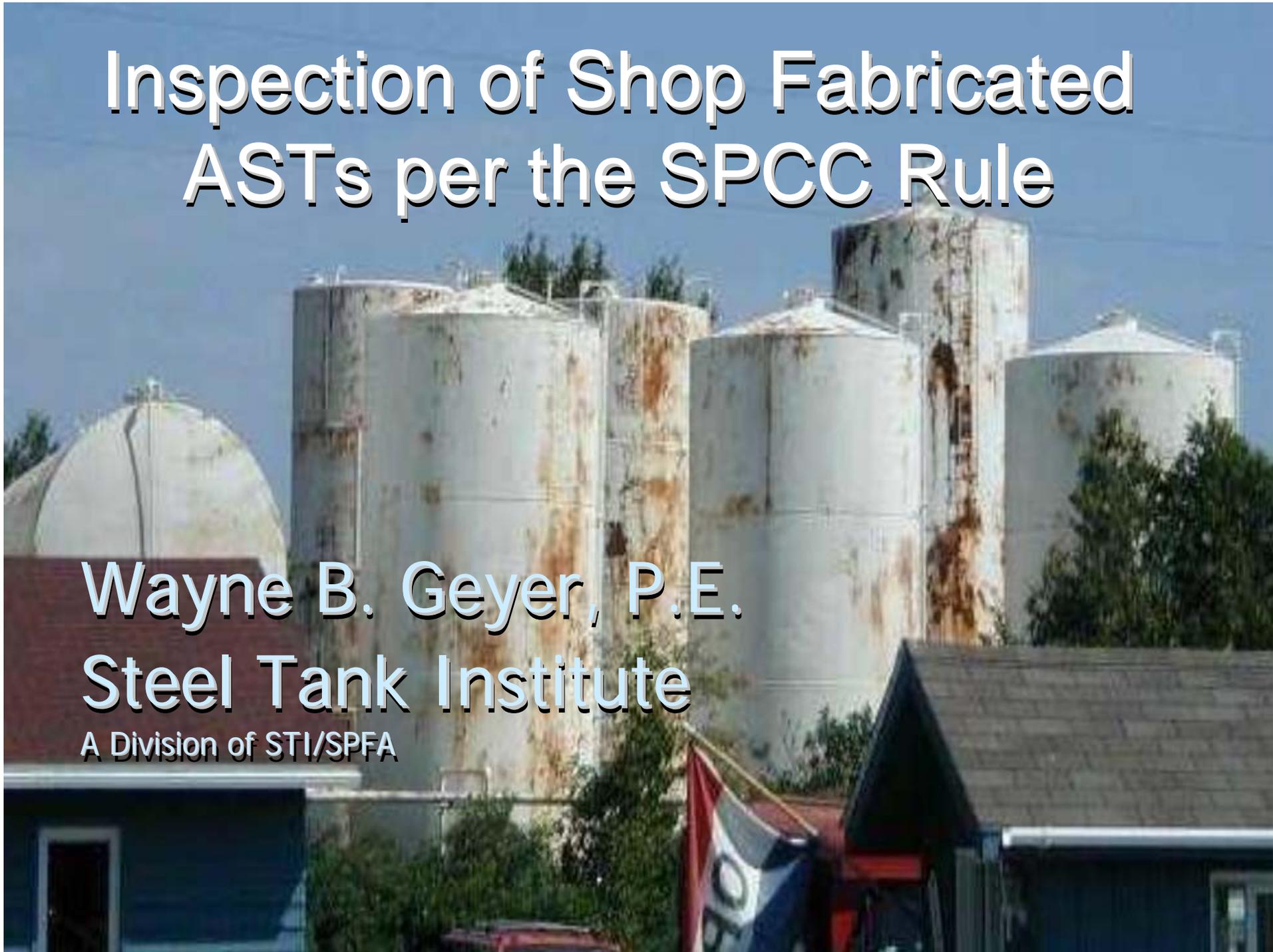


US EPA ARCHIVE DOCUMENT

Inspection of Shop Fabricated ASTs per the SPCC Rule

Wayne B. Geyer, P.E.
Steel Tank Institute
A Division of STI/SPFA

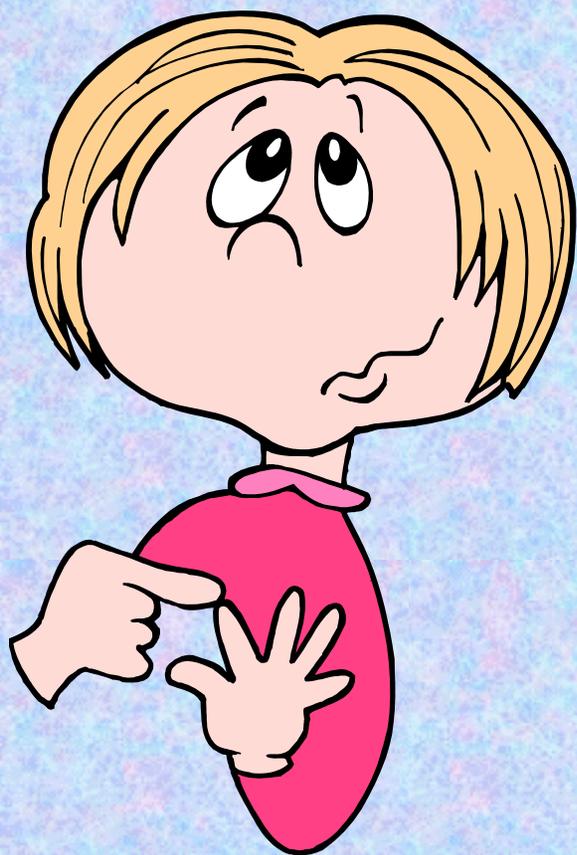


“Few states have any certifications for AST installers and it shows in the *creative* ways the tank systems are installed.”

