Implementation Plan for Title 40 Code of Federal Regulations Parts 280 and 281; Final Rules for Underground Storage Tanks

R. C. Stupka

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Assistant Secretary for Environment, Safety and Health

Westinghouse
Hanford Company

P.O. Box 1970
Richland, Washington 99352

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EXECUTIVE SUMMARY

This report presents the schedules and methods required to comply with the newly promulgated Underground Storage Tank (UST) Regulations Title 40 Code of Federal Regulations (CFR) 280 and 281. These rules were promulgated by the U.S. Environmental Protection Agency (EPA) on September 23, 1988, and became effective December 22, 1988.

These regulations are required by Subtitle I of the Resource Conservation and Recovery Act of 1976. Their purpose is to protect the groundwater supplies of the United States in the following ways:

- o Closing old tanks
- o Detecting and remediating tank leaks and spills
- o Establishing stringent standards for new tanks
- o Upgrade of existing tanks to new-tank standards.

Sixty-five tanks at the Hanford Site are currently regulated under the law. Sixteen tanks are permanently out of service and must be closed before December 22, 1989. Three tanks are temporarily closed and must either be closed or upgraded to new-tank standards by December 22, 1989. Twelve tanks are in service and are over 25 years old. These tanks must be tested for tightness and operated with an effective means of leak detection by December 22, 1989. Five more categories of tanks exist based on the age and service status of the tanks, each having a succeeding annual compliance date for installed leak detection capability of December 22. All regulated Hanford Site tanks and associated piping must meet new-tank standards by December 1998.

The majority of the USTs at the Hanford Site are operated by Westinghouse Hanford Company (Westinghouse Hanford). Kaiser Engineers Hanford and Pacific Northwest Laboratory also operate underground storage tanks. The specific plans to comply with the regulations are presented for each contractor. Estimated costs for tank removal and tightness testing are provided to assist in budget planning. Alternatives to achieve regulatory compliance are discussed, and actions necessary for cleanup in the event of a leak or spill are stated.

Total costs for removal of the 19 tanks in categories A and B will be borne in fiscal years (FY) 1989 and 1990, and they will total \$380,000. The total cost for testing the active tanks through FY 1995 is \$214,000. An FY 1992 line item will address consolidation, removal, upgrade, and replacement of the 39 active tanks that are operated by Westinghouse Hanford and currently regulated by the law.

List of Acronyms

API	American Petroleum Institute
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
DOE-RL	U.S. Department of Energy-Richland Operations Office
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FDC	functional design criteria
FY	fiscal year
IRM	Information Resource Management
KEH	Kaiser Engineers Hanford
OSS	Operations Support Services
PNL	Pacific Northwest Laboratory
RCRA	Resource Conservation and Recovery Act of 1976
RAM	Resource Allocations Management
SARA	Superfund Amendments and Reauthorization Act of 1986
SQAS	Safety Quality Assurance and Security
UST	underground storage tank
WAC	Washington Administrative Code
Westinghouse Hanford	Westinghouse Hanford Company

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1.0 INTRODUCTION

The purpose of this implementation plan is fourfold: (1) It will describe the underground storage tanks at the Hanford Site currently regulated by the law; (2) it will define the programs currently planned and/or underway by the affected Hanford Site contractors; (3) it will bracket costs of compliance this year (fiscal year [FY] 1989) and in the out years, to FY 1995; and (4) it will, through dissemination of information, provide a common understanding of compliance issues by all landlords as well as provide the opportunity for landlord cooperation to achieve efficiency and minimize the costs of compliance.

The Hanford Site has over 350 storage tanks constructed wholly or partially underground and used for a variety of purposes. Two kinds of underground storage tanks (USTs) exist at the Hanford Site. Petroleum USTs comprise the majority of active and out-of-service tanks, and most of the regulations are geared toward them. Chemical USTs also exist at the Hanford site and special requirements for them are addressed.

Sixty-five of these USTs on the Hanford Site are currently regulated by Title 40 Code of Federal Regulations (CFR) 280-281 (U.S. Environmental Protection Agency [EPA 1988(a)]). Eighty percent (52) are operated by Westinghouse Hanford Company (Westinghouse Hanford), 17% (11) are operated by Kaiser Engineers Hanford (KEH), and 3% (2) are controlled by Pacific Northwest Laboratory (PNL). Table 1-1 lists the tank name and alias, if applicable, the tank's general location, its closure and/or upgrade category, and the landlord (responsible contractor or Westinghouse Hanford division). The categories (A-H) are based on age and service status. Table 1-2 explains the closure requirements for Categories A and B and the upgrade requirements for Categories C through H. These requirements are applicable to all Hanford Site contractors. All regulated active tanks must be either closed or upgraded to new-tank standards by 1998.

The regulations allow some latitude with regard to tank closures and upgrades. Table 1-2 summarizes these requirements for tanks which have been permanently or temporarily closed. Table 1-3 summarizes the upgrade requirements for active tanks in the three major areas covered by the regulations, which are leak detection, corrosion protection, and spill/overfill prevention. Tables 1-2 and 1-3 were modified from the USEPA 1988(b). Table 1-4 lists the USTs at the Hanford Site by category. All but 13 of the tanks are operated by Westinghouse Hanford.

Section 2.0 of this report describes the contractor efforts which are underway or planned to comply with the regulations.

Section 3.0 discusses estimated costs, including activities planned for this year and anticipated line item out-year costs. Estimates for tank testing and removal at the Hanford Site are presented to assist in planning adjustments necessary to accomplish work required by the regulations.

Section 4.0 discusses actions to be undertaken in the event a leak or spill is discovered.

Section 5.0 contains the references.

Appendix A contains a summary of provisions of 40 CFR 280 and 281.

Appendix B contains the detailed cost estimate for tank testing and removal.

Table 1-1. Hanford Site Underground Storage Tanks Listed By Category. (sheet 1 of 5)

<u>Tank identification number</u>	<u>Alias</u>	<u>Location</u>	<u>Category^a</u>	<u>Landlord^b</u>
130-D-1		100 Area	A	Westinghouse Hanford- DRD
130-K-1	1717K-LG	100 Area	A	Westinghouse Hanford- DRD
130-K-2	1717K-DF	100 Area	A	Westinghouse Hanford- DRD
311-1 Methanol	311-W	300 Area	A	Westinghouse Hanford- DRD
311-2 Methanol	311-E	300 Area	A	Westinghouse Hanford- DRD
313 Methanol Tank	313 Building	300 Area	A	Westinghouse Hanford- DRD
703-1		700 Area	A	Westinghouse Hanford- IRM
3000-8	8-3000	3000 Area	A	KEH
3000-9	9-3000	3000 Area	A	KEH
3000-10	10-3000	3000 Area	A	KEH
3000-11	11-3000	3000 Area	A	KEH
600-1	1-600	600 Area	A	Westinghouse Hanford- RAM
600-2	2-600	600 Area	A	Westinghouse Hanford- RAM
600-3	3-600	600 Area	A	Westinghouse Hanford- RAM
622R	PNL	600 Area	B	PNL
TK-SQ-151	B Plant	200 East	B	Westinghouse Hanford- DWM

^a See Key to Category

^b See Key to Landlord Abbreviations

Table 1-1. Hanford Site Underground Storage Tanks Listed By Category. (sheet 2 of 5)

<u>Tank identification number</u>	<u>Alias</u>	<u>Location</u>	<u>Category^a</u>	<u>Landlord^b</u>
TK-SQ-152	B Plant	200 East	B	Westinghouse Hanford-DWM
1172-11	11-1172	1100 Area	F	Westinghouse Hanford-OSS
3000-1	1-3000	3000 Area	C	KEH
3000-2	2-3000	3000 Area	C	KEH
3000-3	3-3000	3000 Area	C	KEH
3000-4	4-3000	3000 Area	C	KEH
3000-5	5-3000	3000 Area	A	KEH
3000-6	6-3000	3000 Area	A	KEH
1171-4	4-1171	1100 Area	C	Westinghouse Hanford-OSS
1171-5	5-1171	1100 Area	C	Westinghouse Hanford-OSS
1171-6	6-1171	1100 Area	C	Westinghouse Hanford-OSS
2713W-21	21-2713W	200 West	C	Westinghouse Hanford-OSS
2713W-25	25-2713W	200 West	C	Westinghouse Hanford-OSS
382-1	382 Gas 1	300 Area	C	Westinghouse Hanford-OSS
382-2	382 Gas 2	300 Area	C	Westinghouse Hanford-OSS
382-3	382 Gas 3	300 Area	C	Westinghouse Hanford-OSS
400-FFTF-T-24	400 T-24	400 Area	E	Westinghouse Hanford-OSS
182-N-1-DT	182-Do Day Tank	100 Area	D	Westinghouse Hanford-ARD
				DRD

Table 1-1. Hanford Site Underground Storage Tanks Listed By Category. (sheet 3 of 5)

<u>Tank identification number</u>	<u>Alias</u>	<u>Location</u>	<u>Category^a</u>	<u>Landlord^b</u>
182-N-2-DT	182-Do Day Tank	100 Area	D	Westinghouse Hanford-DRD
182-N-3-DT	182-Do Day Tank	100 Area	D	Westinghouse Hanford-DRD
2713W-23	23-2713W	200 West	D	Westinghouse Hanford-OSS
6652-C	PNL-1-6652P-38	600 Area	DC	PNL
105-N-LFT	105-N Lift Station Tank	100 Area	E	Westinghouse Hanford-DRD
100N-SS-27	27-100N-Service Station	100 Area	E	Westinghouse Hanford-OSS
100N-SS-28	28-100N-Service Station	100 Area	E	Westinghouse Hanford-OSS
2713E-20	20-2713E	200 East	E	Westinghouse Hanford-OSS
3621-D		300 Area	E	Westinghouse Hanford-OSS
222S-1		200 West	F	Westinghouse Hanford-CPD.
100-B-1		100 Area	F	Westinghouse Hanford-OSS
1172-10	10-1172	1100 Area	F	Westinghouse Hanford-OSS
1172-8	8-1172	1100 Area	F	Westinghouse Hanford-OSS
1172-9	9-1172	1100 Area	F	Westinghouse Hanford-OSS
2713W-22	22-2713W	200 West	F	Westinghouse Hanford-OSS
273W-24	24-2713W	200 West	F	Westinghouse Hanford-OSS

Table 1-1. Hanford Site Underground Storage Tanks Listed By Category. (sheet 4 of 5)

<u>Tank identification number</u>	<u>Alias</u>	<u>Location</u>	<u>Category^a</u>	<u>Landlord^b</u>
100N-FS-300	30-100N-UG	100 Area	F	Westinghouse Hanford-SQASD
100N-FS-31	31-100N-D	100 Area	F	Westinghouse Hanford-SQASD
200W-FS-34	34-200-FS-UG	200 West	F	Westinghouse Hanford-SQASD
200W-FS-35	35-200-FS-D	200 West	F	Westinghouse Hanford-SQASD
300-FS-15	15-300	300 Area	G	Westinghouse Hanford-SQASD
300-FS-16	16-300	300 Area	G	Westinghouse Hanford-SQASD
1171-2	2-1171	1100 Area	G	Westinghouse Hanford-OSS
1171-3	3-1171	1100 Area	G	Westinghouse Hanford-OSS
2711E-26		200 East	G	Westinghouse Hanford-OSS
2713E-19	19-2713E	200 East	G	Westinghouse Hanford-OSS
200E-HSF-17	17-200E-HSF	200 East	G	Westinghouse Hanford-SQASD
2721E-HP-18	18-200E-Patrol	200 East	G	Westinghouse Hanford-SQASD
3000-12	12-3000	3000 Area	H	KEH
400-FS-40	4704-S-1	400 Area	H	Westinghouse Hanford-SQASD
400-FS-41	4704-S-1	400 Area	H	Westinghouse Hanford-SQASD

**Table 1-1. Hanford Site Underground Storage Tanks
Listed by Category. (sheet 5 of 5)**

^aKey to Category

Category A	Permanently closed--Remove by December 22, 1989
Category B	Temporarily closed--Activate and upgrade or remove by December 22, 1989
Category C	Tightness test and leak detection by December 22, 1989
Category D	Tightness test and leak detection by December 22, 1990
Category E	Tightness test and leak detection by December 22, 1991
Category F	Tightness test and leak detection by December 22, 1992
Category G	Tightness test and leak detection by December 22, 1993
Category H	Tightness test and leak detection by December 22, 1993

^bKey to Landlord Abbreviations

KEH	Kaiser Engineers Hanford
PNL	Pacific Northwest Laboratory
Westinghouse Hanford	Westinghouse Hanford Company

Westinghouse Hanford Company--Boeing Computer Services

ARD	Advanced Reactor Development Division
CPD	Chemical Processing Division
DRD	Defense Reactor Division
DWM	Defense Waste Management Division
IRM	Information Resource Management, Division 1
OSS	Operations Support Services
RAM	Resource Allocations Management
SQASD	Safety, Quality Assurance, and Security Division

^c These tanks, although place in their respective categories due to their chronological age, are deferred from the leak detection upgrade requirements because they fuel emergency generators.

