

# APSA & SPCC Tank and Container Integrity Inspections

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# Integrity Inspections

## Training Agenda

- SPCC references with integrity, inspection and testing
- SPCC requirements
- Industry standards
- Tank and container inspections
- Examples and common deficiencies

# Integrity Inspections

SPCC integrity, inspection and testing references:

- [40 CFR 112.3\(d\)\(1\)\(iv\)](#): Professional engineer certification;
- [40 CFR 112.6\(a\)](#): Tier 1 & II self-certification;
- [40 CFR 112.7\(d\)](#): Secondary Containment Impracticability;
- [40 CFR 112.7\(e\)](#): Inspections, tests, and records;
- [40 CFR 112.7\(h\)\(3\)](#): Facility loading/unloading racks;
- [40 CFR 112.7\(k\)\(2\)\(i\)](#): Alternative requirements for general containment for oil-filled operational equipment;

# Integrity Inspections

SPCC integrity, inspection and testing references continued:

- [40 CFR 112.8\(b\)](#): Facility drainage
- [40 CFR 112.8\(c\)](#): Bulk Storage Containers
- [40 CFR 112.8\(d\)](#): Facility transfer operations, pumping, and facility process.

References for oil production facilities (40 CFR 112.9, 112.10 and Facility Response Plans (112.20) are excluded from the list.





# Integrity Inspections

Requirement to prepare and implement a SPCC Plan

40 CFR 112.3(d)(1): By means of this certification the Professional Engineer attests:

(iv) That procedures for required inspections and testing have been established;



**CERTIFIED**

# Integrity Inspections

## Qualified Facility Plans

40 CFR 112.6(a)(1): Tier I self-certification, you must certify that:

(iv) You have established procedures for required inspections and testing in accordance with industry inspection and testing standards or recommended practices;



**CERTIFIED**

# Integrity Inspections

## Qualified Facility Plans

[40 CFR 112.6\(b\)\(1\)](#) Tier II self-certification. You must certify in the Plan that:

(iv) Procedures for required inspections and testing have been established;



**CERTIFIED**

# Integrity Inspections

40 CFR 112.7(d): *Secondary Containment Impracticability.*

... for bulk storage containers, conduct both periodic integrity testing of the containers and periodic integrity and leak testing of the valves and piping...



# Integrity Inspections

40 CFR 112.7(e): *Inspections, tests, and records.*

Conduct inspections and tests required by this part in accordance with written procedures that you or the certifying engineer develop for the facility.





# Integrity Inspections

40 CFR 112.7(h)(3): *Facility tank car and tank truck loading/unloading rack (excluding offshore facilities).*

Prior to filling and departure of any tank car or tank truck, closely inspect for discharges the lowermost drain and all outlets of such vehicles, and if necessary, ensure that they are tightened, adjusted, or replaced to prevent liquid discharge while in transit.



# Integrity Inspections

40 CFR 112.7(h)(3): *Facility tank car and tank truck loading/unloading rack (excluding offshore facilities).*



# Integrity Inspections

## Oil-Filled Operational Equipment

40 CFR 112.7(k)(2)(i): *Alternative Requirements to General Secondary Containment.*

Establish and document the facility procedures for inspections or a monitoring program to detect equipment failure and/or a discharge;



# Integrity Inspections

## Oil-Filled Operational Equipment

40 CFR 112.7(k)(2)(i): *Alternative Requirements to General Secondary Containment.*





# Integrity Inspections

## 40 CFR 112.8(b): *Facility Drainage.*

(1) ...inspect the condition of the accumulation [from diked storage areas] before draining, to ensure no oil will be discharged.





# Integrity Inspections

40 CFR 112.8(b): *Facility Drainage.*



# Integrity Inspections

## 40 CFR 112.8(b): *Facility Drainage.*

(2) ...If your facility drainage drains directly into a watercourse and not into an on-site wastewater treatment plant, you must **inspect** and may drain uncontaminated retained stormwater...



# Integrity Inspections

## 40 CFR 112.8(c): *Bulk Storage Containers.*

(3)(ii) Inspect the retained rainwater to ensure that its presence will not cause a discharge, [if bypassing a treatment system].



# Integrity Inspections

## 40 CFR 112.8(c): *Bulk Storage Containers.*

(6) Test or inspect each aboveground container for integrity on a regular schedule and whenever you make material repairs...





# Integrity Inspections

## 40 CFR 112.8(c): *Bulk Storage Containers.*

(6) *Continued* ...You must determine, in accordance with industry standards, the appropriate qualifications for personnel performing tests and inspections, the frequency and type of testing and inspections, which take into account container size, configuration, and design...





