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Management of Petroleum Underground Storage Tanks at the Hanford Site

Prepared for the U.S. Department of Energy
Office of Environmental Restoration
and Waste Management

Westinghouse Hanford Company Richland, Washington

Hanford Operations and Engineering Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

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MANAGEMENT OF PETROLEUM UNDERGROUND STORAGE TANKS AT THE HANFORD SITE

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ABSTRACT

This report represents the timetables, responsible organizations, and methods required to comply with the newly promulgated Washington Administrative Code (WAC) 173-360 Underground Storage Tank (UST) Regulations which became effective December 29, 1990. This report only addresses UST systems that contain nonradioactive material.

A total of 84 tanks at the Hanford Site are currently regulated under WAC 173-360. In addition, 32 regulated tanks have been removed as a result of the federally mandated program and the newly implemented state regulations.

The majority of the USTs at the Hanford Site are operated by Westinghouse Hanford; however, one is operated by Kaiser Engineers Hanford (KEH) and one by Pacific Northwest Laboratory (PNL).

TANK CATEGORY DEVELOPMENT

INTRODUCTION

Before the state underground storage tank (UST) regulations became effective, UST systems were regulated beginning in 1988 under Title 40 Code of Federal Regulations (CFR) 280 and 281. The Washington State Department of Ecology (Ecology) was directed by Revised Code of Washington (RCW) 90.76 to establish a UST program designed, operated, and enforced in a manner that, at a minimum, meets the requirements for delegation of the federal regulations. Their purpose is to protect the groundwater supplies of the State of Washington by closing old tanks, detecting and remediating tank leaks and spills, establishing stringent standards for new tanks, and upgrading existing tanks to new-tank standards.

The active USTs on the Hanford Site have been divided into eight categories, based on the age and service status of the tanks, each having a succeeding annual compliance date for installed leak detection capability beginning December 22, 1989 (except for the deferred tanks which do not require leak detection). All fully regulated Hanford Site tanks and associated piping must meet new-tank standards by December 1998 or undergo permanent closure. Westinghouse Hanford Company (Westinghouse Hanford) has responsibility for implementing the tank removal program and managing the release detection program on the Hanford Site.

The Hanford Site originally had 356 storage tanks placed wholly or partially underground. Petroleum USTs comprise the majority of active and out-of-service tanks, and most of the regulations are geared towards them. Of the USTs on the Hanford Site, 65 were initially regulated by Title 40 CFR 280 and 281 [U.S. Environmental Protection Agency (EPA) (1988a)]. Once the regulated tanks were identified in mid-1988 and the final rules (EPA 1988a) published, an implementation plan was prepared by Westinghouse Hanford detailing how those rules would be implemented. In December 1990, the State of Washington implemented its new WAC regulation for USTs (WAC-173-360). Of the 65 USTs originally identified as regulated in 1988, 22 were permanently closed (removed) in 1989, five were removed in 1990, and five were removed to date in 1991. There are currently 84 tanks which are regulated to varying degrees by the WAC regulations of which 21 are abandoned (orphan tanks) and will be removed.

CONTRACTOR ROLES AND RESPONSIBILITIES

PROJECT MANAGEMENT

Westinghouse Hanford is assigned project management responsibility at the Hanford Site by the U.S. Department of Energy (DOE) Field Office, Richland, for the implementation of Chapter 173-360 WAC UST Regulations. Implementation of this program is governed by an internal Westinghouse Hanford implementation plan.

OTHER CONTRACTORS RESPONSIBILITIES/INTERFACES

Kaiser Engineers Hanford (KEH) and Pacific Northwest Laboratory (PNL) have contractual responsibilities to DOE Field Office, Richland, as operators of UST systems under WAC 173-360. To assure that these responsibilities are met and liabilities minimized, a close, well-understood interface exists between Westinghouse Hanford, as Project Manager, and KEH and PNL, as operators; and DOE Field Office, Richland, as the owner.

