# Chapter 7 Inspection, Evaluation, and Testing

## 7.1 Introduction

The inspection, evaluation and testing requirements of the SPCC rule are intended to prevent, predict and detect potential integrity or structural issues before they cause a leak, spill or discharge of oil to navigable waters or adjoining shorelines. Regularly scheduled inspections, evaluations, and testing by qualified personnel are critical parts of oil discharge prevention. They are conducted not only on containers, but also on associated piping, valves, and appurtenances, and on other equipment and components that could be a source or cause of an oil discharge.

Activities may involve one or more of the following: an external visual **inspection** of containers, piping, valves, appurtenances, foundations, and supports; a non-destructive **testing** (examination) to evaluate integrity of certain containers; and additional **evaluations**, as needed, to assess the equipment's fitness for continued service. The type of inspection program and its scope will depend on site-specific conditions and the application of good engineering practices, adherence to applicable industry standards and/or manufacturer's requirements. An inspection, evaluation, and testing program that complies with SPCC requirements should specify the procedures, schedule/frequency, types of equipment covered, person(s) conducting the activities, recordkeeping practices, and other elements as outlined in this chapter.

The remainder of this chapter is organized as follows:

- ***Section 7.2*** provides an overview of the SPCC inspection, evaluation, and testing requirements.
- ***Section 7.3*** discusses the role of industry standards and recommended practices in meeting SPCC requirements.
- ***Section 7.4*** discusses determining a baseline in order to establish a regular inspection schedule.
- ***Section 7.5*** presents special circumstances, including the use of environmentally equivalent measures. This section also includes suggested minimum requirements for a hybrid inspection program.
- ***Section 7.6*** discusses the role of the EPA inspector in reviewing a facility's compliance with the rule's inspection, evaluation, and testing requirements.
- ***Section 7.7*** summarizes industry standards, code requirements, and recommended practices (RPs) that apply to different types of equipment.

## 7.2 Inspection, Evaluation, and Testing under the SPCC Rule

Various provisions of the SPCC rule relate to the inspection, evaluation, and testing of containers, associated piping, and other oil-containing equipment. Different requirements apply to different types of equipment, oil, and facilities. The requirements are generally aimed at preventing discharges of oil caused by leaks, corrosion, brittle fracture, overfill, or other forms of container or equipment failure by ensuring that containers used to store oil have the necessary physical integrity for continued oil storage. The requirements are also aimed at detecting container and equipment failures (such as pinhole leaks) before they can become significant and result in a discharge as described in §112.1(b).

### 7.2.1 Summary of Inspection, Evaluation and Integrity Testing Requirements

*Table 7-1* summarizes the provisions that apply to different types of equipment and facilities. As shown in the table, applicable inspection and testing provisions vary depending on the type of equipment, facility, and circumstances. For example, some inspection and testing provisions apply specifically to bulk storage containers at onshore facilities (other than oil production facilities) while other inspection and/or testing requirements apply to other components of a facility that might cause a discharge (such as vehicle drains, foundations, or other equipment or devices). Animal fat and vegetable oil (AFVO) containers that meet certain criteria are eligible for differentiated integrity testing requirements. Onshore oil production facilities have a distinct set of inspection requirements including minimum expectations for a flowline maintenance program. The SPCC rule also includes regulatory alternatives to sized secondary containment that include inspection and corrective action requirements.

Finally, additional requirements apply under certain circumstances, such as when an aboveground field-constructed container undergoes repairs, alterations, or a change in service that may affect its potential for a brittle fracture or other catastrophic failure, or in cases where secondary containment for bulk storage containers is impracticable (§112.7(d), as described in *Chapter 4: Secondary Containment and Impracticability*). Facility owners and operators must maintain records to demonstrate compliance with the inspection, evaluation, and integrity testing requirements per §112.7(e).

**Table 7-1: Summary of SPCC inspection, evaluation, and integrity testing program provisions and associated recordkeeping requirements.**

| Facility Component | Section(s) | Action | Method, Circumstance, and Required Action |
|---|---|---|---|
| *(Text in italics indicates the frequency or circumstances for performing the activity, as specified in the SPCC rule.)* | | | |
| **General Requirements Applicable to All Facilities** | | | |
| **Bulk storage containers** with no secondary containment and for which an impracticability determination has been made | 112.7(d) | **Test** | Integrity testing. *Periodically.*<br>Integrity testing is required for all bulk storage containers. In cases where no secondary containment is present because it is impracticable, good engineering practice may suggest more frequent testing than would otherwise be scheduled.<br>Note that this includes bulk storage containers at oil production, drilling and workover facilities that are not typically subject to integrity testing requirements. |
| **Valves and piping** associated with bulk storage containers with no secondary containment and for which an impracticability determination has been made | 112.7(d) | **Test** | Integrity and leak testing of valves and piping associated with containers that have no secondary containment as described in §112.7(c). *Periodically.* |
| **Recordkeeping** requirement | 112.7(e) | **Record** | Keep written procedures and a signed record of inspections[105] and tests for a period of three years.[106] Records kept under usual and customary business practices will suffice. *For all actions.* |
| Lowermost **drain** and all **outlets** of tank car or tank truck at loading/unloading racks | 112.7(h)(3) | **Inspect** | Visually inspect. *Prior to filling and departure of tank car or tank truck from loading/unloading racks.* |

[105] Inspections include evaluations (e.g. brittle fracture evaluation) required under the regulation.

[106] Certain industry standards require recordkeeping beyond three years. Facility owners/operators should keep comparison records of integrity inspections and tests as directed in the standard, but no less than three years in accordance with the SPCC record retention requirement, in order to identify changing conditions of the oil storage container. EPA recommends that formal testing and inspection records or reports be retained for the life of the container.

| Facility Component | Section(s) | Action | Method, Circumstance, and Required Action |
|---|---|---|---|
| Field-constructed **aboveground container** | 112.7(i) | **Evaluate**<br><br>**Corrective Action** | Evaluate potential for brittle fracture or other catastrophic failure. *When the container undergoes a repair, alteration, reconstruction or a change in service that might affect the risk of a discharge or failure due to brittle fracture or other catastrophe, or has discharged oil or failed due to brittle fracture failure or other catastrophic failure*.<br>Based on the results of this evaluation, take appropriate action. |
| **Onshore Facilities (Excluding Oil Production Facilities)**[107] | | | |
| **Diked areas** | 112.8(b)(1) & 112.8(b)(2) or 112.12(b)(1) & 112.12(b)(2)[108] | **Inspect**<br>**Record** | Visually inspect content for presence of oil when draining into a watercourse. *Prior to draining.*<br>Keep adequate records of such events. |
| **Diked areas for bulk storage containers** | 112.8(c)(3) & 112.8(c)(3) | **Inspect**<br>**Record** | Inspect retained rainwater to ensure that it will not cause a discharge as described in §112.1(b) when draining to storm sewer or open watercourse, lake or pond. *Prior to draining.*<br>Keep adequate records of such events. |
| **Buried *metallic* storage tank** installed on or after January 10, 1974 | 112.8(c)(4) or 112.12(c)(4) | **Test** | Leak test. *Regularly* |
| Aboveground **bulk storage container** | 112.8(c)(6) or 112.12(c)(6) | **Test or Inspect** | Test or inspect each container for integrity. *Following a regular schedule and whenever material repairs are made.*<br>Determine scope, frequency of testing and qualification of personnel performing the test or inspection, in accordance with industry standards. Tests include, but are not limited to, visual inspection, hydrostatic testing or other non-destructive testing. |
| Aboveground **bulk storage container** | 112.8(c)(6) or 112.12(c)(6) | **Inspect** | Inspect outside of container for signs of deterioration and discharges. *Frequently.* |
| Aboveground bulk storage container **supports and foundations** | 112.8(c)(6) or 112.12(c)(6) | **Inspect** | Inspect container's supports and foundations. *Following a regular schedule and whenever material repairs are made.* |

107 Note that §112.8 provisions apply to facilities that store petroleum oils and non-petroleum oils (excluding AFVO). §112.12 provisions apply to facilities storing AFVO (i.e., animal fats and oils and greases, and fish and marine mammal oils; and for vegetable oils, including oils from seeds, nuts, fruits, and kernels.) Also see alternative provisions in table under "Onshore Facilities (Excluding Production) – Animal Fats and Vegetable Oils."

108 Sections 112.8(b)(2) and 112.12(b)(2) reference dike drainage procedures in §§112.8(c)(3)(ii)-(iv) and 112.12(c)(3)(ii)-(iv). These dike drainage procedures apply to any facility drainage that drains directly to a watercourse.

| Facility Component | Section(s) | Action | Method, Circumstance, and Required Action |
|---|---|---|---|
| **Diked areas** around bulk containers | 112.8(c)(6) or 112.12(c)(6) | **Inspect** | Inspect for signs of deterioration, discharges, or accumulation of oil inside diked areas. *Frequently*. |
| **Steam return and exhaust lines** | 112.8(c)(7) or 112.12(c)(7) | **Monitor** | Monitor for leaks from defective internal heating coils. *On an ongoing or regular basis*. |
| **Liquid level sensing devices** | 112.8(c)(8)(v) or 112.12(c)(8)(v) | **Test** | Test for proper operation. *Regularly.* |
| **Effluent treatment** facilities | 112.8(c)(9) or 112.12(c)(9) | **Observe** | Detect possible system upsets that could cause a discharge. *Frequently.* |
| **Bulk storage containers** | 112.8(c)(10) or 112.12(c)(10) | **Corrective Action** | Correct visible discharges which result in a loss of oil from the container, including but not limited to seams, gaskets, piping, pumps, valves, rivets, and bolts.<br>Remove any accumulations of oil in diked areas. *Promptly.*[109] |
| **Buried piping**[110] | 112.8(d)(1) or 112.12(d)(1) | **Inspect**<br>**Corrective Action** | Inspect for deterioration. *Whenever a section of buried line is exposed for any reason.*<br>If corrosion damage is found, additional examination and corrective action must be undertaken as indicated by the magnitude of the damage. |
| | 112.8(d)(4) or 112.12(d)(4) | **Test** | Integrity and leak testing. *At the time of installation, modification, construction, relocation, or replacement.* |
| All aboveground **valves, piping, and appurtenances** | 112.8(d)(4) or 112.12(d)(4) | **Inspect** | During the inspection, assess general condition of items, such as flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces. *Regularly.* |
| **Onshore Oil Production Facilities (Excluding Drilling and Workover Facilities)** | | | |
| **Diked areas** associated with tank batteries and separation and treating areas | 112.9(b)(1) | **Inspect**<br>**Corrective Action** | Visually inspect contents of dike area and take action in accordance with §112.8(c)(3)(ii), (iii), and (iv). *Prior to draining.*<br>Remove accumulated oil on the rainwater and return it to storage or dispose of it in accordance with legally approved methods. *Prior to draining.* |

109 "Prompt'' removal means beginning the cleanup of any accumulation of oil immediately after discovery of the discharge, or immediately after any actions to prevent fire or explosion or other threats to worker health and safety, but such actions may not be used to unreasonably delay such efforts (67 FR 47122, July 17, 2002).

110 Any buried piping connected to an exempt completely buried storage tank regulated under 40 CFR part 280 or 281 is also exempt from the SPCC rule.

| Facility Component | Section(s) | Action | Method, Circumstance, and Required Action |
|---|---|---|---|
| Field **drainage systems** (such as drainage ditches or road ditches), **oil traps, sumps, and skimmers** | 112.9(b)(2) | **Inspect**<br><br>**Corrective Action** | Inspect for an accumulation of oil that may have resulted from any small discharge. *Inspect at regularly scheduled intervals.*<br>Remove any accumulations of oil. *Promptly.* |
| **Aboveground bulk storage containers** | 112.9(c)(3) | **Inspect** | Visually inspect each container to assess deterioration and maintenance needs. *Periodically and on a regular schedule.* |
| **Foundation and support** of each aboveground container that is on or above the surface of the ground | 112.9(c)(3) | **Inspect** | Visually inspect to assess deterioration and maintenance needs. *Periodically and on a regular schedule.* |
| **Flow-through process vessels** and associated components (such as dump valves) without sized secondary containment | 112.9(c)(5)(i) | **Inspect and/or test** | Visually inspect and/or test for leaks, corrosion, or other conditions that could lead to a discharge as described in 112.1(b). *Periodically and on a regular schedule.* |
| **Flow-through process vessels** and associated components without sized secondary containment | 112.9(c)(5)(ii) | **Corrective Action** | Take corrective action or make repairs. *As indicated by regularly scheduled visual inspections, tests, or evidence of an oil discharge.* |
| **Flow-through process vessels** without sized secondary containment | 112.9(c)(5)(iii) | **Corrective Action** | Remove or initiate actions to stabilize and remediate any accumulations of oil discharges associated with flow-through process vessels. *Promptly.* |
| **Produced water** containers without sized secondary containment | 112.9(c)(6)(i) | ***Implement Procedure***<br><br>**Record** | Implement a procedure for each produced water container that is designed to separate the free-phase oil that accumulates on the surface of the produced water. *On a regular schedule.*<br>Include in the Plan a description of the procedures, frequency, amount of free-phase oil expected to be maintained inside the container, and a Professional Engineer (PE) certification in accordance with §112.3(d)(1)(vi).<br>Maintain records of such events in accordance with §112.7(e). |

| Facility Component | Section(s) | Action | Method, Circumstance, and Required Action |
|---|---|---|---|
| **Produced water** containers and associated piping without sized secondary containment | 112.9(c)(6)(ii) | **Inspect and/or test** | Visually inspect and/or test for leaks, corrosion, or other conditions that could lead to a discharge as described in 112.1(b) in accordance with good engineering practice. *On a regular schedule.* |
| **Produced water** containers and associated piping without sized secondary containment | 112.9(c)(6)(iii) | **Corrective action** | Take corrective action or make repairs. As indicated by regularly scheduled visual inspections, tests, or evidence of an oil discharge. |
| **Produced water** containers and associated piping without sized secondary containment | 112.9(c)(6)(iv) | **Corrective action** | Remove or initiate actions to stabilize and remediate any accumulations of oil discharges. *Promptly*. |
| All aboveground **valves and piping** associated with transfer operations | 112.9(d)(1) | **Inspect** | Inspect for the general condition of flange joints, valve glands and bodies, drip pans, pipe supports, pumping well polish rod stuffing boxes, bleeder and gauge valves, and other such items. *Periodically and upon a regular schedule.* |
| **Saltwater (oil field brine) disposal** facilities | 112.9(d)(2) | **Inspect** | Inspect to detect possible system upsets capable of causing a discharge. *Often, particularly following a sudden change in atmospheric temperature.* |
| **Flowlines and intra-facility gathering lines** and associated appurtenances | 112.9(d)(4)(ii) | **Inspect and/or test** | Visually inspect and/or test for leaks, oil discharges, corrosion, or other conditions that could lead to a discharge as described in 112.1(b). *On a periodic and regular schedule*.<br>For flowlines and intra-facility gathering lines that are not provided with secondary containment in accordance with §112.7(c), inspect or test the lines such that the *frequency and type of testing allows for the implementation of a contingency plan as described under 40 CFR part 109.* |
| **Flowlines and intra-facility gathering lines** and associated appurtenances | 112.9(d)(4)(iii) | **Corrective Action** | Take corrective action or make repairs. As indicated by regularly scheduled visual inspections, tests, or evidence of a discharge. |
| **Flowlines and intra-facility gathering lines** and associated appurtenances | 112.9(d)(4)(iv) | **Corrective Action** | Remove or initiate actions to stabilize and remediate any accumulations of oil discharges. *Promptly.* |

| Facility Component | Section(s) | Action | Method, Circumstance, and Required Action |
|---|---|---|---|
| **Offshore Oil Drilling, Production, and Workover Facilities** | | | |
| **Oil drainage collection equipment,** where drains or sumps are not practicable | 112.11(b) | **Corrective action** | Remove oil contained in collection equipment *as often as necessary to prevent overflow.* |
| **Sump system** (liquid removal system and pump start-up device) | 112.11(c) | **Inspect and Test** | Use preventive maintenance, inspection and testing program to assure reliable operation. *Regularly scheduled.* |
| **Pollution prevention equipment and systems** | 112.11(h) & (i) | **Inspect and Test** | Prepare and maintain a written procedure within the Plan for inspecting and testing pollution prevention equipment and systems. Conduct testing and inspection of the pollution prevention equipment and systems commensurate with the complexity, conditions, and circumstances of the facility and any other appropriate regulations. Use simulated discharges for testing and inspecting human and equipment pollution control and countermeasure systems. *On a scheduled periodic basis.* |
| **Sub-marine piping** | 112.11(p) | **Inspect and Test** | Inspect and test for good operating conditions and for failures. *Periodically and according to a schedule.* |
| **Onshore Facilities (Excluding Oil Production) – Animal Fats and Vegetable Oils**[111] | | | |
| **Bulk storage** containers that are subject to 21 CFR part 110, are elevated, constructed of austenitic stainless steel, have no external insulation and are shop-fabricated; **and associated diked areas** | 112.12(c)(6)(ii) | **Inspect** | Conduct formal visual inspection of bulk storage containers. *Following a regular schedule.*<br>Inspect the outside of the container for signs of deterioration, discharges, or accumulation of oil inside diked areas. *Frequently*. |

The SPCC rule is a performance-based regulation. Since each facility may present unique characteristics and methods may evolve as new technologies are developed, the rule does not prescribe a specific frequency or method to perform the required inspections, evaluations, and tests. Instead, it relies on the use of good

111 Note that additional inspection requirements applicable to AFVO facilities are described in the table above. See alternative provisions in table under "Onshore Facilities (Excluding Production Facilities)."

engineering practice, based on the professional judgment of the PE (for a PE-certified SPCC Plan), which includes consideration of applicable industry standards. In addition, recommended practices, safety considerations, and requirements of other federal, state, or local regulations may be considered in the development and certification of the SPCC Plan. Section 112.3(d)(1) specifically states that the PE certifying a Plan attests that "procedures for required inspections and testing have been established." Section 112.3(d)(1) also states that the Plan must be prepared in accordance with good engineering practice, including consideration of applicable industry standards, and with the requirements of 40 CFR part 112. Thus, when certifying an SPCC Plan, a PE is also certifying that the inspection program described in the Plan is appropriate for the facility and is consistent with good engineering practice.

Similarly, the owner/operator of a qualified facility[112] who self-certifies the SPCC Plan must attest that the SPCC Plan has been prepared in accordance with the SPCC rule[113] and accepted and sound industry practices and standards; that procedures for inspections and tests have been established for the facility; and that the Plan will be implemented. While owners and operators of qualified facilities may choose not to have their SPCC Plans certified by a PE, they are still required to comply with all of the SPCC requirements and to develop and implement a spill prevention program in accordance with good engineering practices, and may do so by following regulatory guidance and industry recommended practices, consulting with tank testing professionals, and implementing standard design and operation protocols.

The preamble to the 2002 SPCC rule amendment (67 FR 47042, July 17, 2002) lists examples of industry standards and recommended practices that may be relevant to determining what constitutes good engineering practice for various rule provisions. These industry standards are summarized in *Table 7-2* and *Table 7-3* (*Section 7.3*) and further discussed in *Section 7.7*. Although EPA refers to the use of industry standards to determine inspection and integrity testing practices, the Agency does not prescribe a particular standard or schedule for testing. "Good engineering practice" and relevant industry standards change over time. In addition, site-specific conditions at an SPCC-regulated facility play a significant role in the development of appropriate inspections and tests and the associated schedule for these activities. For example, the American Petroleum Institute (API) Standard 653, "Tank Inspection, Repair, Alteration, and Reconstruction," includes a cap on the maximum time interval between inspections, and provides specific criteria for alternative inspection intervals based on the calculated corrosion rate or risk-based inspection assessment. API 653 also provides an internal inspection interval when the corrosion rates are not known. Similarly, the Steel Tank Institute (STI) Standard SP001 provides specific intervals for external inspection of portable containers; and external and internal inspection of shop-built containers and small field-erected containers based on container size and configuration. Site-specific

112 The self-certification option is designed for owners and operators of those facilities that store smaller amounts of oil. These smaller amounts of oil generally translate to facilities with simpler, pre-engineered installations, such as restaurants, office buildings, family farms, automotive repair shops, and rural electrical substations. For more information on qualified facilities, see *Chapter 1: Introduction.*

113 Note that this provision applies to Tier II qualified facility Plans. The Tier I qualified facility self-certification provisions in §112.6(a)(1) do not require the owner or operator to attest that the Plan was prepared in accordance with the SPCC rule because the template in Appendix G of the rule, that serves as the SPCC Plan for these facilities, addresses applicable rule requirements.

conditions may therefore affect the exact schedule of inspections and tests conducted under either industry standard.

Finally, environmentally equivalent measures may substitute for integrity testing requirements as allowed under §112.7(a)(2) when reviewed and certified by a PE.[114] *Chapter 3: Environmental Equivalence* provides a general discussion of environmental equivalence, while *Section 7.5* discusses its particular relevance to bulk storage container integrity testing and inspection requirements at onshore facilities and other special circumstances.

The remaining portions of *Section 7.2* discuss various requirements related to the inspection, testing, evaluation, and maintenance of selected components of facilities (*Sections 7.2.1* through *7.2.13*). The section ends with a discussion of the general role of industry standards in meeting SPCC requirements (*Section 7.3*).

> **FYI – Oil-filled equipment**
>
> Oil-filled equipment is not a bulk storage container and, therefore, NOT subject to the integrity testing requirements of the SPCC rule.

### 7.2.2 Regularly Scheduled Integrity Testing and Inspection of Aboveground Bulk Storage Containers (at Onshore Facilities Other than Oil Production Facilities)

Section 112.8(c)(6) of the SPCC rule specifies the inspection and testing requirements for aboveground bulk storage containers at onshore facilities that store petroleum oils and non-petroleum oils (except AFVOs). Section 112.12(c)(6) contains similar requirements for facilities with animal fats and vegetable oils.[115] The SPCC rule has two distinct inspection requirements for bulk storage containers:

- Test or inspect **each** container for integrity on a regular schedule and whenever material repairs are made; and
- Frequently inspect the outside of the container for signs of deterioration, discharges, or accumulation of oil inside diked areas. This visual inspection is intended to be a routine walk-around and includes the container's supports and foundations.

[114] Qualified facility owners or operators who choose to self-certify their SPCC Plan, as allowed under §112.3(g), may incorporate environmentally equivalent alternatives in the Plan when each alternate method is reviewed and certified in writing by a PE.

