New US EPA SPCC Regs Effective 8-17-02

EPA has revised the Spill Prevention Control & Countermeasure rule. These revisions became effective on **August 17, 2002**. Most facilities must comply with the following:

If your onshore facility was in operation on or before August 16, 2002, you must maintain your Plan, but must amend it, if necessary to ensure compliance with this part, on or before **November 10, 2011,** and must implement the amended Plan as soon as possible, **but not later than November 10, 2011**. If your onshore or offshore facility becomes operational after August 16, 2002, through **November 10, 2011**, and could reasonably be expected to have a discharge (spill), you must prepare a Plan on or before **November 10, 2011**, and fully implement it as soon as possible, but not later **November 10, 2011**. (b) If you are the owner or operator of an onshore or offshore facility that becomes operational after **November 10, 2011**, and could reasonably be expected to have a discharge (spill), you must prepare and implement a Plan before you begin operations.

Most facilities that currently have SPCC Plans must amend these plans and implement revised plans **no later than November 10, 2011. The EPA requires that a Register Professional Engineer certify the amended SPCC Plan by November 10, 2011.**

Farms have until November 10, 2011 to meet the new regulations: EPA defines a farm as "a facility on a tract of land devoted to the production of crops or raising of animals, including fish, which produced and sold, or normally would have produced and sold, $1,000 or more of agricultural products during a year."

SOME HIGHLIGHTS OF CHANGES:

1) All underground tanks (USTs) that meet federal or state UST requirements are exempt from the new regulation.
2) Storage of containers less than 55 gallons is exempt from capacity calculations.
3) Only aboveground tanks with aggregate or single storage capacity greater than 1,320 gallons are required to prepare SPCC Plan.
4) SPCC Plan review has been changed from every 3 years to every 5 years by owner/operator if no changes to spill potential of facility.
5) Tank & piping integrity testing in accordance with industry standards (every five-twenty years) and when repairs are done. Integrity testing must be accomplished by companies/individuals certified by STI or API beginning **November 10, 2011**. **Vertical tanks isolated from the ground, horizontal tanks or double wall tanks not in contact with the ground may only require external/visual inspection, unless otherwise noted by engineer. Equivalent Environmental Protection is allowed.**
6) All buried piping that is installed or replaced after 8-16-02, must have protective coating and wrapping and cathodic protection, or meet 40 CFR part 280 or a state program.
7) Overfill prevention systems & alarms must be installed in accordance with industry standards and Fire Codes. Overfill prevention must be inspected/tested in accordance with industry standards. **Vent whistles can be used at smaller facilities where vent whistle can be heard during tank filling.** Another equivalent method as allowed: If a facility operator/driver will check containers visual tank gauge prior to the unloading process and allow driver/facility operator to check tank gauge during tank filling process at frequent intervals. **Equivalent Environmental Protection is allowed.**
8) Secondary containment systems or their equivalents are required for Bulk Tanks, Loading & Unloading Areas and Piping Systems and must be sufficiently impervious. **Equivalent Environmental Protection is allowed.**
9) Security Fencing and Area Security Lights are **may be** required. **Equivalent Environmental Protection is allowed.**

Equivalent Environmental Protection is defined by US EPA as: In the SPCC context, equivalent environmental protection means an equal level of protection of navigable waters and adjoining shorelines from oil pollution. While environmental equivalence need not be a mathematical equivalence, it must achieve the same desired outcome, though not necessarily through the same mode of operation.

For each environmental equivalent measure, the SPCC Plan must state the reason for nonconformance within the relevant section of the Plan, as required in §112.7(a)(2). The Plan must also describe the alternative measure in detail and explain how the measure provides environmental protection equivalent to that provided by the SPCC provision.

The facility owner or operator must ensure that alternative measures are adequate for the facility; that equipment, devices, or materials are designed for the intended use; and that the equipment, devices, or materials are properly implemented and maintained to provide effective environmental protection (§§112.3(d) and 112.7).

Be advised, the US EPA has indicated the deadline for compliance with the revised regulations is tentatively set for **November 10, 2011**. These regulations may undergo significant changes in the coming months. Changes could occur in tank integrity testing for bio-fuels storage; farm storage; mobile refuel vehicles; secondary containment requirements for loading/unloading areas; definition of navigable waters; and security requirements.

NCPCM Staff can prepare Amendments and New SPCC Plans for your firm or your customer's tanks for a fee. A complete text or revised regulation can be found at http://www.epa.gov/emergencies/content/spcc/index.htm The original 1973 SPCC regulation first became effective on January 10, 1974, under the Clean Water Act (CWA). Please contact NCPCM's Tim Laughlin at 919-782-4411 (tlaughlin@ncpcm.org) for more information.

EPA SPCC Plan Update on Shop Fabricated Tank Integrity Testing

On July 17, 2002, EPA adopted revisions to their SPCC regulations that were subsequently delayed until November 10, 2011. As matters stand today, industry has until November 10, 2011, to revise & implement their spill plans to comply with the 2002 changes. Tank integrity testing clock will began after November 10, 2011.

Per US EPA an industry standard such as API 653 or STI-001 is not an alternative method of compliance but a recommended method of compliance. There is an important regulatory distinction between the two.

There are two methods of compliance under the rule.