# Integrity Inspections

## 40 CFR 112.8(c): *Bulk Storage Containers.*

(6) *Continued* ... You must keep comparison records and you must also inspect the container's supports and foundations. In addition, you must frequently inspect the outside of the container for signs of deterioration, discharges, or accumulation of oil inside diked areas.



# Integrity Inspections

40 CFR 112.8(d): *Facility transfer operations, pumping, and facility process.*

(1) If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage.

# Integrity Inspections

40 CFR 112.8(d): *Facility transfer operations, pumping, and facility process.*



# Integrity Inspections

40 CFR 112.8(d): *Facility transfer operations, pumping, and facility process.*

(4) Regularly inspect all aboveground valves, piping, and appurtenances. During the inspection you must assess the general condition of items, such as flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces.





# Integrity Inspections

40 CFR 112.8(d): *Facility transfer operations, pumping, and facility process.*





# Integrity Inspections

40 CFR 112.8(d): *Facility transfer operations, pumping, and facility process.*

(4) *Continued...* You must also conduct integrity and leak testing of buried piping at the time of installation, modification, construction, relocation, or replacement.

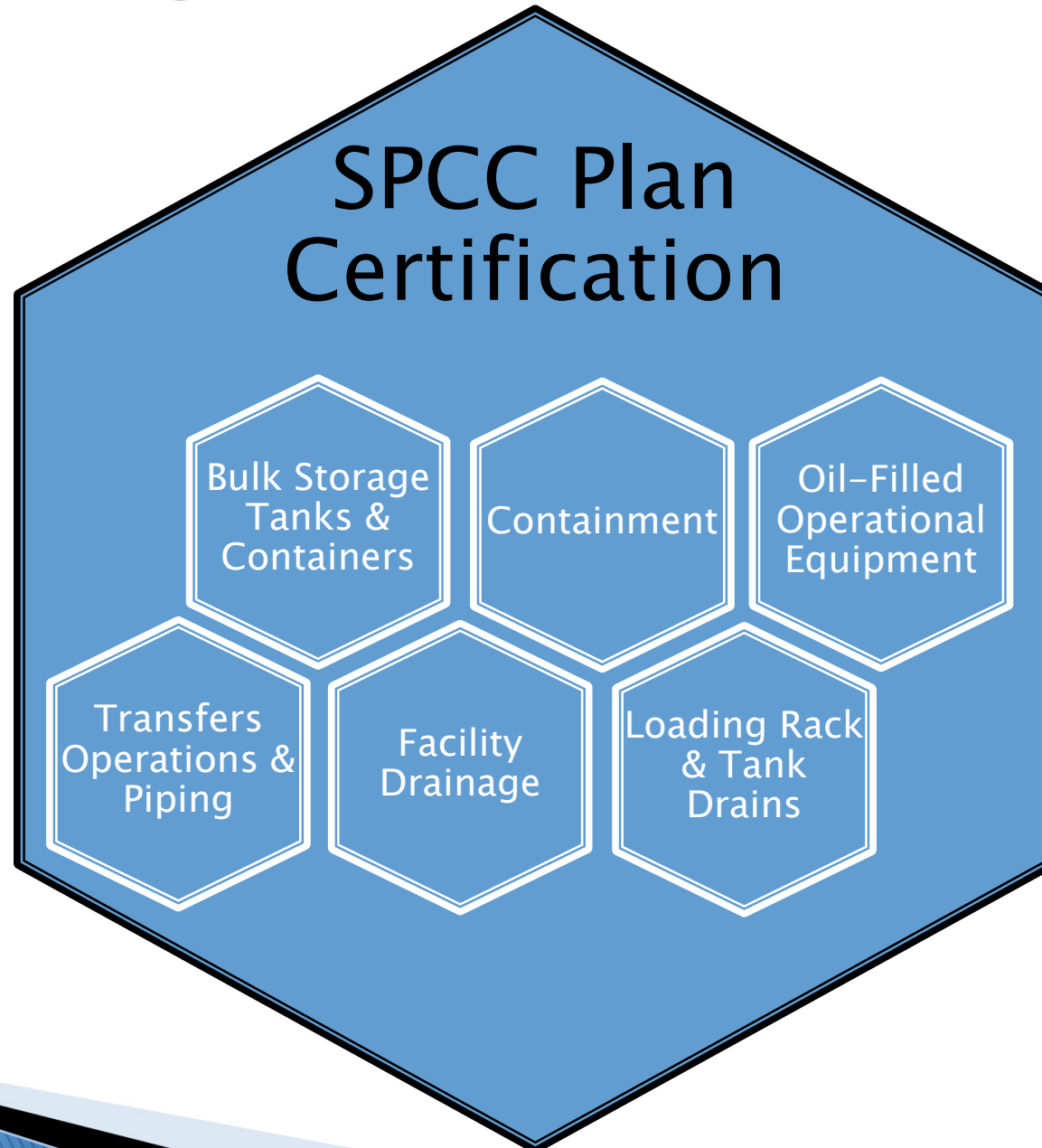


# Integrity Inspections

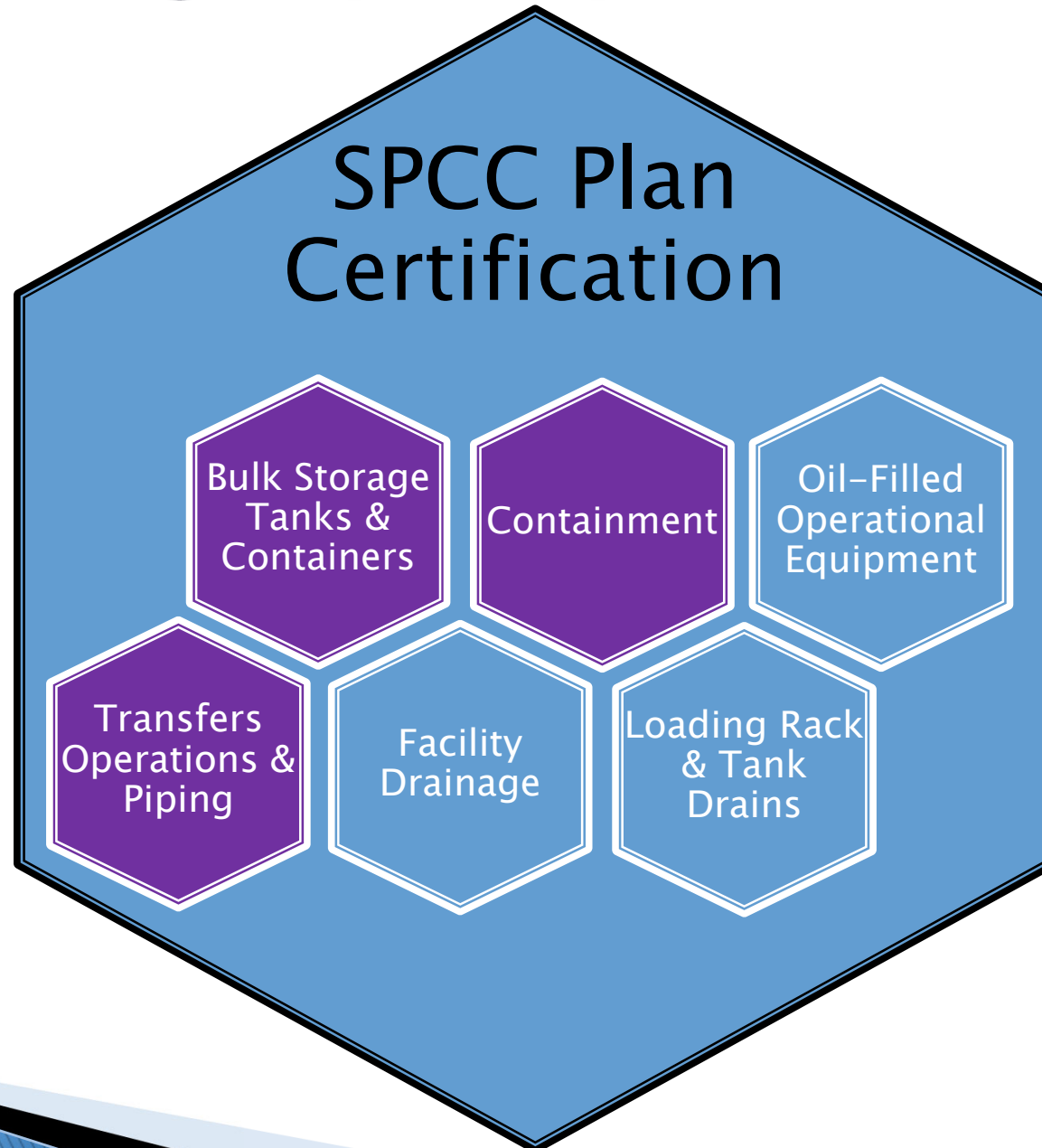
40 CFR 112.8(d): *Facility transfer operations, pumping, and facility process.*



