CHAPTER 4
Aboveground Storage Tanks and Containers

This chapter summarizes:

- *Regulations for aboveground fuel storage tanks*
- *Prevention of spills, overfills, and corrosion*
- *Containment options and drainage for tanks and containers*

4.1 Regulatory Background

There are many overlapping federal regulations for **aboveground storage tanks (ASTs)** and containers. Unfortunately, many of these requirements are found indirectly as pieces of regulations on other topics. A few of the more important regulations with AST requirements are:

- Spill Prevention, Control and Countermeasure (SPCC) Rules (40 CFR 112) (see *Chapter 1, Environmental and Emergency Response Planning* and *Section 4.2* in this chapter)
- National Pollutant Discharge Elimination System (NPDES) (40 CFR 122) (see *Chapter 9, Wastewater and Stormwater*)
- *International Fire Code (IFC)* published by the International Code Council
- National Fire Protection Association (NFPA) 1 – Uniform Fire Code
- NFPA 30 – Flammable and Combustible Liquids Code
- NFPA 30A – Code for Motor Fuel Dispensing Facilities and Repair Garages
- U.S. Coast Guard (USCG) requirements for transferring oil or hazardous materials in bulk (33 CFR 154)
- **Occupational Health and Safety Act (OSHA)** requirements for flammable and combustible liquids (29 CFR 1910.106)
- Requirement for hazardous waste containers (40 CFR 265, Subpart I) and tanks (40 CFR 265, Subpart J) (see *Chapter 7, Hazardous and Recycled Waste)*

Most states have adopted the IFC or NFPA 1 as their state fire code. If your facility is located in a metropolitan area, the chances are good that your local fire department has modified and adopted the IFC or NFPA. These standards have additional requirements for designing, installing and operating ASTs containing fuels and hazardous materials. Be sure to check with your local or state fire marshal to see what guidelines they have adopted.

Additionally, over 35 states have their own regulatory programs that impose additional, or more stringent, AST requirements (see *Appendix 4-1* and *Section 4.9*)

The Law Says

- *Motor vehicles with fuel tanks for self-propulsion (aircraft, trucks, buses, aviation ground service equipment, dozers) are not required to have secondary containment (40 CFR 112.1(d)(7)).*
- *Mobile refuelers that store fuel for transfer operations are required to provide containment during transfer operations. When parked or not operating, mobile refuelers should be located in areas with containment and/or diversionary structures and near spill response equipment (40 CFR 112.7(c)).*
- *Mobile or portable containers of petroleum greater than 55-gallon capacity, including towed bowsers when not in use, are required to have secondary containment sized to hold the capacity of the largest container (40 CFR 112.8(c)(11)). This sized secondary containment requirement also applies to totes and tanks (40 CFR 112.8(c)(2)).*
- *State agencies and local fire marshals require compliance with fire codes for aboveground storage of flammable and combustible liquids, such as the International Fire Code or the National Fire Protection Association Standards.*

4.2 Spill Prevention, Control, and Countermeasure Requirements

As mentioned in Chapter 1, SPCC requirements apply to facilities with a total AST oil capacity of over 1,320 gallons in containers of 55 gallons or larger. It also applies if the total buried storage capacity is over 42,000 gallons. The SPCC rule exempts buried storage tanks and ancillary equipment when tanks are subject to 40 CFR part 280 discussed in *Chapter 3, Underground Storage Tanks*. The SPCC rule applies specifically to a facility's maximum storage capacity, regardless of the operational capacity or whether the tanks are completely full. Use the worksheet in *Appendix 4-2* to determine whether your facility is subject to SPCC requirements.

Did You Know?

The EPA's SPCC Guidance for Regional Inspectors is also useful for facility operators (see Section 4.10, For More Information). For instance, it clarifies the relationship between the various general and specific secondary containment requirements.

4.2.1 Secondary Containment Requirements

The goal of the SPCC rule is to prevent discharges of oil into **navigable waters**, and one of the primary ways to achieve this goal is to require **secondary containment**. There are two types of secondary containment requirements discussed in the SPCC regulations: general and specific. *General* secondary containment requirements address the most likely oil discharge from a facility; *specific* secondary containment requirements—sometimes called sized secondary containment requirements—address a major container or tank failure. All facilities must meet the general secondary containment requirements; bulk storage containers and tanks must also meet the specific containment requirements.

At regulated facilities, all areas with the potential for a discharge are subject to the general secondary containment provisions (40 CFR 112.7(c)), which require that these areas be designed with appropriate containment or diversionary structures to prevent harmful discharges. Examples of general secondary containment are:

- Impervious dikes, berms, retaining walls, and curbing
- Culverts, guttering, or other drainage systems, including stormwater retention ponds
- Weirs or dam-like structures generally used with skimmers
- Booms and sorbent materials used to recover liquids
- Barriers such as spill mats and storm drain covers
- Drip pans typically used with product-dispersing hoses and uncoupling hoses
- Sumps and collection systems

Areas where specific types of containers or activities occur are also subject to additional, more stringent specific containment requirements (40 CFR 112.8). In general, the specific containment provisions require containment sized to capture the volume of the single largest compartment or container, plus **sufficient freeboard** for precipitation.

