plastic or double wall fiberglass.

Additionally, any piping, equipment, or device not contained within secondary containment/Double Wall AST is subject to the general secondary containment requirements of §112.7(c). If a facility drainage system will be used to comply with secondary containment, then the piping, equipment or device is also subject to requirements of §112.8(b) or §112.12(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 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.

OHSA Confined Space Entry Program

Many of you may be using contractors at your AST/UST facilities to meet regulations. 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): A "confined space" has limited or restricted means of entry or exit, is large enough for an employee to enter and perform assigned work and is not designed for continuous occupancy by the employee. These spaces may include, but are not limited to, underground vaults, tanks, storage bins, pits/sumps and diked areas, vessels, and silos. A "permit-required confined space" is one that meets the definition of a confined space and has one or more of these characteristics: 1. contains or has the potential to contain a hazardous atmosphere, 2. contains a material that has the potential for engulfing an entrant, 3. has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section, and/or 4. contains any other recognized serious safety or health hazards.

Confined spaces may be classified into two categories: (1) open-topped enclosures with depths that restrict the natural movement of air (e.g., degreasers, pits, selected types of tanks/sumps and

excavations), and (2) enclosures with limited openings for entry and exit (e.g., sewers, tanks and silo). Therefore, all dikes, berms, sumps, pits and remote impounding areas and that have walls/depth over 4 feet in height are considered OSHA 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, which 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

Convenience Store Employee Supervision of Refueling Operations in Accordance with NC/IFC Fire Codes

From Chapter 23 of the NC/IFC Fire Code:

2304.1 Supervision of dispensing.

The dispensing of fuel at motor fuel-dispensing facilities shall be conducted by a qualified attendant or shall be under the supervision of a qualified attendant at all times or shall be in accordance with Section 2304.3.

❖ Motor fuel-dispensing facilities must have a trained, qualified attendant on duty when the facility is open for business, unless the fire code official specifically approves an unattended location.

2304.2 Attended self-service motor fuel-dispensing facilities.

Attended self-service motor fuel-dispensing facilities shall comply with Sections 2304.2.1 through 2304.2.5. Attended self-service motor fuel-dispensing facilities shall have at least one qualified attendant on duty while the facility is open for business. The attendant's primary function shall be to supervise, observe and

control the dispensing of fuel. The attendant shall prevent the dispensing of fuel into containers that do not comply with Section 2304.4.1, control sources of ignition, give immediate attention to accidental spills or releases, and be prepared to use fire extinguishers.

❖ An attendant trained in spill control, ignition source control, recognizing approved fuel containers and fire extinguishment is required to be in visual contact with the dispensing operation when the motor fuel-dispensing facility is open for business unless the fire code official has given approval for an unattended self-service facility. The attendant may perform other duties such as those of cashier so long as the attendant can supervise the dispensing operation and has immediate access to emergency shutoff controls. Note that the responsibility of supervision, observation and control of the dispensing operations includes enforcement of the procedures and rules in Sections 2305.6 and 2310.5.

2305.6 Warning signs.

Warning signs shall be conspicuously posted within sight of each dispenser in the fuel-dispensing area and shall state the following:

- 1. It is illegal and dangerous to fill unapproved containers with fuel.**
- 2. Smoking is prohibited.**
- 3. The engine shall be shut off during the refueling process.**
- 4. Portable containers shall not be filled while located inside the trunk, passenger compartment, or truck bed of a vehicle.**

❖ The warning sign must be legible and conspicuously posted in the dispensing area. The intent is to notify the dispenser operator not to use unapproved fuel containers, to remove portable containers from the vehicle before filling (see commentary, Section 2304.4.3) and to eliminate ignition source, such as smoking and operating internal combustion engines. The warnings should be on a sign with a contrasting background that will catch the eye of the person performing the dispensing operation.

The NC/IFC Fire Code Chapter 50 HAZARDOUS MATERIALS - GENERAL PROVISIONS

5001.1 Scope: Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials shall be in accordance with this chapter. This chapter shall apply to all hazardous materials, including those materials regulated elsewhere in this code, except that when specific requirements are provided in other chapters, those specific requirements shall apply in accordance with the applicable chapter.

