

Source Water Protection Practices Bulletin

Managing Above Ground Storage Tanks to Prevent Contamination of Drinking Water

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Basic AST Facts:

- Most storage tanks contain petroleum products.
- State AST regulations may be more stringent than Federal requirements.
- A spill of only one gallon of oil can contaminate a million gallons of water.
- ASTs should have a secondary containment area to contain spills.
- If a tank is not used for more than a year it is possible your State may require you to declare it as “Out of Service”.
- Inspect any accumulated water for chemicals prior to discharge from the AST area.
- Most States require AST inspections by Fire Marshalls.

Above ground storage tanks (ASTs) are tanks or other containers that are above ground, partially buried, bunkered, or in a subterranean vault. These can include floating fuel systems. This fact sheet focuses on the management of facilities with ASTs to prevent contamination of drinking water sources (ground water and surface water used as public drinking water supplies).

Above Ground Storage Tank Use

The majority of storage tanks contain petroleum products (e.g., motor fuels, petroleum solvents, heating oil, lubricants, used oil). Oil storage facilities with ASTs are typically found in marketing terminals, refineries, and fuel distribution centers. Storage tanks may also be found in airports, school bus barns, hospitals, automotive repair shops, military bases, farms, and industrial plants. Discharges of chemicals, petroleum, or non-petroleum oils from storage tanks can contaminate source water. Product spilled, leaked, or lost from storage tanks may accumulate in soils or be carried away in storm runoff.



1 - Above Ground Storage Tank

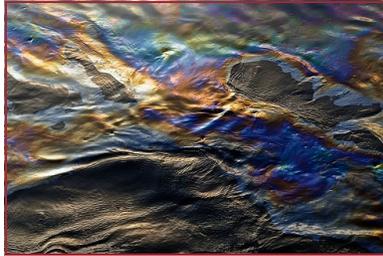
Some of the causes for storage tank releases are holes from corrosion, failure of piping systems, and spills and overfills, as well as equipment failure and human operational error. The Spill Prevention Control and Countermeasures (SPCC) regulations require owners or operators of certain above ground oil storage facilities to prepare and comply with written, site-specific, spill prevention plans (see 40 CFR Part 112):

- Facilities with a total above ground oil storage capacity of more than 1,320 gallons;
- Single above ground tanks with an oil storage capacity of more than 660 gallons; and
- Facilities with a combined underground oil storage capacity greater than 42,000 gallons.

Please note, however, that State AST regulations may be more stringent or differ in other ways from the Federal requirements. You must check with local regulatory authorities to make sure which ASTs are subject to what requirements. All AST facility owners or operators exempt from these regulations should still consider implementing the prevention measures described in this fact sheet to preclude future storage tank problems.

Why is it Important to Manage Above Ground Storage Tanks Near Sources of Drinking Water?

Storage tank releases can contaminate soil and drinking water supplies. Petroleum products are composed of volatile organic compounds (VOCs). Any oil spill can pose a serious threat to human health and the environment,



2 -
Oil in
water.

requires remediation that extends beyond your facility's boundary, and results in substantial cleanup costs. Even a small spill can have a serious impact. A single pint of oil released into the water can cover one acre of water surface area and can seriously damage an aquatic habitat. A spill of only one gallon of oil can contaminate a million gallons of water. It may take years for an ecosystem to recover from the damage caused by an oil spill.

The location of the facility must be considered in relation to drinking water wells, streams, ponds and ditches (perennial or intermittent), storm or sanitary sewers, wetlands, mudflats, sandflats, farm drain tiles, or other navigable waters. Factors such as the distance to drinking water wells and surface water, volume of material stored, worse case weather conditions, drainage patterns, land contours, and soil conditions must also be taken into account.

