U.S. Department of Energy
Office of River Protection
P.O. Box 450
Richland, Washington 99352

0059085

DEC 2 3 2002

02-ED-041

Mr. Michael A. Wilson, Program Manager
Nuclear Waste Program
State of Washington
Department of Ecology
1315 W. Fourth Avenue
Kennewick, Washington 99336

RECEIVED
APR 1 7 2003
EDMC

Dear Mr. Wilson:

SUBMITTAL OF REVISED M-23-23 SINGLE-SHELL TANK (SST) SYSTEM SURVEILLANCE AND MONITORING FUNCTIONS AND REQUIREMENTS (F&R) DOCUMENT

References:
1. Ecology letter from J. J. Lyon to J. E. Rasmussen, ORP, dated June 12, 2002. 57440
2. Ecology letter from J. J. Lyon to J. E. Rasmussen, ORP, dated August 22, 2002.

This letter transmits the SST F&R document for the M-23-23 revised F&R document.

This package contains the revised F&R (Attachment 1), the signed Review Comment Record (Attachment 2) which are reflected in the revised F&R, and a draft change request (Attachment 3) deleting equipment requirements. The transmittal of this document resolves all issues raised in References 1 and 2. We appreciate the professionalism of your staff in resolving these issues in a timely manner. We will sign the change request after the State of Washington Department of Ecology has had a chance to review this package.

If you have any questions, please contact Mary Beth Burandt, Environmental Division, (509) 373-9160.

Sincerely,

James E. Rasmussen

James E. Rasmussen, Director
Environmental Division

ED:MEB

Attachments: (3)

cc: See page 2

DEC 2 3 2002

cc w/attachs:
W. T. Dixon, CHG (w/o attachs)
J. C. Fulton, CHG (w/o attachs)
J. Cox, CTUIR
J. J. Lyon, Ecology
R. F. Stanley, Ecology
B. Wilson, Ecology
N. Ceto, EPA
J. S. Hertzel, FHI
O. S. Kramer, FHI
R. Morrison, FHI
T. Martin, HAB
J. L. Hanson, INNOV (w/o attachs)
P. Sobotta, NPT
K. Niles, ODOE
E. M. Mattlin, RL
R. Jim, YN
TPA Administrative Record

Attachment 2
02-ED-041

Review Comment Record
RPP-9937 Submitted Per HFFACO Milestone M-23-23

Attachment 1
02-ED-041

Revised Functions and Requirements

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
11-06-02	
3. Project No.	4. Page
	Page 1 of 16

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
RPP-9937 submitted per HFFACO Milestone M-23-23		Heggen (DH), Caggiano (JC), Wilson (BW), Brown (MB), DeWitt (KDW)		

17. Comment Submittal Approval:

10. Agreement with indicated comment disposition(s)

11. CLOSED

Organization Manager (Optional)

Date

Reviewer/Point of Contact

Author/Originator

12-03-02
Date

Reviewer/Point of Contact

Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1.	Section 4.1.1, item (2), Basis, links the ability to respond to a leak (specifically interim stabilization) to the regulatory requirement for leak detection. There is no regulatory language in either state or federal codes that provide for reduced leak detection due to reduced ability to respond to a detected leak. Each is a separate requirement. Interim stabilization should not be considered the ONLY possible response to leak, rather it is an intermediary step towards closure. In the case of a catastrophic tank failure, it is possible other actions may be needed (i.e. retrieval, grout curtains, chemical stabilization, capping, engineered barriers, etc). Also, there are many reasons to monitor for leaks (i.e. impact to groundwater, worker safety, etc). For these reasons it is unacceptable for USDOE to link regulatory requirements		Per discussions with Ecology on 9/19/02 and 10/22/02: The language in Section 4.1.1.A.2, page 4-7 will be modified to read: "SSTs that meet interim stabilization criteria, and do not have a susceptibility to exceeding the interim stabilization criteria, shall have a reduced monitoring frequency due to reduced risk. (see Figure 4-2) (see Section 5.0 for BMP monitoring for these tanks)." Table B-4 will also be updated to reflect this language. Figure 4-2 and supporting text will be modified to reflect that the tank conditions will be monitored and evaluated and, if conditions change, monitoring frequency could change as specified in the Figure.	

REVIEW COMMENT RECORD (RCR)	1. Date 11-06-02	2. Review No.
	3. Project No.	4. Page Page 2 of 16

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
	for leak detection to regulatory requirements to respond to a leak. RPP-9937 is unacceptable as written and must be revised to delete leak response as a requirement for maintaining a leak detection system. (BW)			
2.	Section B 4.0 of RPP-9937 advises that interim stabilization is the action to be taken in the event of a detected leak; therefore, an SST declared to be interim stabilized need not be provided with a leak detection system. Per this section, 102 of the 149 SSTs (68%) are not required to have leak detection monitoring. This section also states that tanks that have been interim stabilized contain less than 40K gallons of drainable liquid, therefore leak detection is no longer needed. The Interim Stabilization Criteria presented on page xii states that a SST system tank may be considered interim stabilized when up to 50K gallons of drainable liquids may remain in SSTs and up to 400 gallons may remain in "non single shell tanks." Leak detection requirements apply to tank systems storing hazardous waste until such systems are closed per RCRA requirements. Interim stabilization is an intermediary step towards RCRA tank closure and not an end-point unto itself. Also, there is no minimum leak amount in state or federal code that exempts a tank system from leak detection requirements. The regulatory requirement for leak detection is to detect any leak. Therefore RPP-9937 must be revised to delete interim stabilization as the sole demonstration for reduced leak detection requirements and provide sufficient demonstration per 40CFR, Subpart J, 265.193(c)(3), (4) and (f) for reducing leak detection requirements. (BW)(MB)(DH)(JC)		Per discussions with Ecology on 9/19/02 and 10/22/02, Table B-4, reference to 4.1.1(A)(2) will be changed to read: "SSTs that meet interim stabilization criteria, and do not have a susceptibility to exceeding the interim stabilization criteria, shall have a reduced monitoring frequency due to reduced risk. (see Figure 4-2) (see Section 5.0 for BMP monitoring for these tanks)." Monitoring is required for all 149 SSTs as described in Sections 4 and 5 and summarized in Appendix A. The frequency of monitoring is based on specific tank conditions. The 40K gallons is used as one of the criterion for determining monitoring frequency. Per Section 5.2.1, tanks that contain less than 50,000 gallons but greater than or equal to 40,000 gallons are deemed susceptible to exceeding interim stabilization criteria due to potential intrusion. See page B-39 for further discussion.	

3.	RPP-9937 does not discuss whether SSTs that are interim stabilized in the future will also be considered exempt from leak detection monitoring. Therefore, for those tanks where interim stabilization is acceptable by Ecology for alternate leak detection requirements, RPP-9937must be revised to describe the leak detection requirements for SSTs completing interim stabilization in the future. (BW)		Per discussions with Ecology on 9/19/02 and 10/22/02, when a tank is interim stabilized, the monitoring requirements for the tank will be updated to reflect the revised category for the tank as described in Figure 4-2. Figure 4-2 and supporting text will be modified to reflect that the tank conditions will be monitored and evaluated and, if conditions change, monitoring frequency could change as specified in the Figure.	
4.	Section B 4.0 describes the parameters beyond which leak detection would not be required for interim stabilized tanks (i.e. dry surface and no interstitial liquid above 24" from the bottom of a tank). However, the text lacks a discussion of what monitoring is in place to insure these parameters are maintained. Therefore RPP-9937 must be revised to describe the system in place to monitor and insure that conditions within each interim stabilized SST remain within the parameters for interim stabilization. (BW)		As discussed during negotiations of M-23-25, *LOW Installation*, tanks with the interstitial liquid level within about 24 inches of tank bottom cannot utilize a Liquid Observation Well (LOW) for leak detection. Section 5.2.1 describes the monitoring of SSTs that fit this criterion. All SSTs will receive monitoring to identify changing conditions as described in the response to Comment 3.	
5.	Definitions (page xii): This section defines "Interim Stabilization Criteria" and refers to procedure HNF-IP-0842. Section 3.1 of HNF-IP-0842 lists the steps to be taken to determine if a SST has been interim stabilized. In addition to pumping a SST to the specified limits a SST may be considered interim stabilized per this procedure if a major equipment failure has occurred, if engineering reviews based on estimated waste volumes determine further pumping is not technically feasible or if cost/benefit analysis or ALARA concerns preclude further pumping. Also, interim stabilization criteria were based on older pump technology and it is likely that newer pumps would be able to retrieve additional tank liquids without the failure rates of the old pumps (i.e. Moyno down hole pump technology).		Per discussions with Ecology on 9/19/02, interim stabilization criteria are beyond the scope of M-23-23. Interim stabilization criteria have been established through Consent Decree CT-99-5076-EFS. Tanks that do not meet interim stabilization criteria, or are susceptible to exceeding the criteria, have an increased monitoring frequency as described in Section 5.2.1. Per discussions with Ecology on 10/22/02, summary information on each tank will be provided in the executive summary of this report.	

	Provide a listing of the 102 SSTs described in section B 4.0 which have been determined to be interim stabilized and no longer requiring leak detection by the following categories: 1) SSTs pumped to a final flow rate of 0.05 gpm and with less than 50K gallons of interstitial liquid remaining, 2) SSTs in which major equipment failure occurred resulting in interim stabilization, 3) SSTs in which calculated waste volumes determined interim stabilization had been completed and 4) SSTs in which engineer's evaluation determined that cost/benefit analysis, ALARA or other considerations resulted in completion of interim stabilization. Include the volumes of liquids remaining in each SST and an analysis of current (and developing) pump technology and the potential for application of such tehnologies to the SSTs. (DH)(BW)			
6.	Throughout RPP-9937 the term "active" is applied to tank system components determined by USDOE and its contractors to be used in support of various tank farm program functions (i.e. section 4.2). RPP-9937 then limits leak detection requirements to those components administratively determined by USDOE and its contractors to be "active" and exempts those components administratively determined to be "inactive" or "out-of-use" (i.e. section 4.3.2). Leak detection and monitoring requirements apply to tank systems until they are closed per WAC 173-303-610. Furthermore, any tank system component that is used to treat, stores or dispose of waste is subject to all regulatory requirements for tank systems including leak detection. Therefore USDOE's administrative determination of "active" is incorrect, conflicts with regulatory requirements and cannot be used to exempt any tank system component from leak detection requirements. RPP-9937 must be revised to clarify the regulatory meaning of active tank systems as described above. (JC)(BW)(MB)(DH)		Per discussions with Ecology on 10/22/02, the term active will be deleted from the report due to the unintended regulatory connotation, which was not the way the term was used in the document. The term "active" will be replaced with "mission essential" which is defined as "those systems, components, and structures where it would be typical for waste to be moved in and out of the system to meet a current or expected mission."	

7.	Section 4.1.1 limits review of leak detection capability to those devices currently installed within the SST system. However, the regulatory reference to "existing detection technologies" includes all existing and available technologies. Currently installed leak detection equipment in the SSTs are limited at best, ineffective in many cases, and do not include all existing and available technologies. Some SSTs have no effective in-tank leak detection. Also, certain ex-tank technologies have the potential to detect leaks in the several hundred gallon-range. USDOE has failed to demonstrate per 40CFR, Subpart J, 265.193(c)(3) that existing and available leak detection technologies do not exist to accurately detect a leak in SSTs. Therefore, RPP-9937 is unacceptable as written and must be revised to include a description of all existing and available leak detection technologies that could be used to detect a leak from SSTs. This description must include the current status of the USDOE's ex-tank LDM workshop down-select process. (DH)(BW)		Per discussions during negotiations and with Ecology on 9/19/02, for M-23-23, leak detection was limited to existing Tank Farm in-tank leak detection technology (e.g., ENRAFs, LOWs, and Manual Tapes). Ex-tank technology is outside the scope of this document.	
8.	Section 3.0 divides the SST system into components governed by leak detection requirements and those components USDOE considers exempt from leak detection requirements. The ninth bullet on this page exempts the 242-S and T Evaporators from leak detection requirements based on their administrative status (i.e. standby/shutdown). However, these facilities have not been closed per RCRA requirements. Also, the Calendar Year 2001 Hanford Land Disposal Restrictions Report lists these facilities (in Appendix C, Pg C-15 of the 2001 LDR Report) as containing liquids and solids in process tanks that potentially may designate as mixed waste. The 2001 LDR Report includes a schedule (for CY 2004) to perform assessments of the storage status of the vessels within these facilities which would include quantification of liquid levels in vessels. Therefore, RPP-9937 must be revised to include the 242-S		Per discussions with Ecology on 10/22/02, the 242-S and -T Evaporators are not within the scope of this document. Management of the 242-S and -T Evaporators is described on the Silver List Closeout Forms (5.3 and 5.4) in which the parties agreed that the evaporators would be listed in the WIDs database and managed as RCRA Past Practice Units. With respect to the 2001 LDR report, the agreement between Ecology and DOE states that a schedule would be developed to perform assessments and identify data gaps. Quantification of liquid levels for the Evaporators is not required for the assessment phase.	

	and T Evaporators as SST components requiring liquid level assessments to determine if leak detection will be needed. (BW)(JC)			
9.	The number of Miscellaneous Underground Storage Tanks (MUSTs) provided in section 3.1.2 (19 MUSTs listed) does not correspond to either the number of MUSTs (40) reported to Ecology as administered by CHG during a March 2001 MUST inspection or the number of MUSTs (31) attributed to single-shell tank system in the monthly Tank Waste Summary Report (HNF-EP-0182). RPP-9937 must be revised to accurately list all MUSTs within the SST system including explanations for any discrepancies with HNF-EP-0182 and the SST Closure Plan (DOE/ORP-2001-18, Rev.0) and include plans for leak detection and monitoring for each MUST. (DH)(BW)		The MUST list in this document has been compared with the list provided to Ecology in a August 2002 briefing (08/02/02 DOE - Ecology Brownbag), the Waste Tank Summary Report for Month Ending July 31, 2002 (HNF-EP-0182, Rev. 172), and the SST System Closure Work Plan (DOE/ORP-2001-18, Rev.0 Draft C). The MUST list provided in this document has been updated to include MUSTs associated with the SST system that are not RCRA Past Practice or CERCLA Past Practice Units. Per discussions with Ecology on 10/22/02, RCRA Past Practice units will not be included in this report. RCRA Past Practice Units are addressed in TPA Milestone M-45 and the Single-Shell Tank System Closure Work Plan. The revised list of MUSTs now includes: 241-A-302A, 241-AX-151-CT, 241-S-304, 241-TX-302C, 241-U-301B, 241-UX-302A, and 241-BY-ITS2-Tank 2. Summary information on the MUSTs will be provided in the executive summary of this report. The text in the document will be revised to reflect this revised list (including text in Sections 3.1.2, 4, Figure 4-3, 5, 6, Appendix A, and Appendix B).	

10.	Section 3.1.4, (pg. 3-14) contains descriptions of three out-of-service facilities (244-TXR Vault, 244-UR Vault and 231-W-151 Vault) that are not monitored. The monthly Tank Waste Summary Report (HNF-EP-1087) lists the contents of 244-TXR as unknown; however, table B-44 indicates that the 244-UR and TXR tanks do not require monitoring. Page 3-13 states that records do not indicate if tanks in the 231-W-1512 vault receive monitoring. Ecology cannot be assured that tanks within these three vaults are empty; therefore, the waste must be characterized (265.199(a) or volumes measured. (MB)		Per discussions with Ecology on 10/22/02, RCRA Past Practice Units will not be included in this report. The list of vessels and cells in Miscellaneous Structures has been reviewed and updated and these three vaults have been deleted. The vaults are addressed in the Single-Shell Tank System Closure Work Plan. Summary information on the vessels in the miscellaneous structures will be provided in the executive summary of this report. The text in the document will be revised to reflect this revised list (including text in Sections 3, Figure 4-4, 5, 6, Appendix A, and Appendix B).	
11.	1) RPP-9937 lists catch tank 242-TA-R1 as an "inactive/out-of-use" catch tank (see appendix A, Pg A-6). Section 5.2.2 states that tanks in this category are only subject to leak detection requirements if interim stabilization requirements have not been met and if they are subject to intrusion. If these requirements have been met, the catch tank is subject only to visual monitoring once every five years as a "best management practice" or BMP, see section 4.1.1, B). A catch tank (241-TA-R1) is listed in table B-8, appendix B. However, Ecology believes this is a typographical error. Assuming tank 241-TA-R1 in appendix B actually corresponds to catch tank 242-TA-R1 listed in appendix A, this catch tank would be subject only to five-year monitoring as a BMP. The vault (242-TA) in which catch tank 242-TA-R1 is located is not listed in RPP-9937 at all (see section 3.1.6, pg 3-13 and appendix A, pg A-6). On August 1, 2002 Hanford Occurrence Report # RP-CHG-		1) Catch tank 241-TA-R1 in Table B-8 should be 242-TA-R1. However, per discussions with Ecology on 10/22/02, RCRA Past Practice Units will not be included in this report and reference to this tank will be removed from the document. 2) Per discussions with Ecology on 10/22/02, the monitoring frequency for non-RCRA Past Practice tanks in this category has been reduced from once every five years to annual. 3) For those tanks and miscellaneous structures within the scope of this report, Figures 4-3 and 4-4 and supporting text will be modified to reflect that the tank/structure conditions will be monitored and evaluated. If conditions change, monitoring frequency could change as specified in the Figures.	

	TANKFARM-2002-0083 was issued describing the discovery of ten feet of liquid within the 242-TA vault and that the 242-TA-R1 catch tank was floating off its foundation in the accumulated liquid. Considering this discovery, RPP-9937 must be revised to: 1) explain why the 242-TA-R1 catch tank is listed in RPP-9937 but the 242-TA vault isn't. 2) explain and justify how the five year BMP monitoring frequency would support timely discovery of leaks within SST components, such as catch tanks and vaults, considering the findings of occurrence report # RP-CHG-TANKFARM-2002-0083. 3) describe what action will be taken per RPP-9937 requirements to address identification and removal of the liquid accumulated in the 242-TA vault considering that: a) the 242-TA vault isn't listed in RPP-9937, b) that, per leak response requirements of RPP-9937, the action to respond to a leak has already been taken (i.e. interim stabilization), and 3) per RPP-9937 leak detection isn't required for the 242-TA vault or its catch tank since the 242-TA-R1 catch tank is considered interim stabilized and not subject to intrusion. 4) confirm and correct the typo (listing of 242-TA-R1 catch tank in appendix A as 241-TA-R1 in appendix B). 5) provide a listing of <u>all</u> catch tanks and <u>all</u> vaults in the SST system consistent with: a) the monthly Tank Waste Summary Report (HNF-EP-0182), b) SST Part A, c) the SST Closure Plan (DOE/ORP-2001-18, Rev. 0), and d) between all sections of RPP-9937 itself. This listing must include, in tabular form, the date of the most recent surveillance of liquid level within each catch tank and each vault, the volume and liquid level within each catch tank and each vault per most recent surveillance, a description of the surveillance methods and liquid level monitoring equipment in each catch tank and each vault, the frequency and method of liquid level monitoring in each catch tank and vault, and improvements to the surveillance and liquid		4) This catch tank has been removed from the report as discussed in the response to 1). 5) As discussed in Comment 9 and 10 above, RCRA Past Practice Units will be removed from this report. Summary information on the MUSTs and Vessels in Miscellaneous Structures will be provided in the executive summary of this report.	

	level monitoring of each catch tank and vault sufficient to meet leak detection requirements of 40CFR, subpart J, 265.193(c)(3) and (4). (BW)			
12.	Section 3.1.4, Diversion Boxes (page 3-11, paragraph 2) states that diversion boxes receive transfer line drainage, thereby serving as containment for any drained liquid. Without knowledge of the status of secondary containment in every diversion box, Ecology cannot determine if they are compliant. Add text to explain which if any of them meet secondary containment requirements or what assessments will be done of their structures. (MB)		The diversion boxes serve as secondary containment. The DOE does not assert that these boxes are RCRA-compliant for secondary containment. In-use diversion boxes required for mission essential activities will be required to have LDM during transfers as defined in Section 4.2.2.	
13.	Table 3-2 (page 3-6) lists the date that a SST was declared a leaker and lists the waste type present in the tank at the time it was declared a leaker. The declaration may have occurred years after the tank leaked and thus the type of waste present in the tank may have been different. For example, BX-102 is listed as being declared a leaker in 1971, but that's the date that waste spilled from an overfill in 1951 (U Recovery waste) actually reached a drywell where gross gamma logging detected the elevated gross gamma activity (incorrectly identified as Cs-137). There were probably also numerous leaks of various waste streams from piping feeding these tanks. This table is oversimplified and ought to be appropriately qualified. (JC)		DOE does not disagree with this comment. However, this table was provided to give historical perspective on the SST System to enable the reader to put LDM in context. The data is consistent with the leak history information contained in the references listed on page 3-5. DOE is unable to respond to "appropriate qualification". Per section 9.2.1 of the Hanford Federal Facility Agreement and Consent Order: "Comments by the lead regulatory agency shall be provided with adequate specificity so that the DOE can make necessary changes to the document. Comments shall refer to any pertinent sources of authority or references upon which the comments are based and, upon request of the DOE, the commenting agency shall provide a copy of the cited authority or reference."	
14.	Page 3-3, first paragraph, last sentence: Cascade lines were a major problem during historic tank farm operations because: a) the seal with the tank sidewall was often faulty and not liquid tight, b) lines became plugged leading to tank overfills (e.g., BX-102) and c) use of site-fabricated above ground transfer lines/equipment. Sludge accumulated in all tanks in a cascade, NOT just the first tank. Please correct. (JC)		Some sludge is carried over into all of the tanks during the cascading process. The last sentence in the paragraph will be changed to read: "Due to the cascading effect, more solids generally tended to settle out in the first tanks in the series with more supernate in the last tanks."	

15.	Section 4.1.1 (page. 4-8, item 3, Requirement): Please explain how weekly monitoring satisfies the requirement to detect a leak within 24 hours. (JC)		The purpose of M-23-23 is to address appropriate monitoring requirements for SSTs. DOE and the WDOE discussed that detecting a leak in 24 hours was not practicable for Hanford SSTs based on existing in-tank leak detection technology.	
16.	Figure 4-3 (page 4-11): The first box indicates that there are 19 MUSTs holding a total of 8,260 gals. Simple division of 8,260 by 19 indicates that the average MUST contains 434 gals. Although some may be bigger, at least some must exceed 400 gallons. Explain and revise. (JC)		The MUST list will be updated as discussed in the response to Comment 9 above. Figure 4-3 will be updated accordingly.	
17.	Section 4.1.3, 1, 2, Requirement (page 4-16): The basis for not requiring a response to a leak appears to be some internal procedure. Identify this procedure and justify its use for precluding leak detection. (JC)		The technical basis for not requiring a response to a leak is described in the paragraph below the Requirement.	
18.	Section 5.1.1 Current Leak Detection & Monitoring; Pg 5-3: The last bullet on the page, "Groundwater Monitoring" states that groundwater monitoring requirements have been implemented through HFFACO Milestone 24-00 series. This is an inaccurate statement. Milestone M-24-00 has not been completed and the groundwater monitoring system in SST waste management areas is incomplete. Well installations per M-24-00 have been occurring at a pace that will take decades to complete. Further, a Compliance Monitoring Evaluation (CME) inspection completed by Ecology in December 2000 revealed serious deficiencies of the groundwater monitoring system in SST waste management areas (T & TX/TY waste management areas). These deficiencies have yet to be resolved. The original groundwater monitoring network was established when the groundwater flow direction, gradient, and water table were significantly different than at present. Consequently, some of the		This information was intended to provide historical perspective to enable the reader to put LDM in context. It was not meant to provide an all-inclusive status of other existing TPA milestones. This information will be deleted from this report.	

	wells installed before 1995 and may now be either dry and/or no longer located up or down gradient. Additional groundwater monitoring wells have been constructed at SSTs since 1999 and some wells listed as active in 1999 are now dry because of the declining water table. Also, the SSTs are monitored under WAC 173-303-400 which references 40 CFR 265, Subpart F (interim-status standards). However, on page 5-4, the top three bullets reference a mix of final status and interim-status terminology. Under interim-status standards, those SST WMAs that have impacted groundwater go from indicator parameter monitoring to groundwater quality assessment monitoring. Five of the SST WMAs are in assessment monitoring status (WMAs B-BX-BY, S-SX, T, TX-TY and U). The SST system is proceeding directly to closure without applying for final status. Correct this information and make it current. Therefore, RPP-9937 must be revised to describe these limitations of the groundwater monitoring system as a component of a SST leak detection system while including current groundwater monitoring system data and configuration. (BW)(JC)			
19.	Pg. 5-2, LOWs. What response occurs if there is a significant change in the profile in an LOW? Revise the document to clarify. (JC)		Each LOW has an established baseline for interstitial liquid level measurements and tolerance limits. Any confirmed data point that falls outside this limit is investigated as a possible intrusion or leak, depending on the direction of the data deviation.	
20.	Pg. 5-3, Drywell Monitoring. The tool used to monitor drywells is a gross GAMMA logging tool that detects (or did detect when in operation) changes in the count rate from gamma-emitting radionuclides. Spectral gamma logging was performed as a baseline, and certain other wells were then re-logged. However, spectral gamma logging using the HPGe detector is not occurring on a regular		This information was intended to provide historical perspective to enable the reader to put LDM in context. It was not meant to provide an all-inclusive status of the drywell monitoring program. This information will be deleted from this report.	

	basis. Some follow-on logging is conducted using an NaI tool. Please update and correct this information including a description of actions taken in response to a change in the logging profile? Please clarify what the response to such a change would be. (JC)			
21.	Appendix B, Pg. B-13. Drywells were historically logged with gross GAMMA logging systems to detect gamma-emitting radionuclides. Routine drywell monitoring ceased in 1994. Spectral gamma logging IS NOT routine; i.e., a baseline logging was performed in all accessible drywells and some follow-on logging has occurred. Some movement of gamma-emitting contaminants in the subsurface has been detected. What is being done for these cases? If you don't track this movement, then this is not monitoring. Please correct. Appendix B, Pg. B-13. State the limitations of drywell logging; i.e., the number, location, spacing and depth of boreholes, the tools used, the radius of investigation from the borehole, the frequency of logging, and the speed of the tool being moved in the borehole. Also include the limitation that this is a monitoring technique, NOT an effective leak detection technique that can detect a leak within 24 hrs except under the most unusual of circumstances. (JC)		This information was intended to provide historical perspective to enable the reader to put LDM in context. It was not meant to provide an all-inclusive status of the drywell monitoring program. This information will be deleted from this report.	
22.	Page 5-5, third bullet: Missing are details relating to the accuracy, error margins, all measurement parameters, etc. for the material (mass) balance monitoring process. Provide additional text describing the missing information. (DH)		This section was provided for general information and is intended to be a generic discussion of the material balance process. Material balance monitoring requirements are tank specific and are included in tank specific procedures for transfers.	
23.	Page 5-6, Section 5.1.3: The first paragraph mentions different interim stabilization requirements yet fails to describe the differences. Provide additional text and/or table comparing the old and new interim stabilization requirements. (DH)		Per discussions with Ecology on 9/19/02 and 10/22/02, interim stabilization requirements are beyond the scope of M-23-23. Interim stabilization criteria have been established through Consent Decree CT-99-5076-EFS. Tanks that do not meet interim stabilization criteria, or are susceptible to exceeding the criteria, have an increased monitoring frequency as described in Section 5.2.1.	