# Integrity Inspections



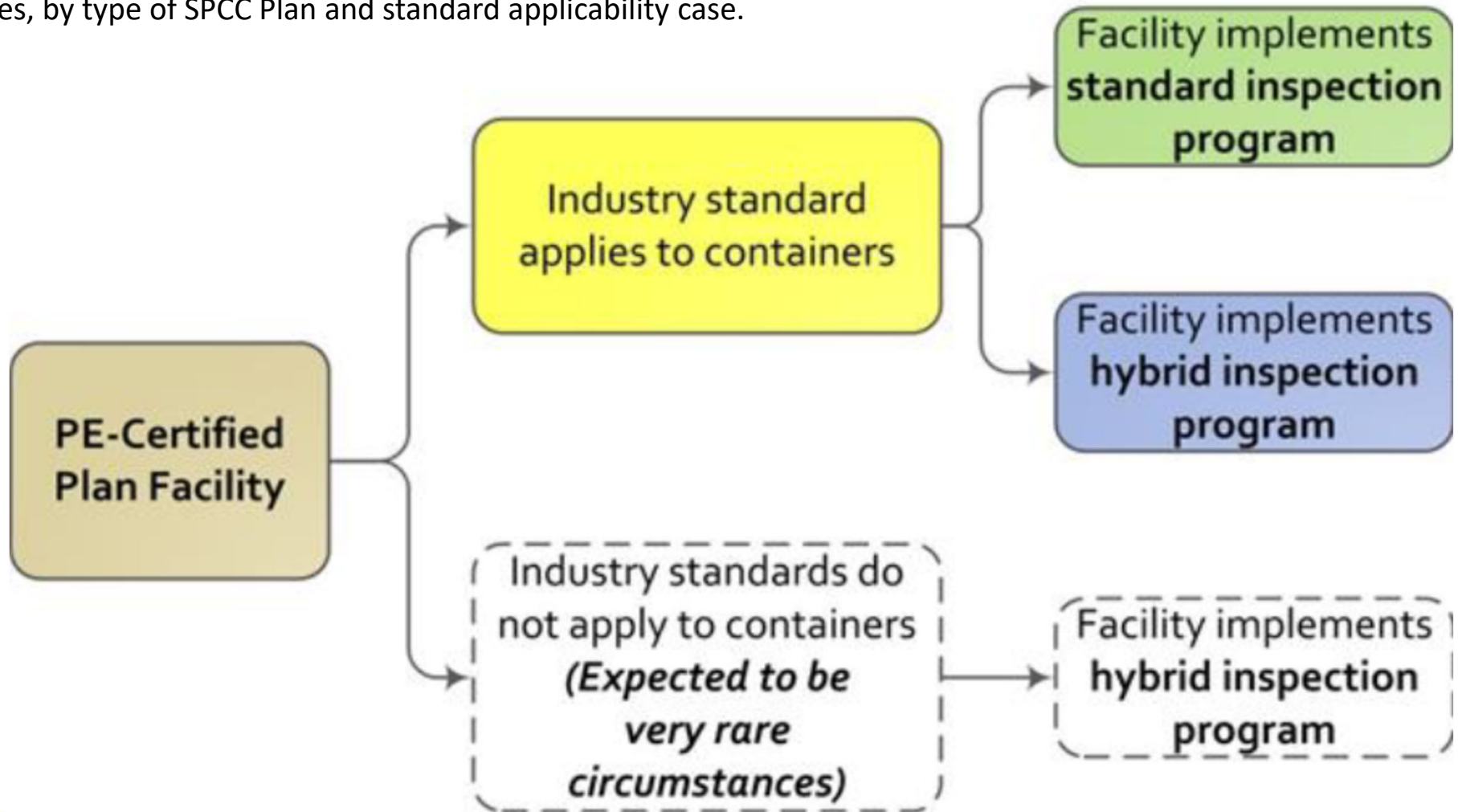
# Integrity Inspections





# Integrity Inspections

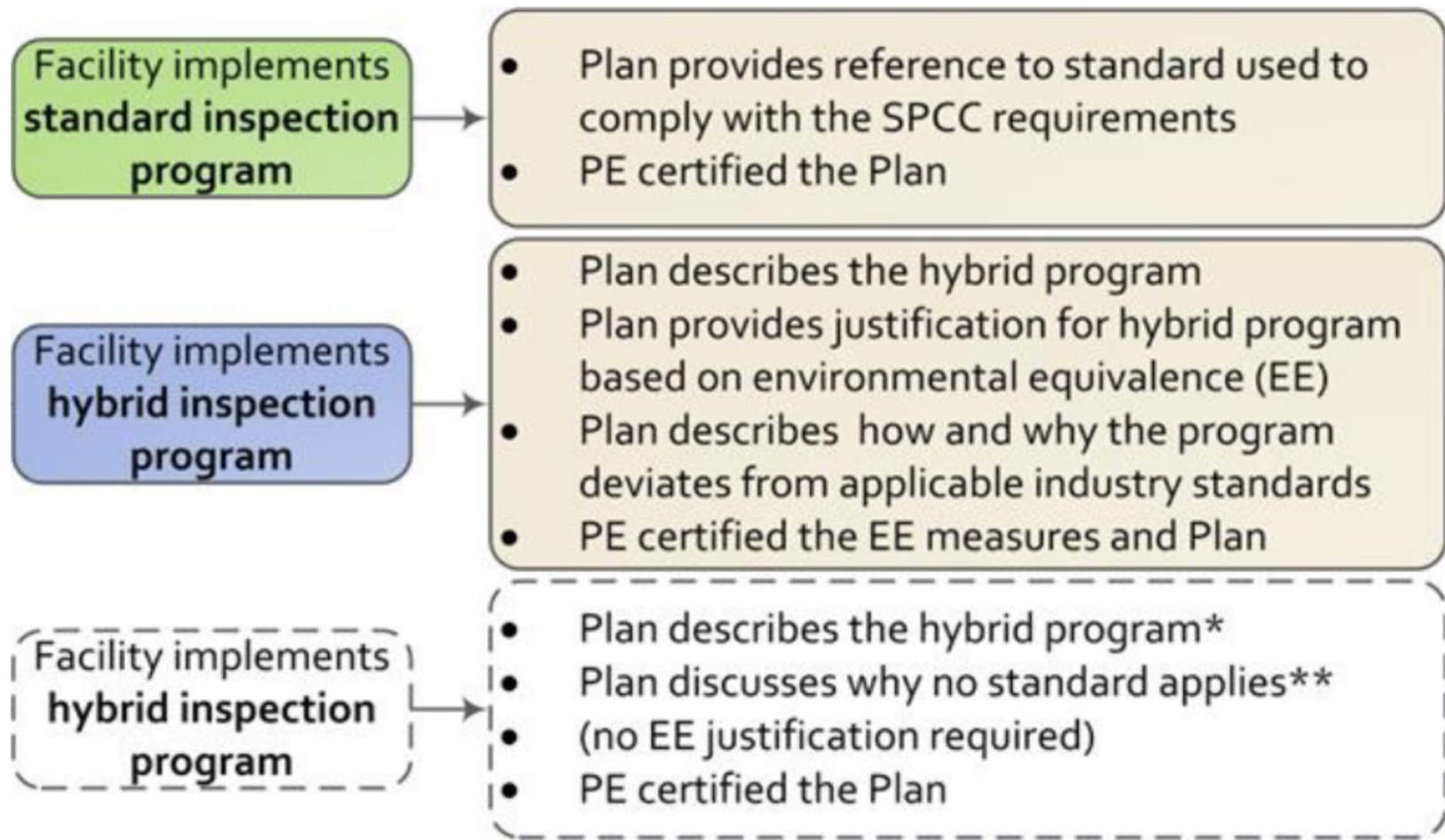
Figure 7-4: Summary of integrity testing and inspection program documentation for bulk storage containers at onshore facilities, by type of SPCC Plan and standard applicability case.





# Integrity Inspections

Figure 7-4: Summary of integrity testing and inspection program documentation for bulk storage containers at onshore facilities, by type of SPCC Plan and standard applicability case.



# Integrity Industry Standards

- ▶ Steel Tank Institute (STI)
  - SP001 Standard for the Inspection of Aboveground Storage Tanks
- ▶ American Petroleum Institute (API)
  - Standard 653 Tank Inspection, Repair, Alteration, and Reconstruction
- ▶ Fiberglass Tank & Pipe Institute
  - Recommended Practice FT&V 2007-1

*Any Others?*



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# Integrity Industry Standards

## STI SP001 Standard Scope:

- Atmospheric storage of flammable or combustible liquids;
- Ambient temperature up to 200 °F;
- Shop-fabricated, field erected tanks and portable containers;
- Diameter less than 30 feet, shell height less than 50 feet; and
- Total capacity less than 75,000 gallons.

# Tank Category

## STI SP001 Spill Control:

- Remote impounding;
- Secondary containment dike/berm;
- Open top steel diked AST; and
- Closed top steel diked AST, double-wall AST and concrete-encased AST with overfill prevention.

