DATANET ENGINEERING, INC.

UST Overfill Control Mandatory Since 1998

Why do we still have overfills?

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1

From EPA's *"Must for USTs"*:

When Do You Have To Act?

TYPE OF TANK & PIPING	LEAK DETECTION	SPILL & OVERFILL PROTECTION	CORROSION PROTECTION
New Tanks & Piping (installed *after* December 22, 1988)	At installation	At installation (Does not apply to piping)	At installation
Existing Tanks & Piping (installed *before* December 22, 1988)	No later than December 1993	No later than December 22, 1998 (Does not apply to piping)	No later than December 22, 1998

2

Means of Overfill Control:

- Shutoff
- Restrict
- Alarm

3

Why Don't Overfill Systems Work?`

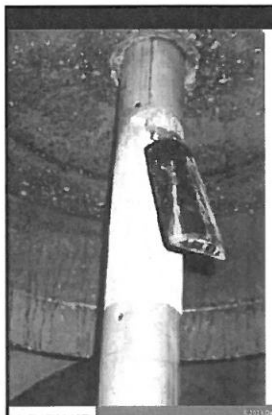
- Improper Installation
- Tank Not Vapor Tight
- Lack of Maintenance
- Deliberate Sabotage
- Activation of Valve Destroys Tank
- Faulty Plumbing Design

4

Improper Installation

Installers confused by unique measurements at sites and place overfill valve or restrictor too high in tanks.