Table 1-2. Closure or Upgrade Schedules for Underground Storage Tanks.

Schedule for Closure

TYPE OF TANK AND 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 to Action	December 22, 1989 Or 12 Months After Temporary Closure
Category B Temporarily Closed	Operate and Maintain Corrosion Protection Operate and Maintain Release Detection if Not Empty	Immediately
	Cap and Secure All Lines, Pumps, Manways and Ancillary Equipment Leave Vent Lines Open and Functional	March 22, 1989 Or 3 Months After Temporary Closure
	Permanently Close	December 22, 1989 Or 12 Months After Temporary Closure

Schedule For Implementation of Required Upgrades

TYPE OF TANK AND PIPING	LEAK DETECTION	CORROSIVE PROTECTION	SPILL / OVERFILL PREVENTION
New Tanks and Piping*	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	By No Later Than: December 1989 December 1990 December 1991 December 1992 December 1993 December 1993	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 which cannot meet this schedule for upgrade must be closed permanently by the scheduled upgrade deadline date

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Table 1-3. Upgrade Requirements for Active Underground Storage Tanks.

Minimum Requirements For Leak Detection, Corrosion Protection, and Spill and Overfill Prevention

LEAK DETECTION: Implementation of One Method Required		
NEW TANKS	Monthly Monitoring* Monthly Inventory Control and Tank Tightness Testing Every 5 Years For 10 Years After Installation Only	
EXISTING TANKS	Monthly Monitoring Monthly Inventory Control and Annual Tank Tightness Testing Until December 1993 Only Monthly Inventory Control and Tank Tightness Testing Every 5 Years Until December 1998 or For 10 Years After Installation of Corrosion/Spill and Overfill Equipment Only	
NEW AND EXISTING PRESSURIZED PIPING	One Method From Each Set Automatic Flow Restrictor Automatic Shutoff Device Continuous Alarm System	Annual Line Testing Monthly Monitoring* Except Automatic Tank Gauging
NEW AND EXISTING SUCTION PIPING	Monthly Monitoring* Line Testing Every 3 Years No Requirements For Systems Designed to Specific Criteria	
CORROSION PROTECTION: Implementation of One Method Required		
NEW TANKS	Coated and Cathodically Protected Steel Fiberglass Steel Tank Clad With Fiberglass	
EXISTING TANKS	Same Options as For New Tanks Add Cathodic Protection System Interior Lining Interior Lining and Cathodic Protection	
NEW PIPING	Coated and Cathodically Protected Steel Fiberglass	
EXISTING PIPING	Same Options as For New Piping Cathodically Protected Steel	
SPILL / OVERFILL PREVENTION: Implementation of One Method Required		
ALL TANKS	Catchment Basins And	Automatic Shutoff Device or Overfill Alarms or Ball Float Valves
*Monthly Monitoring Includes: Automatic Tank Gauging Vapor Monitoring Interstitial Monitoring		
Groundwater Monitoring Other Approved Methods		

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Table 1-4. List of Underground Storage Tanks at the Hanford Site by Category.

Category A Permanently Closed	Category B Temporarily Closed	Category C 12-22-89	Category D 12-22-90	Category E 12-22-91	Category F 12-22-92	Category G 12-22-93	Category H 12-22-93
500-1 500-2 500-3 3000-5 3000-6 3000-8 3000-9 3000-10 3000-11 313 Methanol TK 311-1 Methanol 311-2 Methanol 130-D-1 130-K-1 130-K-2 703-1	TK-SQ-151 TK-SQ-152 622R	1171-4 1171-5 1171-6 3000-1 3000-2 3000-3 3000-4 382-1 382-2 382-3 2713W-21 2713W-25	182-N-1-DT 182-N-2-DT 182-N-3-DT 6652-C* 2713W-23	3621-D 20-2713E 105-N-LFT 100N-SS-28 100N-SS-27 400-T-24*	1172-8 1172-9 1172-10 2713W-22 2713W-24 222-S 100-B-1 200W-FS-34 200W-FS-35 100N-FS-30 100N-FS-31 11-1172	200E-HSF-17 1171-2 1171-3 2711E-26 2721E-HP-18 2713E-19 300-FS-15 300-FS-16	400-FS-40 400-FS-41 3000-12

*Deferred by regulations from leak detection requirement.

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2.0 CONTRACTOR ROLES AND RESPONSIBILITIES

2.1 WESTINGHOUSE HANFORD COMPANY

Westinghouse Hanford operates 52 of the 65 USTs covered by the regulations. Westinghouse Hanford also operates eight tanks which will fall under the regulations when the State of Washington becomes authorized through implementation of its own program. These tanks contain either ethylene glycol or brine, which are listed as hazardous materials in the State Dangerous Waste Regulations (Washington Administrative Code (WAC 173-303)), but not in the Federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). These eight additional tanks are listed in Table 2-1.

Table 2-1. Tanks to be Regulated as Underground Storage Tanks by the State of Washington.

<u>Tank</u>	<u>Location</u>	<u>Landlord</u>	<u>Contents</u>
165-KE-E	100 Area	Defense Reactor Division (DRD)	
165-KE-W	100 Area	DRD	Ethylene
165-KW-E	100 Area	DRD	Glycol
165-KW-W	100 Area	DRD	
284E-BP-1	200 East	Operations Support Services (OSS)	
284E-BP-2	200 East	OSS	Brine
284W-BP-1	200 West	OSS	
284W-BP-2	200 West	OSS	

It is possible the State of Washington will promulgate regulations that are more restrictive than those of the EPA in particular the current exemptions dealing with fuel oil storage and emergency generators. This action could result in the regulation of more USTs if tank types at the Hanford Site are affected. The Westinghouse Hanford Regulatory Compliance Function will carefully review any regulations promulgated by the State for such impacts and update this plan as necessary.

2.1.1 Funding Provisions

The lead division in Westinghouse Hanford for the compliance effort will be Operations Support Services. They have assumed the authority to:

- o Require funding to perform all tasks associated with compliance
- o Direct the preparation of offsite bids to perform work
- o Coordinate with other contractors
- o Request, as necessary, the U.S. Department of Energy-Richland Operations Office (DOE-RL) to notify the State of changes in tank status
- o Perform work required to comply with the regulations, including the development of line item funding.

The U.S. Department of Energy-Headquarters (DOE-HQ) has mandated that the Hanford Environmental Restoration (ER) Program will provide funding for any regulated UST that was installed prior to November 1988, and which has been declared inactive. All 65 USTs at the Hanford Site fit that description, although only 19 are out-of-service and scheduled for removal before December 22, 1989. The ER Program will provide contingency in the future to remove tanks that fail tightness test and that are declared out-of-service by the operating contractor.

The cost of upgrades and/or replacement of tanks will be borne by the contractor requiring the service.

2.1.2 Planning

Planning for tanks in Category D will occur in July of this year to support finalization of the detailed budget for fiscal year (FY) 1990. Funding this year has been identified by Landlord Program Management for an Engineering Study, Functional Design Criteria (FDC), and Conceptual Design Report, which will result in a Line Item currently proposed for FY 1992 or FY 1993. This project will include actions on any or all USTs in Categories C through H and will meet the 1998 deadline for all active tanks to be closed or meet new-tank standards.

2.1.3 Underground Storage Tank Designation

Rockwell Hanford Operations made the original submittal for Hanford contractors in May 1986. The list at that time, for all contractors, contained 331 tanks. A revision of the list was begun in July 1988 in anticipation of the final rule, and 289 tanks were removed from the list because of exemptions provided in the final rules. Through a process of two complete contractor reviews, plus drawing checks, physical inspections, key personnel interviews, and elimination of duplicates or aliases, 23 new tanks were discovered and added to the revised notification that was forwarded to the Washington Department of Ecology (Ecology) on February 27, 1989.

At this time it is unlikely that any undiscovered USTs exist at the Hanford Site. The status of USTs will continue to change, and a 30 d notice to the implementing agency is required prior to the change in status of any tank. Westinghouse Hanford will continue to provide notification to DOE-RL for transmittal to the State of Washington for all the contractors regarding UST status changes.

2.1.4 Tank Activities by Category

Westinghouse Hanford will take the following actions to comply with the UST regulations. These actions are listed by tank category. Performance is the responsibility of the appropriate landlord listed in Table 1-1. Unless specifically stated otherwise, these actions apply to petroleum USTs.

Category A--Permanently Closed

Petroleum or chemical tanks which are to be permanently closed may be either filled with inert material or removed from the ground. A site assessment and corrective action for leaks and/or spills discovered during closure is required.

Westinghouse Hanford controls 10 of the 16 tanks in this category, and closure must be completed by December 22, 1989. Because of the difficulty of sampling beneath an in-place UST to assure that no leak has occurred and to preclude any future liability, removal of all ten tanks is the preferred option, unless cost or safety issues significantly impact this decision. A written removal plan is required for tanks operated by Westinghouse Hanford. It shall include descriptions depicting the preparation of the tank for removal, tank disposal, specific method of sampling, and spill survey plans. The sample results, when they become available, shall be appended to the plan, and the plan shall be considered a permanent record. Standards for removal and disposal should follow those described by the American Petroleum Institute (API, 1987).

Category B--Temporarily Closed

Westinghouse Hanford operates all three tanks in this category. These tanks must be emptied immediately. All lines must be capped and closed (except for vent lines) by March 22, 1989. Each of these three tanks must be permanently closed by December 22, 1989. If they are reactivated before December 22, 1989, they will meet the standards for new tanks.

Category C--Active Tanks Installed 1965 or Earlier

Westinghouse Hanford operates eight of the 12 tanks in this category. Westinghouse Hanford Company will implement monthly inventory control with annual tank tightness testing. The first tightness test will occur before December 22, 1989.

Category D--Active Tanks 20-25 Years Old

Westinghouse Hanford has four of the five tanks in this category. Leak detection employing monthly inventory control and annual testing will be instituted prior to December 22, 1990. The three 182N-DT tanks will implement an approved monthly monitoring technique by December 22, 1990.