# Tank Category

## SP001 Continuous Release Detection Methods (CRDM):

- Release prevention barrier (RPB);
- Double-wall AST or double-bottom AST;
- Elevated AST;
- Steel diked AST; and
- Concrete-encased AST.



# Tank Category

## SP001 Categories:

Category  
1

- Spill Control
- CRDM

Category  
2

- Spill Control Only

Category  
3

- CDRM

# Tank Category

STI SP001 – Table of Inspection Types for Tanks

Capacity (Gallons)	Category	Inspection Type
55 – 1,100	1 & 2	• Periodic Inspections
	3	• Periodic Inspections • Non-Destructive Shell Inspection and Leak Test
1,101 – 5,000	1	• Periodic Inspections
	2 & 3	• Periodic Inspections • Non-Destructive Shell Inspection and Leak Test
5,001 – 75,000	1	• Periodic Inspections • Non-Destructive Shell Inspection
	2 & 3	• Periodic Inspections • Non-Destructive Shell Inspection and Leak Test

# Inspection Responsibilities

- ▶ Tank Owner/Representative
  - Periodic inspections ([Monthly and Annual](#))
  - Retain records for 3 years
- ▶ Certified Inspector
  - Non-Destructive Shell Inspection and Leak Testing
  - Retain records for the life of the tank



# Tank Details

- Configuration and design standards





# Integrity Inspections

40 CFR 112.12(c)(6)(ii): Bulk storage containers subject to Good Manufacturing Practices, containing food for human consumption (21 CFR part 110), which are elevated, constructed of austenitic stainless steel, have no external insulation, and are shop-fabricated. formal visual inspections shall be conducted on a regular schedule.