5001.1.1 Waiver: The provisions of this chapter are waived when the code official determines that such enforcement is preempted by other codes, statutes, or ordinances. The details of any action granting such a waiver shall be recorded and entered in the files of the code enforcement agency. The Code official may require convenience stores to develop a Hazardous Materials Management Plan (5001.4.1) and or Hazardous Materials Inventory Statement (5001.4.2).

Convenience Store Employee Training on Petroleum Spills & Fire Emergencies

OSHA and the NC Fire Code require convenience store employees to have training on petroleum spills and fire emergencies. DO NOT WASH/HOSE DOWN PETROLEUM SPILLS REGARDLESS OF THE QUANTITY SPILLED.

No oil sheen is to leave the property. For small spills apply absorption products that can be cleaned up and disposed of properly.

OSHA's 1910.38 EMPLOYEE EMERGENCY PLANS AND FIRE PREVENTION PLANS

If convenience stores have 10 or fewer employees, then a common plan could be developed to orally communicate to the store employees. **Emergency Action Plan & Fire Prevention Plan: The plan shall be in writing except with 10 or fewer employees (per Facility) the plan may be communicated orally, and the employer need not maintain a written plan on site.** The elements of a plan shall be: (A) Emergency escape procedures and escape routes. (B) Procedures for employees who must remain behind to operate critical plants operations before they evacuate. (C) Procedures to account for all employees after emergency evacuation. (D) Rescue and medical duties for those employees designated to perform them. (E) The preferred means of reporting fires and other emergencies. (F) Names, phone numbers, of persons, departments who can be contacted for other information or explanation of the plan.

- 1) Employer alarm system that complies with 1910.165: For convenience stores this can be designated employee visual site of emergency.
- 2) Evacuation: The employer must establish in the plan the types of evacuation to be used in emergencies.
- 3) Training: The employer shall designate and train a sufficient number of persons to assist in the safe and orderly evacuation of other persons. The employer must review the plan with each employee before the plan is initially developed, whenever the employee's responsibilities change, & whenever the plan is changed. The employer shall apprise employees of the fire hazards of the materials and fire hazards to which they are exposed. The employer shall review with each employee the parts of the plan which the employee must know to protect the employee in the event of a fire emergency. **Small petroleum spills in unconfined spaces that do not exceed chemical exposure limits may be cleaned up by non-OSHA trained personnel.**
- 4) Housekeeping: The employer shall control the accumulation of flammable and combustible waste materials so that they do not contribute to a fire emergency. Housekeeping procedures shall be incorporated in the fire prevention plan.
- 5) Maintenance: The employer shall regularly and properly maintain all equipment and systems installed on heat producing equipment to prevent accidental ignition of combustible materials. The maintenance procedures shall be part of the written plan.

THE NORTH CAROLINA HAZARD COMMUNICATION STANDARD UNDER OSHA ("EMPLOYEE RIGHT TO KNOW") Acting from Federal Regulation 29 CFR 1910.1200

APPLICABILITY: The Hazard Communication Standard (HCS) is based on a simple concept-that employees have a need and a right to know the hazards and identities of the chemicals they are exposed to when working. For example, at a retail facility such as a convenience store where all hazardous chemicals are in sealed containers, then there is no requirement for an HCS. However, if an employee gauges the USTs with a stick, then they would or cleans up spills, they will be exposed, and that facility would require an HCS.

North Carolina Law Article 21A: Oil Pollution and Hazardous Substances Control.

Requires proper oil spill reporting and disposal of spills & clean up materials. For full text of law go to http://h2o.enr.state.nc.us/admin/rules/documents/StatutesMay2004_000.doc#_Toc73243915

§143-215.85. Required notice.