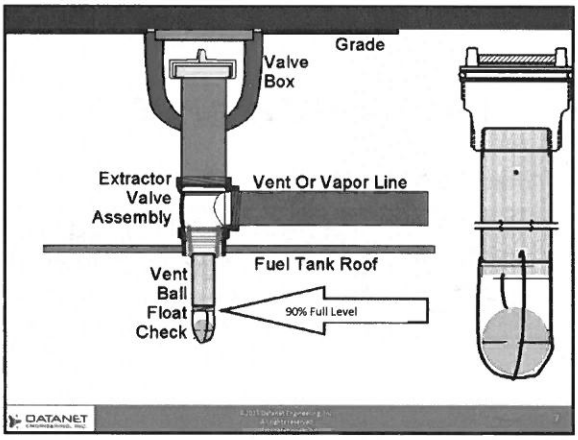
5

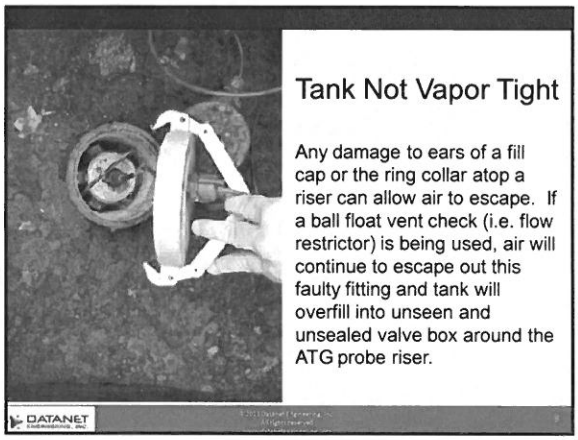


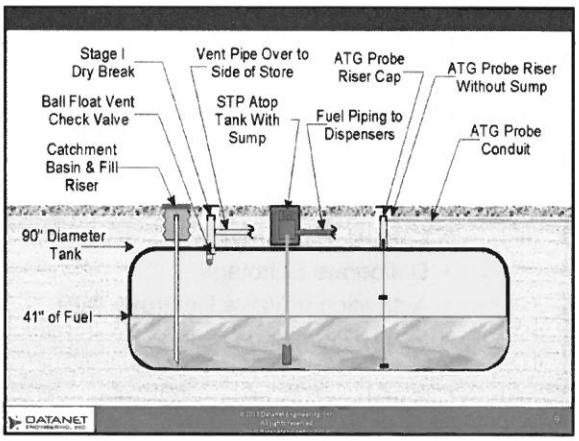
Improper Installation

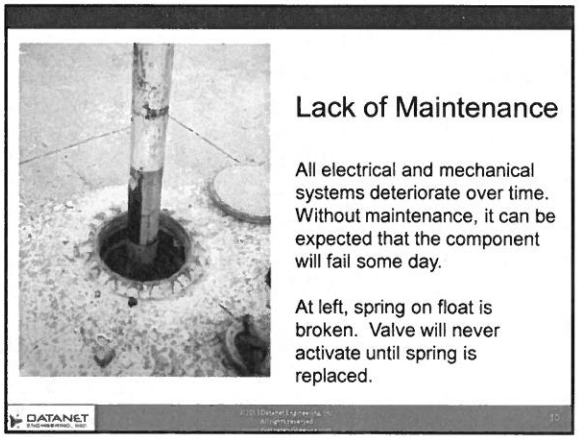
Here valve is so high in tank that its activation point is above the roof line.

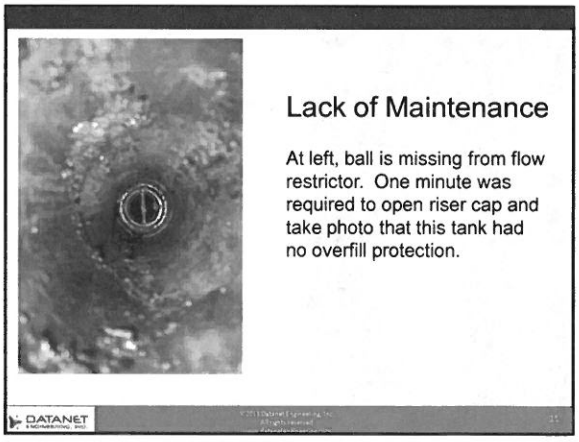
6

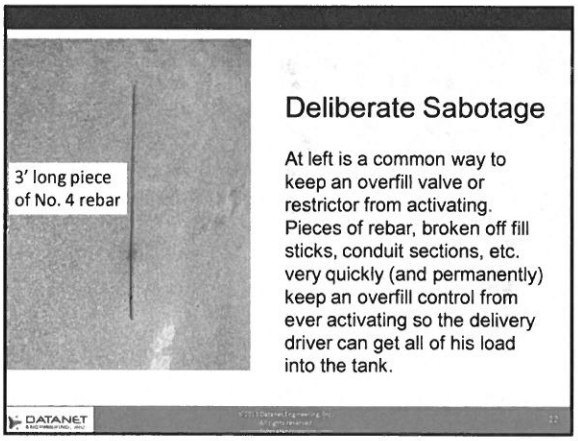

Grade
Valve Box
Extractor Valve Assembly
Vent Or Vapor Line
Fuel Tank Roof
Vent Ball Float Check
90% Full Level

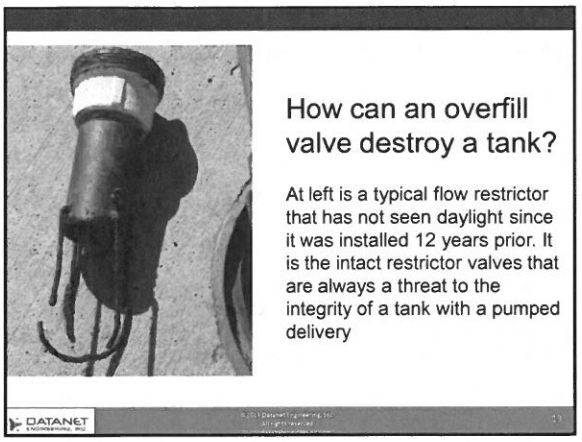

Tank Not Vapor Tight
Any damage to ears of a fill cap or the ring collar atop a riser can allow air to escape. If a ball float vent check (i.e. flow restrictor) is being used, air will continue to escape out this faulty fitting and tank will overfill into unseen and unsealed valve box around the ATG probe riser.