[115] See *Section 7.5.2* for more information on deviating from the SPCC rule requirements based on environmental equivalence.

**§112.8(c)(6)**

Test or inspect each aboveground container for integrity on a regular schedule and whenever you make material repairs. 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 (such as containers that are: shop-built, field-erected, skid-mounted, elevated, equipped with a liner, double-walled, or partially buried). Examples of these integrity tests include, but are not limited to: visual inspection, hydrostatic testing, radiographic testing, ultrasonic testing, acoustic emissions testing, or other systems of non-destructive testing. 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. Records of inspections and tests kept under usual and customary business practices satisfy the recordkeeping requirements of this paragraph.

Note: The above text is only a brief excerpt of the rule. Refer to 40 CFR part 112 for the full text of the rule.

Integrity testing is any means to measure the strength (structural soundness) of a container shell, bottom, and/or floor to contain oil, and may include leak testing to determine whether the container will discharge oil (67 FR 47120, July 17, 2002). The integrity testing and routine inspection requirements apply to aboveground bulk storage containers with a capacity of 55 gallons[116] or more, including:

- Large (field-constructed or field-erected) and small (shop-built) aboveground containers; [117]
- Containers located on, partially in (partially buried, bunkered, or vaulted tanks), and off the ground wherever located; and
- Double-walled containers.

**Regularly scheduled integrity tests or inspections**

Integrity testing is a necessary component of any good oil discharge prevention plan. Integrity testing is necessary to determine whether the bulk storage container (e.g., tank) is suitable for continued use until the next formal inspection. It will help to prevent discharges by testing the integrity of containers, ensuring they are suitable for continued service under current and anticipated operating conditions (e.g., product, temperature, pressure). For example, testing may help facility owners/operators to determine whether corrosion has reached a point where repairs are required or replacement of the container is necessary. Information obtained through

116 For information on inspecting mobile/portable containers, see *Section 7.5.1*.

117 STI SP001 makes the distinction between field-erected and shop-fabricated tanks. A field-erected aboveground storage tank (AST) is a welded metal AST erected on the site where it will be used. For the purpose of the standard, ASTs are to be inspected as field-erected ASTs if they are either: (a) an AST where the nameplate indicates that it is a field-erected AST, and limited to a maximum shell height of 50 feet and maximum diameter of 30 feet; or (b) an AST without a nameplate that is more than 50,000 gallons and has a maximum shell height of 50 feet and a maximum diameter of 30 feet. A shop-fabricated AST is a welded metal AST fabricated in a manufacturing facility or an AST not otherwise identified as field-erected with a volume less than or equal to 50,000 gallons. (STI SP001, "Standard for the Inspection of Aboveground Storage Tanks," 5th Edition September 2011)

integrity testing also enables a facility owner/operator to budget and plan for routine maintenance and any associated repairs and avoid unexpected disruptions to facility operations.

Industry standards describe procedures to identify the condition of the container through formal internal and external inspections conducted by certified personnel. For internal inspections, the container must typically be taken out of service, cleaned, and made ready for personnel to enter the container.

**FYI – Industry standard identified in SPCC Plan**

The industry standard identified in an SPCC Plan outlines the specific inspection and integrity testing protocol for the containers at the facility. These protocols may vary depending on the size and configuration of the facility's containers.

For example, portable containers (e.g., a drum) have fewer inspection requirements than shop-built and field-erected containers.

Examples of integrity tests include, but are not limited to:

- Visual inspection,
- Radiographic examination,
- Ultrasonic Testing (UT), including Ultrasonic Thickness Scan (UTS) and Ultrasonic Thickness Testing (UTT),
- Magnetic Flux Leakage (MFL) scan,
- Helium leak testing,
- Magnetic particle examination,
- Liquid penetrant examination,
- Acoustic emissions testing,
- Hydrostatic testing,
- Inert gas leak testing, or
- Other methods of non-destructive examination.

Acoustic emissions testing and UT robotic measurement[118] are non-destructive examination methods that can be used while the tank is in service. Acoustic emissions testing is used to determine if there is a leak but does not determine if there is corrosion or metal loss. Hydrostatic testing is typically performed on new tanks and on existing tanks that have had major repairs or alterations. Industry standards may use one, or a

118 The PE should determine how to incorporate robotic inspections into an integrity testing program. Robotic inspections alone may not constitute a comprehensive integrity testing evaluation of the container as specified by the appropriate industry standards.

combination, of these non-destructive examination methods or tests as part of an integrity testing program.[119] If there are containers at the facility that have never been inspected for integrity, then, depending on their size and configuration, industry standards may require that the owner or operator first assess baseline conditions for these containers in order to develop an inspection and testing protocol (see *Section 7.4* of this chapter for information on determining a baseline).

According to §112.8(c)(6), the frequency and type of testing and inspections as well as the qualifications for personnel performing tests and inspections must be determined in accordance with applicable industry standards. While frequent external visual inspections can often be completed by trained facility personnel, the requirement to conduct regular integrity tests or inspections may involve hiring specialized personnel (as specified by the applicable industry standard). For example, integrity testing of field-erected aboveground storage tanks in accordance with API 653 involves formal in-service external inspections and formal out-of-service internal inspections conducted by an API 653 certified inspector. A formal in-service external inspection involves visual inspection (typically using a standard checklist) and UT measurements of the tank shell. A formal out-of-service internal inspection determines the condition of the tank's floor, welds, walls and structure, but should also include the shell, roof (fixed or floating roof), nozzles, and tank appurtenances. The out-of-service inspection typically includes non-destructive testing such as MFL scanning of the floor, vacuum box testing of floor welds, helium leak testing, UT measurements, and tank bottom settlement measurements.

**Integrity Testing and Secondary Containment Impracticability**

Periodic integrity testing is required as an additional measure in §112.7(d) when it is impracticable to provide adequate secondary containment for bulk storage containers (among other measures). The Plan preparer may decide, based on good engineering practice, to increase the frequency of integrity tests for containers that have inadequate secondary containment because there is a higher potential of a discharge reaching navigable waters or adjoining shorelines.

This approach to establish an increased inspection frequency for an aboveground container without secondary containment is used in the STI SP001 standard.

The SPCC rule requires that integrity testing of aboveground bulk storage containers be performed on a regular schedule, as well as when material repairs[120] are made, because such repairs might increase the potential for oil discharges. Testing on a 'regular schedule' means testing per industry standards or at a frequency sufficient to prevent discharges. (67 FR 47119, July 17, 2002).

Industry standards establish the scope and frequency for inspections, considering the particular conditions of the aboveground container. These conditions may include the age, service history, original construction specifications (e.g., shop-built vs. field-erected, welded steel vs. riveted steel), prior inspection results, and the existing condition of the container. They may also consider the degree of risk of a discharge to

119 Note that in some circumstances, industry standards allow visual inspection alone for portable containers.

120 Examples of material repairs include removal or replacement of the annular plate ring; replacement of the container bottom; jacking of a container shell; installation of a 12-inch or larger nozzle in the shell; replacement of a door sheet or tombstone in the shell, or other shell repair; or such repairs that might materially change the potential for oil to be discharged from the container.

navigable waters and adjoining shorelines. For example, for containers that are located near saltwater, an accelerated corrosion rate would be expected. The frequency of inspections is based on the changing conditions of the container (e.g., corrosion rates, settling); the interval between inspections may therefore vary over the lifetime of the container.

Once the Plan preparer selects an inspection schedule for aboveground containers (based on applicable industry standards), it must be documented in the SPCC Plan and the owner or operator must conduct inspections according to that schedule. The Plan should also include a description of the conditions of the container at the time the Plan was certified that led to the specific inspection schedule identified.

**Frequent Inspections – Visual**

The rule requires frequent inspections of the outside of the container for signs of deterioration, discharges, or accumulations of oil inside diked areas (§112.8(c)(6)). This visual inspection is intended to be a routine walk-around and include the container's supports and foundations. The scope and frequency of the inspection is determined by industry standards or according to a site-specific inspection program developed and certified[121] by the Plan preparer. Industry standards typically require monthly visual inspections, although some facilities conduct daily or weekly visual inspections of their containers. EPA expects the visual inspection to occur on an ongoing routine basis, to be conducted by qualified personnel, and to follow industry standards. The necessary qualifications for personnel conducting the inspections are outlined in tank inspection standards such as API 653 and STI SP001. Records of visual inspections should be maintained and kept under usual and customary business practices.

### 7.2.3 Removal of Oil Accumulations in Bulk Storage Container Diked Areas

The rule requires that the owner or operator promptly correct visible discharges which result in a loss of oil from a bulk storage container, including but not limited to seams, gaskets, piping, pumps, valves, rivets, and bolts and remove oil accumulations in diked areas. "Prompt'' removal means beginning the cleanup of any accumulation of oil immediately after discovery of the discharge, or immediately after any actions to prevent fire or explosion or other threats to worker health and safety, but such actions may not be used to unreasonably delay such efforts (67 FR 47122, July 17, 2002).

**§112.8(c)(10) and §112.12(c)(10)**

Promptly correct visible discharges which result in a loss of oil from the container, including but not limited to seams, gaskets, piping, pumps, valves, rivets, and bolts. You must promptly remove any accumulations of oil in diked areas.

Note: The above text is only a brief excerpt of the rule. Refer to 40 CFR part 112 for the full text of the rule.

[121] The Plan certification requires that procedures for inspection and testing have been established by either a PE (in accordance with §112.3(d)(1)(iv)) or the owner or operator of a qualified facility (in accordance with either §112.6(a)(1)(iv) or §112.6(b)(1)(iv)).

### 7.2.4 Integrity Testing and Inspection for AFVO Bulk Storage Containers

The integrity testing requirements at §112.12(c)(6)(i), for animal fats and vegetable oil containers are identical to those described above at §112.8(c)(6).[122] To address differences in the way certain AFVOs may be stored and handled at a facility, the SPCC rule also provides differentiated, more flexible, alternative requirements at §112.12(c)(6)(ii) for AFVO containers that meet certain criteria. Facility owners/operators with AFVO containers that meet the specific criteria can conduct visual inspections of their containers on a regular schedule in lieu of meeting the integrity testing requirements found at §112.12(c)(6)(i). According to §112.12(c)(6)(ii), this flexibility applies to bulk storage containers that:

- Are subject to the Food and Drug Administration (FDA) regulations in 21 CFR part 110, *Current Good Manufacturing Practice in Manufacturing, Packing or Holding Human Food*;
- Are elevated;
- Are made from austenitic stainless steel;
- Have no external insulation; and
- Are shop-built.

The owner or operator is required to document in the SPCC Plan the procedures for visual inspections of AFVO bulk storage containers that are eligible for these differentiated requirements.

EPA developed this alternative to integrity testing based on the ways these oils are stored and handled at a facility. Each of the five criteria for this approach is described below and addresses the design, construction, and maintenance of bulk storage containers to minimize the potential for internal and external corrosion. Note that formal visual inspections may be used in lieu of integrity testing only when all five criteria are met.

[122] See *Section 7.5.2* for more information on deviating from the SPCC rule requirements based on environmental equivalence.

**112.12(c)(6) Bulk storage container inspections.**

(i) Except for containers that meet the criteria provided in paragraph (c)(6)(ii) of this section, test or inspect each aboveground container for integrity on a regular schedule and whenever you make material repairs. 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 (such as containers that are: shop-built, field-erected, skid-mounted, elevated, equipped with a liner, double-walled, or partially buried). Examples of these integrity tests include, but are not limited to: Visual inspection, hydrostatic testing, radiographic testing, ultrasonic testing, acoustic emissions testing, or other systems of nondestructive testing. 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. Records of inspections and tests kept under usual and customary business practices satisfy the recordkeeping requirements of this paragraph.

(ii) For bulk storage containers that are subject to 21 CFR part 110, are elevated, constructed of austenitic stainless steel, have no external insulation, and are shop-fabricated, conduct formal visual inspection on a regular schedule. In addition, you must frequently inspect the outside of the container for signs of deterioration, discharges, or accumulation of oil inside diked areas. You must determine and document in the Plan the appropriate qualifications for personnel performing tests and inspections. Records of inspections and tests kept under usual and customary business practices satisfy the recordkeeping requirements of this paragraph (c)(6).

Note: The above text is only a brief excerpt of the rule. Refer to 40 CFR part 112 for the full text of the rule.

**FDA Regulation at 21 CFR Part 110**

The regulation at 21 CFR part 110, *Current Good Manufacturing Practice in Manufacturing, Packing or Holding Human Food* provides minimal elements for an integrity testing program, which address maintenance of the container, its foundations, and support structures.

FDA requires that facilities be constructed in such a manner that the floor, walls, and ceilings be adequately cleaned and kept clean and in good repair (21 CFR 110.20(b)(4)). Thus, the FDA requirements include procedures and practices, such as frequent monitoring of the floor around a bulk storage container, to ensure that cracks in the floor under and/or around the foundations of a bulk storage container do not accumulate food particles, organic matter, pests, or other potentially unsanitary substances that could lead to food contamination. These inspection requirements also address the SPCC rule requirement to inspect the container's foundations for structural integrity.

Additionally, all plant equipment, including the container's structural supports, must be designed and constructed to be adequately cleanable and properly maintained (21 CFR 110.40(a)). Periodic maintenance of the structural supports of a bulk storage container is also an oil spill preventive measure, especially inside a facility where mobile equipment (e.g., forklifts) can strike and damage the container and/or its structural supports.

FDA also requires that equipment (such as bulk storage containers) be designed, constructed, and used in such a way as to prevent food contamination by metal fragments or other potential contaminants (21 CFR 110.40(a)). Food-contact surfaces must be corrosion-resistant when in contact with food. Monitoring AFVOs for metal fragments as the oil exits the bulk storage container, either by sampling the oil itself for metal or by monitoring the inclusion prevention device for metal fragment accumulation, is a reasonable alternative approach to an internal inspection for corrosion. These regulatory requirements are likely to prevent the corrosion of the internal contact surface in food grade AFVO bulk storage containers.

For some bulk storage container configurations, external corrosion can be the primary concern with respect to their integrity. Significant corrosion of the exterior surface can occur from exposure to moisture and, in some cases, may be enhanced if insulation is present. Significant corrosion can also occur from overfills of oil and/or any associated substance(s) that have accumulated on the exterior surface, as well as from cleaning and sanitizing agents. FDA requires equipment that is in the manufacturing or food-handling area but does not come into contact with food to be constructed to be kept in a clean condition (21 CFR 110.40(c)). Since plant equipment used in the manufacturing or food-handling area must be designed to be kept clean and withstand the corrosive effects of cleaning agents, it is generally constructed of austenitic stainless steel.

In order to further address the potential for external corrosion and allow facility personnel to visually identify leaks and discharges, EPA requires that bulk oil storage containers which will be subject to visual inspections only be elevated, be made of austenitic stainless steel, have no external insulation and be shop fabricated. The following sections provide the rationales for these additional criteria.

**Elevated Bulk Storage Containers**

FDA recommends, but does not require, that all plant equipment be installed and maintained to facilitate its cleaning, including all adjacent spaces. According to 21 CFR 110.40(a), "all equipment *should* be so installed and maintained as to facilitate cleaning of the equipment and of all adjacent spaces." In practice, an owner or operator of a facility implementing this recommended practice is likely to have a bulk storage container that is elevated off the floor.

Food equipment is generally designed to stand on legs, which elevates the plant equipment off the floor so that the space between the plant equipment and the floor can be cleaned. An elevated bulk storage container also facilitates complete drainage because the oil can be withdrawn from the lowest point in the container, so that foreign substances or materials do not accumulate and contaminate the food oil.

For the purposes of oil spill prevention, elevated bulk storage containers allow visual inspections for oil discharges all around the container. Additionally, self-draining containers that operate using gravity flow allow complete drainage and prevent substances other than oil (e.g., water) from accumulating at the bottom of the container, thus minimizing corrosion. The self-drainage design, in conjunction with the applicable regulatory requirements, is likely to prevent the corrosion of the internal contact surface in food-grade AFVO bulk storage containers.

**Containers Made From Austenitic Stainless Steel**

EPA limits the alternative approach to AFVO bulk storage containers made of austenitic stainless steel to ensure that containers are corrosion resistant and compatible with the materials stored. FDA requires that the food-contact surface be corrosion resistant under 21 CFR part 110 but does not explicitly require that AFVOs be stored in austenitic stainless steel bulk storage containers. For example, a carbon steel container with an internal liner may provide a corrosion resistant food contact surface to meet the FDA requirements. Although this meets the FDA regulatory requirements for food contact surfaces, the presence of a liner may also indicate that the oil in the bulk storage container is incompatible with the construction material of the bulk storage container.

In addition, non-homogenous container systems (e.g., containers with external insulation, external coating, mild-carbon steel shell, internal liner) are more complex than homogenous container systems (e.g., containers constructed solely of austenitic stainless steel) and may require additional inspection measures to ensure the integrity of the container. Finally, there is less chance of corrosion with austenitic stainless steel containers because they are compatible with cleaning agents and acidic detergents used to clean food and non-food contact surfaces.

Note that this limitation to austenitic stainless steel construction is only for an owner or operator who chooses to take advantage of the alternative compliance option in §112.12(c)(6)(ii). An SPCC Plan may still be certified with an environmental equivalence determination, in accordance with §112.7(a)(2) of the SPCC rule, for other types of bulk storage containers that are similarly corrosion resistant but do not meet all of the criteria described in §112.12(c)(6)(ii). *Chapter 3: Environmental Equivalence* discusses associated requirements.

**Containers with No External Insulation**

A minimum criterion for inspections is frequent monitoring of the exterior surface of a bulk storage container for corrosion and/or other mechanisms that can threaten a container's integrity. External insulation acts as a physical barrier to prevent effective visual examination of the exterior surface of the bulk storage container. Additionally, insulating materials on a bulk storage container and/or any associated equipment and piping can become damp when not properly sealed and cause significant corrosion, which may threaten the integrity of the container. Therefore, EPA included only containers with no external insulation in the alternative option for integrity testing.

**Shop-Fabricated Containers**

Shop-fabricated (i.e., shop-built) containers are containers that are shop-assembled in one piece before transport to the installation site. Shop-fabricated containers generally have lower volume capacities, smaller tank diameters, and a fewer number of welds than field-erected containers and are typically comprised of a single type of material with a single wall thickness.

The Steel Tank Institute's (STI) SP001, *Standard for the Inspection for Aboveground Storage Tanks,* establishes the scope and frequency for visual inspections of shop-fabricated containers. EPA limited the alternative integrity testing option to shop-fabricated containers because they are simpler in design and construction (e.g., typically subject to less stress, and less likely to fail as a result of a brittle fracture) than field-erected containers.

### 7.2.5 Regular Leak Testing of Completely Buried Tanks

Completely buried metallic storage tanks installed on or after January 10, 1974 must be regularly leak tested. ‘‘Regular testing’’ means testing in accordance with industry standards or at a frequency sufficient to prevent leaks. Appropriate methods of testing should be selected based on good engineering practice and tests conducted in accordance with 40 CFR part 280.43 or a State program approved under 40 CFR part 281 are acceptable.

**§§112.8(c)(4), 112.12(c)(4)**

Protect any completely buried metallic storage tank installed on or after January 10, 1974 from corrosion by coatings or cathodic protection compatible with local soil conditions. You must regularly leak test such completely buried metallic storage tanks.

Note: The above text is only a brief excerpt of the rule. Refer to 40 CFR part 112 for the full text of the SPCC rule.

Leak testing is often referred to as “tank tightness testing.” Tank tightness tests include a wide variety of methods. Other terms used for these methods include "precision," "volumetric," and "nonvolumetric" testing. The features of tank tightness testing vary by method, as described in EPA Guidance on meeting UST system requirements:[123]

- Many tightness test methods are "volumetric" methods in which the change in product level in a tank over several hours is measured very precisely (in milliliters or thousandths of an inch).
- Other methods use acoustics or tracer chemicals to determine the presence of a hole in the tank. *With such methods, all of the factors in the following bullets may not apply.*
- For most methods, changes in product temperature also must be measured very precisely (thousandths of a degree) at the same time as level measurements, because temperature changes cause volume changes that interfere with finding a leak.
- For most methods, a net decrease in product volume (subtracting out volume changes caused by temperature) over the time of the test indicates a leak.
- The testing equipment is temporarily installed in the tank, usually through the fill pipe.
- The tank must be taken out of service for the test, generally for several hours, depending on the method.
- Many test methods require that the product in the tank be a certain level before testing, which often requires adding product from another tank on-site or purchasing additional product.

[123] For more information on tank tightness testing, see: http://www.epa.gov/oust/ustsystm/inventor.htm. For more information on preventing and detecting underground storage tank system leaks, see http://www.epa.gov/oust/prevleak.htm.

- Some tightness test methods require all of the measurements and calculations to be made by hand by the tester.
- Other tightness test methods are highly automated. After the tester sets up the equipment, a computer controls the measurements and analysis.
- A few methods measure properties of the product that are independent of temperature, such as the mass of the product, and so do not need to measure product temperature.
- Some automatic tank gauging systems are capable of meeting the regulatory requirements for tank tightness testing and can be considered as an equivalent method.

The SPCC Plan must describe the method and schedule for testing completely buried tanks.

### 7.2.6 Brittle Fracture Evaluation of Field-Constructed Aboveground Containers

Brittle fracture is a type of structural failure in aboveground steel tanks, characterized by rapid crack formation that can cause sudden tank failure. This, along with catastrophic failures such as those resulting from lightning strikes, seismic activity, or other such events, can cause the entire contents of a container to be discharged to the environment. Brittle fracture was most vividly illustrated by the splitting and collapse of a 3.8 million gallon (120-foot diameter) tank in Floreffe, Pennsylvania, which released approximately 750,000 gallons of oil into the Monongahela River in January 1988. A review of past failures due to brittle fracture shows that they typically occur:

- During an initial hydrotest,
- On the first filling in cold weather,
- After a change to lower temperature service, or
- After a repair/modification.

> **§112.7(i)**
>
> If a field-constructed aboveground container undergoes a repair, alteration, reconstruction, or a change in service that might affect the risk of a discharge or failure due to brittle fracture or other catastrophe, or has discharged oil or failed due to brittle fracture failure or other catastrophe, evaluate the container for risk of discharge or failure due to brittle fracture or other catastrophe, and as necessary, take appropriate action.
>
> Note: The above text is only a brief excerpt of the rule. Refer to 40 CFR part 112 for the full text of the SPCC rule.