1. You can use a recommended method of compliance (a method included in the rule), OR

2. You can use an alternative method of compliance, (a method not included in the rule).

If you use a recommended method of compliance, you are not required to have the approval of a PE or a justification in your SPCC plan as to why this method is "equally protective of the environment".

If you use an alternative method of compliance, you must have approval of the PE and justification in your SPCC plan that the method is "as equally protective of the environment" as the recommended method of compliance that you are replacing.

The final SPCC rule is recognizing industry standards, such as API 653 & STI-001 are not alternative methods of compliance but a recommended method of compliance. Therefore, you may use API 653 or STI-001 without approval of a PE and without having to prove it is equally protective of the environment.

For example, if you want to use STI-001 as your visual testing standard, you may do so without justification by the PE that the STI-001 is equally protective of the environment.

Let's take this example a step further. Under STI-001, you must use a certified inspector to conduct the visual inspection (for most tanks). Maybe you want to conduct the inspection yourself and not use a certified inspector. If so, you can take advantage of the PMAA settlement language (see below) that allows your PE to come up with an alternative method of compliance. This alternative method could simply follow STI-001 in every way except that it would allow you to conduct the visual inspection rather than a certified inspector. This alternative method would be ok to use under the SPCC rule so long as the PE can justify why allowing you to conduct the visual inspection is as equally protective of the environment as requiring a certified inspector to do so.

The bottom line is that you can use STI-001 to comply with the visual integrity inspection requirement under the SPCC rule without involvement of a PE. Or you can use a hybrid STI-001 that your PE comes up with as an alternative method under the PMAA settlement agreement. The only difference is that the alternative method has to pass muster as being equally protective of the environment before it can be used. The US EPA leaves that decision to the PE.

PMAA challenged the 2002 SPCC changes in federal court and settled that litigation. As part of the settlement EPA has provide clarification on certain issues.

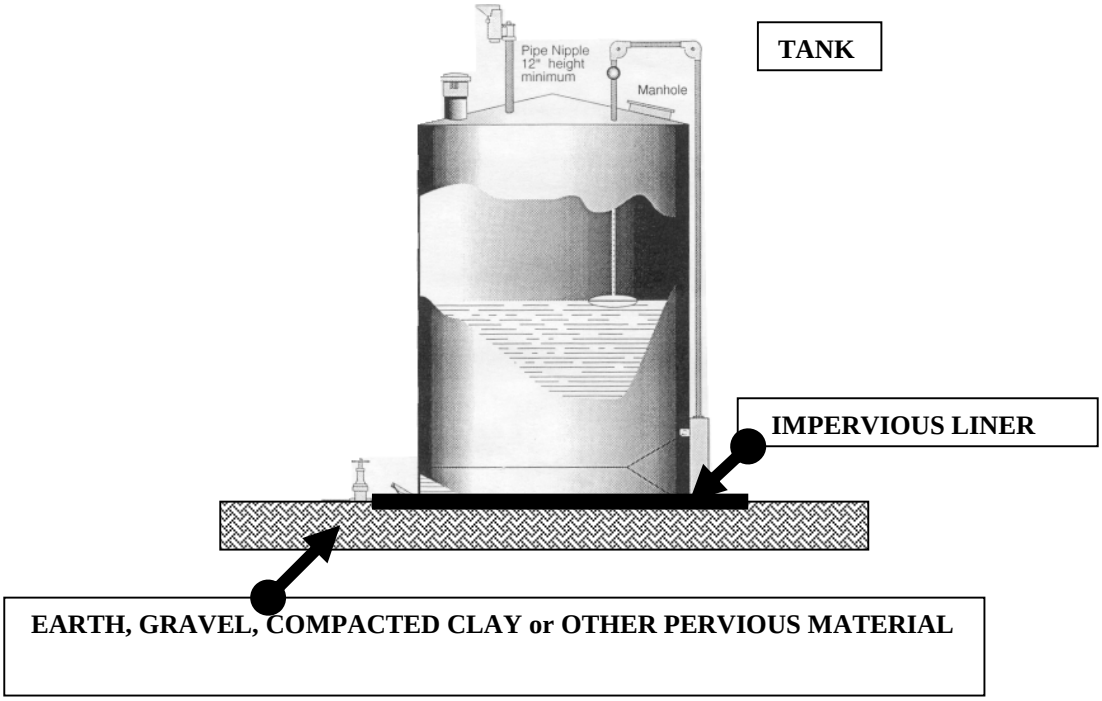
EPA has provided settlement agreements with Industry on issues regarding Loading Racks, Tank Integrity Testing, Security, and Cost regarding Reasons of Impracticability. For a copy of the settlement agreement letter to PMAA go to: http://www.epa.gov/emergencies/content/spcc/spcc_guidance.htm

In the area of tank integrity testing US EPA has decided **that shop built tanks, less than 30,000 gallons, where all sides are visible, will only require visual inspections per approval of the engineer.** When tanks rest directly on the ground without a synthetic barrier, an engineered approved integrity testing protocol in accordance with industry standards (STI or API) will have to be implemented to ensure the tank is not leaking through the bottom. Integrity testing will be accomplished at regular schedule intervals in accordance with industry standards. EPA generally accepts an approach that combines visual inspection with placement of a barrier between the container and the ground, **designed and operated in a way that ensures that any leaks are immediately detected, to be considered "equivalent" to integrity testing.** For example, EPA generally accepts that

equivalent environmental protection would be to place a shop-built container on an adequately designed, maintained, and inspected synthetic liner. **VERTICAL TANKS THAT REST ON GROUND/GRAVEL/EARTH & HAVE SYNTHETIC LINER BETWEEN TANK BOTTOM AND GROUND/GRAVEL/EARTH DO NOT HAVE TO BE INTEGRITY TESTED unless the engineer requires testing. Unless the engineer requires integrity testing, tanks that rest/sit on properly installed concrete are excluded from integrity testing**. Should have sand/pea gravel between the liner and tank bottom/