Interface Requirements

Table A lists the methodology, from start of project to site remediation (if necessary), for a typical UST closure. The interface points and the approval/notifications that the Project Manager will provide for the operators (KEH or PNL) are included in the tables. Westinghouse Hanford also provides KEH and PNL designated representatives with appropriate project status.

COMPLIANCE REQUIREMENTS

Table B provides an overview of compliance schedules listed in WAC 173-360-330.

RELEASE DETECTION PROGRAM REQUIREMENTS

Tightness Testing

Tank tightness testing is performed by a Westinghouse Hanford subcontractor and is made available to Westinghouse Hanford Operating Divisions, KEH, and PNL as a service provided by Westinghouse Hanford Restoration Operations, or by separate certified testing subcontract administered by each tank operator.

Necessary tank preparations are specified by the subcontractor, and each tank is prepared for testing by the operating unit. Schedules for the Hanford Site restoration operations administered tank testing are developed with normally two week notification before testing. This lead time is necessary because of the tank conditions for the tests, i.e., completely filled and out of service for 8 to 12 h before the test and out of service until after the test completion.

Each UST operator, and Westinghouse Hanford Restoration Operations, are informed in writing of the test results by the subcontractor as soon as available. In the event that a tank fails to meet tightness requirements as discussed in WAC-173-360-345, Westinghouse Hanford Restoration Operations initiates the notification process.

Table A. Contractor Interface Actions.

Westinghouse Hanford Environmental Division Action	Pacific Northwest Laboratory* or Kaiser Engineers Hanford*	
	Approval of Action	Notification of Action Completion
1. Prepare Liquid Sample Plan.	X	
2. Subcontractor laboratory analysis.**		X (Copy of Results)
3. Designate waste.	X	
4. Pump contents/rinse tank.		X
5. Prepare waste manifests and ship wastes.		X (Copy of Documents)
6. Subcontractor disposes of waste and provides certification.		X (Copy of Certification)
7. Prepare Implementation Plan.	X	
8. Prepare detailed work plan including soil sampling	X	
9. Obtain excavation permit.	X	
10. Obtain cultural resource review.		X
11. Prepare Job Control documentation.		X
12. Inert, excavate, and remove UST.		X
13. Transport UST to storage area to await final disposition.		X
14. Obtain soil samples of UST impression in excavation.		X
15. Provide immediate notification if a leak is evident.		X
16. Subcontractor laboratory analysis.**		X (Copy of Results)
17. Backfill excavation.		X
18. Subcontractor removes and certifies UST is clean and properly disposes of.		X (Copy of Certification)
19. Provide follow-up reports if UST was found to have leaked.		X
20. Site remediation (if necessary).		X

* Approvals, notifications, etc., required only if KEH or PNL UST systems are affected.
** Duplicate samples for independent analysis may be obtained if desired for the contractor who has operator responsibilities for a particular UST.

Table B. Closure or Upgrade Schedules for Underground Storage Tanks.

Schedule For Required Temporary/Permanent Closure

TYPE OF TANK & PIPING	REQUIRED ACTION	DEADLINE DATE
Category A - Permanently Closed	Empty and Clean Remove From Ground or Fill With Inert Solid Material Perform Site Assessment and Corrective Action as Necessary Provide Notification Prior and Following Action as Required	December 22, 1989 Or 12 mo After Temporary Closure or as Negotiated With the DOE
Category B - Temporarily Closed	Operate and Maintain Corrosion Protection Operate and Maintain Release Detection if Not Empty	Immediately
	Cap and Secure All Lines, Pumps, Manway & Ancillary Equipment Leave Vent Lines Open & Functional	March 22, 1989 Or 3 mo After Temporary Closure
	Permanently Closed	December 22, 1989 Or 12 mo After Temporary Closure

Schedule For Implementation of Required Upgrades

TYPE OF TANK & PIPING	LEAK DETECTION	CORROSION PROTECTION	SPILL/OVERFILL PREVENTION
New Tanks and Pipings*	At Installation	At Installation	At Installation
Existing Tanks** Installed Category C Tanks Category D Tanks Category E Tanks Category F Tanks Category G Tanks Category H Tanks Category I Tanks	No Later Than: December 1989 December 1990 December 199. December 1992 December 1993 December 1994 December 1995	December 1998	December 1998
Existing Piping** Pressurized Suction	December 1990 Same as Existing Tanks	December 1998 December 1998	Does Not Apply Does Not Apply

* New tanks and piping are those installed after December 1988.
** Existing tanks and piping are those installed before December 1988. Tanks that cannot meet this schedule for upgrade must be closed permanently by the scheduled upgrade deadline date.

