

Office of Emergency Management TECHNICAL ALERT

# Failures of Overfill Prevention at Substantial Harm Oil Facilities During Marine Vessel and Pipeline High-Volume Oil Transfer Operations



**Notice:** The U.S. Environmental Protection Agency (EPA) is issuing this Technical Alert as part of its ongoing effort to protect human health and the environment. The EPA strives to continually address the causes and contributing factors associated with significant oil discharge incidents in order to prevent their recurrence. The purpose of this Technical Alert is to:

- **Highlight** the importance of properly designed, operated, maintained, and inspected overfill prevention measures which prevent oil discharge incidents during high-volume oil transfer operations such as those associated with marine vessels<sup>1</sup> and pipelines.<sup>2</sup>
- **Remind** owners and operators of substantial harm oil storage facilities that they are typically subject to both the EPA's Facility Response Plan (FRP) and Spill Prevention, Control, and Countermeasure (SPCC) regulations (40 CFR Part 112). These regulations include, but are not limited to, the technical requirements for implementing overfill prevention, oil handling procedures, drainage valve operations, appropriate security lighting, and oil discharge response preparedness.
- **Provide** an overview of relevant industry codes, standards, recommended practices, and/or guidelines<sup>3</sup> which constitute good engineering practice that may assist facilities in adequately addressing these regulatory requirements.

It is important that a facility owner and/or operator review this information and consider whether additional action is needed to address these requirements at their substantial harm, high-volume<sup>4</sup> oil storage facility that is subject to the SPCC regulation (SPCC-regulated facility). The statements in this document are intended solely as a technical advisory. This document does not substitute for or change any applicable statutory provisions or regulations, nor is it a regulation itself.

<sup>&</sup>lt;sup>1</sup> The U.S. Coast Guard typically regulates the loading or unloading of oil in bulk from a vessel to an onshore facility, as well as the oil-carrying vessel (ship or barge) and the connecting piping (33 CFR Part 154, Facilities Transferring Oil or Hazardous Material in Bulk). Typically, the oil passes from the USCG's jurisdiction to that of the EPA when it passes the first valve inside the secondary containment for the oil storage container (tank) at an otherwise regulated facility. If there is no secondary containment, The EPA's jurisdiction begins at the first valve or manifold closest to the oil storage container.

<sup>&</sup>lt;sup>2</sup> The U.S. Department of Transportation (DOT) typically has jurisdiction (49 CFR Part 195) over transportation-related onshore and offshore facilities, including transportation-related pipelines. Any inter-facility pipeline, including a gathering line, or piping that transports oil between facilities, is typically considered transportation-related, and is therefore outside the jurisdiction of the EPA and not subject to the SPCC regulation. The EPA typically regulates non-transportation-related oil storage tanks (containers) even though they receive oil from a DOT regulated pipeline (U.S. EPA, 2002).

<sup>&</sup>lt;sup>3</sup> Guidelines may also include consulting manufacturer specifications and/or recommendations.

<sup>&</sup>lt;sup>4</sup> See Appendix C to Part 112, Title 40: Attachment C-II – Certification of the Applicability of the Substantial Harm Criteria.



## Introduction

Overfills of large field-constructed/erected, aboveground storage tanks<sup>5</sup> (ASTs) at substantial harm oil storage facilities during high-volume oil product transfer operations from marine vessels and pipelines have resulted in discharges of oil to the environment and nearby waterways. These overfill incidents have also resulted in fires, explosions, injuries, and significant physical damage to adjacent storage tanks, the immediate facility, and the surrounding communities. There are several overfill prevention systems commonly used at facilities for monitoring liquid levels in ASTs, including audible or visual high liquid level alarms, automatic high liquid level pump shutoff devices, fast response systems (gauges) with attendants, and direct communication procedures during product transfers. When these systems fail, overfills can occur. Inadequate maintenance, lack of inspection and/or improper implementation of these systems, failure to train personnel, and improperly implemented standard operating procedures (SOPs) can also contribute to overfill incidents.

Additional operational factors can contribute to the overall extent and impact of AST overfill incidents. These factors include open dike drainage valves; variations in flow rates and pressures caused by improperly designed or poorly implemented operating procedures during transfers and other oil handling procedures; malfunctioning or inoperable alarms or overfill prevention devices; and inadequate available nighttime security lighting around tanks and piping at facilities.