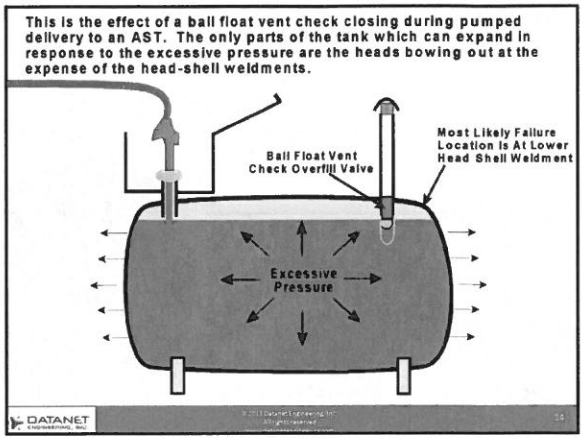

Stage I Dry Break
Vent Pipe Over to Side of Store
ATG Probe Riser Cap
ATG Probe Riser Without Sump
Ball Float Vent Check Valve
STP Atop Tank With Sump
Fuel Piping to Dispensers
ATG Probe Conduit
Catchment Basin & Fill Riser
90" Diameter Tank
41" of Fuel


Lack of Maintenance
All electrical and mechanical systems deteriorate over time. Without maintenance, it can be expected that the component will fail some day.
At left, spring on float is broken. Valve will never activate until spring is replaced.


Lack of Maintenance
At left, ball is missing from flow restrictor. One minute was required to open riser cap and take photo that this tank had no overfill protection.


3' long piece of No. 4 rebar
Deliberate Sabotage
At left is a common way to keep an overfill valve or restrictor from activating. Pieces of rebar, broken off fill sticks, conduit sections, etc. very quickly (and permanently) keep an overfill control from ever activating so the delivery driver can get all of his load into the tank.


How can an overfill valve destroy a tank?
At left is a typical flow restrictor that has not seen daylight since it was installed 12 years prior. It is the intact restrictor valves that are always a threat to the integrity of a tank with a pumped delivery
DATANET


This is the effect of a ball float vent check closing during pumped delivery to an AST. The only parts of the tank which can expand in response to the excessive pressure are the heads bowing out at the expense of the head-shell weldments.
Ball Float Vent Check Overfill Valve
Most Likely Failure Location Is At Lower Head Shell Weldment
Excessive Pressure
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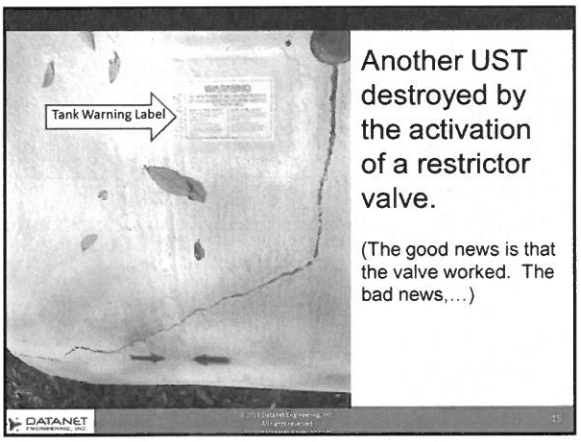
Tank Warning Label
Another UST destroyed by the activation of a restrictor valve.
(The good news is that the valve worked. The bad news,…)
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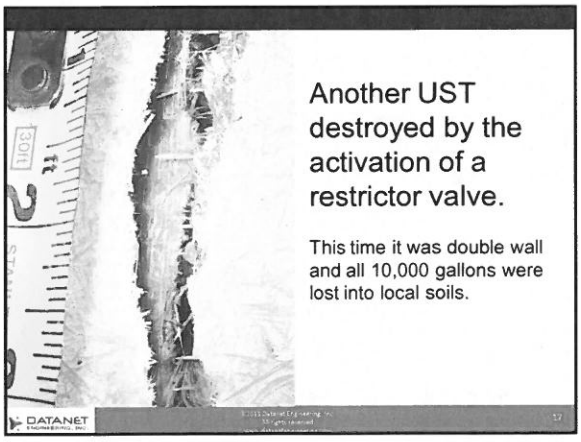
automatic shut-off devices ("flapper valves") or vent-restriction devices ("ball-float valves"), follow the instructions provided by the manufacturer of the overfill-protection device and consult the authority having jurisdiction to determine the level at which the overfill protection should operate.
WARNING
Overfill protection, such as automatic shut-off devices or vent-restriction devices, should not be installed if owner/operator will allow pump or pressure filling of the tank. Failure to follow this instruction could cause tank failure, and result in death or serious injury.
11.4. VENTING INTERSTITIAL SPACE
CAUTION