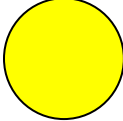
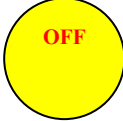

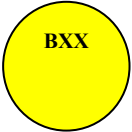




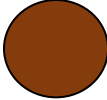
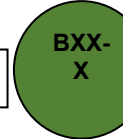



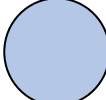

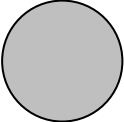

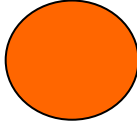
(b) As used in this subsection, "petroleum" has the same meaning as in G.S. 143-215.94A. A person who owns or has control over petroleum that is discharged into the environment shall immediately take measures to collect and remove the discharge, report the discharge to the Department within 24 hours of the discharge, and begin to restore the area affected by the discharge in accordance with the requirements of this Article if the volume of the petroleum that is discharged is 25 gallons or more or if the petroleum causes a sheen on nearby surface water or if the petroleum is discharged at a distance of 100 feet or less from any surface water body. **If the volume of petroleum that is discharged is less than 25 gallons, the petroleum does not cause a sheen on nearby surface water, and the petroleum is discharged at a distance of more than 100 feet from all surface water bodies, the person who owns or has control over the petroleum shall immediately take measures to collect and remove the discharge.** If a discharge of less than 25 gallons of petroleum cannot be cleaned up within 24 hours of the discharge or if the discharge causes a sheen on nearby surface water, the person who owns or has control over the petroleum shall immediately notify the Department.

API Color Symbols System for Proper ID of Fuel Storage Tanks, Fills & Piping

The industry standard color code is provided via the American Petroleum Institute (API). **API Standard 1637-Using the API Color-Symbol System to Identify Equipment, Vehicles, and Transfer Points for Petroleum Fuels and Related Products at Dispensing and Storage Facilities and Distribution Terminals. (4th Edition April 2020).** API 1637 is available for purchase through the API Publications Store at www.apiwebstore.org. **COPYRIGHTED MATERIAL-AVIATION FUELS UNDER IP-1542**

The IFC Fire Code requires each fill pipe for motor fuel at a service station must have a label or must be painted a particular color to represent the product in the tank. Furthermore, there must be a key or code chart for such color painting available inside the station office and every employee should be aware of the location of the color code at the station. NIST Handbook 44 also requires an ID system in place. If color code is used, a color chart is required at the place of business where it can be easily seen, preferably where it can be seen from the tanks. As to what colors are best for the various fuels sold - each company can use their own scheme, but the recommendations of the

American Petroleum Institute (API) are shown on this page. **Anytime there is the slightest doubt as to color codes or what products that customer has “stop and call dispatch”. SEE CHART BELOW**
 SAMPLE COLOR CODE CHART-TYPICAL FUELS ONLY

GASOLINES/BLENDS		DISTILLATES & BIODIESEL Blends	
UNLEADED (Less than E-10)		ULSD (HWY)	OFF RD. ULSD
 PREMIUM		 DIESEL	 OFF
 MID GRADE		 BXX	 OFFB XX
 REGULAR			
 PREMIUM E-0			 2
Above 10% Alcohol Blends (Bronze Color)		 KEROSENE	 BXX- X
 E85	 E15		
	 EXX	 BIOFUEL HEAT	
	 DEF		
 USED OIL	 OBSERVATION WELL	 VAPOR RECOVERY	

Accidental Mixing of Different Fuel Types

Remember the 1% correct rule of thumb for distillate fuels and gasoline blends. This equates to blending 1 gallon per every 100 gallons. For light distillates (Kerosene) mixed with medium distillates (Diesel/Fuel Oil) use 1.5% to 2% rule of thumb. Consider that you accidentally dropped 200 gallons of diesel into 4,200 gallons of gasoline. To correct the problem, which is changing the entire mix to gasoline, divide 200 by 1% (0.01) equals 20,000. Take 4,200 (original gasoline) from 20,000 equals 15,800. Therefore, you would need an additional 15,800 gallons of gasoline added to the mix to meet specs.

For large accidental mixes, it is recommended to pump out and take back to terminal. Consider you dropped 1,000 gallons of gasoline into 10,000 gallons of Diesel. You would have to add 90,000 gallons to the blend of 11,000 gallons to meet spec. Remember, this is a Rule of Thumb correction. You could potentially make a correction with the above ratios and still be out of spec.

Federal US EPA Stage One Vapory Recovery Regulations

On January 10, 2008, U.S. EPA published 40 CFR Part 63, Subpart CCCCCC—*National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Dispensing Facilities (GDF)* as a final rule. These rules affect all gasoline dispensing stations except major facilities subject to Title V permitting. The rules are separated into three categories dispensing gasoline (excluding aviation gasoline storage tanks at airports). They are:

1. **Facilities with monthly throughputs less than 10,000 gallons**
2. **Facilities with monthly throughputs of 10,000 gallons or more**
3. **Facilities with monthly throughputs of 100,000 gallons or more**

It is probable that GDFs with monthly throughputs over 100,000 gallons of gasoline or more will be required to conduct 3-year testing on their pressure/vacuum vents and registering their facilities with US EPA & State/Local air pollution control agencies.