Storage tanks with a maximum shell thickness of one-half inch or less are not generally considered at risk for brittle fracture.[124, 125]

124 McLaughlin, James E. 1991. “Preventing Brittle Fracture of Aboveground Storage Tanks – Basis for the Approach Incorporated into API 653.” Case Studies: Sessions III and IV of the IIW Conference: Fitness for Purpose of Welded Structures. October 23-24, 1991, Key Biscayne, Florida, USA. Cosponsored by the American Welding Society, Welding Research Institute, Welding Institute of Canada, and International Institute of Welding. Published by the American Welding Society, Miami, Florida. Pages 90-110.

Section 112.7(i) of the SPCC rule requires that field-constructed aboveground containers that have undergone a repair or change in service that might affect the risk of a discharge due to brittle fracture or other catastrophe, or have had a discharge associated with brittle fracture or other catastrophe, be evaluated to assess the risk of such a discharge. Unless the original design shell thickness of the tank is less than one-half inch (see API 653, Section 5, and STI SP001, Appendix B), evidence of this evaluation should be documented in the facility's SPCC Plan.

Industry standards discuss methods for assessing the risk of brittle fracture failure for a field-erected aboveground container and for performing a brittle fracture evaluation. These include API 653, "*Tank Inspection, Repair, Alteration, and Reconstruction*," API RP 920 "*Prevention of Brittle Fracture of Pressure Vessels*," and API RP 579-1/ASME FFS-1, "*Fitness-for-Service*." API 653 includes a decision tree or flowchart for use by the owner/operator and PE in assessing the risk of brittle fracture.

### 7.2.7 Inspections of Piping at Onshore Facilities (Other than Oil Production Facilities)

Any piping installed prior to August 16, 2002 was subject to coating and cathodic protection if soil conditions warranted. However, in 2002, the SPCC rule was revised to require that all piping installed or replaced after August 16, 2002 be protectively wrapped and coated and also cathodically protected. The preamble to the final rule explains:

> *"…we believe that all soil conditions warrant protection of buried piping. We did not propose to make the requirement applicable to all existing piping because of the significant possibility that replacing all unprotected buried piping might cause more discharges than it would prevent. If soil conditions warrant such protection for existing piping, it is already required by the current rule." (67 FR 47123, July 17, 2002).*

Additionally, the SPCC rule has required since its original promulgation in 1973, that if any portion of buried piping at non-production facilities is exposed, the line must be inspected for deterioration, as per §§112.8(d)(1) and 112.12(d)(1). If corrosion damage is found, additional inspection or corrective action must be taken as needed.

Aboveground piping, valves, and appurtenances at non-production facilities must be regularly inspected, as per §§112.8(d)(4) and 112.12(d)(4) and in accordance with industry standards. In addition, buried piping must be integrity and leak tested at the time of installation, modification, construction, relocation, or replacement.

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125 API 653 4th Edition April 2009 Addendum 2 January 2012 Section 5.3.5.

**§112.8(d) and 112.12(d)**

(1) Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. ***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.***

(4) Regularly inspect all aboveground valves, piping, and appurtenances. During the inspection you must assess the general condition of the items, such as flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces. You must also conduct integrity and leak testing of buried piping at the time of installation, modification, construction, relocation, or replacement.

Note: The above text is only a brief excerpt of the rule. Refer to 40 CFR part 112 for the full text of the SPCC rule. *Emphasis added.*

## 7.2.8 Inspection of Drainage Area and Bulk Storage Containers at Onshore Oil Production Facilities

**Drainage Areas at Oil Production Facilities**

The rule contains provisions for inspecting drainage from tank batteries or separation and treating areas. As per §112.9(b)(1), dike drains associated with tank batteries and separation and treating areas must be closed and sealed at all times and drainage areas must be inspected prior to draining in accordance with §112.8(c)(3)(ii), (iii), and (iv) as follows:

- Inspect the retained rainwater to ensure that its presence will not cause a discharge as described in §112.1(b);
- Open the bypass valve and reseal it following drainage under responsible supervision; and
- Keep adequate records of such events, for example, any records required under permits issued in accordance with 40 CFR 122.41(j)(2) and 122.41(m)(3).

Field drainage systems, such as road ditches, and oil traps, sumps or skimmers must be inspected at regular

**§112.9(b)**

(1) …Prior to drainage, you must inspect the diked area and take action as provided in §112.8(c)(3)(ii), (iii), and (iv). You must remove accumulated oil on the rainwater and return it to storage or dispose of it in accordance with legally approved methods.

(2) Inspect at regularly scheduled intervals field drainage systems (such as drainage ditches or road ditches), and oil traps, sumps, or skimmers, for an accumulation of oil that may have resulted from any small discharge. You must promptly remove any accumulations of oil.

**§112.9(c)**

(3) Except as described in paragraph (c)(5) of this section for flow-through process vessels and paragraph (c)(6) of this section for produced water containers and any associated piping and appurtenances downstream from the container, periodically and upon a regular schedule visually inspect each container of oil for deterioration and maintenance needs, including the foundation and support of each container that is on or above the surface of the ground.

Note: The above text is only a brief excerpt of the rule. Refer to 40 CFR part 112 for the full text of the SPCC rule.

intervals (§112.9(b)(2)) for accumulations of oil which must be promptly removed.

**Bulk Storage Containers at Oil Production Facilities**

Each bulk storage container (e.g., oil stock tanks,[126] flow-through process vessels, and produced water containers) at an oil production facility must be inspected periodically and upon a regular schedule for signs of deterioration and maintenance needs in accordance with §112.9(c)(3), including the foundation and support of each container that is on or above the surface of the ground. This inspection is intended to be a routine walk-around where the inspector looks at the container and supports and foundations for any evidence of damage, corrosion, or leaks. The inspection procedures and schedule must be documented in the SPCC Plan and inspections conducted in accordance with the Plan, good engineering practices, and any appropriate industry standards or recommended practices identified in the Plan.

The inspection should occur on an ongoing routine basis and be conducted by qualified personnel. Before the PE certifies the SPCC Plan in accordance with §112.3(d),[127] he must consider applicable industry standards and verify that appropriate procedures for inspections and tests have been established. API has developed Recommended Practice 12R1 "Recommended Practice for Setting, Maintenance, Inspection, Operation and Repair of Tanks in Production Service" that includes inspection procedures for tanks employed in onshore oil production service and in certain circumstances includes non-destructive testing elements in addition to visual inspection.

Additionally, the owner or operator of an onshore oil production facility must conduct ***integrity testing*** for any bulk storage containers for which he determines secondary containment is impracticable. The Plan must follow the provision of §112.7(d) and clearly explain why secondary containment measures are not practicable; for bulk storage containers, conduct both periodic integrity testing of the containers and periodic integrity and leak testing of the valves and piping; and, unless the facility owner or operator has submitted a response plan under §112.20, provide the following in the Plan:

- An oil spill contingency plan following the provisions of 40 CFR part 109, and
- A written commitment of manpower, equipment, and materials required to expeditiously control and remove any quantity of oil discharged that may be harmful.

### 7.2.9 Alternative Inspection Requirements for Flow-through Process Vessels at Oil Production Facilities

Flow-through process vessels at oil production facilities are bulk storage containers and are therefore subject to the bulk storage container requirements of §112.9(c) including specific secondary containment

[126] A stock tank is a storage tank for oil production after the oil has been treated (Schlumberger Oil Field Glossary http://www.glossary.oilfield.slb.com/)

[127] In the case of a qualified facility, the owner or operator would certify the SPCC Plan in accordance with either §112.6(a)(1) or 112.6(b)(1), as applicable.

requirements of §112.9(c)(2). However, facility owners and operators have the option to implement alternative requirements in accordance with §112.9(c)(5) in lieu of providing sized secondary containment.

As an alternative to the sized secondary containment and inspection requirements for bulk storage containers at oil production facilities found at §§112.9(c)(2) and 112.9(c)(3), an oil production facility owner or operator may opt to provide general secondary containment in accordance with §112.7(c), and comply with the following requirements for flow-through process vessels at oil production facilities:

- **Periodically and on a regular schedule visually inspect and/or test flow-through process vessels and associated components (such as dump valves) for leaks, corrosion, or other conditions that could lead to a discharge, as described in §112.1(b).** Regular inspections are necessary to ensure that any leak, or potential for a leak, is detected promptly enough to prevent a discharge of the entire contents of the separation or treating equipment. This is especially true for components that typically cause discharges, such as dump valves. These requirements are consistent with the inspection requirements for bulk storage containers under §112.9(c)(3). (73 FR 74279, December 5, 2008). Records of inspections or tests must be maintained in accordance with §112.7(e). This requirement is necessary to increase the likelihood that a discharge to navigable waters or adjoining shorelines will be prevented or detected promptly.

- **Take corrective action or make repairs to flow-through process vessels and any associated components as indicated by regularly scheduled visual inspections, tests, or evidence of an oil discharge.** Corrective action/repairs ensure that equipment is adequately maintained to prevent discharges from flow-through process vessels and associated components. Needed repairs that are identified during regular inspections should be scheduled in a timely manner to prevent a discharge.

> **Tip – Oil discharge**
>
> Note that the SPCC rule defines *discharge* to include any spilling, leaking, pumping, pouring, emitting, emptying, or dumping of oil… and not just a discharge as described in §112.1(b) (i.e., a discharge to navigable waters or adjoining shorelines.)
>
> Therefore corrective action and removal must be initiated before the discharge reaches navigable waters or adjoining shorelines.

- **Promptly remove or initiate actions to stabilize and remediate any accumulations of oil discharges associated with flow-through process vessels.** If a leak or spill is identified during an inspection, corrective action is necessary to ensure that a discharge does not impact navigable waters or adjoining shorelines. The owner or operator must remove, or stabilize and remediate, oil accumulations from flow-through process vessels and any associated components in order to prevent a discharge as described in §112.1(b). This may include removal of oil-contaminated soil. Removal of recoverable oil may be combined with physical, chemical, and/or biological treatment methods to address any residual oil. These treatment methods must be consistent with other Federal, state or local requirements as applicable, and must be properly managed to prevent a discharge as described in §112.1(b). Disposal of oil and/or oil-contaminated media must be in accordance with applicable Federal, state, and local requirements (see 73 FR 74279, December 5, 2008). The SPCC Plan must describe the methods of disposal of recovered materials in accordance with applicable legal requirements under §112.7(a)(3)(v).

These additional requirements are necessary because oil production facilities are generally unattended, so there is a lower potential to immediately discover and correct a discharge than at a non-production facility, which would typically be attended during hours of operation. The owner or operator of the facility may choose to deviate from the measures described above by substituting environmentally equivalent alternatives. The alternative measure chosen, and certified by a PE, must represent good engineering practice and must achieve environmental protection equivalent to the SPCC rule requirement as required in §112.7(a)(2). For more information on environmental equivalence, see *Chapter 3: Environmental Equivalence*, *Section 3.3.8*. For more information on how to determine appropriate secondary containment capacity to comply with the general secondary containment requirements of §112.7(c), see *Chapter 4: Secondary Containment and Impracticability*, *Section 4.8.1.*

**§112.9(c)(5)**

*Flow-through process vessels.* The owner or operator of a facility with flow-through process vessels may choose to implement the alternate requirements as described below in lieu of sized secondary containment required in paragraphs (c)(2) and (c)(3) of this section.

(i) Periodically and on a regular schedule visually inspect and/or test flow-through process vessels and associated components (such as dump valves) for leaks, corrosion, or other conditions that could lead to a discharge as described in §112.1(b).

(ii) Take corrective action or make repairs to flow-through process vessels and any associated components as indicated by regularly scheduled visual inspections, tests, or evidence of an oil discharge.

(iii) Promptly remove or initiate actions to stabilize and remediate any accumulations of oil discharges associated with flow-through process vessels.

(iv) If your facility discharges more than 1,000 U.S. gallons of oil in a single discharge as described in §112.1(b), or discharges more than 42 U.S. gallons of oil in each of two discharges as described in §112.1(b) within any twelve month period, from flow-through process vessels (excluding discharges that are the result of natural disasters, acts of war, or terrorism) then you must, within six months from the time the facility becomes subject to this paragraph, ensure that all flow-through process vessels subject to this subpart comply with §112.9(c)(2) and (c)(3).

Note: The above text is an excerpt of the SPCC rule. Refer to 40 CFR part 112 for the full text of the rule.

**Tip – Discharges from flow-through process vessels**

If flow-through process vessels at the facility cause a single discharge of oil to navigable waters or adjoining shorelines exceeding 1,000 U.S. gallons, or two discharges of oil to navigable waters or adjoining shorelines each exceeding 42 U.S. gallons within any 12-month period (excluding discharges that are the result of natural disasters, acts of war, or terrorism), then the owner/operator must, within six months:

- Install sized secondary containment with sufficient freeboard for precipitation for all flow-process vessels at the facility,
- Periodically and upon a regular schedule visually inspect each container of oil for deterioration and maintenance needs, including the foundation and support of each container that is on or above the surface of the ground, and
- Submit a report to the Regional Administrator within 60 days of the discharge(s) and to the appropriate state agency or agencies in charge of oil pollution control activities, as per Section 112.4(a).

The report must include the name of the facility; the name of the owner or operator; location of the facility; maximum storage or handling capacity of the facility and normal daily throughput; corrective action and countermeasures taken, including a description of equipment repairs and replacements; an adequate description of the facility, including maps, flow diagrams, and topographical maps, as necessary; the cause of the discharge(s), including a failure analysis of the system or subsystem in which the failure occurred; additional preventive measures taken or contemplated to minimize the possibility of recurrence; and any other information as the Regional Administrator may reasonably require pertinent to the Plan or discharge.

### 7.2.10 Alternative Inspection Requirements for Produced Water Containers at Oil Production Facilities

Like flow-through process vessels, produced water containers are bulk storage containers and are therefore subject to the bulk storage container requirements of §112.9(c) for oil production facilities, including specific secondary containment requirements of §112.9(c)(2).

However, differentiated inspections and testing requirements apply in cases where the facility owner or operator takes advantage of the option outlined in §112.9(c)(6) in lieu of providing sized secondary containment for produced water containers.

**§112.9(c)**

(6) For each produced water container, comply with §112.9(c)(1) and (c)(4); and §112.9(c)(2) and (c)(3), or comply with the provisions of the following paragraphs (c)(6)(i) through (v):

(i) Implement, on a regular schedule, a procedure for each produced water container that is designed to separate the free-phase oil that accumulates on the surface of the produced water. Include in the Plan a description of the procedures, frequency, amount of free-phase oil expected to be maintained inside the container, and a Professional Engineer certification in accordance with §112.3(d)(1)(vi). Maintain records of such events in accordance with §112.7(e). Records kept under usual and customary business practices will suffice for purposes of this paragraph. If this procedure is not implemented as described in the Plan or no records are maintained, then you must comply with §112.9(c)(2) and (c)(3).

(ii) On a regular schedule, visually inspect and/or test the produced water container and associated piping for leaks, corrosion, or other conditions that could lead to a discharge as described in §112.1(b) in accordance with good engineering practice.

(iii) Take corrective action or make repairs to the produced water container and any associated piping as indicated by regularly scheduled visual inspections, tests, or evidence of an oil discharge.

(iv) Promptly remove or initiate actions to stabilize and remediate any accumulations of oil discharges associated with the produced water container.

(v) If your facility discharges more than 1,000 U.S. gallons of oil in a single discharge as described in §112.1(b), or discharges more than 42 U.S. gallons of oil in each of two discharges as described in §112.1(b) within any twelve month period from a produced water container subject to this subpart (excluding discharges that are the result of natural disasters, acts of war, or terrorism) then you must, within six months from the time the facility becomes subject to this paragraph, ensure that all produced water containers subject to this subpart comply with §112.9(c)(2) and (c)(3).

Note: The above text is only a brief excerpt of the rule. Refer to 40 CFR part 112 for the full text of the SPCC rule.

As an alternative to the sized secondary containment requirements and inspection requirements for bulk storage containers at oil production facilities found at §§112.9(c)(2) and 112.9(c)(3), an oil production facility owner or operator may opt to provide general secondary containment in accordance with §112.7(c) for produced water containers, and comply with the following additional requirements:

**Implement on a regular schedule a procedure for each produced water container that is designed to separate the free-phase oil that accumulates on the surface of the produced water (e.g., skimming program).**

- The facility owner or operator must implement a process and/or procedure for the produced water container (s) that is designed to remove the free-phase oil that accumulates on the surface of the produced water container. This process or procedure must be implemented on a regular schedule so that the amount of free phase oil that collects in produced water containers does not exceed the amounts that can be managed by the general secondary containment system designed by the PE to address the typical failure mode, and the most likely quantity of oil that would be discharged.

- The SPCC Plan must include a description of the free-phase oil separation and removal process or procedure, the frequency at which the procedure is implemented or operated, the maximum amount of free-phase oil expected to accumulate in the container, and a description of the adequacy of the general secondary containment approach for the produced water container, including the anticipated typical failure mode and the method, design, and capacity for general secondary containment. Additionally, the owner or operator must keep records of the implementation of these procedures in accordance with §112.7(e). (see 73 FR 74287, December 5, 2008).

- Section 112.3(d)(1)(vi) requires the PE to certify that the oil removal process or procedure for produced water containers is designed according to good engineering practice to reduce the accumulation of free-phase oil, and that the process or procedure and frequency for required inspections, maintenance, and testing have been established. When developing this procedure and designing general secondary containment for produced water containers, the PE should carefully consider the length of time the facility is unattended and the flow rate of produced water into the container to ensure that the most likely discharge of the produced water container is discovered before it escapes secondary containment.

- Furthermore, this oil removal process or procedure is essential for reducing the amount of free-phase oil in the produced water container to ensure that the secondary containment system is appropriate to contain a discharge before cleanup can occur. Therefore, EPA inspectors should review records of the implementation of the process or procedure to ensure that the Plan is being properly implemented. If, upon inspection, it is discovered that the removal process or procedure is not implemented, then the Regional Administrator may require amendments to the Plan that include providing sized secondary containment for produced water containers at the facility (§112.4(d)).

> **Tip – Oil discharge**
>
> Note that the SPCC rule defines *discharge* to include any spilling, leaking, pumping, pouring, emitting, emptying, or dumping of oil… and not just a discharge as described in §112.1(b) (i.e., a discharge to navigable waters or adjoining shorelines).
>
> Therefore, corrective action and removal must be initiated when the container is leaking but before the discharge reaches navigable waters or adjoining shorelines.

**On a regular schedule, visually inspect and/or test the produced water container and associated piping for leaks, corrosion, or other conditions that could lead to a discharge as described in §112.1(b) in accordance with good engineering practice.**

- These inspections and/or tests are to be done in conjunction with procedures implemented on a regular schedule to separate the free-phase oil that accumulates on the surface of the produced water, and are meant to ensure that the produced water container will not cause a discharge as described in §112.1(b) were its contents to be released. The inspections and tests may involve, for example, frequently inspecting the content of the produced water container to assess the amount of oil that has accumulated. Records of inspections or tests must be maintained in accordance with §112.7(e). This requirement is necessary to increase the likelihood that a discharge to navigable waters or adjoining shorelines will be prevented or detected promptly when general secondary containment measures are used instead of sized secondary containment.

**Take corrective action or make repairs to the produced water container and any associated piping as indicated by regularly scheduled visual inspections, tests, or evidence of an oil discharge.**

- Corrective action is necessary to prevent a discharge from occurring, as well as in response to a discharge. This measure is intended to prevent discharges by ensuring that produced water containers are adequately maintained.

**Promptly remove or initiate actions to stabilize and remediate any accumulations of oil discharges associated with the produced water container.**

- This requirement is intended to ensure the removal of oil accumulations around the container and any associated piping and appurtenances that may contribute to a discharge as described in §112.1(b). This may include removal of oil-contaminated soil as a means of preventing oil from becoming a discharge as described in §112.1(b). Disposal of oil and/or oil-contaminated media must be in accordance with applicable Federal, state, and local requirements.

The owner or operator of the facility may choose to deviate from the measures described above by substituting environmentally equivalent alternatives, but must still comply with the secondary containment requirements in §112.7(c). The alternative measure chosen, and certified by a PE, must represent good engineering practice and must achieve environmental protection equivalent to the SPCC rule requirement, as required in §112.7(a)(2). For more information on environmental equivalence see *Chapter 3: Environmental Equivalence, Section 3.3.8*. For more information on how to determine appropriate capacity for secondary containment systems to comply with the general secondary containment requirements of §112.7(c) see *Chapter 4: Secondary Containment and Impracticability*, *Section 4.8.2.*

### 7.2.11 Inspection of Facility Transfer Operations at Onshore Oil Production Facilities

All aboveground valves and piping at facility transfer operations must be inspected on a regular schedule to check the condition of all components (§112.9(d)(1) and (2)).

**§112.9(d)**

(1) Periodically and upon a regular schedule inspect all aboveground valves and piping associated with transfer operations for the general condition of flange joints, valve glands and bodies, drip pans, pipe supports, pumping well polish rod stuffing boxes, bleeder and gauge valves, and other such items.

(2) Inspect saltwater (oil field brine) disposal facilities often, particularly following a sudden change in atmospheric temperature, to detect possible system upsets capable of causing a discharge.

Note: The above text is only a brief excerpt of the rule. Refer to 40 CFR part 112 for the full text of the SPCC rule.

Inspections ‘‘upon a regular schedule’’ means in accordance with industry standards or at a frequency sufficient to prevent discharges as described in §112.1(b). Whatever frequency of inspections is selected must be documented in the Plan (67 FR 47130, July 17, 2002). The inspection requirement includes transfer operations, including but not limited to all aboveground valves and piping, the general condition of flange joints, valve glands and bodies, drip pans, pipe supports, pumping well polish rod stuffing boxes, bleeder and gauge valves, and other such items. Saltwater or oil field brine disposal facilities also must be inspected often and particularly following a sudden change in atmospheric temperature.

### 7.2.12 Maintenance of Flowlines and Intra-Facility Gathering Lines

The purpose of a flowline/intra-facility gathering line maintenance program is to help prevent oil discharges from this piping. Common causes of such discharges include mechanical damage (e.g., impact or rupture) and corrosion. The SPCC rule requires that the scope of a maintenance program include written procedures and other measures to prevent corrosion or other conditions that could cause a discharge. An effective flowline/intra-facility gathering line maintenance program is necessary to detect a discharge in a timely manner so that the oil discharge response operations described in a contingency plan may be implemented effectively.

