
PLANNING BEFORE A FLOOD

Understand The Risk

In order to help improve a UST's resilience during a flood, it is important to know the potential for a flood, and its possible impacts on the UST facility and surrounding sites. There are a variety of methods for reducing a flood's impact. However, the most effective methods take into consideration the specifics of the site and its location. UST owners and operators may do the following to help them better understand and assess the threat of flooding:

- Several federal websites offer flood maps:
 - [FEMA's Flood Map Service Center \(MSC\)](#) website provides information on flood hazards in the community.
 - EPA's [EnviroAtlas](#) website provides information on flood hazards in your community.
 - [National Oceanic and Atmospheric Administration's \(NOAA\) Coastal Flood Exposure Mapper](#) provides information on coastal flooding and hazards for the East Coast, West Coast, Gulf of Mexico, and islands in the Pacific Ocean and Caribbean Sea.
 - NOAA's [Inundation Dashboard](#) provides real-time and historic coastal flooding information at water level stations.
- Collect previous flooding data on how past flooding events threatened or impacted the UST facility.
- Complete a sensitive receptor survey of potential sites that may be affected if a release occurs.
- Determine the potential sources of flooding that could impact the UST facility, such as swollen rivers or streams, flash floods, levee or dam failure, spring thaw, coastal or urban locales.

Installation Practices To Help Reduce Flooding Impact

Owners and operators may consider using the measures below prior to installing a UST.

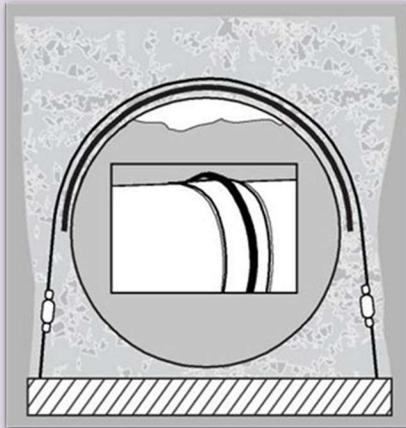
- Federal Emergency Management Agency's (FEMA) P-348, [Protecting Building Utility Systems From Flood Damage \(2017\)](#) illustrates design and construction of new utility systems and structures in flood-prone areas. It also addresses evaluating structures undergoing substantial improvement and includes information on handling installation of tanks in high groundwater areas. FEMA's [building code resources](#) provides guidance on the hazard-resistant provisions in the building codes.
- Owners and operators may consider installing shut-off valves below the flood elevation level on fuel lines and tank vents.
- Owners and operators may consider extending the vent pipe above flood levels to help prevent floodwaters from entering the vent line and tank.

- Offset UST Buoyancy - the following methods may prevent the UST from floating:
 - Add a restraining force by increasing the burial depth or the amount of pavement on top of the tank, or both. The burial depth should not exceed the manufacturer's recommendation.
 - Anchor the tank to a reinforced concrete pad with non-corrosive hold-down straps.
 - Install deadman anchors with straps attached, outside the tank diameter alongside the tank.
- Develop a contingency plan that includes, but is not limited to:
 - A facility diagram identifying all UST locations and active remediation systems
 - Emergency contact information and notification procedures
 - Checklist and inventory of items needed to maintain a minimum level of service after a flood
 - A list of UST contractors and testers
 - A list of funding resources for facility restoration
 - UST flood preparation and facility restoration checklists
- [Useful Resources And Links](#) section of this guide to access real-time interactive information on emerging flood threats

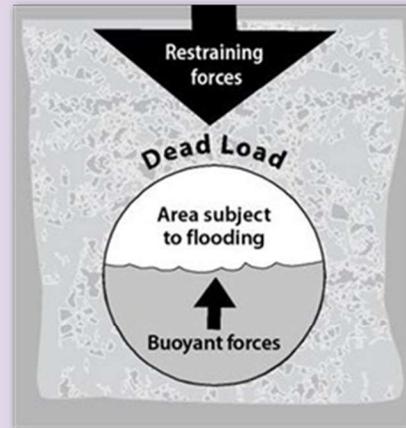


FEMA's [Ready Business Hurricane Toolkit](#) provides information on taking action to protect employees, protect customers, and help ensure business continuity for hurricanes and tropical storms.

