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Document 35.1
Petroleum Product Storage in Tanks

Recommended for approval by the ES&H Working Group

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New document or new requirements

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35.1

Petroleum Product Storage in Tanks*

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* **Editorial revision**

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Petroleum Product Storage in Tanks

1.0 Introduction

This document addresses the requirements for storage tanks containing petroleum products, such as gasoline, diesel fuel, heavy fuel oils, lubricating oils, waste oils, and substances containing at least 5% petroleum. Tanks containing other hazardous materials or wastes are required to meet the storage requirements for those materials or wastes.

Several volumes and documents of the *ES&H Manual* contain requirements pertaining to the acquisition, handling, use, labeling, tracking, or transport of hazardous materials and waste, or to the storage of hazardous materials other than petroleum products. The requirements in those documents are not reproduced here. Such requirements are contained in the specific documents in the *ES&H Manual* shown in Table 1.

Table 1. Location in the *ES&H Manual* of hazard-specific documents and related material.

Topic	Location in the *ES&H Manual*
Waste management requirements	Document 36.1
Acquisition, receipt, transportation, and tracking of hazardous material	Document 21.1
Biological materials	Part 13
Chemicals	Part 14
Explosives	Part 17
Ionizing Radiation	Part 20
Onsite hazardous material packaging and transportation	Document 21.2
Requirements for transfer of equipment and property for storage	Document 21.5
ChemTrack	Document 21.1
Management of Retention Tanks Systems	Document 32.2
Operational and Safety Facility Plans	Document 3.3
Preventing Storm Water Pollution and Oil Spills	Document 32.3

Various work- and facility-specific documents also apply to the management of hazardous materials and products, and shall be followed. These documents include:

- Integration Work Sheets (IWSs).
- Facility Safety Plans (FSPs) and Operational Safety Plans (OSPs).

- Site safety plans and safety analysis documents.
- Internal procedures.

2.0 Applicability

The requirements specified in this document are applicable to the Livermore site, Site 300, and any other location where LLNL personnel have management responsibility for storage of petroleum products and substances containing at least 5% petroleum.

Tanks containing petroleum products shall be managed in compliance with all county, state, and federal underground storage tank (UST) and aboveground storage tank (AST) regulations. Tanks containing waste, including hazardous waste other than petroleum products, shall meet the storage requirements for those substances. (See Document 32.2, "Management of Retention Tanks Systems," Document 36.1, "Waste Management Requirements," and Document 32.3, "Preventing Storm Water Pollution and Oil Spills," in the *ES&H Manual.*)

3.0 Hazards

Petroleum products are stored in tanks throughout the Livermore Site and Site 300. Storing petroleum products in tanks can potentially result in a release of the petroleum product to the environment because of design defects, human error, and equipment failures. Such leaks have contaminated soil and ground water, requiring expensive and time-consuming cleanup. To minimize the potential to release petroleum products from tank systems to the environment, it is important for employees who are responsible for the operation of tank systems to understand the hazards related to system operation and to implement appropriate controls.

4.0 Controls

4.1 Engineering Controls for Petroleum Underground and Aboveground Storage Tanks

In California, nearly 20,000 unauthorized releases from USTs have been reported. Approximately 90% of the USTs contain petroleum products. Figure 1 shows a design and leak detection system for a typical petroleum UST. ASTs have also leaked or spilled for various reasons. To prevent such leaks from occurring, federal and state governments have passed increasingly strict design, construction, operation, and monitoring requirements.