Tanks meeting these requirements have relaxed inspections requirements





# Container Category

## STI SP001 – Table of Inspection Types for Portable Containers

Category	Inspection Type
1 & 2	<ul style="list-style-type: none"><li>• Periodic Inspections</li></ul>
3	<ul style="list-style-type: none"><li>• Periodic Inspections</li><li>• DOT testing and recertification<ul style="list-style-type: none"><li>• Plastic every 7 years</li><li>• Steel every 12 years</li><li>• Stainless steel every 17 years</li></ul></li></ul>

# Container Details

- Configuration and design standards



# Container Inspections

- Tank Owner/Representative
  - Periodic inspections (Monthly)
  - Retain inspections for 3 years
- ▶ Certified Inspector (Category 3 ONLY)
  - DOT Recertification and Leak Testing
  - Retain records for the life of the container







Tank Shell, Heads and Roof

6

Free of visible signs of coating failure?

☐ Yes ☒ No

# Integrity Inspections >>

Any issues with these tanks?



#### Other Conditions

18

Is the system free of any other conditions that need to be addressed for continued safe operation?

☐ Yes ☒ No

## Integrity Inspections >>

Any issues with this tank?





11	Normal and emergency vents free of obstructions?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
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## Integrity Inspections >>

Any issues with this tank equipment?



### Tank and Piping

1

Is tank exterior (roof, shell, heads, bottom, connections, fittings, valves, etc.) free of visible leaks?

**Note:** If "No", identify tank and describe leak and actions taken.

☐ Yes ☒ No



## Integrity Inspections >>

Any issues with this tank?





8

Is overfill prevention equipment in good working condition? If it is equipped with a mechanical test mechanism, actuate the mechanism to confirm operation.

☐ Yes ☒ No ☐ N/A



## Integrity Inspections >>

Any issues with this tank?





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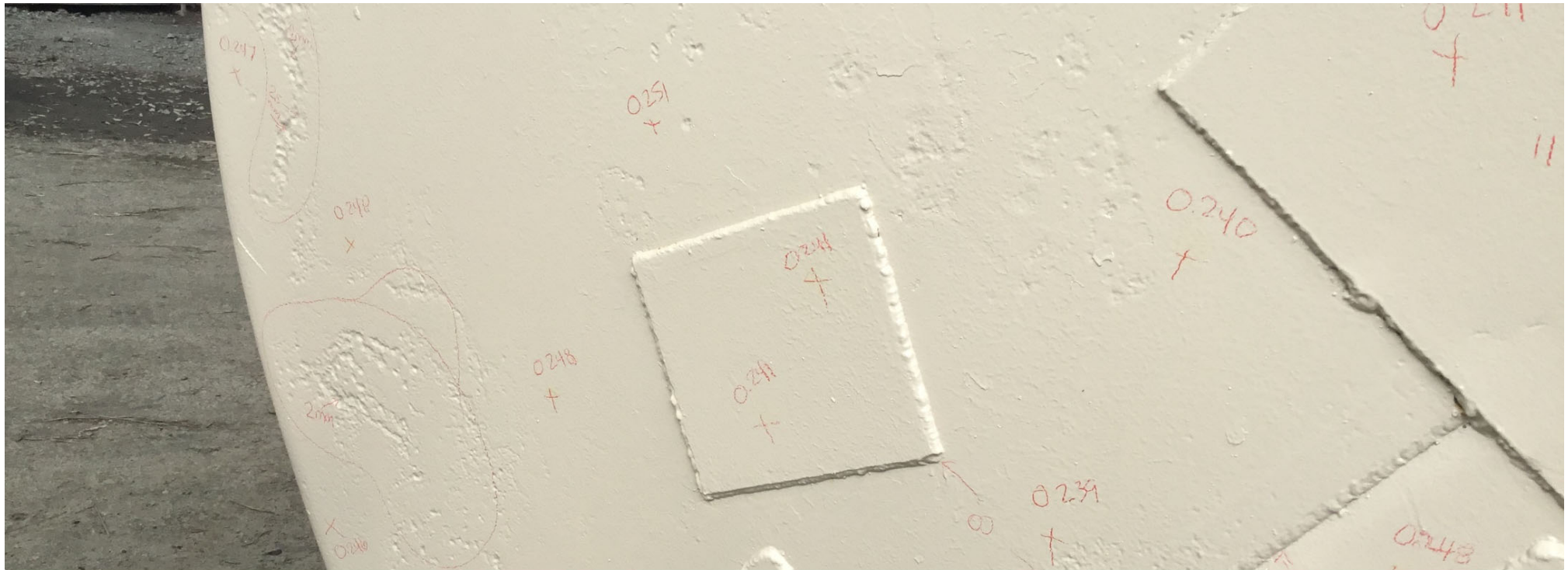
Is the emergency vent in good working condition and functional, as required by manufacturer? Consult manufacturer's requirements. Verify that components are moving freely (including long-bolt manways).