**§112.9(d)(4)**

Prepare and implement a written program of flowline/intra-facility gathering line maintenance. The maintenance program must address your procedures to:

(i) Ensure that flowlines and intra-facility gathering lines and associated valves and equipment are compatible with the type of production fluids, their potential corrosivity, volume, and pressure, and other conditions expected in the operational environment.

(ii) Visually inspect and/or test flowlines and intra-facility gathering lines and associated appurtenances on a periodic and regular schedule for leaks, oil discharges, corrosion, or other conditions that could lead to a discharge as described in §112.1(b). For flowlines and intra-facility gathering lines that are not provided with secondary containment in accordance with §112.7(c), the frequency and type of testing must allow for the implementation of a contingency plan as described under part 109 of this chapter.

(iii) Take corrective action or make repairs to any flowlines and intra-facility gathering lines and associated appurtenances as indicated by regularly scheduled visual inspections, tests, or evidence of a discharge.

(iv) Promptly remove or initiate actions to stabilize and remediate any accumulations of oil discharges associated with flowlines, intra-facility gathering lines, and associated appurtenances.

Note: The above text is an excerpt of the SPCC rule. Refer to 40 CFR part 112 for the full text of the rule.

The SPCC rule specifically requires a written maintenance program that addresses procedures to:

- Ensure that flowlines and intra-facility gathering lines and associated valves and equipment are compatible with the type of production fluids, their potential corrosivity, volume, pressure, and other operating conditions.

- Visually inspect and/or test flowlines and intra-facility gathering lines and associated appurtenances on a periodic and regular schedule for leaks, oil discharges, corrosion, or other conditions that could lead to a discharge as described in §112.1(b). For flowlines and intra-facility gathering lines that are not provided with secondary containment in accordance with §112.7(c), the frequency and type of testing must allow for the implementation of a contingency plan as described under 40 CFR part 109.

- Take corrective action or make repairs to any flowlines and intra-facility gathering lines and associated appurtenances as indicated by regularly scheduled visual inspections, tests, or evidence of a discharge. Note that the SPCC rule defines *discharge* to include any spilling, leaking, pumping, pouring, emitting, emptying, or dumping of oil; not just a discharge as described in §112.1(b) (i.e., a discharge to navigable waters or adjoining shorelines). Therefore, corrective action and removal must be initiated before the discharge reaches navigable waters or adjoining shorelines.

- Promptly remove or initiate actions to stabilize and remediate any accumulations of oil discharges associated with flowlines, intra-facility gathering lines, and associated appurtenances. The owner or operator of the facility has both the responsibility and flexibility to outline an inspection program under §112.9(d)(4)(ii) that puts the timeframe for ''prompt removal'' in the context of the inspection frequency (73 FR 74276, December 5, 2008).

Oil production facility owners or operators must either provide secondary containment for flowlines and intra-facility gathering lines in accordance with §112.7(c) or comply with alternative measures for these lines under §112.9(d)(3). Unless the facility owner/operator has submitted a response plan under §112.20, the alternative measures include an oil spill contingency plan following the provisions of 40 CFR part 109 and a written commitment of manpower, equipment, and materials required to expeditiously control and remove any quantity of oil discharged that might be harmful.

The frequency and type of inspections and/or tests must allow for the implementation of the contingency plan prepared in accordance with 40 CFR part 109 or the FRP. This measure is intended to ensure that any discharges, potential problems or conditions related to the flowline/intra-facility gathering line that could lead to a discharge will be promptly discovered. This is because an oil spill contingency plan cannot be effective unless the discharge is discovered in a timely manner so that the response operations described in the contingency plan can be implemented.

Additionally, the results of inspections or tests will inform the owner/operator of any corrections or repairs that need to be made. Corrective action is necessary in order to prevent a discharge as described in §112.1(b) by ensuring that flowlines and intra-facility gathering lines are well maintained and by ensuring prompt corrective actions or repairs in response to conditions found during the inspection/testing of the flow and intra-facility gathering lines.

The Plan preparer certifying the Plan will typically establish the scope and frequency of inspections, tests, and preventive maintenance based on industry standards, manufacturer's recommendations, and other sources of good engineering practice. This guidance refers to selected relevant industry standards that describe methods used to test the integrity of piping, such as API 570[128] and ASME B31.4. While these standards are not specific to flowlines and intra-facility gathering lines, they may serve as guidance. There is currently no published industry standard for a flowline or intra-facility gathering line maintenance program; however, a standard may be developed in the future. If an industry standard is developed that meets all of the requirements described in §112.9(d)(4) then the PE may follow that standard when developing a flowline/intra-facility gathering line program for the facility.

Due to changes in flowrates and corrosivity of production fluids over time in an oil field, the frequency of inspection may need to change over the lifetime of the well in order to prevent discharges. For buried piping, a facility owner or operator should develop an inspection program to identify evidence of leaks at the surface or other conditions that may lead to a discharge to navigable waters or adjoining shorelines. The provisions for a flowline/intra-facility gathering line maintenance program in §112.9(d)(4) are eligible for environmental equivalence as discussed in more detail in *Chapter 3: Equivalence, Section 3.3.5.*

## 7.2.13 Inspection and Corrective Action Requirements at Offshore Facilities

For offshore facilities, the SPCC rule includes inspection requirements for oil collection equipment, sumps, pollution prevention equipment, and piping.

Section 112.11(b) requires that the facility include oil collection equipment to prevent and control small oil discharges and direct facility drains toward a central collection sump to prevent a discharge as described in §112.1(b). When drains and sumps are not practicable, oil must be removed from collection equipment as often as necessary to prevent an overflow. The facility owner/operator can use inspections as directed in §112.11(h) and (i) to determine the frequency of oil removal activities to prevent overflows from this collection equipment.

Facilities employing a sump system must provide adequately sized sump and drains; make available a spare pump to remove liquid from the sump and assure that oil does not escape; and employ a regularly scheduled preventive maintenance inspection and testing program to assure reliable operation of the liquid removal system and pump start-up device. Redundant automatic sump pumps and control devices may be required on some installations (§112.11(c)). In accordance with §112.11(h), the offshore facility owner/operator must prepare and maintain at the facility a written procedure within the Plan for inspecting and testing pollution prevention equipment and systems and then implement that procedure as directed in §112.11(i). The rule requires the owner or operator to conduct testing and inspection of the pollution prevention equipment and systems at the facility on a scheduled periodic basis, commensurate with the complexity, conditions, and circumstances of the facility and any other appropriate regulations and to use simulated discharges for testing and inspecting human and equipment pollution control and countermeasure systems.

128 API 570 3th Edition November 2009

Finally, the owner/operator must maintain sub-marine piping appurtenant to the facility in good operating condition at all times and inspect or test such piping for failures periodically and according to a schedule in accordance with §112.11(p).

**§112.11 Relevant sections**

(b) Use oil drainage collection equipment to prevent and control small oil discharges around pumps, glands, valves, flanges, expansion joints, hoses, drain lines, separators, treaters, tanks, and associated equipment. You must control and direct facility drains toward a central collection sump to prevent the facility from having a discharge as described in § 112.1(b). Where drains and sumps are not practicable, you must remove oil contained in collection equipment as often as necessary to prevent overflow.

(c) For facilities employing a sump system, provide adequately sized sump and drains and make available a spare pump to remove liquid from the sump and assure that oil does not escape. You must employ a regularly scheduled preventive maintenance inspection and testing program to assure reliable operation of the liquid removal system and pump start-up device. Redundant automatic sump pumps and control devices may be required on some installations.

(h) Prepare and maintain at the facility a written procedure within the Plan for inspecting and testing pollution prevention equipment and systems.

(i) Conduct testing and inspection of the pollution prevention equipment and systems at the facility on a scheduled periodic basis, commensurate with the complexity, conditions, and circumstances of the facility and any other appropriate regulations. You must use simulated discharges for testing and inspecting human and equipment pollution control and countermeasure systems.

(p) Maintain sub-marine piping appurtenant to the facility in good operating condition at all times. You must periodically and according to a schedule inspect or test such piping for failures. You must document and keep a record of such inspections or tests at the facility.

Note: The above text is only a brief excerpt of the rule. Refer to 40 CFR part 112 for the full text of the SPCC rule.

## 7.3 Role of Industry Standards and Recommended Practices in Meeting SPCC Requirements

The SPCC rule does not require the use of a specific industry standard for conducting inspections, evaluations, and integrity testing of bulk storage containers and other equipment at a facility. Rather, the rule provides flexibility in a facility owner/operator's use of industry standards to comply with the requirements, consistent with good engineering practice and as reviewed by the PE certifying the Plan.

To develop an appropriate inspection, evaluation, and testing program for an SPCC-regulated facility, the PE must consider applicable industry standards (§112.3(d)(1)(iii)). If the facility owner or operator indicates in the SPCC Plan that he intends to use a standard to comply with a particular rule requirement (e.g., integrity testing), then it is mandatory to implement the relevant portions of the standard (i.e., those that address integrity testing of the container). In this case, if the standard is more stringent than federal regulations (e.g., for recordkeeping retention requirements), the standard would take precedent. A summary is provided in *Table 7-5* later in this chapter to assist EPA inspectors in reviewing the relevance of particular industry standards to the equipment observed at an SPCC-regulated facility. The SPCC Plan should clearly identify the standard used to comply with the SPCC requirements. As required in §112. 5(b), facility owners/operators must review their SPCC Plan at least once every five years to include more effective prevention and control technology. This may provide an opportunity to consider revisions to industry standards and determine whether these revisions impact implementation of the SPCC Plan.

**Tip for Qualified Facilities**

The Plan preparer must ensure that the Plan is prepared in accordance with accepted and sound industry practices and standards; and that procedures for required inspections and testing are established in accordance with industry inspection and testing standards or recommended

Industry standards typically apply to containers built according to a specified design (API 653, for example, applies to tanks constructed in accordance with API 650 or API 12C specifications); the standards[129] describe the scope, frequency, and methods for evaluating the suitability of the containers for continued service. This assessment usually considers performance relative to specified minimum criteria, such as remaining shell thickness or ability to maintain pressure. The standards specify certain visual inspections, evaluations, assessments, and tests that must be performed by inspectors certified by the standard-setting organizations (e.g., American Petroleum Institute, Steel Tank Institute).

In the preamble to the 2002 SPCC rule amendments, EPA provided examples of industry standards that may constitute good engineering practice for assessing the integrity of different types of containers for oil storage (67 FR 47120, July 17, 2002). Compliance with other federal requirements and industry standards may also meet SPCC inspection, evaluation, and testing requirements. For example, the U.S. Department of Transportation (DOT) regulates containers used to transport hazardous materials, including certain oil products; mobile/portable containers that leave a facility are subject to the DOT construction and continuing qualification and maintenance requirements (49 CFR part 178 and 49 CFR part 180). Measures that comply with these DOT requirements may be used by the facility owner and operator and by the certifying PE as references of good engineering practice for assessing the fitness for service of mobile/portable containers.

*Table 7-2* summarizes key elements of industry standards and recommended practices commonly used for testing aboveground storage tanks (ASTs). *Table 7-3* summarizes key elements of standards and recommended practices used for testing piping and other equipment. *Section 7.7* provides a more detailed description of the standards listed in the tables. Other industry standards, beyond those detailed in this chapter, exist for specific equipment or purposes. Many of these are cross-referenced in API 653, including publications and standards from other organizations such as the American Society for Testing and Materials (ASTM), the American Society for Non-Destructive Testing (ASNT), and the American Society of Mechanical Engineers (ASME). Other organizations, such as the National Fire Protection Association (NFPA), the National Association of Corrosion Engineers (NACE), and the Underwriters Laboratory (UL), also provide critical information on various container types and appurtenances. Note that this Chapter reflects industry standards in effect at the time EPA revised this Guidance; however, industry standards are subject to change.

129 See *Section 7.7* of this chapter for more information on these publications.

**Table 7-2: Summary of industry standards and recommended practices (RP) for ASTs.**

| | **API 653**[130] | **STI SP001**[131] | **API RP 575**[132] | **API RP 12R1**[133] |
|---|---|---|---|---|
| Equipment covered | Field-fabricated, welded, or riveted ASTs operating at atmospheric pressure and built according to API 650 and API 12C. | ASTs including shop-fabricated and field-erected tanks and portable containers and containment systems with contents at atmospheric pressure and up to 200°F (93.3°C). | Atmospheric and low-pressure ASTs that have been in service. | Atmospheric ASTs employed in oil and gas production, treating, and processing. |
| Scope | Inspection and design; fitness for service; repair and alterations; risk. | Inspection and evaluation of ASTs. | Inspection and repair of tanks. | Setting, connecting, maintaining, operating, inspecting, and repairing tanks. |
| Inspection interval | *Certified inspections*: Dependent on tank's service history. Intervals from 5 to 30 years. *Owner inspections*: monthly. | *Certified inspections*: Inspection intervals and scope based on tank size and configuration. *Owner inspections*: monthly, quarterly, and yearly. | Same as API 653 and API RP 12R1. | Scheduled and unscheduled internal and external inspections conducted as per Table 1 and Table 2 of the Recommended Practice, based on tank conditions. |
| Inspection performed by | Authorized inspector, tank owner. | Certified inspector (either by API 653 with STI adjunct certification or STI) or owner's inspector. | Same as API 653. | Competent person or qualified inspector, as defined in recommended practice. |
| Applicable section of this Guidance | *Section 7.7.1* | *Section 7.7.2* | *Section 7.7.3* | *Section 7.7.5* |

130 API 653 4th Edition April 2009 Addendum 2 January 2012

131 STI SP001 5th Edition September 2011

132 API 575 2nd Edition May 2005

133 AP 12R1 5th Edition April 2008

**Table 7-3: Summary of industry standards and recommended practices (RP) for piping, valves, and appurtenances.**

| | **API 570**[134] | **API RP 574**[135] | **API RP 1110**[136] | **ASME B31.3**[137] | **ASME B31.4**[138] |
|---|---|---|---|---|---|
| Equipment covered | In-service aboveground and buried metallic piping | Piping, tubing, valves and fittings in petroleum refineries and chemical plants | Steel pipelines for the transportation of gas, petroleum gas, hazardous liquids, highly volatile liquids or carbon dioxide (pressure testing) | New process piping for oil, petrochemical, chemical, and other industries | Pressure piping for liquid hydrocarbons and other liquids |
| Scope | Inspection, repair, alteration, and rerating procedures | Inspection practices, intervals and records. | Planning, implementation and records and drawings for pressure testing | Safety requirements for design, construction and testing | Safe design, construction, inspection, testing, operation, and maintenance |
| Inspection interval | Based on possible forms of degradation and consequence of failure, maximum of 10 years | Based on five factors including consequences of a failure as classified by API 570 | Not specified | As part of quality assurance function. Differentiates between inspection and examination | Not specified |
| Inspection performed by | Authorized piping inspector | Authorized piping inspector | Qualified by both training and experience, considering six factors | Qualified Inspector, as defined in standard | Qualified Inspector, as defined in standard |
| Applicable section of this Guidance | *Section 7.7.6* | *Section 7.7.7* | *Section 7.7.8* | *Section 7.7.11* | *Section 7.7.13* |

134 API 570 3rd Edition November 2009

135 API 574 3rd Edition November 2009

136 API 1110 5th Edition June 2007

137 ASME B31.3 3rd Edition 2008

138 ASME B31.4 2006

## 7.4 Baselining

Industry standards, such as API 653 and STI SP001, contain minimum requirements to inspect aboveground containers and criteria to assess each container's suitability for continued service. The baseline and suitability evaluation provides information on the container's existing condition relative to the design metal thickness and the rate of metal loss from corrosion as well as the anticipated remaining service. Some facilities may not have yet performed integrity testing of their tanks. In this case, developing an appropriate integrity testing program will require assessing baseline conditions for these tanks. This "baseline" will provide information on the existing condition of the tank shell and tank bottom, or other factors, in order to establish a regular inspection schedule.

Section 112.7 of the rule requires that if any facilities, procedures, methods, or equipment are not yet fully operational, the SPCC Plan must explain the details of installation and operational start-up; this applies to the inspection and testing programs required by the rule. If an owner or operator has yet to implement the integrity testing program, the SPCC Plan should establish and document a schedule (in accordance with good engineering practice and the introductory paragraph of §112.7) that describes the projected implementation of the integrity testing program for the aboveground bulk storage containers at the facility. The owner or operator must then implement the inspection program in accordance with the SPCC Plan. The PE is responsible for determining the scope and frequency of testing when certifying, in accordance with §112.3(d), that the SPCC Plan is consistent with industry standards and is appropriate for the facility.

The implementation of the testing program should be in accordance with industry standards and establish appropriate inspection priorities among multiple containers at a facility. For instance, special consideration may be discussed in the Plan for containers for which the age and existing condition is not known (no baseline or only partial information exists); older containers; or those in more demanding service. These higher priority containers may be targeted for inspection in the schedule before other aboveground containers where the baseline information is known.

**Is a baseline necessary when the standard requires only visual inspections?**

No, if the industry standard only requires visual inspections for the container (e.g., certain shop-built containers) then a baseline is not necessary. The standard establishes a frequency for visual inspections rather than basing the interval on the container's corrosion rate. On the other hand, a baseline is necessary for most non-destructive testing protocols, because the container's corrosion rate impacts the frequency/interval of future formal integrity testing inspections.

Owners and operators need to refer to the particular industry standard identified in the SPCC Plan to determine the scope of inspection and testing requirements. For example, under the STI SP001 standard, visual inspection is allowed for portable containers such as drums and totes. A baseline determination of metal thickness of a portable container is not required prior to implementing the visual-only integrity testing inspection protocol.

This section provides guidance on integrity testing for circumstances the EPA inspector may encounter at an SPCC-regulated facility, i.e., aboveground bulk storage containers for which the baseline condition is known and aboveground bulk storage containers for which the baseline condition is *not* known.

### 7.4.1 Aboveground Bulk Storage Container for Which the Baseline Condition Is Known

In the case of tanks for which the baseline condition is known (e.g., the shell thickness and bottom thickness), the inspection, evaluation and testing schedule should occur at a scope and frequency based on industry standards (or a hybrid inspection program developed by a PE, as described in *Section 7.5.3*) per §112.8(c)(6) or §112.12(c)(6). There is an advantage to knowing the baseline condition of a tank, particularly the remaining wall thickness and bottom thickness. Only when the baseline is known can an inspection and testing program be established on a regular schedule. The inspection interval should be identified consistent with intervals specified in industry standards or should be based on the corrosion rate and expected remaining life of the container. This inspection interval must be documented in the Plan in accordance with §§112.3(d), 112.7(e), 112.8(c)(6), and 112.12(c)(6). API 653 is an example of an industry standard that directs the owner/operator to consider the remaining wall thickness and bottom thickness, and the established corrosion rates to determine an inspection interval for external and internal inspections and testing. In the case of a tank that is newly built, construction data (e.g., as-built drawings and/or manufacturers cut-sheets) may typically be used as an initial datum to establish wall and bottom thicknesses, and would be included in the established procedures for inspection and testing.

Inspection and testing standards may require visual inspection of both the exterior and interior of the container, and the use of another method of non-destructive evaluation depending on the type and configuration of the container. EPA inspectors should note that the scope and frequency of inspections and tests for shop-built tanks and field-erected tanks at an SPCC-regulated facility may vary due to the age of the tank, the configuration, and the applicable industry standard used as the reference. For example, the Plan preparer may choose to develop an inspection and testing program for the facility's shop-built containers in accordance with STI SP001, and may elect to develop a program for the facility's field-erected containers in accordance with API 653. As an alternative example, the Plan preparer may elect to develop a program in accordance with STI SP001 for both the facility's shop-built and field-erected containers, after determining that the containers are within the scope of the standard.

### 7.4.2 Aboveground Bulk Storage Container for Which the Baseline Condition Is Not Known

For a facility to comply with the requirement for integrity testing of containers on a regular schedule (§§112.8(c)(6) and 112.12(c)(6)), a baseline condition for each container is necessary to establish inspection intervals. However, for shop-built and field-erected containers for which construction history and wall and/or bottom plate thickness baselines *are not known,* it is not possible to establish a regular integrity testing program at the time the Plan is prepared. In this case, the Plan preparer must describe in the SPCC Plan an interim schedule (in accordance with the introductory paragraph of §112.7) that allows the facility to gather the baseline data to establish a regular schedule of integrity testing in accordance with §§112.8(c)(6) and 112.12(c)(6).

When a container has no prior inspection history or baseline information, the implementation of the baseline inspection program is important in order to assess the container's "suitability for continued service." Both API 653 and STI SP001 contain minimum requirements to inspect aboveground containers and criteria to assess a container's suitability for continued service. In some cases, where baseline information is not known, the testing program may include two data collection periods, one to establish a baseline of the container's existing shell and bottom plate thickness, and a second inspection to establish corrosion rates in order to develop the next inspection interval. These inspection intervals establish the frequency of the 'regular schedule' required for testing under the SPCC rule.

When no or only partial baseline information is available for a container at the facility, then the owner/operator should schedule integrity testing in accordance with industry standards as soon as possible and in accordance with both good engineering practice and the judgment of the certifying PE.[139] Because the SPCC Plan must be reviewed at the facility every five years in accordance with §112.5(b), the owner or operator of the facility should consider to begin collecting inspection data during the next five year period. As an example, a facility owner/operator is scheduling upcoming inspections for bulk storage containers at a facility he recently purchased. The owner/operator has no records of inspections or information on the in-service date (i.e. original construction date) for a 10,000-gallon aboveground storage container at the facility. The SPCC Plan was last amended on November 10, 2011. Therefore, in order to establish a baseline for the 10,000-gallon AST, the facility owner schedules the first (baseline) container inspection or integrity test by November 10, 2016.

Example baselining plans are presented in *Figure 7-1* and *Figure 7-2*. The examples present simple scenarios and are only provided as an illustration of some of the factors that may be considered when determining a schedule to initiate inspections of bulk storage containers.

139 If the owner or operator of a Tier II qualified facility is not familiar with inspection standards, then he should consult with a tank inspection professional or PE to establish an inspection schedule.