24.	Pg. 5-8, paragraph 2. Clarify the 40,000 gallons of waste; i.e., is it total waste, liquid waste, or some other category? (JC)		The 40,000 gallons is drainable interstitial liquid waste. All locations in the text will be modified to state "40,000 gallons of drainable interstitial liquid waste".	
25.	Pg. 5-8, paragraph 2. Liquid intrusion averaging 1,000 gal/yr is unacceptable. Provide a description of what is being done to control this problem? (JC)		The 1000 gal/yr is not defined as an acceptable intrusion rate. Rather, it is the historical intrusion that the interim stabilized tanks experienced over a 10-year duration. Appendix B, Section 2.1 describes ongoing intrusion prevention activities.	
26.	Pg. 5-8, paragraph 2. Provide a publication date and a title/summary of RPP-10435, as it seems integral to the argument being made here. (JC)		The citation will be added: "RPP-10435, *Single-Shell Tank System Integrity Assessment Report*". The reference will also be updated in Section 8.0.	
27.	Table 6-2 shows a single cost that is reflected in Appendix C for tanks readily accessible through risers. Estimates of the cost of conducting a liquid waste volume assessment are grossly deficient. No attempt is made to address the costs if tanks have constraints to entry. Section 6.0 contains a single paragraph that addresses costs for ENRAF installation; the total cost shown ($144K) does not match the estimate for installation in tank C-106 ($132K). No supporting data are provided for either of the costs shown. The information provided is grossly insufficient for Ecology to evaluate the bases of the costs or to determine the impacts on compliance should inadequate funding be received for FY03. No identification of funding sources is made, even at the PBS level. Ecology cannot be assured that the funds will be available in FY03 because ORP is constrained by DOE HQ from revealing details of funding. Nothing assures this reviewer that the work will actually get done or that it will have any source of assured funding. The information is therefore unacceptable as submitted. (MB)		Many of the statements such as "grossly deficient" and "grossly insufficient" appear to be opinion without the pertinent source or authority referenced per Section 9.2.1 of the HFFACO. During negotiations, the information on cost was added due to the uncertainty related to the M-23-23 F&R. Now that the document is completed and the technical basis established, the work can be accomplished within the existing baseline. With that in mind, DOE recommends deleting the cost and extra equipment from the scope of the M-23-23 Milestone. Although this identification of funding sources is a TPA requirement, this requirement is outside the scope of this document.	

28.	The schedules provided in Section D for installation of an ENRAF and an LOW are not supported by detailed cost information in Appendix C. The schedules show installation in the first quarter of Federal Fiscal Year 2003 (Oct-Dec 2002). It appears from the schedules that all of the installations will be completed by the end of December 2002. The locations of the C-106 tank and the vault tanks would seem to imply that multiple crews will be conducting the installations. Without planning data to the contrary, Ecology will expect the entire volume measurement/ENRAF and LOW installations effort to be completed by 1 January 2003. Cost information should be provided for each installation then summed with ALL assumptions included. (MB)		It appears the reviewer has mis-understood the schedule, which was provided to give an idea of the timeframes for installation. DOE did not intend to imply we were modifying M-23-25. An assessment schedule will be provided by September 15, 2003. Once the volume assessment is complete, the results will be compared against the technical requirements of this document and appropriate changes will be made."	
29.	The schedules in section D include activities such as mockup/training. Ecology cannot determine if such training is done for every installation or once. Without such information, Ecology cannot gauge the cost of installation accurately. (MB)		DOE does not understand the relevancy of this comment and how it applies to the scope of this document.	
30.	Executive Summary, Page iv, last para: Strike the statement "...monitoring for safe storage, ...are beyond the scope of this document." Part of the purpose of this document is to document "monitoring" activities for the SSTs. Monitoring for unfit-for-use underground storage tanks shall include monitoring for safe storage. Revise this document to include and describe safe storage monitoring. (DH)		The sentence was incorrect. Executive Summary, Page iv, second paragraph, first sentence will be revised to: "Functions and requirements for monitoring other activities associated with the single-shell tank system, including monitoring associated with retrieval or groundwater quality, are beyond the scope of this document." The last sentence will be deleted.	
31.	Page 1-2, Last paragraph: Typo. Last sentence should read "This F&R document supports..." (DH)		The typo will be corrected.	
32.	Page 1-7, Fig. 1-4. Correct this figure to include a schematic of construction of tanks in the SX and A Tank Farms where the intersection of the sidewall and bottom is orthogonal, NOT dished. Also, add information as to which tanks farms include tanks of the different capacities and constructions shown. (JC)		SX tanks do have a dished bottom. A and AX tanks have flat bottoms. The figure will be revised to include this information.	

REVIEW COMMENT RECORD (RCR)	1. Date 11-06-02	2. Review No.
	3. Project No.	4. Page Page 15 of 16

33.	Page 6-1, Section 6.0, third paragraph: Explain why it costs $79,000 to connect an ENRAF to the TMACS. (DH)		See response to Comment #29.	
34.	Pages 6-2 – 6-5, Tables 6-1, and 6-2. What is the basis of these cost estimates? (JC)		See response to Comment #27.	
35.	Page A-4 to A-5: Missing is a description of the destination of any liquid drainage for each At-Tank Pit. Provide the missing information. (DH)		A general description was included in Section 3.1.3: "By engineering design, pits drain to tanks".	
36.	Page A-5: Missing is a description of the status of each "Active" SST transfer line. Provide the missing description, including the nature of any secondary containment, the destination of any secondary containment drainage, and the specific type of leak detection used. (DH)		The description of active piping was provided in Section 3.1.5. Typically, transfer piping was designed to drain to pits, and pits to drain to tanks. DOE does not assert that this piping has secondary containment. As a result, LDM will occur during transfers as described in Section 5.1.2.	
37.	Section 3.0: Define how much and what kinds of additions were added to enhance storage life and is this still the best management practice. (KDW)		This section was provided for general information and is a discussion of past practices. It is not intended to provide a comprehensive history of the SSTs. No liquids are currently being added to the tanks unless it is approved under the SST Part A.	
38.	Section 3.0: Describe what types of heat producing radionuclides were removed, which were left and why. (KDW)		This section was provided for general information and is a discussion of past practices. It is not intended to provide a comprehensive history of the SSTs.	
39.	Section 4.3.2: List tank farm procedure for daily inspections. (KDW)		Further discussion of tank farm inspections was provided in Section 5.1.2, pages 5-5 and 5-6.	
40.	Section 5.1.2: How and why was the 30 minute response time for manual shutdown by operator determined. Is this the only fail safe. (KDW)		The 30-minute response time is determined by the commute distance and access into the farm, including time for personnel to dress into required Personnel Protective Equipment.	

41.	Section 5.2.1: Explain why certain tanks deemed to have suspect integrity, determined to be a leaker or experienced intrusion at a rate greater than 1,000 gal/yr would not require monitoring at a frequency greater than annually. (KDW)		The technical basis for monitoring frequency is provided in Appendix B, Section B 4.0.	
42.	Section 5.2.1: This section states that a determination can be to demonstrate a tank does not show suspect integrity. Explain this determination. (KDW)		As stated in Section 5.2.1, a tank is deemed to have suspect integrity if it has been previously declared a known or assumed leaker (HNF-EP-0182, Rev. 166) or was identified in RPP-10435 as having a bulge or having stored boiling waste.	
43.	Section 5.2.1: Reconcile a five-year inspection frequency with a possible intrusion rate of 1,000 gal/yr. (KDW)		Per agreement with Ecology on 10/22/02, the frequency will be changed to annually. The tanks in this category have been interim stabilized and contain < 40,000 gallons drainable interstitial liquid. If an intrusion event were to occur, the liquid would be absorbed into the solid and the interstitial liquid level would slowly rise. This level would not be readily detectable for some period of time.	
44.	Section 5.2.1: Define what is considered in a "timely manner" to facilitate a response action. (KDW)		Per agreement with Ecology on 10/22/02, the frequency will be changed to annually.	

Attachment 3
02-ED-041

Draft Change Control Form
Change Number M-23-02-02

Change Number	Federal Facility Agreement and Consent Order Change Control Form Do not use blue ink. Type or print using black ink.	Date
M-23-02-02 Draft		December 19, 2002

Originator DOE-ORP **Phone 376-2247**

Class of Change

[ ] I – Signatories [X] II – Executive Manager [ ] III – Project Manager

Change Title

Modification of Hanford Federal Facility Agreement and Consent Order (HFFACO) M-23 milestone to reflect the agreements reached in the M-23-23 Function and Requirements document.

Description/Justification of Change

The HFFACO milestone M-23-23 Single-Shell Tank (SST) System Leak Detection and Monitoring Functions and Requirements (F&R) document establishes leak detection and monitoring requirements for the safe storage of waste in the SST system.

Impact of Change

This change request modifies the Hanford Federal Facility Agreement and Consent Order (HFFACO) M-23 milestone to reflect the agreements reached in the M-23-23 Functions and Requirements document.

Affected Documents

The Hanford Federal Facility Agreement and Consent Order, as amended, including HFFACO Action Plan Appendix D, DOE's Annual Land Disposal Restrictions Report, the Hanford site-wide hazardous waste facility permit, DOE's Tank Farm Closure/Post-Closure Workplan Update, and Hanford site internal planning, management, and budget documents (e.g., DOE and DOE contractor Baselines, Baseline Change Control documents; Sitewide Systems Engineering Control documents; Project Management Plans; and the Hanford site Integrated Priority List (IPL)).

Approvals

_____	_____	_____ Approved	_____ Disapproved
Ecology	Date		
_____	_____	_____ Approved	_____ Disapproved
DOE - ORP	Date		
_____	_____	_____ Approved	_____ Disapproved
EPA	Date		

Modifications to the M-23 series milestone incorporated into the HFFACO by approval of this M-23-02-02 Change Request are shown here as either shaded additions, or ~~strikethrough~~ deletions.

M/S Number	Milestone Description	Due Date
M-023-25	COMPLETE THE INSTALLATION OF LIQUID OBSERVATION WELLS (LOWs) FOR SSTs AX-103, B-101, T-101, T-109, TX-103, TX-104, B-107, B-108, B-109, BY-108, BX-110, TX-116, C-102, C-105, BX-109, TY-105, U-110, A-106, C-112, SX-111, SX-112, S-107, C-103, AND TX-105. ORDER OF INSTALLATION OF THESE LOWs SHALL GIVE PRIORITY TO THOSE CONTAINING PREDOMINANTLY SALT CAKE, OR WHICH OTHERWISE POSE A HIGHER RISK OF ENVIRONMENTAL CONTAMINATION SHOULD THEY FAIL. NOTE: LOW MONITORING FREQUENCY AND OTHER LEAK DETECTION AND MONITORING REQUIREMENTS WILL BE REVIEWED AS PART OF THE SINGLE-SHELL TANK SYSTEM LEAK DETECTION AND MONITORING FUNCTIONS AND REQUIREMENTS DOCUMENT.	September 30, 2004
M-023-25A	COMPLETE THE INSTALLATION OF LIQUID OBSERVATION WELLS (LOWs) AND BEGIN WEEKLY LIQUID OBSERVATION MONITORING FOR FOUR SSTs	March 31, 2002
M-023-25B	COMPLETE THE INSTALLATION OF LIQUID OBSERVATION WELLS (LOWs) AND BEGIN WEEKLY LIQUID OBSERVATION MONITORING FOR FOUR SSTs	September 30, 2002
M-023-25C	COMPLETE THE INSTALLATION OF LIQUID OBSERVATION WELLS (LOWs) AND BEGIN WEEKLY LIQUID OBSERVATION MONITORING FOR FOUR SSTs	March 31, 2003
M-023-25D	COMPLETE THE INSTALLATION OF LIQUID OBSERVATION WELLS (LOWs) AND BEGIN WEEKLY LIQUID OBSERVATION MONITORING FOR FOUR SSTs	September 30, 2003
~~M-023-25E~~	~~PROCURE NECESSARY EQUIPMENT TO SUPPORT ADDITIONAL LOW MONITORING SYSTEMS.~~	~~September 30, 2003~~
M-023-25F	COMPLETE THE INSTALLATION OF LIQUID OBSERVATION WELLS (LOWs) AND BEGIN WEEKLY LIQUID OBSERVATION MONITORING FOR FOUR ADDITIONAL SSTs.	March 31, 2004
M-023-25G	COMPLETE THE INSTALLATION OF LIQUID OBSERVATION WELLS (LOWs) AND BEGIN WEEKLY LIQUID OBSERVATION MONITORING FOR FOUR ADDITIONAL SSTs.	September 30, 2004
M-23-26	**SUBMIT AN ASSESSMENT SCHEDULE FOR PERFORMANCE OF LIQUID VOLUME ASSESSMENTS FOR MISCELLANEOUS UNDERGROUND STORAGE TANKS IDENTIFIED IN FIGURE 4-3, AND FOR LIQUID VOLUME ASSESSMENTS FOR VESSELS IN MISCELLANEOUS STRUCTURES IDENTIFIED IN FIGURE 4-4.**	**September 15, 2003**

RPP-9937
Revision B

Single-Shell Tank System Leak Detection and Monitoring Functions and Requirements Document

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

CH2MHILL
Hanford Group, Inc.
Richland, Washington

Contractor for the U.S. Department of Energy
Office of River Protection under Contract DE-AC27-99RL14047

EXECUTIVE SUMMARY

This Functions and Requirements (F&R) document establishes leak detection and monitoring functions and requirements for the single-shell tank (SST) system during storage of waste as required by Hanford Federal Facility Agreement and Consent Order Milestone M-23-23, "Submit Single-Shell Tank System Leak Detection and Monitoring Functions and Requirements Document for Ecology Approval." The F&Rs come from an analysis of applicable regulations, the current physical condition of system components, and the current leak detection and monitoring (LDM) program. In addition, best management practices that go beyond the LDM F&Rs define how tanks will be monitored for leak detection and liquid intrusion purposes by processes other than direct in-tank liquid level detection.

There are several functions related to leak detection that are applied to the components of the SST system based on the requirements of 40 Code of Federal Regulations (CFR) 265. These functions have been developed in response to the regulations and include:

- *Detect the leak,*
- *Contain the leak,*
- *Respond to the leak, and*
- *Evaluate the SST system status.*

Each function must be accomplished in a manner that meets a specified objective, referred to as a requirement. Examples of requirements include:

- *Detect the leak within 24 hours or as soon as practicable,*
- *Mitigate the effects of the leak as soon as practicable,*
- *Respond to the leak within 24 hours of detecting the leak,*
- *Determine if the waste is compatible with the tank material.*

This document also identifies and describes SST system components, requirements applicable to leak monitoring of SST system components, and components that currently do and do not have

leak monitoring. This document groups the components in the SST system and assigns F&Rs to these groups consistent with the leak monitoring requirements of 40 CFR 265. Changes to the current monitoring program based on the difference between its current state and its required state are provided. Figures ES-1, ES-2, and ES-3 graphically represent the F&R grouping logic, applicable F&Rs, and number of components in each F&R group for SSTs, miscellaneous underground storage tanks (MUST), and vessels and cells in miscellaneous structures, respectively.

This document provides the basis for sorting the 149 SSTs into four groups for purposes of establishing the LDM F&R. Table ES-1 provides a summary of the characteristics of the tanks and the required monitoring; the table is sorted by the four groups. Data used to group the tanks were derived from published data available that describe the condition of the SSTs, and the quantity and characteristics of the waste in the tanks. The groupings are based on the volume of drainable liquid capable of leaking to the environment, the integrity of the SST, the ability of existing Tank Farm technology to detect and respond to a leak if one occurred, and the potential significance of a leak. Tanks that do not meet interim stabilization criteria and/or tanks that may have suspect integrity receive more frequent monitoring than sound tanks that meet interim stabilization criteria. All 149 SSTs will receive monitoring, either as direct liquid level monitoring to detect leaks or as periodic monitoring to detect liquid intrusions. If conditions for a tank change as a result of monitoring, the grouping and monitoring frequency will be reevaluated and recategorized per the requirements established by this document.

This document provides the basis for sorting MUSTs into four groups for purposes of establishing the LDM F&Rs. The groupings are based on the volume of drainable liquid capable of leaking to the environment, the potential for liquid intrusions, and the available information on the liquid volumes. Table ES-2 provides a summary of the MUSTs and the required monitoring. The MUSTs subject to the requirements in this document include those MUSTs associated with the SST system that are not Resource Conservation and Recovery Act of 1976 (RCRA) Past-Practice or Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Past-Practice Units. The MUSTs identified in this document will receive monitoring, either direct liquid level monitoring to detect leaks or as periodic

monitoring to detect liquid intrusions. If conditions for a MUST change, the grouping and monitoring frequency will be reevaluated and recategorized per the requirements established by this document.

This document provides the basis for sorting vessels and cells in miscellaneous structures into three groups for purposes of establishing the LDM F&Rs. The groupings are based on the volume of drainable liquid capable of leaking to the environment, the potential for liquid intrusions, and the available information on the liquid volumes. Table ES-3 provides a summary of the vessels and the required monitoring. Vessels and cells subject to the requirements in this document include those associated with the SST system that are not RCRA Past-Practice or CERCLA Past-Practice Units. Vessel and cell conditions will receive routine monitoring. If conditions for a vessel change, the grouping and monitoring frequency will be reevaluated and per the requirements established by this document.

Functions and requirements for monitoring other activities associated with the SST system, including monitoring associated with retrieval or groundwater quality, are beyond the scope of this document. Liquid level monitoring activities based on F&Rs other than detecting and responding to a leak are, however, discussed in Section 5.0 and Appendix B with best management practices identified for appropriate tanks and vessels. This document is a Hanford Federal Facility Agreement and Consent Order Primary Document requiring Washington State Department of Ecology review and approval. Document revisions will follow the criteria outlined in Section 9.3 of the Hanford Federal Facility Agreement and Consent Order.

Figure ES-1. Single-Shell Tank Leak Detection and Monitoring Requirements

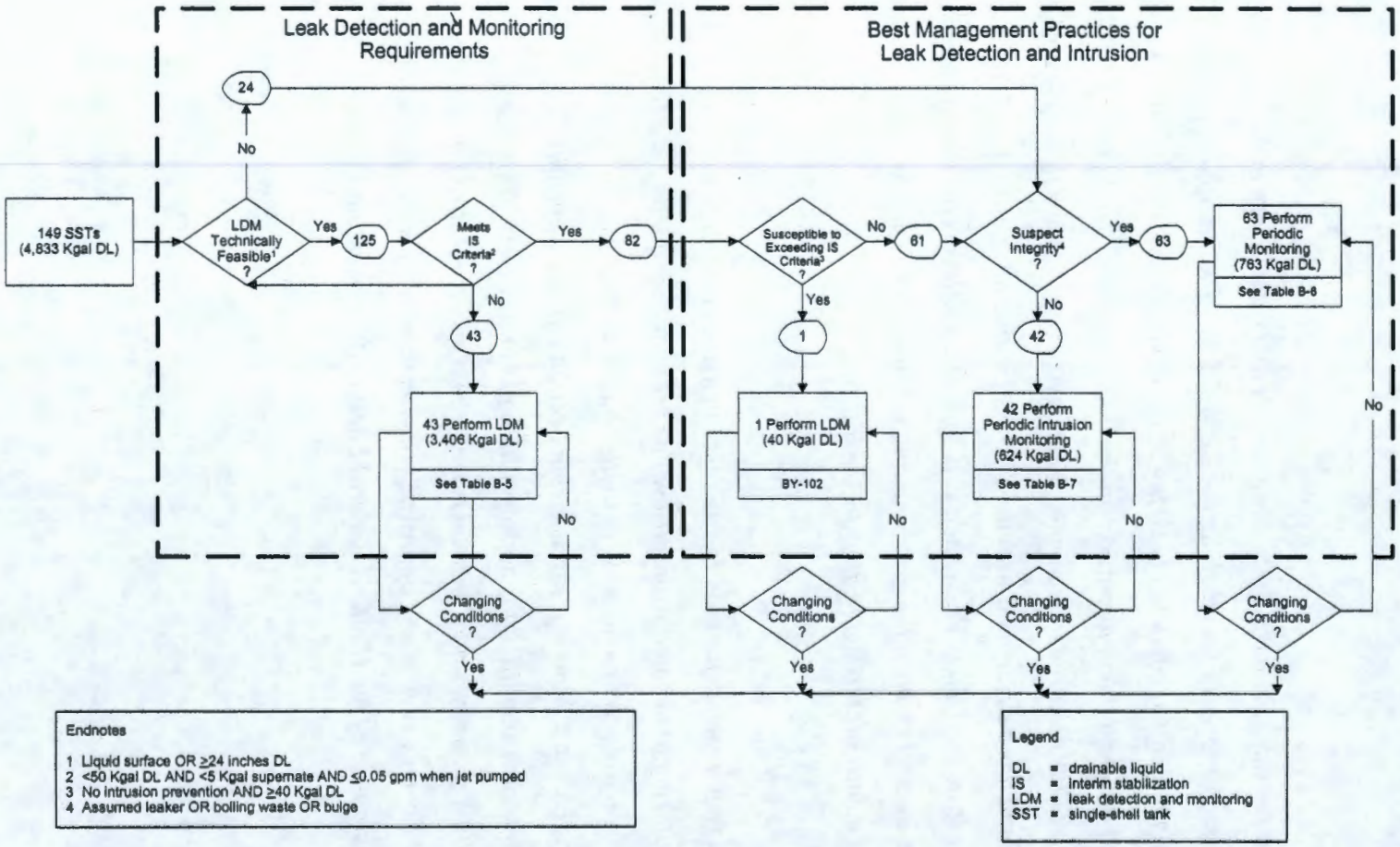


Figure ES-2. Miscellaneous Underground Storage Tank Leak Detection and Monitoring Requirements