The following sections summarize the secondary containment requirements for oil-containing units, such as:

- Bulk storage containers and tanks

- Mobile or portable containers
- Oil-filled operational equipment
- Oil-filled manufacturing equipment
- Mobile refuelers
- Motor vehicles
- Oil/water separators
- Piping and loading and unloading racks (discussed in *Chapter 5, Piping and Pipelines*)

4.2.1.1 Bulk Storage Containers and Tanks

SPCC defines bulk storage containers as any container used to store oil with a capacity of 55 gallons or more, such as emergency generators, day tanks, product dispensing tanks, and used oil tanks. ASTs are considered bulk storage containers. In addition to complying with the general secondary containment requirements above, each facility must comply with specific secondary containment and other requirements for bulk storage containers including:

- Containment sized to hold the entire capacity of the largest single container or tank with sufficient freeboard to also contain precipitation. This is usually the amount of precipitation from a 24-hour 25-year storm.
- Diked areas **sufficiently impervious** to contain spilled oil.
- Bypass or release values must be kept closed to contain rainwater until it can be inspected for contaminants and discharged under supervision (note: the draining of rainwater from containment must be documented).
- Visual inspection of the outside of the container for signs of deterioration and leaks. Tank supports and foundations should be checked.
- Regular **integrity testing** using hydrostatic testing, radiographic testing, ultrasonic testing, acoustic emissions testing, or other nondestructive shell thickness testing. Descriptions of these methods are discussed in *Appendix 4-3.*
- Integrity testing after tank repairs.
- Prompt repairs of visible leaks from tank seams, gaskets, rivets, and bolts.
- Equipping tanks with one or more of the following level gauging systems and alarms to prevent spills:
  - High-level alarms
  - High liquid pump cut-off devices
  - Communication system between the tank gauger and pump station
  - Liquid level meters, such as digital computers, telepulse system, or visual gauges
  - Liquid-level-sensing devices (should be regularly tested for proper operation)
  - Other devices that provide equivalent protection (such as relief valves and overflow lines)

Buried tanks and bunker tanks (partially buried) must have coating or cathodic protection and regular testing of such systems. The bottom of the ASTs may be subject to extensive corrosion, which may not be evident during visual inspections. Corrosion protection can be provided by dielectric coatings and carefully engineered cathodic protection. Some facilities have installed double-bottom tanks to reduce the corrosion factor.

Your SPCC Plan must describe how your tank design and operations comply with these requirements (see *Chapter 1, Environmental and Emergency Response Planning*).

4.2.1.2 Mobile or Portable Containers

Mobile or portable storage containers, such as 55-gallon drums, skid tanks, totes, **bowsers**, and emergency backup generators (if greater than 55 gallons), also require general secondary containment.

Size-specific secondary containment is required for mobile or portable containers (other than mobile refuelers). The specific secondary containment (for example, dikes or catchment basins) must hold 100% of the capacity of the largest container and additional volume for precipitation (40 CFR 112.8(c)(11)). To comply with this requirement, the facility might need to designate an area of the installation to locate mobile containers when not in use.

In addition, oil-filled tank trucks and railcars used only within the facility boundaries are regulated under the SPCC rule as mobile or portable containers. If tank trucks or rail cars are used in commerce and travel to other facilities, they would be regulated by the U.S. Department of Transportation (DOT) instead.

4.2.1.3 Oil-filled Operational Equipment

Oil-filled operational equipment includes systems containing oil to enable operation of the equipment. Specifically, it is equipment with an oil storage container (or multiple containers) where the presence of oil is intrinsic to the operation of the device and facilitates the function of the equipment. Oil is not consumed by oil-filled operational equipment. Examples of oil-filled operational equipment include hydraulic systems, lubricating systems (including lubricating systems for pumps, compressors, and other rotating equipment), gear boxes, machine coolant systems, heat transfer systems, transformers, and other electrical equipment.

Oil-filled electrical and operational equipment must comply with the general secondary containment requirements. Because this equipment does not require frequent transfer of oil, there are no additional specific secondary containment requirements.

4.2.1.4 Oil-filled Manufacturing Equipment

Oil-filled manufacturing equipment stores oil that is incidental to a manufacturing activity or process to create or modify a finished product. Again, oil is not consumed by oil-filled manufacturing equipment. Examples of oil-filled manufacturing equipment include reactors, mixing tanks, dryers, heat exchangers, distillation columns, and flow-through process tanks. Oil-filled manufacturing equipment is subject to the general secondary containment requirements.

4.2.1.5 Mobile Refuelers

The EPA defines a mobile refueler as a bulk storage container onboard a vehicle or towed that is designed or used solely to store and transport fuel for transfer into or from an aircraft, motor vehicle, locomotive, vessel, ground service equipment, or other oil storage container.

This definition is also intended to include vehicles with cargo tanks or tank trucks used to fuel or defuel aircraft, tanks, or motor vehicles. This definition is not intended to include mobile or portable containers that are not involved in fueling activities.

Mobile refuelers are exempt from the specific secondary containment requirements to contain the capacity of the largest compartment or container. Instead, the general secondary containment requirements to address a most likely spill scenario apply to mobile refuelers during all periods of operations. For instance, containment such as drip pans, absorbent socks and mats, and readily available emergency response equipment are required during fuel transfer if permanent secondary containment or drainage collection systems are not in place. The exemption from sized secondary containment requirements was designed for vehicles and portable containers that move locations frequently. The exemption does not apply to mobile refuelers used primarily for the bulk storage of oil in a fixed location (for example, a refueler that no longer can move or conduct transfers and is left only to serve as a bulk storage container). Some states have more specific definitions. For instance, in Florida a mobile tank is defined as an AST that is moved to a different location at least once every 180 days (otherwise, it is a bulk storage container). In addition, check with your host installation to see if they provide parking areas with secondary containment for overnight parking of mobile refuelers containing fuel.

4.2.1.6 Motor Vehicles

Aircraft, automobiles, sport utility vehicles, buses, self-propelled aviation ground service equipment, and construction vehicles (for example, bulldozers) are exempt from SPCC requirements (40 CFR 112.1(d)). These are defined as motor vehicles where the petroleum fuel is used only for self-propulsion of the vehicle (and not stored on the vehicle for transfer to another vehicle). Tank trucks that are used in interstate commerce are not subject to SPCC requirements, as they are regulated by DOT.

4.2.1.7 Oil/Water Separators

The intended use of the **oil/water separator** determines whether it is subject to SPCC regulations. Oil/water separators used exclusively as part of a permitted wastewater treatment process are not subject to SPCC requirements. Oil/water separators to remove water from oil, sometimes called free-water knockout tanks or product recovery tanks, are regulated as bulk storage tanks under the SPCC rule.