Another UST destroyed by the activation of a restrictor valve.
This time it was double wall and all 10,000 gallons were lost into local soils.
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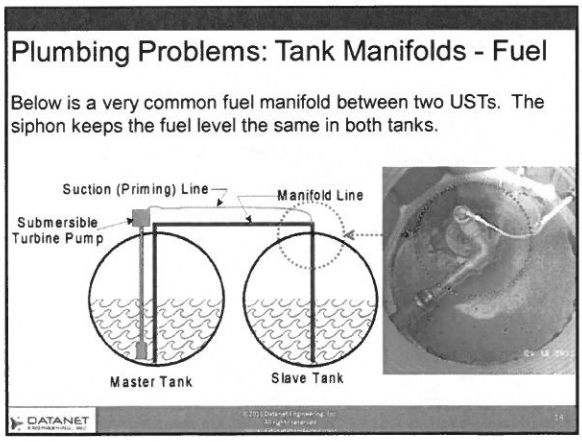
Plumbing Problems: Tank Manifolds - Fuel
Below is a very common fuel manifold between two USTs. The siphon keeps the fuel level the same in both tanks.
Suction (Priming) Line
Manifold Line
Submersible Turbine Pump
Master Tank
Slave Tank
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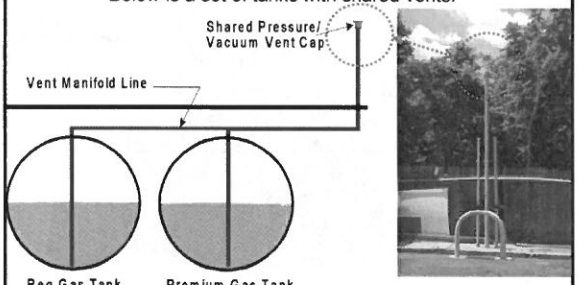
Plumbing Problems: Tank Manifolds - Vents

Below is a set of tanks with shared vents.



Plumbing Problems: Tank Manifolds - Vents

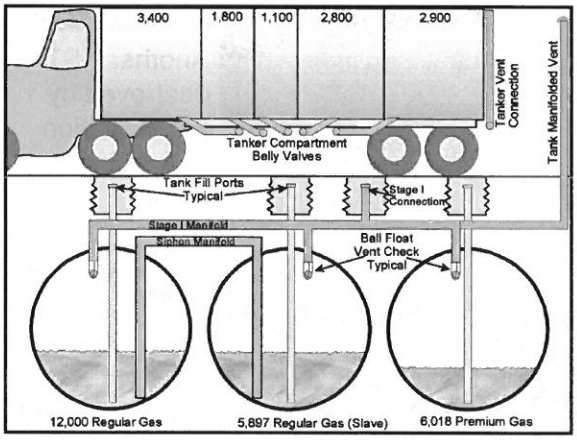
NFPA 30 (2012 Edition): 27.8.1.4 Manifolding of vent piping shall be prohibited except where required for special purposes such as vapor recovery, vapor conservation, or air pollution control.