Impervious Liners cost approximately $600 to $800 (12ft x 12ft sq.) web site: http://www.bregenvironmental.com/

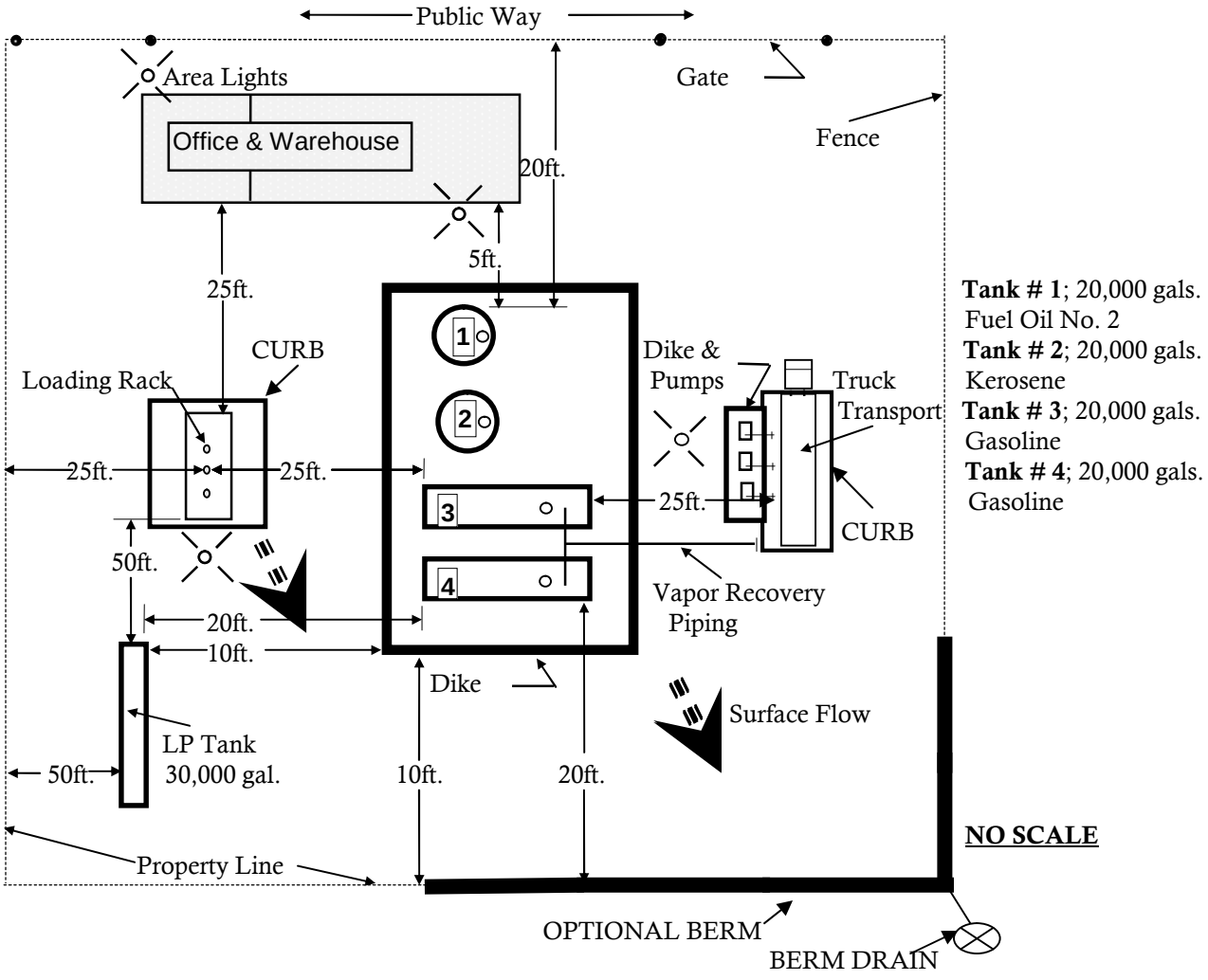
You have two options for vertical tanks installed on the ground, integrity test or install impervious liner. The STI standard requirements are more stringent the US EPA/PMAA settlement agreement. Please call Tim Laughlin (919.782.4411 or email: tlaughlin@ncpcm.org) for more information or to set up an appointment to have your SPCC Plan reviewed.