Category E--Active Tanks 15-20 Years Old

Westinghouse Hanford has five tanks in this category. Leak detection employing monthly inventory control and annual testing will be instituted prior to December 22, 1991.

Category F--Active Tanks 10-15 Years Old

Westinghouse Hanford has 12 tanks in this category. Leak detection employing monthly inventory control and annual testing will be instituted prior to December 22, 1992.

Category G and H--Tanks 10 Years Old or Less

Westinghouse Hanford has eight tanks in Category G (5-10 yr) and two tanks in Category H (0-5 yr). Leak detection employing monthly inventory control and annual testing will be installed prior to December 22, 1993.

2.1.5 Piping

All Westinghouse Hanford active USTs which have pressurized piping will meet the leak detection and corrosion protection requirements for new pressurized piping by December 1990. This includes automatic shutoff, automatic flow restrictions, or continuous alarm in the event of a leak. Annual tightness testing or monthly monitoring will be required.

Active tanks, with suction piping which leaves the line full, will meet the requirements for new-suction piping; however, this will be accomplished according to the same schedule as the leak-detection upgrades on the tanks themselves (Section 2.1.4). This upgrade will involve corrosion protection tightness testing every 3 yr or monthly monitoring. The initial tightness test will be performed at the same time the tank meets the leak detection schedule (Section 2.1.4). Suction piping design to have the line empty in the absence of demand is exempt from this requirement.

2.1.6 New-Tank Standards

All Hanford Site tanks operated by Westinghouse Hanford, regardless of age, must meet new-tank standards by December 1998. This includes corrosion protection and spill/overflow prevention. The OSS will prepare an Engineering Study, Functional Design Criteria, and Conceptual Design Report to address the

best way to meet these new-tank standards. In the interim, the legal requirements for USTs will be fully adhered to.

2.1.7 Chemical Underground Storage Tanks

The requirements in Section 2.1.4 through Section 2.1.6 apply specifically to petroleum USTs. For chemical USTs, special upgrade requirements apply. By December 1998, all chemical USTs will feature secondary containment and interstitial monitoring as their primary method of leak detection, and meet standards in the areas of corrosion protection and spill/overflow prevention.

2.2 KAISER ENGINEERS HANFORD

Kaiser Engineers Hanford Company is responsible for 11 tanks that are regulated under the UST regulations. These tanks appear on the Department of Energy UST notification form as tanks 3000-1 through 3000-6 and 3000-8 through 3000-12. Of those 11 tanks, 10 are required to have some sort of remediation or upgrade by December 22, 1989, (all but tank 3000-12). Six of the 10 tanks are permanently out of use and four are currently in use.

Those tanks that are permanently out of use (3000-5, 3000-6, and 3000-8 through 3000-11) will be removed from the ground before December 22, 1989. Kaiser Engineers Hanford will notify the State of Washington through DOE-RL 30 d prior to a change in status of any tank (Tanks 3000-5 and 3000-6 are listed in Category C but are permanently out of service and will be moved to Category A). If it is determined a leak has occurred and damaged the surrounding environment, corrective action will be taken in accordance with regulations under 40 CFR 280, Subpart F.

Before tanks are removed, they will be emptied and cleaned by removing all liquids, dangerous vapor levels, and accumulated sludge. These actions will be performed in accordance with industry standards. Before closure is completed, the soil where contamination (if any) is likely to be present will be sampled for constituents of concern. In selecting sample types, locations, and measurement methods, KEH, or its subcontractor, will consider the method of closure, nature of stored substances, type of backfill, depth to groundwater, and other factors that are appropriate for identifying the presence of a release from the tanks. If contamination is discovered, KEH will begin corrective action.

All records that demonstrate compliance with permanent closure requirements will be maintained for at least 3 yr after completion of permanent closure.

The four tanks currently in use that must be remediated or upgraded by December 22, 1989, are numbered 3000-1 through 3000-4. Those tanks are required to have leak detection installed by that date. The option that KEH has chosen to fulfill the requirement is for monthly inventory control and

annual tank tightness testing. Monthly inventory control is currently in place.

2.3 PACIFIC NORTHWEST LABORATORY

Pacific Northwest Laboratory plans to comply with UST regulation for tanks 622R and 6652-C as follows.

662R (Category B)

Tank 622R and its piping will comply with permanent closure requirements as outlined in 40 CFR 280, Subpart G, Out-of-Service UST Systems and Closure.

6652-C (Category D)

Tank 6652-C and its piping will comply with all requirements within their time periods required by 40 CFR 280 and any appropriate Ecology regulations. This includes spill and overfill protection, corrosion protection, recordkeeping, and any notification requirements that may become applicable. Since the tank stores unleaded gasoline solely for the use of an emergency generator, it is deferred from Subpart D release detection requirements and thus, is not required to add release detection by December 22, 1990. If the tank is eventually closed, it will comply with 40 CFR 280 and any other relevant closure requirements.

Pacific Northwest Laboratory will notify the State through DOE-RL of any change in tank status 45 d prior to actually initiating the change. Westinghouse Hanford will be notified of any change in status of tanks operated by PNL.

3.0 COST ESTIMATES

Kaiser Engineers Hanford has provided cost estimates to assist in FY 1989 planning for tank removal and tightness testing. These cost estimates are listed in detail in Appendix B. Their fully burdened estimate based on the removal and testing of only one tank at a time is \$20,000 for removal and \$1,000 for testing. By combining removal of all the tanks, a savings of at least 30% can be realized. Competitive bidding should result in even greater savings. It should be emphasized that these estimates support midyear planning adjustments only. Fiscal years 1989 and 1990 removal costs will be borne by the Hanford Environmental Restoration Program.

Testing for these tanks is an annual requirement and new tank standards must be met by 1998. An FDC to support a 1992 line item are under development, and a Conceptual Design Report will be issued this year. All active tanks will meet new-tank requirements through the line item by FY 1995

(for estimating purposes). It is assumed that testing will not reveal any leaking tanks and that all tanks will require testing through FY 1995. The total testing cost by category through 1995 is as follows:

Category C	\$ 84,000
Category D	\$ 24,000
Category E	\$ 25,000
Category F	\$ 48,000
Category G	\$ 24,000
Category H	\$ 9,000
Total	\$214,000 Testing Cost Through 1995

The total cost of removal is born in FY 1989. The breakdown is as follows:

\$120,000	Kaiser Engineers Hanford
\$ 20,000	Pacific Northwest Laboratory
<u>\$240,000</u>	Westinghouse Hanford Company
\$380,000	Total

Annual expenditures will accrue as follows. Costs for piping upgrades are not included. However, since these are not required until FY 1990 at the earliest, costs for this work can be considered in the normal planning cycle.

	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95
Removal	\$380,000	--	--	--	--	--	--
Testing	<u>12,000</u>	\$16,000	\$21,000	\$33,000	\$44,000	\$44,000	\$44,000
Total	\$392,000						

Tanks tested and found to be leaking will be emptied, removed, and the area cleaned. The cost of remediation is not included. The cost of the line item is also not included. Its cost should be available in early FY 1990.

4.0 LEAKS AND SPILLS

The EPA estimates that nationwide as many as 25 percent of the five million USTs currently operating in the country are leaking. Even if a much lower failure rate at the Hanford Site is assumed because of low soil moisture and corrosivity, removal, testing, and upgrade of USTs may reveal a significant leakage problem at one or more tank sites.

The first years of testing and tank removal involve tanks with the greatest chronological age. The likelihood of leakage is greatest in these tanks, and consequently, the need to fund remediation as a contingency will be greatest now and in the future. It is recommended that the possibility be taken into account during the planning cycles. It should be assumed that the cost of remediation, if required at any out-of-service UST, will be borne by the ER program.

If a leak is found, remediation is not tied to the December 22 compliance date. Prompt cleanup is assumed, and there are several actions which must be taken by the contractors to comply with the law, regardless of the extent of the environmental damage or the pace of the cleanup. These actions include the following.

- o For active tanks, take immediate actions to stop and contain the leak or spill.
- o Each contractor must notify the regulatory authority within 24 h. Operational Westinghouse Hanford organizations should also notify the Environmental Division via an Event Fact Sheet.
- o Report progress of cleanup to the regulatory authority within 20 d after cleanup commences. Do this through the Department of Energy via the Regulatory Compliance Function.
- o If significant environmental damage has occurred, a site investigation must be undertaken and a corrective action plan prepared. The results of this complete investigation must be presented to the regulatory authority within 45 d of the discovery.
- o Long-term actions will involve compliance with requirements established for the site by the regulatory authority. Corrective action plans developed for the cleanup must be approved by the regulatory authority.

Additional information on extensive cleanup can be obtained from the publication "Cleanup of Releases from Petroleum USTs, Selected Technologies" Stock No. 055-000-00272-0, available from the U.S. Government Printing Office, Washington, D. C.

5.0 REFERENCES

- EPA, 1988a, "Underground Storage Tanks; Technical Requirements" Final Rule, Federal Register, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1988b, "Musts for USTs. A Summary of the New Regulations for Underground Storage Tank Systems," U.S. Environmental Protection Agency, Washington, D.C.
- American Petroleum Institute (API), "Removal and Disposal of Underground Storage Tanks, API Recommended Practice 1604. Marketing Department, Second Edition, December 1987.

APPENDIX A
SUMMARY OF PROVISIONS
HAZARDOUS AND SOLID WASTE AMENDMENTS
OF 1984 SUBTITLE I

1.0 INTRODUCTION

The Hazardous and Solid Waste Amendments of 1984 extend and strengthen the provisions of the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (RCRA). Subtitle I of RCRA, as amended, provides for the development and implementation of a comprehensive regulatory program for underground storage tank (UST) systems containing regulated substances and unplanned releases of these substances to the environment. This appendix describes the provision of this regulation.

2.0 OVERVIEW

The UST regulations final ruling, promulgated September 22, 1988, outlines technical and operating standards for UST systems containing regulated substances, including product materials defined as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and petroleum products.

Until the promulgation of the final ruling, an interim prohibition was established that restricted installation of UST systems after May 8, 1986. Any system installed under the interim prohibition is required to be protected from corrosion, prevent releases due to corrosion or structural failure for the operational life of the tank, and be constructed of material compatible with the substance to be stored.

The UST regulations are organized into five major sections. The first section outlines performance standards for new UST systems, including requirements for corrosion protection, spill and overfill prevention equipment, installation, and notification.

The second section addresses the upgrading of existing active UST systems. Cathodic protection, interior linings, piping, and spill and overfill prevention equipment must be upgraded by December 22, 1998, to meet the performance standards for new UST systems.

The third major section, contained in Subparts C and D, describes general operating requirements for UST systems. Spill and overfill control, operation and maintenance of corrosion protection, compatibility, repair, reporting and recordkeeping requirements are addressed in Subpart C. Subpart D contains

detailed requirements for release detection systems, including a list of acceptable options in release detection methods.

Subparts E and F constitute the fourth major section of concern. Requirements for release reporting, investigation, confirmation, and corrective action are listed in these sections.

The fifth and final major section deals with requirements for out-of-service UST systems and closure. Permanent closure, temporary closure, and changes in service are addressed.

