SWWP Newsletter

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PETROLEUM STORAGE TANKS AND SPILLS

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INTRODUCTION

Petroleum storage tanks are a necessity for the United States Army. However, in remote locations, unit commanders may be unfamiliar with the requirements associated with storage tanks, or may not understand the requirements for inspection or what to do in the event of a spill or leak. This paper serves to address these issues.

TANK HISTORY

A record of tank history should be maintained by a reliable organization, such as the Directorate of Public Works (DPW). The history should include relevant information such as --

- Date of tank installation.
- Name of the company who installed the tank.
- Physical characteristics (size, construction material, product contained, etc.).
- Soil and ground water characteristics.

This information is not inclusive of the information that should be maintained for a tank. However, having this information available greatly assists in assessing that a tank is appropriate for its mission. In the event of a problem, this information helps the investigator determine potential causes of failure of the tank, as well as assists in preparing a strategy for the clean up of the site.

DISCHARGES/SPILLS

Prepare for spills were petroleum and other hazardous substances are stored or used. A discharge into or upon navigable water has not been clearly defined, and varies from jurisdiction to jurisdiction. Therefore, it is important that all spills of petroleum products that reach the ground or escape containment be reported to the Environmental Coordinator and /or the Installation On-Scene Coordinator (IOSC). These individuals will make the determination if the spill is reportable.

UNDERGROUND STORAGE TANKS (USTS)

Under ground storage tanks (USTs) are defined as any tank with 10% or greater of the tank volume located underground. The 10% calculation includes the volume in the tank piping. Generally, this means that the tank is not accessible to normal visual inspection. For example, a tank that is located in a concrete vault situated below the ground surface is not necessarily considered a UST, because it is accessible for inspection. Specific local laws and regulations may affect the definition and interpretation of what is considered a UST.

UST Standards. Title 40 Code of Federal Regulations, Part 280 (40 CFR 280) lists the standards for USTs. The compliance deadline for USTs has passed, so all USTs should currently meet the standard for new or upgraded tanks. Tanks must meet the following standards:

The tank is constructed of an approved material:

- Fiberglass Reinforced Plastic (FRP)
- Steel with cathodic protection
- Steel – FRP composite metal without corrosion protection, if it can be certified corrosion protection is not needed.
- Metal without corrosion protection, if it can be certified corrosion protection is not needed.

The piping is constructed of an approved material:

- FRP
- Steel with cathodic protection
- Metal without corrosion protection if it can be certified corrosion protection is not needed.

USTs are specialized containers that are difficult to inspect; thereby, warranting specific environmental regulations. All regulated USTs must comply with 40 CFR 280.

The tank is constructed with spill and overfill protection to prevent the release of product to the environment when the transfer hose is disconnected from the fill port.

The tank is installed in accordance with procedures developed by a nationally recognized association, such as the American Petroleum Institute, and the installation is certified.

Operation. The owner and operator must ensure that releases do not occur due to spilling or overfilling of the UST.

Corrosion protection systems must be operational. Corrosion protection systems are to be inspected within 6 months of installation and every 3 years thereafter.

The tank must be compatible with the material stored. Both FRP and steel are compatible with petroleum products.

Leak Detection. USTs are specialized containers that are difficult to inspect. Each UST systems consist of two containment structures that require leak detection and monitoring. The first and most obvious is the tank itself. The second is the associated piping, which can be easily overlooked.

Tanks. Because USTs cannot be visually inspected, there must be a method of determining if the tank is operating as designed. Acceptable methods of leak detection for tanks include:

- Weekly tank gauging. USTs of 550 gallons or less may use weekly tank gauging. This involves manually measuring the volume of liquid in the tank at the beginning and ending of a 36-hour period.
- Automatic tank gauging. This is an electronic device that detects a leak of 0.2 gallons per hour from the tank. This method also requires that inventory control procedures and records be kept on the tank.
- Vapor monitoring. If the UST is located in proper soil conditions, vapor monitors may be installed to detect leaks. Such a system involves checking the vapor monitors on a routine basis to determine if the tank is leaking.
- Ground-water monitoring. This procedure is similar to vapor monitoring in that specific ground conditions must exist for this method to be used. Monitoring wells are placed around the UST, and the monitors must be checked for free product on a regular basis to determine if the tank is leaking.
- Interstitial monitoring. This involves the electronic monitoring of the space between the UST and a secondary barrier immediately around or beneath the tank, and may include a second wall of the UST itself.
- Other. Other methods are acceptable if they can detect a leak of 0.2 gallons per hour from the tank.