- John Cignatta, course instructor for STI AST inspector certification

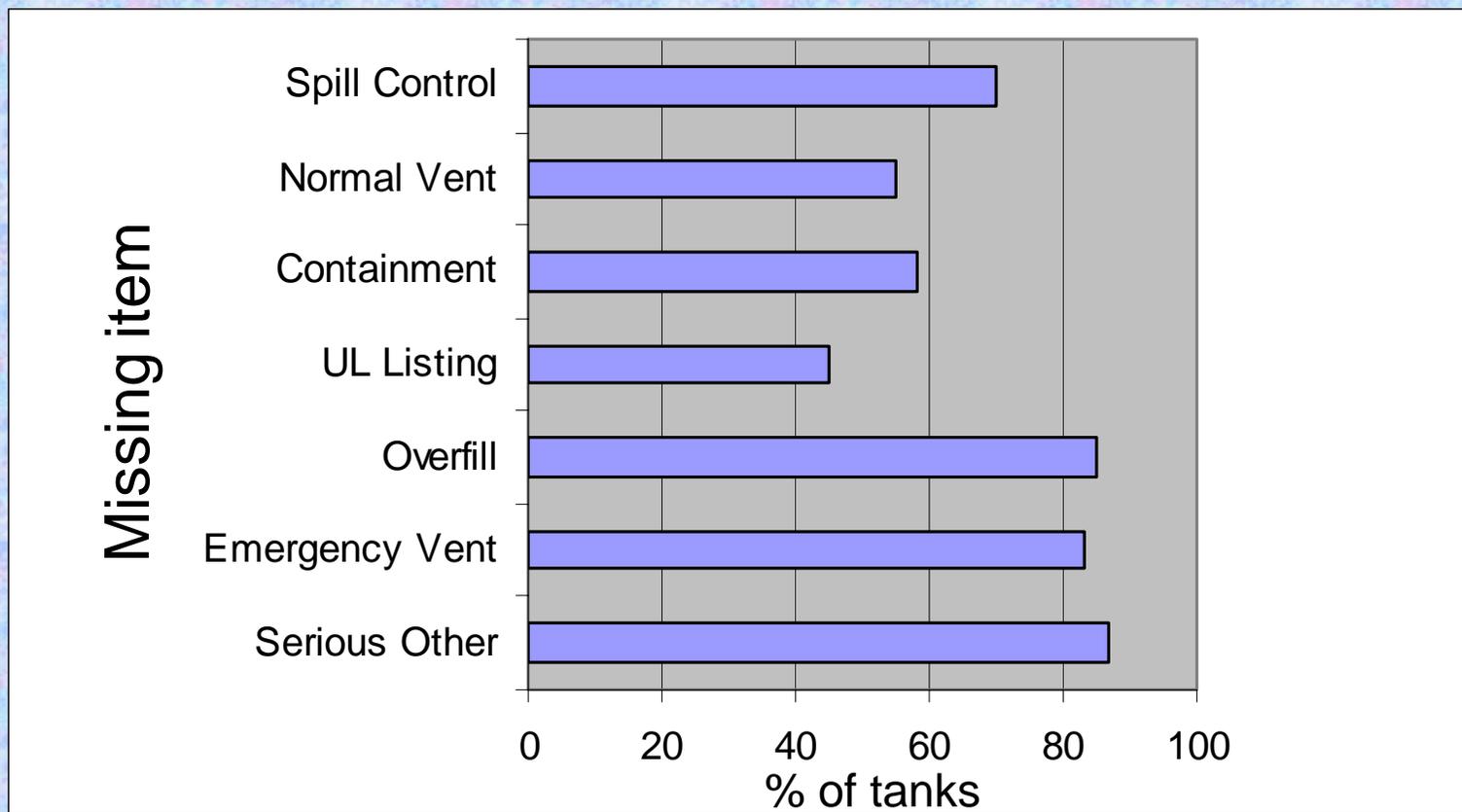
Review of 28 tanks at a

major

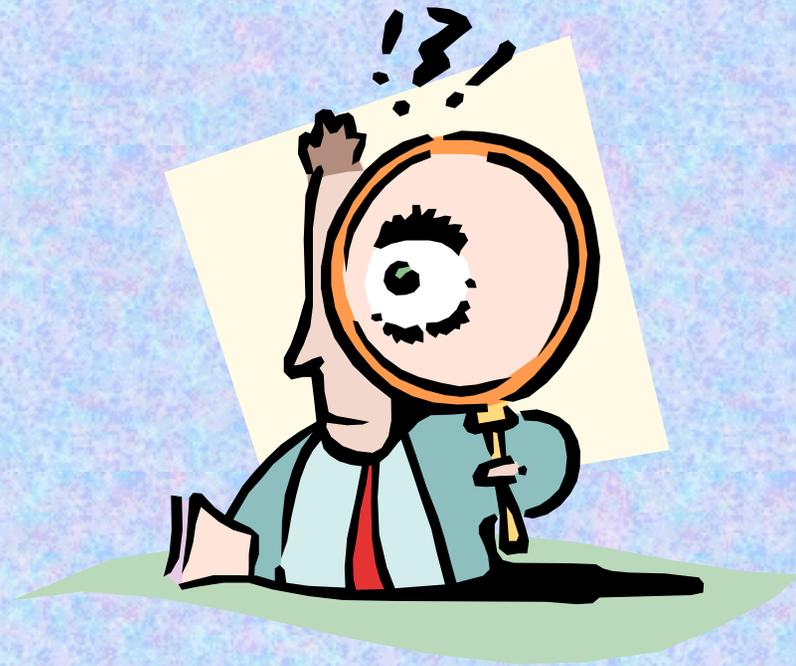


- Nearly 90% lacked adequate venting
- Over 50% lacked adequate containment
- Leaking tank
- Doorways in dikes
- No overfill alarms
-

Review of 28 tanks at a Major Facility



Revised SPCC Rules



- References industry standards
 - Tank inspection per API 653 or STI SP001
- Requires “Integrity Testing”
 - Visual inspection alone no longer sufficient

Test Each Aboveground Container for Integrity

- Section 112.8(c)(6)
- On a regular schedule
- Combine **visual inspection** with **another testing technique**
 - Hydrostatic testing
 - Radiographic testing
 - Ultrasonic testing
 - Acoustic emissions testing
 - Other nondestructive shell testing
- Frequently inspect the outside of container

Show me some tanks!!!