Properly designed, maintained, inspected, and operated oil/water separators may be used as part of a facility's drainage systems to meet the general or specific secondary containment requirements (see *Chapter 9, Wastewater and Stormwater*). The design and capacity of such systems need to be sufficient to handle the expected incoming oil and water to prevent a discharge of oil and

untreated wastewater. The layer of oil in most oil/water separators is typically pumped out on a regular basis and sent for recycling (see *Chapter 7, Hazardous and Recycled Waste*).

Separate containers used to store recovered oil from an oil/water separator (sometimes called slop tanks) would meet the definition of a bulk storage container and must comply with general and secondary requirements.

4.2.1.8 Loading and Unloading Racks

Petroleum transfer areas and loading and unloading racks are required to have secondary containment. Refer to *Chapter 5, Piping and Pipelines* for more information about the SPCC requirements for these areas. Other oil transfers that are to and from SPCC-regulated containers and equipment also are covered by SPCC regulations. Examples include fuel dispensing operations, tank refueling operations, and tank emptying operations.

4.2.2 Facility Drainage and Security

Facility drainage systems must be designed to prevent oil discharges to surface water in event of a spill. For instance:

- Drainage from diked areas must be controlled by manual open–close valves or manually activated pumps. Flapper valves are not acceptable. Drainage valves should be closed and locked (electronically controlled and automated systems are acceptable) when not in use.
- Any stormwater that accumulates in the secondary containment must be inspected, documented, and then properly managed. If no sheen is present, then the stormwater can be discharged to the ground or storm drain. If any oil sheen is observed, the contaminated water *cannot* be discharged to the ground. The contaminated water should be diverted to an on-site treatment plant or oil/water separator, or drummed for off-site disposal.
- Draining of containment structures must be observed at all times, and valves should be closed when completed.
- Adequate records of the drainage must be kept (date, time, personnel names, results of visual inspection).

Don't Forget...

Drain valves must be closed when not in use. Diked areas should be free of pooled oil. Spills should be removed promptly.

You should control drainage from undiked areas, such as tank car and truck loading and unloading areas, truck wash down areas, piping and manifold areas, garage bays, and fuel islands. Undiked areas can be designed to control drainage through a combination of curbing, trenches, catchment basins, and retention ponds, as necessary, to contain a spill. If a paved area is improperly graded or if a curb is deteriorating, contaminated water may escape from the facility.

4.2.3 Security

Your facility must have adequate security to deter vandalism and prevent unauthorized access to containers and equipment that could be involved in an oil discharge. For instance:

- Starter controls on pumps should be locked in the off position or located in an area restricted to authorized personnel when not operating or in standby mode.

- Tank flow valves and drain valves (such as water draw-off valves, sampling valves, and sparge valves) should be securely locked when not operational.
- Out-of-service and loading and unloading pipe connections should be secured in a closed position.
- The facility should be fully fenced, and entrance gates should be locked and/or guarded.
- There should be adequate lighting at night to detect spills.

4.2.4 Inspections and Records

All potential spill sites where petroleum or hazardous materials are stored or handled must be inspected frequently and regularly in accordance with procedures in the facility's SPCC Plan. Inspection procedures need to meet the requirements of relevant industry standards (such as those published by the American Petroleum Institute [API] or Steel Tank Institute [STI]). Inspection and integrity testing records must be kept for at least 3 years. *Exhibit 4–1* lists the types of records that should be maintained at the facility.

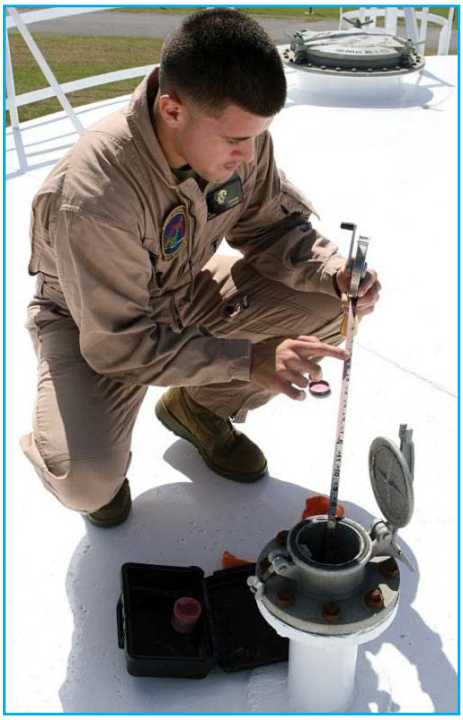
4.2.5 Training and Staffing

Oil-handling staff must be trained in operation and maintenance of equipment to prevent discharges; protocols for responding to discharges; applicable pollution control laws, rules, and regulations; general facility operations; and the SPCC Plan. Oil-handling staff also must be trained annually in known discharges or failures, malfunctioning components, and any recently developed precautionary measures.

SPCC regulations also require designation of one person at each facility who is accountable for discharge prevention and who reports to facility management. Refer to *Chapter 10, Training* for more information on SPCC training.

EXHIBIT 4–1
AST Inspection and Maintenance Program Records

Aboveground Storage Tanks, Piping, and Appurtenances	Dikes, Berms, Secondary Containment Systems
- Regular visual inspections and tank integrity testing. - Tank servicing, maintenance, cleaning, and repairs. - Supports and foundations (inspections for cracks, crumbling, deterioration, and seepage). - Storage tank flow valves, pumps, flange joints, and expansion joints (regular visual inspections). Make sure they are working properly, free of leaks, and in locked position as appropriate. - Storage tank level gauges and alarms (regular mechanical function testing and visual inspections).	- Containment dikes and berm integrity (regular visual inspections, especially after storms). - Date, time, and signature of employee and/or manager who performed drainage of stormwater from diked containment areas. - Loading and unloading area drainage system effectiveness. - Spill response supplies are available and in good condition.



4.2.6 Environmental Equivalence and Impracticability Determinations

The EPA wanted the SPCC rules to be more performance-based when they modified the regulations in 2002. For instance, EPA will allow deviations from certain requirements as long as the alternative measure provides equivalent environmental protection. If an SPCC requirement is inappropriate or can be achieved through an alternative method based on good engineering practices, the facility can document and implement environmentally equivalent measures (40 CFR 112.7(a)(2)). However, deviations are *not* allowed for general and specific secondary containment, training, and recordkeeping requirements. Environmentally equivalent measures must be approved by a licensed Professional Engineer (PE) and documented in the SPCC Plan.