Local Air Pollution Programs may have additional requirements/fees then state or federal requirements.

Other regulations (40 CFR Part 63, Subpart BBBBBB) state new requirements regarding bulk gasoline plants and terminals.

Summary Brochure for Bulk facilities:

<http://www.epa.gov/ttn/atw/area/bulkgasb.pdf>

Summary Brochure for Gasoline Dispensing Facilities:

<http://www.epa.gov/ttn/atw/area/gdfb.pdf>

Federal US EPA Stage Two Vapory Recovery Regulations

The requirements in the CAAA of 1990 regarding Stage II vapor recovery are contained in **Title I: Provisions for Attainment and Maintenance of National Ambient Air Quality Standards**. A key element of this title is that it "classifies" areas with similar pollution levels. The Clean Air Act Amendments (CAAA) of 1990 require the installation of Stage II vapor recovery systems in ozone nonattainment areas classified as serious, severe, and extreme. Stage II vapor recovery on vehicle refueling is an effective control technology to reduce gasoline vapor emissions that contain volatile organic compounds (VOC) and hazardous air pollutants from serious ozone non-attainment areas. Vehicle refueling emissions consist of the gasoline vapors displaced from the automobile tank by dispensed liquid gasoline.

The Stage II system collects these vapors at the vehicle fill pipe and returns them to the underground storage tank. Without vapor recovery, the dispensing of gasoline causes the introduction of fresh air into the storage tank. Liquid gasoline then evaporates until liquid/vapor equilibrium is attained. Stage II systems return saturated vapors to the storage tank thus preventing this evaporation and actually saving gasoline.

See US EPA web site: <http://www.epa.gov/ttn/oarpg/amend.html>

EPA Toxic Release Inventory (TRI) Reporting

EPA TRI reporting requirements are mandatory for Bulk Petroleum Plants and Terminals with standard industrial classification code (SIC) 5171. TRI requires the operator of a covered facility to file an annual report documenting all releases of hazardous petroleum substances over the previous twelve-month period. Other chemicals, such as antifreeze (ethylene glycol) or brake fluids may also be included in the reporting requirements. The typical reportable release from bulk plants results from evaporation, fugitive emissions, and/or spills. The TRI reporting year on Form R or A, the report is due by **July 1, 20--**.

The following exemptions will apply: You just have to meet one of these to be exempt.

- Your Bulk Plant facility is not SIC code 5171.
- Your Bulk Plant facility is a SIC code 5171, but you have fewer than 10 employees. (20,000 hours worked)
- Is your SIC 5171 facility under the reporting threshold annual throughput? For gasoline the minimum throughput is about 60,000 gallons, for diesel and No. 2 fuel oil about 357,000 gallons, for K-1 about 275,000 gallons, for lube oil about 352,000 gallons.

See <http://www.epa.gov/tri>

ELECTRICAL REQUIREMENTS PER NFPA 70

PLEASE SEE THE CURRENT EDITION OF THE NATIONAL ELECTRICAL CODE®.

The NFPA 70®: NEC® covers the latest requirements on electrical wiring and equipment installation issues, including minimum provisions for the use of connections, voltage markings, conductors, and cables. Chapters address specific circumstances surrounding special occupancies and industrial equipment and machines. It also contains specific details on the safe installation and use of communications and signaling conductors.

All requirements in the National Electrical Code® are confirmed through a rigorous process of comprehensive review, markup, annotation and revision. The NEC has been published since 1897, and in that time the code and its accompanying National Electrical Code Handbook have undergone radical restructuring to reflect the latest electrical and wiring technologies.