HOME MADE
DO-NUTS
STRAIGHT
AHEAD
WALL DRUG















SERVICE
TANK
LOUISVILLE, KY

SAFETY
WARNING

PLEASE DON'T SHIT
AROUND THIS WORK AREA

FEB 22 2002

AST Standards for Shop Fabricated Tanks



- API - American Petroleum Institute
- UL - Underwriters Laboratories
- SwRI - Southwest Research Institute

API Specifications

- API 12F
 - “Specification for Shop Welded Tanks for Storage of Production Liquids”
 - Vertical, cylindrical only
- API 650, Appendix J
 - “Shop Assembled Welded Steel Tanks for Oil Storage”
 - Vertical, cylindrical only

API Vertical Tanks



API Vertical-UL Horizontal Tanks



Underwriters Laboratories



- **UL 142** “Steel Aboveground Tanks for Flammable and Combustible Liquids”
- **UL 2085** “Protected Aboveground Tanks for Flammable and Combustible Liquids”

UL 142 Steel thickness

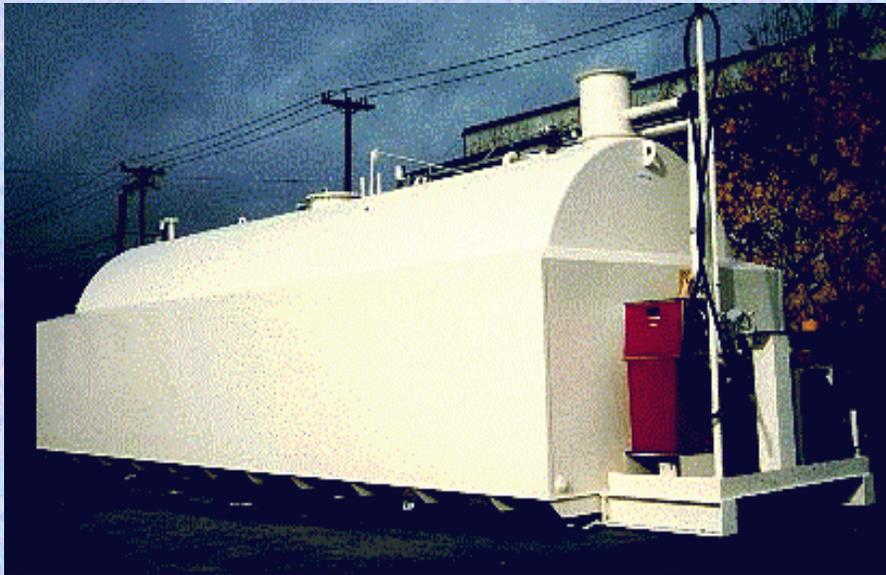
Table 13.1
Minimum steel thickness – horizontal tanks

Actual capacity, U.S. gallons (kL)		Maximum diameter, inches (m)	Minimum steel thickness, inch (mm)	
			Carbon steel	Stainless steel
550 or less	(2.08)	48 (1.22)	0.093 (2.36)	0.071 (1.80)
551 – 1100	(2.14 – 4.16)	64 (1.63)	0.123 (3.12)	0.086 (2.18)
1101 – 9000	(4.17 – 34.07)	76 (1.93)	0.167 (4.24)	0.115 (2.92)
1101 – 35,000	(4.17 – 132.49)	144 (3.66)	0.240 (6.10)	0.158 (4.01)
35,001 – 50,000	(132.50 – 189.27)	144 (3.66)	0.365 (9.27)	0.240 (6.10)