Examples Of Offsetting Buoyancy When Installing An UST



A reinforced bottom hold-down pad provides a firm bed for the tank and adds resistance to flotation. Credit: EPA



The extra weight of the backfill and pavement over the tank may be enough to keep the tank from floating. Credit: EPA



UST with hold down straps on a concrete pad. Credit: EPA



UST deadmen installation. Credit: ZCL Composites

Read more information on properly anchoring an UST in:

- National Fire Protection Association (NFPA) 30 Flammable Combustible Liquids Code
- Petroleum Equipment Institute's (PEI) Recommended Practice 100
- American Petroleum Institute's (API) Recommended Practice 1615
- Federal Emergency Management Agency (FEMA) P-348
- FEMA's [Compilation of Flood Resistant Provisions](#) contain excerpts from 2018 international building codes

Refer to the tank manufacturer's instructions for details on bottom hold-down pad construction, installing tank straps, and deadman construction.

UST FLOOD CHECKLIST

Using this checklist may help address an UST in the event of a flood. Owners and operators must follow requirements established by their UST implementing agency for:

- Emergency response
- Restarting an UST system
- UST system removal and release cleanup
- Waste disposal
- UST system component testing
- UST system installation

Before The Flood

- Conduct an inspection of the entire facility to determine areas susceptible to flooding and the potential consequences if a flood happens.
- Assess the extent and duration of predicted flooding.
- Turn off power to all UST system including STPs, pumps, and dispensers.
 - Keep the release detection system on as long as power is available.
- Take product inventory and water level readings of all tanks.
- Reduce the chance of a tank rise.
 - Place heavy objects, for example dumpster, sandbags, or large containers full of sand or rock, over the tank.
 - Fill the tank with fuel to decrease buoyancy by weighing down the tank so it will not float out of the ground.
 - If the predicted flood extent and duration is excessive, owners and operators may want to instead consider minimizing the amount of fuel to lessen the likelihood of a release into the environment.
 - Do not fill tanks with water due to additional costs for disposing contaminated water and possible corrosion to the tank system.
- Make sure fill caps are operable and secure.
- Place sand bags on top of the spill catch basin and tank top sump lids to minimize the amount of water entering each tank
- Make sure the seal on spill bucket plungers are operational to keep water out of the tank.
- If possible, have an UST technician drain all product lines back into each tank.
- Close flow restrictors and manually trip shear valves on pressurized piping to prevent product releases from dispenser lines.
- Temporarily cap off vent pipes to prevent water from entering the tank and displacing product.
- Protect fuel pump and controls to prevent damage from flooding.
 - Secure dispensers with plastic, tarps or plywood.
 - If time allows, consider removing dispensers, and storing them safely.
 - Remember to also protect aboveground components from floating debris or floodwater.

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- ❑ Check the remediation system, if applicable.
 - Shut off power to the remediation system.
 - Disconnect all wiring and piping to remediation trailers and remove portable equipment trailers from the flood hazard area.
 - Cap and secure remediation wells to prevent floodwaters from entering.
 - Store remediation equipment away from the flood hazard area.
 - If possible, close all control valves to isolate the remediation system.

After The Flood

Take the following actions after the water recedes and local officials allow re-entry. Remember that every situation is different and site-specific issues will dictate the proper course of action.

Before bringing an UST system back into service:

- ❑ Make sure the power is off.
- ❑ Remove all debris and water from the concrete pad.
- ❑ Inspect the concrete pad for any indication of tank movement or shifting.
 - If the pad has been damaged, have a contractor evaluate the entire UST system to determine its suitability to receive product.
- ❑ Inspect UST system components, such as secondary and under-dispenser containment and sumps for leaks.
 - Have a technician check the connections and verify that all dry secondary containment areas are still dry.
 - Ensure that the isolation boot under the dispenser is working properly. Loose or defective boots may allow water seepage into the piping secondary containment.
- ❑ Measure the product and water levels in each tank.
 - If there is a discrepancy in pre and post flood levels, follow the UST implementing agency requirements for release notification and response.
- ❑ Remove any debris from each tank.
- ❑ Remove any water from the tank according to implementing agency requirements.