If the facility owner and/or operator is incapable of installing secondary containment, then an impracticability determination can be made. Impracticability can be decided based on space and geographical limitations, local zoning ordinances, fire codes, safety, or other good engineering practice reasons. Impracticability cannot be based solely on economic cost. If impracticability has been determined, then the facility must substitute the following measures in place of secondary containment (112.7(d)):

- Periodic integrity testing of bulk storage containers, periodic integrity testing, and leak testing of valves and piping associated with the containers
- An oil spill contingency plan following the provisions of 40 CFR 109.5, which are more detailed and burdensome than those required in 40 CFR 112, including:
  - Defining authorities, responsibilities, and duties of persons, organizations, and agencies to be involved in planning or directing oil removal operations
  - Establishing notification procedures for the purpose of early detection and timely notification of an oil discharge
  - Providing full resource capability and commitment during an oil discharge situation
  - Providing well-defined and specific actions to be taken after discovery and notification of an oil discharge
  - Specifying procedures to facilitate recovery of damages and enforcement measures
- A written commitment of resources, equipment, and materials required to control and remove any quantity of oil discharged that may be harmful

Areas where the technical impracticability determination can be used are:

- General containment (areas with potential for discharge, such as piping, oil-filled operating and manufacturing equipment, and non-rack–related transfer areas)
- Loading and unloading racks
- Bulk storage containers
- Mobile or portable oil containers

4.3 National Pollutant Discharge Elimination System Tanks

Chapter 9, Wastewater and Stormwater discusses NPDES requirements (40 CFR 122) in more detail. Permits issued under the NPDES program often contain requirements for tank management, specifically under the stormwater section of the permit. Most states have authorization to enforce the NPDES permit program and have their own stormwater general permits that may address tank management issues. Typical items included in the stormwater permits are:

- When the facility is operating, inspect tanks at least monthly for potential leaks, and ensure that appropriate action is taken by implementing tracking or follow-up procedures.
- Wash water from tank cleaning is not allowed to go onto the ground or into the storm drain system.

4.4 International Fire Code

The IFC is the fire code usually adopted by state fire marshals. The IFC includes design and operational standards for various types of facilities, processes, and materials. Several sections within the IFC may be applicable to DLA Energy operations; these sections specifically address:

- Combustible and flammable liquids storage
- Aviation facilities
- Motor fuel dispensing facilities and repair garages
- Hazardous materials
- Flammable gases
- Flammable solids
- Liquefied petroleum gases
- Oxidizers

The IFC also includes general precautions against fire (such as prohibiting accumulations of combustible waste and stating where dumpsters should be placed) and emergency planning and preparedness requirements.

Specific operational requirements for combustible and flammable liquids tanks include:

- Maintaining fire protection and suppression systems
- Assessing the site for fire and explosion hazards after a spill or leak if the fire code official determines that there is a concern, and submitting the report to the local fire chief within 60 days
- Providing secondary containment
- Providing various identification and warning labels on the tanks
- Color coding or labeling the tank's loading and unloading piping
- Providing a permanent sign on the fill point of the tank documenting the filling procedure and the tank calibration chart

- Providing guard posts, ballards or other approved protection for tanks, piping, valves, and fitting for protection from vehicular impact
- Ensuring warning signs are visible to vehicles around pipelines
- Conducting testing of manual control valves and check valves under normal and emergency conditions
- Having operational procedures in place that require the person filling the tank to determine the remaining gallons available to reach 90% of the tank's capacity *prior to* filling the tank
- Providing spill containers at least 5 gallons in size for each fill connection
- Keeping combustible materials, drums, and barrels away from diked areas
- Removing and disposing out-of-service tanks in accordance with specific procedures
- Requiring minimum aisle space of 4 feet between piles or racks of flammable drums
- Managing bulk tank farms, wharves, bulk fuel transfers, and solvent stills in specified manners

4.5 National Fire Protection Association

NFPA publishes a series of codes used to design and operate tanks and other operations that may pose a fire hazard. Some states have adopted NFPA standards as their state fire code. A few of the key NFPA codes are listed below. Note that there are many other NFPA codes that may be applicable to DLA Energy operations.

- NFPA 1 – Uniform Fire Code
- NFPA 30 – Flammable and Combustible Liquids Code
- NFPA 30A – Code for Motor Fuel Dispensing Facilities and Repair Garages
- NFPA 52 – Compressed Natural Gas Vehicular Fuel Systems Code
- NFPA 57 – Liquefied Natural Gas Vehicular Fuel Systems Code
- NFPA 58 – Liquefied Petroleum Gas Code
- NPFA 303 – Fire Protection Standard for Marinas and Boatyards
- NFPA 307 – Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves
- NFPA 326 – Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair
- NFPA 329 – Recommended Practice for Handling Releases of Flammable and Combustible Liquids and Gases

Consult your local or state fire chief to determine what they require. Two of these standards are discussed in more detail below.

4.5.1 NFPA 1 – Uniform Fire Code

NFPA 1 includes design standards for ASTs and includes some operational requirements.

NFPA 1 also has sections on many different types of operations that may be applicable to DLA Energy operations. These sections include:

- Combustible waste and refuse
- Airports and heliports
- Marinas and boatyards
- Motor fuel dispensing facilities and repair garages
- General storage
- Refueling
- Hazardous materials
- Compressed gases and cryogenic fluids
- Flammable and combustible liquids
- Flammable solids
- Liquefied petroleum gases and natural gases
- Oxidizers and organic peroxides

NFPA 1 requires the following for tanks:

- Providing an emergency action plan; training; coordinating with local authorities; shutting down storage tanks and testing associated alarms, interlocks, and controls; and posting the plan.
- Inspecting and maintaining the area around the tanks; addressing proper maintenance and inspection of fire prevention equipment; having maintenance and operational practices that control leakage and prevent spillage; keeping the area free of weeds, trash, and other combustible materials; keeping access ways clear; and keeping combustible wastes and residues in operational areas to a minimum, stored in covered metal containers, and disposed of daily.
- Labeling tanks in a specific manner. Isolated tanks have additional labeling requirements.
- Providing written procedures to prevent overfilling tanks.