UL 142 type tanks

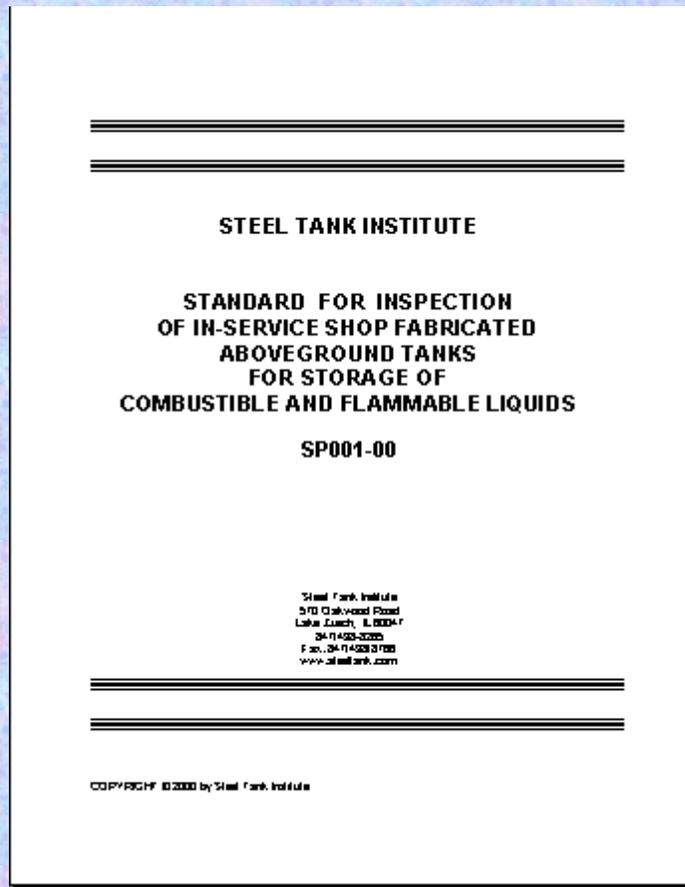


UL 142 type tanks





STI SP001-03



Standard for Inspection of
In-Service Shop
Fabricated Aboveground
Tanks for Storage of
Combustible and
Flammable Liquids

How STI SP001 differs from API 653

- API 653 emphasis is the large, field constructed tanks per API 650.
 - Strictly vertical tanks.
 - The bottom of the tank is not visible.
- API 653 requirements are needed because
 - Large volume
 - Large pressure

How STI SP001 differs from API 653

- API 650 includes equations for calculating the steel thickness needed for a particular tank.
- API 653 allows for / requires more judgement by inspector

How STI SP001 differs from API 653

- Shop fabricated tanks
 - Tables that specify the steel thickness based on tank diameter and capacity.
 - Smaller capacities and smaller hydrostatic pressures
 - Capacity up to 50,000 gallons.
 - Manufactured in controlled shop environments

50,000 gallon tank



Corrosion concerns



- Check corroded areas to find minimum thickness



Single wall tanks resting directly on the ground are a concern!!

Periodic Inspection by tank owner

- ✓ Water inside tank
- ✓ Vents
- ✓ Pipe connections
- ✓ Exterior paint
- ✓ Foundation



[www.steeltank.com/library/
pubs/waterinfuel tanks.htm](http://www.steeltank.com/library/pubs/waterinfuel tanks.htm)

Certified Inspection

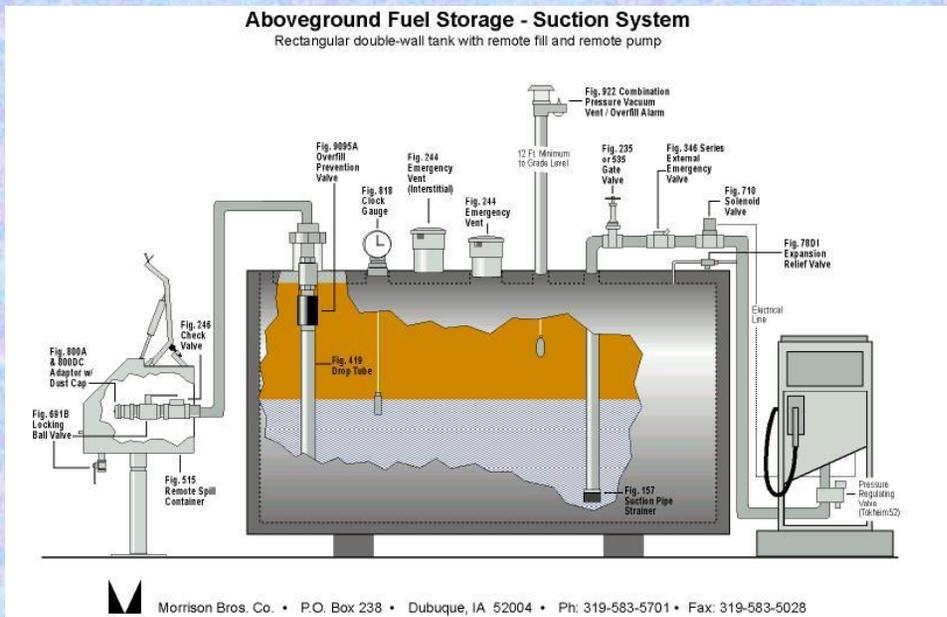
- Performed by Qualified Tank Inspector
 - STI Trained and Certified
 - API Certified
- Every 10 Years
- All types of tanks (single and double wall, on ground and elevated)