Monitoring Program

The Monitoring Program provides for routine data collection and monthly evaluations to ensure that tank leaks that may develop between annual tightness testing are identified and stopped as early as possible. Westinghouse Hanford Restoration Operations provides an administrative control procedure to specify data requirements for each participating UST operator. Although each UST operator may opt to use individually developed procedures and methods, all Hanford Site UST Release Detection data must meet the requirements of WAC 173-360-345.

All data, regardless of operator or method of monitoring, is submitted to Westinghouse Hanford Restoration Operations for monthly evaluation, trend analysis, and release reporting as outlined.

LEAKS AND SPILLS

The EPA estimates that nationwide as many as 25% of the 5 M USTs currently operating in the country are leaking (API 1987). A lower failure rate has been experienced at the Hanford Site because of low soil moisture and corrosivity. Removal and testing of USTs revealed tank failure by corrosion problems at two of the closure sites to date. Three additional sites have identified releases from overfilling the tanks or leaking piping systems.

TANK CLOSURE

Notifications and Tank Preparations

The following are the initial steps for permanent tank closure once the decision has been made to permanently close a particular UST:

- Westinghouse Hanford Environmental Division notifies Ecology through DOE Field Office, Richland, identifying tanks to be pulled at least 30 d before tank removal as required by WAC 173-360-385
- Tank liquid samples are obtained for analysis and waste designation per approved procedures if inventory history is unavailable
- Removal and disposal of tank contents per state and federal regulations
- Rinse and flush tank, vacuum rinsate, and dispose of rinsate per state and federal regulations
- Perform Ground Penetrating Radar survey to obtain exact location of tank and piping system.

Actual Tank Removal

Actual tank removal is performed by a Westinghouse Hanford approved procedure to ensure a safe and technically correct approach. The basic process for tank removal is as follows:

- Inert potentially explosive atmospheres in the UST by adding CO_2 or dry ice before excavation. Excavation will not proceed until UST oxygen level is below 10%
- Excavate and remove UST piping. Piping is placed in tank for offsite cleaning and disposal
- Excavate, remove UST, perform radiation surveys, and transport to a central location for storage until final cleaning and disposal
- Perform a visual inspection of the tank and excavation, inspect again using an organic vapor monitoring instrument, and then obtain soil samples per an approved sample plan
- Westinghouse Hanford will provide immediate (24 h) notification and follow-up reports for any tank/piping determined to have leaked.

Follow-up Actions

Following soil sample collection and analysis, the excavation is normally backfilled, compacted, and sloped to match the pre-excavation site appearance. If a significant leak was determined to have occurred, additional excavation and sampling is done to confirm the size of the release. If it is determined that the release is significant and goes beyond the lowest point of sampling, then the requirements of WAC 173-340 are followed.

All USTs removed and stored at a central location as part of a project are cleaned and certified free of any hazardous material by an approved subcontractor. This work is performed by experienced personnel working to industry standards. Copies of the certification are kept in the project files as part of the UST records.

Site remediation/cleanup that is required because of UST leakage is planned, scheduled and performed in accordance with the *Guidance for Remediation of Releases from Underground Storage Tanks* issued by the Ecology. This document, while not a regulation, is used in conjunction with Chapter 173-340 WAC, "The Model Toxics Control Act Cleanup Regulation" requirements on an individual case basis. Remediation plans are reviewed by and coordinated with the tank operator before submission to the regulatory agency.