This Technical Alert describes the regulatory requirements and industry codes, standards, recommended practices, and/or guidelines that address adequately designed, implemented, and maintained overfill prevention systems. Oil discharges to the environment and nearby waterways may be prevented and/or minimized when these overfill prevention systems are used in conjunction with the implementation of standardized and properly designed oil handling and transfer procedures, proper operation and maintenance of dike drainage valves, routine inspection and testing procedures, and the installation and maintenance of appropriate security lighting.

Facility owners and operators (owners/operators) should be aware of relevant environmental, fire protection, safety and security requirements, applicable laws and regulations, industry codes, standards, recommended practices, and/or guidelines as they relate to their facility. The EPA's SPCC regulation found at Title 40, Code of Federal Regulations (CFR), Part 112 (<u>40 CFR Part 112</u>) was promulgated under the authority of Section 311(j)(1)(c) of the Federal Water Pollution Control Act (Clean Water Act). The SPCC regulation is the foundation of the EPA's oil discharge prevention program, and its primary goal is to assist facilities in preventing oil discharges into navigable waters or adjoining shorelines.

<sup>&</sup>lt;sup>5</sup> While the SPCC rule uses the term "container," this document uses tank and container interchangeably.

# **EPA's Oil Pollution Prevention Regulations**

As it relates to overfill prevention and the associated operational factors addressed in this Technical Alert, the SPCC regulation includes, but is not limited to, requirements for overfill prevention, development and implementation of oil handling and transfer procedures, operation of dike drainage valves, and implementation of security lighting to assist in the discovery of oil discharges and to prevent vandalism. Substantial harm SPCC facilities may also be subject to EPA's FRP requirements as codified in 40 CFR Part 112, Subpart D. Facilities that have an aggregate oil storage capacity of 42,000 gallons or more and that transfer oil over water to or from vessels are subject to these requirements (see 40 CFR 112.20(f)(1)(i)). Additionally, SPCC facilities with one million gallons or more in aggregate oil storage capacity that meet one or more substantial harm factor(s) listed at 40 CFR 112.20(f)(1)(ii) are also subject to FRP requirements. The SPCC and FRP regulatory requirements work together to prevent discharges and ensure appropriate response planning/preparedness resources are in place to address oil discharges after they occur. Facility owners and operators are responsible for determining if their facility is subject to EPA's <u>FRP requirements</u><sup>6</sup> in addition to the SPCC requirements.

# Significant Oil Discharge Incidents Involving Overfill Prevention Failures

A 2015 Chemical Safety Board report identified 18 aboveground storage tank overfill incidents that occurred between 1972 and 2014, in both the United States and internationally (U.S. CSB, 2015). Of those 18 AST overfill incidents, 11 resulted in a gasoline vapor cloud ignition and/or explosion. The two incidents highlighted below both occurred after their overfill prevention mechanisms failed.

In December 2005 an incident at an oil storage depot in Hertfordshire, United Kingdom, started with the overfill of an aboveground gasoline storage tank, which subsequently created a vapor cloud that then ignited, creating an explosion. The explosion caused multiple tank fires, additional loss of containment, and overall damage to 22 ASTs. The tank that was overfilled was equipped with a gauge to enable operators to monitor filling operations, as well as an independent high-level switch that would automatically shut down filling operations in the event of an overfill. However, neither of the overfill prevention mechanisms were operable at the time of the incident. The overfill and resulting explosion injured 43 people and caused damage onsite and to nearby residential and commercial properties.