STI AST Inspector Training

NEW for 2004

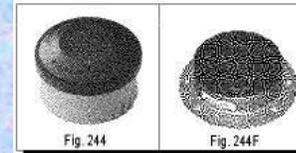
- Level 1
 - Tank inspector
- Level 2
 - Tank system inspector
- Michigan
 - May 24 - 28
- New York
 - June 14 - 18
- California
 - July 19 - 23
- Tennessee
 - September 20 - 2

Level 2 – Tank System



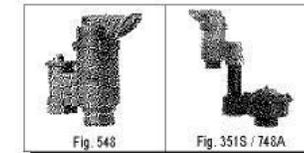
AST Bulk Storage

Emergency Vent (Threaded or Flanged)



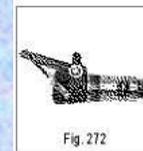
Allows tank to exhaust excessive pressure if exposed to pool fire. Size to be determined by tank size and type.

Normal (P/V) Vent - and with Flame Arrestor



Allows tank to breathe during normal filling and withdrawing operations. Match vent size to fill and withdrawal piping.

Internal Emergency Valve



Automatic shut-off of product flow in event of fire and/or impact. Poppet is located inside tank.

Gate Valve with Expansion Relief

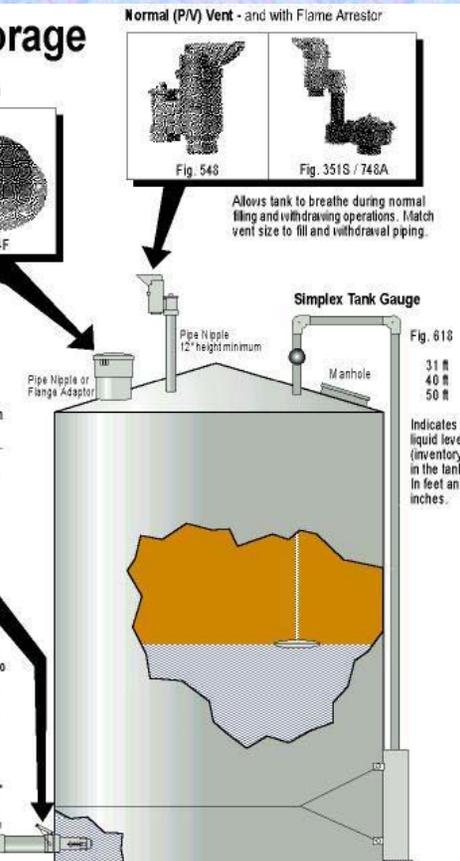


Expansion Relief feature allows excess pressure due to temperature gain to bleed back to tank.

Frost Proof Drain Valve



Allows water on bottom of tank to be drained off. Seat is located up inside the tank shell.



Morrison Bros. Co.
P.O. Box 238 • Dubuque, IA 52004
Ph: 319-583-5701 • Fax: 319-583-5028

STI Certified Inspection

- Tank type dictates inspection method:
 - **Single wall not in contact with ground**
 - **Single wall in contact with ground**
 - **Double wall or double-bottom**