All USTs removed and stored at a central location as part of the project are to be taken offsite to be cleaned and certified free of any hazardous products by an approved subcontractor. The tanks are scrapped after they have

been certified clean. Copies of the certification are kept in the project files as part of the UST records which are maintained by Decommissioning Engineering, Hanford Restoration Operations.

Twenty-one tank sites (some sites contained multiple tanks) have been permanently closed since 1989. Five of these were identified as release sites, two by tank penetration and three by overfills and/or pipe leakage during tank operation. Remediation plans for two of these sites have been forwarded to Ecology for concurrence before the start of field work. One plan calls for soil removal and cleanup of the soil by means of controlled solid-phase soil remediation. The other tank site soil is expected to be a hazardous waste and will be disposed of in a landfill in accordance with state and federal regulations based on characterization sampling during the soil removal work. The remaining two sites were characterized following tank removal; however, cleanup has been deferred. Cleanup of the petroleum contamination will be planned, following characterization of other wastes in the vicinity.

ORPHAN TANKS

It is possible that additional undiscovered USTs may exist at the Hanford Site. These are most likely in areas of old town sites, 1940s central construction areas, or abandoned farmsteads. As tanks are discovered, investigated, and confirmed to fall under the UST regulations, they are reported by Westinghouse Hanford Environmental Division to Ecology through DOE Field Office, Richland. A detailed historical research effort has been conducted in these areas. Orphan tanks identified for removal are treated the same as other USTs, i.e., sampled to confirm their contents, pumped out, cleaned, etc.

COMPLIANCE COST

PRE-UPGRADE OR REPLACEMENT COST

Although cost estimates have been prepared for each UST covered by current regulations, the most detailed information is available from the work completed to date. These costs included site wide program development, engineering, tank content characterization, liquid waste disposal, radiological clearance, tank removal, cleaning, and disposal. Also included in this information is the cost of site assessment that exceeded regulatory requirements to support later remedial investigations that may be necessary in the area of the closed tank site.

Cost estimates for planning purposes, for active tanks requiring tightness testing, are approximately $700 annually per tank. While the necessity of forced tank removal will not be known until after each annual test, an estimate to remove 25% of the tanks tested (at an average of $30,000 per tank) is expected. The 25% value is based on industry averages for 15-yr-old UST systems (API 1987) and that experienced to date at

the Hanford Site. The actual removal costs can vary greatly between different tank sites depending on the number of sample analyses needed, amount of hand digging required, shoring required, etc..

LONG-RANGE PLANNING

In 1989, a conceptual design report was prepared to address the proposed compliance actions for Westinghouse Hanford USTs at the Hanford Site. Most of the existing tanks included in the proposed compliance project are single-wall steel tanks that were installed over 10 yr ago, some up to 45 yr ago. This compliance project covers work that is currently expected to be funded in fiscal year 1994 and bring all but six of the Hanford Site tanks regulated by WAC 173-360 to "new tank standards" by 1996. Five of the remaining six tanks will be permanently closed before 1994, and the final tank is expected to be replaced by 1996.

Most of the Hanford Site infrastructure tanks will be removed and replaced. Consolidation of fueling operations at a new facility will eliminate the need to replace some of the removed tanks. The only tanks which will not be removed were installed in 1987 in accordance with the interim Federal regulations. These two tanks will be upgraded to meet the current regulations. Two other tanks used to store waste oil will be removed and not replaced, but rather a replacement for another tank in the area will be sized to accept all waste oil generated in the facility. The vehicle wash pad drains that are currently directed to two individual tanks will be routed to a new oil/water separator. This action will eliminate these two tanks and allow the clean, processed water to be discharged to a nearby sanitary sewer.

Site assessment is currently planned to be accomplished by the tank removal sub-contractor with Westinghouse Hanford oversight. It is anticipated that any necessary site remediation (soil removal and subsequent solid phase remediation) will be done by Westinghouse Hanford immediately to meet Ecology pre-established site cleanup levels and to prevent significant impact to the compliance project.

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