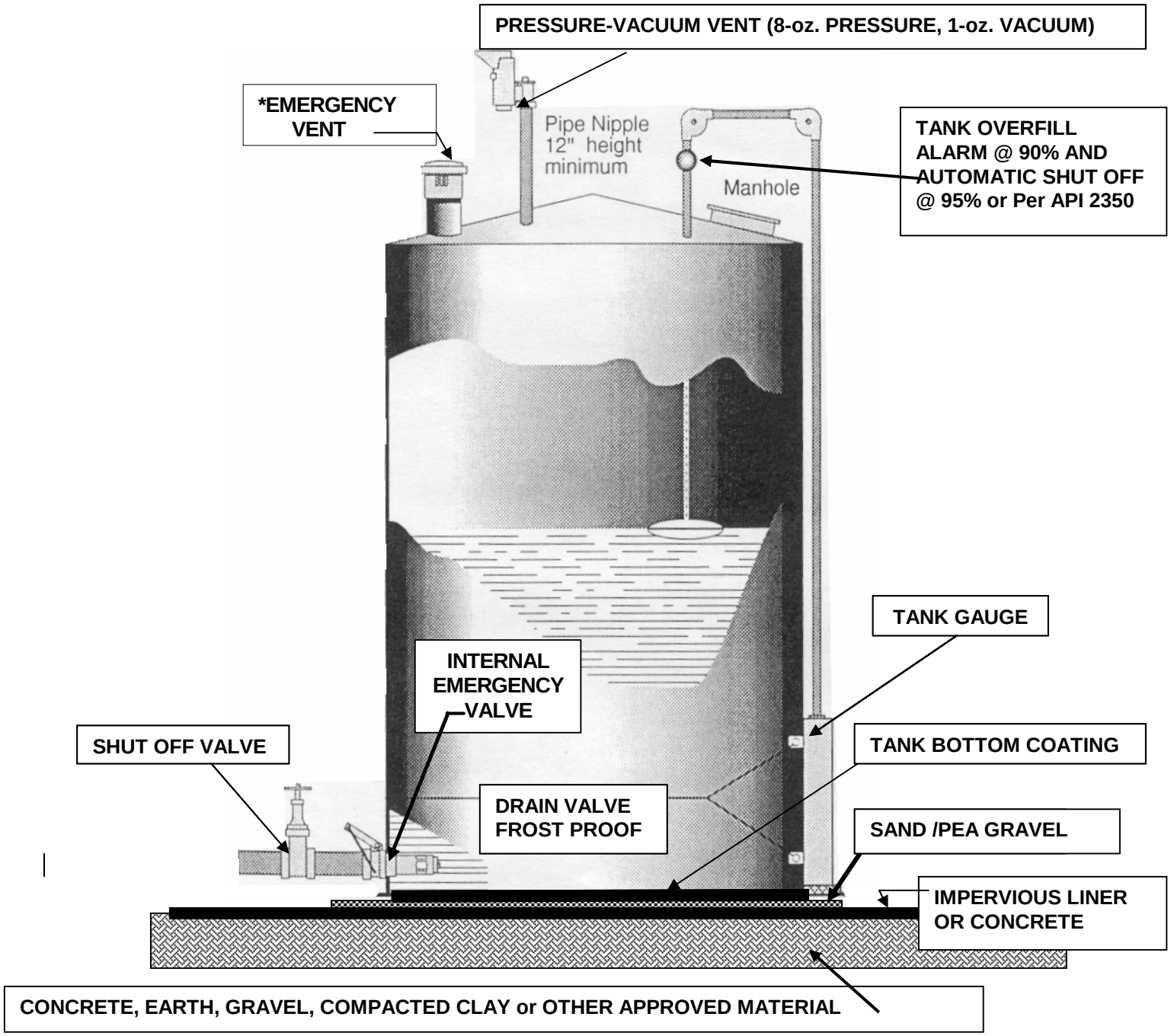
Bulk Plant Fire Code AST's Minimum Distance Requirements

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

TYPICAL BULK PLANT INSTALLATION LAYOUT



ABOVEGROUND BULK PLANT TANK



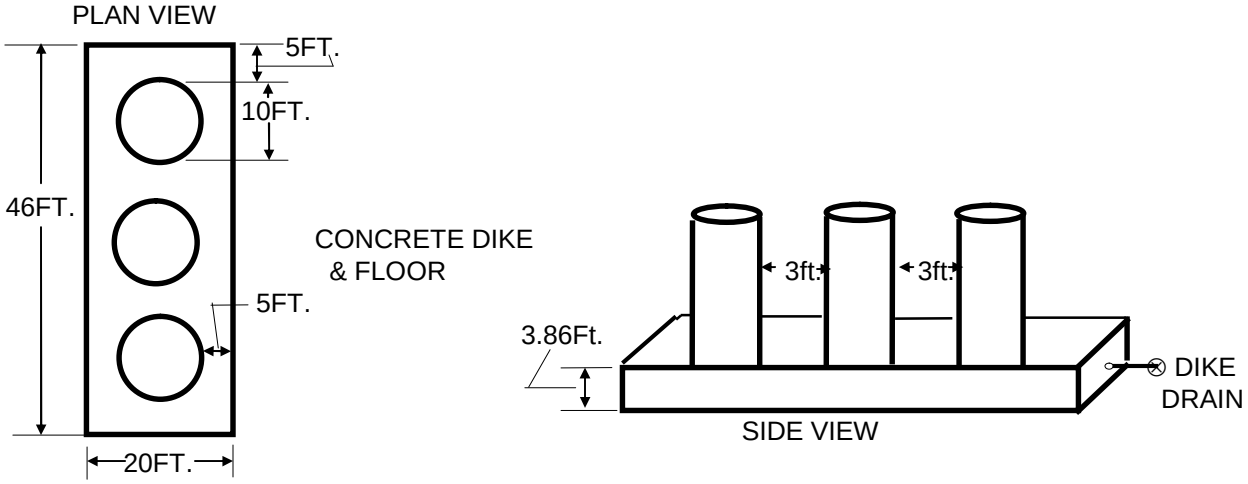
*Emergency relief venting consists of a manufactured emergency vent to relieve at approximately 2.5 psig pressure, or refer to liftable manhole covers, large diameter vents or weak roof to shell welds if either of these alternatives is used. NC Fire Prevention Code (IFC) Sections 2206.6.2.6 and 3404.2.9.6.8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