Available Prevention Measures to Address Above Ground Storage Tanks

The following list of prevention measures is not all-encompassing; others can be found in the references provided at the end of the document. Furthermore, detailed explanations of each device mentioned below are found in the supporting documents. Please keep in mind that individual prevention measures may or may not be adequate to prevent contamination of source waters. Most likely, individual

**A SINGLE PINT OF OIL
RELEASED INTO THE WATER CAN
COVER 1 ACRE OF WATER
SURFACE AREA AND SERIOUSLY
DAMAGE AQUATIC HABITATS.**

measures should be combined in an overall prevention approach that considers the nature of the potential source of contamination, the purpose, cost, operational, and maintenance requirements of the measures, the vulnerability of the source water, the public's acceptance of the measures, and the community's desired degree of risk reduction.

Federal AST Requirements under 40 CFR Part 112

Follow standard tank filling practices when filling tanks to prevent spills and overfills. Furthermore, all ASTs should have a secondary containment area that contains spills and allows leaks to be more easily detected. The containment area surrounding the tank should hold 110 percent of the contents of the largest tank plus freeboard for precipitation. Secondary containment for ASTs must be impermeable to the materials being stored. Methods include berms, dikes, liners, vaults, and double-walled tanks. A manually controlled sump pump should be used to collect rain water that may accumulate in the secondary containment area. Any discharge should be inspected for petroleum or chemicals prior to being dispensed.

Routinely monitor ASTs to ensure they are not leaking. An audit of a newly installed tank system by a professional engineer can identify and correct problems such as loose fittings, poor welding, and poorly fit gaskets. After installation, inspect the tank system periodically to ensure it is in good condition. Depending on the permeability of the secondary containment area, more frequent containment area checks may be necessary. Areas to inspect include tank foundations, connections, coatings, tank walls, and the piping system. Integrity testing should be done periodically by a qualified professional and in accordance to applicable standards.

If an AST has remained out of service for more a year or more, many States require



3 -
AST.

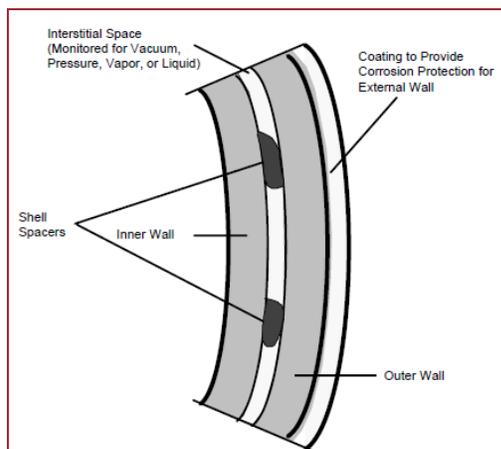
owners to maintain and monitor the tank, declare the tank inactive, or remove it. If the tank is declared inactive, remove all substances from the AST system (including pipes) and completely clean the inside. Secure tanks by bolting and locking all valves, as well as capping all gauge openings and fill lines. Clearly label tanks with the date and the words "Out of Service." Samples may be required when removing tanks to determine if any contamination has occurred. Most States require out-of-service tanks to be inspected and meet leak detection requirements before they are put back into service.

Additional AST Prevention Measures

The following prevention measures go beyond the Federal regulations under 40 CFR Part 112, but are highly recommended:

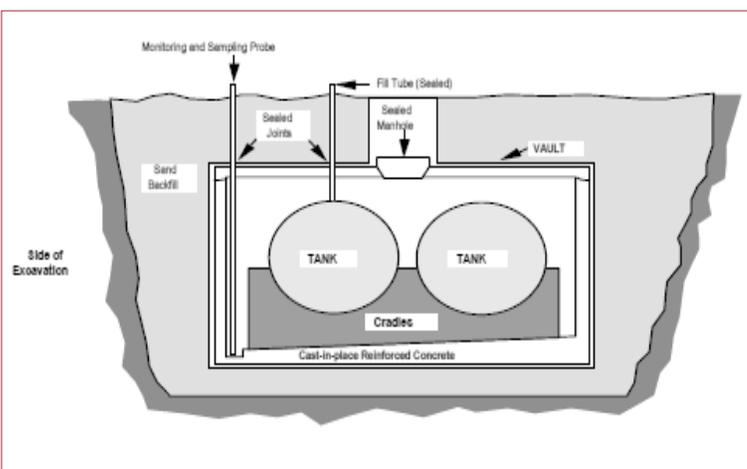
Facility Location:

The location of the facility must be considered in relation to drinking water wells, streams, ponds and ditches (perennial or intermittent), storm or sanitary sewers, wetlands, mudflats, sandflats, farm drain tiles, or other navigable waters. The distance to drinking water wells and surface water, volume of material stored, worse case weather conditions, drainage patterns, land contours, and soil conditions must also be taken into account.



4 - Cross section of a double-walled tank.

5 - Tanks in a vault.



7 - Covered AST with secondary containment (above)



8 - Elevated AST (left)

Preventing Evaporation:

While not a preventative measure for source water protection, preventing evaporation has economic and air quality benefits. To keep out rain and reduce evaporation losses and moisture condensation, paint tanks a reflective color, install them in an east-west direction, install a low-pressure valve on top of the tank, and cover the structure. A roof structure covering a 10,000 gallon tank will conserve 600 to 1,000 gallons of gasoline per year, which would have escaped by evaporation without the shade cover.

Corrosion Control:

ASTs should have corrosion protection for the tank. Options include elevating tanks, resting tanks on continuous concrete slabs, installing double-walled tanks, cathodically protecting the tanks, internally lining tanks, inspecting tanks according to American Petroleum Institute standard, or a combination of the options listed above. All underground piping to

the tank should be double-walled or located above ground or cathodically protected so you can inspect it when it fails. To maximize system safety, seal the floors, containment area, and sump pump pit with an appropriate coating (e.g., petroleum resistant coating). Any accumulated water should be inspected for petroleum or chemicals prior to discharge.

Periodic Cleanup:

Accumulated minor spillage, over time, may result in a film or sheen on collected rain water, making it unsuitable for discharge to the soil or drains. Periodic cleanup of the containment areas (e.g., sweeping with a broom and using limited absorbent) can prevent unnecessary dirt and contaminant buildup.

A ROOF COVERING A 10,000 GALLON TANK WILL CONSERVE 600-1,000 GALLONS OF GASOLINE PER YEAR, WHICH WOULD HAVE ESCAPED BY EVAPORATION.

Registration Programs:

Local jurisdictions may want to implement registration programs for exempt tanks, in order to exercise some oversight of their construction and operation. Furthermore, most States also require inspections for ASTs by fire marshals. Inspection programs can be expanded to cover water contamination issues.



6 - Floating fuel station in the Amazon.

Additional Information

The following documents contain more detailed information on ASTs and are available for free on the Internet. You can contact your EPA Regional SPCC or Oil Coordinator for more information, as well. There are also State and local authorities that are often located in Oil, Environmental, or Pollution Control Divisions who can provide you with local regulations for ASTs.

Contact local government authorities in your area to see if there are ordinances in place to manage ASTs. Numerous examples of local source water protection-related ordinances for various potential contaminant sources can be found at: <http://www.epa.gov/r5water/ordcom/><http://www.epa.gov/owow/nps/ordinance/><http://www.epa.gov/owow/nps/ordinance/links.htm>

The following documents provide additional information on AST prevention measures and regulations:

Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida.. Above-Ground Fuel Storage Systems (EES-61). (1992, October). Retrieved February 9, 2001 from the World Wide Web: <http://www.cdc.gov/niosh/nasd/docs2/as04300.html>

Minnesota Pollution Control Agency. Above-Ground Storage Tank Systems. (2000, October 18). Retrieved February 9, 2001 from the World Wide Web: <http://www.pca.state.mn.us/cleanup/ast.html>

Minnesota Pollution Control Agency. Out-of-Service Tank Systems. (1998, November). Retrieved February 9, 2001 from the World Wide Web: <http://www.pca.state.mn.us/cleanup/ast.html>