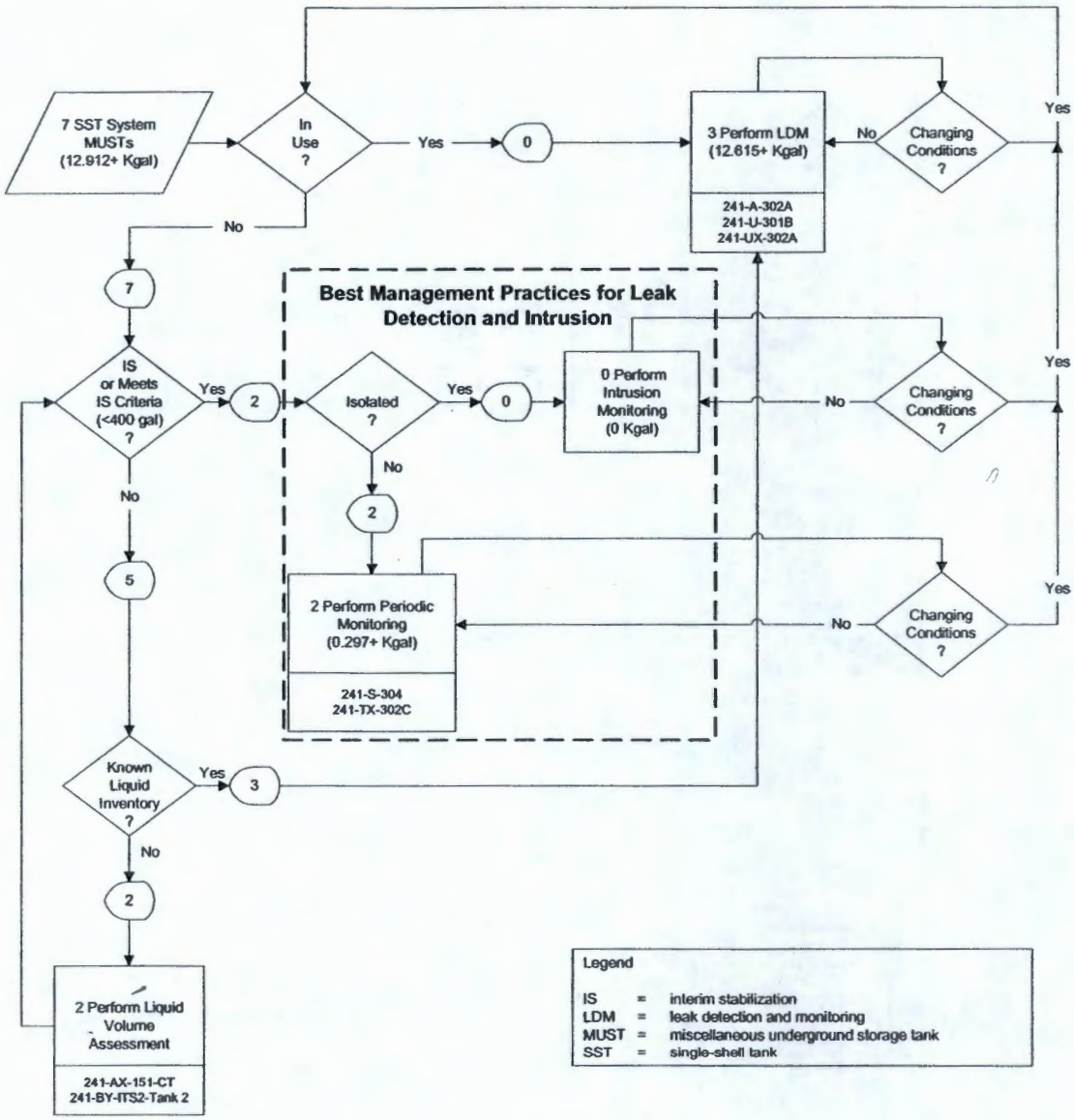


Figure ES-3. Miscellaneous Structure Leak Detection and Monitoring Requirements

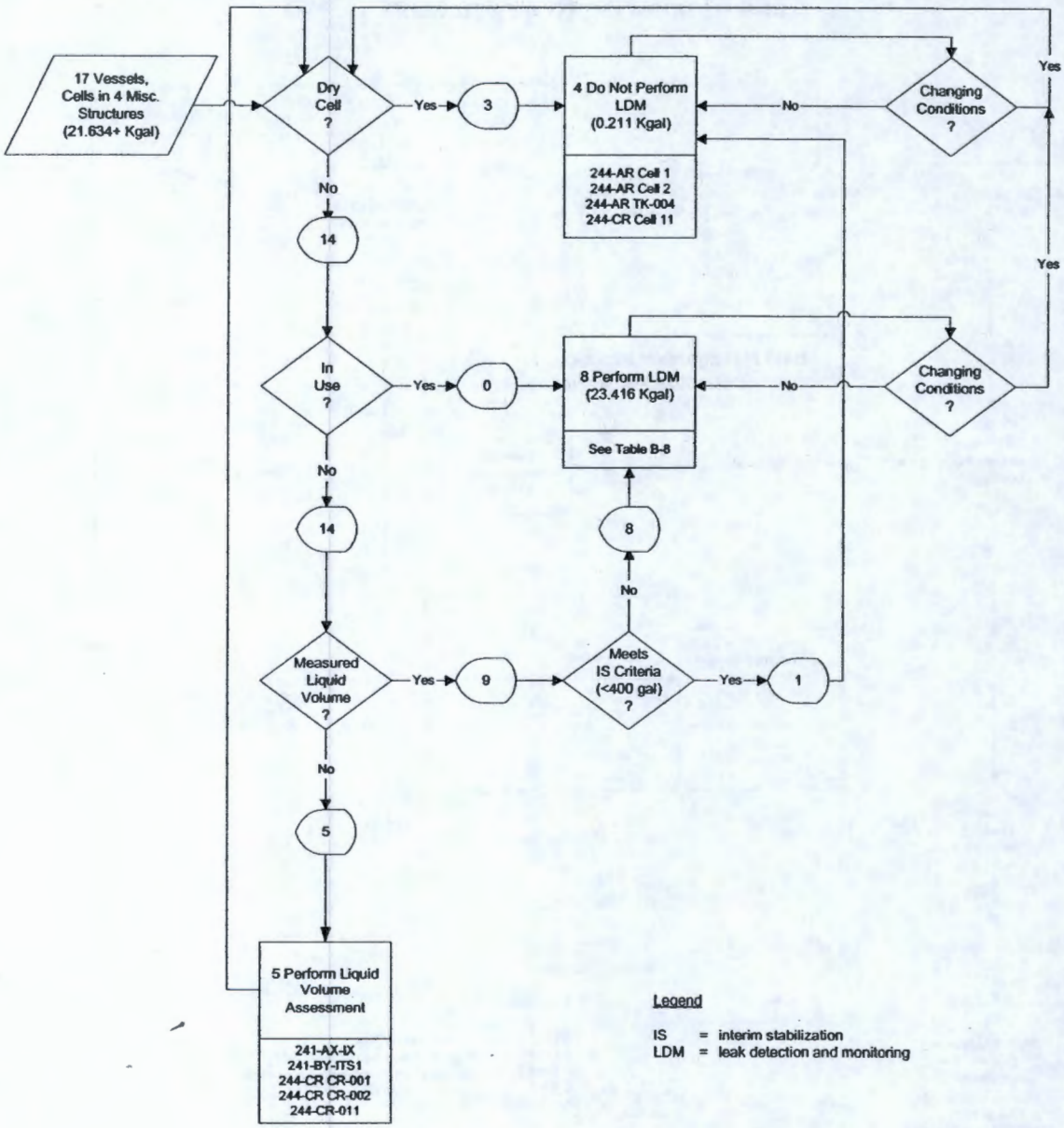


Table ES-1. Single-Shell Tank Summary (6 Sheets)

Tank	Suspect Integrity	Interim Stabilized	Intrusion Prevention	Drainable Interstitial Liquid (Kgals)	Sludge Volume (Kgal)	Saltcake Volume (Kgal)	Drainable Liquid (Kgal)	Supernatant Liquid (Kgal)	Liquid Level (In.)	Current Leak Detection Method	Food Instrument Corporation/ENRAF™	Manual Tape	Liquid Observation Well	Surface	Monitoring Frequency and Instrument
63 Perform Periodic Monitoring (Total Drainable Liquid = 763 Kgal)															
A-102	x	x		9	0	36	11	2	15	N	E*			Dry	Annual – ENRAF™
AX-102	x	x	x	0	6	24	0	0	14	N	E*	T		Dry	Annual – ENRAF™
AX-104	x	x	x	0	7	0	0	0	3	N	E*			Dry	Annual – ENRAF™
B-103	x	x	x	10	1	55	10	0	17	N	E*			Dry	Annual – ENRAF™
BX-108	x	x	x	4	31	0	4	0	5	N	E*			Dry	Annual – ENRAF™
BX-111	x	x	x	6	32	157	6	0	21	L	E*		L	Dry	Annual – LOW
C-111	x	x	x	4	57	0	4	0	16	N		T		Dry	Annual – Manual Tape
C-201	x	x	x	0	1	0	0	0	17	N		T		Dry	Annual – Manual Tape
C-202	x	x	x	0	1	0	0	0	10	N	E			Dry	Annual – ENRAF™
C-204	x	x	x	0	3	0	0	0	18	N		T		Dry	Annual – Manual Tape
SX-113	x	x	x	0	19	0	0	0	15	N	E*			Dry	Annual – ENRAF™
T-103	x	x	x	3	23	0	7	4	5	N	E*			Dry	Annual – ENRAF™
T-106	x	x	x	0	22	0	0	0	3	N	E*			Dry	Annual – ENRAF™
T-109	x	x	x	11	0	62	11	0	17	N	E*		M-23-25	Dry	Annual – LOW
TX-107	x	x	x	7	0	30	7	0	20	N	E*			Dry	Annual – ENRAF™
TY-101	x	x	x	2	72	46	2	0	17	N	E*			Dry	Annual – ENRAF™
TY-106	x	x	x	1	16	0	1	0	14	N	E*			Dry	Annual – ENRAF™
U-112	x	x	x	4	45	0	4	0	13	N		T		Dry	Annual – Manual Tape
A-104	x	x	x	0	28	0	4	0	NA	N	E*			Dry	Annual - ENRAF™
A-105	x	x	x	0	37	0	0	0	NA	N	E*			Dry	Annual - ENRAF™
A-106	x	x	x	9	50	29	9	0	46	N	E*		L	Dry	Annual - LOW
AX-103	x	x	x	22	8	100	22	0	41	N	E*		L	Dry	Annual - LOW
B-101	x	x	x	20	28	81	20	0	35	N	E*		M-23-25	Dry	Annual - LOW
B-105	x	x	x	20	28	262	20	0	40	L	E*		L	Dry	Annual - LOW
B-107	x	x	x	23	86	75	23	0	47	N	E*		M-23-25	Dry	Annual - LOW
B-110	x	x	x	27	244	0	28	1	96	L	E*		L	Dry	Annual - LOW
B-111	x	x	x	23	241	0	24	1	88	L	E*		L	Dry	Annual - LOW
B-112	x	x	x	2	15	17	5	3	7	E	E*			Liquid	Annual - ENRAF™

63 → 63 Perform Periodic Monitoring (763 Kgal DL)

LDM Technically Feasible? No
Dry surface AND < 24 inches drainable liquid **Suspect Integrity? No**

Not assumed leaker AND no boiling waste AND no bulge

OR

LDM Technically Feasible? Yes
Liquid surface OR ≥ 24 inches drainable liquid
Meets Interim Stabilization Criteria? Yes
Susceptible to Exceeding IS Criteria? No
Intrusion prevention OR < 40 Kgal drainable liquid
Suspect Integrity? No
Not assumed leaker AND no boiling waste AND no bulge

Table ES-1. Single-Shell Tank Summary (6 Sheets)

Tank	Suspect Integrity	Interim Stabilized	Intrusion Prevention	Drainable Interstitial Liquid (Kgals)	Sludge Volume (Kgal)	Saltcake Volume (Kgal)	Drainable Liquid (Kgal)	Supernatant Liquid (Kgal)	Liquid Level (In.)	Current Leak Detection Method	Food Instrument Corporation/ENRAF™	Manual Tape	Liquid Observation Well	Surface	Monitoring Frequency and Instrument
B-203	x	x	x	5	51	0	6	1	261	E	E*			Liquid	Annual - ENRAF™
B-204	x	x	x	5	50	0	6	1	257	E	E*			Liquid	Annual - ENRAF™
BX-101	x	x	x	4	48	0	4	0	NA	E	E*			Liquid	Annual - ENRAF™
BX-102	x	x	x	0	112	0	0	0	31	N	E*			Dry	Annual - ENRAF™
BX-110	x	x	x	35	65	139	36	1	67	N	E*		L	Dry	Annual - LOW
BY-107	x	x	x	42	15	257	42	0	70	L		T	L	Dry	Annual - LOW
C-101	x	x	x	4	88	0	4	0	28	N	E*			Dry	Annual - ENRAF™
C-110	x	x	x	37	177	0	38	1	57	E	E*			Liquid	Annual - ENRAF™
C-203	x	x	x	0	3	0	0	0	29	N		T		Dry	Annual - Manual Tape
S-104	x	x	x	49	132	156	49	0	111	L	E*		L	Dry	Annual - LOW
SX-106	x	x		37	0	397	37	0	63	L	E*		L	Dry	Annual - LOW
SX-107	x	x	x	7	79	16	7	0	43	N	E*			Dry	Annual - ENRAF™
SX-108	x	x	x	0	73	0	0	0	47	N	E*			Dry	Annual - ENRAF™
SX-109	x	x	x	0	58	183	0	0	96	N	E*			Dry	Annual - ENRAF™
SX-110	x	x	x	0	29	27	0	0	28	N	E*			Dry	Annual - ENRAF™
SX-111	x	x	x	11	76	39	11	0	50	N	E*		M-23-25	Dry	Annual - LOW
SX-112	x	x	x	6	56	19	6	0	39	N	E*		M-23-25	Dry	Annual - LOW
SX-114	x	x	x	30	42	115	30	0	71	N	E*			Dry	Annual - ENRAF™
SX-115	x	x	x	0	4	0	0	0	NA	N	E			Dry	Annual - ENRAF™
T-101	x	x		16	37	63	16	0	25	N	E*		M-23-25	Dry	Annual - LOW
T-107	x	x		34	173	0	34	0	66	E	E*			Liquid	Annual - ENRAF™
T-108	x	x	x	4	5	11	4	0	12	E	E*			Liquid	Annual - ENRAF™
T-111	x	x		38	447	0	38	0	146	L	E*		L	Dry	Annual - LOW
TX-105	x	x	x	25	8	568	25	0	31	N	E*		M-23-25	Dry	Annual - LOW
TX-110	x	x	x	14	37	430	14	0	33	L	E*		L	Dry	Annual - LOW
TX-113	x	x	x	18	93	546	18	0	47	L	E*		L	Dry	Annual - LOW
TX-115	x	x	x	25	8	546	25	0	35	L	E*		L	Dry	Annual - LOW
TX-116	x	x	x	21	66	531	21	2	52	N	E*		L	Dry	Annual - LOW
TX-117	x	x	x	10	29	452	10	0	30	L	E*		L	Dry	Annual - LOW
TY-103	x	x	x	23	103	52	23	0	56	L	E*		L	Dry	Annual - LOW
TY-104	x	x	x	4	43	0	5	1	24	E	E*			Liquid	Annual - ENRAF™
TY-105	x	x	x	12	231	0	12	0	70	N	E*		L	Dry	Annual - LOW
U-101	x	x	x	4	24	0	4	0	5	M		T		Liquid	Annual - Manual Tape
U-104	x	x	x	0	122	0	0	0	NA	N		T		Dry	Annual - Manual Tape
U-110	x	x		16	176	0	16	0	62	N	E		L	Dry	Annual - ENRAF™

Table ES-1. Single-Shell Tank Summary (6 Sheets)

Tank	Suspect Integrity	Interim Stabilized	Intrusion Prevention	Drainable Interstitial Liquid (Kgals)	Sludge Volume (Kgal)	Saltcake Volume (Kgal)	Drainable Liquid (Kgal)	Supernatant Liquid (Kgal)	Liquid Level (In.)	Current Leak Detection Method	Food Instrument Corporation/ENRAF™	Manual Tape	Liquid Observation Well	Surface	Monitoring Frequency and Instrument
42 Perform Periodic Intrusion Monitoring (Total Drainable Liquid = 624 Kgal)															
42 → 42 Perform Periodic Intrusion Monitoring (624 Kgal DL)															
LDM Technically Feasible? No Dry surface AND < 24 inches drainable liquid **Suspect Integrity? No** Not assumed leaker AND no boiling waste AND no bulge															
OR															
LDM Technically Feasible? Yes Liquid surface OR ≥ 24 inches drainable liquid **Meets Interim Stabilization Criteria? Yes** **Susceptible to Exceeding IS Criteria? No** Intrusion prevention OR < 40 Kgal drainable liquid **Suspect Integrity? No** Not assumed leaker AND no boiling waste AND no bulge															
BX-106		x	x	4	38	0	4	0	0	N	E*			Dry	Annual – ENRAF™
C-108		x	x	4	66	0	4	0	20	N	E*			Dry	Annual – ENRAF™
C-109		x	x	4	63	0	4	0	20	N	E*			Dry	Annual – ENRAF™
S-108		x		4	5	545	4	0	17	L	E*		L	Dry	Annual – LOW
TX-108		x	x	8	6	123	8	0	20	N	E*		L	Dry	Annual – LOW
U-203		x	x	0	3	0	1	1	19	N	E			Dry	Annual – ENRAF™
B-102		x	x	7	0	28	11	4	7	E	E*			Liquid	Annual - ENRAF™
B-104		x	x	45	309	65	45	0	132	L	E*		L	Dry	Annual - LOW
B-106		x	x	8	121	0	9	1	38	E	E*			Liquid	Annual - ENRAF™
B-108		x	x	19	27	65	19	0	30	N	E*		M-23-25	Dry	Annual - LOW
B-109		x	x	23	50	75	23	0	42	N	E*		M-23-25	Dry	Annual - LOW
B-202		x	x	4	29	0	4	0	143	E	E*			Liquid	Annual - ENRAF™
BX-104		x	x	4	97	0	7	3	32	E	E*			Liquid	Annual - ENRAF™
BX-107		x	x	37	347	0	37	0	121	E	E*			Liquid	Annual - ENRAF™
BX-109		x	x	25	193	0	25	0	66	N	E*		M-23-25	Dry	Annual - LOW
BX-112		x	x	9	163	0	10	1	55	E	E*			Liquid	Annual - ENRAF™
BY-101		x	x	24	37	333	24	0	89	L		T	L	Dry	Annual - Manual Tape
BY-110		x	x	20	43	323	20	0	60	L	E		L	Dry	Annual - LOW
BY-111		x	x	14	0	302	14	0	27	L	E		L	Dry	Annual - LOW
BY-112		x	x	24	2	284	24	0	28	L		T	L	Dry	Annual - LOW
C-104		x	x	29	259	0	29	0	NA	N	E*		L	Dry	Annual - LOW
C-105		x		10	132	0	10	0	44	N	E*		M-23-25	Dry	Annual - LOW
C-112		x	x	6	104	0	6	0	33	N	E*		M-23-25	Dry	Annual - LOW
S-105		x	x	42	2	404	42	0	54	L	E*		L	Dry	Annual - LOW
S-110		x		30	96	293	30	0	92	L	E*		L	Dry	Annual - LOW
T-104		x		31	317	0	31	0	107	L	E*		L	Dry	Annual - LOW
T-105		x	x	5	98	0	5	0	30	N	E*			Dry	Annual - ENRAF™
T-202		x	x	3	21	0	3	0	109	E	E*			Liquid	Annual - ENRAF™
T-203		x	x	5	37	0	5	0	182	N	E*			Dry	Annual - ENRAF™
T-204		x	x	5	37	0	5	0	197	E	E*			Liquid	Annual - ENRAF™

Table ES-1. Single-Shell Tank Summary (6 Sheets)

Tank	Suspect Integrity	Interim Stabilized	Intrusion Prevention	Drainable Interstitial Liquid (Kgals)	Sludge Volume (Kgal)	Saltcake Volume (Kgal)	Drainable Liquid (Kgal)	Supernatant Liquid (Kgal)	Liquid Level (In.)	Current Leak Detection Method	Food Instrument Corporation/ENRAF™	Manual Tape	Liquid Observation Well	Surface	Monitoring Frequency and Instrument
TX-101		x	x	7	74	17	7	0	39	E	E*			Liquid	Annual - ENRAF™
TX-103		x	x	18	0	145	18	0	34	N	E*		M-23-25	Dry	Annual - LOW
TX-104		x	x	9	34	32	12	3	31	N	E*		M-23-25	Dry	Annual - LOW
TX-109		x	x	6	363	0	6	0	126	L	E*		L	Dry	Annual - LOW
TX-111		x	x	10	43	322	10	0	30	L	E*		L	Dry	Annual - LOW
TX-112		x	x	26	0	634	26	0	63	L	E*		L	Dry	Annual - LOW
TX-118		x	x	31	0	256	31	0	40	L	E*		L	Dry	Annual - LOW
TY-102		x	x	13	0	69	13	0	30	E	E*			Liquid	Annual - ENRAF™
U-103		x		33	13	405	34	1	61	L	E*		L	Dry	Annual - LOW
U-201		x	x	1	4	0	2	1	28	M		T		Liquid	Annual - Manual Tape
U-202		x	x	0	3	0	1	1	27	M		T		Liquid	Annual - Manual Tape
U-204		x	x	0	3	0	1	1	18	E	E			Liquid	Annual - ENRAF™
43 Perform LDM (Total Drainable Liquid = 3,406 Kgal)															
43 → 43 Perform LDM (3,406 Kgal DL)	**LDM Technically Feasible? Yes** Liquid surface OR ≥ 24 inches drainable liquid **Meets Interim Stabilization Criteria? No**														
A-101	x			95	3	482	590	494		L	E*		L	Dry	Weekly – LOW
A-103	x	x	x	87	2	364	91	4	139	L	E*		L	Dry	Weekly – LOW
AX-101	x			74	3	383	438	364		L	E*		L	Dry	Weekly – LOW
B-201	x	x	x	5	30	0	5	0		E	E*			Liquid	Weekly – ENRAF™
BX-103		x	x	4	62	0	15	11	19	E	E*			Liquid	Weekly – ENRAF™
BX-105		x	x	4	67	0	9	5	25	N	E*			Dry	Weekly – ENRAF™
BY-103	x	x		58	9	407	58	0	116	L	E*		L	Dry	Weekly – LOW
BY-104		x	x	51	45	313	51	0	88	L		T	L	Dry	Weekly – LOW
BY-105	x			112	48	422	112	0		L		T	L	Dry	Weekly – LOW
BY-106	x			126	32	491	126	0		L		T	L	Dry	Weekly – LOW
BY-108	x	x	x	33	40	182	33	0	57	N		T	L	Dry	Weekly – LOW
BY-109		x		37	24	253	37	0	52	L	F		L	Dry	Weekly – LOW
C-102		x	x	62	316	0	62	0	94	N	E*		M-23-25	Dry	Weekly – LOW
C-103				10	125	0	85	75		E	E*		M-23-25	Dry	Weekly – LOW
C-106				1	6	0	31	30		N	E*			Dry	Weekly – ENRAF™
C-107		x	x	30	248	0	30	0	68	E	E*			Liquid	Weekly – ENRAF™
S-101				83	122	292	95	12		E	E*		L	Liquid	Weekly – LOW
S-102				93	22	421	93	0		L	E*		L	Dry	Weekly – LOW
S-103		x		45	9	227	46	1	69	E	E*		L	Liquid	Weekly – LOW
S-106		x		26	0	455	26	0		L	E*		L	Dry	Weekly – LOW

Table ES-1. Single-Shell Tank Summary (6 Sheets)

Tank	Suspect Integrity	Interim Stabilized	Intrusion Prevention	Drainable Interstitial Liquid (Kgals)	Sludge Volume (Kgal)	Saltcake Volume (Kgal)	Drainable Liquid (Kgal)	Supernatant Liquid (Kgal)	Liquid Level (In.)	Current Leak Detection Method	Food Instrument Corporation/ENRAF™	Manual Tape	Liquid Observation Well	Surface	Monitoring Frequency and Instrument
S-107				52	336	26	66	14		E	E*		L	Liquid	Weekly – LOW
S-109		x		16	13	520	16	0		L	E*		L	Dry	Weekly – LOW
S-111				82	76	417	130	48		E	E*		L	Liquid	Weekly – LOW
S-112				74	6	616	74	0		L	E*		L	Dry	Weekly – LOW
SX-101	x			93	144	269	93	0		L	E*		L	Dry	Weekly – LOW
SX-102	x			95	55	421	229	134		L	E*		L	Dry	Weekly – LOW
SX-103	x			31	8	485	31	0		L	E*		L	Dry	Weekly – LOW
SX-104	x	x		48	136	310	48	0	87	L	E*		L	Dry	Weekly – LOW
SX-105	x	x		39	65	311	39	0		L	E*		L	Dry	Weekly – LOW
T-102		x	x	3	19	0	16	13		E	E*			Liquid	Weekly – ENRAF™
T-110		x		48	369	0	48	1	147	L	E*		L	Dry	Weekly – LOW
T-112		x	x	4	60	0	11	7		E	E*			Liquid	Weekly – ENRAF™
T-201		x	x	4	29	0	6	2		E	E*			Liquid	Weekly – ENRAF™
TX-102		x	x	27	2	215	27	0	35	L	E*		L	Dry	Weekly – LOW
TX-106		x	x	37	5	343	37	0	64	L	E*		L	Dry	Weekly – LOW
TX-114	x	x	x	17	4	528	17	0	37	L	E*		L	Dry	Weekly – LOW
U-102		x		17	34	293	17	0		L	E		L	Dry	Weekly – LOW
U-105		x		44	32	321	44	0		L	E*		L	Dry	Weekly – LOW
U-106		x		36	0	170	38	2		L	E*		L	Dry	Weekly – LOW
U-107				92	15	310	125	33		E	E*		L	Liquid	Weekly – LOW
U-108				108	29	415	132	24		L	E*		L	Dry	Weekly – LOW
U-109		x*		49	35	366	49	0		L	E*		L	Dry	Weekly – LOW
U-111				80	26	264	80	0		L	E		L	Dry	Weekly – LOW
1 Perform LDM (Total Drainable Liquid = 40 Kgal)															
LDM Technically Feasible? Yes Liquid surface OR ≥ 24 inches drainable liquid **Meets Interim Stabilization Criteria? Yes** **Susceptible to Exceeding IS Criteria? Yes** No intrusion prevention AND ≥ 40 Kgal drainable liquid															
BY-102		x		40	0	227	40	0	63	L	E*		L	Dry	Weekly – LOW

Table ES-1. Single-Shell Tank Summary (6 Sheets)

Legend

Tank data in this table are derived from the sources provided below. Current conditions are not maintained in this document.