4.5.2 NFPA 30 – Flammable and Combustible Liquids Code

NFPA 30 addresses design and operations of fixed tanks, portable tanks and containers, piping systems, facility, and wharves operations. Environment-related requirements for fixed tanks include:

- Requiring vapor detection and liquid detection alarm systems for vaulted tanks
- Defining minimum distances between tanks, other tanks, property line, and buildings
- Controlling spillage from aboveground tanks through remote impounding, diking, or double walls. Specific design requirements are provided

- Testing requirements
- Providing an emergency action plan; training; coordinating with local authorities; shutting down storage tanks and testing associated alarms, interlocks, and controls; and posting the plan
- Inspecting and keeping the area around the tanks free from weeds, trash, and other combustible materials
- Maintaining accessways
- Providing formal written procedures to prevent overfilling the tank
- Labeling tanks per specific requirements
- Securing unsupervised, isolated tanks

Specific requirements are also listed for loading and unloading operations and facilities, including tank vehicles, tank cars, and wharves.

4.6 U.S. Coast Guard Requirements

33 CFR 154, Facilities Transferring Oil or Hazardous Material in Bulk, applies to facilities transferring oil or hazardous materials to and from vessels with a total capacity of 250 barrels or more. The operations manual required by this regulation is detailed; some of the required environment-related information includes:

- Procedures to be followed if the cargo spills or leaks, for each specific cargo
- Description and instructions for the use of drip and discharge collection and vessel slop reception facilities, if any
- Description and location of each emergency shutdown system
- Quantity, types, location, and instructions for use of fire extinguishing systems
- Procedures for reporting and initial containment of oil or hazardous material discharges
- Summary of applicable federal, state, and local oil or hazardous material pollution laws and regulations
- Marking each transfer hose with the name or type of material that may be transferred through the hose
- Procedures for tank cleaning or stripping operations, if conducted
- Description of the vapor control system's design and operation

The regulations also address discharge containment and discuss how much discharge containment equipment is required and how quickly discharges must be removed.

33 CFR 154 requires response plans to address spills at facilities that could be expected to cause substantial harm to the environment under 33 CFR 154.1015 (note that these plans are different from the Facility Response Plans discussed in 40 CFR as mentioned in *Chapter 1, Environmental and Emergency Response Planning*).

4.7 OSHA Requirements

OSHA requirements are found in 29 CFR and address health and safety requirements. Some of the OSHA regulations could be interpreted as also providing environmental protection. For instance, two potentially applicable regulations and some of the specific requirements of each are discussed below.

4.7.1 Flammable and Combustible Liquids

29 CFR 1910.106 applies to management of flammable and combustible liquids. Specific requirements for drainage or diked areas (one must be provided) include:

- Tank farm drainage
  - Must end up in vacant land or a basin having a capacity of at least the largest tank in the tank farm
  - Must not expose any tank or off-site area to flames if the fuel is on fire
- Diked areas
  - Must have a capacity of at least the largest tank in the tank farm
  - Walls must be constructed of earth, steel, concrete, or solid masonry designed to be watertight and to withstand a full hydrostatic head
  - Earth walls over 3 feet high must have a 2-foot-wide flat section at the top
  - Average height of the walls must not be over 6 feet above the interior grade
  - No loose combustible material or empty or full drums are allowed inside the diked area

Specific tank spacing and size limitations for portable tanks are given. Requirements for service stations include:

- Dispensing areas of service stations must be graded or curbing and door sills must be provided so that a spill will not flow into the buildings.
- Crankcase drainings and other flammable and combustible wastes shall not be dumped into the sewers but must be stored in tanks or drums outside the building until taken off-site.

4.7.2 Hazard Communication

The purpose of the hazard communication rules in 29 CFR 1910.1200 is to ensure that the information on the hazards of chemicals used by workers is transmitted to the workers. Hazard communication requires specific labeling of tanks and containers used in the work place.

4.8 Hazardous Waste Tanks

The hazardous waste regulations in 40 CFR 264 Subpart J (**treatment, storage, disposal, and recycle facility [TSDRF]** permitted tanks) and 40 CFR 265 Subpart J (hazardous waste generator tanks) provide specific standards for design, construction, testing, and inspections of ASTs that are used for storage of hazardous wastes. The requirements listed in these regulations are specific and comprehensive, and the regulations should be consulted when evaluating hazardous waste tanks. Typical requirements include:

- Specific design standards, such as:

- The tank must have a written assessment reviewed and certified by an independent, qualified, licensed PE in accordance with 40 CFR 270.11(d) attesting that the system has sufficient structural integrity and is acceptable for hazardous waste storage.
- Secondary containment capacity must equal 100% of the capacity of the largest tank in the containment area plus the volume for a 24-hour, 25-year storm (if the area is uncovered).
- Secondary containment systems must be designed, installed, and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, groundwater, or surface water at any time during the use of the tank system. Such containment must be capable of detecting and collecting releases and accumulated liquids until the collected material is removed. Specific containment systems design requirements are given.
- Installation of specific emissions controls for volatile materials.

- Specific operational requirements, such as:
  - Using appropriate controls to prevent spills from the tank or the containment, including (1) spill prevention controls (for example, check valves, dry discount couplings); (2) overfill prevention controls (for example, level-sensing devices, high-level alarms, automatic feed cutoff, or bypass to a standby tank); and (3) maintenance of sufficient freeboard in uncovered tanks to prevent overtopping by wave or wind action or by precipitation.
  - Developing and following a procedure for inspecting overfill controls and leak detection equipment.
  - Inspecting specific parts of the tank system and surrounding area daily.

Note that **small quantity generators** of hazardous waste have slightly different requirements (see *Chapter 7, Hazardous and Recycled Waste*).