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

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

SECONDARY CONTAINMENT VOLUME REQUIREMENTS FOR ASTs

The US EPA has established regulations requiring spill prevention and control for aboveground storage tanks greater than gallons or two tanks with total capacity greater than 1320 gallons. The NC Fire Code requires secondary containment for ASTs greater than 60 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 dikes floors are required to be coated, lined or have impermeable earth to prevent seepage.



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 π X radius squared X 2 tanks. Therefore, 3.14 X 5^2 X 2 = 157 $Ft.^2$ Net dike available area, 920 $Ft.^2$ - 157 $Ft.^2$ = 763 $Ft.^2$ To determine dike wall height, divide 2942 $Ft.^3$ by 763 $Ft.^2$ = 3.86 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**. For one tank only, use dike length X dike width X dike height = cubic feet, then convert to gallons to match minimum volume needed. Please call Tim Laughlin at NCPCM for more information.

Aboveground Petroleum Storage Containment Systems via Concrete
CONCRETE DIKE ENGINEERING NOTES:

1) Concrete pad shall be constructed in accordance with Chapter 19 of the NC Building Code and the American Concrete Institute. Petroleum Secondary Containment Dike shall be in compliance with the applicable requirements of US EPA 40 CFR Part 112 (2002), National Fire Protection Association Pamphlet (NFPA) #30, and/or OSHA 29 CFR Part 1910.106. The reference regulations require the dike to be "liquid tight" or "sufficiently impervious". The dike floor must be sufficiently impervious to hold the spilled petroleum until clean up begins. Typically, the dike must hold the petroleum for a minimum of 72 hours.

New dike floor shall slope to dike discharge drain. Dike discharge drain should be lockable.

Notes from **Concrete Structures for Containment of Hazardous Materials American Concrete Institute (ACI) 350.2R-04.**

2.1…The addition of pozzolans, latex, and polymer modifierscan increase concrete's resistance to chemical attack…

2.2…A minimum slope of 2% should be included in the design of floors and trench bottoms to prevent ponding and help drainage. Secondary containment systems for flammable and combustible liquids should have a slope that is in accordance with NFPA 30, "Flammable and Combustible Liquids Code," or an applicable fire code…
2.2.3 Footings—Footings should be cast on top of, or monolithically with, the floor slab to enhance liquid tightness. Upturned footings help reduce restraint of shrinkage and its associated cracking.

3.1—Waterstops 3.1.1 *General*—Waterstops should be provided at expansion/contraction joints and where construction joints cannot be avoided. Waterstops are positioned in concrete joints to prevent the passage of liquid through the joint. Mechanical joints may be considered for repairing an existing joint.

3.2—Joint sealants: 3.2.1 *General*— Provide joints with chemically resistant sealants. See ACI 504R for additional information on sealing joints. Sealants are generally applied in liquid or semiliquid form, and are thus formed into the required shape within the mold provided at the joint opening. The manufacturer's recommendations and applications for use should be thoroughly explored for each specific application of a sealant. ACI 504R provides additional information on joint sealants.

4.2.1 Curing—Curing is one of the most important operations in reinforced concrete construction. Without proper curing, even the best-designed reinforced concrete develops surface cracks. Refer to ACI 308R and ACI 308.1 for a complete description of curing procedures.

5.1—Liners; Liners can function as either the primary or secondary containment, depending upon the type of installation and the location of the liner within the installation. A liner should exhibit good chemical resistance to deterioration and compatibility with the hazardous material. Many different types of liner materials can be used.

5.2—Coatings; When the material contained in the primary system is aggressive to concrete, a coating is appropriate. Secondary containment systems can also require a coating in areas where piping connections and disconnections are frequently made or when required by the applicable environmental authority. Coating systems include materials such as paints, mortars, liquefied rubbers, and resins.

6.1—General; A secondary containment system should prevent any primary containment leak from escaping to the environment. The secondary containment system should either retain such a leak until it is removed or should direct the leaked material to a predetermined and controllable drainage channel or sump. Secondary containment systems are normally dry in service. These systems include chemical tank farms, truck unloading stations, sumps, drumming rooms, apron slabs, trenches, and other areas where hazardous materials are handled or transferred.

(END ACI -350 REFERENCES)

TYPICAL DESIGN DETAILS

2) Concrete is particularly suitable for above- and below grade environmental primary and secondary containment systems. When properly designed and constructed, concrete containment systems are **impermeable** and highly resistant to failure during fires.

The permeability of mature hardened paste kept continuously moist ranges from 0.1 x 10-12 to 120 x 10-12 cm per sec. for water-cement ratios ranging from 0.3 to 0.7. The permeability of rock commonly used as concrete aggregate varies from approximately 1.7 x 10-9 to 3.5 x 10-13 cm per sec. **The permeability of mature, good-quality concrete is approximately 1 x 10-10 cm per sec.** Concrete pads can be coated with exterior petroleum resistance coating.