See more at: <http://catalog.nfpa.org>

MUST INSTALL ALL ELECTRIC EQUIPMENT PER ELECTRICAL-FIRE CODE FOR PETROLEUM MOTOR FUELS (Current-NC/IFC & NFPA 70 NEC)

2201.5 Electrical. Electrical wiring and equipment shall be suitable for the locations in which they are installed and shall comply with Section 605, NFPA 30A and NEC-NFPA 70. Specifically ARTICLE 500 Hazardous (Classified), Locations, Classes I, II, and III, Divisions 1 and 2. Article 514: Motor Fuel Dispensing Facilities--This article shall apply to motor fuel dispensing facilities, marine/motor fuel dispensing facilities, motor fuel dispensing facilities located inside buildings, and fleet vehicle motor fuel dispensing facilities. 515.1 This article covers a property or portion of a property where flammable liquids are received by tank vessel, pipelines, tank car, or tank vehicle and are stored or blended in bulk for the purpose of distributing such liquids by tank vessel, pipeline, tank car, tank vehicle, portable tank, or container.

Example NEC CODE Language

514.4 Wiring and Equipment Installed in Class I Locations. All electrical equipment and wiring installed in Class I locations as classified in 514.3 (Motor Fuel Dispensing Facilities) shall comply with the applicable provisions of Article 501.

See 2014 NFPA 70 NEC Chapter 5 Special Occupancies: Article 500-504 Hazardous Classified Locations Classes I, II & III, Divisions 1 & 2:

Class I: In locations in which flammable vapors and gases may be present.

Division 1: In which ignitable concentrations of hazards exist under normal operation conditions and/or where hazard is caused by frequent maintenance or repair work or frequent equipment failure. Example: Area around a Gasoline Dispenser, Tank or Pump—Group “D”

Division 2: In which ignitable concentrations of hazards are handled, processed or used, but which are normally in closed containers or closed systems from which they can only escape through accidental rupture or breakdown of such containers or systems.

The National Electrical Manufacturers Association (NEMA) has developed a rating system to identify the ability of a device or system to afford protection from the outside environment. NEMA Standard Publication 250, *Enclosures for Electrical Equipment*, establishes requirements that must be met for an enclosure to gain a specific Type designation. Underwriters Laboratories (UL) has adopted the NEMA Type designations, and UL Publication 698, *Standard for Industrial Control Equipment for Use in Hazardous Locations*, sets forth similar requirements. Factory Mutual (FM) Research Corporation Approval Standard, *Explosion-proof Electrical Equipment, Class Number 3615*, sets forth construction requirements and performance tests. These rating systems provide information that assists users in making informed product choices in selecting the proper enclosures for hazardous locations.

SECTION 605 ELECTRICAL EQUIPMENT, WIRING AND HAZARDS

NC IFC CODE SECTION 605.1 Abatement of electrical hazards. Identified electrical hazards shall be abated. Identified hazardous electrical conditions in permanent wiring shall be brought to the attention of the responsible code official. Electrical wiring, devices, appliances and other equipment that is modified or damaged and constitutes an electrical shock or fire hazard shall not be used.

From NFPA 30A 2012--

8.1 Scope: This chapter shall apply to the installation of electrical wiring and electrical utilization equipment in areas where liquids are stored, handled, or dispensed.

8.2 General Requirements: Electrical wiring and electrical utilization equipment shall be of a type specified by and shall be installed in accordance with *NFPA 70, National Electrical Code*. Electrical wiring and electrical utilization equipment shall be approved for the locations in which they are installed.

8.3 Installation in Classified Locations

8.3.1 Where Class I liquids are stored, handled, or dispensed, electrical wiring and electrical utilization equipment shall be designed and installed in accordance with the requirements for Class I, Division 1 or Division 2 classified locations, as set forth in 8.3.2 and in *NFPA 70, National Electrical Code*.

8.3.2 Table 8.3.2 shall be used to delineate and classify areas for the purposes of installing electrical wiring and electrical utilization equipment where Class I liquids are stored, handled, or dispensed.

See NEC & Fire Codes for All Classified Locations

EXAMPLES:

Outdoor Suction Pumps –Division I Classified Location:

Entire space within any pit or box below grade level, any part of which is within 10ft horizontally from any edge of pump.

Outdoor Aboveground Tank –Division I Classified Location:

Entire space within dike, where dike height exceeds distance from tank shell to inside of dike wall for more than 50 percent of tank circumference.