3.0 PROGRAM SCOPE AND NOTIFICATION

The term Underground Storage Tank or UST is defined to include any one or combination of tanks (including underground pipes connected thereto) that is used to contain an accumulation of regulated substances, and the volume of which (including the volume of underground pipes connected thereto) is 10% or more beneath the surface of the ground. The following systems are either not considered USTs or are specifically excluded by the regulation:

1. Farm or residential tank of 1,100 gal or less capacity used for storing motor fuel for noncommercial purposes
2. Tanks used for storing heating oil for consumptive use on the premises where stored
3. Septic tank
4. Pipeline facility (including gathering lines) regulated under
 - a. The Natural Gas Pipeline Safety Act of 1968 or
 - b. The Hazardous Liquid Pipeline Safety Act of 1979 or
 - c. Which is an intrastate pipeline facility regulated under State laws comparable to the provisions of the law referred to in paragraph (1)(a) or (1)(b) of this definition
5. Surface impoundment, pit, pond, or lagoon
6. Storm water or wastewater collection system
7. Flow-through process tank
8. Liquid trap or associated gathering lines directly related to oil or gas production and gathering operations or

9. Storage tank situated in an underground area (such as a basement, cellar, mineworking, drift, shaft, or tunnel) if the storage tank is situated on or above the surface of the floor
10. Any UST system holding hazardous wastes listed or identified under Subtitle C of the Solid Waste Disposal Act, or a mixture of such hazardous waste and any other regulated substance
11. Any wastewater treatment tank system that is part of a wastewater treatment facility regulated under Section 402 or 307(b) of the Clean Water Act
12. Equipment or machinery that contains regulated substances for operational purposes such as hydraulic lift tanks and electrical equipment tanks
13. Any private or commercial underground tank system whose capacity is 110 gal or less
14. Any underground tank system that contains a de minimis (below minimum standard) concentration of regulated substances
15. Any emergency spill or overflow containment underground tank or system that is expeditiously emptied after use.

These systems are deferred under the following subparts. Subpart B, Design, Construction, Installation, and Notification; Subpart C, General Operating Requirements; Subpart D, Release Detection; Subpart E, Release Reporting, Investigation, and Confirmation; and Subpart G, Out of Service UST Systems and Closure, are deferred for the following types of UST systems:

16. Wastewater treatment tank systems
17. Any UST systems containing radioactive material that are regulated under the Atomic Energy Act of 1954 (42 USC 2011 and following)
18. Any UST system that is part of an emergency generator system at nuclear power generation facilities regulated by the Nuclear Regulatory Commission under 10 CFR 50 Appendix A
19. Airport hydrant fuel distribution systems
20. UST systems with field-constructed tanks.

Subpart D, Release Detection, is deferred until FY 1998 for any UST system that stores fuel solely for use by emergency power generators.

Any owner who brings an underground storage tank system into use after May 8, 1986, is given 30 d from the date the system is put in use to submit a notice of existence of the tank system to the State or local agency

or department designated. This notification must be provided on either the Federally mandated form provided in the legislation, or a State form if required by State law, regulations, or procedure, provided that the State form meets Federal requirements. Notification for several tanks may be provided on one notification form, but notification for tanks located at more than one place of operation must be filed on separate forms. All the required information must be completed for each tank reported.

All owners and operators of new UST systems must certify on the notification form. The owner and operator must also ensure that the tank system installer certifies in the notification form that the methods used to install the tank and piping comply with installation requirements.

Beginning October 24, 1988, any person who sells a tank intended to be used as an UST must notify the purchaser of such tank of the owner's notification obligations.

4.0 INTERIM PROHIBITION

An interim prohibition section was included in the proposed rulings to provide control over installation of UST systems during the period of time prior to promulgation of the regulations. This prohibition states that no person may install a UST system for the purpose of storing regulated substances unless the UST system (whether of single- or double-wall construction) meets the following conditions:

- o Will prevent releases due to corrosion or structural failure for the operational life of the UST system
- o Is cathodically protected against corrosion, constructed of non-corrodible material, steel clad with a non-corrodible material, or designed in a manner to prevent the release or threatened release of any stored substance
- o Is constructed or lined with material that is compatible with the stored substance.

A UST system without corrosion protection may be installed at a site which has been determined by a corrosion expert to be sufficiently non-corrosive to prevent releases due to corrosion throughout the operating life of the system. Documentation of this assessment of corrosivity must be maintained by the owner and operator for the life of the tank.

5.0 PERFORMANCE STANDARDS FOR NEW UNDERGROUND STORAGE TANK SYSTEMS

5.1 INSTALLATION

All tanks and piping must be properly installed in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory and in accordance with the manufacturer's instructions.

All owners and operators must ensure that one or more of the following methods of certification, testing, or inspection is used to provide a certification of compliance on the UST notification form:

- o The installer has been certified by the tank and piping manufacturers; or
- o The installer has been certified or licensed by the implementing agency; or
- o The installation has been inspected and certified by a registered professional engineer with education and experience in UST system installation; or
- o The installation has been inspected and approved by the implementing agency; or
- o All work listed in the manufacturer's installation checklists has been completed; or
- o The owner and operator have complied with another method for ensuring compliance that is determined by the implementing agency to be no less protective of human health and the environment.

5.2 CORROSION PROTECTION

Any portion of the system underground that routinely contains product must be protected from corrosion in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory. Cathodic protection is not required for tanks constructed of fiberglass-reinforced plastic or a metal-fiberglass-reinforced-plastic composite or for tanks installed at a site which has been determined by a corrosion expert to be sufficiently noncorrosive to prevent releases due to corrosion for the life of the system. In the latter case records must be maintained by the owner and operator documenting this assessment of corrosivity throughout the remaining life of the tank.

For all other tanks, cathodic protection is required. Protection for steel tanks may be provided as follows:

- o The tank may be coated with a suitable dielectric material
- o Field-installed cathodic protection systems must be designed by a corrosion expert
- o Impressed current systems must be designed to allow determination of current operating status
- o Cathodic protection systems must be operated and maintained in accordance with regulatory guidelines.

Corrosion protection must also be provided for piping that routinely contains regulated substances and is in contact with the ground in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory. Standards for piping are identical to the above standards for tank systems.

5.3 SPILL AND OVERFILL PREVENTION

Equipment must be provided to prevent spilling and overfilling associated with product transfer to the UST system. Standards for spill and overfill equipment are as follows:

- o Spill prevention equipment must prevent the release of the product to the environment when the transfer hose is detached from the fill pipe (for example, a spill catchment basin)
- o Overfill protection equipment must automatically shut off flow into the tank when the tank is no more than 95% full or alert the transfer operator when the tank is no more than 90% full by restricting the flow into the tank or triggering a high-level alarm.

Spill and overfill prevention equipment as specified is not required if alternative equipment is used that is determined by the implementing agency to be no less protective of human health and the environment than the equipment specified above, or if the UST system is filled by transfers of no more than 25 gal at one time.

6.0 UPGRADE OF EXISTING UNDERGROUND STORAGE TANK SYSTEMS

6.1 GENERAL

No later than December 22, 1998, all existing UST systems must comply with either the standards as set for new UST system performance, standards for system upgrade as defined below, or requirements for closure, site assessment, and corrective action as required.

6.2 INTERIOR LINING

Steel tanks may be upgraded by installation of interior lining or cathodic protection, according to a code of practice developed by a nationally recognized association or independent testing laboratory. Tank linings must be properly installed according to regulatory requirements, and the lined tank must be internally inspected for structural soundness and lining performance within 10 yr after lining and every 5 yr thereafter.

6.3 CATHODIC PROTECTION

Steel tanks may also be upgraded by cathodic protection. The cathodic protection system must meet regulatory requirements, and the integrity of the tank must be ensured prior to system installation. Tank integrity may be ensured by internal inspection for tanks greater than 10 yr old. For tanks less than 10 yr old, integrity may be assumed on the basis of monthly release monitoring over the life of the tank or determined through tightness testing, conducted both prior to installation of the cathodic protection system and between 3 and 6 mo following the system installation. Another method of corrosion-hole detection may be used if the method is determined by the implementing agency to be no less protective of human health and the environment than the methods specified.

A tank may be upgraded by both internal lining and cathodic protection by compliance with all the criteria outlined for both upgrades. A tank so upgraded is exempt from periodic internal inspections.

6.4 PROTECTION OF PIPING

Metal piping that routinely contains regulated substances and is in contact with the ground must be cathodically protected in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory. Cathodic protection systems for piping must meet the regulatory requirements outlined here for cathodic protection of tank systems.

6.5 SPILL AND OVERFILL PROTECTION

To prevent spilling and overfilling associated with product transfer, all existing UST systems must be upgraded to comply with spill and overfill prevention equipment requirements as specified for new UST systems.

7.0 GENERAL OPERATING REQUIREMENTS

7.1 RELEASE PREVENTION

The owner and operator must prevent releases in product transfer. The volume available in the tank must be ascertained to be greater than the volume of product to be transferred to the tank before the transfer is made. Each transfer operation must be monitored constantly to prevent overfilling and spilling.

Any spills and overfills must be reported, investigated, and corrective action taken in accordance with regulatory requirements.

7.2 CORROSION PROTECTION

Corrosion protection systems for steel tank systems must be operated and maintained to ensure that releases due to corrosion are prevented for as long as the UST system is used to store regulated substances. Corrosion protection must be continuously provided to the metal components of that portion of the tank and piping that routinely contain regulated substances and are in contact with the ground.

Cathodic protection systems must be inspected for proper operation by a qualified cathodic protection tester. All systems must be tested within 6 mo of installation and at least every 3 yr thereafter. Criteria used to determine the adequacy of cathodic protection must be set in accordance with a code of practice developed by a nationally recognized association. Impressed current cathodic protection systems must also be inspected every 60 d to ensure the equipment is running properly.

Records of the operation of cathodic protection must be maintained to demonstrate compliance with the performance standards specified above. These records must provide the results of the last three annual inspections and the last two 60-d inspections if required.

7.3 COMPATIBILITY

Tanks and piping must be lined with materials that are compatible with the substance stored in the system.

7.4 REPAIR OF TANK SYSTEMS

Repairs must be sufficient to prevent releases due to structural failure or corrosion for as long as the system is used to store regulated substances. All repairs must be properly conducted in accordance with a code of practice developed by a nationally recognized association or an independent testing laboratory.

Repairs to fiberglass-reinforced plastic tanks may be made by the manufacturer's authorized representatives. Metal pipe sections and fittings which have released product as a result of corrosion or other damage must be replaced. Fiberglass pipes and fittings may be repaired in accordance with the manufacturer's specifications.

Repaired tanks and piping must be tightness tested within 30 d following the date of the completion of the repair. Tightness testing must be conducted in accordance with regulatory requirements. Tightness testing is not required if an internal inspection is conducted or if the repaired portion of the system is monitored monthly for releases using a Federal or State approved method.

Within 6 mo following the repair of any cathodically protected system, cathodic protection must be tested to ensure proper operation.

Records of each repair must be maintained for the remaining operating life of the UST system to demonstrate compliance with these regulatory requirements.

7.5 INSPECTION AND MAINTENANCE OF RECORDS FOR TANK SYSTEMS

Inspections, monitoring and testing conducted by the implementing agency, as well as requests for document submission, testing, and monitoring by the owner or operator, must be met with full cooperation. Notification must be provided for all UST systems, including certification of proper installation for new systems. Reports must be filed for all releases including suspected releases, spills and overfills, and confirmed releases. In the case of a release, a write-up of corrective actions planned or taken including initial abatement measures, initial site characterization, free product removal, investigation of soil and groundwater cleanup, and a corrective action plan must be provided to the implementing agencies. A notification must also be provided prior to permanent closure or change-in-service of a system.