Most states have been authorized to enforce the hazardous waste regulations. State hazardous waste regulations are often more stringent than federal requirements. Contact your state regulator to determine specific requirements.

State Requirements

4.9 State Requirements

Appendix 4-1 provides a list of states that have have their own AST regulations. Some of these states have delegated authority to implement the regulations to local agencies, such as regional boards or county and city agencies. Be sure to check with your local and state agencies to determine if there are additional requirements for your ASTs. For instance, below are some state requirements that are more stringent than federal rules:

- Florida requires that stormwater accumulated in secondary containment be removed within 1 week of the rainfall event. Florida also requires spill and overfill prevention and other tank equipment for ASTs to be from manufacturers on a state-approved equipment list.
- In New York, all facilities regulated under Article 17, Title 10 of the Environmental Conservation Law, Control of the Bulk Storage of Petroleum, must meet certain handling and storage requirements. ASTs must observe

rules for color coding of fill ports, shutoff valves, gauges, and check valves. In addition, the New York Oil Spill Prevention, Control and Compensation Act (Article 12 of the Navigation Law) regulates oil terminals and transport vessels operating in the waters of the state that have a storage capacity of 400,000 gallons or more.

- New Jersey requires a Discharge Prevention Program for large sites (if a site has a total storage capacity of 20,000 gallons or more for hazardous substances other than petroleum or petroleum products, or a total storage capacity of 200,000 gallons or more for hazardous substances of all kinds, including petroleum and non-petroleum products). Facilities must document their compliance by submitting two plans to the New Jersey Department of Environmental Protection: (1) a Discharge Prevention, Containment, and Countermeasure Plan and (2) a Discharge, Cleanup, and Removal Plan.
- California standards for tanks systems establish minimum procedures for the management of all underground and aboveground tank systems that held hazardous materials or hazardous waste and are to be disposed of or reclaimed. This rule establishes procedures for on-site cleaning and cutting during tank decommissioning, including written agency notification and independent certification of compliance with the regulations.

4.10 For More Information

For More Information

For Information On…	See…
AST Related Agencies	
EPA Oil Spill Program and Resources	*www.epa.gov/oilspill*
EPA Office of Emergency Management	*www.epa.gov/emergencies*
EPA SPCC Program	*http://www.epa.gov/oem/content/spcc/ index.htm*
Tank Related Professional and Trade Associations	
American Petroleum Institute (API)	*www.api.org*
American Society for Testing and Materials (ASTM)	*www.astm.org*
Fiberglass Tank and Pipe Institute (FTPI)	*www.fiberglasstankandpipe.com*
NACE International – The Corrosion Society	*www.nace.org*
National Fire Protection Association (NFPA)	*www.nfpa.org*
Petroleum Equipment Institute (PEI)	*www.pei.org*
Steel Tank Institute (STI)	*www.steeltank.com*
Underwriters Laboratories (UL)	*www.ul.com/global/eng/pages*
American Society of Mechanical Engineers (ASME)	*www.asme.org*
American Society of Nondestructive Testing (ASNT)	*www.asnt.org*
American Welding Society (AWS)	*www.aws.org*
Documents and References	
SPCC Guidance for Regional Inspectors	*https://www.epa.gov/oil-spills-prevention-and-preparedness-regulations/spcc-guidance-regional-inspectors*

Action Items

4.11 Action Items

Item	Date Started	Date Completed	N/A	Comment(s)
Verify that your liquid storage tanks meet industry standards for design, construction, alterations, and repairs.			☐	
Register your tank systems with a regulatory agency (usually a state agency).			☐	
Test your tanks for integrity to prevent accidental failures.			☐	
Prepare contingency and response plans to prevent releases and establish a plan of action in the event of a tank failure.			☐	
Train your staff in spill prevention and release response.			☐	
Routinely inspect your tank systems and secondary containment for actual or potential product releases.			☐	
Manage tank system wastes properly (including bottom water, removed paint); these may be considered hazardous waste.			☐	
Notify and report to regulatory agencies if a release is detected.			☐	
Maintain records of training, inspections, tank testing, registrations, self-inspections to prove compliance.			☐	
Understand the varying secondary containment requirements for stationary containers, portable containers, oil-filled operational equipment, oil-filled manufacturing equipment, mobile refuelers, motor vehicles, and oil/water separators.			☐	

CHAPTER 4
Appendices

Appendix 4–1 States with Aboveground Storage Tank Regulations

Appendix 4–2 SPCC Facility Oil Capacity Worksheet

Appendix 4–3 Aboveground Storage Tank Integrity Testing Methods

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Appendix 4-1: States with Aboveground Storage Tank Regulations

State	AST Regulatory Citation[1]	Comments
Alabama	Alabama Administrative Code (AAC) Chapter 335–6–16 – Administrative Guidelines and Procedures for the Alabama Underground and Aboveground Storage Tank Trust Fund	Federal facilities are exempt.
Alaska	Alaska Statutes Title 46, Chapter 4 – Oil and Hazardous Substance Pollution Control	State regulations require the submittal of an oil discharge prevention and contingency plan (which is similar to an SPCC Plan).
Arizona	NA[2]	
Arkansas	Arkansas Pollution Control and Ecology Commission Regulation 12 – Storage Tank Regulations	
California	California Code of Regulations (CCR) Title 22, Division 4.5, Chapter 32 – Management of Tanks	Many California municipalities have tank and SPCC regulations; potentially under the fire marshal.
Colorado	7 Code of Colorado Regulations (CCR) 1101, Regulation 14 – Underground Storage Tanks and Aboveground Storage Tanks, Article 3 – Aboveground Storage Tanks	
Connecticut	NA[2]	
Delaware	Delaware Administrative Code, Title 7, Regulation 1352 – Aboveground Storage Tanks	State regulations require the preparation of a Release Preparedness Plan (RPP), which is similar to but contains more information than a SPCC Plan (information can be incorporated into the SPCC Plan to meet the state requirements).
District of Columbia	NA[2]	
Florida	Florida Administrative Code (FAC) Chapter 62–762 – Aboveground Storage Tank Systems	State regulations are more stringent than federal for inspections, overfill protection, and reporting.
Georgia	NA[2]	
Hawaii	NA[2]	
Idaho	NA[2]	
Illinois	Illinois Administrative Code, Title 41, Section 160 Storage, Transportation, Sale and Use of Gasoline and Volatile Oils	Regulations includes hazardous materials in addition to oil for SPCC plans.
Indiana	NA[2]	
Iowa	Iowa Administrative Code (IAC) 661 Chapter 221 – Flammable and Combustible Liquids	SPCC Plan submittal to fire marshal could be required.
Kansas	Kansas Administrative Regulations (KAR) 28–44 – Petroleum Products Storage Tanks	
Kentucky	Kentucky Administrative Regulations (KAR) Title 815, Chapter 7, Subchapter 120 – Kentucky Building Code	Requires a permit for ASTs for petroleum products or hazardous substances and hazardous material plan review.