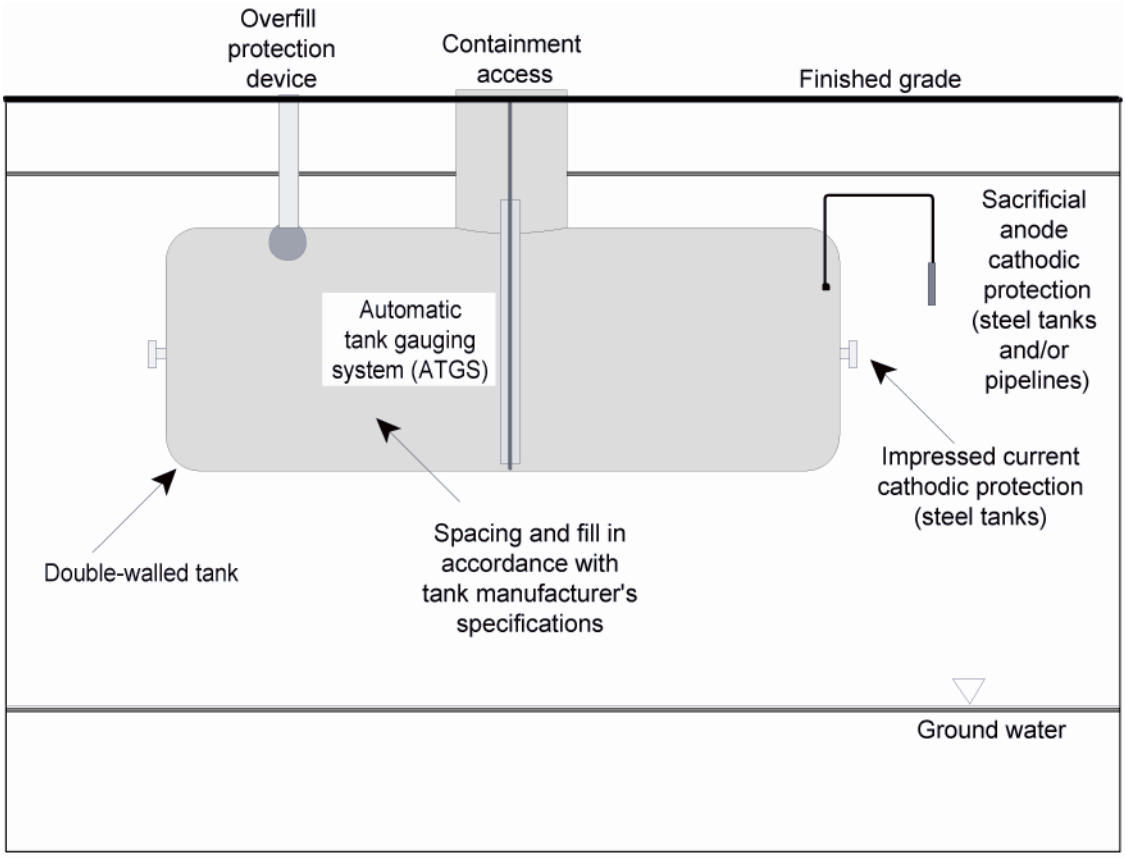

Figure 1. Generalized UST design and leak detection methods.

4.2 Administrative Controls

4.2.1 Regulatory Requirements

Federal regulation of tanks began as part of the Clean Water Act, with spill prevention, control, and countermeasures (SPCC) regulations. California enacted similar but more stringent regulations, which specifically address construction, operation, and release detection actions for USTs. These state regulations, which apply to LLNL USTs, are administered by the Alameda County Department of Environmental Health, Hazardous Materials Division, for USTs at the Livermore site. USTs at Site 300 are regulated by San Joaquin County Public Health Services, Environmental Health Division. Aboveground tanks that are regulated by California's Aboveground Petroleum Storage Act are regulated by California Regional Water Quality Control Boards, San Francisco Bay Region and Central Valley Region, for the Livermore site and Site 300, respectively.

4.2.2 Information Reporting Requirements

Requirements for spill reporting and response are addressed in the SPCC and Spill Contingency Plans for LLNL and the UST tank response plan.

4.2.3 Training Requirements

Operators of ASTs subject to SPCC plan requirements shall take EP34045, *Spill Prevention Control and Countermeasure (SPCC) Plan,* training. The tank owner shall ensure that operators of both AST and UST tanks are trained on their specific tank operations. However, different operations have different training requirements. Contact the area ES&H Team environmental analyst for information.