In October 2009, an incident at an oil distribution and storage facility in Bayamon, Puerto Rico, began with an overfill of a 5-million-gallon AST during routine gasoline transfer operations from a marine tanker vessel to an onshore tank farm (Jimenez, 2011). As the AST overflowed into secondary containment, the aerosolized gasoline spray created a vapor cloud that ignited once it contacted an ignition source, resulting in a massive explosion. At the time of the incident, the overfilled tank was equipped with an automated overfill prevention system and a secondary mechanical gauge to enable operators to monitor filling operations. However, the automated overfill prevention system was not operable and the mechanical tank gauge mechanism malfunctioned. There were also additional operational factors that contributed to the overall extent of the incident, including the implemented oil handling and transfer procedures, variations in flow rates and pressures during product transfer, open dike drainage valves, and inadequate nighttime security lighting. The resulting explosions and associated fires impacted almost all of the ASTs on site. In addition to the on-site damage, the explosion injured several individuals

<sup>&</sup>lt;sup>6</sup> See Appendix C to Part 112, Title 40.

and its shockwave damaged hundreds of local homes and businesses in the surrounding area, including a military facility. An estimated 30 million gallons of petroleum products were discharged into stormwater channels, on-site surface waters, adjacent wetlands, and tributaries to San Juan Bay.

# Regulatory Requirements and Associated Industry Codes, Standards, Recommended Practices, and Guidelines



Tank fires at a fuel storage facility in Bayamon, Puerto Rico in 2009.

#### **Overfill Prevention**

Alarm systems, SOPs, and/or devices for overfill prevention are important for all facilities, large or small, to prevent oil discharges. Such systems and procedures alert the facility owner/operator to potential container overfills, which are often a cause of oil discharges. Sections §112.8(c)(8) and §112.12(c)(8) of the SPCC regulation require that each container installation be engineered to avoid discharges during transfer activities. The overfill prevention system must be in accordance with good engineering practice, considering methods that are appropriate for the types of transfer activities and circumstances for each container. The SPCC regulation also requires regular testing of liquid level sensing devices to ensure proper operation. Liquid level sensing devices can be tested in accordance with industry standards or manufacturer specifications as determined by the Professional Engineer (PE) responsible for certifying the SPCC Plan and implemented as described in the certified SPCC Plan. Under the environmental equivalence provision at §112.7(a)(2), the facility owner/operator may substitute "procedures" or alternative measures that provide equivalent environmental protection to the overfill systems required in the regulation. However, the facility SPCC Plan must state the reasons for nonconformance and describe the alternative measure in detail, including how it achieves equivalent environmental protection when implemented (§112.7(a)(2)). The environmentally equivalent measure must be developed and certified by a PE.

Industry codes, standards, recommended practices, and/or guidelines that can be used by an owner/operator to implement alarm systems, oil discharge prevention systems, and inventory control that may prevent overfills include, but are not limited to, the following:

- API Standard 2350 (API STD 2350), Overfill Protection for Storage Tanks in Petroleum Facilities (2021);
- API Standard 2610 (API STD 2610), Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities (2018);
- API, Manual of Petroleum Measurement Standards; and
- NFPA 30, Flammable and Combustible Liquids Code (2024).

It is important to note that the first reference above was a Recommended Practice (RP) in the first three editions, until 2005. It was revised from being a Recommended Practice (API RP 2350) to a Standard (API STD 2350) in its fourth and fifth editions. These subsequent revisions provide specific minimum requirements and recommendations related to overfill protection and prevention. API STD 2350 allows for adaptation and changes to the procedures listed within the standard to account for the varied systems at individual terminals. API STD 2350 has also been updated significantly since 2005 to provide increased specificity in its discussion regarding activities during high-volume transfers such as those from vessel or pipeline receipt operations. In addition, multiple normative<sup>7</sup> references to other industry guidance and standards were added to API STD 2610 during its revision.

## **Oil Handling Procedures (Marine Vessel and Pipeline Transfers)**

Oil transfer activities occurring within an SPCC-regulated facility are regulated under §112.7(a)(3)(ii) of 40 CFR Part 112. Under §112.7(a)(3)(ii), the SPCC Plan must include a discussion of discharge prevention measures including procedures for routine handling of products (loading, unloading, and facility transfers, etc.). The discussion of routine handling procedures should provide an adequate level of detail on how to conduct activities such as product transfers to and from the AST(s) and gauging of liquid levels in ASTs in conjunction with filling operations. It is imperative that the facility's oil handling procedures are consistent with good engineering practice, industry codes, standards, recommended practices, and/or guidelines and implemented according to the facility's PE-certified SPCC Plan. These oil handling procedures that are consistent with good engineering practice, industry codes, standards, recommended practices, and/or guidelines and referenced SOPs should be clearly communicated to oil handling procedures that are consistent with good engineering practice, industry codes, standards, recommended practices, and/or guidelines can reduce the risk of oil discharges.