State	AST Regulatory Citation[1]	Comments
Louisiana	Louisiana Administrative Code (LAC) Title 33, Part IX, Subpart 1. Water Pollution Control, Chapter 9 – Spill Prevention and Control	Requires the submittal of a Spill Prevention and Control Plan (which is similar to an SPCC Plan) and includes hazardous materials in addition to oil for these plans.
Maine	Maine Revised Statutes (MRS) Title 38, Chapter 3, Subchapter 2–B – Oil Storage Facilities and Groundwater Protection. Also Code of Maine Regulations (CMR) Chapter 692 Siting of Oil Storage Facilities.	
Maryland	Code of Maryland Regulations (COMAR) Title 26, Subtitle 10 – Oil Pollution and Tank Management	
Massachusetts	527 Code of Massachusetts Regulations (CMR) 9.00 – Board of Fire Prevention Regulations – Tanks and Containers and also 520 CMR 12.00 Requirements for Installation of Tanks	
Michigan	Michigan Administrative Code (MAC) Chapter 324, Part 5 – Spillage of Oil and Polluting Materials	State regulations require preparation of a Pollution Incident Prevention Plan. This document is similar to an SPCC Plan.
Minnesota	Minnesota Administrative Rule (MAR) Chapter 7151 – Aboveground Storage of Liquid Substances	
Mississippi	NA[2]	
Missouri	Missouri Code of State Regulations (CSR) Title 2, Division 20, Chapter 15 – Petroleum Inspections. 10 CSR Division 26 Chapter 1–Underground and Aboveground Storage Tanks. 10 CSR Division 26, Chapter 5–AST Release Reporting.	
Montana	Administrative Rules of Montana (ARM) Rule 17, Chapter 57 – Aboveground Storage Tanks	
Nebraska	Nebraska Administrative Code (NAC) Title 158 – Aboveground Storage Tanks	
Nevada	Nevada Administrative Code (NAC) Chapter 590 – Petroleum Products and Antifreeze	
New Hampshire	New Hampshire Code of Administrative Rules (N.H. Code Admin. R.) Chapter Env–Wm 1402 – Control of Aboveground Petroleum Storage Facilities	
New Jersey	New Jersey Administrative Code, Title 7, Chapter 27, Subchapter 16 – Prevention and Control of Discharge at Major Facilities and Subchapter 4 – Plans	Requires submittal of Discharge Prevention, Containment, and Countermeasures Plan (DPCC), similar to SPCC Plan, for major facilities.
New Mexico	New Mexico Administrative Code (NMAC) Title 20, Chapter 5 – Petroleum Storage Tanks	
New York	New York Codes, Rules and Regulations (NYCRR) Title 6, Chapter V, Part 596, Hazardous Substance Bulk Storage Regulations, and Parts 612–614. New York Environmental Conservation Law, Article 17, Title 10 – Control of the Bulk Storage of Petroleum. Oil Spill Prevention, Control and Compensation Act (Article 12 of Navigation Law).	
North Carolina	North Carolina Oil Pollution and Hazardous Substances Control Chapter 143, Section 215.96 – Oil Terminal Facility Registration	ASTs are required to be registered with the state if they meet the definition of oil terminal facility.

State	AST Regulatory Citation[1]	Comments
North Dakota	North Dakota Administrative Code (NDAC) Article 45–10 – Petroleum Tank Release Compensation Fund	State regulations include release cleanup requirements only.
Ohio	NA[2]	
Oklahoma	Oklahoma Administrative Code (OAC) Title 165, Chapter 26 – Aboveground Storage Tanks	
Oregon	NA[2]	
Pennsylvania	Pennsylvania Code Title 25, Chapter 245 – Administration of the Storage Tank and Spill Prevention Program	State regulations require preparation and submittal of a Spill Prevention and Response Plan (SPRP). This document is similar to an SPCC with additional requirements.
Rhode Island	Oil Pollution Control Regulations Sections 1–18 per Chapter 46–12 the Rhode Island General Laws	State regulations require the preparation of a Spill Prevention and Emergency Plan (SPEP). This document is similar to an SPCC but requires more detailed figure.
South Carolina	NA[2]	
South Dakota	South Dakota Administrative Rules (SDAR) Chapter 74:56:03 – Aboveground Stationary Storage Tanks	
Tennessee	NA[2]	
Texas	Texas Administrative Code (TAC) Chapter 334, Subchapter F – Aboveground Storage Tanks. The Texas General Land Office (TGLO) also has a regulation for oil spill prevention and response at waterfront facilities in 31 TAC 19.	The TGLO regulation requires waterfront facilities that store or handle oil to submit response plans that have varying requirements based on the amount of oil storage.
Utah	NA[2]	
Vermont	Vermont Aboveground Storage Tank Rules, Subchapters 1– 3	
Virginia	Virginia Administrative Code (VAC) Title 9, Agency 25, Chapter 91 – Facility and Aboveground Storage Tank (AST) Regulation	Oil-filled operational equipment is considered bulk storage containers per state regulations.
Washington	Washington Administrative Code (WAC) Title 173, Chapter 182 – Oil Spill Contingency Plan and Chapter 180 – Facility Oil Handling Standards	Applies only to those facilities transferring oil to or from a tank vessel (ship), such as a barge or oil tanker, or to or from a pipeline
West Virginia	West Virginia Code of State Rules (CSR) Title 47, Series 63 –Aboveground Storage Tanks	Secondary containment required for ASTs regardless of size.
Wisconsin	Wisconsin Administration Code Safety and Professional Services (SPS) Chapter 310 – Flammable, Combustible and Hazardous Liquids, Subchapter IV General AST Storage	
Wyoming	Wyoming Water Quality Rules and Regulations (WWQRR) Chapter 17 – Storage Tanks	The state regulations require that the SPCC Plan must be submitted to the state agency.