Suspect Integrity
- x = Assumed leaker per HNF-EP-0182, Rev. 173, or boiling waste or tank bulge per RPP-10435, Rev. 0

Interim Stabilized
- x = Saltwell pumped per HNF-EP-0182, Rev. 173
- x* = Saltwell pumped but not yet officially declared interim stabilized

Intrusion Prevention
- x = Isolated per HNF-EP-0182, Rev. 173

Drainable Interstitial Liquid = Volume in Thousands of Gallons per HNF-EP-0182, Rev. 173 or HNF-EP-0182, Rev. 161

Revision 173 of HNF-EP-0182 does not report these data for tanks currently undergoing interim stabilization, or that have only recently completed interim stabilization. Accordingly, the table uses data from HNF-EP-0182, Rev. 161, as this is the most current revision that reports these data for these tanks.

Sludge Volume = Volume in thousands of gallons per HNF-EP-0182, Rev. 173

Salt Cake Volume = Volume in thousands of gallons per HNF-EP-0182, Rev. 173

Drainable Liquid = Volume in thousands of gallons per HNF-EP-0182, Rev. 173 or HNF-EP-0182, Rev. 161

Revision 173 of HNF-EP-0182 does not report these data for tanks currently undergoing interim stabilization, or that have only recently completed interim stabilization. Accordingly, the table uses data from HNF-EP-0182, Rev. 161, as this is the most current revision that reports these data for these tanks.

Supernate = Volume of supernate in thousands of gallons per HNF-EP-0182, Rev. 173 or HNF-EP-0182, Rev. 161

Revision 173 of HNF-EP-0182 does not report these data for tanks currently undergoing interim stabilization, or that have only recently completed interim stabilization. Accordingly, the table uses data from HNF-EP-0182, Rev. 161, as this is the most current revision that reports these data for these tanks.

Liquid Level = Level in inches per RPP-5556, Rev. 0, or HNF-SD-RE-TI-178, Rev. 7

This column is blank for tanks are currently undergoing interim stabilization, or have only recently completed interim stabilization. A value of "NA" indicates the tank has a record in HNF-SD-RE-TI-178 (but not RPP-5556), but the record does not indicate the final liquid level.

Current Leak Detection Method per RPP-9645, Rev. 0
- N = None
- M = Manual tape on a liquid surface
- L = Liquid observation well (LOW)
- E = ENRAF™ gauge on a liquid surface[1]

Food Instrument Corporation / ENRAF™ per RPP-9645, Rev. 0
- F = Manual Food Instrument Corporation (FIC)
- E = Manual ENRAF™
- E* = Continuous ENRAF™ data available on the tank monitoring and control system

Manual Tape per RPP-9645, Rev. 0
- T = Tank is equipped with a manual tape

Liquid Observation Well per RPP-9645, Rev. 0
- L = Installed LOW
- M-23-25 = LOW installation scheduled per Milestone M-23-25

Surface = Condition observation from photo - photo may predate interim stabilization

[1] ENRAF is a trademark of the ENRAF Corporation, Houston, Texas.

Table ES-2. Miscellaneous Underground Storage Tank Summary

MUST No.	Liquid (Kgal)*	Monitoring Frequency
241-A-302A	6.57	Weekly – ENRAF™
241-AX-151-CT	Unknown	To be determined after liquid volume assessment
241-BY-ITS2-Tank 2	Unknown	To be determined after liquid volume assessment
241-S-304	0.13	Annual – ENRAF™
241-TX-302C	0.167	Annual – ENRAF™
241-U-301B	7.946	Weekly – ENRAF™
241-UX-302A	4.012	Weekly – ENRAF™

* Liquid volume estimates from HNF-EP-0182, Rev. 173
MUST = miscellaneous underground storage tank

Table ES-3. Vessels in Miscellaneous Structures Summary

Structure	Vessel	Liquid (Kgal)	Monitoring Frequency
241-AX-IX	Ion-exchange unit	Unknown	To be determined after liquid volume assessment
241-BY-ITS1	In-tank solidification unit	Unknown	To be determined after liquid volume assessment
244-AR	TK-001	0.817	Weekly - ENRAF™
244-AR	Cell 1	0	None*
244-AR	TK-002	10.208	Weekly - ENRAF™
244-AR	Cell 2	0	None*
244-AR	TK-003	1.991	Weekly - ENRAF™
244-AR	TK-004	0.211	None*
244-AR	Cell 3	3	Weekly - ENRAF™
244-CR	CR-001	Unknown	To be determined after liquid volume assessment
244-CR	Cell 1	1	Weekly - ENRAF™
244-CR	CR-002	Unknown	To be determined after liquid volume assessment
244-CR	Cell 2	1	Weekly - ENRAF™
244-CR	CR-003	3.007	Weekly - MT
244-CR	Cell 3	0.4	Weekly - ENRAF™
244-CR	CR-011	Unknown	To be determined after liquid volume assessment
244-CR	Cell 11	0	None*

Note: * Vessels and cells with <400 gallons of liquid do not require monitoring
MT = manual tape

This page intentionally left blank.

CONTENTS

1.0 INTRODUCTION 1-1
1.1 PURPOSE AND SCOPE 1-1
1.2 INTEGRATION AND COORDINATION 1-3
1.3 OVERVIEW OF THE SINGLE-SHELL TANK SYSTEM 1-3

2.0 SINGLE-SHELL TANK SYSTEM REGULATIONS 2-1
2.1 STATE AND FEDERAL REGULATIONS 2-1
2.2 REQUIREMENTS FROM THE *HANFORD FEDERAL FACILITY AGREEMENT AND CONSENT ORDER* 2-13

3.0 SINGLE-SHELL TANK SYSTEM COMPONENT DESCRIPTIONS AND LEAK DETECTION STATUS 3-1
3.1 SINGLE-SHELL TANK SYSTEM COMPONENT GROUPINGS 3-3
3.1.1 Single-Shell Tanks 3-5
3.1.2 Miscellaneous Underground Storage Tanks 3-9
3.1.3 At-Tank Pits 3-9
3.1.4 Between-Tank Pits 3-10
3.1.5 Piping 3-11
3.1.6 Miscellaneous Structures 3-11

4.0 LEAK DETECTION AND MONITORING FUNCTIONS AND REQUIREMENTS 4-1
4.1 CONTROL SINGLE-SHELL TANK SYSTEM PRIMARY CONTAINMENT LEAKS 4-10
4.1.1 Detect Primary Containment Leaks in the Single-Shell Tank System 4-10
4.1.2 Contain Primary Containment Leaks in the Single-Shell Tank System 4-13
4.1.3 Respond to Primary Containment Leaks in the Single-Shell Tank System 4-15
4.2 CONTROL SINGLE-SHELL TANK SYSTEM TRANSFER COMPONENT LEAKS 4-17
4.2.1 Detect Waste Leakage within At-Tank Pits and Between-Tank Pits 4-17
4.2.2 Contain Waste Leakage within At-Tank Pits and Between-Tank Pits 4-18
4.2.3 Respond to Waste Leakage in At-Tank Pits and Between-Tank Pits 4-19
4.2.4 Detect Leaks in Single-Shell Tank System Piping 4-19
4.2.5 Contain Waste Leakage within Piping Secondary Containment 4-20
4.2.6 Respond to Leakage in Single-Shell Tank System Transfer Piping 4-20

4.3 INSPECTIONS AND EVALUATIONS OF THE SINGLE-SHELL TANK SYSTEM 4-21
4.3.1 Assess System Integrity 4-21
4.3.2 Perform Single-Shell Tank System Inspections 4-21
4.3.3 Corrective Maintenance 4-23
4.4 DESIGN AND CONSTRUCTION 4-24

5.0 CURRENT SINGLE-SHELL TANK SYSTEM MONITORING 5-1
5.1 CURRENT SINGLE-SHELL TANK SYSTEM LEAK DETECTION AND MONITORING 5-1
5.1.1 In-Tank Leak Detection 5-1
5.1.2 Monitoring in Single-Shell Tank Ancillary Systems 5-3
5.1.3 Interim Stabilization 5-4
5.2 BEST MANAGEMENT PRACTICE MONITORING 5-5
5.2.1 Single-Shell Tanks 5-6
5.2.2 Miscellaneous Underground Storage Tanks 5-7
5.2.3 Vessels and Cells in Miscellaneous Structures 5-7

6.0 CHANGE CONTROL 6-1

7.0 REFERENCES 7-1

APPENDICES

Appendix A: List of Single-Shell Tank System Components Relating to Leak Detection and Monitoring

Appendix B: Rationale and Justification for Implementing Requirements and Best Management Practices

Appendix C: Cost Analysis

Appendix D: Schedule Analysis

FIGURES

Figure 1-1. River Protection Project Management System Document Hierarchy 1-3
Figure 1-2. Location of Single-Shell Tanks and Double-Shell Tanks at the Hanford Site 1-4
Figure 1-3. Cross-Sectional Views of Hanford Site Single-Shell Tanks 1-5
Figure 3-1. Tank Waste in a Single-Shell Tank 3-2
Figure 3-2. Relational Diagram of Single-Shell Tank System Components 3-4
Figure 3-3. Single-Shell Tank Cross-Section 3-5
Figure 4-1. Single-Shell Tank System Components–Functions and Requirements 4-6
Figure 4-2. Single-Shell Tank Leak Detection and Monitoring Requirements 4-7
Figure 4-3. Miscellaneous Underground Storage Tank Leak Detection and Monitoring Requirements 4-8
Figure 4-4. Miscellaneous Structure Leak Detection and Monitoring Requirements 4-9

TABLES

Table 2-1. Washington State Regulations 2-1
Table 2-2. Containment and Detection of Releases 2-3
Table 2-3. Inspections 2-10
Table 2-4. Response to Leaks or Spills and Disposition of Leaking or Unfit-for-Use Tank Systems 2-11
Table 2-5. Milestone M-23-23 2-13
Table 2-6. Milestone M-23-24 2-14
Table 3-1. Single-Shell Tank Component Groupings 3-3
Table 3-2. Single-Shell Tank Leak Volume Estimates 3-6
Table 4-1. Component Groups and Requirements 4-3
Table 5-1. Schedule and Status for Interim Stabilization of Single-Shell Tanks 5-5

This page intentionally left blank.

ABBREVIATION AND ACRONYM LIST

API	American Petroleum Institute
BMP	best management practice
CFR	*Code of Federal Regulations*
DL	drainable liquid
DOE	U.S. Department of Energy
DST	double-shell tank
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
F&Rs	functions and requirements
FIC	Food Instrument Corporation
HFFACO	*Hanford Federal Facility Agreement and Consent Order*
IQRPE	independent, qualified, registered, professional engineer
IS	interim stabilization
LDM	leak detection and monitoring
LOW	liquid observation well
MT	manual tape
MUST	miscellaneous underground storage tank
ORP	Office of River Protection
PUREX	plutonium-uranium extraction
RCRA	*Resource Conservation and Recovery Act of 1976*
REDOX	reduction-oxidation process
RPP	RCRA Past Practice
RPP	River Protection Project
SST	single-shell tank
STI	Steel Tank Institute
TSD	treatment, storage, and disposal
WAC	*Washington Administrative Code*

DEFINITIONS

Drainable Liquid: The amount of supernate liquid and interstitial liquid available to gravity drain from a tank in the event of a leak.

Inactive/Not-in-use: A component with no current and no expected mission in safe storage or transfer of single-shell tank system waste. Inactive/not-in-use components may and do contain waste.

In Use: A component actively transferring waste, or physically connected to a system actively transferring waste.

Interim Stabilization: The process of removing pumpable supernate liquid and interstitial liquid from the single-shell tank system.

Interim Stabilization Criteria: The content limits that a tank must achieve to be declared interim stabilized. To be declared interim stabilized, single-shell tanks must contain less than 50,000 gallons of drainable interstitial liquid, and contain less than 5,000 gallons of supernatant liquid. In addition, if jet pumping is used, the pump flow rate must be at 0.05 gpm or less before pumping may be discontinued (Consent Decree CT-99-5076-EFS). To be declared interim stabilized, non single-shell tanks must contain 400 gallons or less of liquid, or have a liquid heel of 4 inches or less at either the tank bottom or sludge-to-supernate interface, or contain less than 5,000 gallons of liquid if transport regulations preclude transporting the tank waste by tanker truck (HNF-IP-0842, Volume 4, Section 4.1, Rev. 3c).

Interim Status: A provision of the *Resource Conservation and Recovery Act of 1976* that grants a facility the right to continue to operate (treat, store, or dispose of hazardous waste) in accordance with applicable *Resource Conservation and Recovery Act of 1976* or state regulations until issuance of a *Resource Conservation and Recovery Act of 1976* permit.

Interstitial Liquid: The liquid in a waste matrix contained within the pore spaces of salts and sludge, some of which can gravity drain and the rest of which cannot drain due to capillary action.

Intrusion: The inadvertent introduction of water or liquid waste into a tank that commingles with waste and affects the total amount of drainable liquid in the tank.

Mission Essential: Those systems, components, and structures where it would be typical for waste to be moved in and out of the system to meet a current or expected mission.

Mixed Waste: Waste that contains both hazardous waste, as defined by the *Resource Conservation and Recovery Act of 1976* and its amendments, and radioactive waste, as defined by the *Atomic Energy Act of 1954* and its amendments.

Pumpable: Drainable supernate and interstitial liquid minus unpumpable supernate and interstitial liquid. Liquid in a single-shell tank is considered pumpable if it has a pumping flow rate greater than 0.05 gpm.

Supernate: Free liquid waste.

Unpumpable: Liquid held in the pore spaces of salts and sludge by capillary action that existing tank farm pumping systems cannot remove from a tank.

Vessel: For the purposes of this document, a tank, column, cell or similar component in a building structure that by design or practice may store waste.

This page intentionally left blank.

1.0 INTRODUCTION

The Hanford Site single-shell tank (SST) system consists of underground tanks and ancillary equipment built between 1943 and 1964. The SST system received radioactive and chemical process waste generated by defense activities that began at the site in 1944. Although the SST system no longer receives process waste, it continues to store waste pending retrieval and closure. Construction of the SST system occurred prior to *Resource Conservation and Recovery Act of 1976* (RCRA), and the current configuration and condition of the system does not meet interim status regulatory requirements for treatment, storage and disposal (TSD) facilities.

The Washington State Department of Ecology (Ecology) inspected the U.S. Department of Energy (DOE) Hanford Site SST system in fiscal years 2000 and 2001. The inspection assessed compliance with applicable regulations for management of interim status TSD facilities. The inspection identified potential violations. Subsequent negotiations between Ecology and DOE resulted in the creation of Milestone M-23-23, "Submit Single-Shell Tank System Leak Detection and Monitoring Functions and Requirements Document for Ecology Approval," of the *Hanford Federal Facility Agreement and Consent Order* (HFFACO) (Ecology et al. 1989) to address the potential violations.

The Ecology inspection conducted during fiscal years 2000 and 2001 identified four potential violations (Moore 2001):

- The DOE did not complete an assessment of the Hanford Site SSTs to determine they did not leak, or determine them unfit for use, by January 12, 1990, per *Washington Administrative Code* (WAC) 173-303-400(3) and 40 *Code of Federal Regulations* (CFR) 265.191(a).
- The DOE did not install secondary containment for the SST system prior to January 12, 1991, per WAC 173-303-400(3) and 40 CFR 265.193(a).
- The DOE did not inspect all SST monitoring equipment and leak detection equipment at least once each operating day per WAC 173-303-400(3) and 40 CFR 265.195(a).
- The DOE did not remove all waste from the SST system per 40 CFR 265.196(b) and did not close the SST system per 40 CFR 265.196(e).

This document responds to HFFACO Milestone M-23-23 that requires the DOE to submit a leak detection and monitoring (LDM) functions and requirements (F&Rs) document for Ecology approval by June 15, 2002.

Section 1.1 describes the purpose and scope of this document. Section 1.2 provides a brief description of the SST system. Section 1.3 describes HFFACO Milestone M-23-23.

1.1 PURPOSE AND SCOPE

This document fulfills the requirements of HFFACO Milestone M-23-23 by describing LDM F&Rs for the SST system. These F&Rs satisfy the following purposes.

Functions – Identify tasks, activities, and actions required to transform current conditions to the desired end state.

Requirements – Define parameters that, when met, provide assurance the end-state product will meet the mission need.

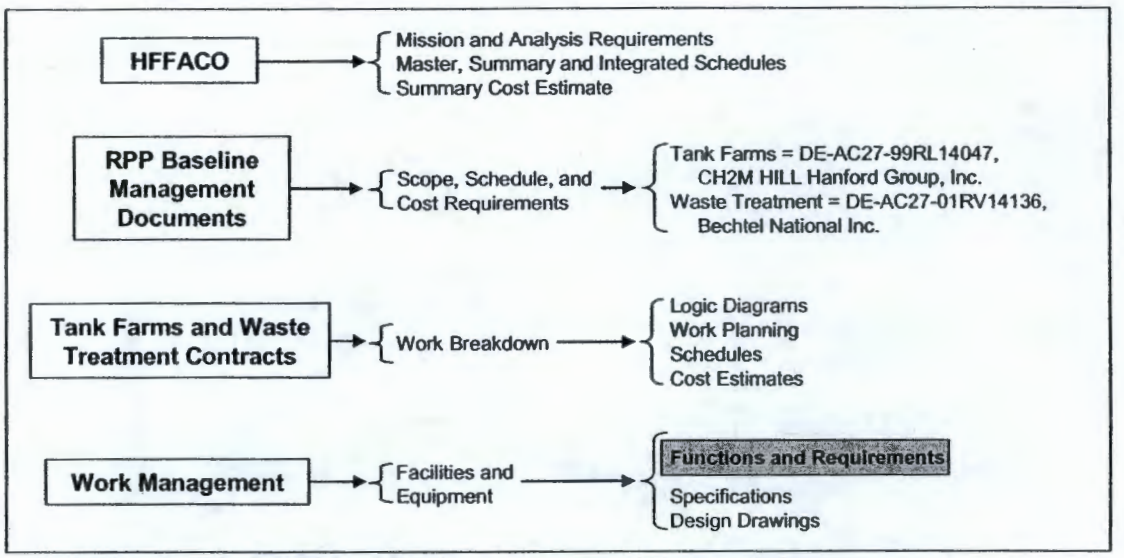
As required by HFFACO Milestone M-23-23, this document includes:

- Identification of applicable interim status regulations for leak detection, monitoring, and surveillance of the SST system (Section 2.0);
- Description of the SST system and ancillary components (Section 3.0);
- Identification and detail of SST system monitoring instruments (Section 5.0);
- Identification of SST system components not monitored by instrumentation (Section 3.0 and Appendix A);
- Procedures for evaluating the status of individual tanks and ancillary equipment components (Section 5.0);
- Single-shell tank LDM frequencies and other parameters associated with the inspection and LDM of the tank system based on applicable regulatory requirements for leak detection (Section 4.0 and Appendix B);
- Associated budget and schedule estimates for needed upgrades (Appendix C and Appendix D); and
- An HFFACO change control process governing Agreement Primary Documents (Section 6.0).

Upon approval by the DOE Office of River Protection (ORP) and Ecology, this document becomes an Agreement Primary Document pursuant to Action Plan Section 9.2.1 of the HFFACO. Approval of this document provides the basis for updating the LDM program for the SST system.

Figure 1-1 shows the hierarchy of the DOE ORP River Protection Project (RPP) management system documents. This F&Rs document supports SST system work management including system specification and design drawings and facility operations maintenance and management.

Figure 1-1. River Protection Project Management System Document Hierarchy



HFFACO = *Hanford Federal Facility Agreement and Consent Order*
RPP = River Protection Project

1.2 INTEGRATION AND COORDINATION

In 2001, DOE and Ecology concluded negotiations of milestones that required the DOE to submit documents addressing the F&Rs for SST system LDM and SST system integrity (HFFACO Milestones M-23-23 and M-23-24, "Submit Single-Shell Tank System Leak Detection and Monitoring Functions and Requirements Document," and "Submit Single-Shell Tank System Integrity Assessment Report and Associated Certification(s) and Determination(s) Pursuant to 40 CFR 265.191," respectively).

This document only addresses LDM F&Rs for SST system components associated with storage of waste governed by RCRA. This document addresses F&Rs for LDM; it does not address F&Rs for other activities associated with the SST system, including monitoring associated with retrieval or groundwater quality.

1.3 OVERVIEW OF THE SINGLE-SHELL TANK SYSTEM

The Hanford SST system consists of 149 SSTs, and ancillary tanks, pits, pipes and structures located in 12 tank farms in the 200 East and 200 West Areas (Figure 1-2). The SST system contains radioactive and chemical waste generated by nuclear defense activities that began at the site in 1944. The SST system no longer receives process waste, and is regulated as interim status TSD facilities pending closure.

The SST system consists of underground, reinforced concrete, steel-lined SSTs with capacities from 55,000 to 1,000,000 gallons with flat or dish-shaped bottoms and domed tops (Figure 1-3); miscellaneous underground storage tanks (MUSTs) with operating volumes of less than 50,000 gallons; pits; piping; and vessels and cells in miscellaneous structures.

Section 3.0 of this document discusses SST system and leak detection components in more detail.