4.2.4 Underground Storage Tank Requirements

Federal and state regulations define standards for constructing and monitoring USTs and UST piping. The standards include release prevention equipment such as double-wall containment and leak detection monitoring.

Regulations require monitoring and response plans to prevent, detect, and respond to releases from USTs [23 California Code of Regulations (CCR), Article 4, § 2641]. The monitoring program is required to be approved by the Alameda County Department of Environmental Health for USTs at the Livermore site and by San Joaquin County Public Health Services, Environmental Health Division, for those at Site 300. USTs are permitted by the counties.

4.2.5 Aboveground Storage Tank Requirements

ASTs are often chosen as an alternative to USTs. Regulations concerning spill prevention and secondary containment apply to these tanks as well. Requirements for ASTs include secondary containment as well as visual inspections for leaks and inventory control. Regulations may also require that AST be included in the Livermore site and Site 300 SPCC Plans.

For petroleum ASTs with a capacity greater than 660 gallons, or a facility with ASTs where the cumulative storage capacity is greater than 1320 gallons, a storage statement is required to be filed with the State Water Resources Control Board every two years and is subject to SPCC Plan requirements. Appropriate containment should be provided for ASTs that have a volume of less than 660 gallons if they pose a significant risk. Appropriate spill prevention and cleanup capabilities shall be in place for tanks not posing a significant environmental risk (see Document 32.3, "Preventing Storm Water Pollution and Oil Spills," in the *ES&H Manual*).

4.3 Closure Requirements

UST systems may be closed according to temporary closure regulations if storage has ceased but re-use is planned within 12 months, or according to permanent closure regulations if no re-

use is planned. In both cases, stored materials shall be completely removed and the tanks made inert. All portions of UST systems to be permanently closed shall be removed for proper disposal. When removal of the tank is not feasible, the tank may be filled with an inert solid and closed in place. UST closure requires regulator approve plans, site inspections, and completion reports.

Closure of AST systems is not regulated. Systems to be closed should be removed for proper disposal or re-use for similar purposes at another LLNL location.

5.0 Responsibilities

All workers and organizations responsible for petroleum product storage shall refer to and follow the guidelines and requirements in Document 2.1, "Laboratory and ES&H Policies, General Worker Responsibilities, and Integrated Safety Management," in the *ES&H Manual.*

5.1 Tank Owner (Facility Authorizing Organization)

The tank owner should assign a properly trained tank operator to the tank system. The tank owner shall ensure that up-to-date monitoring and response plans are developed and posted at each UST site. The tank owner shall ensure that electronic UST leak-monitoring systems are annually certified to be in proper working order using manufacturers' prescribed programming and sensors. When a tank is no longer in service, the tank owner shall determine if the tank is to be temporarily or permanently closed and shall ensure that all closure requirements are met. Water Guidance and Monitoring Group (WGMG) analysts can assist tank owners with the certification process. Document 32.2, "Management of Retention Tank Systems," in the *ES&H Manual*, although written for wastewater tank systems, provides guidance that generally applies to USTs and ASTs.

5.2 Tank Operators

The tank operator is a properly trained and assigned individual who is responsible for the day-to-day operation of the tank system. The tank operator shall report any anticipated change in the AST or UST use or status to the ES&H Team environmental analyst. Operators of all USTs and ASTs shall coordinate with WGMG when installing new tanks, closing existing tanks, or making any major repairs or any changes in a tank's process, products stored, leak detection system, or alarm system. In such cases, operators may contact the WGMG analyst through the area ES&H Team environmental analyst for assistance.

5.2.1 Underground Storage Tank Operators

The tank operator shall monitor the UST to detect leaks. Double-walled USTs are monitored for leakage in two ways. In the first, the interstitial spaces between the double walls of the tank and the piping are monitored. The second method requires an automatic tank gauging system to determine whether fluctuations in the product level indicate a possible leak. The tank operator shall maintain leak detection systems in working order. If a release from any UST is suspected, the operator shall follow the response plan at the tank site.