Outdoor Aboveground Tank Vent –Division I Classified Location:

Within 5 ft of the open end of vent, extending in all directions.

EXPLOSION PROOF FITTINGS TO BE INSTALLED ON ELECTRICAL CONDUIT IN ACCORDANCE WITH NFPA/NEC 70 STANDARDS. FIRST & LAST 10' (NO LESS THAN 2' IN LENGTH @ A MINIMUM BURIAL DEPTH OF 24 INCHES) U/G CONDUIT TO BE STEEL IMC-RMC WITH SEAL-OFFS AND BONDING TO TROUGH ALL CONDUITS TO HAVE SEAL OFF FITTINGS ENTERING AND LEAVING HAZARDOUS LOCATIONS.

ALL CURRENT CARRYING CONDUCTORS TO BE BROKEN THROUGH E-STOP. E-STOP TO BE LABELED PER NFPA 70 AND LOCATED NO CLOSER THAN 20' FROM NEAREST DISPENSER. DATA WIRES TO BE 18-2 TWISTED PAIR W/10-12 TWISTS PER FOOT. NO WIRE LESS THAN #14 PHHN & ALL WIRE IS COPPER.

NOTE: U.L. requires that all electrical connections to the dispenser be made with threaded, rigid conduit and properly sealed conductors. All dispensers and electrical connection boxes must be grounded per NFPA 70.

CIRCUIT BREAKERS & EMERGENCY ELECTRICAL DISCONNECT

- A primary requirement in dispenser installation wiring is to provide a means for disconnecting all power connections, including the neutral and data wires, to the dispensers for a safe shutdown and servicing of the units. The power to the electronic register (control power) should be on a separate dedicated breaker for each dispenser. No other equipment should be on this breaker.

GROUNDING

- All dispensers and electrical connection boxes must be grounded per NFPA 70.
- Connect a ground wire between the AC junction box ground lug and the main electrical service panel.
- Make sure a ground rod is properly installed and wired to the ground bus strip of the main electrical service panel in accordance with the National Electrical Code. Unless prohibited by local regulations, it is recommended that the neutral and ground bus strips be tied together.

WIRING

- All wiring should be UL-Listed, rated for a minimum 90C (194F), 600V, and gasoline and oil-resistant.
- All AC wire terminations must be made in the AC junction box or the optional Pulse Output Interface junction box as applicable. Take care when handling the junction box cover(s). Keep the mating flange clean and free of burrs and scratches. Make sure all wire connections are tightly spliced and secured with a wire nut. Use electrical tape to close the open end of the wire nut. After completing the wiring terminations, securely fasten the junction box cover using all of the supplied bolts. Make sure that any unused conduit entry openings are properly plugged.

PER EXISTING PANEL CONDITIONS PER NEC:

220.16 Loads for Additions to Existing Installations Optional Feeder and Service Load Calculations

220.87 Determining Existing Loads

The calculation of a feeder or service load for existing installations shall be permitted to use actual maximum demand to determine the existing load under all of the following conditions:

(1) The maximum demand data is available for a 1-year period. *Exception: If the maximum demand data for a 1-year period is not available, the calculated load shall be permitted to be based on the maximum demand (measure of average power demand over a 15-minute period) continuously recorded over a minimum 30-day period using a recording ammeter or power meter connected to the highest loaded phase of the feeder or service, based on the initial loading at the start of the recording. The recording shall reflect the maximum demand of the feeder or service by being taken when the building or space is occupied and shall include by measurement or calculation the larger of the heating or cooling equipment load, and other loads that may be periodic in nature due to seasonal or similar conditions.*

(2) The maximum demand at 125 percent plus the new load does not exceed the ampacity of the feeder or rating of the service.

(3) The feeder has overcurrent protection in accordance with 240.4, and the service has overload protection in accordance with 230.90.

Course Summary: To protect the motoring public and to enhance air quality, the NC Fire Code, NFPA, IFC, US EPA and the NC Division of Air Quality has formulated regulations and codes regarding the storage of Petroleum. The NC State Board of Registration for Professional Engineers and Land Surveyors have also required that a Professional Engineer (PE) seal all plans regarding ASTs/USTs installations, piping, ancillary equipment upgrades, and vapor recovery system installations for further protection of the public and environment.