Double wall or

- Cr detection sy
- Check for wa fuel in interstice



STI Certified Inspection

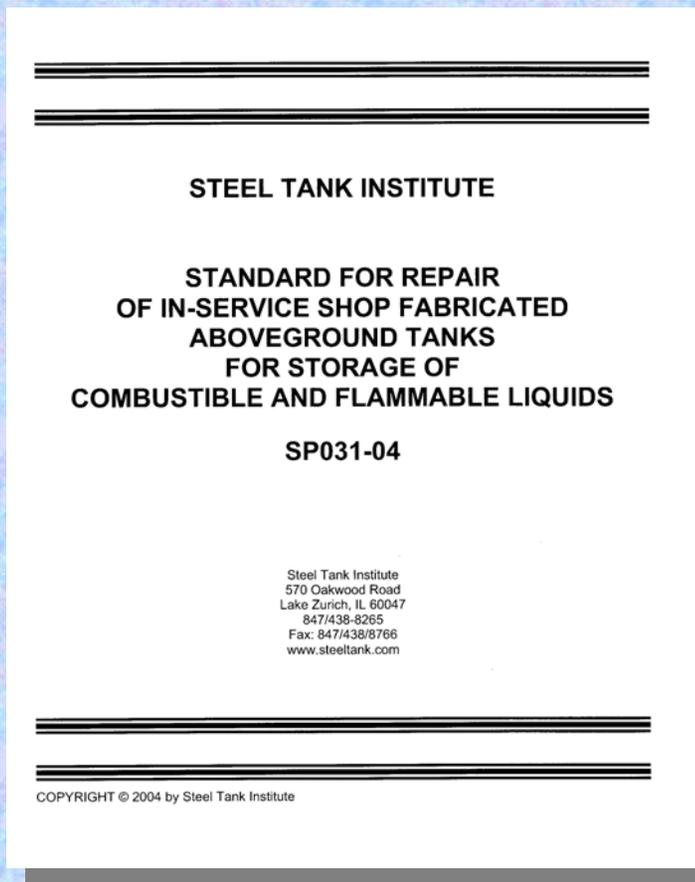
- UT Testing by scanning if possible
 - Most reliable method for determining wall thickness
 - Qualified UT inspector necessary (ASNT Specifications)



6. Certified Inspection Criteria

- Must compare **remaining wall thickness** to original thickness

STI SP031-04



Standard for Repair of
In-Service Shop
Fabricated
Aboveground Tanks
for Storage of
Combustible and
Flammable Liquids

SP031 Repair Standard

- Patches
- New bottoms
- Additions
- Structural modifications
- Testing of repairs
- Supervising Personnel
 - STI inspectors
 - API inspectors
- Repair Personnel
 - Tank manufacturer
 - ASME welders
 - AWS welders

Not all that meets the eye!

Tank owner surprises

Tank #1



Tank #1

- No grounding anywhere
- Unsecured AST's in a flood plain (Not a single anchor bolt)
- Many Electric Code Violations
- Improperly Secured Conduits
- OSHA Access Issue on the back stairs and top platform
- PVC Caps atop various nozzles (No Fire Rating for PVC)
- Labeling Issues

Tank #2



Tank #2

- Unsupported Pipes
- Leaking Submersible Turbine Pump
- Kinked Flex Co
- Improperly Inst Fuel
- No CP on buried pipe runs
- Electric Code \
- Combustible Materials stored inside dike
- Poor Control on Tank Filling Re
- Conduits pipes in |
- Pipes an close in |
- Unsuppc
- Missina |

Tank #3



Tank #3

- Unsupported conduits
- Valve on Return Piping
- PVC Coupling on tank nozzle
- Flex Fittings secured to Unistrut clamps
- Normal tank's secondary
- No Velocity Protection (i.e., bollards)
- No fire diamonds
- Improper labeling of nozzles
- Tank not being stuck to check either ATG accuracy or accumulation of water
 - Veeder water flow up on muck/r bottom)

Get the BIG picture first

From 20 feet away....

- Dirt spots on tank, fuel spilled?
- Coated for underground?
- Tank next to river, is it anchored?
- Supports more than 12 in. high?
- Enough openings on top?
- Adequate containment?
- Paint condition?
- Level gauge visible?
- Condition of foundation?

Closer inspection

- Emergency vent condition?
- Normal vent condition?
- Weep holes? Use UV light here
- Adequate supports?
- Look inside tank, but with proper training only.

New STI Standards Committee

To review inspection standards

SP001

SP031

Does this Comply?













Inspection of Tanks Keeps Things Happy