5.2.2 Aboveground Storage Tank Operators

Operators shall be familiar with the LLNL SPCC Plans, particularly with those sections specific to their facility. The Livermore site and Site 300 each have distinct plans. Both plans require the inclusion of all ASTs greater than 660 gallons or areas where the cumulative storage capacity of ASTs is greater than 1320 gallons. In general, the SPCC Plan defines requirements for daily inspections of ASTs, secondary containment, security, and spill prevention procedures. These plans are summarized in Document 32.3 of the *ES&H Manual* and can be found at the following internet address:

http://www-r.llnl.gov/es_and_h/spcc/spcc-hp.html

The operator is responsible for managing liquids that accumulate in the AST secondary containment. In areas where secondary containment may accumulate rainwater, the drain valve shall be a locking type and shall be left closed and locked. The tank operator shall ensure that all rainwater is drained. The tank operator shall follow the procedures identified in the SPCC plans for releasing and documenting the release of uncontaminated rainwater collected in secondary containment. If the tank system is located in a Radioactive Materials Management Area (RMMA), the liquid may need to be tested for radioactivity before it is discharged. If the tank system is located in a RMMA, the operator shall contact the area ES&H Team environmental analyst for guidance.

If a release from the tank might affect ground water, the bottom of the AST shall have a foundation design that provides for early detection of a release, or have a system installed to detect a release before there is an impact on the ground water. If the AST bottom can be viewed directly, the operator shall perform visual inspections.

5.3 Environmental Protection Department

WGMG analysts maintain and modify the SPCC Plans for both sites. WGMG analysts provide biennial notification to the SWRCB for regulated tanks and maintain a database of all tanks owned and operated by LLNL. WGMG analysts will provide guidance related to the design, maintenance, operation, and closure of tank systems; obtain permits as necessary; and prepare closure reports. In addition, WGMG analysts assist in determining if releases from USTs are

reportable or recordable, and they report releases as necessary to the county agencies and/or the regional water quality control boards.

6.0 Work Smart Standards

CA Health & Safety Code § 25270-25270.13, Aboveground Storage of Petroleum.

CA Health & Safety Code §§ 25280–25299.7, Underground Storage of Hazardous Substances.

CA Health & Safety Code §§ 25299.10–25299.43, Petroleum Underground Storage Tank Cleanup.

23 CCR §§ 2610–2728, Underground Tank Regulations.

23 CCR §§ 2730–2802, Underground Tank Tester Regulations.

40 CFR 110, Discharge of Oil.

40 CFR 112, Oil Pollution Prevention.

40 CFR 264.196, Response to leaks or spills and disposition of leaking or unfit-for-use tank systems.

40 CFR 265.196, Response to leaks or spills and disposition of leaking or unfit-for-use tank systems.

40 CFR 280, Technical Standards and Corrective Action Requirements for Owners of Underground Storage Tanks.

40 CFR 281, Approval of State Underground Storage Tank Programs.

DOE O 420.1A, §4.4 Natural Phenomena Hazards Mitigation.

33 USC § 1251 et seq., Federal Water Pollution Control Act as Amended by the Clean Water Act.

42 USC § 6991 et seq., Regulation of Underground Storage Tanks.

7.0 Resources for More Information

7.1 Contacts

Questions regarding storage of petroleum products in USTs or ASTs can be addressed by the area ES&H Team environmental analyst, who can provide the name and telephone number of the appropriate WGMG analyst.

7.2 Other Sources

LLNL Spill Contingency Plans.

LLNL Livermore site and Site 300 Spill Prevention, Control, and Countermeasures (SPCC) Plans.

Document 32.2, "Management of Retention Tank Systems," in the *ES&H Manual.*

Document 32.3, "Preventing Storm Water Pollution and Oil Spills," in the *ES&H Manual.*