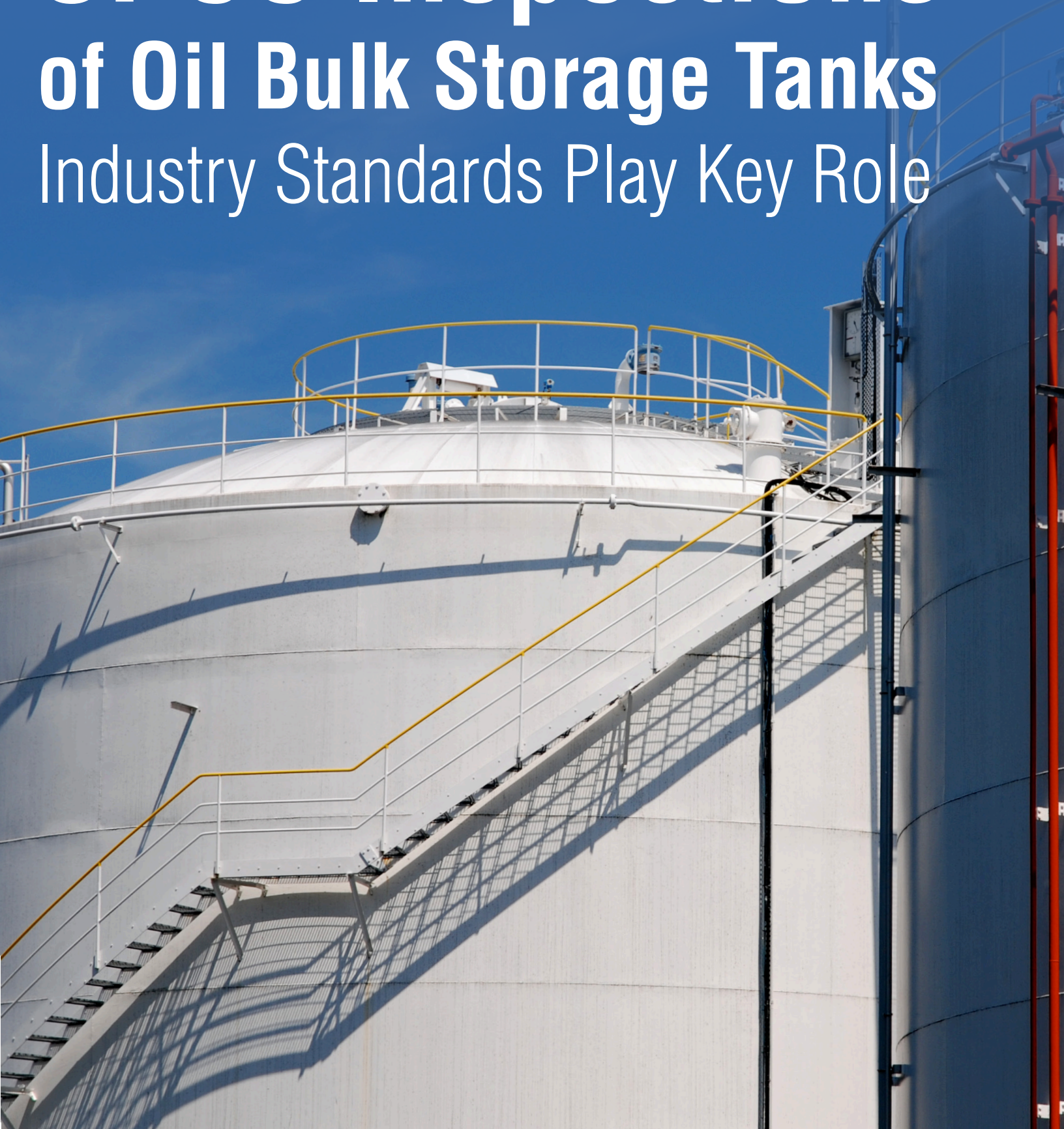


SPCC Inspections of Oil Bulk Storage Tanks Industry Standards Play Key Role



SPCC INSPECTIONS OF OIL BULK STORAGE TANKS

INDUSTRY STANDARDS PLAY KEY ROLE

Under 40 CFR 112.3(d)(iv) of the federal oil-pollution prevention regulations, owners and operators (O/O) of nontransportation facilities that must develop Spill Prevention, Control, and Countermeasure (SPCC) plans must include in those plans procedures for inspecting and testing oil bulk storage containers and oil-filled equipment. The SPCC regulations apply to facilities with a total aboveground oil storage capacity of 1,320 gallons (gal) and/or more than 42,000 gal of buried oil storage capacity (excluding completely buried tanks subject to Resource Conservation and Recovery Act (RCRA) provisions at 40 CFR 280 and 281) and that could reasonably be expected to discharge oil in quantities that may be harmful into or upon the navigable waters of the United States or adjoining shorelines.