3) A 3.5 to 4 inch thick concrete ((f'c) 3,000 psi @ 28 days) **non-structural** dike pad/floor installed as site conditions call for. Site/soil conditions may warrant a steel reinforced 6in. x 6in. 10/10 welded wire mesh over 8.0 mil. polyethylene liner and 4 inches of crushed stone installed on compacted or undisturbed approved earth. Structural slabs/pads shall be (prestressed membrane slabs) should have a minimum thickness of 5 in. Nonprestressed membrane slabs should have a minimum thickness of 6 in. To enhance liquid-tightness, membrane slabs should be placed without construction joints.

- "Plain" slab/pad has no steel reinforcement.
- "Reinforced" slab/pad has steel reinforcement.
- "Continuous" slab/pad has no expansion/control joints, with high reinforcing steel content.

Other Design Considerations/Specifications: TYPICAL

- **Steel reinforcement can also be #4 deformed reinforcing bars, grade 40, (Fy = 40 Kips) 12 inches on center in both directions. Typical 2 to 3-inch of separation from the rebar to all faces of structure.**

- **Sub-Grade soil bearing capacity of the foundation bed is typical (qs) 2000 psf minimum. Pad shall be over 4 inches finished course of pea gravel and a base course of crushed stone 8 inches thick. Finished and Base courses should extend 12 inches beyond the edge of the pad. Compaction of fill/existing soils may be required in 10 inch lifts. <u>May need soils engineering analysis by qualified geotechnical engineer.</u>**
- **Moisture Control and Vapor Barriers. Prevents debonding of coatings/paints.**
- **Liquid tight expansion joints as needed per site conditions and steel placement. Expansion joints shall not exceed 15 feet intervals perpendicular to the pads long axis. Expansion joint shall be sealed by polymeric joint sealant and expansion joint material shall be full depth of slab thickness. In no case shall expansion joint be less than ¼ inch in thickness. <u>Control joints, or contraction joints may be used instead of expansion joints on slabs 4 inches or less.</u>**
- **Pad shall be installed to provide for stormwater runoff. (slope ¼ inch per foot to drainage system)**

4) Tank piers/footing shall be designed as subsoil site conditions warrant. The bearing pressure of the soil can range from 1,000 pounds per square foot (psf) for soft clay to over 4,000 psf for coarse, compacted gravel. Consider that a 20,000 gallon diesel single wall UL-tank, 10 feet in diameter exerts a downward force of approximately 2,200 psf.

For Horizontal Tanks, loads depend on the number of saddles and the size of the footings.

Large Vertical Tank loads should be provided with base course of crushed stone approximately 6 inches thick depending on site soil conditions. The finished course shall consist of 4 inches of clean, compacted sand, gravel or crushed rock that is placed over the base course. Finished and Base courses should extend 12 inches beyond the diameter of the tank.

Typically, large vertical tanks are installed on 8 to 10 inch thick concrete pads/piers over base and finished course materials. Stronger fiber reinforced concrete ((f'c) 5,000 psi @ 28 days) can be used, typically at slab thickness of 5 inches. Tanks must be properly anchored in high wind, flood and seismic zones.

Steel reinforcement can be two layers of #8 deformed reinforcing bars, grade 60, (Fy = 60 Kips) 12 inches on center in both directions. Typical 3-inch of separation from the rebar to all faces of structure. Standalone tank pads/piers shall have perimeter footing.

NC BUILDING/FIRE CODE REFERENCE

3404.2.10 Drainage and diking.

The area surrounding a tank or group of tanks shall be provided with drainage control or shall be diked to prevent accidental discharge of liquid from endangering adjacent tanks, adjoining property or reaching waterways.

Exceptions:

1. The code official is authorized to alter or waive these requirements based on a technical report which demonstrates that such tank or group of tanks does not constitute a hazard to other tanks, waterways or adjoining property, after consideration of special features such as topographical conditions, nature of occupancy and proximity to buildings on the same or adjacent property, capacity, and construction of proposed tanks and character of liquids to be stored, and nature and quantity of private and public fire protection provided.

2. Drainage control and diking is not required for listed secondary containment tanks.

3404.2.10.1 Volumetric capacity.

The volumetric capacity of the diked area shall not be less than the greatest amount of liquid that can be released from the largest tank within the diked area. The capacity of the diked area enclosing more than one tank shall be calculated by deducting the volume of the tanks other than the largest tank below the height of the dike.

3404.2.10.2 Diked areas containing two or more tanks.

Diked areas containing two or more tanks shall be subdivided in accordance with NFPA 30.

3404.2.10.3 Protection of piping from exposure fires.

Piping shall not pass through adjacent diked areas or impounding basins, unless provided with a sealed sleeve or otherwise protected from exposure to fire.

3404.2.10.4 Combustible materials in diked areas.

Diked areas shall be kept free from combustible materials, drums and barrels.