Facility oil handling personnel need to be aware of all requirements documented in a facility SPCC Plan's oil handling procedures. Failure to implement properly designed and PE-certified oil handling procedures correctly can have an adverse impact on the overall management of the oil transfer process, particularly in the case of operating valves on piping systems where multiple tanks are being filled simultaneously. This is of particular importance during high-volume transfers from marine vessels and pipelines. Failure to correctly implement oil handling procedures during transfer operations may result in the facility personnel's inability to accurately calculate and/or monitor fill rates and fill times, potentially increasing the risk of an overfill. Finally, the SPCC rule requires, under §112.8(d)(4) & §112.12(d)(4), regular inspections of aboveground valves, piping, and appurtenances to assess their general condition, which may be incorporated in these oil handling procedures.

Industry standards that may assist an owner/operator with oil handling procedures include API STD 2350, Overfill Protection for Storage Tanks in Petroleum Facilities and API STD 2610, Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities. Oil handling procedures are

<sup>&</sup>lt;sup>7</sup> Elements or provisions that are mandatory to claim compliance with the standard.



discussed at length in each of the current editions of these API standards. The current Fifth Edition of API STD 2350 includes significant updates from the previous editions to provide increased specificity to its discussion regarding activities during marine vessel receipt operations. The standard now specifies procedures for activities during receipt operations including, but not limited to, (1) required regularly scheduled monitoring and documentation of product levels; (2) regularly scheduled comparisons of planned levels versus actual levels and the recording of specifically identified information relative to the receipt/transfer; (3) monitoring of tanks which are not scheduled to receive product, but are connected to the same product manifold; (4) a competent person or automatic system verifying product is only flowing into the correct tank(s) and gauging equipment is operative; and, (5) the establishment of procedures that ensure continuity of communications and control between operations personnel for shift changes while receipts are occurring. In addition, API STD 2350 now requires extra attention when developing procedures for operations involving multiple tanks being filled simultaneously. API STD 2610 significantly expands on the minimum requirements for emergencies and abnormal conditions, including:

- Requirements for documented procedures to be followed;
- Alarm activation and overfill scenarios; and
- When a tank gauging or monitoring system fails.

Other industry codes, standards, recommended practices, and/or guidelines that may assist an owner/operator and/or the PE certifying the SPCC Plan with oil handling procedures include API, *Manual of Petroleum Measurement Standards* and NFPA 30, *Flammable and Combustible Liquids Code*.<sup>8</sup>

### Management and Operation of Containment Drainage Systems

Properly engineered containment drainage systems (such as dikes and berms, curbing, spill diversion ponds, or similar systems) remain an effective means of discharge control and containment for oil storage containers. When a dike is used to satisfy either general or specific secondary containment requirements, then facility drainage requirements under §112.8 and §112.12 apply. Drainage from diked storage areas at onshore facilities can be managed by several means such as valves, manually activated pumps, or ejectors. The requirements for drainage of diked areas at these onshore facilities are found in

<sup>&</sup>lt;sup>8</sup> For the purposes of this Technical Alert, the EPA is referencing the current versions of the codes, standards, recommended practices, and/or guidelines, as opposed to the versions that were referenced in 67 FR 47121 (July 17, 2002).

§112.8(b)(1), §112.8(b)(2), §112.8(c)(3) or §112.12(b)(1), §112.12(b)(2), and §112.12(c)(3). For diked areas serving as secondary containment for bulk storage containers, §112.8(c)(3) and §112.12(c)(3) require that stormwater accumulations be inspected for the presence of oil in quantities that may be harmful<sup>9</sup> and that records of the drainage events be maintained. Prior to draining these diked areas, accumulated oil on the retained rainwater must be removed and returned to storage or disposed of in accordance with approved methods and regulatory requirements. An owner/operator should secure (i.e., lock) valves controlling dike or remote impoundment areas where they can be accessed by non-facility personnel, such as when the valve itself is located outside the facility fence line.