Owners and operators must maintain on file a corrosion expert's analysis of site corrosion potential when corrosion protection equipment is not used. Documentation of the following must also be maintained: operation of corrosion protection equipment, repairs to UST systems, recent compliance with release detection requirements, and results of the site investigation conducted at permanent closure. Records must be maintained at the UST site either immediately available for inspection by the implementing agency or at a readily available alternative site to be provided to the implementing agency upon request.

8.0 RELEASE DETECTION

8.1 GENERAL REQUIREMENTS

Owners and operators of new and existing UST systems must provide release detection that is capable of detection of a release from any portion of the tank and connected underground piping which routinely contains product. Release detection systems must be installed, calibrated, operated, and maintained in accordance with the manufacturer's instructions, including routine maintenance and service checks for operability or running condition. All systems must meet regulatory requirements for performance, and any performance claims and their manner of determination must be described in writing by the equipment manufacturer or installer. In addition, methods used after December 22, 1990, (excepting methods permanently installed prior to that date) must be capable of detecting the leak rate or quantity as regulated for that method with a probability of detection of 0.95 and a probability of false alarm of 0.05.

When a release detection method operated in accordance with regulated performance standards indicates that a release may have occurred, owners and operators must provide notification to the implementing agency as required.

All UST systems must be in compliance with these release detection requirements by December 22 as follows:

- o 1989 for systems installed before 1965 or for systems for which the installation date is unknown
- o 1990 for systems installed between 1965 and 1969, and for all systems with pressurized piping
- o 1991 for systems installed between 1970 and 1974
- o 1992 for systems installed between 1975 and 1979
- o 1993 for systems installed between 1980 and 1988.

Where a method of release detection in compliance with these requirements cannot be implemented, closure procedures must be completed by the date on which release detection would be required for that tank system.

8.2 PETROLEUM STORAGE TANKS

Petroleum UST systems must be monitored at least every 30 d for releases using a method approved for hazardous substance UST systems. Tank systems that meet legislated performance standards and monthly inventory control requirements for new UST systems may satisfy release detection requirements by the use of tank tightness testing at least every 5 yr until December 22, 1998. After this date the tank must be upgraded according to a release detection method as listed for hazardous material UST systems, it

must be or permanently closed. Tanks with a capacity of 550 gal or less may satisfy the release detection requirement through the use of weekly tank gauging.

Underground piping that routinely contains regulated substances must be monitored for releases. Underground piping that conveys regulated substances under pressure must be equipped with an automatic line-leak detector and have an annual line tightness test or monthly monitoring conducted in accordance with regulatory requirements. Underground piping that conveys regulated substances under suction must have either a line tightness test conducted at least every 3 yr or use a monthly monitoring method conducted in accordance with regulatory requirements. No release detection is required for suction piping that meets the following conditions:

- o Is designed and constructed to operate at less than atmospheric pressure
- o Is sloped so that the contents of the pipe will drain back into the storage tank if the suction is released
- o Includes only one check valve each suction line which is located directly below and as close as practical to the suction pump, provided that a method exists that allows compliance to be readily determined.

8.3 HAZARDOUS SUBSTANCES

Release detection for UST systems containing hazardous substance must meet requirements as outlined for petroleum UST systems. By December 22, 1998, all existing hazardous substance UST systems must be in compliance with release detection requirements for new systems described below.

Release detection for new hazardous substance UST systems must have secondary containment systems designed, constructed, and installed to contain regulated substances released from the tank system until they are detected and removed. To prevent the release of regulated substances to the environment at any time during the operational life of the UST system. Secondary containment systems must be checked for evidence of a release at least every 30 d.

Double-walled tanks must be designed, constructed, and installed to contain a release from any portion of the inner tank within the outer wall and to detect the failure of the inner wall.

External liners (including vaults) must be designed, constructed, and installed to contain 100% of the capacity of the largest tank within the liner boundary, prevent the interference of precipitation or groundwater intrusion with the ability to contain or detect a release of regulated substances, and be capable of preventing lateral as well as vertical migration of regulated substances.

Underground piping must be equipped with secondary containment that satisfies the requirements for tank containment systems. In addition, underground piping that conveys regulated substances under pressure must be equipped with an automatic line-leak detector.

Other methods of release detection may be used if owners and operators can demonstrate to the implementing agency that an alternative method can detect a release of the stored substance as effectively as any of the methods allowed for petroleum tank systems. Information must also be provided to the implementing agency on effective corrective action technologies, health risks, chemical and physical properties of the stored substance and the characteristics of the UST site. Approval from the implementing agency must be obtained prior to installation and operation of the new UST system.

Facilities will be informed of the requirements for new systems and required to meet these requirements in the design, installation, and operation of new systems.

8.4 METHODS OF RELEASE DETECTION

8.4.1 Inventory Control

Product inventory control (or another test of equivalent performance) must be conducted monthly. Detection capability must be at least one percent of flow-through plus 130 gal on a monthly basis. Inventory volume measurements for regulated substance inputs, withdrawals, and the amount still remaining in the tank must be recorded each operating day. Equipment used must be capable of measuring the level of product over the full range of the tank's height to the nearest one-eighth of an inch. The regulated substance inputs must be reconciled with delivery receipts by measurement of the tank inventory volume before and after delivery. Deliveries must be made through a drop tube that extends to within 1 ft of the tank bottom. Product dispensing must be metered and recorded within the local standards for meter calibration or an accuracy of 6 in³ for every 5 gal of product withdrawn. The measurement of any water level in the bottom of the tank must be made to the nearest one-eighth of an inch at least once a month.

8.4.2 Manual Tank Gauging

Manual tank gauging must be conducted as follows. The tank liquid level measurements must be taken at the beginning and ending of a period of at least 36 h during which no liquid is added to or removed from the tank. Level measurements must be based on an average of two consecutive stick readings at both the beginning and ending of the period. The equipment used must be capable of measuring the level of product over the full range of the tank's height to the nearest one-eighth of an inch. A leak must be suspected if the variation between beginning and ending measurements exceeds the weekly or monthly standards. For a nominal tank capacity of 550 gal or less a weekly standard of 10 gal must be used (one test) and 5 gal for a monthly standard

(average of four tests). For a nominal tank capacity of 551 to 1,000 gal, 13 gal must be used for a weekly standard and 7 gal for a monthly standard. For a nominal tank capacity of 1,001 to 2,000 gal, 26 gal must be used for a weekly standard and 13 gal for a monthly standard. Only tanks of 550 gal or less nominal capacity may use this as the sole method of release detection. Tanks of 550 to 2,000 gal may use this method in place of manual inventory control. Tanks of greater than 2,000 gal nominal capacity may not use this method to meet these requirements.

8.4.3 Tank Tightness Testing

Tank tightness testing must be capable of detecting a 0.1 gal/h leak rate from any portion of the tank that routinely contains product while accounting for the effects of thermal expansion or contraction of the product, vapor pockets, tank deformation, evaporation or condensation, and the location of the water table.

Equipment for automatic tank gauging that tests for the loss of product and conducts inventory control must have a detection capability of 0.2 gal/h leak rate from any portion of the tank that routinely contains product. Inventory control must be conducted in accordance with the requirements for inventory control as outlined above.

8.4.4 Vapor Monitoring

Testing or monitoring for vapors within the soil gas of the excavation zone may be used provided that the materials used as backfill are sufficiently porous to readily allow diffusion of vapors from releases into the excavation area. The stored regulated substance, or a tracer compound placed in the tank system, must be sufficiently volatile to result in a vapor level that is detectable by the monitoring devices located in the excavation zone in the event of a release from the tank. The measurement of vapors by the monitoring device must not be rendered inoperative by the groundwater rainfall, soil moisture, or other known interferences so that a release could go undetected for more than 30 d. The level of background contamination in the excavation zone must not interfere with the method used to detect releases from the tank. The vapor monitors must be designed and operated to detect any significant increase in concentration above background of the regulated substance stored in the tank system, a component or components of that substance, or a tracer compound placed in the tank system. In the UST excavation zone, the site must be assessed to establish the number and position of monitoring wells that will detect releases within the excavation zone from any portion of the tank that routinely contains product. Monitoring wells must be clearly marked and secured to avoid unauthorized access and tampering.

8.4.5 Groundwater Monitoring

For groundwater monitoring to be a valid method of release detection, the substance stored in the UST system must be immiscible with water and have a specific gravity of less than one. The groundwater must never be more than 20 ft from the ground surface and the hydraulic conductivity of the soils between the UST system and the monitoring wells must not be less than 0.01 cm/sec. The soils should consist of gravel, coarse to medium sand, coarse silts, or other permeable materials.

The slotted portion of the monitoring well casing must be designed to prevent migration of natural soils or filter pack into the well and to allow entry of regulated substance on the water table into the well under both high and low groundwater conditions. Monitoring wells shall be sealed from the ground surface to the top of the filter pack. Wells shall intercept the excavation zone or be placed as close to the zone as is technically feasible. Continuous monitoring devices used must have a detection capability of at least one-eighth of an inch of free product on top of the groundwater in the wells.

Within and immediately below the UST system excavation zone, the site must be assessed to ensure the validity of the use of this method and to establish the number and positioning of monitoring wells that will detect releases from any portion of the tank that routinely contains product.

Monitoring wells must be clearly marked and secured to avoid unauthorized access and tampering.

8.4.6 Interstitial Monitoring

Interstitial monitoring between the UST system and a secondary barrier immediately around or beneath it may be used but only if the system is designed, constructed, and installed to detect a leak from any portion of the tank that routinely contains product.

For double-walled UST systems, the sampling or testing method must be capable of detecting a release through the inner wall in any portion of the tank that routinely contains product.

For UST systems with a secondary barrier within the excavation zone, the sampling or testing method used must be capable of detecting a release between the UST system and the secondary barrier. The secondary barrier around or beneath the UST system must consist of artificially constructed material that is sufficiently thick and impermeable (at least $10E-06$ cm/sec for the regulated substance stored) to direct a release to the monitoring point and permit its detection. The barrier must be compatible with the regulated substance stored so that a release from the UST system will not cause a deterioration of the barrier allowing a release to pass through undetected.

For cathodically protected tanks, the secondary barrier must be installed so that it does not interfere with the proper operation of the cathodic

protection system. The groundwater, soil moisture, or rainfall must not render the testing or sampling method used inoperative so that a release could go undetected for more than 30 d. The site must be assessed to ensure that the secondary barrier is always above the groundwater and not in a 25-year flood plain, unless the barrier and monitoring designs are for use under such conditions. Monitoring wells must be clearly marked and secured to avoid unauthorized access and tampering.

For tanks with an internally fitted liner, an automated device must be capable of detecting a release between the inner wall of the tank and the liner, and the liner must be compatible with the substance stored.

8.4.7 Other Methods

Any other type of release detection method, or combination of methods, can be used if it has detection capability of 0.2-gal/h leak rate or a release of 150 gal within a month with a probability of detection of 0.95 and a probability of false alarm of 0.5. The implementing agency may approve another method if the owner and operator can demonstrate that the method can detect a release as effectively as any of the methods described above. In comparing methods, the implementing agency shall consider the size of release that the method can detect and the frequency and reliability with which it can be detected. If the method is approved, the owner and operator must comply with any conditions imposed by the implementing agency on its use to ensure the protection of human health and the environment.