3404.2.10.5 Equipment, controls and piping in diked areas.

Pumps, manifolds and fire protection equipment or controls shall not be located within diked areas or drainage basins or in a location where such equipment and controls would be endangered by fire in the diked area or

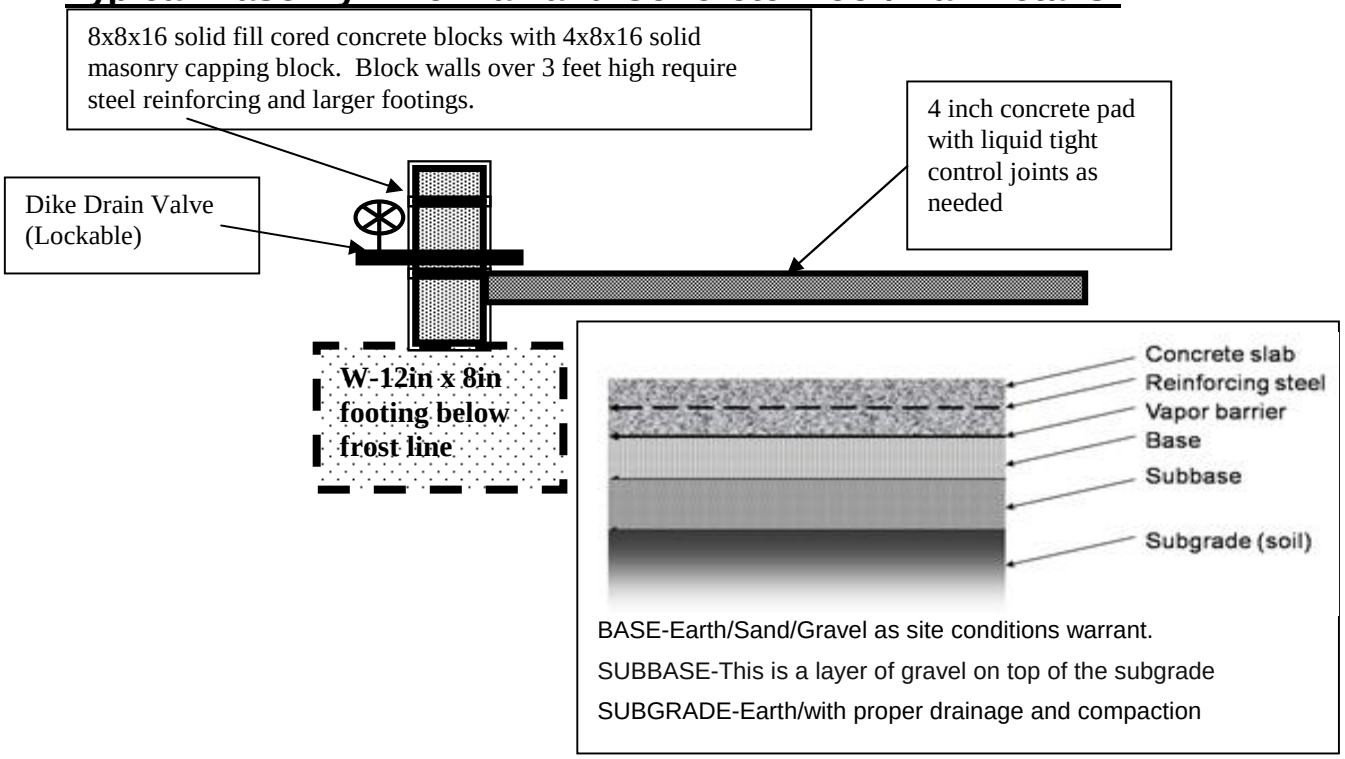
drainage basin. Piping above ground shall be minimized and located as close as practical to the shell of the tank in diked areas or drainage basins.

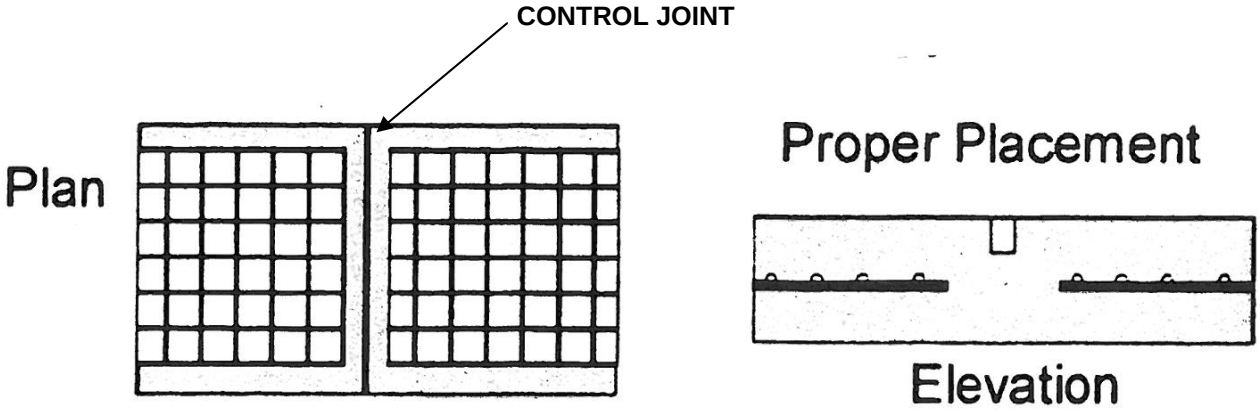
Exceptions:

1. Pumps, manifolds and piping integral to the tanks or equipment being served which is protected by intermediate diking, beams, drainage or fire protection such as water spray, monitors or resistive coating.
2. Fire protection equipment or controls which are appurtenances to the tanks or equipment being protected, such as foam chambers or foam piping and water or foam monitors and hydrants, or hand and wheeled extinguishers.