According to the SPCC regulation, if dikes are drained using valves, they must be of manual open-andclosed design (i.e., may not be a flapper-type drain valve) to prevent an uncontrolled discharge outside of the dike, such as into a facility drainage system or effluent treatment system, except where facility systems are designed to control such a discharge (\$112.8(b)(2) and \$112.12(b)(2)). It is important to also note that the SPCC regulation requires that bypass valves for diked areas be sealed closed (\$112.8(c)(3)(i)and \$112.12(c)(3)(i)). However, the regulation does not preclude the use of innovative devices that achieve the same environmental protection as would be achieved by manual open-and-closed design valves. The provision in \$112.7(a)(2) allows for alternatives if the facility owner/operator states in the SPCC Plan the reasons for non-conformance and describes how the alternative will provide equivalent environmental protection. Additionally, if alternate devices are used to substitute for manual, open-andclosed design valves, a facility owner/operator must inspect and may drain retained stormwater, as provided in \$112.8(c)(3)(ii), (iii) & (iv) and \$112.12(c)(3)(ii), (iii) & (iv), if the facility drainage drains directly into a watercourse, lake, or pond bypassing the facility treatment system.

When an AST overfill occurs within diked secondary containment and the standard operating procedures, industry codes, standards, recommended practices, and/or guidelines for dike drainage valves have not been implemented properly (i.e., drainage valves in poor condition, malfunctioning drainage valves, drainage valves left in the open position) there can be an increased risk of an oil discharge from the diked area during that overfill event. Drainage valves left in the open position (not including operation during appropriate drainage activities) and/or malfunctioning drainage valves create an opening in the containment system, negating the integrity of the diked secondary containment. It is vital that the valves for restraining stormwater drainage in diked areas are properly designed, inspected, and maintained to ensure their operational integrity. Compliance with, and attention to, the regulatory requirements under §112.8(b)(1) & (2), §112.12(b)(1) & (2), §112.8(c)(3), §112.12(c)(3), §112.8(d)(4), and §112.12(d)(4) are essential to proper drainage valve operation; and inspection of dike drainage for the presence of oil in quantities that may be harmful reduces the risk of a discharge from the secondary containment dike in the event of a tank overfill. Additionally, for un-diked areas with a potential for a discharge, when secondary containment requirements are addressed through facility drainage controls such as culverting, gutters, ponds, or other drainage systems, the requirements in §112.8(b)(3), (4) & (5), or §112.12(b)(3), (4) & (5) apply. The facility drainage system must be designed to flow into ponds, lagoons, or catchment basins designed to retain oil or return it to the facility.

There are industry codes, standards, recommended practices, and/or guidelines which constitute good engineering practice that may assist facilities in adequately addressing the regulatory requirements associated with dike drainage valve controls and operations. Annex E to API STD 2350, *Overfill Protection for Storage Tanks in Petroleum Facilities* is informative relating to risk assessment for overfill protection.

<sup>&</sup>lt;sup>9</sup> Refer to 40 CFR Part 110.

Annex E provides an example for incorporating the potential for secondary containment drainage valves to be inadvertently left in an open position into a risk assessment determination due to the severe consequences resulting from such a scenario. In addition, Section 9.2.3.2 of API STD 2610, *Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities* states that drainage that would bypass an in-plant treatment system shall be accomplished through block valves that are located, or that may be safely operated from, outside the diked area, and that these valves shall be normally closed and secured. As discussed in 67 FR 47105 and 47125 (July 17, 2002),<sup>10</sup> other industry codes, standards, recommended practices, and/or guidelines that may assist<sup>11</sup> an owner/operator and/or PE certifying the SPCC Plan with the operation, inspection, and testing of valves include:

- API Standard 570, Piping Inspection Code: In-service Inspection, Rating, Repair, and Alteration of Piping Systems (Fifth Edition, February 2024);
- API Recommended Practice 574, Inspection Practices for Piping System Components (Fifth Edition, February 2024);
- American Society of Mechanical Engineers (ASME) B31.3, Process Piping (2022); and
- ASME B31.4, Pipeline Transportation Systems for Liquids and Slurries (2022).