This paper reviews the principal requirements for inspections of oil bulk storage containers, with an emphasis on integrity testing, applicable industry standards, field-built and shop-built tanks, and frequency of inspections.



Overview

Perhaps the most onerous inspection requirement applying to oil bulk storage containers is integrity testing. With smaller shop-built containers, integrity testing may be as simple as an external visual inspection. But with larger containers that are generally erected in the field, integrity testing typically requires using instruments and complex procedures that should be conducted by properly trained technicians. Inspections must also cover tank appurtenances. (The U.S. Environmental Protection Agency (EPA) defines *appurtenances* as additional pieces of equipment necessary to bring the tank into service, e.g., shell manholes, inlet-outlet connections, vent connections, and liquid gauges and alarms.)



The EPA defines *integrity testing* as “any means to measure the strength (structural soundness) of the container shell, bottom, and/or floor to contain oil and may include leak testing to determine whether the container will discharge oil. It includes, but is not limited to, testing foundations and supports of containers. Its scope includes both the inside and outside of the container. It also includes frequent observation of the outside of the container for signs of deterioration, leaks, or accumulation of oil inside diked areas.” July 17, 2002, *Federal Register*.

There are exceptions to the integrity testing requirements for bulk storage tanks. For example, integrity testing is not required for onshore oil-production facilities unless the O/O determines that secondary containment is impracticable. Completely buried underground storage tanks (USTs) are not specifically subject to integrity testing but must be leak tested regularly. In addition, integrity testing is generally not required for containers that store animal fats or vegetable oils, although these are subject to visual inspections.

The EPA developed the SPCC inspection regulations in close consultation with industry and standards-setting organizations. One result is that the Agency's rules provide flexibility to allow O/Os to select the type of integrity testing protocol most suited to the facility from standards established by the organizations. In addition, an O/O may deviate from a "portion" of an integrity inspection protocol provided a professional engineer (PE) certifies the change.

The two commonly used inspection standards for aboveground bulk storage containers are the American Petroleum Institute's (API) Standard 653 (*Tank Inspection, Repair, Alteration, and Reconstruction*) and the Steel Tank Institute's (STI) SP001 (*Standard for the Inspection of Aboveground Storage Tanks*).

While inspections must be conducted on a regular schedule, the actual frequency of inspections can be decided by the O/O as long as there is justification for that decision, based again on the appropriate industry standards or findings certified by a PE and explained in the SPCC Plan. Deviations from inspection frequency specified in a standard protocol are also allowed, but again, the reason for the deviation must be explained, and the inspection frequency adopted must be certified by a PE in the SPCC Plan.



Applicability

Integrity testing is required for all aboveground bulk storage containers located at onshore facilities (except oil-production facilities). Integrity testing is necessary to determine if the container is suitable for continued use until the next formal inspection.

Specifically, sections 40 CFR 112.8(c)(6) and 112.12(c)(6)(i) require integrity testing and routine inspections for any of the following aboveground bulk storage containers with a capacity of 55 gallons or more:

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

Rule requirements

The SPCC rule requires that O/Os:

- Test or inspect *each* container for integrity on a regular schedule and whenever material repairs are made.
- 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 that includes visual inspection of the container's supports and foundations.
- Identify in the SPCC Plan the type and frequency of testing and inspection for each container and the appropriate qualifications of personnel performing the tests and inspections. The O/O must retain testing and inspection records for 3 years; the EPA recommends that formal test records or reports be retained for the life of the container.

Formal integrity inspections may be either external or, if the container is empty, internal. For example, integrity testing of field-erected aboveground storage tanks in accordance with API 653 calls for formal in-service external inspections and formal out-of-service internal inspections to be conducted by an API 653-certified inspector. A formal in-service external inspection involves visual inspection and ultrasonic thickness (UT) measurements of the shell. A formal out-of-service internal inspection determines the condition of the tank's floor, walls, and structure and should also include the shell, roof, nozzles, and tank appurtenances. The out-of-service inspection typically includes nondestructive testing, such as magnetic flux leakage (MFL) scanning of the floor, vacuum box testing of floor welds, helium leak testing, UT measurements, and tank bottom settlement measurements.

Other types of nondestructive integrity tests include radiographic examination, magnetic particle examination, liquid penetrant examination, acoustic emissions testing, hydrostatic testing, and inert gas leak testing.

Baseline and frequency

API 653 and STI SP001 indicate that the O/O should ascertain the baseline conditions of containers before integrity testing is conducted; documenting such conditions is important for comparisons with conditions found in subsequent inspections to identify changes affecting the container's integrity. In 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 thicknesses and a second inspection to establish corrosion rates.