(End of code reference)

Typical Masonry Dike Wall and Concrete Floor/Wall Details:





WELDED WIRE FABRIC DETAIL

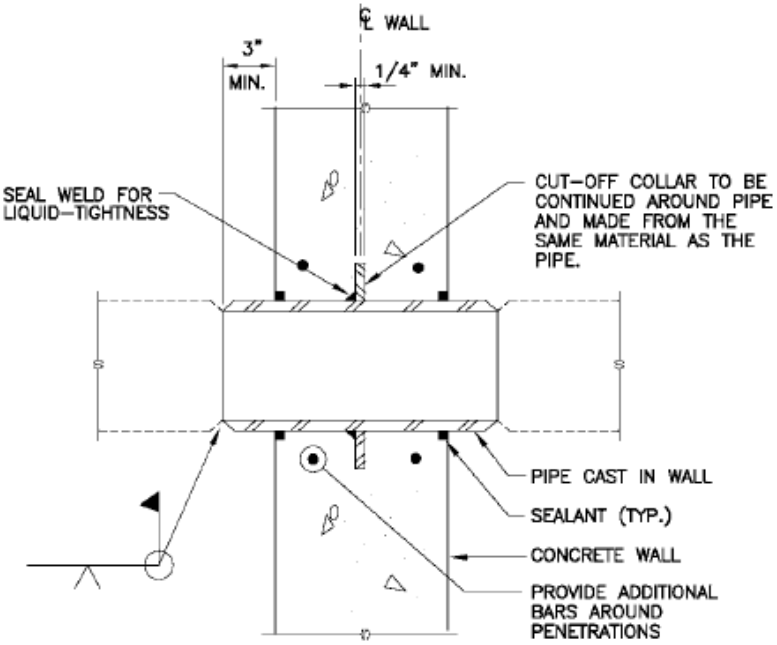
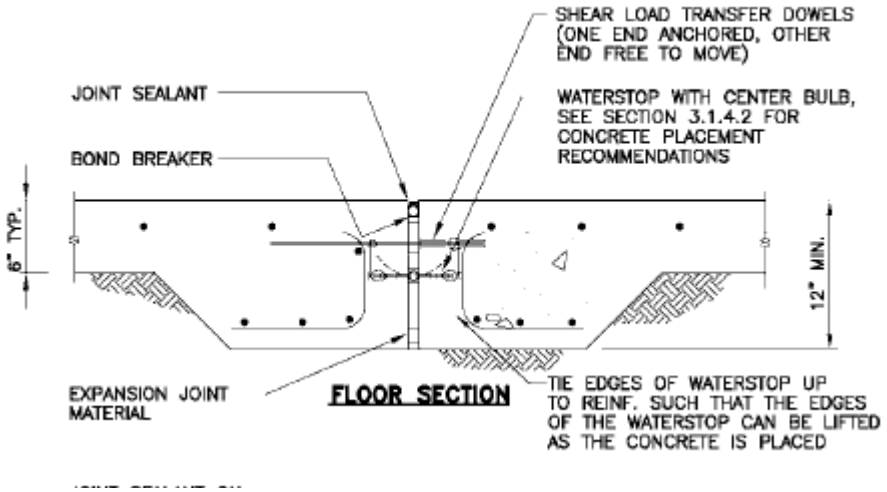


Fig. 4.5—Steel pipe penetration detail.



EXPANSION JOINTS

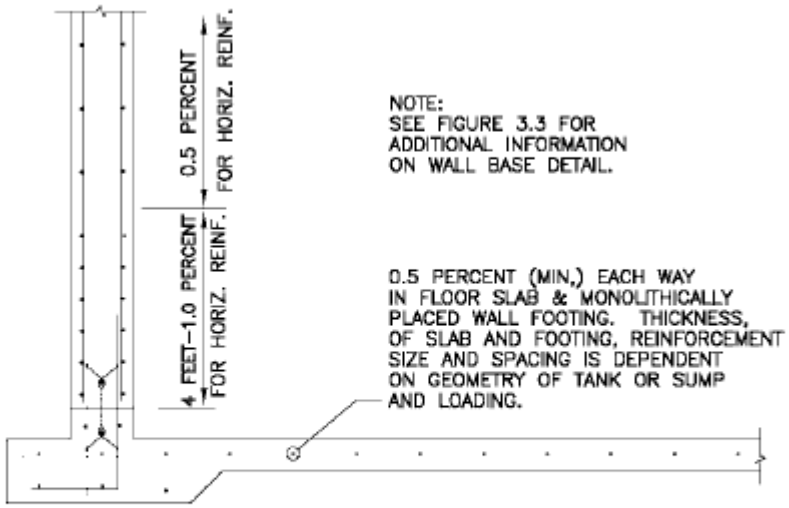


Fig. 2.1—Recommendations for increased reinforcement percentage parallel to bonded joints.

POURED IN PLACE CONCRETE WALL DETAIL

NCPCM
North Carolina Petroleum & Convenience Marketers
Fueling North Carolina's Future

Rev-6-22-11

The intent of this document is to provide information to NCPCM Petroleum Marketing Industry members. It will not serve as engineering design, permit approvals, construction documents, and equipment approvals or for any other purpose. Concrete Dike Not for use in vehicular traffic areas.