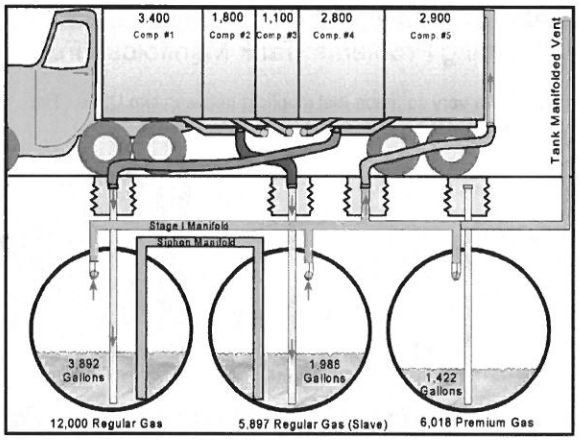
IFC (2012 Edition): 5704.2.7.3.5 Manifolding. Tank vent piping shall not be manifolded unless required for special purposes such as vapor recovery, vapor conservation or air pollution control.

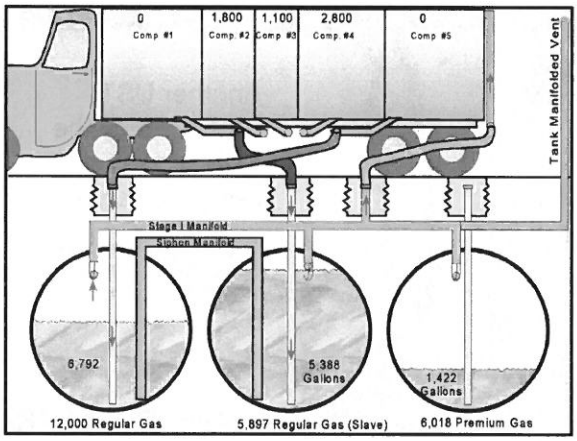
OSHA 29 CFR 1910.106(b)(3)(iv)(e): When tank vent piping is manifolded, pipe sizes shall be such as to discharge, within the pressure limitations of the system, the vapors they may be required to handle when manifolded tanks are filled simultaneously.

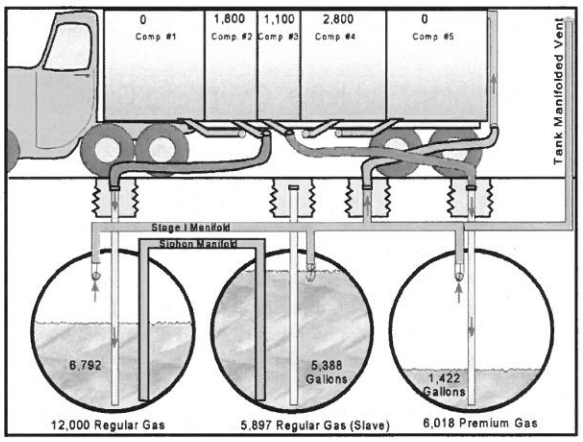
Plumbing Problems: Overfilling Case #1

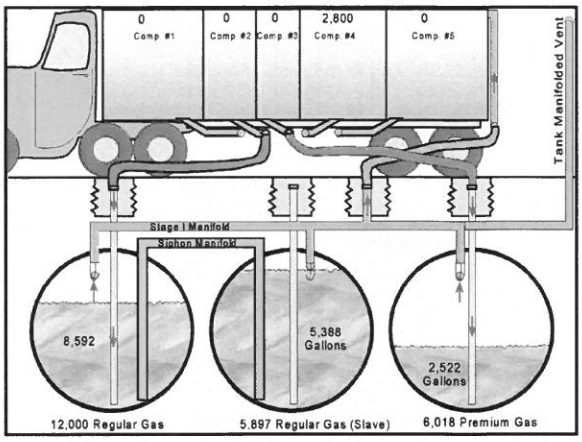
The following case occurred at a typical gas station. The facility was equipped with three tanks: Tank #1 – 12,000 gallon Regular Gas, Tank #2 – 6,000 gallons Regular Gas, and Tank #3 – 6,000 gallons Premium Gas. The delivery driver stuck the tanks before commencing the delivery. When tanks began overfilling, driver saw it and immediately hit the gang lever on the truck to close all valves. His fast actions limited release to approximately 50 gallons.