8.5 METHODS OF RELEASE DETECTION FOR PIPING

Pressure piping used for product delivery on regulated tanks must be upgraded to current standards by December 1990. This includes cathodic protection and leak detection. Suction piping upgrades may or may not be required, depending on the placement of the backflow preventer. If the backflow preventer allows the liquid to drain from the pipe to the tank, no additional upgrades are required by the regulations. If the placement of the backflow preventer leaves the piping full at all time, then the upgrades described below are required. The installation schedule is the same as for the tanks themselves.

Release detection methods for piping which alert the operator to the presence of a leak by restricting or shutting off the flow of regulated substances through piping or triggering an audible or visual alarm may be used only if the detection capability of the method is at least 3 gal/h at 10 lbf/in² line pressure within 1 h. An annual test of the operation of the leak detector must be conducted in accordance with the manufacturer's requirements.

Periodic piping testing may be conducted only with a detection capability of 0.1 gal/h leak rate at one and one-half times the operating pressure.

Any of the methods as outlined for release detection for tank systems may be used if they are designed to detect a release from any portion of the underground piping that routinely contains regulated substances.

8.6 RELEASE DETECTION RECORDKEEPING

All written performance claims pertaining to any release detection system used and the manner in which these claims have been justified or tested by the equipment manufacturer or installer, must be maintained for 5 yr from the date of installation. The results of any sampling, testing, or monitoring must be maintained for at least 1 yr, except that the results of tank tightness testing must be retained until the next test is conducted. Written documentation of all calibration, maintenance, and repair of release detection equipment permanently located onsite must be maintained for at least 1 yr after servicing work is completed. Any schedules of required calibration and maintenance provided by the release detection equipment manufacturer must be retained for 5 yr from the date of installation.

9.0 RELEASE REPORTING, INVESTIGATION, AND CONFIRMATION

9.1 Reporting Requirements

Reporting a release or suspected release must take place within 24 h. The following constitute reportable situations:

- o The discovery by owners and operators or others of released regulated substances at the UST site or in the surrounding area (such as the presence of free product or vapors in soils, basements, sewer and utility lines, and nearby surface water)
- o Unusual operating conditions observed by owners and operators (such as the erratic behavior of product dispensing equipment, the sudden loss of product from the UST system, or an unexplained presence of water in the tank), unless system equipment is found to be defective but not leaking, and is immediately repaired or replaced
- o Monitoring results that indicate a release may have occurred, unless the monitoring device is found to be defective. Additional monitoring must confirm that no release has occurred. If inventory control is the method of release detection chosen, a second month of data must confirm the leak.

When required by the implementing agency, owners and operators of UST systems must determine if the UST system is the source of offsite impacts. These impacts include the discovery of regulated substances (such as the presence of free product or vapors in soils, basements, sewer and utility lines, and nearby surface and drinking waters) that has been observed by the agency or brought to its attention by another party.

Unless corrective action is initiated, owners and operators must immediately investigate and confirm all suspected releases of regulated substances requiring reporting within 7 d. Tests must be conducted to determine whether a leak exists in that portion of the tank that routinely contains product, or the attached delivery piping, or both. If the test results for the system, tank, or delivery piping indicate that a leak exists the system must be repaired, replaced or upgraded, and corrective action must be implemented as required.

Further investigation is not required if the test results for the system, tank, and delivery piping do not indicate that a leak exists and if environmental contamination is not the basis for suspecting a release. A site check must be conducted if the test results for the system, tank, and delivery piping do not indicate that a leak exists but environmental contamination is the basis for suspecting a release. Measurements for the presence of contamination must be taken at the location most likely to be contaminated at the UST site. In selecting sample types, sample locations, and measurement methods, the nature of the stored substance, the type of initial alarm or cause for suspicion, the type of backfill, the depth of ground water, and other factors appropriate for identifying the presence and source of the release must be considered.

If the test results for the excavation zone or the UST site indicate that a release has occurred, corrective action must be implemented. If the test results for the excavation zone or the UST site do not indicate that a release has occurred, further investigation is not required.

A spill or overfill must be contained and immediately cleaned up and reported to the implementing agency within 24 h. Corrective action must be implemented within the same 24-h time period. The following spills and overfills are reportable:

- o Spills or overfills of petroleum that result in a release to the environment that exceeds 25 gal or that cause a sheen on nearby surface water.
- o Spills or overfills of a hazardous substance that result in a release to the environment that equals or exceeds the reportable quantity under CERCLA (40 CFR 302).

A spill or overfill of petroleum that is less than 25 gal or of hazardous substance that is less than the reportable quantity must be immediately contained and cleaned up. If cleanup cannot be accomplished within 24 h, the implementing agency must be notified immediately. A release of a hazardous substance equal to or in excess of its reportable quantity must also be reported immediately (rather than within 24 h) to the National

Response Center under sections 102 and 103 of CERCLA, and to the appropriate State and local authorities under Title III of SARA.

9.2 RELEASE RESPONSE AND CORRECTIVE ACTION

9.2.1 Initial Response and Abatement Measures

Upon confirmation of a release, a report must be made to the implementing agency within 24 h. Immediate action must be taken to prevent any further release of the regulated substance into the environment to identify and mitigate fire, explosion, and vapor hazards.

Unless otherwise directed by the implementing agency, as much of the regulated substance as necessary to prevent further release to the environment must be removed from the UST system. Any above-ground releases or exposed below-ground releases must be visually inspected and further migration of the released substance into surrounding soils and ground water must be prevented. Monitoring and mitigation of any additional fire and safety hazards posed by vapors or free product that have migrated from the UST excavation zone and entered into subsurface structures (such as sewers or basements) must be continued. Hazards posed by contaminated soils that are excavated or exposed as a result of release confirmation, site investigation, abatement, or corrective action activities must be remedied. If these remedies include treatment or disposal of soils, applicable State and local requirements must be complied with. The presence of a release must be measured at the location where contamination is most likely to be present at the UST site, unless the presence and source of the release have been confirmed by conducting a site check or closure site assessment as required. In selecting sample types, sample locations, and measurement methods, the nature of the stored substance, the type of backfill, depth to groundwater and other factors as appropriate for identifying the presence and source of the release must be considered. An investigation must be carried out to determine the possible presence of free product, and free product removal must be started as soon as practicable.

Within 20 d after release confirmation, a report must be submitted to the implementing agency summarizing the initial abatement steps taken and any resulting information or data.

9.2.2 Initial Site Characterization

Unless otherwise directed by the implementing agency, information about the site and the nature of the release must be assembled, including information gained while confirming the release or completing the initial abatement measures. This information must include data on the nature and estimated quantity of release; data from available sources and/or site investigations concerning the surrounding populations, water quality, use and approximate locations of wells potentially affected by the release, subsurface soil conditions, locations of subsurface sewers, climatological conditions, and land use; results of the site check as required; and results

of the free product investigations as required to determine whether free product must be recovered.

Within 45 d of release confirmation the information collected must be submitted to the implementing agency in a manner that demonstrates its applicability and technical adequacy, or in a format and according to the schedule required by the implementing agency.

9.3 FREE PRODUCT REMOVAL

At sites where investigations indicate the presence of free product, free product must be removed to the maximum extent practicable as determined by the implementing agency while continuing, as necessary, any abatement actions initiated. Free product removal must be conducted in a manner that minimizes the spread of contamination into previously uncontaminated zones by using recovery and disposal techniques appropriate to the hydrogeologic conditions at the site. Any recovery byproducts must be properly treated, discharged or disposed of in compliance with applicable local, State and Federal regulations. Abatement of free product migration will be used as a minimum objective for the design of the free product removal system. Any flammable products must be handled in a safe and competent manner to prevent fires or explosions.

Unless otherwise directed by the implementing agency, a free product removal report must be submitted within 45 d after confirming a release. This report must provide the name of the person(s) responsible for implementation of the free product removal measures; the estimated quantity, type, and thickness of free product observed or measured in wells, boreholes, and excavations; the type of free product recovery system used; whether any discharge will take place onsite or offsite during the recovery operation and where such discharge will be located; the type of treatment applied to, and the effluent quantity expected from, any discharge; the steps taken to obtain necessary permits for any discharge; and the disposition of the recovered free product.

9.4 INVESTIGATIONS FOR SOIL AND GROUNDWATER CLEANUP AND CORRECTIVE ACTION PLAN

To determine the full extent and location of soils contaminated by the release and the presence and concentrations of dissolved product contamination in the groundwater, investigations must be conducted for the release, release site, and any surrounding area which may have been affected. Several factors must be considered in determining the extent of investigation required: evidence of contamination in groundwater wells, presence of free product requiring removal, and evidence of contaminated soils in contact with groundwater. Investigations must also be conducted if requested by the implementing agency, based on the potential effects of contaminated soil or groundwater on nearby surface water and groundwater resources.

Information obtained in investigation must be submitted as soon as practicable or in accordance with a schedule established by the implementing agency.

Subsequent to review of investigation findings, the implementing agency may require the submittal of additional information or the development of a corrective action plan for response to contaminated soils or groundwater. Corrective action plans must be submitted according to a schedule and format established by the implementing agency.

The corrective action plan will be approved by the agency only when the plan adequately provides for protection of human health, safety, and the environment. In making this determination, the agency will consider: the physical and chemical characteristics of the regulated substance, including toxicity, persistence, and potential for migration; the hydrogeologic characteristics of the surrounding area; the proximity, quality, and current and future uses of nearby surface and groundwater; the potential effects of residual contamination on nearby surface and groundwater; an exposure assessment; and any additional information submitted.

Upon approval the plan must be implemented, including any modifications made by the implementing agency. The results of the plan must be monitored, evaluated and reported in accordance with a schedule and format established by the implementing agency. Cleanup of soil and groundwater may be started prior to approval of the plan provided that the implementing agency is notified. Any cleanup activity must be in compliance with any conditions imposed by the implementing agency. The implementing agency may require cleanup activity to cease at any time, and may require the mitigation of any adverse consequences from cleanup activities. Any self-initiated cleanup activities must be incorporated into the corrective action plan as submitted for approval.

For each confirmed release that requires a corrective action plan, the implementing agency will provide notice to the public. This notice may include, but is not limited to, public notice in local newspapers, block advertisements, public service announcements, publication in State Register, letters to individual households, or personal contacts by field staff. Site release information and decisions concerning the corrective action plan will be made available to the public for inspection upon request. Public meetings may be held on the corrective action plan if there is sufficient public interest. Public notice must also be provided if implementation of the corrective action plan does not achieve the established cleanup levels and if termination of the plan is under consideration by the agency.

10.0 OUT OF SERVICE UNDERGROUND STORAGE TANK SYSTEMS AND CLOSURE

10.1 TEMPORARY CLOSURE

Temporary closure is defined as removal from service for a period of less than 12 mo. Operation and maintenance of corrosion protection is required throughout temporary closure. Operation and maintenance of release detection systems is required only if the tank is not empty, empty being defined as no more than 2.5 cm (1 in.) of residue, or 0.3% by weight of the total system capacity remaining.

When a system is temporarily closed for 3 mo or more, vent lines must be left open and functioning. All other lines, pumps, manways, and ancillary equipment must be capped and secured.

A system which has been temporarily closed for more than 12 mo must be permanently closed if it does not meet the performance standards for new UST systems or the upgrading requirements, with the exception of spill and overfill equipment requirements. An extension of the 12-mo period may be granted by the implementing agency. A site assessment as required for closure must be completed prior to application for extension.

10.2 PERMANENT CLOSURE OR CHANGE-IN-SERVICE

The implementing agency must be notified of permanent closure or change-in-service 30 d prior to beginning closure actions, unless such actions are in response to corrective action.

For closure, the tank must be emptied and cleaned by removing all liquids and accumulated sludges. The tank must be either removed from the ground or filled with an inert solid material.