☐ Yes ☒ No ☐ N/A

## Integrity Inspections >>

Any issues with this tank?





**10.3.4 Category 1 ASTs** - The AST shall be repaired or replaced if more than 3 square inches of any one square foot of the tank shell (i.e. approximately 2%) is found to be less than 50% of the original shell thickness; or if the remaining shell thickness of an area is less than 25% of the original shell thickness at any point.

## Integrity Inspections >>

Any issues with this tank?

# Public Service Announcement

Underground Storage Tanks (USTs)  
cannot be used as Aboveground  
Storage Tanks (ASTs)





## California State Fire Marshal Information Bulletin 14-005

Issued: July 25, 2014

### Underground Fuel Storage Tanks Prohibited for Use as Aboveground Fuel Storage Tanks

This information bulletin has been developed to inform and advise the public on the prohibited use of converted steel underground storage tanks (UST) as aboveground storage tanks (AST) storing flammable or combustible liquids.

Section 5704.2.7, California Fire Code, 2013 Edition states, "*The design, fabrication and construction of tanks shall comply with NFPA 30. Each tank shall bear a permanent nameplate or marking indicating the standard used as the basis of design.*" The National Fire Protection Association (NFPA) Standard 30, 2012 Edition, Section 3.3.51.1, defines an aboveground tank as a storage tank that is installed above grade, at grade, or below grade without backfill. NFPA 30 Section 21.3.4 states, "Tanks designed and intended for underground use shall not be used as aboveground tanks."

The design, construction, and installation standards of USTs are different than ASTs. Since the core structure of the USTs is designed for an underground placement, it is difficult, dangerous and costly to convert USTs for aboveground placement. For example, tank heads of a UST lack the reinforcement necessary to support the heads if converted into an AST. The soil around a UST provides additional structural support and, therefore, no additional reinforcement is necessary. However, an AST requires larger tank heads to be reinforced with structural steel to stiffen and strengthen the heads.

It is vitally important to recognize the proper installation, maintenance and inspection of ASTs. Tanks which are not listed by industry standards or approved by fire code officials, specifically for aboveground flammable or combustible liquid storage, pose a significant danger and safety threat to owners, operators and others working around these tanks. See references at the end of this bulletin.

If you have questions regarding this Informational Bulletin, please contact Senior Environmental Scientist Denise Gibson at [denise.gibson@fire.ca.gov](mailto:denise.gibson@fire.ca.gov) or (916) 445-8289.



### Ask the experts

## Repurposing underground tanks as aboveground tanks: A dangerous game

On December 11, 2013, one person died and two were injured in Merced County, California, when a farm tank exploded during welding operations.

The tank was approximately 500 gallons capacity, had two 1.5" diameter vents, capped with a tee fitting and elbows that pointed vent discharge downward toward the tank shell. A dedicated emergency vent was not provided. The vent pipes that were present were not equipped with flame arrestors or pressure vacuum vents, although this does not appear to have been a factor in the incident that occurred. The tank had reportedly previously contained a Class 2 liquid, such as diesel fuel, and was not compliant with UL 142.



*"Damaged tank from explosion: Tank ends are bowed outward. No emergency venting evident. Small grinder with wire brush wheel nearby."—Hank Moore, Merced County Fire Marshal*

cause a dedicated emergency vent had not been provided. Merced County Fire Marshal Hank Moore, who investigated this incident, contacted Wayne Geyer at STI/SPFA, and he in turn sought the opinion of several experts in the field.

The feedback that we received from industry experts is a reminder of the importance of proper pre-

ing work penetrated the steel shell. The contractor didn't take adequate precautions because he was dealing with motor oil, which he thought was "safe" because of its high flashpoint and because the U.S. Department of Transportation doesn't require a





2

Is the tank liquid level gauge legible and in good working condition?

☐ Yes ☒ ☐ N/A



## Integrity Inspections >>

Any issues with this tank?



10

Are piping connections to the tank (valves, fittings, pumps, etc.) free of visible leaks?  
**Note:** If "No", identify location and describe leak.