[1] AST regulations can include but are not limited to registration, design, construction, and/or operational requirements (can include tanks, piping, and containment). Citations are not all inclusive.

[2] NA = not applicable (that is, state does not currently have regulations for ASTs)

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Appendix 4-2: SPCC Facility Oil Capacity Worksheet

Use this worksheet to calculate the storage capacity of all aboveground petroleum storage containers that are 55 gallons or more (including gasoline, diesel, JP–8, MOGAS, animal oils and fats, vegetable oils, grease, synthetic oils, motor oil, lube oil, mineral oils, heating oil, used oil, and oil mixed with other wastes).

Do not include the following in this worksheet:

- Containers that are less than 55 gallons (such as pails)
- Container or tank capacities for non-petroleum products and other hazardous materials
- Tanks or other containers that have been permanently closed and are no longer used for storing petroleum
- The capacity of piping or secondary containment
- Oil/water separators that are part of a permitted wastewater treatment process
- Motor vehicles (cars, trucks, buses, self-propelled aviation ground service equipment, construction vehicles) Facilities with combined (indoor and outdoor) aboveground oil storage capacity greater than 1,320 gallons or a completely buried storage capacity greater than 42,000 gallons are required to implement the SPCC regulations in 40 CFR 112.

Aboveground Oil Storage*	Applicable? Yes or No	Details (for example, location and/or description, identification number, or type)	Total Number of Items On-site	Total Capacity (enter the size of each container, not how much it currently holds)
Tank #1				
Tank #2				
Tank #3				
Tank #4				
Tank #5				
Tank #6				
Tank #7				
Tank #8				
Tank #9				
Tank #10				
Tank #11				
Tank #12				
Mobile or portable tanks (mobile refuelers, bowsers)				
Totes				
Drums—unused product				
Drums—waste or used oil				
Other containers >55 gallons (remember to include heating oil, lube oil, solvents, fuel)				
Generators (stationary or portable gen sets)				

Aboveground Oil Storage*	Applicable? Yes or No	Details (for example, location and/or description, identification number, or type)	Total Number of Items On-site	Total Capacity (enter the size of each container, not how much it currently holds)
Oil-filled operational equipment (oil is intrinsic to operation, not consumed): ▪ Transformers ▪ Other electrical equipment ▪ Hydraulic systems ▪ Lubricating systems ▪ Other rotating equipment ▪ Heat transfer systems ▪ Gear boxes				
Oil-filled manufacturing equipment: ▪ Reactors ▪ Mixing tanks ▪ Dryers ▪ Heat exchangers ▪ Flow-through process tanks ▪ Distillation columns				
Oil storage associated with oil/water separators and not part of a permitted treatment system (such as slop tanks)				
Kitchen or cafeteria oil and grease collection				
				TOTAL Gallons

Completely Buried Oil Storage* (Underground Storage Tanks)	Applicable? Yes or No	Details (for example, location and/or description, identification number, or type)	Total Number of Items On-site	Capacity (Enter the size of each tank, not how much it currently holds.)
Tank #1				
Tank #2				
Tank #3				
Tank #4				
				TOTAL Gallons

**Attach a continuation page to this form as necessary to identify other tanks, containers, and equipment containing oil.*

Appendix 4-3: Aboveground Storage Tank Integrity Testing Methods

EPA regulations require tank testing to be conducted in accordance with the written procedures developed for the facility by the certifying engineer in the SPCC Plan. These procedures must consider relevant industry standards in accordance with good engineering practices. Examples of relevant industry standards include the Steel Tank Institute (STI) *Standard for the Inspection of Aboveground Storage Tanks, SP001*, and the American Petroleum Institute (API) *Standard 653, Tank Inspection, Repair, Alteration, and Reconstruction.*

The following tests must be performed on the storage tanks:

- Both periodic **integrity testing** of the storage facility and periodic integrity and leak testing of the associated valves and piping must be performed on a regular schedule and whenever material repairs are made. 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 nozzle in the shell, replacement of a door sheet or tombstone in the shell, or other shell repairs. The frequency and type of testing depends on the size and design of the storage facility.
- Along with visual inspection, other testing techniques must be employed, such as hydrostatic, radiographic, ultrasonic, or acoustic emissions testing.
  - *Hydrostatic leak testing* requires that a component be filled completely with a liquid such as water. Pressure is slowly applied to the liquid until the required pressure is reached. This pressure test is held for the required time, at which point the component is inspected visually to locate leaks.
  - *Industrial radiography testing* is the process of performing non-destructive testing of materials using radiation from a radioactive materials source or a radiation-producing machine. Non-destructive testing (NDT) equipment and consumables assist in checking the structure (and thus, the strength) of material without physically taking samples.
  - *Ultrasonic testing* uses sound waves to detect imperfections in material (like steel) and to measure material properties. The most commonly used ultrasonic testing technique is pulse-echo, wherein sound is introduced into a test object and reflections (echoes) returned to a receiver from internal imperfections or from the part's geometrical surfaces are analyzed.
  - *Acoustic emission testing* listens for emissions from active defects and is very sensitive to defect activity when a structure is loaded beyond its service load in a proof test. It is a useful method for the investigation of local damage in materials. One of the advantages to this method compared to other NDT methods is the possibility to observe damage processes during the entire load history without any disturbance to the specimen.

Integrity and leak testing of buried piping must be conducted at the time of installation, modification, construction, relocation, or replacement.

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