Figure 1-2. Location of Single-Shell Tanks and Double-Shell Tanks at the Hanford Site

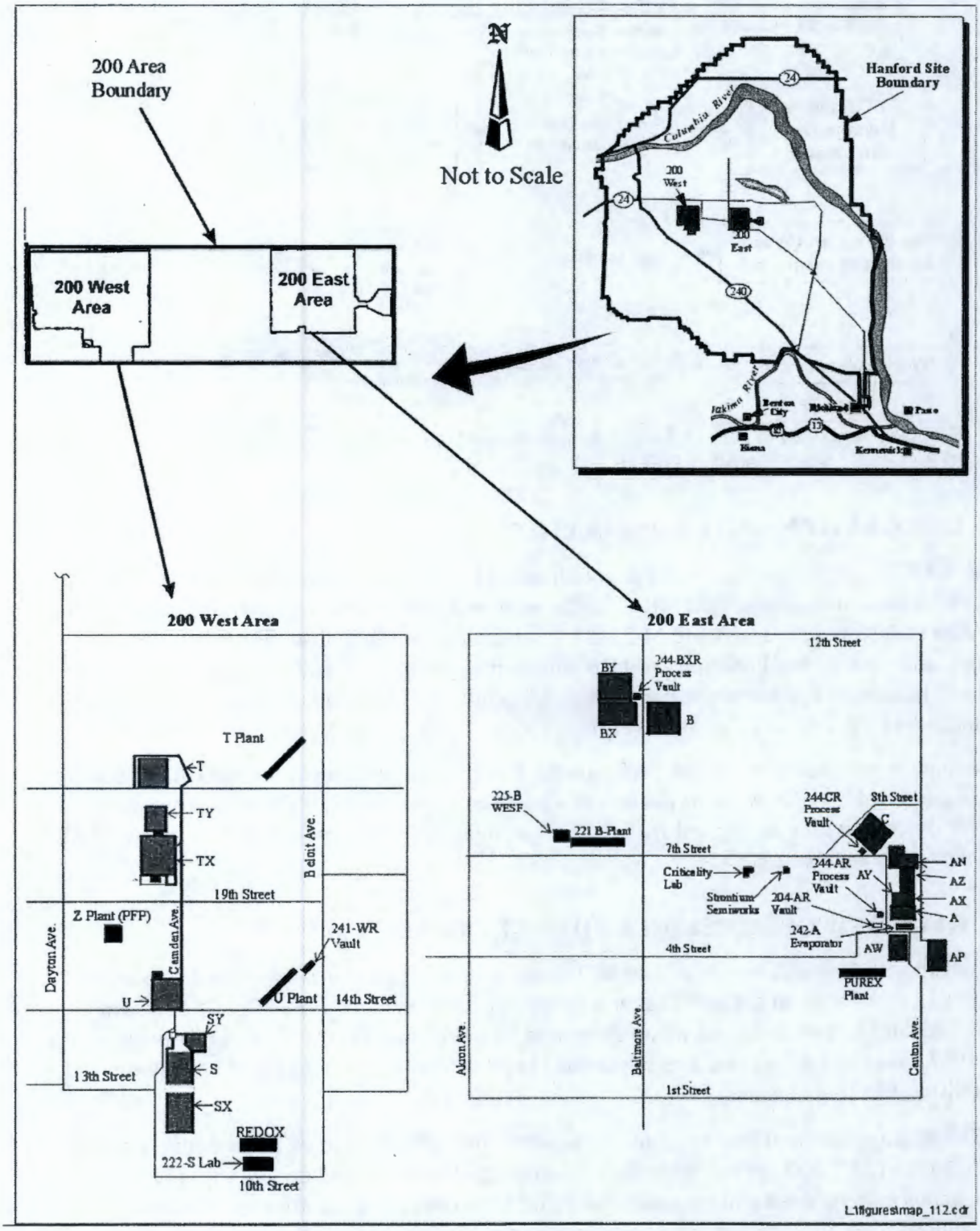
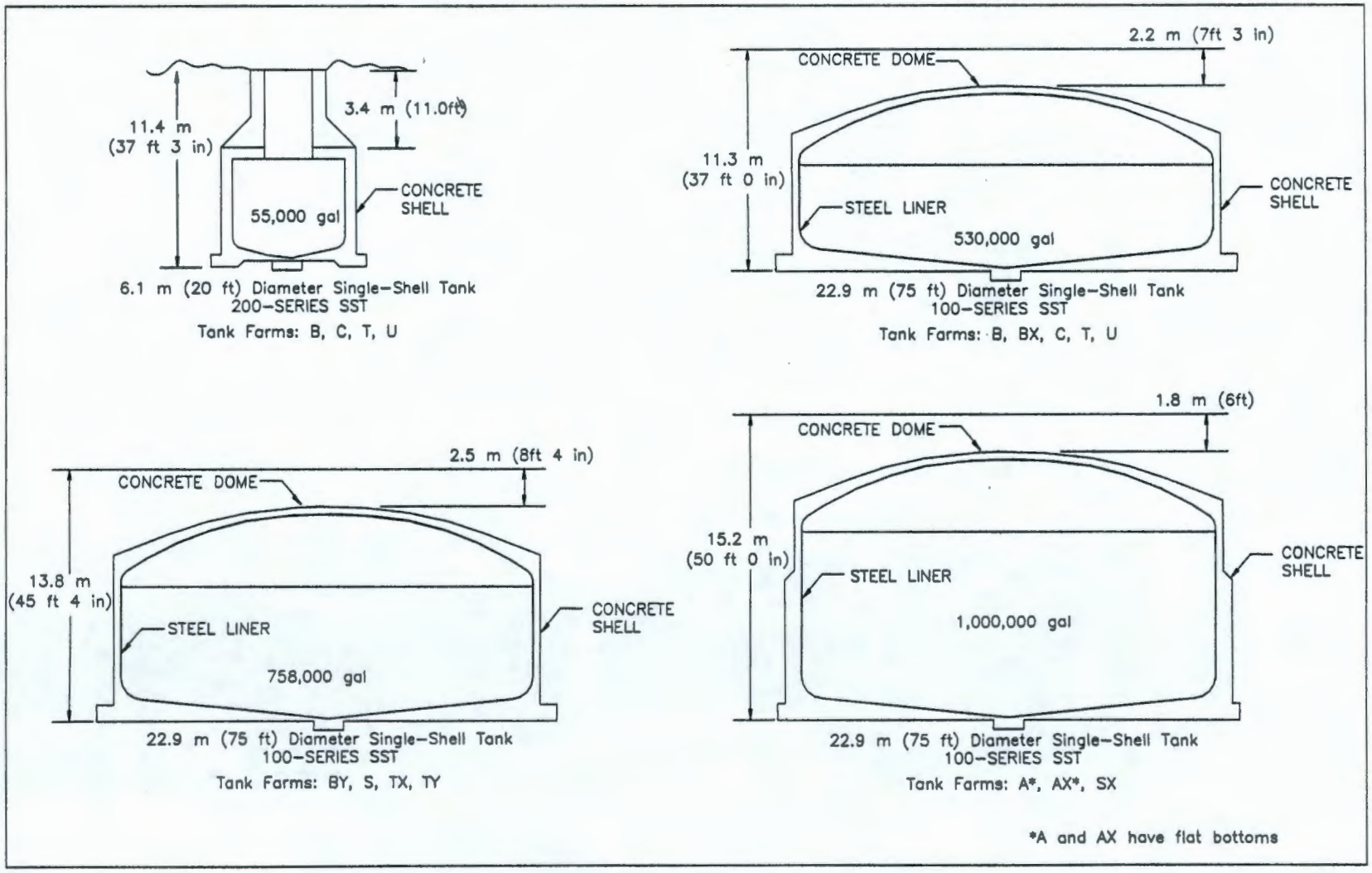


Figure 1-3. Cross-Sectional Views of Hanford Site Single-Shell Tanks



This page intentionally left blank

2.0 SINGLE-SHELL TANK SYSTEM REGULATIONS

The LDM F&Rs established by this document derive from 40 CFR 265, "Interim Status Standard for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities" (incorporated by reference in WAC 173-303) and from HFFACO Milestone M-23-24. Sections 2.1 and 2.2 cite applicable details from these regulations.

2.1 STATE AND FEDERAL REGULATIONS

For interim status facility standards, the Washington State dangerous waste regulations are defined in WAC 173-303-400. The dangerous waste regulations incorporate by reference the standards set forth by the U.S. Environmental Protection Agency in 40 CFR 265 Subpart J for tank systems and define additional requirements and exceptions to 40 CFR Part 265 in WAC 173-303-400(3), "Dangerous Waste Regulations, Interim Status Facility Standards." Excerpts from the State dangerous waste regulations for interim status tank systems are described in Table 2-1.

Table 2-1. Washington State Regulations (2 Sheets)

WAC	Regulation
WAC 173-303-400	"(1) Purpose. The purpose of WAC 173-303-400 is to establish standards which define the acceptable management of dangerous waste during the period of interim status and until certification of final closure or, if the facility is subject to post-closure requirements, until post-closure responsibilities are fulfilled. (2) Applicability (a) Except as provided in 40 CFR 265.1080(b), the interim status standards apply to owners and operators of facilities that treat, store, transfer, and/or dispose of dangerous waste. For purposes of this section, interim status applies to all facilities that comply fully with the requirements of interim status under Section 3005(c) of the Federal Resource Conservation and Recovery Act or WAC 173-303-805… (3) Standards (a) Interim status standards are the standards set forth by the Environmental Protection Agency in 40 CFR Part 265 Section 265.19 of Subpart B, Subparts F through R, Subpart W, Subparts AA, BB, CC (including references to 40 CFR Parts 60, 61, and 63), DD, EE, and Appendix VI, which are incorporated by reference into this regulation (including, by reference, any EPA requirements specified in those subparts which are not otherwise explicitly described in this chapter), and: (i) The land disposal restrictions of WAC 173-303-140; the facility requirements of WAC 173-303-280 through 173-303-440 except WAC 173-303-335; and the corrective action requirements of WAC 173-303-646; (ii) WAC 173-303-630(3), for containers… (iii) WAC 173-303-640 (5)(d), for tanks; and (iv) WAC 173-303-805.

Table 2-1. Washington State Regulations (2 Sheets)

WAC	Regulation
WAC 173-303-400	(b) For purposes of applying the interim status standards of 40 CFR Part 265 Subparts F through R…to the state of Washington facilities, the federal terms have (and in the case of the wording used in the financial instruments referenced in Subpart H of Part 265, must be replaced with) the following state of Washington meanings: (i) "Regional administrator" means the "department" except for 40 CFR Parts 270.2; 270.3… (ii) "Hazardous" means "dangerous" except for Subparts AA, BB, and DD. (iii) "Compliance procedure" has the meaning set forth in WAC 173-303-040, Definitions. (iv) "EPA hazardous waste numbers" mean "dangerous waste numbers" (c) In addition to the changes described in (b) of this subsection, the following modifications are made to interim status standards of 40 CFR Part 265 Subparts F through R… (i) The words "the effective date of these regulations" means"(A) November 19, 1980, for facilities which manage any wastes designated by 40 CFR Part 261; (B) For wastes which become designated by 40 CFR Part 261 subsequent to November 19, 1980, the effective date is the date on which the wastes become regulated; (C) March 12, 1982, for facilities which manage any wastes designated by 40 CFR Part 261… (vii) "Subpart J – tank systems" section 265.193(a) is modified so that the dates by which secondary containment (which meets the requirements of that section) must be provided are the same as the dates in WAC 173-303-640 (4)(a). (viii) "Subpart J – tank systems" section 265.191(a) is modified so that the date by which an assessment of a tank system's integrity musts be completed is January 12, 1990…"

The following pages cite applicable regulations from 40 CFR 265 in three categories:

- Containment and detection of releases (Table 2-2),
- Inspections (Table 2-3),
- Responses to leaks or spills and disposition of leaking or unfit-for-use tank systems (Table 2-4).

Note that Section 2.1 does not include citations from 40 CFR 265.191, "Assessment of Existing Tank Systems' Integrity." Milestone M-23-24 of the HFFACO contains the implementing language agreed upon by Ecology and the ORP for the SST system integrity assessment required by 40 CFR 265.191. Section 2.2 describes regulatory requirements from HFFACO Milestones M-23-23 and M-23-24.

Table 2-2. Containment and Detection of Releases (7 Sheets)

CFR	Regulation
40 CFR 265.193	"(a) In order to prevent the release of hazardous waste or hazardous constituents to the environment, secondary containment that meets the requirements of this section must be provided (except as provided in paragraphs (f) and (g) of this section): (1) For all new tank systems or components, prior to their being put into service; (2) For all existing tanks used to store or treat EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027, within two years after January 12, 1987; (3) For those existing tank systems of known and documentable age, within two years after January 12, 1987, or when the tank systems have reached 15 years of age, whichever comes later; (4) For those existing tank system for which the age cannot be documented, within eight years of January 12, 1987; but if the age of the facility is greater than seven years, secondary containment must be provided by the time the facility reaches 15 years of age, or within two years of January 12, 1987, whichever comes later; and (5) For tank systems that store or treat materials that become hazardous wastes subsequent to January 12, 1987, within the time intervals required in paragraphs (a)(1) through (a)(4) of this section, except that the date that a material becomes a hazardous waste must be used in place of January 12, 1987. (b) Secondary containment systems must be: (1) Designed, installed, and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, ground water, or surface water at any time during the use of the tank system; and (2) Capable of detecting and collecting releases and accumulated liquids until the collected material is removed. (c) To meet the requirements of paragraph (b) of this section, secondary containment systems must be at a minimum: (1) Constructed of or lined with materials that are compatible with the waste(s) to be placed in the tank system and must have sufficient strength and thickness to prevent failure due to pressure gradients (including static head and external hydrological forces), physical contact with the waste to which they are exposed, climatic conditions, the stress of installation, and the stress of daily operation (including stresses from nearby vehicular traffic); (2) Placed on a foundation or base capable of providing support to the secondary containment system and resistance to pressure gradients above and below the system and capable of preventing failure due to settlement, compression, or uplift; (3) Provided with a leak detection system that is designed and operated so that it will detect the failure of either the primary and secondary containment structure or any release of hazardous waste or accumulated liquid in the secondary containment system within 24 hours, or at the earliest practicable time if the existing detection technology or site conditions will not allow detection of a release within 24 hours;

Table 2-2. Containment and Detection of Releases (7 Sheets)

CFR	Regulation
40 CFR 265.193	(4) Sloped or otherwise designed or operated to drain and remove liquids resulting from leaks, spills, or precipitation. Spilled or leaked waste and accumulated precipitation must be removed from the secondary containment system within 24 hours, or in as timely a manner as is possible to prevent harm to human health or the environment, if removal of the released waste or accumulated precipitation cannot be accomplished within 24 hours. Note: If the collected material is a hazardous waste under part 261of this chapter, it is subject to management as a hazardous waste in accordance with all applicable requirements of parts 262 through 265 of this chapter. If the collected material is discharged through a point source to waters of the United States, it is subject to the requirements of sections 301, 304, and 402 of the Clean Water Act, as amended. If discharged to Publicly Owned Treatment Works (POTWs), it is subject to the requirements of section 307 of the Clear Water Act, as amended. If the collected material is released to the environment, it may be subject to the reporting requirements of 40 CFR Part 302. (d) Secondary containment for tanks must include one or more of the following devices: (1) A liner (external to the tank); (2) A vault; (3) A double-walled tank; or (4) An equivalent device as approved by the Regional Administrator. (e) In addition to the requirements of paragraphs (b), (c), and (d) of this section, secondary containment systems must satisfy the following requirements: (1) External liner systems must be: (i) Designed or operated to contain 100 percent of the capacity of the largest tank within its boundary; (ii) Designed or operated to prevent run-on or infiltration of precipitation into the secondary containment system unless the collection system has sufficient excess capacity to contain run-on or infiltration. Such additional capacity must be sufficient to contain precipitation from a 25-year, 24-hour rainfall event; (iii) Free of cracks or gaps; and (iv) Designed and installed to completely surround the tank and to cover all surrounding earth likely to come into contact with the waste if released from the tank(s) (i.e., capable of preventing lateral as well as vertical migration of the waste). (2) Vault systems must be: (i) Designed or operated to contain 100 percent of the capacity of the largest tank within its boundary; (ii) Designed or operated to prevent run-on or infiltration of precipitation into the secondary containment system unless the collection system has sufficient excess capacity to contain run-on or infiltration. Such additional capacity must be sufficient to contain precipitation from a 25-year, 24-hour rainfall event;

Table 2-2. Containment and Detection of Releases (7 Sheets)

CFR	Regulation
40 CFR 265.193	(iii) Constructed with chemical-resistant water stops in place at all joints (if any); (iv) Provided with an impermeable interior coating or lining that is compatible with the stored waste and that will prevent migration of waste into the concrete; (v) Provided with a means to protect against the formation of and ignition of vapors within the vault, if the waste being stored or treated: (A) Meets the definition of ignitable waste under Sec. 262.21 of this chapter, or (B) Meets the definition of reactive waste under Sec. 262.21 of this chapter and may form an ignitable or explosive vapor; and (vi) Provided with an exterior moisture barrier or be otherwise designed or operated to prevent migration of moisture into the vault if the vault is subject to hydraulic pressure. (3) Double-walled tanks must be: (i) Designed as an integral structure (i.e., an inner tank within an outer shell) so that any release from the inner tank is contained by the outer shell; (ii) Protected, if constructed of metal, from both corrosion of the primary tank interior and the external surface of the outer shell; and (iii) Provided with a built-in, continuous leak detection system capable of detecting a release within 24 hours or at the earliest practicable time, if the owner or operator can demonstrate to the Regional Administrator, and the Regional Administrator concurs, that the existing leak detection technology or site conditions will not allow detection of a release within 24 hours. Note: The provisions outlined in the Steel Tank Institute's (STI) 'Standard for Dual Wall Underground Steel Storage Tank" may be used as guidelines for aspects of the design of underground steel double-walled tanks. (f) Ancillary equipment must be provided with full secondary containment (e.g., trench, jacketing, double-walled piping) that meets the requirements of paragraphs (b) and (c) of this section except for: (1) Aboveground piping (exclusive of flanges, joints, valves, and connections) that are visually inspected for leaks on a daily basis; (2) Welded flanges, welded joints, and welded connections that are visually inspected for leaks on a daily basis; (3) Sealless or magnetic coupling pumps and sealless valves, that are visually inspected for leaks on a daily basis; and (4) Pressurized aboveground piping systems with automatic shut-off devices (e.g., excess flow check valves, flow metering shutdown devices, loss of pressure actuated shut-off devices) that are visually inspected for leaks on a daily basis.

Table 2-2. Containment and Detection of Releases (7 Sheets)

CFR	Regulation
40 CFR 265.193	(g) The owner or operator may obtain a variance from the requirements of this Section if the Regional Administrator finds, as a result of a demonstration by the owner or operator, either: that alternative design and operating practices, together with location characteristics, will prevent the migration of hazardous waste or hazardous constituents into the ground water or surface water at least as effectively as secondary containment during the active life of the tank system or that in the event of a release that does migrate to ground water or surface water, no substantial present or potential hazard will be posed to human health or the environment. New underground tank systems may not, per a demonstration in accordance with paragraph (g)(2) of this section, be exempted from the secondary containment requirements of this section. Application for a variance as allowed in paragraph (g) of this section does not waive compliance with the requirements of this subpart for new tank systems. (1) In deciding whether to grant a variance based on a demonstration of equivalent protection of ground water and surface water, the Regional Administrator will consider: (i) The nature and quantity of the waste; (ii) The proposed alternate design and operation; (iii) The hydrogeologic setting of the facility, including the thickness of soils between the tank system and ground water; and (iv) All other factors that would influence the quality and mobility of the hazardous constituents and the potential for them to migrate to ground water or surface water. (2) In deciding whether to grant a variance, based on a demonstration of no substantial present or potential hazard, the Regional Administrator will consider: (i) The potential adverse effects on ground water, surface water, and land quality taking into account: (A) The physical and chemical characteristics of the waste in the tank system, including its potential for migration, (B) The hydrogeological characteristics of the facility and surrounding land, (C) The potential for health risks caused by human exposure to waste constituents, (D) The potential for damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents, and (E) The persistence and permanence of the potential adverse effects; (ii) The potential adverse effects of a release on ground-water quality, taking into account: (A) The quantity and quality of ground water and the direction of ground-water flow, (B) The proximity and withdrawal rates of water in the area, (C) The current and future uses of ground water in the area, and

Table 2-2. Containment and Detection of Releases (7 Sheets)

CFR	Regulation
40 CFR 265.193	(D) The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground-water quality; (iii) The potential adverse effects of a release on surface water quality, taking into account: (A) The quantity and quality of ground water and the direction of ground-water flow, (B) The patterns of rainfall in the region, (C) The proximity of the tank system to surface waters, (D) The current and future uses of surface waters in the area and any water quality standards established for those surface waters, and (E) The existing quality of surface water, including other sources of contamination and the cumulative impact on surface-water quality; and (iv) The potential adverse effects of a release on the land surrounding the tank system, taking into account: (A) The patterns of rainfall in the region, and (B) The current and future uses of the surrounding land. (3) The owner or operator of a tank system, for which a variance from secondary containment had been granted in accordance with the requirements of paragraph (g)(1) of this section, at which a release of hazardous waste has occurred from the primary tank system but has not migrated beyond the zone of engineering control (as established in the variance), must: (i) Comply with the requirements of Sec. 265.196, except paragraph (d); and (ii) Decontaminate or remove contaminated soil to the extent necessary to: (A) Enable the tank system, for which the variance was granted, to resume operation with the capability for the detection of and response to releases at least equivalent to the capability it had prior to the release, and (B) Prevent the migration of hazardous waste or hazardous constituents to ground water or surface water; and (iii) If contaminated soil cannot be removed or decontaminated in accordance with paragraph (g)(3)(ii) of this section, comply with the requirements of Sec. 265.197(b); (4) The owner or operator of a tank system, for which a variance from secondary containment had been granted in accordance with the requirements of paragraph (g)(1) of this section, at which a release of hazardous waste has occurred from the primary tank system and has migrated beyond the zone of engineering control (as established in the variance), must: (i) Comply with the requirements of Sec. 265.196(a), (b), (c), and (d); and

Table 2-2. Containment and Detection of Releases (7 Sheets)

CFR	Regulation
40 CFR 265.193	(ii) Prevent the migration of hazardous waste or hazardous constituents to ground water or surface water, if possible, and decontaminate or remove contaminated soil. If contaminated soil cannot be decontaminated or removed, or if ground water has been contaminated, the owner or operator must comply with the requirements of Sec. 265.197(b); (iii) If repairing, replacing, or reinstalling the tank system, provide secondary containment in accordance with the requirements of paragraphs (a) through (f) of this section or reapply for a variance from secondary containment and meet the requirements for new tank systems in Sec. 265.192 if the tank system is replaced. The owner or operator must comply with these requirements even if contaminated soil can be decontaminated or removed, and ground water or surface water has not been contaminated. (h) The following procedures must be followed in order to request a variance from secondary containment: (1) The Regional Administrator must be notified in writing by the owner or operator that he intends to conduct and submit a demonstration for a variance from secondary containment as allowed in paragraph (g) of this section according to the following schedule: (i) For existing tank systems, at least 24 months prior to the date that secondary containment must be provided in accordance with paragraph (a) of this section; and (ii) For new tank systems, at least 30 days prior to entering into a contract for installation of the tank system. (2) As part of the notification, the owner or operator must also submit to the Regional Administrator a description of the steps necessary to conduct the demonstration and a timetable for completing each of the steps. The demonstration must address each of the factors listed in paragraph (g)(1) or paragraph (g)(2) of this section. (3) The demonstration for a variance must be completed and submitted to the Regional Administrator within 180 days after notifying the Regional Administrator of intent to conduct the demonstration. (4) The Regional Administrator will inform the public, through a newspaper notice, of the availability of the demonstration for a variance. The notice shall be placed in a daily or weekly major local newspaper of general circulation and shall provide at least 30 days from the date of the notice for the public to review and comment on the demonstration for a variance. The Regional Administrator also will hold a public hearing, in response to a request or at his own discretion, whenever such a hearing might clarify one or more issues concerning the demonstration for a variance. Public notice of the hearing will be given at least 30 days prior to the date of the hearing and may be given at the same time as notice of the opportunity for the public to review and comment on the demonstration. These two notices may be combined.

Table 2-2. Containment and Detection of Releases (7 Sheets)

CFR	Regulation
40 CFR 265.193	(5) The Regional Administrator will approve or disapprove the request for a variance within 90 days of receipt of the demonstration from the owner or operator and will notify in writing the owner or operator and each person who submitted written comments or requested notice of the variance decision. If the demonstration for a variance is incomplete or does not include sufficient information, the 90-day time period will begin when the Regional Administrator receives a complete demonstration, including all information necessary to make a final determination. If the public comment period in paragraph (h)(4) of this section is extended, the 90-day time period will be similarly extended. (i) All tank systems, until such time as secondary containment meeting the requirements of this section is provided, must comply with the following: (1) For non-enterable underground tanks, a leak test that meets the requirements of Sec. 265.191(b)(5) must be conducted at least annually; (2) For other than non-enterable underground tanks and for all ancillary equipment, an annual leak test, as described in paragraph (i)(1) of this section, or an internal inspection or other tank integrity examination by an independent, qualified, registered professional engineer that addresses cracks, leaks, corrosion, and erosion must be conducted at least annually. The owner or operator must remove the stored waste from the tank, if necessary, to allow the condition of all internal tank surfaces to be assessed. Note: The practices described in the American Petroleum Institute (API) Publication Guide for Inspection of Refining Equipment, Chapter XIII, 'Atmospheric and Low Pressure Storage Tanks,' 4th edition, 1981, may be used, when applicable, as guidelines for assessing the overall condition of the tank system. (3) The owner or operator must maintain on file at the facility a record of the results of the assessments conducted in accordance with paragraphs (i)(1) through (i)(3) of this section. (4) If a tank system or component is found to be leaking or unfit-for-use as a result of the leak test or assessment in paragraphs (i)(1) through (i)(3) of this section, the owner or operator must comply with the requirements of Sec. 265.196."