☐ Yes ☒ No

## Integrity Inspections >>

Any issues with this tank?





Are all valves free of leaks, corrosion and other damage? Follow manufacturers' instructions for regular maintenance of these items. Check the following and verify (as applicable):

- ☒ Fire valve
- ☐ Shear valve

☐ Yes ☒ No  
☐ Yes ☐ No

☐ N/A  
☐ N/A

## Integrity Inspections >>

Any issues with this tank?



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Is the containment free of excess liquid, debris, cracks, corrosion, erosion, fire hazards and other integrity issues?

☐ Yes ☒ No ☐ N/A

## Integrity Inspections >>

Any issues with this tank?





1	Are all portable container(s) within designated storage area?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
6	Is the container free of distortions, buckling, denting or bulging?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

## Integrity Inspections >>

Any issues with this container?



**Comments:** Unknown damaged drum, missing labels and no containment. Properly dispose of contents and drum ASAP.

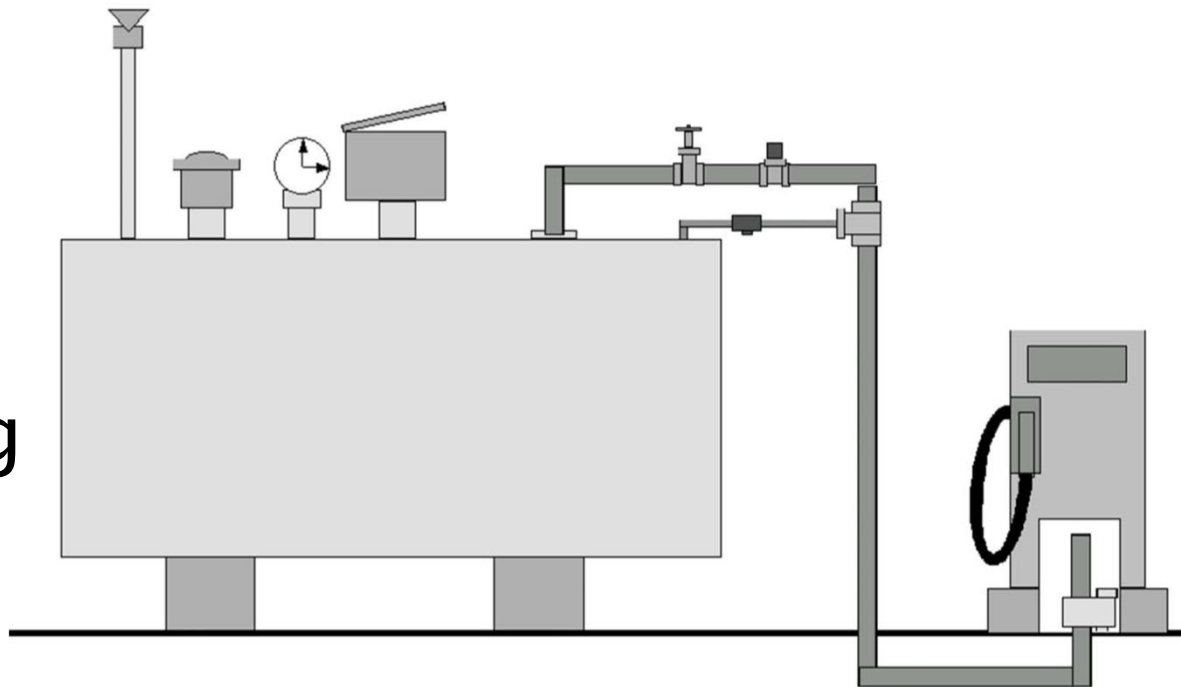
## Integrity Inspections >>

Any issues with this container?



# Common Findings

- ▶ Undersized normal vent
- ▶ Lack of emergency venting
- ▶ Evidence of overfilling and lack of overfill prevention
- ▶ Fitting leaks
- ▶ Missing labels
- ▶ Poor housekeeping



# Tank & Portable Container Integrity Inspection Summary

- ▶ Tanks/containers should be free of paint failure, rust, dents, bulges and leaks;
- ▶ Vents should move freely and be free of debris;
- ▶ Secondary containment should be free of water, oils, and debris (clean and dry); and
- ▶ Promptly address inspection deficiencies.



# Tank & Portable Container Integrity Inspection Summary

- ▶ Document the inspection standard in your SPCC Plan;
- ▶ Utilize STI SP001 checklists or equivalent for periodic inspections, if applicable; and
- ▶ Conduct formal integrity inspections and retain records.

# Audience Question

How often are you required to inspect bulk storage tanks by the SPCC Rule?

- ▶ Answer: There is no specific frequency specified in the SPCC Rule.



# Questions?



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