These inspection intervals establish the frequency of the regular testing schedule. When no or only partial baseline information is available for a container at the facility, the O/O must schedule integrity testing as soon as possible. A baseline is not required when the standard requires visual inspection only.

Testing frequency must be conducted as specified by the industry standard or at a frequency sufficient to prevent discharges. Industry standards establish the scope and frequency for inspections that consider 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. The degree of risk of a discharge to navigable waters or adjoining shorelines must also be considered (e.g., for containers located near saltwater where an accelerated corrosion rate would be expected). The frequency of inspections is based on changing conditions of the container (e.g., corrosion rates, settling), and the period between inspections may shorten over time. Decisions regarding inspection frequency must be documented in the SPCC Plan.



Integrity testing should be considered within the 5-year review cycle required for SPCC plans. This is important for containers that are not yet operational but will become operational before the next review. The EPA recommends that the person(s) preparing the SPCC Plan consult with a tank professional and/or PE to determine the scope of the integrity testing program for nonoperational containers. Language should be included to show that these containers will fall within the scope of the industry inspection standard that will be applied.

The EPA's SPCC guidance documents frequently distinguish between shop-built and field-constructed containers. Generally, only visual inspections are required for shop-built containers. However, the largest shop-built tanks have a capacity of about 50,000 gallons, and industry standards require more than a visual inspection for tanks that have a capacity exceeding 5,000 gallons. If an

O/O wants to deviate from applicable industry standards to develop an integrity testing program, a PE must certify in the SPCC Plan that it is an environmentally equivalent alternative.

Additional inspection points

- **Equivalence.** Following an industry standard is not mandatory; neither is compliance with every element of an industry standard. The SPCC rules recognize that industry standards may not be practicable or may be too costly for some sites. If the industry standard is only partially adopted, the SPCC Plan must include the reason for deviating from the standard and a description of the alternative method adopted, including how it is environmentally equivalent. An environmentally equivalent approach may be based on a combination of elements from various industry standards and good engineering practice or other measures that effectively minimize the risk of container failure and that allow for the detection of leaks.
- **Professional experience.** If no industry standard applies to a particular container (e.g., animal fats and vegetable oils containers, containers storing oils that have a specific gravity greater than 1.0, or oil containers operated at elevated temperatures), the plan preparer should consider the manufacturer's specifications and instructions for the proper use and maintenance of the equipment, appurtenances, or container. If no manufacturer's instructions apply, the plan preparer may call on his or her professional experience and/or consult with tank inspection professionals to develop site-specific inspection and testing requirements that are in accordance with good engineering practice; the alternative procedures must be documented in the SPCC Plan.



- **Hybrid inspections.** Site-specific integrity inspections, also called *hybrid* inspections, should contain specific inspection elements. For shop-built tanks, these include evaluation of external pitting; evaluation of condition and operation of appurtenances; evaluation of welds; establishment of corrosion rates and determination of inspection interval and suitability for continued service; evaluation of tank bottom where it is in contact with ground and no cathodic protection is provided; evaluation of structural integrity of the

foundation; and hydraulic examination to determine if the tank is sound and not leaking. For field-erected tanks, the minimum elements should include evaluation of the foundation; evaluation of settlement; determination of safe product fill height; determination of shell corrosion rate and remaining life; determination of bottom corrosion rate and remaining life; determination of inspection interval and suitability for continued service; evaluation of welds; evaluation of coatings and linings; evaluation of repairs for risk of brittle fracture; and hydraulic evaluation to determine if the tank is hydraulically sound and not leaking.



- **Buried tanks.** Any completely buried metallic storage tank installed on or after January 10, 1974, must be protected from corrosion by coatings and cathodic protection. Regular leak tests are required. Appropriate methods of testing should be selected based on good engineering practice and tests conducted in accordance with 40 CFR Part 280 or a state program approved under 40 CFR Part 281. The method and schedule for testing must be described in the SPCC Plan.
- **Production facilities.** To determine deterioration and maintenance needs, regular visual inspections are required for onshore oil-production facilities for each bulk storage container (e.g., oil stock tanks, flow-through process vessels, produced water containers), associated piping downstream from the container, and the foundation and support of each container that is on or above the surface of the ground. Before certifying this part of the SPCC Plan, the PE must consider applicable industry standards such as *API 12R—Recommended Practice for Setting, Maintenance, Inspection, Operation, and Repair of Tanks in Production Service*—which include inspection procedures for tanks employed in onshore oil-production service. The O/O must conduct integrity testing for any bulk storage containers for which secondary containment is impracticable.