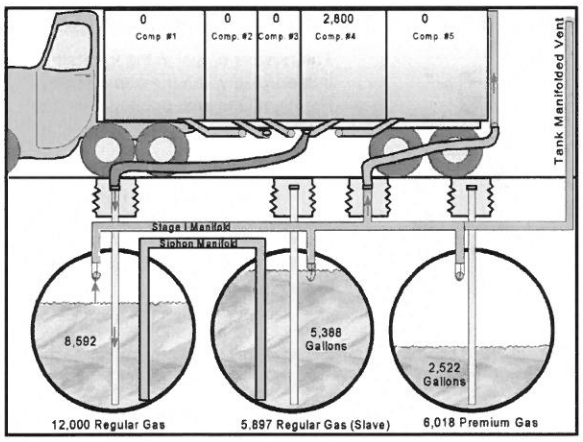







0
Comp. #1
1,800
Comp. #2
1,100
Comp. #3
2,800
Comp. #4
0
Comp. #5
Tank Manifolded Vent
Stage I Manifold
Siphon Manifold
6,792
5,388 Gallons
1,422 Gallons
12,000 Regular Gas
5,897 Regular Gas (Slave)
6,018 Premium Gas


0
Comp. #1
0
Comp. #2
0
Comp. #3
2,800
Comp. #4
0
Comp. #5
Tank Manifolded Vent
Stage I Manifold
Siphon Manifold
8,592
5,388 Gallons
2,522 Gallons
12,000 Regular Gas
5,897 Regular Gas (Slave)
6,018 Premium Gas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Comp. #1
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Comp. #2
0
Comp. #3
2,800
Comp. #4
0
Comp. #5
Tank Manifolded Vent
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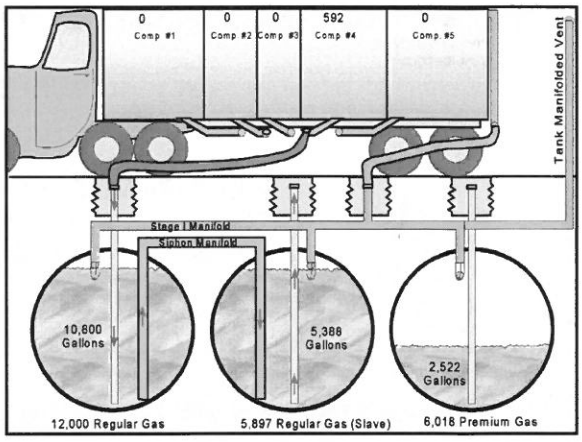
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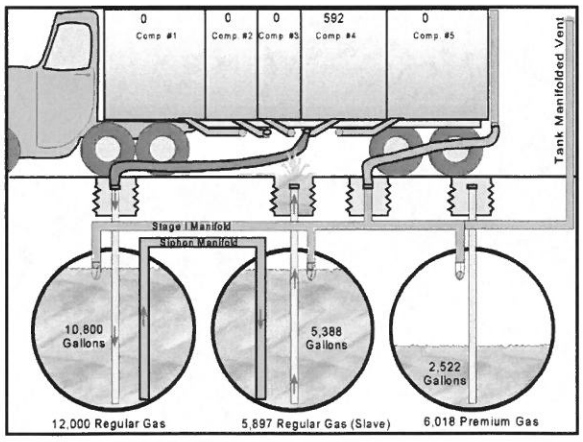
0
Comp. #1
0
Comp. #2
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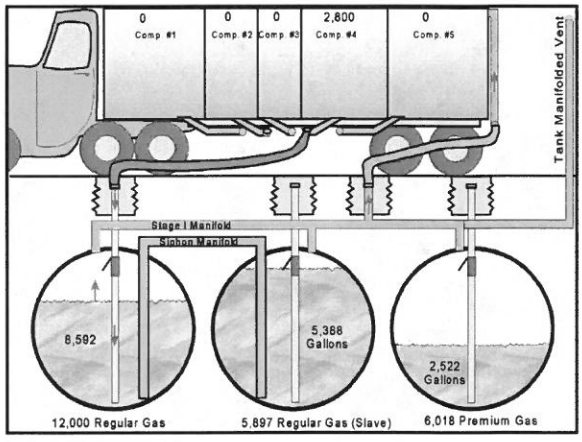
0
Comp. #1
0
Comp. #2
0
Comp. #3
2,800
Comp. #4
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Tank Manifolded Vent
Stage I Manifold
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8,592
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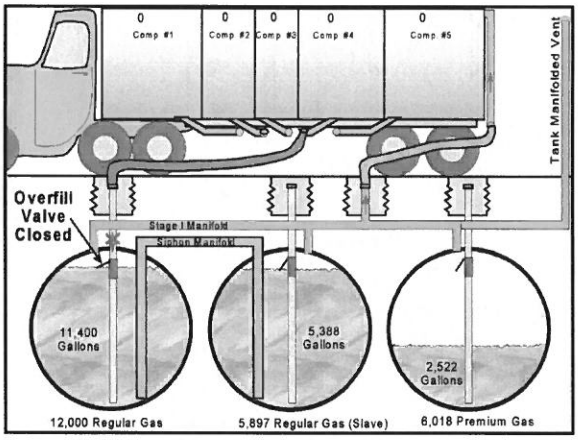
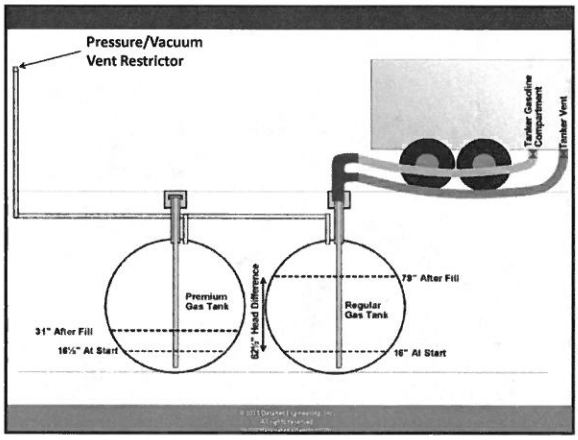
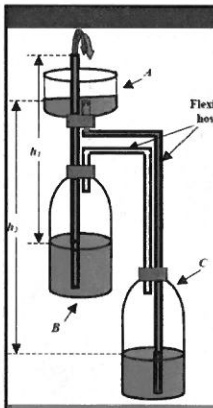