**Figure 7-1: Example baselining plan to determine the integrity testing and inspection schedule using API 653.**

**Scenario**: A facility has three aboveground atmospheric, mild-carbon steel tanks of different ages and conditions. One has a prior inspection history; the others have never been inspected. Although there is limited history available regarding tank construction, the tanks are presumed to be field-erected tanks and to each have 100,000 gallons in storage capacity. The SPCC Plan was amended on November 10, 2011 and API 653 is the referenced inspection standard. What is an appropriate inspection schedule for these tanks?

**Additional information:** API 653 recommends a formal visual inspection* every 5 years or ¼ of corrosion rate, whichever is less, and a non-destructive shell test (UT) within 15 years or ½ of corrosion rate, whichever is less. If corrosion rates are not known, the maximum interval for a UT inspection is 5 years. For internal inspection, the interval from initial service to the initial inspection shall not exceed 10 years, or longer if certain tank safeguards are in place. Subsequent internal inspection intervals are based on corrosion rate shall not exceed 20 years for tanks without a release prevention barrier and 30 years for tanks with a release prevention barrier or at an inspection interval determined using risk-based inspection assessment. If the construction date and date of last inspection are unknown, the compliance date of the regulation should determine the starting point for an integrity testing schedule. The first inspection must occur within 5 years of the compliance date or a lesser period of time as determined by a PE in cases where there is higher risk.

**Determination of inspection schedule:**

| | Construction Date | Last External and Internal Inspection | Next Inspection (External) | Next Inspection (Internal) |
|---|---|---|---|---|
| **Tank 1** | unknown | none | formal visual and shell test (external) before November 10, 2016 | formal (internal) bottom inspection before November 10, 2016 |
| **Tank 2** | 2008 | none | **2013** for both visual inspection and non-destructive shell test** | **2018** or longer if cathodic protection or other safeguards are in place |
| **Tank 3** | 1984 | **Last External:** Inspections conducted in 1999, 2004, and 2009 **Last Internal:** 1999 | **2014** for formal visual** **2014** non-destructive shell test. Both intervals may be decreased based on calculated corrosion rates from the 1999 inspection. | **2029** if the tank has a release prevention barrier, **2019** if the tank does not have a release prevention barrier or sooner based on corrosion rates from the 1999 inspection or as determined from risk-based inspection assessment |

* A formal visual inspection is one conducted by a certified inspector.

** Inspection should be conducted as soon as possible and in consultation with a PE.

Note: Actual inspection schedule is ultimately an engineering determination made by the PE, based on industry standards, and is certified in the Plan. Other events or factors that occur during the life of the container could cause the owner/operator to revise the inspection interval originally calculated.

**Figure 7-2: Example baselining plan to determine the integrity testing and inspection schedule using STI SP001.**

**Scenario**: A facility has four aboveground atmospheric, mild-carbon steel tanks of different ages and conditions. One has a prior inspection history; the others have never been inspected. The tanks are shop-fabricated. Tanks 1, 2 and 3 have 40,000 gallons in storage capacity and Tank 4 has 10,000 gallons in capacity. The SPCC Plan was amended on November 10, 2011 and STI SP001 is the referenced inspection standard. What is an appropriate inspection schedule for these tanks?

**Additional information**: Tanks 1, 2 and 3 are in Category 3 of STI SP001 (i.e., do not have spill control or a continuous release detection method, or CRDM). In addition to periodic inspections recommended by the standard for all tanks, for tanks in Category 3 STI SP001 recommends that a formal external inspection,* as well as a leak test by owner be conducted at a maximum of 5-year intervals, and that a formal internal inspection* be conducted at 10-year intervals. Tank 4 is in Category 1 of STI SP001 (i.e., has spill control and CRDM). For this tank, STI SP001 recommends that a formal external inspection be conducted by a certified inspector at a maximum of 20-year intervals. No formal internal inspection or leak test is required.

If the construction date and date of last inspection are unknown, the compliance date of the regulation should determine the starting point for an integrity testing schedule. The first inspection must occur within 5 years of the compliance date or a lesser period of time as determined by a PE in cases where there is higher risk.

**Determination of inspection schedule:**

| | Construction Date (in service date) | Last External and Internal Inspection | Next Inspection (External) | Next Inspection (Internal) |
|---|---|---|---|---|
| **Tank 1** | unknown | none | Formal external inspection and leak testing before November 10, 2016 | Formal internal inspection before November 10, 2016 |
| **Tank 2** | 2004 | none | **2009** for formal external inspection and leak testing** | **2014** for formal internal inspection |
| **Tank 3** | 1984 | 2005 | **2010** for formal external inspection and leak testing** | **2015** for formal internal inspection* |
| **Tank 4** | 2002 | none | **2022** for formal external inspection | Not required |

* A formal inspection is one conducted by a certified inspector.

**Inspection should be conducted as soon as possible and in consultation with a PE.

Note: Actual inspection schedule is ultimately an engineering determination made by the PE, based on industry standards, and is certified in the Plan. Other events or factors that occur during the life of the container could cause the owner/operator to revise the inspection interval originally calculated.

## 7.5 Specific Circumstances

Integrity testing in accordance with industry standards is required for all aboveground bulk storage containers located at onshore facilities (except oil production facilities), unless the facility owner/operator implements an environmentally equivalent method according to §112.7(a)(2) and documents the deviation in the SPCC Plan (see *Chapter 3: Environmental Equivalence*). This section provides guidance on integrity testing for the following circumstances that an EPA inspector may encounter at an SPCC-regulated facility:

- Integrity testing scenarios for shop-built containers; and
- Using environmentally equivalent alternatives for integrity testing.

This is not a comprehensive list of circumstances. For these and other cases, a PE may recommend alternative approaches.

### 7.5.1 Integrity Testing Scenarios for Shop-built Containers

**Scenario 1: Mobile or Portable Bulk Storage Containers**

Industry standards (such as STI SP001) refer to specific conditions for which visual inspection alone is an appropriate method for verifying the integrity of certain smaller shop-built containers (e.g., portable containers such as drums and totes). These conditions include container type, size, and configuration (such as whether the container is in contact with the ground or has appropriate secondary containment). For example, according to STI SP001, when portable containers have adequate secondary containment then visual inspection of these containers is acceptable and will satisfy the integrity testing requirements of the rule at §112.8(c)(6).

**Scenario 2: Single-Use Mobile or Portable Containers.**

For containers that are single-use and for dispensing only (i.e., the container is not refilled), industry standards such as STI SP001 may require only visual examination by the owner/operator. Since these containers are single-use, other types of integrity testing such as internal or comparative integrity testing for corrosion are generally not appropriate because the containers are not maintained on-site for a long enough period of time that degradation and deterioration of the container's integrity might occur. Single-use containers (e.g., 55-gallon drums) typically are returned to the vendor, recycled, or disposed of in accordance with applicable regulations. Good engineering practices for single-use containers should be identified in the Plan, and these practices should follow industry standards and ensure that the conditions of storage or use of a container do not subject it to potential corrosion or other conditions that may compromise its integrity in its single-use lifetime.

**Scenario 3: Elevated Large Shop-built Containers**

The SPCC rule requires that inspections be in accordance with industry standards. Under certain circumstances the standards may stipulate that visual inspection alone will suffice. However, for tanks larger than 5,000 gallons, most industry standards require more than a visual inspection by the owner or operator.

The previous version of this Guidance[140] published in 2005 described an example considered environmentally equivalent to the integrity testing requirements of the SPCC rule at that time. The example described visual inspection plus certain additional actions to ensure the containment and detection of leaks as appropriate for bulk oil storage containers with a capacity up to 30,000 gallons. This example was based on a policy that described the environmental equivalence flexibility available to a PE with respect to integrity testing in a letter to the Petroleum Marketers Association of America (PMAA).[141]

**Figure 7-3: Shop-built containers elevated on saddles.**

This example was established at a time when the rule specifically required that integrity testing include more than just a visual inspection. While the approach for the use of environmental equivalence described in this letter is still valid, EPA revised the integrity testing provision in 2008 to allow inspection requirements outlined in industry standards to be used without the need for environmental equivalence determinations certified by a PE. After EPA wrote the letter to PMAA in 2004, a major industry standard for integrity testing (STI SP001) was modified to outline ‘‘good engineering practice’’ for integrity testing of shop-built containers. This may affect a PE’s decision whether to certify an environmentally equivalent approach as described in the PMAA letter, or to follow an applicable industry standard without having to certify the measures described in the PMAA letter as an environmentally equivalent method of integrity testing.

If an owner or operator deviates from applicable industry standards to develop an integrity testing program, then a PE must certify an environmentally equivalent alternative in the SPCC Plan. The Plan must provide the reason for the deviation, describe the alternative approach, and explain how it achieves environmental protection equivalent to the applicable industry standard.

**Scenario 4: Shop-built Containers Placed on a Liner**

Certain industry standards, such as STI SP001, also specify differentiated inspection practices for certain shop-built containers that are placed on a barrier or liner and where this barrier is designed in a way that ensures that any leaks are immediately detected. The size of the container and other site-specific factors determine appropriate inspection or testing procedures and frequencies.

**Scenario 5: Double-walled Tanks or Containers**

A double-walled tank is essentially a tank within another tank, equipped with an interstitial (i.e., annular) space and constructed in accordance with industry standards. The inner tank serves as the primary oil storage container while the outer tank serves as secondary containment. The outer tank of a double-walled tank

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140 *SPCC Guidance for Regional Inspectors*, Version 1.0, November 28, 2005.

141 Letter to Daniel Gilligan, President, Petroleum Marketers Association of America, from Marianne Lamont Horinko, Assistant Administrator, Office of Solid Waste and Emergency Response, EPA, May 25, 2004 (available in *Appendix H* of this document).

may provide adequate secondary containment for discharges resulting from leaks or ruptures of the entire capacity of the inner storage tank.

Section 112.8(c)(6) requires the owner or operator to conduct integrity testing on a regular schedule and whenever he makes repairs. One possible advantage of a double-walled shop fabricated aboveground tank is that industry standards (such as STI SP001[142]) may specify a less stringent program for integrity testing during the life of the container. However, note that industry standards may specify more stringent integrity testing requirements for double-walled tanks not equipped with an interstitial space (e.g., formal non-destructive testing).

Section 112.8(c)(6) also requires that the owner or operator frequently inspect the outside of the container for signs of deterioration, discharges, or accumulation of oil inside diked areas (for a double-walled tank, this inspection requirement applies to the inner tank). To comply with the requirement to frequently inspect the outside of the tank, an owner or operator must inspect the interstitial spaces of a shop-built double-wall AST. Typically this is accomplished by an inspection port (which can be visually inspected or used in conjunction with a dip stick, camera, or visual leak indicator), a drain plug, sensors or other equivalent means to detect a discharge into the interstitial (annular) space from the inner primary container. EPA recommends the use of automatic detection devices to detect discharges into the interstitial space. Once a discharge is discovered in the interstice, corrective action is typically required by industry standards. After a discharge to the interstitial space has occurred, the system is no longer operating as a double-walled tank (because the external tank is serving as the primary container unless and until appropriate repairs are made in accordance with the applicable industry standard).

Owners or operators should conduct integrity testing and inspections in accordance with industry standards, when applicable. One industry standard to consider is "SP001, Standard for Inspection of In-Service Shop-Fabricated Aboveground Tanks for Storage of Combustible and Flammable Liquids."

For more information on secondary containment requirements for double-walled tanks see *Chapter 4: Secondary Containment and Impracticability, Section 4.4.5.*

### 7.5.2 Integrity Testing and Inspection Requirements for Bulk Storage Containers at Onshore Facilities – Environmental Equivalence

In December 2008, EPA amended the requirements at §§112.8(c)(6) and 112.12(c)(6) to provide flexibility in complying with the bulk storage container integrity testing requirements. EPA modified the provision to allow an owner or operator to consult and rely on industry standards to determine the appropriate qualifications for personnel performing tests and inspections, as well as the type and frequency of integrity testing required for a particular container size and configuration.

The integrity testing requirements are subject to the environmental equivalence provision, but given the increased flexibility, there may be few, if any, instances where a PE would determine that a deviation is

[142] SP001 Standard for the Inspection of Aboveground Storage Tanks, 5th Edition, Issued September 2011.

appropriate. This is because the rule allows inspection requirements outlined in industry standards to be used without the need for environmental equivalence determinations certified by a PE (see 73 FR 74265, December 5, 2008).

As with other requirements eligible for environmental equivalence provision, a facility owner or operator may not rely solely on measures that are required by other sections of the rule (e.g., secondary containment) to provide "equivalent environmental protection" for integrity testing required under §112.8(c)(6) or §112.12(c)(6). Otherwise, the deviation provision would allow for approaches that provide a lesser degree of protection overall.

In any case where the owner or operator of a facility uses an alternative means of meeting the integrity testing requirement of §112.8(c)(6) or §112.12(c)(6), the SPCC Plan must provide the reason for the deviation, describe the alternative approach, which is most likely to be a site-specific inspection program (i.e., hybrid inspection program), and explain how it achieves equivalent environmental protection (§112.7(a)(2)), while considering good engineering practice and industry standards. In cases where industry standards apply to a container, the PE would need to explain how an inspection or test that deviates from an applicable industry standard is environmentally equivalent to following established industry standards and how it will be implemented in the field. This determination is site-specific and based on good engineering practice as determined by the certifying PE. The hybrid inspection program should include the recommended minimal elements described in *Section 7.5.3* for a PE-developed site-specific integrity testing program. *Figure 7-4* provides a summary of integrity testing and inspection program documentation for bulk storage containers at onshore facilities, by type of SPCC Plan and standard applicability case.

The following sections describe situations in which a hybrid inspection program is developed to comply with the bulk storage container inspection requirements of §§112.8(c)(6) and 112.12(c)(6).

**Hybrid Inspection Program Rather than an Applicable Industry Standard**

Although the rule requires that the Plan preparer consider industry standards when developing an inspection program, the SPCC Plan can include an environmentally equivalent (i.e., hybrid) inspection program when the owner or operator and the certifying PE determine that another inspection approach would be more appropriate or cost effective, based on site-specific factors. The SPCC Plan must include the reason for deviating from the rule requirements, and describe the alternative method in detail, including how it is environmentally equivalent.

An environmentally equivalent approach to following the applicable industry standard verbatim may be a hybrid inspection program that is based on elements designed to minimize the risk of container failure and allow detection of leaks before they impact navigable waters or adjoining shorelines. These elements may be based on a combination of various industry standards and good engineering practice and should include the recommended minimal elements described in *Section 7.5.3* for a PE-developed site-specific integrity testing program (or hybrid inspection program). Alternative measures may, for example, prevent container failure by minimizing the container's exposure to conditions that promote corrosion (e.g., direct contact with soil), or they may enable facility personnel to detect leaks and other container integrity problems early so these problems can be addressed before more severe integrity failure occurs. The ability to use an environmentally equivalent alternative to integrity testing in accordance with an applicable industry standard may be influenced by the tank configuration and adequacy of secondary containment. The facility owner/operator may determine that alternatives to inspection frequency and type of testing and inspections may be more appropriate according to site-specific conditions.

If a Tier II qualified facility owner or operator chooses to develop an alternative inspection program rather than follow an applicable industry standard, then he must have a PE certify the environmentally equivalent measures as described in §112.6(b)(4). A Tier I qualified facility owner or operator cannot deviate from applicable industry standards when following the requirements for Tier I qualified facilities in §112.6(a).

**Hybrid Inspection Program that Deviates from a Portion of an Industry Standard**

It may be appropriate to deviate from portions of an industry standard under certain circumstances. Although the Plan preparer must determine, in accordance with industry standards, the appropriate qualifications for personnel performing tests and inspections, and the frequency and type of testing and inspections when developing the inspection and/or testing program, the inspection program can deviate from a portion of a standard when another approach would be more appropriate or cost effective, based on site-specific factors. The SPCC Plan must document the environmentally equivalent alternative, the reason for deviating from the rule requirement, and describe the alternative method in detail, including how it is environmentally equivalent.[143] The PE should document in the Plan what industry standard applies, how the hybrid inspection program deviates from the applicable industry standard, and how the inspection program meets the minimal recommended elements described in *Section 7.5.3*.

If a Tier II qualified facility owner or operator chooses to deviate from a portion of an applicable industry standard, then he must have a PE certify the environmentally equivalent measures as described in §112.6(b)(4). A Tier I qualified facility owner or operator cannot deviate from applicable industry standards when following the requirements for Tier I qualified facilities in §112.6(a).

**No Applicable Industry Standard – Hybrid Inspection Program Established**

Industry standards are often developed to address a particular industry sector or type of container or equipment. The scope of a standard may limit how it should be applied by specifying the type of containers or equipment, their service conditions, the specific gravity of stored products, or other factors. Two commonly used steel tank inspection standards are STI SP001[144] and API 653.[145] The scope of these two standards addresses many of the steel storage tanks in service at SPCC-regulated facilities and it is likely that one of these inspection standards can be applied. However, if in the judgment of a PE or qualified facility owner/operator, no industry standard applies to a particular container, then the Plan preparer should consider the manufacturer's

143 See 73 FR 74264 (December 5, 2008)

144 STI Standard SP-001, "Standard for the Inspection of Aboveground Storage Tanks," 5th Edition September 2011.

145 API Standard 653, "Tank Inspection, Repair, Alteration, and Reconstruction," Fourth Edition, American Petroleum Institute, April 2009 Addendum 2 January 2012.

specifications and instructions for the proper use and maintenance of the equipment, appurtenance, or container. If no industry standards or manufacturer's instructions apply, the Plan preparer may also call upon his/her professional experience and/or consult with tank inspection professionals to develop site-specific inspection and testing requirements for the facility or equipment that are in accordance with good engineering practice and document them in the Plan.

A customized, site-specific inspection program (i.e., hybrid inspection program) should be based on relevant industry standards (in whole or in part) and other good engineering principles. The hybrid inspection program should be designed to measure the structural soundness of a container shell, bottom, and/or floor to contain oil, and may include leak testing to determine whether the container will discharge oil. API 653 and STI SP001 provide the foundation for integrity testing and inspecting containers, and in many cases it may still be appropriate to consider these standards when developing a hybrid inspection program.

A PE does not need to provide and certify an environmental equivalence justification for implementing a hybrid inspection program when industry standards do not apply to a container or the container is outside the scope of the standard. However, the PE attests in the Plan certification that required inspections and testing have been established and that the Plan has been prepared in accordance with good engineering practice, including applicable industry standards. The PE should document in the Plan why current industry standards do not apply and how the hybrid inspection program meets the minimal recommended elements described in *Section 7.5.3*.

> **Tip – AFVO containers and tanks operated at elevated temperatures**
>
> Although existing industry standards are not specific to integrity testing of AFVO bulk storage containers or tanks operated at elevated temperatures (e.g. asphalt), facilities with these storage containers can follow API Standard 653, "Tank Inspection, Repair, Alteration, and Reconstruction" because the scope is written broadly to include any steel tank constructed in accordance with a tank specification.

The Plan must describe the procedures for this inspection program and the facility owner or operator must keep a record of inspections and tests for three years. Industry standards often advise that records for formal inspections and tests be maintained for the life of the container. These records can be helpful to inform changes in the inspection program.

It is unlikely that qualified facility owner/operators will have bulk storage containers for which no industry standard applies. However, if a qualified facility owner or operator determines that no industry standard applies, then he should follow the procedures described above to develop an inspection program for bulk storage containers. No environmental equivalence determination is necessary in this case and a PE does not need to certify the hybrid inspection program. However, a qualified facility owner/ operator who develops a hybrid inspection program should consider consulting with a tank inspection professional or a PE. The qualified facility owner/operator should also clearly explain why current industry standards do not apply and how the hybrid inspection program meets the minimal recommended elements described in *Section 7.5.3*.

**AFVO Bulk Storage Containers**

The inspection and/or testing requirements for AFVO at §112.12(c)(6)(i) are identical to those described at §112.8(c)(6). The SPCC rule also provides differentiated, more flexible, alternative inspection requirements at

§112.12(c)(6)(ii) for AFVO containers that meet certain criteria (see *Section 7.2.4*). A facility owner/operator with AFVO bulk storage containers may follow an applicable industry standard, such as API 653, to conduct inspections in accordance with the requirements of §112.12(c)(6)(i), follow the requirements of §112.12(c)(6)(ii) (if applicable), or provide an environmentally equivalent measure in the SPCC Plan in accordance with §112.7(a)(2) of the SPCC rule.

The facility owner or operator has flexibility to make an environmental equivalence determination, in accordance with §112.7(a)(2), to address those bulk storage containers that have alternative configurations and meet the intent of the criteria in §112.12(c)(6)(ii) to minimize internal and external corrosion of the container and allow personnel to visually identify a discharge. For example, the criteria in §112.12(c)(6)(ii) requires that bulk storage containers be subject to 21 CFR part 110. However, bulk storage containers that store food oil and are built according to industry standards (such as 3–A Sanitary Standards) may have additional design features to minimize internal and external corrosion of the container and allow for visual detection of a discharge that provide equivalent environmental protection to 21 CFR part 110. Container configurations built according to 3–A Sanitary Standards typically include “manholes” that facilitate complete access for examination of the entire internal surface. These containers also typically have an outer shell (i.e., a double wall) that is sealed completely such as with completely welded seams so that the container integrity is maintained because insulation is less likely to be exposed to moisture.

If a hybrid inspection program is used to meet the integrity testing requirements in §112.12(c)(6), the Plan must state the reasons for nonconformance and explain how the hybrid inspection program provides equivalent environmental protection. The Plan should also address how the program effectively minimizes the risk of container failure and allows detection of leaks before they become significant.

A PE must review and certify the environmental equivalence determination. If a PE develops a hybrid inspection program for a facility, rather than uses an applicable industry standard, then the PE must describe why the hybrid inspection program does not follow the applicable industry consensus standard and how the hybrid inspection program is environmentally equivalent to the industry standard and meets the minimal recommended elements described in *Section 7.5.3*.

### 7.5.3 Suggested Minimum Elements for a PE-Developed Site-Specific Integrity Testing Program (Hybrid Inspection Program)

Although EPA requires inspection, evaluation, and testing in accordance with industry standards, it does not require that inspections and tests be performed according to a specific standard. Consistent with the environmental equivalence provision in §112.7(a)(2), the PE may use industry standards along with other good engineering practices to develop a customized inspection and testing program for the facility (a “hybrid” inspection program), considering the equipment type and condition, characteristics of products stored and handled at the facility, and other site-specific factors. The PE may also develop a hybrid program in the rare cases where industry standards do not apply to a container. The hybrid program should be designed to measure the structural soundness of a container shell, bottom, and/or floor to contain oil, and may include leak testing to determine whether the container will discharge oil. The components of a hybrid inspection program would likely include frequent visual inspections by the owner as well as periodic formal inspections (plus integrity testing, as appropriate) by a certified inspector. Alternatively, the PE can recommend an inspection program following a specific standard, even when the standard does not specifically identify the container in its scope, if he believes that the inspection elements of that standard are appropriate for the container(s) at the facility and in accordance with good engineering practices.