Piping. Pressurized and suction piping systems that routinely contain regulated substances are required to meet specific release detection requirements.

Pressurized piping may use the following methods of leak detection:

- ✓ An automatic leak detection system may be used to shut off flow or trigger an alarm when a leak occurs. This method requires an annual test of the detection system.
- ✓ Annual tightness testing can be performed on the pressurized piping, as long as a specific leak rate and pressure requirements can be met.
- ✓ Vapor, ground-water, interstitial, and other monitoring methods discussed above for tank leak detection may be used for pressurized piping.

Suction piping may use the following methods of leak detection:

- ✓ Tightness testing every 3 years, as long as a specific leak rate and pressure requirements can be met.
- ✓ Methods similar to those described in IIIC1c-f may be used for suction piping.
- ✓ In specific cases, testing of suction piping is not required. An engineer should be consulted to determine if a UST meets these criteria.

Leaks. If the leak detection system indicates a leak, treat as though there is a leak.

- ❖ Stop use of the UST system.
- ❖ Take steps to validate or confirm that the tank or piping is leaking (e.g., tightness testing).
- ❖ If the tank or piping is not leaking, correct the deficiency (e.g., replace faulty leak detection system).
- ❖ If the tank or piping is leaking or if there is environmental evidence of a release, remove product from the tank and initiate closure/removal of tank.
  - ✓ Collect free product on the ground.
  - ✓ Excavate contaminated soil.
  - ✓ Remove free product floating on ground water.
  - ✓ Determine extent of the leak and conduct remediation.

Note: steps IIID4c-d are usually beyond the capability of local units and organizations.

ABOVEGROUND STORAGE TANKS (ASTS)

Unlike USTs, there are no specific regulations for the performance standards of ASTs. However, ASTs are considered to be covered under 40 CFR 112, which requires that a facility owner or operator must take steps to prevent spills from reaching the environment, and to have the facility prepared in the event that preventive measures do not work. The conditions of 40 CFR 112 are also considered to apply to USTs.

Types of ASTs.

Fabricated tanks.

- ❖ Aboveground – suspended by a cradle or other support structure.
- ❖ On-ground – tank is in physical contact with the ground. A tank in contact with the ground is more difficult to inspect than a tank supported aboveground.

Tanks with inherent secondary containment.

Secondary containment. ASTs require secondary containment that is sufficient to capture the contents of the tank plus sufficient freeboard to allow for precipitation. The design of the secondary containment must allow personnel the time to recover the product and take the tank out-of-service. Fabricated tanks have the secondary containment as a structure separate from the tank itself.

Inspections. The procedures of 40 CFR 112, Appendix F, 1.8.1.1 Tank Inspection; and 40 CFR 112, Appendix F, 1.8.1.3 Secondary Containment Inspection are, if not required, good management practices that should be conducted for every AST on a monthly basis. Example checklists are included as Appendix A of this paper. A regulated facility is required to maintain these inspection records for 5 years. Problems noted during the inspection should be addressed immediately.

Fabricated tanks.

- ❖ A formal fabricated tank inspection should be performed by certified inspectors and engineers.
- ❖ A formal external inspection of the tank should be conducted at least every 5 years per American Petroleum Institute Standard 653 (API 653).
- ❖ A formal internal inspection of the tank should be conducted at least every 20 years per API 653.
- ❖ Inspection and repair procedures for fabricated tanks are very extensive and detailed; and are, therefore, omitted from this paper.