Table 2-3. Inspections

CFR	Regulation
40 CFR 265.195	"(a) The owner or operator must inspect, where present, at least once each operating day: (1) Overfill/spill control equipment (e.g., waste-feed cutoff systems, bypass systems, and drainage systems) to ensure that it is in good working order; (2) The aboveground portions of the tank system, if any, to detect corrosion or releases of waste; (3) Data gathered from monitoring equipment and leak-detection equipment, (e.g., pressure and temperature gauges, monitoring wells) to ensure that the tank system is being operated according to its design; and (4) The construction materials and the area immediately surrounding the externally accessible portion of the tank system including secondary containment structures (e.g., dikes) to detect erosion or signs of releases of hazardous waste (e.g., wet spots, dead vegetation); Note: Section 265.15(c) requires the owner or operator to remedy any deterioration or malfunction he finds. Section 265.196 requires the owner or operator to notify the Regional Administrator within 24 hours of confirming a release. Also, 40 CFR part 302 may require the owner or operator to notify the National Response Center of a release. (b) The owner or operator must inspect cathodic protection systems, if present, according to, at a minimum, the following schedule to ensure that they are functioning properly: (1) The proper operation of the cathodic protection system must be confirmed within six months after initial installation, and annually thereafter; and (2) All sources of impressed current must be inspected and/or tested, as appropriate, at least bimonthly (i.e., every other month). Note: The practices described in the National Association of Corrosion Engineers (NACE) standard, 'Recommended Practice (RP-02-85)--Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems,' and the American Petroleum Institute (API) Publication 1632, 'Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems,' may be used, where applicable, as guidelines in maintaining and inspecting cathodic protection systems. (c) The owner or operator must document in the operating record of the facility an inspection of those items in paragraphs (a) and (b) of this section."

Table 2-4. Response to Leaks or Spills and Disposition of Leaking or Unfit-for-Use Tank Systems (2 Sheets)

CFR	Regulation
40 CFR 265.196	"A tank system or secondary containment system from which there has been a leak or spill, or which is unfit for use, must be removed from service immediately, and the owner or operator must satisfy the following requirements: (a) Cessation of use; prevent flow or addition of wastes. The owner or operator must immediately stop the flow of hazardous waste into the tank system or secondary containment system and inspect the system to determine the cause of the release. (b) Removal of waste from tank system or secondary containment system. (1) If the release was from the tank system, the owner or operator must, within 24 hours after detection of the leak or, if the owner or operator demonstrates that that is not possible, at the earliest practicable time remove as much of the waste as is necessary to prevent further release of hazardous waste to the environment and to allow inspection and repair of the tank system to be performed. (2) If the release was to a secondary containment system, all released materials must be removed within 24 hours or in as timely a manner as is possible to prevent harm to human health and the environment. (c) Containment of visible releases to the environment. The owner or operator must immediately conduct a visual inspection of the release and, based upon that inspection: (1) Prevent further migration of the leak or spill to soils or surface water; and (2) Remove, and properly dispose of, any visible contamination of the soil or surface water. (d) Notifications, reports. (1) Any release to the environment, except as provided in paragraph (d)(2) of this section, must be reported to the Regional Administrator within 24 hours of detection. If the release has been reported pursuant to 40 CFR part 302, that report will satisfy this requirement. (2) A leak or spill of hazardous waste that is: (i) Less than or equal to a quantity of one (1) pound, and (ii) Immediately contained and cleaned-up is exempted from the requirements of this paragraph. (3) Within 30 days of detection of a release to the environment, a report containing the following information must be submitted to the Regional Administrator: (i) Likely route of migration of the release; (ii) Characteristics of the surrounding soil (soil composition, geology, hydrogeology, climate); (iii) Results of any monitoring or sampling conducted in connection with the release, (if available). If sampling or monitoring data relating to the release are not available within 30 days, these data must be submitted to the Regional Administrator as soon as they become available; (iv) Proximity to downgradient drinking water, surface water, and population areas; and

Table 2-4. Response to Leaks or Spills and Disposition of Leaking or Unfit-for-Use Tank Systems (2 Sheets)

CFR	Regulation
40 CFR 265.196	(v) Description of response actions taken or planned. (e) Provision of secondary containment, repair, or closure. (1) Unless the owner or operator satisfies the requirements of paragraphs (e) (2) through (4) of this section, the tank system must be closed in accordance with Sec. 265.197. (2) If the cause of the release was a spill that has not damaged the integrity of the system, the owner/operator may return the system to service as soon as the released waste is removed and repairs, if necessary, are made. (3) If the cause of the release was a leak from the primary tank system into the secondary containment system, the system must be repaired prior to returning the tank system to service. (4) If the source of the release was a leak to the environment from a component of a tank system without secondary containment, the owner/operator must provide the component of the system from which the leak occurred with secondary containment that satisfies the requirements of Sec. 265.193 before it can be returned to service, unless the source of the leak is an aboveground portion of a tank system. If the source is an aboveground component that can be inspected visually, the component must be repaired and may be returned to service without secondary containment as long as the requirements of paragraph (f) of this section are satisfied. If a component is replaced to comply with the requirements of this subparagraph, that component must satisfy the requirements for new tank systems or components in Secs. 265.192 and 265.193. Additionally, if a leak has occurred in any portion of a tank system component that is not readily accessible for visual inspection (e.g., the bottom of an inground or onground tank), the entire component must be provided with secondary containment in accordance with Sec. 265.193 prior to being returned to use. (f) Certification of major repairs. If the owner or operator has repaired a tank system in accordance with paragraph (e) of this section, and the repair has been extensive (e.g., installation of an internal liner; repair of a ruptured primary containment or secondary containment vessel), the tank system must not be returned to service unless the owner/operator has obtained a certification by an independent, qualified, registered professional engineer in accordance with Sec. 270.11(d) that the repaired system is capable of handling hazardous wastes without release for the intended life of the system. This certification must be submitted to the Regional Administrator within seven days after returning the tank system to use. Note: The Regional Administrator may, on the basis of any information received that there is or has been a release of hazardous waste or hazardous constituents into the environment, issue an order under RCRA section 3004(v), 3008(h), or 7003(a) requiring corrective action or such other response as deemed necessary to protect human health or the environment. Note: See Sec. 265.15(c) for the requirements necessary to remedy a failure. Also, 40 CFR Part 302 requires the owner or operator to notify the National Response Center of a release of any 'reportable quantity.'"

2.2 REQUIREMENTS FROM THE *HANFORD FEDERAL FACILITY AGREEMENT AND CONSENT ORDER*

This section cites applicable requirements from HFFACO Milestones M-23-23 and M-23-24. Milestone M-23-23 requires creation of the LDM F&Rs document; Table 2-5 cites these requirements. Milestone M-23-24 contains the implementing language agreed upon by the DOE ORP and Ecology for 40 CFR 265.191; Table 2-6 cites these requirements.

Table 2-5. Milestone M-23-23

Milestone	Description	Due Date
M-23-23	"Submit Single-Shell Tank System Leak Detection and Monitoring Functions and Requirements Document for Ecology Approval. The SST system leak detection and monitoring functions and requirements document will identify and document the location and specification of all components of DOE's existing SST leak detection and monitoring system, and will establish specifications for system upgrades and/or programmatic improvements. The functions and requirements document shall be submitted for Ecology approval as an agreement primary document pursuant to action plan section 9.2.1, and shall include the following: (1) The identification and detail of SST system monitoring instruments, (2) The identification of SST system components not monitored by instrumentation, (3) procedures for the evaluation of individual tank and ancillary equipment component status, (4) Monitoring frequencies and other parameters associated with the inspection and (leak detection) monitoring of the tank system (5) The need for detection and monitoring system upgrades so as to achieve compliance with regulatory and DOE requirements, and (6) Associated budgetary and schedule estimates. The SST leak detection and monitoring functions and requirements document shall also contain: an adequate level of detail so as to allow Ecology to assess the adequacy of the program, a proposed implementation schedule for upgrades and programmatic changes, and a corresponding draft agreement change request. Following approval work requirements of the SST system leak detection and monitoring functions and requirements document shall be implemented as enforceable primary document requirement under the agreement."	June 15, 2002

Table 2-6. Milestone M-23-24 (3 Sheets)

Milestone	Description	Due Date
M-23-24	"Submit single-shell tank system integrity assessment report and associated certification(s) and determination(s) pursuant to 40 CFR 265.191. This report shall document and assess the integrity of DOE's SST system pursuant to the requirements of 40 CFR 265.191. The SST system is comprised of DOE's one hundred-forty nine (149) SST's and their ancillary equipment. This report shall be certified by an independent, qualified, registered, professional engineer (IQRPE) attesting to the tank system's integrity (see certification at M-23-24) and shall contain a conclusory statement as to DOE's determination that the (SST) tank system either is not leaking or is unfit for use pursuant to 40 CFR 265.191. For other than non enterable portions of the SST system which DOE finds fit for use (pursuant to 40 CFR 265.191) by mean other than leak testing pursuant to 40 CFR 265.191(b)(5), such assessment/findings may be conducted in accordance with the practices described in the American Petroleum Institute (API) publication, Guide for Inspection or Refinery Equipment, Chapter XIII, Atmospheric and Low-Pressure Tanks. DOE's report shall have the objective of determining SST system integrity, and whether or not the (SST) tank system is adequately designed and has sufficient structural strength and compatability with the waste(s) to be stored or treated to ensure that it will not collapse, rupture, or fail. The SST system integrity assessment report shall document, at a minimum, all information gathered for the SST system to meet the requirements of 40 CFR, Subpart J, Part 265.191(1), (2), (3), (5)(i) and (5)(ii), including the following: A. 40 CFR 265.191(b)(1) – Design Standards: A concise and specific description: of the materials used in construction, construction methods employed, quality control, and testing performed on materials, and the final structure, prior to being placed in service, all engineering codes referenced for construction, design operating specification, and a presentation of all calculations employed to determine each structures design strength, and useful life. An evaluation of the design life of each SST system component shall be described, based on all data gathered, waste compatability with the materials of construction, history of corrosion protection, operational history (including any documented or detected leaks), schematics depicting the location of tank breaches if known, visual examinations, and any other sources of tank integrity assessment information gathered for each tank and associated SST system ancillary equipment. DOE's report shall also include a tabular listing by component equipment number, of all transfer pipelines within the SST system, describing the materials of construction, and compliance with secondary containment requirements.	June 30, 2002

Table 2-6. Milestone M-23-24 (3 Sheets)

Milestone	Description	Due Date
M-23-24	B. 40 CFR 265.191(b)(2) – Hazardous Characteristics of the Wastes That Have Been, or will be Handled: A concise and specific presentation describing the compatability of the waste stored in each tank with the tank structure and materials. This presentation shall include the following at a minimum: waste chemical characteristics and properties such as corrosivity, temperature, homogeneity, organic content, specific gravity, gas retention and generation, flammability, and a comparison between the waste currently stored, and/or proposed to be stored in each tank to the design specification for each tank. C. 40 CFR 265.191(b)(3) – Existing Corrosion Protection Measures: A thorough description and history of all corrosion protection measures employed for all transfer systems (e.g., caustic flushes), within each SST since completion of construction. This history shall include a description of all sampling and analysis performed to monitor the status of corrosion inhibitor adjustments to chemical composition of the waste within each SST, or transferred through SST transfer system lines. D. 40 CFR 265.191(b)(4) – Documented Age of the Tank System: The age of each component of the SST system, including the SST's and their ancillary equipment, shall be described, including the completed construction date, the date placed in service, and the date of first receipt of waste. E. 40 CFR 265.191(b)(5) – Results of Leak Test(s), Internal Inspection(s) or other Tank Integrity Examinations for Each Tank and Associated Ancillary Equipment, Including the Following: The results of all examination(s) of the primary containment structure of each of the one hundred-forty nine (149) SST's and their ancillary equipment. The results of corrosion probes existing in each tank, results of testing on simulated tank structures, or materials, and studies of the effects of waste stored within each tank on the tank's materials of construction. All corrosion studies of any transfer pipelines shall also be included in this integrity assessment report. The results of leak and/or pressure testing, including associated testing regimen and specifications for all SST waste transfer systems. A summary, in tabular form or otherwise, of observations and conclusions from all visual examinations by direct observation or remote camera surveillance, within each SST. This summary shall include observations and conclusions from all visual observations by direct observation or remote camera surveillance, taken within SST system ancillary equipment (e.g., valve pits, pump pits, double-contained receiver tanks, catch tanks, vaults, transfer pipelines). All videotapes from remote camera surveillance shall be retained in the facility's operating record and shall be available to Ecology on request.	June 30, 2002

Table 2-6. Milestone M-23-24 (3 Sheets)

Milestone	Description	Due Date
M-23-24	Certification by an independent, qualified, registered, professional, engineer (IQRPE) meeting the following requirements: 1. To meet the requirements for 'independent,' the IQRPE must not be employed by any company that is either operated, or exists, as a prime contractor for the Hanford Contract Team. Further, the IQRPE cannot have worked for any company as described above for a period of one (1) year prior to undertaking the review of SST system tank integrity assessment work. 2. To meet the requirement for 'qualified,' the IQRPE must be an engineer experienced in examination of tank storage systems. Certification by the National Association of Corrosion Engineers (NACE) is desirable, but not required. 3. To meet the requirement for 'registered professional engineer,' the IQRPE must be registered as a professional engineer with the Washington State Department of Licensing, or by a state which has reciprocity with the State of Washington. Certification(s) of the single-shall tank system integrity assessment report shall be by the following statement unless another statement is agreed to with Ecology: 'I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document, and all attachments, and that, based on my assessment of the plans and procedures utilized for obtaining this information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.'	June 30, 2002

3.0 SINGLE-SHELL TANK SYSTEM COMPONENT DESCRIPTIONS AND LEAK DETECTION STATUS

The SST system components subject to LDM F&Rs consists of the tanks and ancillary equipment identified in Appendix A. This section describes these SST system components.

The SST system components governed by LDM requirements established by this document include the following:

- 133 SSTs (100 series) (530,000 to 1,000,000 gallons);
- 16 SSTs (200 series) (55,000 gallons);
- Seven inactive/not-in-use MUSTs;
- Numerous at-tank pits (pump, sluice, heel, saltwell, saltwell caisson, diversion and receiving);
- Numerous between-tank pits (diversion boxes, valve, and flush),
- Numerous pipelines; and
- 17 vessels and cells in four miscellaneous structures.

The following SST components are not within the scope of this document and are not governed by the F&Rs in this document.

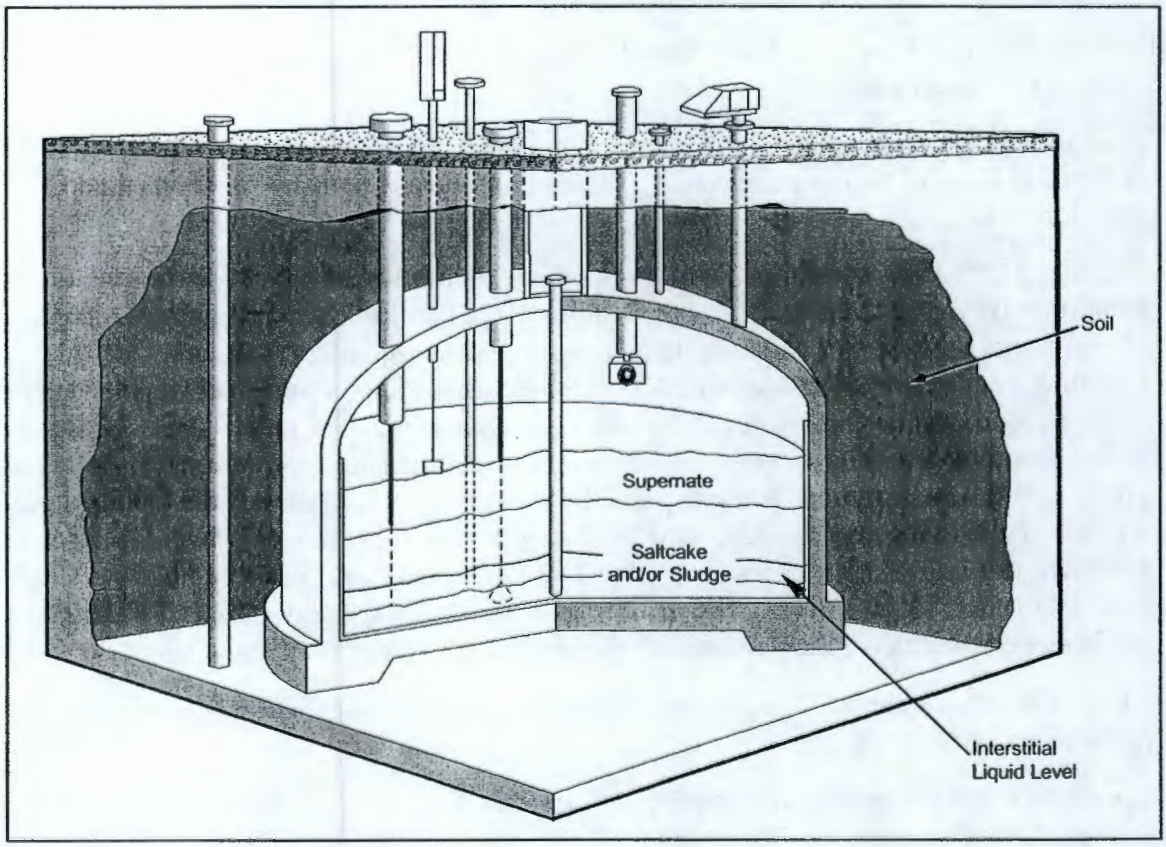
- Control buildings, electrical distribution components, and ventilation components that by design and practice do not store waste. These components have no functions associated with LDM.
- 242-S and 242-T Evaporators. These components currently reside in standby/shutdown Condition III and V, respectively. In Condition III, a facility receives maintenance that allows for its restart, but restart would take more than six months to accomplish. In Condition V, a facility will perform no further operations, and it receives maintenance to allow for decommissioning within 50 years. The actions taken to place these facilities in standby/shutdown minimize their surveillance and maintenance requirements, and minimize the environmental hazards posed by these facilities. Also, these facilities have no anticipated future mission associated with safe waste storage and LDM. Management of the 242-S and -T Evaporators is described on the Silver List Closeout Forms (5.3 and 5.4) (DOE-RL 1996) in which the parties agreed that the evaporators would be listed in the Waste Information Data System and managed as RCRA Past-Practice Units.
- RCRA Past-Practice Unit Components. These units will be addressed through closure requirements.
- *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* Past-Practice Unit Components. These units will be addressed through closure requirements.
- Pumps. Pumps themselves do not have leak detection capabilities. Rather, by engineering design, they drain to structures, such as pits, that do have leak detection capabilities.

Waste contained within the SST system consists primarily of sludge, salt cake, and drainable and non-drainable liquid generated by the following chemical processes:

- Bismuth phosphate ($BiPO_4$) process;
- Reduction-oxidation (REDOX) process;
- Plutonium-uranium extraction (PUREX) process;
- Tributyl phosphate process; and
- B Plant waste fractionation process.

Sludge contains solids precipitated from neutralization of acid waste prior to transfer to the SSTs (e.g., hydrous metal oxides). Salt cake contains various salts formed by evaporation of water from the waste. Drainable liquids exist as supernate and interstitial liquids in the tanks. Non-drainable liquids are bound to the surface of solid particles by capillary action and cannot drain from the waste solids. Figure 3-1 depicts waste forms found in SSTs.

Figure 3-1. Tank Waste in a Single-Shell Tank



Operations and natural processes have created non-homogenous waste. For example, the tanks received additions of non-radioactive chemicals to enhance storage capabilities, some heat-producing radionuclides were removed, and additions of non-radioactive chemicals were made to reduce corrosion of tank liners. Natural processes have caused settling, stratification and segregation of waste components. The 100-series tanks reside in cascades. When the first tank in the cascade filled with waste, it overflowed into successive tanks through pipes penetrating the sidewalls. Cascading in the 100-series SSTs allowed cooling and precipitation of radionuclides. Due to the cascading effect, more solids generally tended to settle out in the first tank in the series with more supernate in the last tanks.

3.1 SINGLE-SHELL TANK SYSTEM COMPONENT GROUPINGS

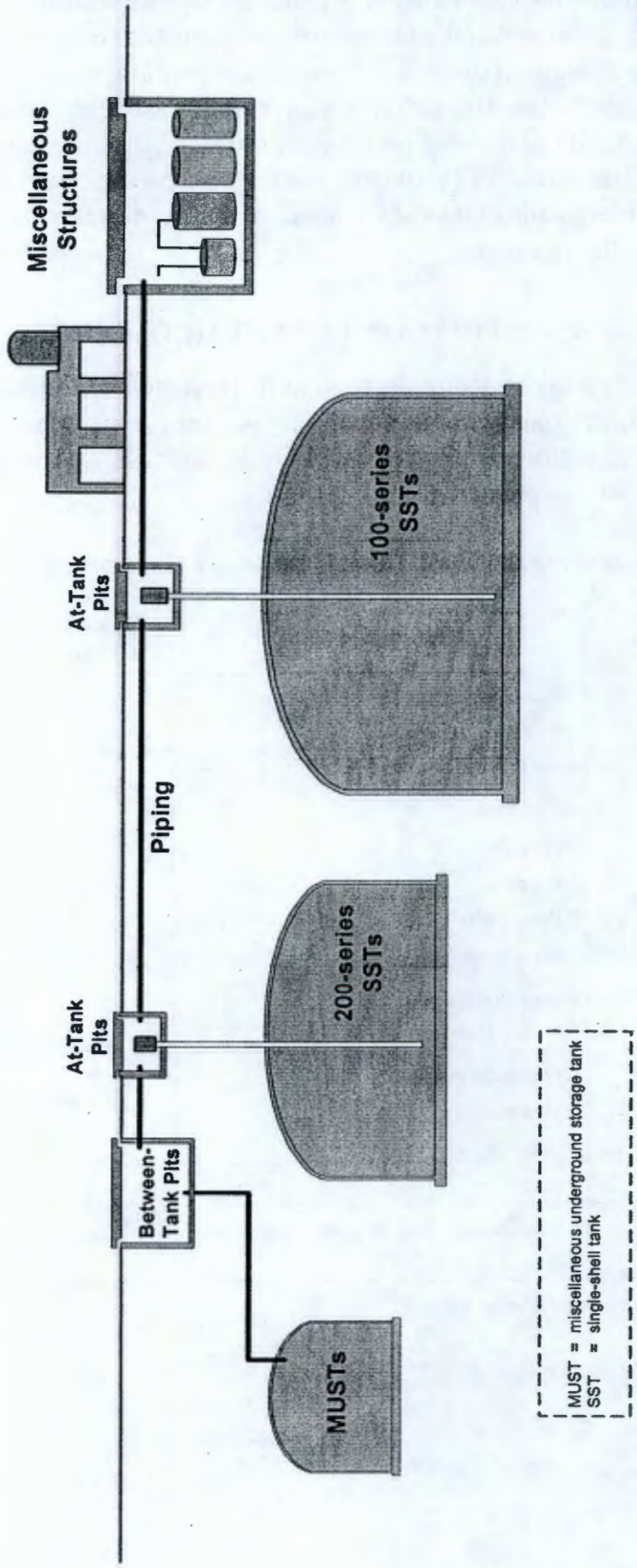
This document organizes SST components into groups to facilitate identification of applicable LDM requirements. Component groups contain items that perform similar functions. Table 3-1 and this section summarize these groups. Figure 3-1 illustrates the SST system and the interrelationship of SST system components.

Table 3-1. Single-Shell Tank Component Groupings

Grouping in Appendix A	Group Elements	Description of Component Group – Report Section #
SSTs	100-series tanks 200-series tanks	3.1.1
MUSTs	Inactive/not-in-use MUSTs	3.1.2
At-tank pits	Pump pits Sluice pits Heel pits Saltwell pits Saltwell caissons Distribution pits Receiving pits	3.1.3
Between-tank pits	Diversions boxes Valve pits Flush pits	3.1.4
Piping	Piping	3.1.5
Miscellaneous structures	Miscellaneous buildings and structures Vaults	3.1.6

MUST = miscellaneous underground storage tank
SST = single-shell tank

Figure 3-2. Relational Diagram of Single-Shell Tank System Components



3.1.1 Single-Shell Tanks

Single-shell tanks consist of underground, reinforced concrete shells with internal liners of mild carbon-steel covering the bottoms and sidewalls (Figure 3-3). The SST farms contain 67 tanks known or assumed to have leaked (HNF-EP-0182, Rev. 166; HNF-4872, Vol. I, Rev. 0) (Table 3-2). The last declaration of a leaking tank occurred in 1994 (Tank T-111). No additional confirmation or declaration of leakers has occurred since 1994.