#### Facility Security Lighting to Detect an Oil Discharge and Prevent Vandalism

The implementation of appropriate security lighting and/or alternative facility-specific security measures as required under §112.7(g) helps to ensure that an owner/operator can detect an oil discharge, prevent vandalism, and initiate appropriate response activities. The SPCC Plan's facility security lighting requirement is discussed under §112.7(g), which states in part, "Describe in your Plan how you...address the appropriateness of security lighting to both prevent acts of vandalism and assist in the discovery of oil discharges." The facility security requirements are performance-based and allow an owner/operator

<sup>&</sup>lt;sup>10</sup> For the purposes of this Technical Alert, the EPA is referencing the current versions of the codes, standards, recommended practices, and/or guidelines, as opposed to the versions that were referenced in 67 FR 47121 (July 17, 2002).

<sup>&</sup>lt;sup>11</sup> While these codes, standards, recommended practices, and/or guidelines may not be specifically applicable to drainage valves, they still may serve as best practices as determined by the certifying PE.

to tailor the security measures to their facility's specific characteristics and location in order to provide whatever measures are most appropriate for the facility, as long as the measures accomplish the stated security goals under §112.7(g).

Although the SPCC regulation does not specifically require lighting, the appropriateness of security lighting and/or the implementation of alternative security measures to prevent acts of vandalism and assist in the discovery of oil discharges are key considerations that must be adequately described in the SPCC Plan. A facility owner/operator is also required to document in the SPCC Plan how the security measures are implemented. Being able to detect that an oil discharge has occurred, or is occurring, at a facility is a key initial step that enables facility personnel to stop the source of the oil discharge, begin mitigating the cause of the discharge, identify potentially hazardous conditions resulting from the discharge, such as a vapor cloud formation, and begin responding to the resulting conditions that could be hazardous to facility infrastructure, on-site personnel, or the surrounding community.

A facility can utilize the environmental equivalence provision at §112.7(a)(2) to address security requirements and as such, the facility owner/operator may substitute "procedures" or alternative measures that provide equivalent environmental protection for security measures, including appropriate security lighting. The facility SPCC Plan must state the reasons for nonconformance and describe the alternative measure in detail, including how it achieves equivalent environmental protection when implemented (§112.7(a)(2)). The environmentally equivalent measure must be developed and certified by a PE. However, given the performance-based flexibility allowing a facility to tailor security measures to specific site characteristics and location, there may be limited instances where a PE would determine that an environmental equivalence deviation is necessary.

There are industry codes, standards, recommended practices, and/or guidelines which constitute good engineering practice that may assist facilities in adequately addressing the regulatory requirements associated with security measures such as lighting. API STD 2610 (Third Edition), *Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities* includes provisions for lighting design. Under Section 11.2, API STD 2610 states that design considerations should include development of an area lighting plan. In addition, the Standard also states that lighting levels should be provided consistent with the safe operational needs of each specific area of the facility to facilitate loading, unloading, and product transfer. Section 13.2.2 of API STD 2610 stipulates that sufficient lighting and proper electrical classification should be provided for loading racks, yard and tank farm areas, gate card readers, own-use fueling, pump-back and meter prover facilities, loading pumps, motor starter racks, and office, garage, and warehouse lighting. The Standard also discusses the various types of lighting available to achieve the illumination of outdoor areas. Perimeter lighting is addressed in API STD 2610 under Section 13.3.6.3 and provides additional reference to the Illuminating Engineering Society's (IES's) *The Lighting Handbook*.

## **Technical Considerations to Reduce Risks Posed by AST Overfills**

A facility's implementation of AST overfill prevention measures and oil handling procedures as required by the SPCC regulation is a key factor in preventing tank overfill events. Additionally, when an overfill incident does occur, compliance with SPCC regulatory requirements for routine oil handling procedures, dike drainage valves, facility lighting, and implementing SPCC plan countermeasures can also substantially reduce the extent of the impact from the tank overfill. During the development of an initial facility SPCC Plan, the required 5-year review of a current SPCC Plan, and during a general review of facility operations or processes, technical considerations based on good engineering practice and industry codes, standards, recommended practices, and/or guidelines relative to overfill prevention, oil handling procedures, dike drainage valves, appropriate security lighting, and implementing SPCC plan