Plumbing Problems: Overfilling Case #2

The following case occurred again at a typical gas station. The facility was equipped with two tanks: Tank #1 – 10,000 gallon Regular Gas, Tank #2 - 6,000 gallons Premium Gas. The delivery driver stuck the Regular Gas tank before commencing the delivery to it. In the middle of the delivery to the Regular tank, the driver opened the Premium tank to stick it. The video shows the gushing of fuel that resulted due to the vent manifold between the tanks.





The release of fuel in the fountain that erupted when the cap on the Premium Gas tank opened was due to the pressure from the filling of the Regular Gas Tank.

At the left is a hydraulic model of the Bernoulli equation in effect for this overfilling. This effect was discovered 2,000 years ago and is called a Hero Fountain.

$$v = \sqrt{2g(h_2 - h_1)} = \sqrt{\frac{2\Delta P}{\rho}}$$

How to Get Overfill Systems to Work

- Proper Installation
  - ✓ Worker Training
  - ✓ Worker Certifications
- Tank Not Vapor Tight & Lack of Maintenance and Deliberate Sabotage
  - ✓Annual Re-certifications
  - ✓Weekly Inspections
- Activation of Valve Destroys Tank
- Faulty Plumbing Design

What is required to meet 40 CFR 280?

(There is only one correct answer below)

A. An approved overfill valve installed in the tank
B. A valve proven to protect the tank from an overfill
C. A or B

(Check out Judge Charneski's interpretation of 40 CFR 280 for the EPA Vs. Euclid Oil Case and $3.3M fine at: http://www.epa.gov/oalj/orders/euclidof-va-id-110906.pdf)

A common defense that appears to surface with respect to the various types of violations at issue in this case centers on respondent's purported reliance upon a third party contractor to perform the work that ultimately results in the charge of violation. For instance, regarding the overfill protection charges, respondent maintains that it *"reasonably relied a state-certified contractors to ensure that the pollution control equipment was working properly."* Resp. Br. at 22-23. It is the holding of this Tribunal that a party may not avoid liability for noncompliance with a UST regulations simply by hiring a contractor to perform the work required by these regulations. **In other words, a party cannot "*contract out*" its responsibility to comply with the UST regulations.**

How to Justify Annual Re-Certs of Overfill Equipment

- Reference Judge Charneski Decision
- Reference NFPA 30:

23.17 Inspection and Maintenance of Underground Storage Tanks.
23.17.1 Inspection and maintenance for underground tanks shall meet the requirements of Section 21.8.
23.17.2 Overfill protection devices or systems shall be inspected and tested **annually** to ensure proper operation.

- Reference PEI PR 1200
- Reference forthcoming revision to 40 CFR 280

Why Reference PEI RP1200?

- This is the industry standard for "HOW TO CHECK" overfill controls, secondary containments, shear valves, spill buckets, sumps, etc.
- The checklists in the document insure that the tester really did follow the mandatory protocols.
- Checklist documentations make is easy for compliance personnel to recognize proper testing

Annual Overfill System Re-Certification:

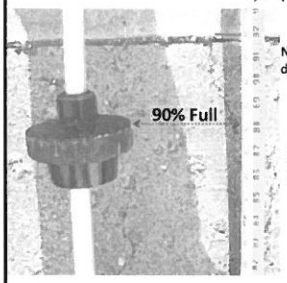
- Must remove valve from the tank
- Visually inspect for defects
- Activate valve to check functionality
- Measure length to ensure complete shutoff occurs when the tank is no more than 95% full (i.e. Activation point must be at 90% D off floor or lower)

Annual Overfill System Re-Certification:

- Must remove float from the tank
- Visually inspect for defects
- Move float to simulate overfill and check functionality
- Measure length to ensure alarm occurs when the tank is no more than 90% full (i.e. Activation point must be at 83.9% D off floor or lower)

Annual Overfill System Re-Certification:

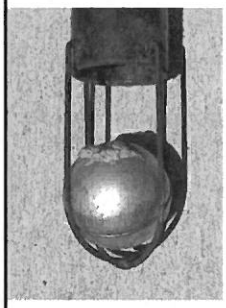
- Print out proves test was done



Note: Ensure that activation of annunciator by delivery driver occurs by 90% full inside tank

HIGH PRODUCT ALARM
MAR 5. 2014 11:09 AM

What about Vent Restrictors?



- Restrictors cannot hurt a tank's integrity if they are removed and discarded
- Restrictors cannot cause a tank to become over-pressurized if they are removed and discarded
- Restrictors cannot cause an adjacent tank with manifolded vent to spray fuel out fill riser if they are removed and discarded

What about piping & hydraulic problems causing releases?

The absence of engineering in the design and selection of components for fuel systems allows unintended consequences with almost no recourse to any party. Despite a configuration resulting in an expensive release for the site owner, the contractor can attest to all components meeting applicable codes and regulations (as will the state UST compliance officer). To preclude such an occurrence, owners should obtain competent engineering support. Competent engineering assistance is invaluable in both preventing most fuel releases and allowing recovery of damages if one does occur.

Where can UST training be obtained?

Check out all of our UST courses on Installation, Inspection, Removal and Operation at our Fuel Systems Training Center in Owings Mills, MD and on our web site at:

www.datanetengineering.com/training

Properly managing fuel systems every day

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jcignatta@datanetengineering.com