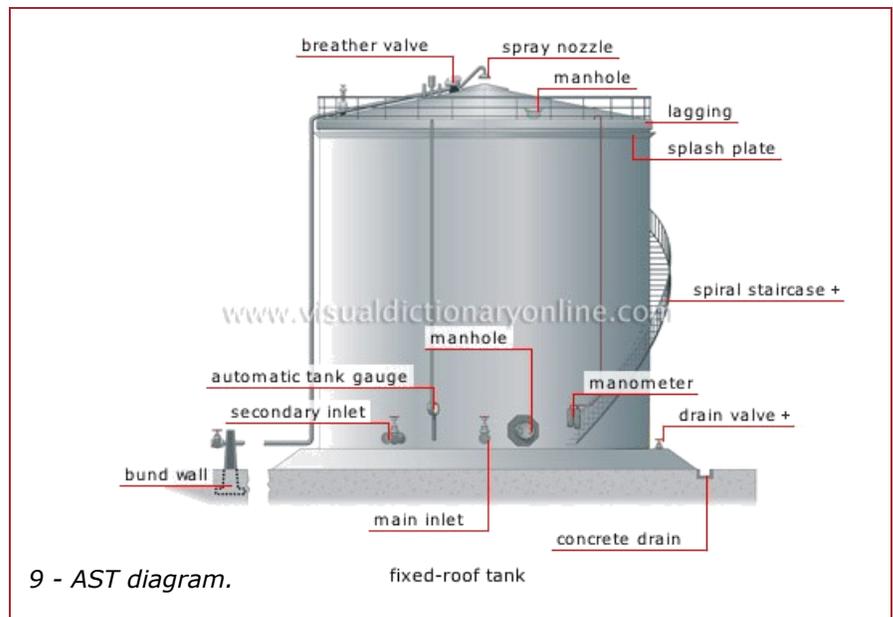
Purdue University Extension Service. Petroleum Product Storage Practices on the Farm. (1991). Retrieved February 12, 2001 from the World Wide Web: <http://pasture.ecn.purdue.edu/~epados/farmstead/fuel/src/title.htm>

South Dakota Department of Environment and Natural Resources, Ground Water Quality Program.. Frequently Asked Questions about UST and AST Systems. (n.d.). Retrieved February 19, 2001 from the World Wide Web: <http://www.state.sd.us/denr/DES/Ground/tanks/FAQTANK.htm>

U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. SPCC Requirements and Pollution Prevention Practices for Bulk Storage Facilities. (n.d.). Retrieved February 9, 2001 from the World Wide Web: <http://www.epa.gov/oilspill/spcc/index.htm>

U.S. Environmental Protection Agency, Office of Water. Storm Water Management for Industrial Activities – Developing Pollution Prevention Plans and Best Management Practices. Section 3.6 – Liquid Storage in Above-Ground Storage Tanks (EPA 832/R-92-006). (1992, September). Retrieved February 9, 2001 from the World Wide Web: <http://www.epa.gov/owm/sw/indguide/index.htm>

U.S. Environmental Protection Agency, Oil Spill Program. Introduction and Background to the Oil Pollution Prevention Regulation. (n.d.). Retrieved May 1, 2001 from the World Wide Web: <http://www.epa.gov/oilspill/spcc/index.html>



9 - AST diagram.

Image Credits

1 - Federal Facilities Environmental Stewardship and Compliance Assistance Center. Assistance: Facility Regulatory Tour for Storage Tanks: Above Ground Storage Tanks. Accessed on July 26, 2010 at: <http://www.fedcenter.gov/assistance/facilitytour/tanks/aboveground/>

2 - Flickr Creative Commons: Attribution only search. Psychedelic water uploaded by “notsogoodphotography” on April 24, 2010. <http://www.flickr.com/photos/notsogoodphotography/4547807568/>

3 - Flickr Creative Commons: Attribution only search. Imperium storage tanks, uploaded by “skidrd” on August 18, 2007. <http://www.flickr.com/photos/skidrd/1160891313/>



10 - AST Diagram.