Inherent tanks. Tanks with inherent secondary containment that have failed or have a problem should be taken out-of-service immediately and the product removed from the tank.

RELEASES AND SPILLS

Releases and spills may occur as a result of tank failure, secondary containment failure, faulty equipment, failure to follow correct procedures, or overfilling of tanks or vehicles. In extreme cases, a release may be caused by negligence or vandalism. In any case, quick response to a spill is critical to limit the damage caused by the spill.

Procedures. Appendix B contains a general outline of the spill response procedures. Spill response is event specific, in that the actions performed are based on the responder's training in dealing with spills, knowledge of the material spilled, having a plan of action, and the availability of the proper response materials.

- Training. Personnel must be trained to know what should be done in the event of a spill. This involves not only being able to perform the physical actions necessary to control, contain, and clean up a spill, but also includes knowledge of the substance spilled and the health and safety requirements of working with the spilled material.

- Knowledge. Material Safety Data Sheets (MSDS) provide information on hazardous materials, and should be made readily available to all persons using hazardous substances. The MSDS details the health effects of contact with a particular substance, and the proper precautionary measures that should be employed when dealing with the substance. This information will not only allow personnel to address spills, but will also provide them with the knowledge of when additional resources are necessary or the spill is beyond the capability of locally available resources.

- Plan of action. A prepared contingency plan avoids confusion and delays when having to deal with an adverse event. The general outline of spill response procedures in Appendix B provides a general overview only. This outline can be used as a guide for spill response; however, facilities are better served if site-specific information and planning is performed to address the specific potential actions required.

- Response materials. Units should have response materials readily available where hazardous substances are used. In general, a facility should be able to deal with a petroleum spill of up to 55 gallons. This involves having specific materials on hand to deal with a spill. There are commercially available spill kits, or a facility may accumulate supplies it deems necessary to deal with potential spills at its location. Within this planning, specific substances used should be evaluated for special response needs, such as materials that would require personal protective equipment that provides skin or respiratory protection for the responders.

QUESTIONS/COMMENTS

Questions in regard to this newsletter should be relayed to the following e-mail address: andrew.maly@apg.amedd.army.mil or by calling (410) 436-8114 / DSN 584-1108.

Questions regarding our services or suggestions for future newsletter topics can be e-mailed to: william.fifty@apg.amedd.army.mil or answered by calling (410) 436-3816 / DSN 584-3816. We can provide the technical assistance necessary for SWPPP revisions, quarterly visual examinations, and storm water sampling and analysis.

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WILLIAM F. FIFTY
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APPENDIX A
SECONDARY CONTAINMENT CHECKLIST

Dike or berm system:

1) Level of precipitation in dike/available capacity
2) Operational status of drainage valves
3) Dike or berm permeability
4) Debris
5) Erosion
6) Permeability of the earthen floor of diked area
7) Location/status of pipes, inlets, drainage beneath tanks, etc.

Secondary containment:

1) Cracks
2) Discoloration
3) Presence of spilled or leaked material (standing liquid)
4) Corrosion
5) Valve conditions

Retention and drainage ponds:

1) Erosion
2) Available capacity
3) Presence of spilled or leaked material
4) Debris
5) Stressed vegetation

SECONDARY CONTAINMENT INSPECTION LOG

Inspector	Tank or SI#	Date	Comments

APPENDIX B
ABOVEGROUND STORAGE TANK INSPECTION CHECKLIST

Check tanks for leaks, specifically looking for:

1) drip marks
2) discoloration of tanks
3) puddles containing spilled or leaked material
4) corrosion
5) cracks
6) localized dead vegetation

Check foundation for:

1) cracks
2) discoloration
3) puddles containing spilled or leaked material
4) settling
5) gaps between tank and foundation
6) damage caused by vegetation roots

Check piping for:

1) droplets of stored material
2) discoloration
3) corrosion
4) bowing of pipe between supports
5) evidence of stored material seepage from valves or seals
6) localized dead vegetation

TANK/SURFACE IMPOUNDMENT INSPECTION LOG

Inspector	Tank or SI#	Date	Comments