Figure 3-3. Single-Shell Tank Cross-Section

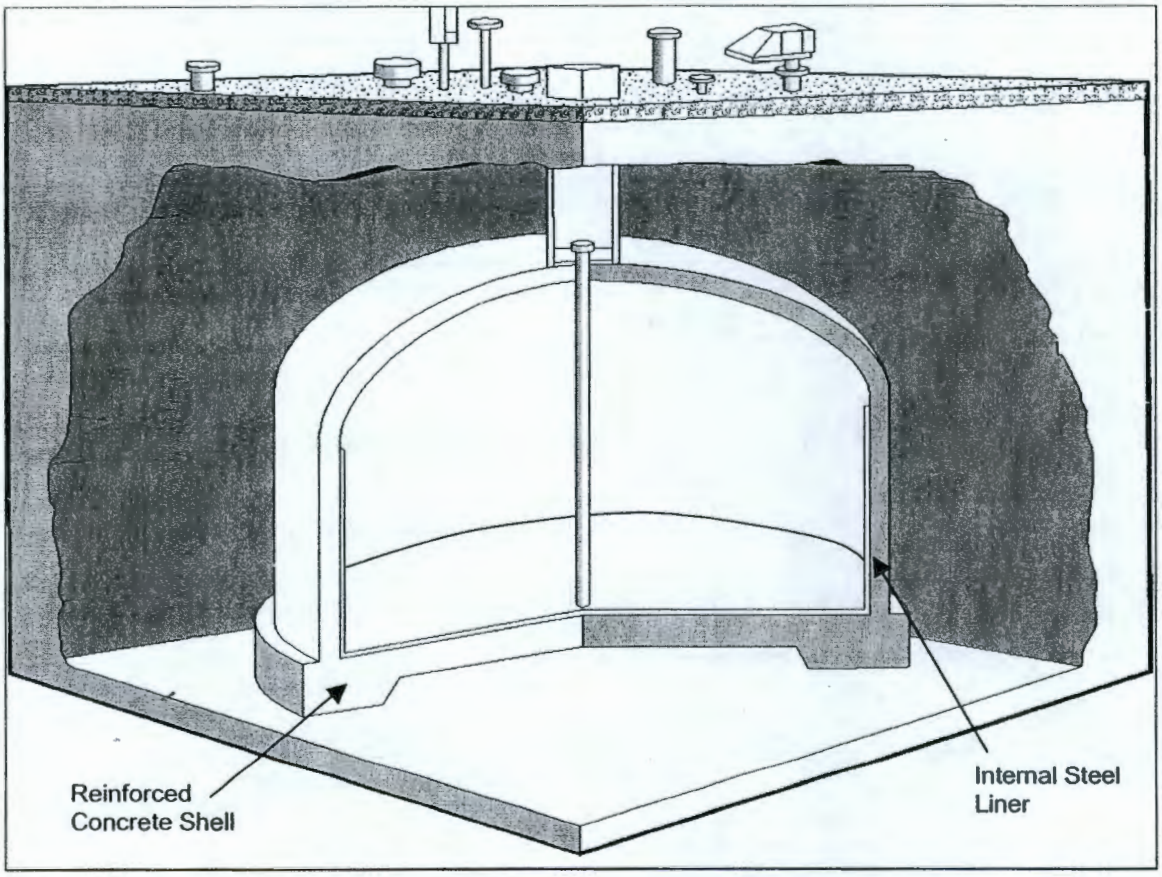


Table 3-2. Single-Shell Tank Leak Volume Estimates (3 Sheets)

Tank	Year Leak Declared	Leak Estimate (gal)	Waste Group / Waste Type
A-103	1987	5,500	Double-shell slurry feed, non-complexed waste and evaporator feed
A-104	1975	500 to 2,500	Sluice, neutralized acid waste, water, and B Plant high-level waste
A-105	1963	10,000 to 277,000	Neutralized acid waste and ion exchange waste
AX-102	1988	3,000	Complex concentrate waste, double-shell slurry feed, and evaporator feed
AX-104	1977	8,000	Non-complexed waste and neutralized acid waste
B-101	1974	8,000	Cladding waste, evaporator bottoms waste and B Plant low-level waste
B-103	1978	8,000	Cladding waste, evaporator bottoms waste, and ion-exchange waste
B-105	1978	8,000	Evaporator bottoms waste and first-cycle decontamination waste
B-107	1980	8,000	First-cycle decontamination waste, evaporator bottoms waste and cladding waste
B-110	1981	10,000	Second-cycle decontamination waste and B Plant cell drainage waste
B-111	1978	8,000	Second-cycle decontamination waste and B Plant cell drainage waste
B-112	1978	2,000	Second-cycle decontamination waste and B Plant cell drainage waste
B-201	1980	1,200	Lanthanum fluoride decontamination waste
B-203	1983	300	Lanthanum fluoride decontamination waste
B-204	1984	400	Lanthanum fluoride decontamination waste
BX-101	1972	8,000	Tributyl phosphate waste and cladding waste
BX-102	1971	70,000	Tributyl phosphate waste and cladding waste
BX-108	1974	2,500	Tributyl phosphate waste and cladding waste
BX-110	1976	8,000	First-cycle decontamination waste and in-tank solidified evaporator bottoms waste
BX-111	1984	8,000	First-cycle decontamination waste, and in-tank solidified evaporator bottoms waste
BY-103	1973	< 5,000	Ferrocyanide-scavenged tributyl phosphate waste and in-tank solidified evaporator bottoms waste
BY-105	1984	8,000	Ferrocyanide-scavenged tributyl phosphate waste and in-tank solidified evaporator bottoms waste

Table 3-2. Single-Shell Tank Leak Volume Estimates (3 Sheets)

Tank	Year Leak Declared	Leak Estimate (gal)	Waste Group / Waste Type
BY-106	1984	8,000	Ferrocyanide-scavenged tributyl phosphate waste and in-tank solidified evaporator bottoms waste
BY-107	1984	15,100	Ferrocyanide-scavenged tributyl phosphate waste and in-tank solidified evaporator bottoms waste
BY-108	1972	< 5,000	Ferrocyanide-scavenged tributyl phosphate waste and in-tank solidified evaporator bottoms waste
C-101	1980	20,000	Tributyl phosphate waste and cladding waste
C-110	1984	2,000	First-cycle decontamination waste and tributyl phosphate waste
C-111	1968	5,500	Ferrocyanide-scavenged tributyl phosphate waste and first-cycle decontamination waste
C-201	1988	550	Hot semi-works waste
C-202	1988	450	Hot semi-works waste
C-203	1984	400	Hot semi-works waste
C-204	1988	350	Hot semi-works waste
S-104	1968	2,4000	REDOX high-level waste
SX-104	1988	6,000	REDOX high-level waste and evaporator bottoms waste
SX-107	1964	< 5,000	REDOX high-level waste
SX-108	1962	2,400 to 35,000	REDOX high-level waste
SX-109	1965	< 10,000	REDOX high-level waste
SX-110	1976	5,500	REDOX high-level waste and REDOX ion-exchange waste
SX-111	1974	500 to 2,000	REDOX high-level waste and REDOX ion-exchange waste
SX-112	1969	30,000	REDOX high-level waste
SX-113	1962	15,000	REDOX high-level waste and diatomaceous earth
SX-114	1972	8,000	REDOX high-level waste and REDOX ion-exchange waste
SX-115	1965	50,000	REDOX high-level waste
T-101	1992	7,500	Cladding waste and mixture of several miscellaneous wastes
T-103	1974	< 1,000	Cladding waste and mixture of several miscellaneous wastes
T-106	1973	115,000	First-cycle decontamination waste and cladding waste
T-107	1984	8,000	Ferrocyanide-scavenged tributyl phosphate waste and first-cycle decontamination waste
T-108	1974	< 1,000	First-cycle decontamination waste and tributyl phosphate waste
T-109	1974	< 1,000	Tributyl phosphate waste and evaporator bottoms waste

Table 3-2. Single-Shell Tank Leak Volume Estimates (3 Sheets)

Tank	Year Leak Declared	Leak Estimate (gal)	Waste Group / Waste Type
T-111	1979, 1994	< 1,000	Second-cycle decontamination waste and lanthanum fluoride decontamination waste
TX-105	1977	8,000	REDOX high-level waste evaporator bottoms waste
TX-107	1984	2,500	REDOX high-level waste evaporator bottoms waste
TX-110	1977	8,000	Evaporator bottoms waste and first-cycle decontamination waste
TX-113	1974	8,000	Evaporator bottoms waste and first-cycle decontamination waste
TX-114	1974	8,000	Evaporator bottoms waste and first-cycle decontamination waste
TX-115	1977	8,000	Evaporator bottoms waste and REDOX high-level waste
TX-116	1977	8,000	Evaporator bottoms waste and first-cycle decontamination waste
TX-117	1977	8,000	Evaporator bottoms waste and first-cycle decontamination waste
TY-101	1973	< 1,000	Ferrocyanide-scavenged first-cycle decontamination waste and evaporator bottoms waste
TY-103	1973	3,000	Tributyl phosphate waste and ferrocyanide-scavenged first-cycle decontamination waste
TY-104	1981	1,400	Tributyl phosphate waste and ferrocyanide-scavenged first-cycle decontamination waste
TY-105	1960	35,000	Tributyl phosphate waste
TY-106	1959	20,000	Tributyl phosphate waste
U-101	1959	30,000	REDOX high-level waste
U-104	1961	55,000	REDOX high-level waste and diatomaceous earth
U-110	1975	5,000 to 8,100	First-cycle decontamination waste and cladding waste
U-112	1980	8,500	Unknown

REDOX = reduction-oxidation process

Waste stored in the SSTs consists of mixed waste containing primarily inorganic compounds and radioactive components. Inorganic compounds include:

- Sodium hydroxide;
- Sodium salts of nitrate, nitrite, carbonate, aluminate, and phosphate; and
- Hydrous oxides of aluminum, iron, and manganese.

Radioactive components in the waste consist primarily of mixed long-lived fission radionuclides (e.g., iodine-129) and actinide elements (e.g., uranium, neptunium, plutonium, thorium, americium). The waste may contain heavy metals (e.g., lead, chromium, cadmium).

Most of the tanks have moderately to strongly alkaline solutions with pH values up to 14. Historically, tank operations maintained a high pH in conjunction with additions of sodium nitrite to limit corrosion of the SST carbon-steel liners, transfer piping, and related process facilities used to handle SST waste. Current operating practices do not allow additions to the SSTs to adjust tank pH.

- **100-Series Tanks**

  One hundred thirty-three of the 149 SSTs have diameters of 75 feet. These tanks have operating volumes of 530,000, 750,000, and 1,000,000 gallons (see Figure 1-3). These tanks collectively make up the 100-series tanks. Appendix A contains a complete listing of all 100-series tanks.

- **200-Series Tanks**

  Sixteen smaller tanks have the same basic design as the 100-series tanks. However, the smaller tanks have diameters of only 20 feet and operating volumes of 55,000 gallons (see Figure 1-3). These tanks collectively make up the 200-series tanks. Appendix A contains a complete listing of all 200-series tanks.

3.1.2 Miscellaneous Underground Storage Tanks

The SST farms contain seven MUSTs that are inactive/not-in-use or RCRA regulated. All of these tanks have operating volumes of less than 50,000 gallons. The MUSTs fulfilled a variety of uses: some collected drainage from pits, and others collected facility-generated waste for batch transfer to a more permanent storage facility. The MUSTs follow one of four basic designs: direct-buried concrete, direct-buried steel, steel tanks in vaults or pits, and concrete vaults with steel liners. Many are directly buried in the ground, and most are catch tanks that collect small amounts of waste drained from waste transfer components. Many contain sludge and waste. Appendix A contains a complete listing of these SST system MUSTs.

3.1.3 At-Tank Pits

At-tank pits consist of below-grade concrete structures with removable concrete cover blocks. These pits contain pumps, monitoring equipment, and transfer system connections and piping spools (jumpers) used to interconnect the SST transfer system piping network. By engineering design, pits drain to tanks. All in-use pits involved in waste transfers contain continuously monitored conductivity-based leak detectors. The number and type of pits associated with an SST depends on its function and the type of waste the SST stores. Not all SSTs have all of the at-tank pits described below. Appendix A contains a complete listing of at-tank pits.

- **Pump Pits**

  Pump pits contain equipment for pumping waste out of SSTs. They usually reside over the center of the tank dome.

- **Sluice Pits**

  Sluice pits connected transfer piping to the sluicer assembly during past waste sluicing operations. They reside over off-center tank risers.

- **Heel Pits**

  Heel pits allow for equipment installation in SSTs. They reside over off-center tank risers.

- **Saltwell Pits**

  Saltwell pits allow for installation of saltwell pumps and piping in SSTs. They reside over the tank near the center or off-center.

- **Saltwell Caissons**

  Saltwell caissons consist of large, covered pits over SST tank domes. They allow for the installation of oversized equipment in the tank, including saltwell pumps. They were typically constructed from a section of corrugated metal pipe to create a caisson over the dome to allow for access to the riser. They serve a similar purpose as saltwell pits, but have a different construction.

3.1.4 Between-Tank Pits

Between-tank pits include diversion boxes, valve pits, and flush pits. Appendix A contains a complete listing of between-tank pits.

- **Diversion Boxes**

  Diversion boxes are below-grade, reinforced concrete structures that provide a flexible method of directing liquid waste from multiple inlets to multiple outlets, increasing route flexibility. The top of the diversion box is a concrete cover block that usually extends above grade. The cover blocks vary in thickness from box to box, and some are steel lined. Transfer lines are connected in the diversion box by installing a jumper between the connecting nozzles. Jumpers can be either fixed or flexible.

  Diversion boxes are equipped with leak detection probes; however, the probes are operated only for transfers. The pit drains are connected to catch tanks that collect any potential leakage from the jumper connections. Some transfer lines also drain back to the diversion box, which provides containment for any drained liquids.

- **Valve Pits**

  Valve pits are a form of diversion box and are also located below ground. They were used when transferring waste from multiple tanks at the same time. In the valve pit, the transfer lines of the sending tank are manifolded to the receiver tank line by means of a series of valves and jumper connections. Two-way and three-way valves are built into each rigid jumper assembly to divert the flow in the required direction. Waste also can be routed through the valve pit with stainless-steel flex jumpers. During a transfer, the leak detector in each valve pit in the transfer route is operating and is interlocked to

shutdown pumps if activated. Each valve pit also has a flush line connected to a flush pit or a drain line connected to an underground storage tank.

- **Flush Pits**

  The components for pipeline back flushing and decontamination operations are located in flush pits. In-line back flow preventers protect the flush pit system from contamination resulting from mixed waste back flowing into the flushing system.

3.1.5 Piping

The SST farms in the 200 East and 200 West Areas contain approximately 1,300 pipelines. The piping transferred waste to and from tanks in and among the farms. Piping has a variety of configurations including: single-walled direct buried, concrete-encased, double-wall buried, and more recently temporary aboveground hose-in-hose. Appendix A contains a listing of piping subject to LDM F&Rs.

- **Mission Essential Piping**

  Mission essential piping includes any piping that will or may support interim stabilization of an SST (but excluding retrieval). Mission essential piping has leak detection capability during all transfers until physical disconnection of the system from the mission essential transfer route(s) occurs.

  Mission essential piping gravity drains to tanks (i.e., SSTs and MUSTs) by design, and receives periodic flushing during and after use.

- **Inactive/Not-in-use Piping**

  Inactive/not-in-use piping includes any piping with no current and no expected mission in safe storage or transfer of SST system waste. Inactive/not-in-use piping does not have leak detection capabilities.

3.1.6 Miscellaneous Structures

The following sections identify SST system miscellaneous structure vaults that fall within the scope of the HFFACO Milestone M-23-23 requirements for LDM F&Rs.

Vaults

Vaults consist of shielded enclosures housing waste processing equipment. The vaults operated to collect, clarify, and allow physical and chemical modification of waste before its transfer elsewhere. Appendix A contains a listing of vaults subject to LDM F&Rs.

- **244-AR Vault**

  The 244-AR vault is located north west of the A Tank Farm in the 200 East Area. The vault was designed to receive, treat and transfer PUREX facility tank farm sludge to B Plant for fission product removal; provide interim storage for the PUREX facility acid waste feed to B Plant; and receive and distribute neutralized high-level waste from B Plant. The 244-AR vault is being cleaned and readied for decontamination and decommissioning per HFFACO Milestone M-45-11.

The 244-AR vault has three process cells. Cell 1 has a 43,000-gallon flat bottom stainless-steel tank (244-AR-TK-001); Cell 2 has a 43,000-gallon flat bottom stainless-steel tank (244-AR-TK-002); and Cell 3 has two slope bottom stainless-steel tanks (244-AR-TK-003 and 244-AR TK-004), each with a capacity of 4,800 gallons. Each of the three cells is equipped with a sump to detect leaks in any of the four tanks. Liquid levels in all four tanks and all three sumps are monitored weekly. The facility and tank ventilation system is not functional (RPP-9645, Rev. 0).

- **244-CR Vault**

The 244-CR vault is an inactive facility that functioned as a lag storage and transfer station from various waste streams including liquid discharge from Hot Semiworks (C Plant) and fission product "crudes" being transported between PUREX and B Plant. The facility also provided lag storage for PUREX acidified sludge in transit to the 244-AR vault and has been used for routing waste transfers from the C Tank Farm to the double-shell tanks (DSTs). The 244-CR vault houses a 50,000-gallon carbon-steel tank (244-TK-CR-001); two 15,000-gallon stainless-steel tanks (244-TK-CR-002 and 244-TK-CR-003); and a 50,000-gallon stainless-steel tank (244-TK-CR-011). All above-grade portions of the facility, including steam and air supply lines, have been removed. Tank 244-TK-CR-003 is currently monitored. None of the other tanks in the vault complex are monitored (RPP-9645, Rev. 0).

4.0 LEAK DETECTION AND MONITORING FUNCTIONS AND REQUIREMENTS

There are several functions related to leak detection that are applied to the components of the SST system based on the requirements of 40 CFR 265. These functions have been developed in response to the regulations and include:

- Detect the leak,
- Contain the leak,
- Respond to the leak, and
- Evaluate the SST system status.

Each of the functions must be accomplished in a manner that meets a specified objective, referred to as a requirement. Examples of requirements include:

- Detect the leak within 24 hours or as soon as practicable,
- Mitigate the effects of the leak as soon as practicable,
- Respond to the leak within 24 hours of detecting the leak, and
- Determine if the waste is compatible with the tank material.

The LDM functions identified in this document apply to the SST system components listed in Appendix A. However, the application of the functions differs depending on the characteristics of the components (e.g., purpose, status, dimensions, waste characteristics). To facilitate application of the functions, this document bins individual SST system groups into components. Component groups perform, or performed, similar functions and have similar characteristics. This document organizes components into two groups. Within these groups, this document further distinguishes between five subgroups to account for important component features:

- Primary containment structures:
  - SSTs,
  - MUSTs, and
  - Vessels and cells in miscellaneous structures.
- Transfer components:
  - Pipes, and
  - Pits.

This document bins primary containment structures into the same group because these components store, or may store, waste by design or practice. Processes for removing pumpable supernate and interstitial liquid waste, called interim stabilization, have been developed for these components. However, in addition to sharing important features, primary containment structures also have notable differences in size, status, and waste characteristics. To facilitate identification of requirements based on the functions, this document creates sub-groups of primary

containment structures that consist of SSTs, MUSTs, and vessels and cells in miscellaneous structures.

Transfer components fall into the same grouping because they facilitate, or facilitated, waste transfers within the SST system, but did not and do not store waste by design or practice except during waste transfers or in abnormal situations (e.g., when a transfer line plugs). To facilitate identification of requirements based on the functions, this document creates sub-groups of transfer components that consist of pits and pipes.

Section 4.1 establishes functions (detect, contain, respond) and requirements for primary containment structures. Section 4.2 establishes functions (detect, contain, respond) for transfer components. Section 4.3 identifies F&Rs for inspecting and evaluating the condition of SST system components (primary containment structures and transfer components) and for performing component maintenance. Section 4.4 identifies requirements for the design of new SST system components. Table 4-1 summarizes the location in this document of F&Rs for all SST system components and includes the following information:

- Identifies the name of the component sub-group (i.e., SSTs, MUSTs, miscellaneous structures, etc.) as described in Section 3.0 of this document;
- Provides a reference to a section in this document that describes the component sub-group;
- Identifies the important features of the sub-group used to assign functions and requirements (referred to as the F&R group), and (for SSTs, MUSTs, and vessels and cells in miscellaneous structures) identifies a figure that provides a breakdown of how many components in each F&R group have these features; and
- Provides a reference to a section in this document that describes the requirements applied to the F&R group.

Figure 4-1 graphically depicts the SST system component sub-groups. Figures 4-2, 4-3, and 4-4 graphically represent the F&R grouping logic, applicable F&Rs, and number of components in each F&R group for SSTs, MUSTs, and vessels and cells in miscellaneous structures, respectively. The assignment of an SST, MUST, vessel or cell to an F&R group is based on the component conditions and is subject to change. Component conditions are routinely monitored. If conditions for a tank change as a result of monitoring, the grouping and monitoring frequency will be reevaluated and recategorized per the requirements established by this document.