4, 5, 11 - EPA: Office of Solid Waste and Emergency Response, September 2005. RCRA Training Module: Introduction to Tanks (40 CFR Parts 264/265, Subpart J) <http://www.epa.gov/epawaste/inforesources/pubs/hotline/training/tanks05.pdf>

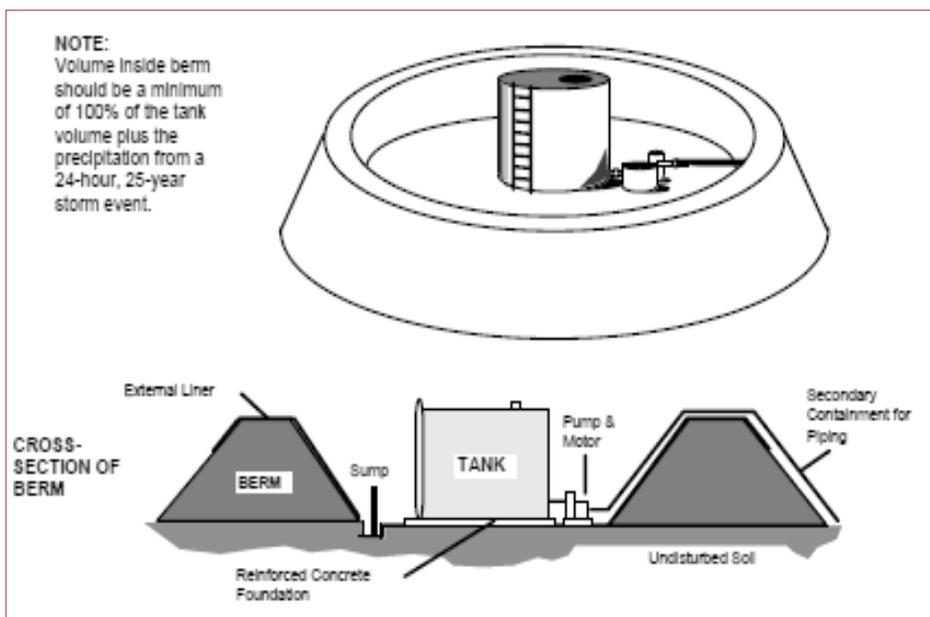
6 - TravelPod Blogs. Amazon floating fuel stations, uploaded by “Suenson_taylors” on November 7, 2009. http://www.travelpod.com/travel-photo/suenson_taylors/1/1257735331/amazon-floating-fuel-stations.jpg/tpod.html

7, 8 - From original AST document.

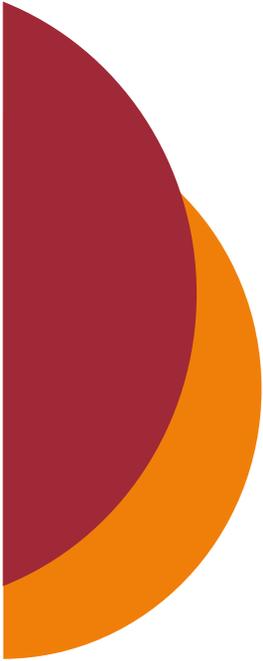
9, 10 - Merriam-Webster Visual Dictionary

Online. Search for - Energy :: Geothermal and Fossil Energy :: Oil :: Tanks [1] and [3]. Diagrams of ASTs. http://visual.merriam-webster.com/energy/geothermal-fossil-energy/oil/tanks_1.php

Back Cover - Flickr Creative Commons: Attribution only search. Oil/water storage tanks, Conroe oil field, uploaded by “roy.luck” on May 10, 2009.



11 - AST diagram.



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The mission of EPA is to protect human health and to safeguard the natural environment -- air, water and land -- upon which life depends.

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