#### **AST Overfill Prevention Considerations**

- Are personnel involved with transfer operations appropriately trained, and have the routine oil transfer procedures documented in the SPCC Plan been communicated to them?
- Has the facility implemented procedures to verify that an AST has sufficient available capacity to receive the intended transfer volume?
- Has the facility implemented appropriate systems, procedures, or devices to ensure that transfer operations are appropriately monitored?
- Are there systems, procedures, or devices in place to monitor product levels throughout the transfer operation?
- Has the facility identified an appropriate testing/inspection frequency in the SPCC Plan to ensure that overfill prevention systems and devices are operational and provide accurate readings of tank levels and/or flow rates during oil transfers? Has that testing/inspection frequency been implemented according to the SPCC Plan?





- Inspections of overfill prevention devices and systems are effective if they address both the operational status and the accuracy of the device or system.
  - Are the systems or devices providing accurate readings of the tank levels and/or flow rates?
  - Are there measures in place to ensure tank gauges and overfill alarms are operational, calibrated, and routinely tested?

• Are there procedures/SOPs in place for conducting routine operational tests and related preventative maintenance for tank level gauging systems and/or methods to verify their accuracy?

## **Routine Oil Handling Procedure Considerations**

- Has the facility's PE developed the SPCC Plan and related SOPs for routine oil handling procedures to ensure the procedures are consistent with good engineering practice and current industry codes and standards?
- Are the procedures implemented within the facility for routine oil handling activities consistent with the written procedures discussed within the facility SPCC Plan and/or referenced SOPs?
- Are oil handling personnel routinely trained on oil handling procedures?

## **Dike Drainage Valve Considerations**

- Has the owner/operator secured (i.e., locked) valves controlling dike or remote impoundment areas where they can be accessed by non-facility personnel, such as when the valve itself is located outside the facility fence line?
- If there are multiple types of dike drainage valves in use throughout a facility, are personnel aware of their operational differences?
- Can personnel readily distinguish between open and closed valve positions to ensure that dike drainage valves are kept in the closed position (except when opened to conduct drainage activities)?
- Does the facility SPCC Plan describe dike drainage valve operating/inspection procedures or are there referenced facility SOPs for operating and inspecting dike drainage valves?
- Are facility personnel properly trained in accordance with the SPCC Plan and/or referenced SOPs to operate dike drainage valves and inspect/document that any retained rainwater discharged from a dike drainage valve will not cause a discharge of oil in quantities that may be harmful?
- Are dike drainage valves tested periodically to ensure proper operation of drainage systems?

## **Facility Security Lighting Considerations**

- Does the facility SPCC Plan adequately describe the appropriateness of security lighting for the site and/or any alternative, facility-specific measures utilized on site to prevent vandalism and assist in the discovery of oil discharges?
- Have the appropriate security lighting measures and/or alternative, facility-specific measures been implemented according to what is described in the facility SPCC Plan?
- Does the facility have adequate lighting or other alternative measures in place within the AST storage areas to ensure that a tank overfill event and any subsequent oil discharge outside of secondary containment can be visually detected by personnel so that response actions can be initiated?
- Has the facility considered if the lighting or other alternative measures implemented within the AST storage areas will also ensure that potentially hazardous conditions resulting from a tank overfill, such as a vapor cloud formation, would be detectable by facility personnel?



## Conclusions

This Technical Alert highlights the importance of good engineering practice in order to ensure compliance with the EPA's SPCC regulation requirements (40 CFR Part 112) associated with the proper implementation and operation of overfill prevention systems, oil handling procedures, diked containment drainage valves, and appropriate security lighting at SPCC-regulated substantial harm oil facilities with high volume oil transfers. A facility owner/operator and their PE certifying the SPCC Plan must consult relevant industry codes, standards, recommended practices, and/or guidelines that constitute good engineering practice for the most up-to-date technical guidance to assist them in complying with the regulatory requirements of the SPCC regulation.<sup>12</sup> Ultimately, it is the responsibility of an oil facility owner/operator to comply with the Oil Pollution Prevention regulations by:

- Developing and implementing an SPCC Plan designed to prevent oil discharges;
- Assuring that oil facility personnel are prepared to respond to an oil discharge; and
- Developing and implementing an FRP ensuring oil facilities have adequate spill response resources, as applicable.