Any hybrid inspection program should include an evaluation of the principal elements that would cause a tank to fail, and how the inspection program addresses finding such conditions, or prevents such conditions from continuing to the point of failure. For example, internal and external corrosion conditions must be considered, and a testing method developed to assure that the condition is identified and measured. Conditions that may lead to a structural failure, for example a failing foundation, should be identified and evaluation methods developed to identify the condition. In all cases, careful consideration should be given to discovering such conditions that may not be identifiable from visual examination, such as the bottom of floor plates. Hybrid programs should also include evaluation of container modifications made since last examination that may degrade integrity or lead to failure.

The following is a partial list of items to consider regarding the elements of a hybrid inspection program.

**1) For shop-built tanks:**

- Visually inspect exterior of tank;
- Evaluate external pitting;
- Evaluate hoop stress and longitudinal stress risks where corrosion of the shell is present;
- Evaluate condition and operation of appurtenances;
- Evaluate welds;
- Establish corrosion rates and determine the inspection interval and suitability for continued service;
- Evaluate tank bottom where it is in contact with ground and no cathodic protection is provided;
- Evaluate the structural integrity of the foundation;
- Evaluate anchor bolts in areas where required; and
- Evaluate the tank to determine whether it is hydraulically sound and not leaking.

**2) For field-erected tanks:**

- Evaluate foundation;
- Evaluate settlement;

- Determine safe product fill height;
- Determine shell corrosion rate and remaining life;
- Determine bottom corrosion rate and remaining life;
- Determine the inspection interval and suitability for continued service;
- Evaluate welds;
- Evaluate coatings and linings;
- Evaluate repairs for risk of brittle fracture; and
- Evaluate the tank to determine whether it is hydraulically sound and not leaking.

EPA suggests that an appropriately trained and qualified inspector conduct a hybrid inspection and provide a detailed report of the findings. The qualifications of the tank inspector will depend on the condition and circumstances of the tank (e.g., size, field-erected or shop-built), and a tank inspector should only conduct an inspection to the extent he/she is qualified to do so. A registered PE may be able to perform the hybrid inspection or could have a certified tank inspector (e.g., STI or API) complete the inspection.[146] Either way, the hybrid inspection program should be reviewed and certified by a PE in accordance with §112.3(d) (or §112.6(b)(4) for Tier II qualified facilities).

EPA inspectors may review checklists that are used by facility personnel to conduct the frequent inspections. *Table 7-4* provides an example of the type of information that may be included on an owner/operator-performed inspection checklist.

[146] Note that industry inspection standards require the inspector's certification number on these reports.

**Table 7-4: Owner/Operator tank inspection checklist (from Appendix F of 40 CFR part 112).**

| | | |
|---|---|---|
| I. | Check tanks for leaks, specifically looking for: | |
| | A. | Drip marks; |
| | B. | Discoloration of tanks; |
| | C. | Puddles containing spilled or leaked material; |
| | D. | Corrosion; |
| | E. | Cracks; and |
| | F. | Localized dead vegetation. |
| II. | Check foundation for: | |
| | A. | Cracks; |
| | B. | Discoloration; |
| | C. | Puddles containing spilled or leaked material; |
| | D. | Settling; |
| | E. | Gaps between tank and foundation; and |
| | F. | Damage caused by vegetation roots. |
| III. | Check piping for: | |
| | A. | Droplets of stored material; |
| | B. | Discoloration; |
| | C. | Corrosion; |
| | D. | Bowing of pipe between supports; |
| | E. | Evidence of stored material seepage from valves or seals; and |
| | F. | Localized dead vegetation. |

## 7.6 Documentation Requirements and Role of the EPA Inspector

When evaluating the SPCC Plan the EPA inspector will need to review the scope of the inspection program identified in the Plan and determine whether the facility owner/operator is implementing the program as described. Additionally, if there have been any changes or alterations to bulk storage containers at the facility, the EPA inspector will need to identify whether those alterations were performed in accordance with industry standards and whether additional evaluations were conducted and documented.

### 7.6.1 Evaluating Tank Re-Rating Alterations

Chapter 2: SPCC Rule Applicability, Section 2.7.3 describes how to calculate the storage capacity for bulk storage containers and discusses appropriate methods for altering the capacity of a bulk storage container (i.e., tank re-rating). Re-rating a tank's storage capacity is permitted when the alteration is completed in accordance with applicable industry standards and good engineering practice. As discussed in Chapter 2: SPCC Rule Applicability, Section 2.7.3, any container alteration will require a technical amendment to the SPCC Plan certified by a PE in accordance with §112.5. Additionally, tank alterations which change the original shell capacity may affect secondary containment capacity necessary to comply with SPCC requirements and FRP applicability and requirements under 40 CFR part 112 subpart D. Any subsequent changes to the shell capacity (e.g., to increase capacity) will require a re-assessment of SPCC compliance and FRP applicability.

Since this type of alteration may have a significant impact on secondary containment capacity, compliance with SPCC rule requirements, and FRP applicability, the EPA inspector must carefully review these alterations. This review should consider relevant SPCC requirements and Plan documentation, industry standards, records, and field observations as described below.

**Relevant SPCC Requirements and Plan Documentation:**

The EPA inspector should consider the following questions when evaluating whether the SPCC Plan appropriately addresses tank alterations completed at the facility:

- Do all relevant sections of the SPCC Plan reflect the current container capacity and was the technical amendment to the Plan documented and certified by a PE?
  - The certifying PE must sign an amendment to the SPCC Plan. As part of this certification, the PE verifies that the modifications to the tank (e.g., installation of overflow ports or new tank bottom) were done in accordance with industry standards and identifies the standard used (e.g., API 653).
- Have operating procedures that may be affected by the alteration been updated in the Plan to reflect the current tank capacity?
- If the alteration includes an overflow nozzle and the associated overflow pipe is equipped with a valve,[147] does the Plan clearly explain the purpose of the valve and identify the reasons the valve may be closed, including any implications for 40 CFR part 112 requirements when the valve is closed and the capacity of the tank reverts to a larger capacity? Each time the valve is closed, was a technical amendment of the SPCC Plan completed to address:
  - Revised tank capacity;
  - Adequacy of secondary containment capacity; and

[147] A valve is not recommended unless otherwise required by code.

- Updates to tank transfer procedures (to identify change in maximum capacity of the tank), facility diagram, tank information and any other relevant SPCC requirements.

- Additionally, has the facility owner/operator determined FRP applicability based on tank capacity when the valve is both open and closed? If the facility is FRP-subject when the valve is closed then was an FRP submitted to the EPA regional office?

**Relevant Industry Standards:**

API Standard 650, *Welded Tanks for Oil Storage*,[148] and API Standard 653, *Tank Inspection, Repair, Alteration, and Reconstruction,*[149] include specifications for tank construction and inspections (respectively) that are relevant when re-rating a tank. When evaluating a tank that has been re-rated to a lower storage capacity, the EPA inspector should verify that the documentation of the tank alterations describe conformance with industry standards, which stipulate the following:[150]

API 650 Specifications:

- When emergency overflow slots are used, the overflow slots are covered with a corrosion-resistant coarse-mesh screen and provided with weather shields (the closed area of the screen must be deducted to determine the net open area).

- The overflow slots are sized to discharge at the pump-in rates for the tank. Overflow discharge rates were determined by using the net open area (less screen) and using a product level (for determining head pressure) not exceeding the top of the overflow opening.

- The floating-roof seal does not interfere with the operation of the emergency overflow openings.

- Overflow slots are not placed over the stairway or nozzles unless restricted by tank diameter/height or unless overflow piping, collection headers, or troughs are specified by the Purchaser [e.g., facility owner/operator] to divert flow.

API 653 Specifications:

API 653 provides requirements on installing new penetrations (such as a nozzle) in existing tanks. The standard requires:

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148 API Standard 650, "Welded Tanks for Oil Storage," Eleventh Edition, American Petroleum Institute, June 2007 Addendum 3 August 2011, Errata, October 2011.

149 API Standard 653, "Tank Inspection, Repair, Alteration, and Reconstruction," Fourth Edition, American Petroleum Institute, April 2009 Addendum 2 January 2012.

150 Please note that these are summaries. EPA inspectors should refer to the full text of the relevant industry standards when conducting an evaluation of a tank alteration.

- All design, work execution, materials, welding procedures, examination, and testing methods be approved by the authorized inspector or by an engineer experienced in storage tank design.

- New shell penetrations (i.e. nozzles) be in accordance with material, design, and stress relief requirements of API 650, and in accordance with relevant portions of API 653.

- Proper spacing of welds.

- Examinations be performed in accordance with the standard:

  - Penetrations (i.e. nozzles) located on a shell joint must receive additional shell radiography in accordance with API 650.
  - Nozzle neck to shell welds and reinforcing plate to shell and nozzle neck welds must be examined by magnetic particle or liquid penetrant examination.

- When penetrations are installed using insert plates as described in the standard, the completed butt welds between the insert plate and the shell plate must be fully radiographed.

- If the shell course where the nozzle is installed is thicker than ½ inch and shell material does not meet current API 650 and API 653 design metal temperature the overflow nozzle must be installed with an insert plate.

**Records:**

When an EPA inspector is evaluating a tank that has been re-rated to a lower storage capacity, the EPA inspector should request/review the following records:

- Documentation from a PE that the overflow port is sized based on filling the tank (i.e., fill rate) without substantially increasing the liquid level above the bottom of the overflow opening and is in accordance with API 653;

- Documentation in the owner/operator records on what modifications were made and when, and the maximum liquid level;

- Records that the overflow was inspected by an API 653 certified inspector or reviewed by a tank engineer;

- Documentation on materials, welding procedure, examinations, and testing methods; and

- Records required by the standards. API 653 requires that records of alterations be kept on file. When a tank is evaluated, repaired, altered, or reconstructed the following documentation is maintained in the owner/operators' tank records:

  - Calculations on the following:

- Evaluation of the component for integrity, including brittle fracture considerations;
- Re-rating (including liquid level); and
- Repair and alteration considerations.

- Supporting Data (as applicable):

  - Inspections;
  - Material test report/certifications;
  - Tests;
  - Radiographs;
  - Brittle fracture considerations; and
  - Construction completion record.

**EPA Inspector Field Observations:**

When an EPA inspector is evaluating a tank in the field that has been re-rated to a lower storage capacity, the EPA inspector should look for the following:

- Is the overflow port away from shell welds? When the shell plate, where the nozzle is located, is less than or equal to ½ inch thick, the required spacing is 6 inches from vertical welds and 3 inches from horizontal welds. Other spacing is required for thicker shell plates.
- If the overflow port is a nozzle, the nozzle must have a reinforcing plate or be installed with a thickened insert plate.
- If the overflow nozzle has an overflow pipe, check that it is supported from the shell.
- Check to see if the overflow port's circumference appears proportional to the circumference of the piping supplying the tank with product.
- Does there appear to be a blank flange (skillet) installed between the nozzle and the overflow pipe or any flange along the overflow pipe? This could be difficult to view from ground level, but if a gap exists between the nozzle flange and the overflow pipe fitting or between two flanges along the piping, ask the owner/operator if the alteration has been modified.

The tank may have a new nameplate indicating what modifications were made, the date, and the maximum liquid level. NOTE: API 653 Section 13 covers requirements for nameplates for reconstructed tanks and tanks without nameplates, but does not specifically require the owner/operator to install a new nameplate for altered tanks.

### 7.6.2 Evaluating Inspection, Evaluation and Testing Programs

The facility SPCC Plan must describe the scope and schedule of testing and examinations to be performed on bulk storage containers (as required in §§112.3(d)(1)(iv), 112.7(e), 112.8(c)(6), 112.9(c)(3), and 112.12(c)(6)), and should reference an applicable industry inspection standard or describe an equivalent program (i.e., hybrid inspection program) developed by the PE, in accordance with good engineering practice. If an SPCC Plan specifies a hybrid inspection and testing program, then the EPA inspector should verify that the testing program covers minimum recommended elements for the inspections, the frequency of inspections, and their scope (e.g., wall thickness, footings, tank supports). In cases where the hybrid inspection and testing program is used in lieu of applicable industry standards, the EPA inspector should verify that the Plan includes an environmental equivalence determination, certified by a PE. See *Section 7.5.3* for a list of recommended minimum elements.

If an owner or operator has yet to implement the integrity testing program, the SPCC Plan should establish and document a schedule (in accordance with good engineering practice and the introductory paragraph of §112.7) that describes the projected implementation of the integrity testing program for the aboveground bulk storage containers at the facility. The EPA inspector should pay close attention to the scheduling of integrity testing to ensure that the facility is implementing any schedule associated with §112.7. The EPA inspector should also review the rationale for any inspection schedule that extends beyond the frequency identified in applicable inspection standards (particularly if no baseline exists for the tanks).

A hybrid testing program may be appropriate for a facility where an industry inspection standard does not yet contain enough specificity for a facility's particular tank(s) and/or configuration, or while modifications to an existing industry inspection standard are under consideration. For example, a tank user may have made a request to the industry standard-setting organizations recommending a change or modification to a standard. Both API and STI have mechanisms to allow tank users (and the regulatory community) to request changes to their respective inspection standards. In this case, the modification to a standard may be proposed, but not yet accepted by the standard-setting organization. In the meantime, the facility is still subject to the SPCC requirements to develop an inspection and testing program in accordance with industry standards. In this scenario, a hybrid inspection and testing program may be appropriate. When reviewing the scope and schedule of a hybrid program, the EPA inspector should ensure that a PE has attested that the program has been developed in accordance with good engineering practice and is being implemented at the facility.

The owner or operator of the facility must maintain records of all visual inspections and integrity testing, as required by the SPCC rule in §112.7(e). The owner or operator must keep written procedures and a record of the inspections and tests, signed by the appropriate supervisor or inspector, with the SPCC Plan for a period of three years.[151] Records do not need to be specifically created for this purpose, and may follow the format of records kept under usual and customary business practices, including electronic records. For example, it may be usual and customary to keep inspection records for a drum storage area rather than for each individual drum. These records should cover the frequent inspections performed by facility personnel. Also, industry standards

151 Facility Response Plan holders are required to maintain inspection records for five years.

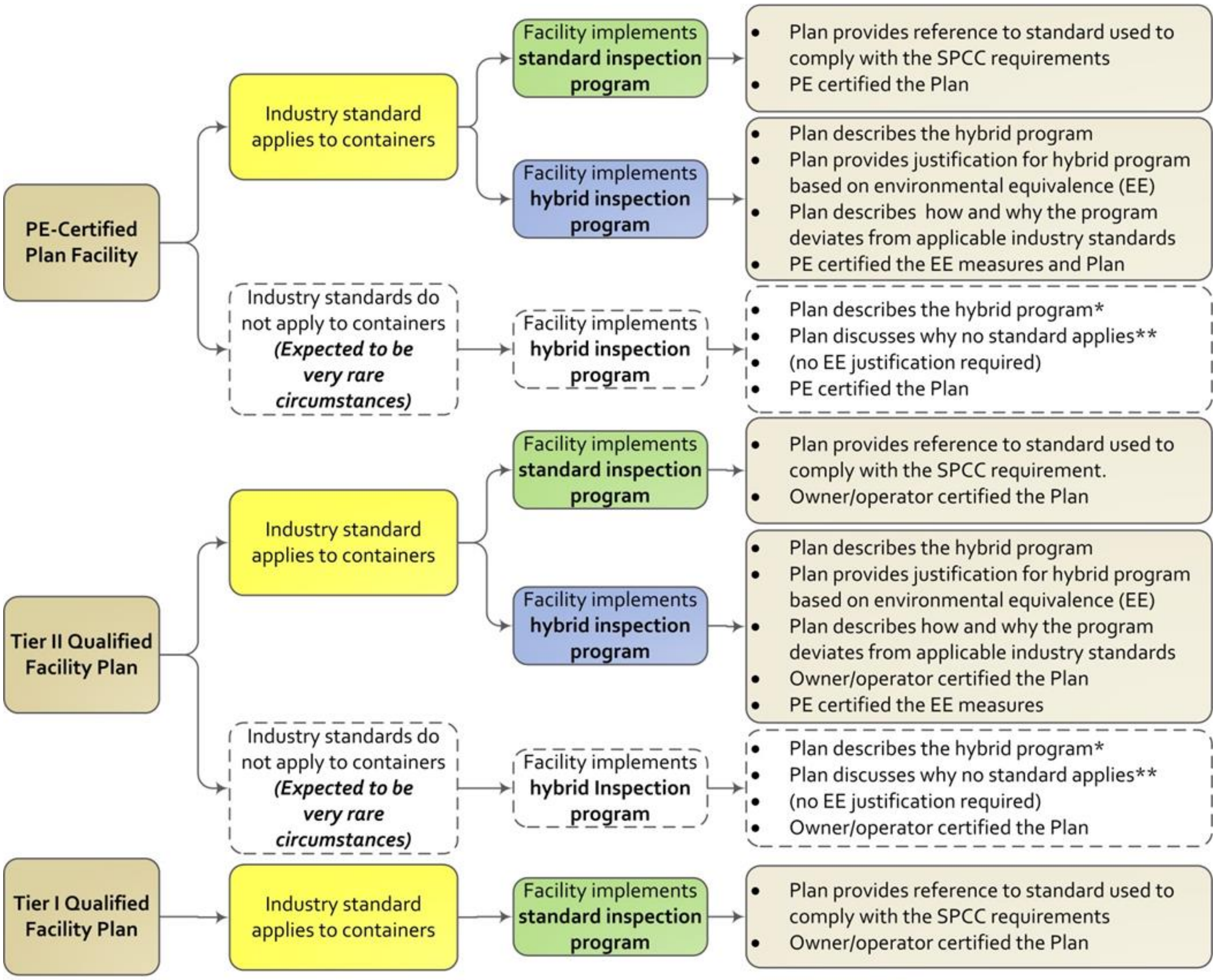
generally provide example guidelines for formal tank inspections, as well as sample checklists. The EPA inspector should review the inspection checklists used by the facility to verify that they are in accordance with the inspection and testing program as certified in the SPCC Plan. The tank inspection checklist from Appendix F of 40 CFR part 112, reproduced as *Table 7-4* in this chapter, provides an example of the type of information that may be included on an owner/operator-performed inspection checklist. Industry standards, such as STI SP001, also provide example inspection checklists.

The EPA inspector should review the description of the integrity testing/inspection program in the SPCC Plan and determine whether it follows an industry standard; deviates from applicable standards; or indicates that no industry standard applies to certain containers. If the program follows an industry standard, the EPA inspector should review the program to verify that it follows the applicable elements of the standard. If an inspection program deviates from industry standards, or the SPCC Plan indicates that no industry standard applies to a particular container, the EPA inspector should review the rationale described in the SPCC Plan and check that the alternative inspection program addresses the recommended minimal elements of a hybrid inspection program described in *Section 7.5.3*.

If an SPCC Plan contains measures that deviate from an applicable industry standard, based on environmental equivalence, then the EPA inspector should look for a clear rationale for the development of the inspection and testing program, paying close attention to the referenced industry standard. The Plan should address how the alternative approach complies or deviates from industry inspection standards and how it will be implemented in the field.

*Figure 7-4* summarizes the type of documentation the EPA inspector should look for when reviewing the use of industry standards to meet SPCC integrity testing and inspection requirements for different types of SPCC Plan and industry standard applicability cases.

**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.**




** Plan describes how the hybrid inspection program meets the minimal recommended elements described in Section 7.5.3.*
*** EPA Inspector should review carefully to confirm that industry standards do not apply*

The EPA inspector should also review records of frequent visual inspections by facility personnel as well as records of regular integrity testing of the container. Both API 653 and STI SP001 contain details on determining a container's suitability for continued service; the maintenance of comparison records at the facility aid in making this determination. Though §112.7(e) requires retention of all records for a period of three years, industry standards often advise that certified inspection and non-destructive examination reports be maintained for the *life of the container*.

In cases where the SPCC Plan has not identified a regularly scheduled inspection and testing program, the EPA inspector should request information on the anticipated schedule (e.g., when a baseline has not been established). If the facility has not performed any formal inspections or integrity testing of bulk storage containers so far, the EPA inspector should verify that the SPCC Plan describes: (1) the strategy for implementing an inspection and testing program and collecting baseline conditions within ten years of the installation date of the tank, or during the first five-year Plan cycle (or another schedule as identified and certified by a PE); and (2) the ongoing testing program that will be established once the baseline information has been collected (including the applicable industry standard that serves as the basis for the program). When the inspection program establishes inspection priorities for multiple containers, the EPA inspector should consider the rationale for these priorities as described in the SPCC Plan and verify implementation.

The EPA inspector should review records of regular and periodic inspections and tests of buried and aboveground piping, valves, and appurtenances. As described throughout this section, such inspections may be visual or involve other methods.

At oil production facilities, the EPA inspector should review records for inspections of bulk storage containers (including flow-through process vessels and produced water containers), piping associated with transfer operations, and flowlines or intra-facility gathering lines. When reviewing a maintenance program, such as the flowline maintenance program required under §112.9(d)(4) for oil production facilities, the EPA inspector should verify that the Plan describes how the flowlines are configured, monitored, and maintained to prevent discharges and whether the frequency and type of testing will allow for the implementation of a contingency plan when secondary containment is not provided for these lines (in accordance with §112.9(d)(3)). The EPA inspector should also verify that the program is implemented in the field; this can be done, for example, by verifying that facility personnel responsible for the maintenance of the equipment are aware of the flowline locations and are familiar with maintenance procedures, including replacement of damaged and/or leaking flowlines.

In summary, the EPA inspector should verify that the owner or operator has reports that document the implementation of the testing, evaluation, or inspection criteria set forth in the Plan. As applicable, the EPA inspector should also verify that the recommended actions that affect the potential for a discharge have been taken to ensure the integrity of the container/piping until the next scheduled inspection or replacement of the container/piping. Specifically, if the tank integrity evaluation/testing report recommends and/or requires repairs then the EPA inspector should request documentation that confirms that the repair was completed or identifies the rationale why the particular repair was not performed. When an inspection procedure is outlined in the Plan that does not meet the specific SPCC requirement, the EPA inspector should verify that the Plan includes a discussion of an environmentally equivalent measure in accordance with §112.7(a)(2). Implementation of the SPCC Plan as certified by the PE is the responsibility of the facility owner/operator (§112.3(d)(2)).