Continued use of an UST system to store a non-regulated substance is considered a change-in-service. Prior to change-in-service, the tank must be emptied and cleaned by removal of all liquid and accumulated sludges, and a site assessment for closure must be conducted.

10.2.1 Site Assessment

Prior to completion of permanent closure or change-in-service, the site must be measured for the presence of a release where contamination is most likely to be present. In selection of sample types, sample locations, and measurement methods, the method of closure, the nature of the stored substance, the type of backfill, the depth of groundwater, and other appropriate factors must be considered. If an approved external release detection method is in operation at the time of closure or change-in-service that indicates no release has occurred, this requirement is satisfied. If contaminated soils or groundwater, or free product as a liquid or vapor, is

discovered in assessment, corrective action must be implemented in accordance with corrective action requirements.

The implementing agency may direct assessment of the excavation zone and closure in compliance with these requirements for a system permanently closed prior to December 22, 1988, if releases from the UST may pose a current or potential threat to human health and the environment in the judgement of the agency.

10.2.2 Records Maintenance

Records of excavation zone assessment must be maintained for 3 yr after completion of permanent closure or change-in-service. Records demonstrating compliance with all other requirements for closure or change-in-service must also be maintained.

11.0 REFERENCES

Atomic Energy Act of 1954, as amended, Public Law 83-703, 66 Stat. 919, 42 USC 2011.

Clean Water Act of 1977, as amended, Public Law 95-217, 92 Stat. 1566, 33 USC 1251.

Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, Public Law 96-510, 94 Stat. 2767, 42 USC 9601 et seq.

Resource Conservation and Recovery Act of 1976, Public Law 94-580, 90 Stat. 2795, 42 USC 6901 et seq.

Superfund Amendments and Reauthorization Act of 1986, Public Law 99-499, 100 Stat. 1613, 42 USC 11001 et seq.

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER-8204

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
UNDERGROUND STORAGE TANK REMOVAL

KEHR01 - PROJECT COST SUMMARY

PAGE 1 OF 7
DATE 04/14/89 01:05
BY G P HULING

COST CODE	DESCRIPTION	ESCALATED TOTAL COST	CONTINGENCY %	TOTAL	TOTAL DOLLARS
810	DEMOLITION	17,000	20	3,000	20,000
(ADJUSTED TO MEET DOE 5100.4)					
PROJECT TOTAL					
		17,000	20	3,000	20,000

B-1

TYPE OF
ESTIMATE

STUDY ESTIMATE

APRIL 14, 1989

ARCHITECT
ENGINEER

[Signature]

OPERATING
CONTRACTOR

REMARKS:

ENGINEERING IS NOT INCLUDED

(ROUNDED/ADJUSTED TO THE NEAREST " 1,000 / 10,000 " - PERCENTAGES NOT RECALCULATED TO REFLECT ROUNDING)

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER-8204

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
UNDERGROUND STORAGE TANK REMOVAL
STUDY ESTIMATE
KEHR02 - WORK BREAKDOWN STRUCTURE SUMMARY

PAGE 2 OF 7
DATE 04/14/89 01:06
BY G P HULING

WBS	DESCRIPTION	ESTIMATE		OTHER INDIRECTS	SUB		ESCALATION %	SUB		CONTINGENCY %	TOTAL	
		SUB TOTAL	TOTAL		TOTAL	TOTAL		TOTAL	TOTAL		TOTAL	DOLLARS
320000	TANK SEAL TESTING	625		131	756		1.16	9	765	20	153	918
320001	REMOVAL OF CONTENTS	230		48	278		1.16	3	282	20	56	338
320002	REMOVAL OF CONCRETE SLAB	2691		565	3256		1.16	38	3294	20	659	3953
320003	EXCAVATION OF TANK	1123		4736	5858		1.16	68	5926	20	1185	7111
320004	DISPOSAL OF TANK	1244		261	1505		1.16	17	1522	20	304	1827
320005	SOIL SAMPLING AND ANALYSIS	1875		394	2269		1.16	26	2295	20	459	2754
320006	BACKFILL OF EXCAVATION	1880		395	2275		1.16	26	2301	20	460	2761
SUBTOTAL 32 FIXED PRICE CONSTRUCTION		9667		6530	16197		1.16	188	16385	20	3277	19662
330000	ESCORTS	405		0	405		1.16	5	410	20	82	492
SUBTOTAL 33 CONSTRUCTION		10072		6530	16602		1.16	193	16795	20	3359	20154

PROJECT TOTAL 10,072 6,530 16,602 1.16 193 16,795 20 3,359 20,154

1. DOCUMENTS AND DRAWINGS
=====

DOCUMENTS DSI-WORK SCOPE & COST ELEMENTS DELIVERED BY RICK STUPKA

DRAWINGS NONE

2. MATERIAL PRICES
=====

UNIT COSTS REPRESENT CURRENT PRICES FOR SPECIFIED MATERIAL. VENDOR INFORMATION WAS OBTAINED FOR THE FOLLOWING ITEMS:

3. LABOR RATES
=====

CURRENT HANFORD BASE RATES AS ISSUED BY KEN (ISSUE # 12, REV. 0, DATED 1-1-88) INCLUDE FRINGE BENEFITS,
LABOR INSURANCE, TAXES AND TRAVEL WHERE APPLICABLE.

4. GENERAL REQUIREMENTS/TECHNICAL SERVICES
=====

FIXED PRICE CONTRACTOR OVERHEAD, PROFIT, BOND AND INSURANCE COSTS HAVE BEEN APPLIED AT THE
FOLLOWING PERCENTAGES AND ARE REFLECTED IN THE "ON&P / B & I" COLUMN OF THE ESTIMATE DETAIL:
25% LABOR, 20% MATERIAL, AND 25% SUBCONTRACTS.

5. ESCALATION
=====

ESCALATION CALCULATED BY THE HANFORD MATERIAL & LABOR ESCALATION STUDY , JANUARY 1989.

6. ROUNDING - GPP:
=====

ITEM COST OF \$1,000 AND A TOTAL COST OF \$10,000.

7. REMARKS
=====

- A. THIS ESTIMATE IS FOR CONSTRUCTION ONLY AND DOES NOT INCLUDE ENGINEERING.
- B. THIS ESTIMATE DOES NOT INCLUDE WMC PROJECT MANAGEMENT COST.
- C. SITE REMEDIATION IS NOT INCLUDED.
- D. THIS ESTIMATE IS FOR THE TANK TO BE CLEANED, CUT-UP OFF SITE, AND DELIVERED TO SALVAGE WITH RECEIPT FURNISHED.
- E. THIS ESTIMATE IS BASED ON ONE TANK.

Kaiser Engineers Hanford
 Westinghouse Hanford Company
 Job No. ER-8204

** Kaiser Engineers Interactive Estimating **
 Underground Storage Tank Removal
 Study Estimate
 KEHR04 - Cost Code Account Summary

Page 4 of 7
 Date 04/14/89 01:06
 By G P Huling

COST CODE	WBS DESCRIPTION	ESTIMATE		OTHER INDIRECTS	SUB TOTAL		ESCALATION		SUB TOTAL		CONTINGENCY		TOTAL DOLLARS
		SUB TOTAL	TOTAL		%	TOTAL	TOTAL	%	TOTAL	TOTAL			
=====													
810 DEMOLITION													
320000	TANK SEAL TESTING	625		131	756	1-16	9	765	20	153	918		
320001	REMOVAL OF CONTENTS	230		48	278	1-16	3	282	20	56	338		
320002	REMOVAL OF CONCRETE SLAB	2691		565	3256	1-16	38	3294	20	659	3953		
320003	EXCAVATION OF TANK	1123		4736	5858	1-16	68	5926	20	1185	7111		
320004	DISPOSAL OF TANK	1244		261	1505	1-16	17	1522	20	304	1827		
320005	SOIL SAMPLING AND ANALYSIS	1875		394	2269	1-16	26	2295	20	459	2754		
320006	BACKFILL OF EXCAVATION	1880		395	2275	1-16	26	2301	20	460	2761		
330000	ESCORTS	405		0	405	1-16	5	410	20	82	492		
TOTAL 810 DEMOLITION		10072		6530	16602	1-16	193	16795	20	3359	20154		
=====													
PROJECT TOTAL		10 072		6,530	16,602	1-16	193	16,795	20	3,359	20,154		
=====													

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER-8204

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
UNDERGROUND STORAGE TANK REMOVAL
STUDY ESTIMATE
KEHR05 - ESTIMATE SUMMARY BY CSI DIVISION

PAGE 5 OF 7
DATE 04/14/89 01:06
BY G P HULING

CSI DIV	DESCRIPTION	ESTIMATE SUB TOTAL	OTHER INDIRECTS	SUB TOTAL	ESCALATION %	SUB TOTAL	CONTINGENCY %	SUB TOTAL	TOTAL DOLLARS
		=====	=====	=====	=====	=====	=====	=====	=====
01	GENERAL REQUIREMENTS	405	9	405	1.16	5	20	82	492
02	SITEWORK	9667	6530	16197	1.16	188	20	3277	19662
	TOTAL CONSTRUCTION	10072	6530	16602	1.16	193	20	3359	20154
		=====	=====	=====	=====	=====	=====	=====	=====
	PROJECT TOTAL	10,072	6,530	16,602	1.16	193	20	3,359	20,154

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER-8204

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
UNDERGROUND STORAGE TANK REMOVAL
STUDY ESTIMATE
KEHRC6 - CONTINGENCY ANALYSIS BASIS SHEET

PAGE 6 OF 7
DATE 04/14/89 01:08
BY G P HULING

REFERENCE: ESTIMATE BASIS SHEET
COST CODE ACCOUNT SUMMARY

PAGE 3 OF 7
PAGE 4 OF 7

THE U.S. DEPARTMENT OF ENERGY - RL ORDER 5700.3 "COST ESTIMATING, ANALYSIS AND STANDARDIZATION"
DATED 3-27-85, PROVIDES GUIDELINES FOR ESTIMATE CONTINGENCIES. THE GUIDELINE FOR A
SHOULD HAVE AN OVERALL RANGE OF % TO % ESTIMATE

CONTINGENCY IS EVALUATED AT THE THIRD COST CODE LEVEL AND SUMMARIZED AT THE PRIMARY AND SECONDARY COST
CODE LEVEL OF THE DETAILED COST ESTIMATE.

ENGINEERING
ENGINEERING IS NOT INCLUDED (CONSTRUCTION ONLY).

AVERAGE ENGINEERING CONTINGENCY 0 %

CONSTRUCTION

A 20% CONTINGENCY FACTOR WAS APPLIED TO THE CONSTRUCTION DUE TO THE LEVEL OF INFORMATION AVAILABLE.