The owner/operator also has a responsibility to implement good engineering practice, in accordance with the SPCC Plan and/or referenced SOPs, by using applicable industry codes, standards, recommended practices, and/or guidelines.

**Notice:** The statements in this document are intended solely as a technical advisory. This document does not substitute for, or change any, applicable statutory provisions or regulations, nor is it a regulation itself. This Technical Alert includes information and language from documents listed in the reference section.

<sup>&</sup>lt;sup>12</sup> Per <u>40 CFR 112.3(d)</u>, the PE must attest that the Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards, and with the requirements of the rule.

# References

American Petroleum Institute (API). API. 2024. Recommended Practice 574, Inspection Practices for Piping System Components. Available at: <u>https://www.api.org/products-and-services/standards/important-standards-announcements/rp574</u>.

**API. 2024.** Standard 570, Piping Inspection Code (Inspection, Repair, Alteration, and Rerating of In-Service Piping Systems). Available at: <u>https://www.apiwebstore.org/standards/570</u>.

**API. 2021.** API Standard 2350 (API STD 2350), Overfill Protection for Storage Tanks in Petroleum Facilities. Available at: <u>https://www.api.org/products-and-services/standards/important-standards-announcements/standard-2350</u>.

**API. 2018.** API Standard 2610 (API STD 2610), Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities. Available at: <u>https://www.apiwebstore.org/standards/2610</u>.

American Society of Mechanical Engineers (ASME). 2023. Process Piping, B31.3. Available at: https://www.asme.org/codes-standards/find-codes-standards/b31-3-process-piping.

**ASME. 2022.** Pipeline Transportation Systems for Liquids and Slurries. B31.4. Available at: <u>https://asme.org/codes-standards/find-codes-standards/b31-4-pipeline-transportation-systems-liquids-slurries</u>.

**Illuminating Engineering Society (IES). 2010.** The Lighting Handbook. Available at: <u>https://store.ies.org/product-category/lighting-library/?v=7516fd43adaa</u>.

**Jimenez, C. 2011.** Caribbean Petroleum Explosion and Fire Response, Bayamon, Puerto Rico. PowerPoint slides, conference presentation. International Oil Spill Conference, May 23-26, Portland, OR. https://www.nrt.org/sites/84/files/EPA CAPECO Powerpoint St. Croix4 8-4-17.pdf.

**National Fire Protection Association (NFPA). 2024**. NFPA 30, Flammable and Combustible Liquids Code. Available at: <u>https://www.nfpa.org/product/nfpa-30-code/p0030code</u>.

**U.S. Chemical Safety and Hazard Investigation Board (CSB). 2015.** Final Investigation Report, Caribbean Petroleum Tank Terminal Explosion and Multiple Tank Fires. Report No. 2010.02.I.PR. <a href="https://www.csb.gov/caribbean-petroleum-refining-tank-explosion-and-fire/">https://www.csb.gov/caribbean-petroleum-refining-tank-explosion-and-fire/</a>.

United States Environmental Protection Agency (U.S. EPA), Office of Emergency Management (OEM). 2013. SPCC Guidance for Regional Inspectors. <u>https://www.epa.gov/sites/default/files/2014-</u>04/documents/spcc\_guidance\_fulltext\_2014.pdf.

**U.S. EPA. 2002**. Oil Pollution Prevention and Response; Non-Transportation-Related Onshore and Offshore Facilities; Final Rule. 67 Federal Register 47042-47152 (July 17, 2002). <u>https://www.federalregister.gov/documents/2002/07/17/02-16852/oil-pollution-prevention-and-response-non-transportation-related-onshore-and-offshore-facilities</u>.

**U.S. EPA. 2009.** Oil Pollution Prevention; Spill Prevention, Control, and Countermeasure (SPCC) Rule-Amendments; Final Rule. 74 Federal Register 58784-58832 (November 13, 2009). <u>https://www.federalregister.gov/documents/2009/11/13/E9-27156/oil-pollution-prevention-spill-prevention-control-and-countermeasure-spcc-rule-amendments</u>.



EPA 540-S-24-001 August 2024 www.epa.gov/OEM