By certifying an SPCC Plan, the PE attests that the Plan has been prepared in accordance with good engineering practice, that it meets the requirements of 40 CFR part 112, and that it is adequate for the facility. Thus, if testing, evaluation, or inspection procedures have been reviewed by the certifying PE and are properly documented, they should generally be considered acceptable by the EPA inspector. However, if testing, evaluation, or inspection procedures appear to be at odds with recognized industry standards with no rationale provided, do not meet the overall objective of oil spill response/prevention, or appear to be inadequate for the facility, appropriate follow-up action may be warranted. In this case, the EPA inspector should clearly document any concerns to assist review and follow-up by the Regional Administrator, where necessary. The EPA inspector may also request additional information from the facility owner or operator regarding the testing, evaluation, or inspection procedures provided in the Plan.

## 7.7 Summary of Industry Standards and Regulations

> **FYI – Industry standard scope**
>
> The scope of a standard will describe the type of tanks that are subject to the standard.
>
> For example, API Standard 653, "Tank Inspection, Repair, Alteration, and Reconstruction," applies to tanks built to API 650 and API 12C specifications.
>
> API 12R1, "Recommended Practice for Setting, Maintenance, Inspection, Operation, and Repair of Tanks in Production Service," pertains to tanks employed in production service or other similar service.

Industry standards are technical guidelines created by experts in a particular industry for use throughout that industry. These guidelines assist in establishing common levels of safety and common practices for manufacture, maintenance, and repair. Standards-developing organizations use a consensus process to establish the minimum accepted industry practice. The SPCC rule (§112.3(d)(1)(iii)) requires that a PE attest that the Plan is prepared in accordance with good engineering practices, including the consideration of applicable industry standards. Similarly, §112.6(a)(1)(iii) and §112.6(b)(1)(iii) require that the owner or operator of a qualified facility certify that the Plan is prepared in accordance with accepted and sound industry practices and standards. Standards play a role in determining good engineering practice when developing spill prevention procedures and an inspection program for an SPCC-regulated facility.

Implementing the inspection program based on a particular industry standard is ultimately up to the owner/operator. When an owner/operator indicates in the SPCC Plan that he intends to use a standard to comply with a particular rule requirement (e.g., integrity testing), then it is mandatory to implement the relevant portions of the standard (i.e., those that address integrity testing of the container). It is important to note that the principles on which industry consensus standards are based may have broad application with regard to meeting the SPCC rule's performance-based requirement for integrity testing bulk storage containers. In the unlikely situation where the scope of available inspection standards does not include a particular tank, the inspection protocols outlined in the standards may serve as a guide for developing a hybrid inspection program.

Although these guidelines are often grouped together under the term "standards," several other terms are used to differentiate among the types of guidelines:

- **Standard (or code)**—set of instructions or guidelines. Use of a particular standard is voluntary. Some groups draw a distinction between a standard and a code. The American Society of Mechanical Engineers (ASME), for example, stipulates that a code is a standard that "has been adopted by one or more governmental bodies and has the force of law..."

- **Recommended practice**—advisory document often useful for a particular situation.
- **Specification**—may be one element of a code or standard or may be used interchangeably with these terms.

This section provides an overview and description of the scope and key elements of pertinent industry inspection standards, including references to relevant sections of the standards. In each case, the purpose is to allow EPA inspectors to be familiar with the general scope and requirements. However, industry standards may be developed or revised over time. For more detailed and complete information, EPA inspectors should review the text of the actual standards. This Chapter reflects the content of the standards at the time EPA revised this Guidance. When words such as “must,” “required,” and “necessary,” or other such terms are used in this section, they are used in describing what the various standards specify and are not considered requirements imposed by EPA, unless otherwise stated in the regulations.

*Table 7-5* summarizes the facility components covered by selected industry standards and recommended practices for tanks, valves, pipes, and appurtenances that are discussed in this section. Additional standards and/or equipment manufacturers’ standards may also apply.

**Table 7-5: Summary of facility components covered in industry standards for inspection, evaluation, and testing.**

| Facility Component(s) Covered in Standard or Recommended Practice | Potentially Relevant Standards and Recommended Practices | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | API 653 | STI SP001 | API 570 | API RP* 575 | API RP* 574 | API 12R1 | API 1110 | ASME B31.3 | ASME B31.4 | FTPI RP |
| New equipment | | | | | | ✓ | ✓ | ✓ | ✓ | |
| Equipment that has been in service | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | |
| Shop-built AST | ✓ | ✓ | | ✓ | | ✓ | | | | |
| Field-erected AST | ✓ | ✓ | | ✓ | | ✓ | | | | |
| Fiberglass Reinforced Plastic tanks | | | | | | | | | | ✓ |
| Container supports or foundation | ✓ | ✓ | | ✓ | | ✓ | | | | |
| Diked area | | ✓ | | | | | | | | |
| Aboveground valves, piping, and appurtenances | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | |
| Underground piping | | | ✓ | | ✓ | | | | | |
| Offshore valves, piping, and appurtenances | | | | | | | | | ✓ | |

* Recommended practice.

The standards that facility personnel must use for inspecting and testing at a particular facility would be specified in the SPCC Plan by the Plan preparer. If the PE requires the use of a specific standard for implementation of the Plan, the owner or operator must also reference that standard in the Plan (67 FR 47057, July 17, 2002). All actions (e.g., visual inspection or testing) performed by facility personnel must be appropriately documented and maintained in permanent facility records as per §112.7(e). Note, however, that certain industry standards may specify that an owner or operator maintain records for longer than three years, in which case the owner or operator should keep comparison records of integrity inspections and tests as directed in the standard in order to identify changing conditions of the oil storage container. Records of inspections and tests kept under usual and customary business practices satisfy the recordkeeping requirements.

In a case where the PE determines that industry inspection standards may not be appropriate in their entirety for a facility's particular tanks and configuration, this section discusses the minimum recommended elements for a hybrid inspection program.

### 7.7.1 API Standard 653 – Tank Inspection, Repair, Alteration, and Reconstruction

API Standard 653 – Tank Inspection, Repair, Alteration, and Reconstruction (API 653)[152] provides the minimum requirements for maintaining the integrity of carbon and alloy steel tanks built to API Standard 650 (Welded Steel Tanks for Oil Storage) and its predecessor, API 12C (Welded Oil Storage Tanks). API 653 may also be used for any steel tank constructed to a tank specification.[153]

API 653 covers the maintenance, inspection, repair, alteration, relocation, and reconstruction of welded or riveted, non-refrigerated, atmospheric pressure, aboveground, field-fabricated, vertical storage tanks after they have been placed in service. The standard limits its scope to the tank foundation, bottom, shell, structure, roof, attached appurtenances, and nozzles to the face of the first flange, first threaded joint, or first welded-end connection. The standard is intended for use by those facilities that utilize engineering and inspection personnel technically trained and experienced in tank design, fabrication, repair, construction, and inspection. Section 1 of the standard introduces the standard and details its scope. Sections 2 and 3 of the standard list the works cited and definitions used in the standard, respectively.

The standard requires that a tank evaluation be conducted when tank inspection results reveal a change in a tank from its original physical condition. Sections 4 and 5 of the standard describe procedures for evaluating an existing tank's suitability for continued operation or a change of service; for making decisions about repairs or alterations; or when considering dismantling, relocating, or reconstructing an existing tank. Section 4 of the standard details the procedures to follow in evaluating the roof, shell, bottom, and foundation of the tank. Section 5 of the standard provides a decision tree to evaluate a tank's risk of brittle fracture.

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152 API Standard 653, "Tank Inspection, Repair, Alteration, and Reconstruction," Fourth Edition, American Petroleum Institute, April 2009 Addendum 2 January 2012.

153 See Section 1.1.3 of API Standard 653.

Section 6 of the standard focuses on factors to consider when establishing inspection intervals and covers detailed procedures for performing external and internal tank integrity inspections. Inspection intervals are largely dependent upon a tank's service history. The standard establishes time intervals for when routine in-service inspections of the tank exterior are to be conducted by the owner/operator and when external visual inspections are to be conducted by an authorized inspector. External ultrasonic thickness (UT) inspections may also be conducted periodically to measure the thickness of the shell and are used to determine the rate of corrosion. Time intervals for external UT inspections are also provided and are based on whether the corrosion rate is known.

Internal inspections (Section 6.4 of the standard) primarily focus on measuring the thickness of the tank bottom and assessing its integrity. Measured or anticipated corrosion rates of the tank bottom can be used to establish internal inspection intervals; however, the inspection interval cannot exceed 30 years using these criteria if the tank has a release prevention barrier and 20 years if the tank does not have a release prevention barrier. Alternatively, risk-based inspection (RBI) procedures, which focus attention specifically on the equipment and associated deterioration mechanisms presenting the most risk to the facility (Section 6.4.2.4 of the standard), can be used to establish internal inspection intervals; an RBI may increase or decrease the inspection interval. API 653 states that an RBI assessment shall be reviewed and approved by an authorized tank inspector and a tank design/corrosion engineer. If a facility chooses to use RBI in the development of a tank integrity testing program, the EPA inspector should verify that these parties conducted the initial RBI assessment.

An external inspection (Section 6.5 of the standard) can be used in place of an internal inspection to determine the bottom plate thickness in cases where the external tank bottom is accessible due to construction, size, or other aspects. If chosen, this option should be documented and included as part of the tank's permanent record. Owners/operators should maintain records that detail construction, inspection history, and repair/alteration history for the tank (Section 6.8 of the standard). Section 6.9 of the standard stipulates that detailed reports should be filed for every inspection performed.

Sections 7 through 11 of API 653 do not address integrity testing, but instead focus on the repair, alteration, and reconstruction of tanks. Section 12 provides specific criteria for examining and testing repairs made to tanks. Section 13 addresses the specific requirements for recording any evaluations, repairs, alterations, or reconstructions that have been performed on a tank in accordance with this standard.

Several annexes provide additional information:

- Annex A to API 653 provides background information on previously published editions of API welded steel storage tank standards.
- Annex B details the approaches that are used to monitor and evaluate the settlement of a tank bottom.

- Annex C provides sample checklists that the owner/operator can use when developing inspection intervals and specific procedures for internal and external inspections of both in-service and out-of-service tanks.
- Annex D focuses on the requirements for authorized inspector certification. Certification of authorized tank inspectors, which is valid for three years from the date of issue, requires the successful completion of an examination, as well as a combination of education and experience.
- Annex E has been removed, and is purposefully left blank.
- Annex F summarizes the non-destructive examination (NDE) requirements for reconstructed and repaired tanks.
- Annex G discusses the qualification of tank bottom examination procedures and personnel.
- Annex H provides guidance for performing a similar service assessment to establish inspection intervals for tanks for which corrosion rates have not been directly measured.
- Annex S covers the requirements for austenitic stainless steel storage tanks, constructed in accordance with API 650, Appendix S, that differ from the basic rules in the rest of API 653. Technical inquiries regarding the use of the standard can be made through API's Web site (www.api.org).

### 7.7.2 STI Standard SP001 – Standard for the Inspection of Aboveground Storage Tanks

STI Standard SP001 – Standard for the Inspection of Aboveground Storage Tanks (STI SP001)[154] provides inspection and evaluation criteria to determine the suitability for continued service of aboveground storage tanks until the next scheduled inspection. STI SP001 applies to the inspection of aboveground storage tanks, including shop-fabricated tanks, field-erected tanks, and portable containers, as defined in the standard, as well as their containment systems. The inspection and testing requirements for field-erected tanks are covered separately in Appendix B of the standard. Specifically, the standard applies to ASTs storing stable, flammable, and combustible liquids at atmospheric pressure with a specific gravity less than approximately 1.0, and those storing liquids with operating temperatures between ambient temperature and 200 degrees Fahrenheit (93.3°C).[155] At a minimum, the following tank components shall be inspected (as applicable): primary and secondary tanks, supports, anchors, foundation and external supports, gauges and alarms, insulation, appurtenances, normal and emergency vents, release prevention barriers, and spill control systems.

After providing general information and definitions, Section 3 of the standard addresses safety considerations, and Section 4 addresses AST inspector qualifications.

[154] STI Standard SP-001, "Standard for the Inspection of Aboveground Storage Tanks," 5th Edition September 2011.

[155] Given this operating range, the standard may not apply to certain tanks such as those containing asphalt cement.

Section 5 of the standard addresses the criteria, including AST type, size, type of installation, corrosion rate, and previous inspection history, if any, that should be used to develop a schedule of inspections for each AST.

A Table of Inspection Schedules (Table 5.5) places tanks into one of three categories and establishes different requirements regarding the type and frequency of periodic inspection by tank owner/operators as well as formal external and internal inspections by a certified inspector. The factors used for categorizing tanks include:

- Tank size,
- Whether the tank is in contact with the ground,
- The presence or absence of secondary containment or spill control, and
- The presence or absence of a continuous release detection method (CRDM).

Section 6 of the standard provides guidelines for the periodic inspections conducted by the owner or his/her designee. The owner's inspector is to complete an AST Record for each AST or tank site, as well as a Monthly Inspection Checklist and an Annual Inspection Checklist. Monthly inspections should monitor water accumulation to prevent Microbial Influenced Corrosion (MIC), and action should be taken if MIC is found. Additional requirements for field-erected tanks are in Appendix B of STI SP001.

Section 7 of the standard contains the minimum inspection requirements for formal external inspections, which are to be performed by a certified inspector. Inspections should cover the AST foundations, supports, secondary containment, drain valves, ancillary equipment, piping, vents, gauges, grounding system (if any), stairways, and coatings on the AST. Original shell thickness should be determined using one of several suggested methods. Ultrasonic Thickness Testing (UTT) readings are to be taken at different locations of the AST depending upon whether the AST is horizontal, vertical, rectangular, and/or insulated. The final report should include field data, measurements, pictures, drawings, tables, and an inspection summary, and should specify the next scheduled inspection.

Section 8 of the standard details the minimum inspection requirements for formal internal inspections, which are to be performed by a certified inspector. A formal internal inspection includes the requirements of an external inspection with some additional requirements for specific situations that are outlined in the standard. Double-wall tanks and secondary containment tanks may be inspected by checking the interstice for liquid or by other equivalent methods. For elevated ASTs where all external surfaces are accessible, the internal inspection may be conducted by examining the tank exterior using such methods as Ultrasonic Thickness Scans (UTS). For all other situations, entry into the interior of the AST is necessary. Internal inspection guidelines are detailed separately for horizontal ASTs and for vertical and rectangular ASTs in Sections 8.2 and 8.3 of the standard, respectively. Additional requirements for field-erected tanks are in Appendix B. The final report should contain elements similar to reports prepared for external inspections.

Section 9 of the standard addresses leak testing methods. For shop-fabricated ASTs, the standard references the Steel Tank Institute Recommended Practice R912, "Installation Instructions for Shop Fabricated Stationary Aboveground Storage Tanks for Flammable, Combustible Liquids." The standard also references DOT regulations for portable containers:

- 49 CFR part 173.28, Reuse, reconditioning, and remanufacturing of packaging, mainly for drums;
- 49 CFR part 178 – 49 CFR Subpart O, Testing and certification of intermediate bulk containers (IBCs); and
- 49 CFR part 180.605, or equivalent, for portable container testing and recertification.

Section 10 of the standard addresses the suitability for continued service based on the results of formal internal and/or external inspections performed by a certified inspector. For ASTs that show signs of damage caused by MIC, the criteria for assessing their suitability for continued service differ based on categories associated with the level of reduction of the shell thickness (as per Section 5 of STI SP001). For other tank damage, an engineer experienced in AST design or a tank manufacturer should determine if an inspection is required for any AST that was exposed to fire, natural disaster, excessive settlement, overpressure, or damage from cracking.

Section 11 of the standard details recordkeeping requirements. Appendix A presents supplemental technical information including terms commonly associated with ASTs, and Appendix B presents information for the inspection of field-erected ASTs.

For more information on STI SP001, please visit the Steel Tank Institute Web site, http://www.steeltank.com.

### 7.7.3 STI Standard SP031 - Standard for Repair of Shop Fabricated Aboveground Tanks for Storage of Combustible & Flammable Liquids

STI Standard SP031 - Standard for Repair of Shop Fabricated Aboveground Tanks for Storage of Combustible & Flammable Liquids[156] covers the repair and modification of an atmospheric-type shop fabricated carbon and stainless steel tanks. It applies to tanks storing flammable and combustible liquids at atmospheric pressure with a specific gravity not greater than 1.0. STI SP031 is referenced in STI SP001 for repairs or alterations to an AST.

156 STI SP031 Standard for Repair of Shop Fabricated Aboveground Tanks for Storage of Combustible & Flammable Liquids 4th Edition November 2008, Revised November 2012

### 7.7.4 API Recommended Practice 575 – Guidelines and Methods for Inspection of Existing Atmospheric and Low-Pressure Storage Tanks

API Recommended Practice 575 – Guidelines and Methods for Inspection of Existing Atmospheric and Low-Pressure Storage Tanks[157] (API RP 575), which supplements API 653, covers the inspection of atmospheric tanks (e.g., cone roof and floating roof tanks) and low-pressure storage tanks (i.e., those that have cylindrical shells and cone or dome roofs) that have been designed to operate at pressures from atmospheric to 15 pounds per square inch gauge (psig). (API RP 572[158] covers vessels operating above 15 psig.) API RP 575 applies only to the inspection of atmospheric and low-pressure storage tanks that have been in service. In addition to describing the types of storage tanks and their construction and maintenance, API RP 575 also covers the reasons for inspection, causes of deterioration, frequency and methods of inspection, methods of repair, and the preparation of records and reports.

The recommended practice is organized as follows:

- Section 1 of API RP 575 introduces the recommended practice and details its scope.
- Section 2 lists codes, standards and related publications that are cited in the recommended practice.
- Section 3 defines terms relevant to API RP 575.
- Section 4 describes specific types of atmospheric and low-pressure storage tanks including construction materials and design standards and their use.
- Section 5 covers the reasons for inspection and causes of deterioration of both steel and non-steel storage tanks. Section 5 also covers the deterioration and failure of auxiliary equipment as well as a similar service methodology for establishing tank corrosion rates.
- Section 6 of API RP 575 addresses inspection frequency and scheduling; it mainly defers to the inspection frequency requirements described in API 653 and API RP 12R1.
- Section 7 covers the methods of inspection including the external inspection of both in-service and out-of-service tanks and the internal inspection of out-of-service tanks.
- Section 8 addresses leak testing and hydraulic integrity of tank bottoms.
- Section 9 focuses on the integrity of repairs and alterations, which stresses the importance of inspecting repairs to ensure they have been properly done.

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157 API RP 575, "Guidelines and Methods for Inspection of Existing Atmospheric and Low-Pressure Storage Tanks," 2nd ed., American Petroleum Institute, May, 2005

158 API 572 Inspection of Pressure Vessels, 3rd Edition, November, 2009

- Section 10 addresses recordkeeping and inspection reports.
- Appendix A describes selected methods for non-destructive examination of tanks, including ultrasonic thickness measurement, ultrasonic corrosion testing, ultrasonic shear wave testing, magnetic flux testing and robotic inspection.
- Appendix B contains similar service evaluation tables for corrosion rates.
- Appendix C provides a selected bibliography.

### 7.7.5 API Recommended Practice 12R1 – Recommended Practice for Setting, Maintenance, Inspection, Operation, and Repair of Tanks in Oil Production Service

API Recommended Practice 12R1 – Recommended Practice for Setting, Maintenance, Inspection, Operation, and Repair of Tanks in Production Service (API RP 12R1)[159] provides guidance on new tank installations and maintenance of existing oil production tanks. These tanks are often referred to as "upstream" or "extraction and production (E&P) tanks."

This recommended practice is primarily intended for tanks fabricated to API Specifications 12B, D, F, and P that are employed in on-land production service.[160] The basic principles in this recommended practice can also be applied to other atmospheric tanks in similar oil and gas production, treating, and processing services; however, they are not applicable to refineries, marketing bulk stations, petrochemical plants, or pipeline storage facilities operated by carriers. According to the recommended practice, tanks that are fabricated to API Standards 12C or 650 should be maintained in accordance with API 653, summarized above.

The recommended practice is organized as follows:

- Sections 1, 2, and 3 describe the scope of the standard, the 19 standards it references, and the relevant definitions, respectively. The remaining four main sections describe the recommended practices.
- Section 4 provides recommended practices for setting of new or relocated tanks and connecting tanks.
- Section 5 recommends practices for safe operation and spill prevention for tanks.[161]

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159 API Recommended Practice 12R1, "Recommended Practice for Setting, Maintenance, Inspection, Operation, and Repair of Tanks in Production Service," 5th edition. American Petroleum Institute. August 1997, Reaffirmed April 2008.

160 API Specifications 12B, D, F, and P correspond to bolted tanks for storage of production liquids, field welded tanks for storage of production liquids, shop welded tanks for storage of production liquids, and specification for fiberglass reinforced plastic tanks, respectively.

161 The scope of API RP 12R1 states that "the spill prevention and examination/inspection provisions of this recommended practice should be a companion to the spill prevention control and countermeasures (SPCC) to prevent environmental damage."

- Section 6 details the recommended practices for routine operational and external and internal condition examinations, internal and external inspections, maintenance of tanks, and recordkeeping. Tables 1 and 2 detail the type of observations, frequency, and associated personnel requirements for internal and external tank inspections. Records from these inspections should be retained with permanent equipment records.

- Section 7 provides guidance for the alteration or repair of various tank components.

API RP 12R1 also contains nine appendices detailing the recommended requirements for qualified inspectors, sample calculations for venting requirements, observations regarding shell corrosion and brittle fracture, checklists for internal and external condition examinations and inspections, details regarding the minimum thickness of tank elements, and various figures and diagrams.