AVERAGE CONSTRUCTION CONTINGENCY 20 %

AVERAGE PROJECT CONTINGENCY 20 %

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER-8204

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
UNDERGROUND STORAGE TANK REMOVAL
STUDY ESTIMATE
KEH07 - ONSITE INDIRECT COSTS BY WBS

PAGE 7 OF 7 FILE
DATE 04/14/89 01:06
BY G P HULING

WBS	DESCRIPTION	ESTIMATE SUB TOTAL	CONTRACT ADMINISTRATION % TOTAL	BID PACK PREP.	OTHER INDIRECTS	TOTAL INDIRECTS
320000	TANK SEAL TESTING	625	21.00	131	0	131
320001	REMOVAL OF CONTENTS	230	21.00	48	0	48
320002	REMOVAL OF CONCRETE SLAB	2691	21.00	565	0	565
320003	EXCAVATION OF TANK	1123	21.00	236	0	4736
320004	DISPOSAL OF TANK	1244	21.00	261	0	261
320005	SOIL SAMPLING AND ANALYSIS	1875	21.00	394	0	394
320006	BACKFILL OF EXCAVATION	1880	21.00	395	0	395
330000	ESCORTS	405	0.00	0	0	0
PROJECT TOTAL		10,072	2,030	4,500	0	6,530

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER-8204

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
UNDERGROUND STORAGE TANK REMOVAL
STUDY ESTIMATE
KEHR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 0001
DATE 04/14/89 01:06
BY G P HULING

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320000	TANK SEAL TESTING										
320000.02	SITWORK										
320000.0250002	TANK TIGHTNESS TESTING	810	1 JOB	0	0	0	0	500	0	125	625
	SUBTOTAL SITWORK			0	0	0	0	500	0	125	625
	TOTAL			0	0	0	0	500	0	125	625
	COST CODE 81002										
	WBS 320000										

(ESCALATION 1.16% - CONTINGENCY 20.00%)

TOTAL WBS 320000 TANK SEAL TESTING	0	0	0	0	0	0	0	500	0	125	625
------------------------------------	---	---	---	---	---	---	---	-----	---	-----	-----

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER-8204

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
UNDERGROUND STORAGE TANK REMOVAL
STUDY ESTIMATE

PAGE 0002
DATE 04/14/89 01:06
BY G P HULING

KEHR08 - ESTIMATE DETAIL BY WBS / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OR&P / B & I	TOTAL DOLLARS
320001	REMOVAL OF CONTENTS										
320001.02	SITEWORK										
320001.0210002	REMOVE 500 GALLONS OF FUEL FROM UST	810	1	JOB 8	184	0	0	0	0	46	230

SUBTOTAL SITEWORK				8	184	0	0	0	0	46	230

TOTAL				8	184	0	0	0	0	46	230

(ESCALATION 1.16% - CONTINGENCY 20.00%)

TOTAL WBS 320001 REMOVAL OF CONTENTS				8	184	0	0	0	0	46	230

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER-8204

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
UNDERGROUND STORAGE TANK REMOVAL
STUDY ESTIMATE
KENR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 0003
DATE 04/14/89 01:06
BY G P HULING

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320002	REMOVAL OF CONCRETE SLAB										
320002.02	SITEWORK										
320002.0230002	DEMO 25 X 25 X 6" CONC.SLAB	810	500 SF	87	1984	0	0	0	0	496	2480
320002.0230004	HAUL AWAY BROKEN CONCRETE	810	1 JOB	8	169	0	0	0	0	42	211
	SUBTOTAL SITEWORK			95	2,153	0	0	0	0	538	2,691
	TOTAL	COST CODE 81002 WBS 320002		95	2,153	0	0	0	0	538	2,691
	(ESCALATION 1.16% - CONTINGENCY 20.00%)										
	TOTAL WBS 320002 REMOVAL OF CONCRETE SLAB			95	2,153	0	0	0	0	538	2,691

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** KAISER ENGINEERS INTERACTIVE ESTIMATING **
UNDERGROUND STORAGE TANK REMOVAL
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KEHR08 - ESTIMATE DETAIL BY WBS / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / 8 & I	TOTAL DOLLARS
320003	EXCAVATION OF TANK										
320003.02	SITEWORK										
320003.0220002	EXCAVATION FOR AST REMOVAL	810	105 CY	26	647	0	0	0	0	162	809
320003.0220004	CUT, DRAIN, AND CAP LINES TO STORAGE TANK	810	1 JOB	8	251	0	0	0	0	63	314

SUBTOTAL SITEWORK				34	898	0	0	0	0	225	1,123

TOTAL				34	898	0	0	0	0	225	1,123

COST CODE 81002											
WBS 320003											
(ESCALATION 1.16% - CONTINGENCY 20.00%)											

TOTAL WBS 320003 EXCAVATION OF TANK				34	898	0	0	0	0	225	1,123

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KEHRO8 - ESTIMATE DETAIL BY WBS / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320004	DISPOSAL OF TANK									
320004.02	SITEWORK									
320004.0240002	CUT, DRAIN, AND CAP LINES TO STORAGE TANK	810	1	JOB	40	995	0	0	0	249
										1244
	SUBTOTAL SITEWORK				40	995	0	0	0	249
										1,244
	TOTAL	COST CODE 81002 WBS 320004			40	995	0	0	0	249
										1,244

(ESCALATION 1.16% - CONTINGENCY 20.00%)

TOTAL WBS 320004 DISPOSAL OF TANK	40	995	0	0	0	0	0	0	249	1,244
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** KAISER ENGINEERS INTERACTIVE ESTIMATING **
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 KEHR08 - ESTIMATE DETAIL BY WBS / COST CODE

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320005	SOIL SAMPLING AND ANALYSIS										
320005.02	SITEWORK										
320005.0250002	2 SAMPLES PER TANK, FIELD ENGINEER WITH DETECTORS, AND REPORT	810	1 JOB	0	0	0	0	1500	0	375	1875

SUBTOTAL SITEWORK				0	0	0	0	1,500	0	375	1,875

TOTAL				0	0	0	0	1,500	0	375	1,875

COST CODE 81002											
WBS 320005											
(ESCALATION 1.16% - CONTINGENCY 20.00%)											

TOTAL WBS 320005 SOIL SAMPLING AND ANALYSIS				0	0	0	0	1,500	0	375	1,875

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KEHR08 - ESTIMATE DETAIL BY WBS / COST CODE

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320006	BACKFILL OF EXCAVATION										
320006.02	SITEWORK										
320006.0220002	BACKFILL AND COMPACTION	810	146 CY	25	622	0	584	0	0	272	1478
320006.0220004	STABILIZATION	810	500 SF	7	174	0	100	0	0	64	338
SUBTOTAL SITEWORK				32	796	0	684	0	0	336	1,816
SALES TAX 7.80% OH&P / B&I (ON MARKUPS ONLY)											
TOTAL				32	796	0	737	0	0	347	1,880
WBS 320006											

(ESCALATION 1.16% - CONTINGENCY 20.00%)

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TOTAL WBS 320006 BACKFILL OF EXCAVATION 32 796 0 737 0 347 1,880

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KEHR08 - ESTIMATE DETAIL BY WBS / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	1 JOB	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
330000	ESCORTS											
330000.01	GENERAL REQUIREMENTS											
330000.010000	ESCORTS	810	1	27	27	405	0	0	0	0	0	405
	SUBTOTAL GENERAL REQUIREMENTS			27	27	405	0	0	0	0	0	405
	TOTAL	COST CODE 81001 WBS 330000		27		405	0	0	0	0	0	405

(ESCALATION 1.16% - CONTINGENCY 20.00%)

TOTAL WBS 330000 ESCORTS 27 405 0 0 0 0 405

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
UNDERGROUND STORAGE TANK REMOVAL
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KEHR10 - CRAFT RATE REPORT BY AREA

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
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F/P RATES - 300 AREA

CRAFT CODE	DESCRIPTION	RATE/HOUR	EXPIRATION DATE
=====	=====	=====	=====
FBM030	BOILERMAKERS	\$28.58	01JANUARY89
FBR030	BRICKMASONS	\$24.01	01JANUARY89
FCA030	CARPENTERS	\$25.24	01JANUARY89
FC1030	CEMENT MASONS - GROUP I	\$23.91	01JANUARY89
FC2030	CEMENT MASONS - GROUP II	\$24.48	01JANUARY89
FC3030	CEMENT MASONS - GROUP III	\$25.04	01JANUARY89
FEL030	ELECTRICIANS - LINEMAN	\$26.17	01JANUARY89
FEW030	ELECTRICIANS - WIREMAN	\$30.90	01JANUARY89
FIW030	INSULATORS - MECHANICAL	\$29.42	01JANUARY89
FIW030	IRONWORKERS	\$28.49	01JANUARY89
FL1030	LABORERS - GROUP 1	\$22.11	01JANUARY89
FL3030	LABORERS - GROUP III	\$22.68	01JANUARY89
FL5030	LABORERS - GROUP V	\$23.25	01JANUARY89
FMA030	MACHINISTS	\$24.45	01JANUARY89
FMW030	MILLWRIGHTS	\$24.89	01JANUARY89
F01030	OPERATING ENGINEERS - GROUP I	\$22.88	01JANUARY89
F04030	OPERATING ENGINEERS - GROUP IV	\$24.01	01JANUARY89
F07030	OPERATING ENGINEERS - GROUP VII	\$24.75	01JANUARY89
FPA030	PAINTERS	\$23.20	01JANUARY89
FPF030	PIPEFITTERS & NDT	\$31.32	01JANUARY89
FQA030	QA/QC INSPECTORS	\$29.87	01JANUARY89
FRO030	ROOFERS	\$24.05	01JANUARY89
FSF030	SPRINKLER FITTERS	\$27.31	01JANUARY89
FSM030	SHEET METAL WORKERS	\$25.54	01JANUARY89
FTX030	TEAMSTERS - GROUP XV	\$25.18	01JANUARY89
FTI030	TEAMSTERS - GROUP I	\$21.05	01JANUARY89
FTI7030	TEAMSTERS - GROUP VII	\$24.04	01JANUARY89

TOTAL CRAFT LABOR RATES FOR ESTIMATING INCLUDING BURDEN AND TRAVEL.

NOTE: SPECIAL PAY PROVISIONS FOR ALL CRAFTS MUST BE ADDED.

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
UNDERGROUND STORAGE TANK REMOVAL
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KENR11 - ESCALATION ANALYSIS REPORT

KAISER ENGINEERS HANFORD
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USE FOR APRIL 1989

MONTH =====	JANUARY =====	FEBRUARY =====	MARCH =====	APRIL =====	MAY =====	JUNE =====	JULY =====	AUGUST =====	SEPTEMBER =====	OCTOBER =====	NOVEMBER =====	DECEMBER =====
YR =====												
1989				0.2304	0.4613	0.6928	0.9248	1.1573	1.4150	1.6733	1.9323	1.9323
1990	2.1919	2.4522	2.7132	2.9749	3.2372	3.5002	3.7638	4.0281	4.2931	4.6345	4.9770	5.3206
1991	5.6654	6.0112	6.3583	6.7064	7.0557	7.4061	7.7577	8.1104	8.4643	8.8802	9.2978	9.7169
1992	10.1376	10.5600	10.9839	11.4095	11.8367	12.2656	12.6961	13.1283	13.5621	14.0157	14.4711	14.9284
1993	15.3874	15.8483	16.3111	16.7757	17.2421	17.7105	18.1807	18.6527	19.1267	19.6877	20.2514	20.8177
1994	21.3867	21.9583	22.5327	23.1097	23.6895	24.2720	24.8573	25.4453	26.0361	26.6296	27.2260	27.8252
1995	28.4271	29.0320	29.6396	30.2502	30.8636	31.4799	32.0991	32.7212	33.3462	34.0163	34.6898	35.3667
1996	36.0470	36.7307	37.4178	38.1084	38.8025	39.5000	40.2011	40.9057	41.6138	42.3589	43.1079	43.8609
1997	44.6179	45.3788	46.1438	46.9127	47.6858	48.4628	49.2440	50.0293	50.8187	51.6478	52.4815	53.3197
1998	54.1626	55.0101	55.8622	56.7191	57.5806	58.4469	59.3180	60.1938	61.0745			

END

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