### 7.7.6 API 570 – Piping Inspection Code: In-Service Inspection, Rating, Repair, and Alteration, of Piping Systems

API 570 – Piping Inspection Code: In-Service Inspection, Rating, Repair, and Alteration, of Piping Systems (API 570)[162] covers procedures for metallic and fiberglass reinforced plastic piping systems and their associated pressure relieving devices that have been in service. API 570 was developed for the petroleum refining and chemical process industries but may be used, where practical, for any piping system. In-service piping systems covered by API 570 include those used for process fluids, hydrocarbons, and similar flammable or toxic fluids. API states that this standard is not a substitute for the original construction requirements governing a piping system before it is placed in service. API 570 is intended for use by organizations that maintain or have access to an authorized inspection agency; a repair organization; and technically qualified piping engineers, inspectors, and examiners. The code is organized as follows:

- Section 4 outlines responsibilities and associated procedures and qualifications. The owner/user of piping systems is responsible for the piping system inspection program, inspection frequencies, and maintenance of piping systems in accordance with this standard. The owner/user organization is also responsible for activities related to the rating, repair and alteration of its piping systems.

- Section 5 addresses the specific inspection and pressure testing practices for in-service piping systems.

- Section 6 addresses the frequency and extent of inspection of piping. Inspection intervals for piping are based on the forms of degradation possible and consequence of failure. Risk-based assessment may be used to determine inspection intervals or an interval can be established which takes into account the corrosion rate and remaining life calculations; piping service

[162] API 570, "Piping Inspection Code: In-Service Inspection, Rating, Repair, and Alteration of Piping Systems," 3rd ed., American Petroleum Institute, November 2009.

classification; applicable jurisdictional requirements; and the judgment of the inspector, the piping engineer, the piping engineer supervisor, or a corrosion specialist.

Table 2 of API 570 provides maximum inspection intervals for piping based on piping service classification:

- Class 1 poses the highest potential of resulting in an immediate emergency if a leak were to occur;
- Class 2 is for services not included in other categories and includes the majority of piping;
- Class 3 is for services that are flammable but do not significantly vaporize when they leak and are not located in high-activity areas; and
- Class 4 is for services that are essentially nonflammable and nontoxic.

The maximum inspection interval for in-service aboveground piping listed in Section 6 Table 2 is as follows:

- Class 1: Thickness measurements – 5 years, visual inspection – 5 years
- Class 2: Thickness measurements – 10 years, visual inspection – 5 years
- Class 3: Thickness measurements – 10 years, visual inspection – 10 years
- Class 4: Thickness measurements – optional, visual inspection – optional

The inspection interval may be less depending on corrosion rates and remaining life. Thickness measurements must be obtained at ½ the remaining life determined from corrosion rates or the intervals listed in Table 2 whichever is less.

The type and frequency of inspections for buried piping is presented separately in Section 9 (see below).

- Section 7 addresses data evaluation, analysis, and recording. The owner/operator should maintain permanent records for all piping systems covered by API 570.

- Section 8 provides guidelines for repairing, altering, and rerating piping systems and refers to ASME B31.3 for in-service repairs.

- Section 9 addresses the inspection of buried piping. Inspecting buried process piping is different from inspecting other process piping because the inspection is hindered by the inaccessibility of the affected areas of the piping.

- Annex A, B, and C address inspector certification, requests for interpretations, examples of repairs, and the external inspection checklist for process piping, respectively.

### 7.7.7 API Recommended Practice 574 – Inspection Practices for Piping System Components

API Recommended Practice 574 – Inspection Practices for Piping System Components (API RP 574)[163] covers inspection practices for piping, tubing, valves (other than control valves), and fittings used in petroleum refineries and chemical plants. It addresses inspection planning processes, inspection intervals and techniques and types of records. API RP 574 is intended to supplement API 570. It does not cover inspection of specialty items, such as instrumentation and control valves. The recommended practice is organized as follows:

- Section 1 introduces the recommended practice and details its scope.
- Sections 2 and 3, respectively, list the references and definitions used throughout the recommended practice.
- Section 4, which begins the substantive portion of the recommended practice, details the types, material specifications, sizes, and other characteristics of the components of the piping system, which include the piping, tubing, valves, fittings, flanges and joints.
- Section 5 details common joining methods, i.e., welding, threading and flanging.
- Section 6 presents the rationale for inspecting the piping system: to identify active deterioration mechanisms and to specify repair, replacement, or future inspections for affected piping. It suggests examining inspection history and points to API 570 as providing the basic requirements for such an inspection program.
- Section 7 discusses the development of an inspection plan, including risk-based plans and interval-based plans. It presents considerations for monitoring the piping system components for corrosion and inspecting for damage.
- Section 8 provides guidelines for establishing the frequency and extent of inspection using the following conditions to determine the frequency of inspection: the consequences of a failure (piping classification, see summary of API 570 in *Section 7.7.6* for a description) degree of risk, amount of corrosion allowance remaining, historical data available, and regulatory requirements. It also discusses inspections on piping that is operating and not in operation.
- Section 9 outlines the safety precautions and preparatory work to be performed prior to inspecting the piping system components. The inspection tools commonly used to inspect piping are listed in Section 9.2.2 of API RP 574.
- Section 10 details the specific procedures and practices to be followed when inspecting the components of the piping system such as external and internal visual inspection, pressure tests,

[163] API RP 574, "Inspection Practices for Piping System Components," 3rd ed., American Petroleum Institute, November 2009.

and other methods. This section also covers the inspection of underground piping (Section 10.10) and new construction (Section 10.11).

- Section 11 refers to ASME B31.3 in describing the procedures a piping engineer should follow to determine the thickness at which piping and valves and flanged fittings should be retired.
- Section 12 addresses recordkeeping.
- Appendix A of the recommended practice provides an external inspection checklist for process piping.

### 7.7.8 API Recommended Practice 1110 – Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids or Carbon Dioxide

API Recommended Practice 1110 – Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids or Carbon Dioxide (API RP 1110)[164] provides guidance regarding the procedures, equipment, and verification of pressure test results, as well as guidance for meeting the requirements of Integrity Management set out in API Standard 1160 and ASME B31.8S. Pressure testing uses a liquid test medium (typically water) to apply internal pressure to a segment of pipe above its normal or maximum operating pressure for a fixed period of time.

The main sections of this standard are Pressure Test Planning, Pressure Test Implementation, and Pressure Test Records and Drawings. Planning for a pressure test involves safety considerations, written test procedures, pipeline operating considerations, selection of a test medium, equipment and materials, target test pressures and durations, and other related issues. There are three basic types of pressure tests based on the intended purpose:

- Spike test— a short duration, high amplitude (pressure ratio) test;
- Strength test— conducted to establish the operating pressure limit of a pipeline; and
- Leak test— used to determine if a pipeline is leaking, and can be used in combination with the other test types

For implementation of pressure tests, personnel should follow site-specific test procedures including appropriate test pressures and the duration of the pressure test. Other operational aspects of pressure test implementation address the proper qualifications of personnel, pressurization, the test period, searching for leaks, and disposal of the test medium. Lastly, adequate test records and drawings should be kept for the useful

164 API Recommended Practice 1110, "Pressure Testing of Liquid Petroleum Pipelines," 5th edition, American Petroleum Institute, June 2007.

life of the pipeline to document the operating pressure limit of a section of pipe or to demonstrate compliance with integrity management requirements.

### 7.7.9 API Recommended Practice 579-1/ASME FFS-1, Fitness-for-Service, Part 3

This recommended practice[165] addresses "Assessment of Existing Equipment for Brittle Fracture" and provides guidelines for evaluating the resistance to brittle fracture of existing carbon and low alloy steel pressure vessels, piping, and storage tanks. If the results of the fitness-for-service assessment indicate that the AST is suitable for the current operating conditions, then the equipment can continue to be operated under the same conditions provided that suitable monitoring/inspection programs are established. API RP 579-1/ASME FFS-1 is intended to supplement and augment the requirements in API 653. That is, when API 653 does not provide specific evaluation procedures or acceptance criteria for a specific type of degradation, or when API 653 explicitly allows the use of fitness-for-service criteria, API RP 579-1/ASME FFS-1 may be used to evaluate the various types of degradation or test requirements addressed in API 653.

A brittle fracture assessment may be warranted based on operating conditions and/or the condition of the AST. API RP 579-1/ASME FFS-1 provides separate brittle fracture assessment procedures for continued service based on three levels. All three apply to pressure vessels, piping, and tankage, although a separate assessment procedure is provided for tankage.

- Level 1 assessments are used for equipment that meets toughness requirements in a recognized code or standard (e.g., API 650).
- Level 2 assessments exempt equipment from further assessment and qualify it for continued service based on one of three methods that utilize operating pressure and temperature; performance of a hydrotest; or the materials of construction, operating conditions, service environment, and past operating experience.
- Level 3 assessments, which normally utilize a fracture mechanics methodology, are used for tanks that do not meet the acceptance criteria for Levels 1 and 2.

A decision tree in API RP 579-1/ASME FFS-1 (Figure 3.3, Brittle Fracture Assessment for Storage Tanks) outlines this assessment procedure. The Level 1 and Level 2 brittle fracture assessment procedures are nearly identical to those found in API 653, Section 5, with a few notable exceptions: API 653 does not use the Level 1 and Level 2 designations; API 653 applies only to tanks that meet API 650 (7th edition or later) construction standards, whereas API 579-1/ASME FFS-1 applies to tanks that meet toughness requirements in the "current construction code;" and the two standards set a different limit on the maximum membrane stress (the stress forces that form within the shell as a result of the pressure of the liquid inside the vessel). There is, however, one major difference between API 653 and API 579-1/ASME FFS-1: API 653 Section 5 does not allow for an exemption of the hydrostatic test requirement whereas API 579-1/ASME FFS-1 does. API 579-1/ASME FFS-1

[165] API Recommended Practice 579, "Fitness for Service," 2nd Edition, American Petroleum Institute, June 2007.

allows for a probabilistic evaluation of the potential for brittle fracture using engineering calculations (i.e., a Level 3 assessment) in lieu of the hydrostatic test.

### 7.7.10 API Standard 2610 – Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities

This standard[166] has short sections on petroleum terminals, pipeline tankage facilities, refinery facilities, bulk plants, lube blending and packaging facilities, asphalt plants, and aviation service facilities. These sections mainly serve to define what is meant by each type of facility. The standard does not apply to installations covered by API Standard 2510 and API RP 12R1, as well as specific types of facilities and equipment listed in the standard. The standard lists governmental requirements and reviews that should be conducted to ensure that facilities meet applicable federal, state, or local requirements (Section 1.3); and has an extensive list of standards, codes, and specifications to use (Section 2.1) and definitions (Section 3). The standard is further organized as follows:

- Section 4 covers the site selection and spacing requirements for the design and construction of new terminal facilities.
- Section 5 addresses the methods of pollution prevention and waste management practices in the design, maintenance, and operation of petroleum terminal and tank facilities.
- Section 6 covers the safe operation of terminals and tanks including hazard identification, operating procedures, safe work practices, emergency response and control procedures, training, and other provisions.
- Section 7 covers fire prevention and protection, including tank overfill protection and inspection and maintenance programs. This section also covers considerations for special products.
- Section 8 covers aboveground petroleum storage tanks and appurtenances such as release prevention, leak detection, and air emissions. This section covers operations, inspections, maintenance, and repair for aboveground and underground tanks.
- Section 9 addresses dikes and berms.
- Section 10 covers pipe, valves, pumps, and piping systems.
- Section 11 covers loading, unloading, and product transfer facilities and activities including spill prevention and containment.
- Section 12 addresses the procedures and practices for achieving effective corrosion control.

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166 API Recommended Practice 2610, "Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities," 2nd edition, American Petroleum Institute, May 2005.

- Section 13 addresses structures, utilities, and yards.
- Section 14 covers removal or decommissioning of facilities.

All of these sections make extensive reference to the regulatory requirements and applicable industry standards.

### 7.7.11 RP FTPI 2007-1 Recommended Practice for the In-service Inspections of Aboveground Atmospheric Fiberglass Reinforced Plastic Tanks and Vessels

The Fiberglass Tank and Pipe Institute (FTPI) 2007-1 Recommended Practice includes recommended inspector qualifications, periodic preventive maintenance inspections, certified external inspections, certified integrity inspections, internal inspections and alternate non-intrusive inspection methods. It also includes report forms for monthly, annual and periodic preventive maintenance and certified inspections and a section on aboveground fiberglass tank fabrication information. RP FTPI 2007-1 may be used for the inspection of aboveground fiberglass tanks or vessels.

The purpose of this Recommended Practice is to provide procedures for conducting periodic preventive maintenance inspections and certified inspections of fiberglass reinforced plastic atmospheric tanks and vessels in corrosive industrial and commercial service after a set period of time and when there is a change of service. The procedures are intended to:

- Minimize maintenance costs;
- Ensure compliance with environmental and safety requirements;
- Minimize system failures; and
- Ensure that proper engineering, construction and maintenance practices are in place.

Recommended Practice FTPI 2007-1 specifies the requirements for external and internal inspections to be performed by certified inspectors as follows:

**Certified External Inspections**

- Every 5 years for tanks or vessels in Hazardous Substance service;
- Every 10 years for tanks/vessels greater than 10,000 gallons capacity and in other service;
- If evidence of material stress appears;
- If tank or vessel leaks occur;
- Before there is a change in service to a dissimilar stored material; or
- If a tank or vessel is relocated.

**Certified Integrity Inspections**

- Every 20 years for tanks/vessels in Hazardous Substance service;
- Every 20 years for tanks/vessels greater than 10,000 gallons capacity and in other service;
- If evidence of material stress appears;
- If tank or vessel leaks occur;
- Before there is a change in service to a dissimilar stored material; or
- If a tank or vessel is relocated.

### 7.7.12 ASME B31.3 – Process Piping

ASME B31.3 – Process Piping[167] is the generally accepted standard of minimum safety requirements for the oil, petrochemical, chemical, pharmaceutical, textile, paper, and semiconductor industries' process piping design and construction (for process piping already in service, other standards should be used, such as API 570, "Piping Inspection Code"). ASME B31.3 is written to be very broad in scope to cover a range of fluids, temperatures, and pressures. This broad coverage leaves a great deal of responsibility with the owner to use good engineering practices. The safety requirements for the design, examination, and testing of process piping vary in stringency based on four different categories of fluid service. Categories include:

- Category D for a low hazard of fluid service,
- Category M for a high hazard of fluid service,
- High Pressure for piping designated by the owner as being in high pressure fluid service[168], and
- Normal to indicate all remaining fluid services.

It is the owner's responsibility to select the appropriate fluid service category, which determines the appropriate examination requirements.

ASME B31.3 distinguishes between inspection and examination. Inspection "applies to functions performed for the owner by the owner's Inspector or the Inspector's delegates." The owner is responsible, through the Inspector, for verifying that the required examinations and testing have been completed. The examination of process piping is to be completed by an examiner who demonstrates sufficient qualifications to perform the specified examination and who has training and experience records kept by his/her employer that

167 ASME Code for Pressure Piping, B31.3-2008, "Process Piping," The American Society of Mechanical Engineers, revision of ASME 31.3-2006, 2008.

168 High Pressure is considered in ASME B31.3 to be pressure in excess of that allowed by the ASME b16.5 Class 2500 rating for the specified design temperature and material group; however, there are not specified pressure limitations for ASME B31.3.

can support these qualifications.[169] Different types of examinations performed include visual, radiographic, ultrasonic, in-process, liquid-penetrant, magnetic-particle, and hardness testing.

While these examinations are a part of the quality assurance procedures for new piping, leak testing should also be performed to test the overall system. According to ASME B31.3, leak testing is required for all new piping systems other than those classified as Category D, which can be examined for leaks after being put into service. Options for leak testing include hydrostatic, pneumatic, hydro pneumatic, and alternative leak tests.

The standard requires that records detailing the examination personnel's qualifications and examination procedures be kept for at least five years. Test records or the inspector's certification that the piping has passed pressure testing are also required to be retained.

### 7.7.13 ASME Code for Pressure Piping B31.4-2006 – Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids

ASME Code for Pressure Piping B31.4-2006 – Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids[170] describes "engineering requirements deemed necessary for safe design and construction of pressure piping." These requirements are for the "design, materials, construction, assembly, inspection, and testing of piping transporting liquids" such as crude oil and liquid petroleum products between various facilities. Piping includes bolting, valves, pipes, gaskets, flanges, fittings, relief devices, pressure-containing parts of other piping components, hangers and supports, and any other equipment used to prevent the overstressing of pressure-containing pipes. This code's primary purpose is to "establish requirements for safe design, construction, inspection, testing, operation, and maintenance of liquid pipeline systems for protection of the general public and operating company personnel."

The personnel inspecting the piping are deemed qualified based on their level of training and experience and should be capable of performing various inspection services such as right-of-way and grading, welding, coating, pressure testing, and pipe surface inspections. Inspections of piping material and inspections during piping construction should include the visual evaluation of all piping components. Once construction is complete, these piping components and the entire system should be tested. Testing methods include hydrostatic testing of internal pressure piping; leak testing; and qualification tests based on a visual examination, bending properties, determination of wall thickness, determination of weld joint factor, weldability, determination of yield strength, and the minimum yield strength value.

Records detailing the design, construction, and testing of the piping should be kept in the files of the operating company for the life of the facility.

[169] ASME B31.3 does not have specific requirements for an examiner, but SNT-TC-1A, "Recommended Practice for Nondestructive Testing Personnel Qualification and Certification," acts as an acceptable guide.

[170] ASME Code for Pressure Piping, B31.4-2006, "Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids," The American Society of Mechanical Engineers, revision of ASME B31.4-2002, 2006.

### 7.7.14 DOT 49 CFR part 180.605 – Requirements for Periodic Testing, Inspection, and Repair of Portable Tanks and Other Portable Containers

Section 180.605[171] applies to any portable tank constructed to a DOT (e.g., 51, 56, 57, 60, or intermodal [IM]) or United Nations (UN) specification. According to these requirements, a portable tank must be inspected prior to further use if it shows evidence of a condition that might render it unsafe for use, has been damaged in an accident, has been out of service for more than a year, has been modified, or is in an unsafe operating condition. All tanks must receive an initial inspection prior to being placed into service and a periodic inspection or intermediate periodic inspection every two to five years. The timeframe between inspections depends upon the tank's specification.

Intermediate periodic inspections must include an internal and external examination of the tank and fittings, a leak test, and a test of the service equipment. The periodic inspection and test must include an external and internal inspection and a sustained air pressure leak test, unless exempted. For tanks that show evidence of damage or corrosion, an exceptional inspection and test is mandated. The extent of the inspection is dictated by the amount of damage or deterioration of the portable tank. Specification-60 tanks are further tested by filling them with water. Specification-IM or Specification-UN portable tanks must also be hydrostatically tested. Any tank that fails a test may not return to service until it is repaired and retested. An approval agency must witness the retest and certify the tank for return to service. The date of the last pressure test and visual inspection must be clearly marked on each portable tank. A written record of the dates and results of the tests, including the name and address of the person performing the test, is to be retained by the tank owner or authorized agent.

Requirements for retest and inspection of Intermediate Bulk Containers (IBCs) are specified in 49 CFR 180.352. Requirements depend on the IBC shell material. For metal, rigid plastic, and composite IBCs, they include a leakproof test and external visual inspection every 2.5 years from the date of manufacture or repair. They also require an internal inspection every 5 years to ensure that the IBC is free from damage and capable of withstanding the applicable conditions. Flexible, fiberboard, or wooden IBCs must be visually inspected prior to first use and permitted reuse. Records of each test must be kept until the next test, or for at least 2.5 years from the date of the last test.

Design standards and specifications for initial qualification and reuse performance testing for portable tanks, drums, and IBCs are contained in 49 CFR part 178, Specifications for Packaging. See http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&tpl=%2Findex.tpl.

171 49 CFR part 180.605, "Requirements for Periodic Testing, Inspection, and Repair of Portable Tanks," Department of Transportation, 64 FR 28052, May 24, 1999, as amended at 67 FR 15744, April 3, 2002 and 68 FR 45042 revision.

### 7.7.15 FAA Advisory Circular 150/5230-4A – Aircraft Fuel Storage, Handling, and Dispensing on Airports

FAA Advisory Circular 150/5230-4A – Aircraft Fuel Storage, Handling, and Dispensing on Airports[172] identifies standards and procedures for storage, handling, and dispensing of aviation fuel on airports. The Federal Aviation Administration (FAA) recommends the standards and procedures referenced in the Advisory Circular (AC) for all airports. The FAA accepts these standards as one means of complying with 14 CFR Part 139, Certification of Airports, as it pertains to fire safety in the safe storage, handling, and dispensing of fuels used in aircraft on airports but not in terms of quality control. Although airports that are not certificated under 14 CFR part 139 are not required to develop fuel safety standards, the FAA recommends that they do so.

This AC is not intended to replace airport procedures developed to meet requirements imposed because of the use of special equipment, nor to replace local regulations. For specific provisions, the other standards that are referenced in this AC are:

- For fuel storage, handling and dispensing, the National Fire Prevention Association's "Standard for Aircraft Fuel Servicing."
- For refueling and quality control procedures, the National Air Transportation Association's "Refueling and Quality Control Procedures for Airport Service and Support Operations." This provides information about fuel safety, types of aviation fuels, fueling vehicle safety, facility inspection procedures, fueling procedures, and methods for handling fuel spills. API also publishes documents pertaining to refueling and facility specifications.

The AC also requires fuel safety training for airports certificated under 14 CFR part 139. (See http://www.faa.gov/airports/resources/advisory_circulars/index.cfm.)

### 7.7.16 FAA Advisory Circular 150/5210-20 – Ground Vehicle Operations on Airports

FAA Advisory Circular 150/5210-20 – Ground Vehicle Operations on Airports[173] provides "guidance to airport operators in developing training programs for safe ground vehicle operations and pedestrian control on the airside of an airport." Specifically, this advisory circular provides recommended operating procedures for ground vehicles. It also provides two appendices containing samples of the training curriculum and training manual. The sample training manual in Appendix B provides airport operators with a template for developing and implementing policies or procedures for controlling ground vehicles and equipment on an airport, for example requirements for fuel trucks transporting oil. Airport operators would use the format but adapt the requirements to specific conditions found on the airport.
(See http://www.faa.gov/airports/resources/advisory_circulars/index.cfm.)

172 FAA Advisory Circular 150/5230-4A, "Aircraft Fuel Storage, Handling, and Dispensing on Airports," Federal Aviation Administration, U.S. Department of Transportation, June 18, 2004.

173 FAA Advisory Circular 150/5210-20, "Ground Vehicle Operations on Airports," Federal Aviation Administration, U.S. Department of Transportation, March 31, 2008.