Table 4-1. Component Groups and Requirements (3 Sheets)

Group	Description Reference	Functions and Requirements Group	Requirements Reference
SSTs	3.1.1	Not technically feasible to LDM (i.e., dry waste surface and less than 24 inches of drainable liquid in the tank bottom) and has suspect integrity (see Figure 4-2) - OR - LDM is technically feasible, meets interim stabilization criteria, not susceptible to exceeding interim stabilization criteria, and has suspect integrity	4.1.1(A)(1) 4.1.2(A) 4.1.3(A)(1) 4.3.1(A) 4.3.2(A) 4.3.3(A) 4.4(A)
		Not technically feasible to LDM and does not have suspect integrity - OR – LDM is technically feasible, meets interim stabilization criteria, not susceptible to exceeding interim stabilization criteria, and does not have suspect integrity (see Figure 4-2)	4.1.1(A)(2) 4.1.2(A) 4.1.3(A)(2) 4.3.1(A) 4.3.2(A) 4.3.3(A) 4.4(A)
		LDM is technically feasible, meets interim stabilization criteria and susceptible to exceeding interim stabilization criteria (see Figure 4-2)	4.1.1(A)(3) 4.1.2(A) 4.1.3(A)(2) 4.3.1(A) 4.3.2(A) 4.3.3(A) 4.4(A)
		LDM is technically feasible, and does not meet interim stabilization criteria (see Figure 4-2)	4.1.1(A)(3) 4.1.2(A) 4.1.3(A)(3) 4.3.1(A) 4.3.2(A) 4.3.3(A) 4.4(A)
MUSTs	3.1.2	Inactive/not-in-use, and interim stabilized or meets interim stabilization criteria (see Figure 4-3)	4.1.1(B)(1) 4.1.2(B)(2) 4.1.3(B)(1) 4.3.1(A) 4.3.2(B)(1) 4.3.3(A) 4.4(A)
		Inactive/not-in-use, not interim stabilized, and does not meet interim stabilization criteria with a known volume of drainable liquid (see Figure 4-3)	4.1.1(B)(2) 4.1.2(B)(2) 4.1.3(B)(2) 4.3.1(A) 4.3.2(B)(1) 4.3.3(A) 4.4(A)

Table 4-1. Component Groups and Requirements (3 Sheets)

Group	Description Reference	Functions and Requirements Group	Requirements Reference
MUSTs	3.1.2	Mission essential (see Figure 4-3)	4.1.1(B)(2) 4.1.2(B)(1) 4.1.3(B)(2) 4.3.1(A) 4.3.2(B)(2) 4.3.3(A) 4.4(A)
	3.1.2	Inactive/not-in-use and has an indeterminate volume of drainable liquid (see Figure 4-3)	4.1.1(B)(3) 4.1.2(B)(2) 4.3.1(A) 4.3.2(B)(1) 4.3.3(A) 4.4(A)
Miscellaneous structures	3.1.6	Dry cells and inactive/not-in-use and meets interim stabilization criteria (see Figure 4-4)	4.1.1(C)(1) 4.1.2(C)(2) 4.1.3(C)(1) 4.3.1(A) 4.3.2(C) 4.3.3(A) 4.4(A)
		Inactive/not-in-use and does not meet interim stabilization criteria (see Figure 4-4)	4.1.1(C)(2) 4.1.2(C)(2) 4.1.3(C)(2) 4.3.1(A) 4.3.2(C) 4.3.3(A) 4.4(A)
		Mission essential (see Figure 4-4)	4.1.1(C)(2) 4.1.2(C)(1) 4.1.3(C)(2) 4.3.1(A) 4.3.2(C) 4.3.3(A) 4.4(A)
		Inactive/not-in-use and has an indeterminate volume of drainable liquid (see Figure 4-4)	4.1.1(C)(3) 4.1.2(C)(2) 4.3.1(A) 4.3.2(C) 4.3.3(A) 4.4(A)
At-tank and between-tank pits	3.1.3 3.1.4	Inactive/not-in-use	4.2.1(A)(1) 4.2.2(A)(1) 4.2.3(A)(1) 4.3.1(A) 4.3.2(D)(1) 4.3.3(A) 4.4(A)

Table 4-1. Component Groups and Requirements (3 Sheets)

Group	Description Reference	Functions and Requirements Group	Requirements Reference
At-tank and between-tank pits	3.1.3 3.1.4	Mission essential	4.2.1(A)(2) 4.2.2(A)(2) 4.2.3(A)(2) 4.3.1(A) 4.3.2(D)(2) 4.3.3(A) 4.4(A)
Pipes	3.1.5	Inactive/not-in-use	4.2.4(A)(1) 4.2.5(A)(1) 4.2.6(A)(1) 4.3.1(A) 4.3.2(E)(1) 4.3.3(A) 4.4(A)
		Mission essential	4.2.4(A)(2) 4.2.5(A)(2) 4.2.6(A)(2) 4.3.1(A) 4.3.2(E)(2) 4.3.3(A) 4.4(A)

LDM = leak detection and monitoring
MUST = miscellaneous underground storage tank
SST = single-shell tank

Figure 4-1. Single-Shell Tank System Components–Functions and Requirements

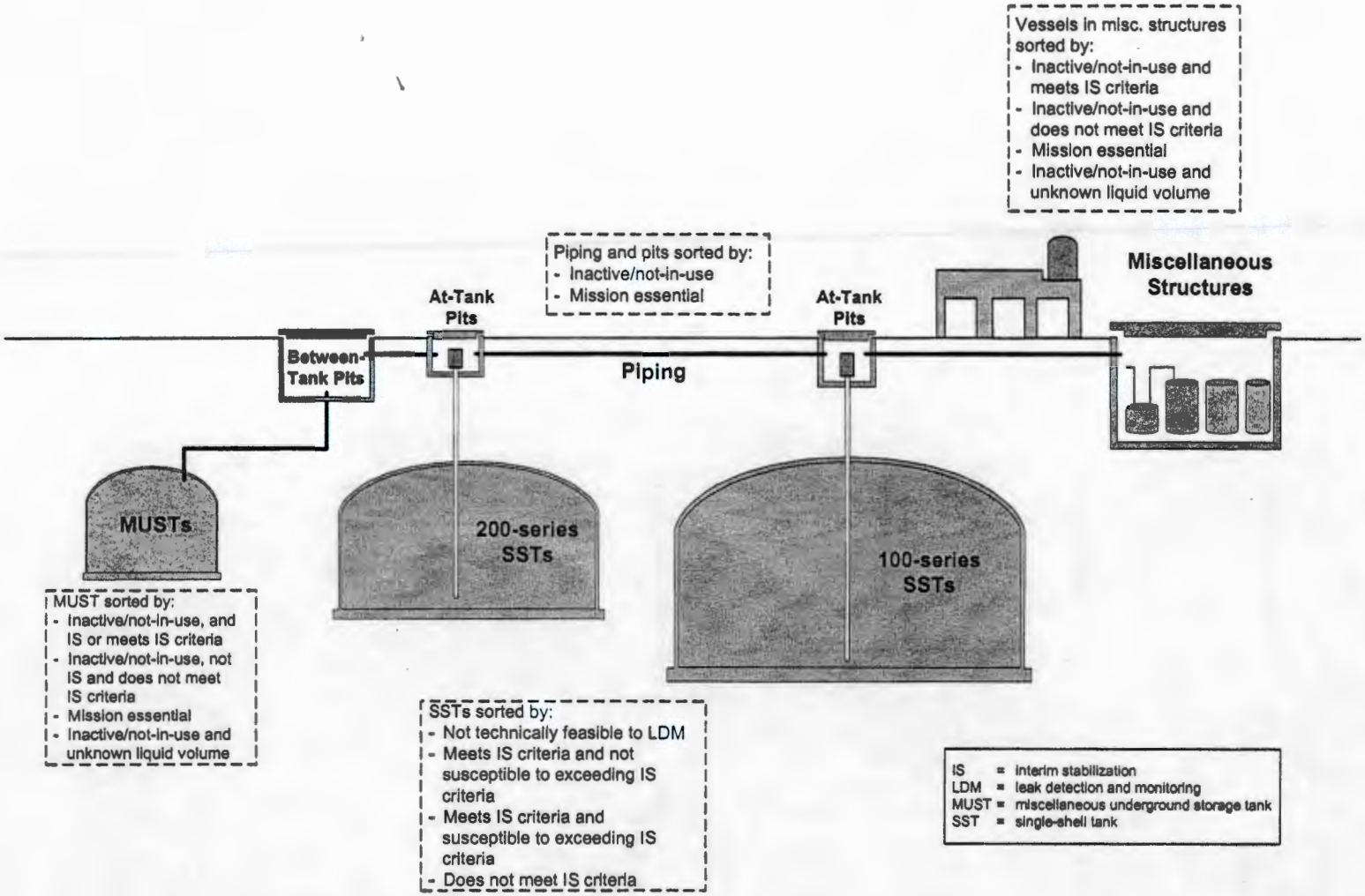


Figure 4-2. Single-Shell Tank Leak Detection and Monitoring Requirements

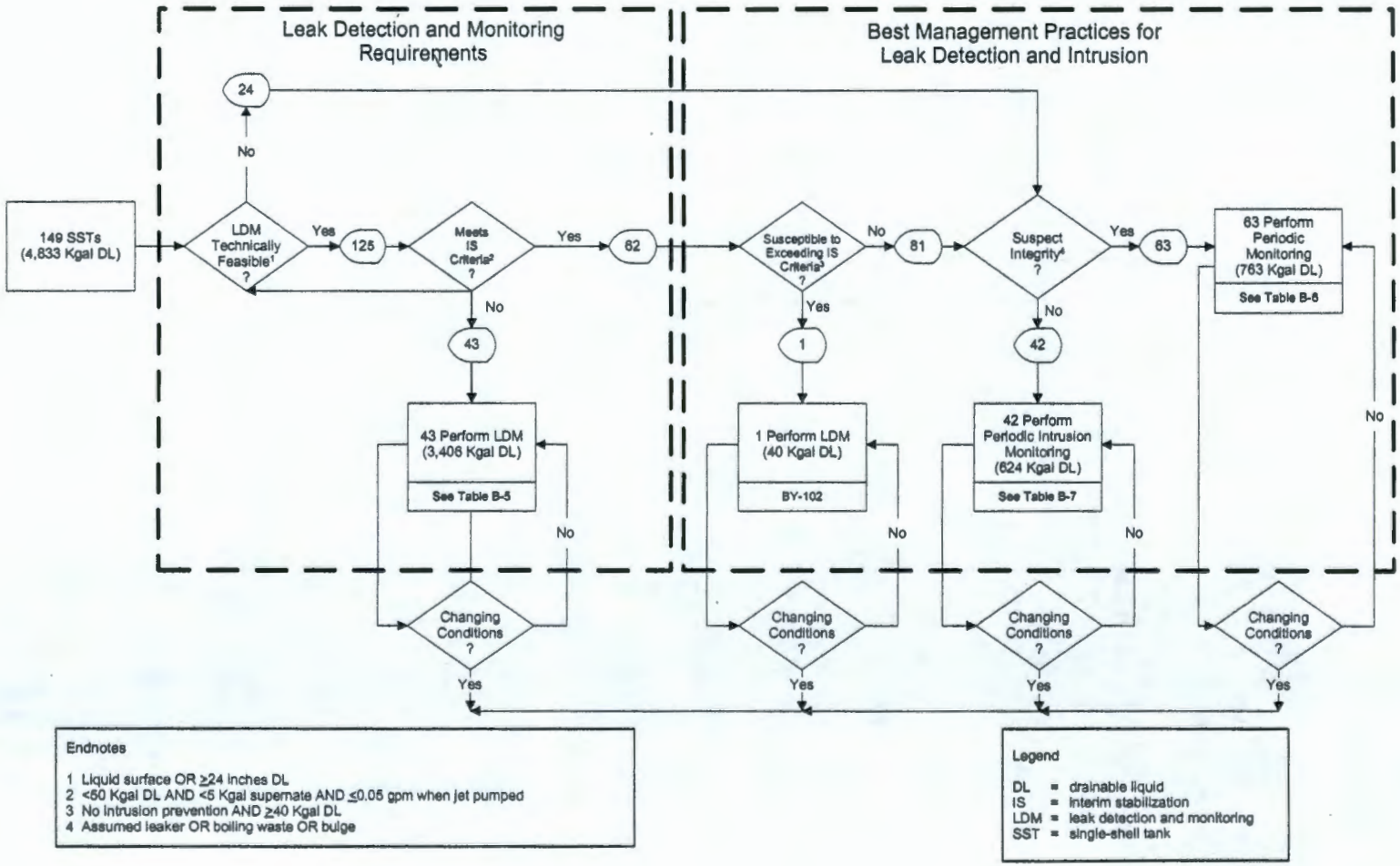


Figure 4-3. Miscellaneous Underground Storage Tank Leak Detection and Monitoring Requirements

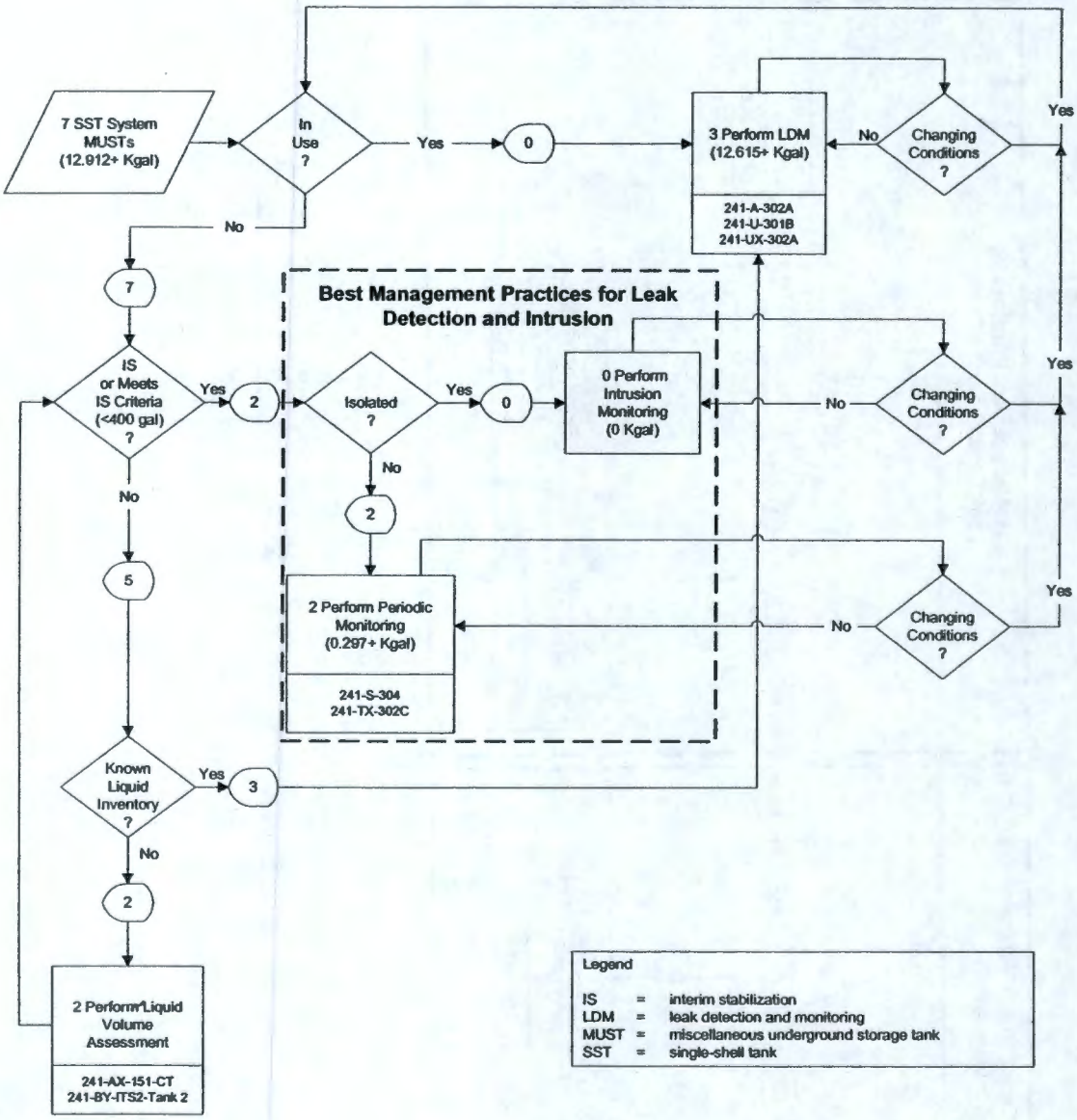
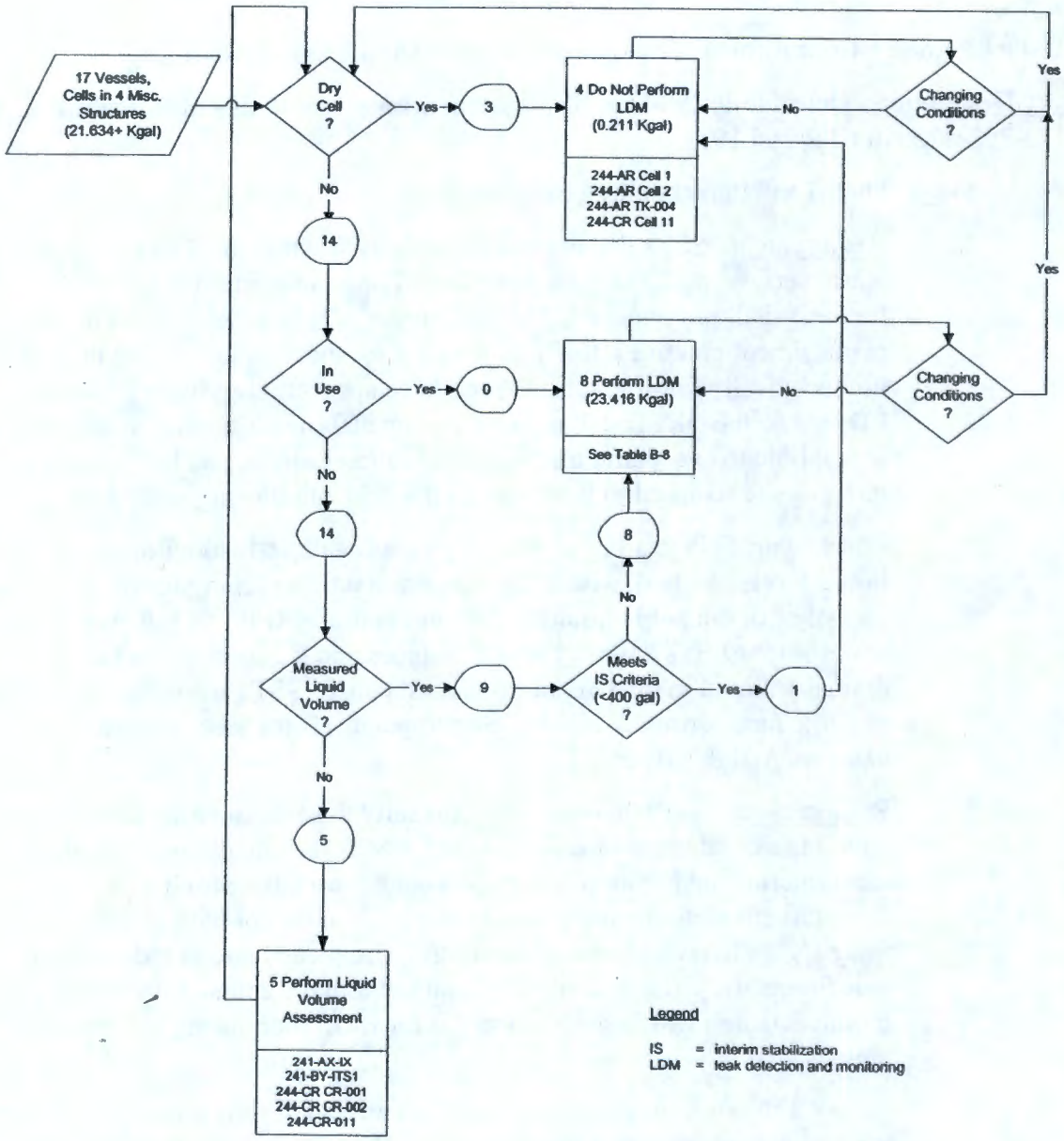


Figure 4-4. Miscellaneous Structure Leak Detection and Monitoring Requirements



4.1 CONTROL SINGLE-SHELL TANK SYSTEM PRIMARY CONTAINMENT LEAKS

4.1.1 Detect Primary Containment Leaks in the Single-Shell Tank System

Regulatory Description: Detect failures of the SST system primary containment structures (WAC 173-303-400; 40 CFR 265.193).

A. Single-Shell Tank Implementing Requirements:

1. Requirement: SSTs that are not technically feasible to LDM (i.e., a dry waste surface, and less than 24 inches of drainable liquid in the tank bottom) shall not require LDM (see Figure 4-2) (see Section 5.0 for best management practice [BMP] monitoring for these tanks). SSTs that are not technically feasible to LDM and have suspect integrity or SSTs where LDM is technically feasible, meet interim stabilization criteria, are not susceptible to exceeding interim stabilization criteria, and have suspect integrity are required to have annual periodic monitoring as a BMP.

   Basis: Currently available technology cannot directly monitor in-tank liquid levels in a tank with a dry waste surface containing less than 24 inches of drainable liquid in the tank bottom (RPP-9645, Rev. 0). Twenty-four SSTs have dry waste surfaces and less than 24 inches of drainable liquid in the tank bottom. Sixty-three SSTs are subject to annual periodic monitoring as a BMP. See Appendix B for an expanded discussion of this basis.

2. Requirement: SSTs that are not technically feasible to LDM and do not have suspect integrity or SSTs where LDM is technically feasible, that meet interim stabilization criteria, do not have a susceptibility to exceeding the interim stabilization criteria, and do not have suspect integrity shall have a reduced monitoring frequency due to reduced risk (see Figure 4-2). These tanks are required to have annual intrusion monitoring as a BMP (see Section 5.0 for BMP monitoring for these tanks).

   Basis: The primary response to a leak in an SST is to respond immediately to remove pumpable liquid. Interim stabilization typically removes liquid waste until the retrieval rate drops to 0.05 gpm or less if jet pumping is used. At this point, capillary action prevents most of the remaining liquid from draining from the tank solids. Therefore, interim stabilization has already removed liquids to the extent practical. If a leak occurred in an SST meeting interim stabilization criteria, the leak would likely occur at a very low rate thus minimizing the extent of the leak. The low leak rate would also make detecting the leak difficult. Moreover, if a leak occurred and it was detected, additional pumping would not result in the removal of liquid beyond established practical limits in SSTs with pumpable liquid flow rates less than 0.05 gpm if jet pumping is used.

Forty-two SSTs are subject to annual intrusion monitoring as a BMP. See Appendix B for an expanded discussion of this basis.

3. Requirement: SSTs where LDM is technically feasible that do not meet interim stabilization criteria, or meet the interim stabilization criteria but have a susceptibility to exceeding the interim stabilization criteria, shall require weekly LDM (see Figure 4-2).

   Basis: Tanks that do not meet interim stabilization criteria require direct measurement of the liquid level for leak monitoring in accordance with WAC 173-303-400 and 40 CFR 265.193. Forty-three SSTs are technically feasible to LDM and do not meet the interim stabilization criteria. One additional SST is technically feasible to LDM, and meets the interim stabilization criteria, but has a susceptibility to exceeding the criteria because it has not been isolated against intrusion and contains 40,000 gallons or more of drainable interstitial liquid waste. See Appendix B for an expanded discussion of this basis.

B. Miscellaneous Underground Storage Tank Implementing Requirements

1. Requirement: Inactive/not-in-use MUSTs that have been interim stabilized or meet interim stabilization criteria, shall not require LDM (see Figure 4-3). The MUSTs that are physically isolated are required to have annual intrusion monitoring as a BMP and MUSTs that are not physically isolated are required to have annual periodic monitoring as a BMP (see Section 5.0 for BMP monitoring for these tanks).

   Basis: A response to a leak in an interim stabilized MUST, or MUST containing less than 400 gallons of drainable liquid, could only involve the installation and operation of the emergency pumping system. The MUST liquid levels would not cover the pump inlet, or the pump could not recover liquid from these MUSTs. Therefore, these MUSTs do not require liquid level monitoring. Two of 7 inactive/not-in-use MUSTs have been interim stabilized or meet the interim stabilization criteria and are not physically isolated. Miscellaneous underground storage tanks have been interim stabilized or meet the interim stabilization criteria and are physically isolated. See Appendix B for an expanded discussion of this basis.

2. Requirement: Inactive/not-in-use MUSTs that have not been interim stabilized and do not meet interim stabilization criteria shall require LDM. Mission essential MUSTs shall require LDM. Leak detection and monitoring systems shall have the ability to detect leaks at the earliest practicable time allowed by existing detection technology and existing MUST conditions (see Figure 4-3).

   Basis: WAC 173-303-400; 40 CFR 265.193(c)(3). See Appendix B for an expanded discussion of this basis. Three MUSTs have not been interim

stabilized or do not meet the interim stabilization criteria and have a known volume of drainable liquid. Zero MUSTs are mission essential.

3. Requirement: Inactive/not-in-use MUSTs with an indeterminate volume of drainable liquid waste shall have a liquid volume assessment (see Figure 4-3).

   Basis: Inactive/not-in-use MUSTs with indeterminate liquid waste volumes require assessments to determine if they meet interim stabilization criteria. Based on those assessments, the requirements appropriate to their classification will be imposed. Two inactive/not-in-use MUSTs in the SST system have indeterminate liquid waste volumes. See Appendix B for an expanded discussion of this basis.

C. Vessels and cells in Miscellaneous Structures Implementing Requirements

1. Requirement: Vessels and cells in miscellaneous structure that are empty and inactive/not-in-use vessels and cells in miscellaneous structures that meet interim stabilization criteria shall not require LDM (see Figure 4-4).

   Basis: The inactive/not-in-use vessels and cells in miscellaneous structures do not and will not receive waste. These vessels and cells have been retrieved to the extent possible, or contain less liquid waste than currently retrievable. Leak detection is therefore not required. Four vessels and cells in miscellaneous structures are either empty or are inactive/not-in-use and meet the interim stabilization criteria because they contain less than 400 gallons of drainable liquid. See Appendix B for an expanded discussion of this basis.

2. Requirement: Inactive/not-in-use vessels and cells in miscellaneous structures that do not meet interim stabilization criteria require LDM. Mission essential vessels and cells in miscellaneous structures require LDM. Leak detection and monitoring systems shall have the ability to detect leaks at the earliest practicable time allowed by existing detection technology and existing vessel and cell conditions (see Figure 4-4).

   Basis: WAC 173-303-400; 40 CFR 265.193(c)(3). Eight vessels and cells are either mission essential or are inactive/not-in-use and do not meet the interim stabilization criteria. See Appendix B for an expanded discussion of this basis.

3. Requirement: Inactive/not-in-use vessels and cells in miscellaneous structures with an indeterminate volume of drainable liquid waste shall have a liquid volume assessment (see Figure 4-4).

   Basis: Inactive/not-in-use vessels and cells in miscellaneous structures with indeterminate liquid waste volumes require a liquid volume assessment to determine if they meet interim stabilization criteria because they contain less than 400 gallons of liquid waste. Based on those assessments, the requirements appropriate to their classification will be

imposed. Five inactive/not-in-use vessels and cells in miscellaneous structures have an indeterminate liquid waste volume. See Appendix B for an expanded discussion of this basis.

4.1.2 Contain Primary Containment Leaks in the Single-Shell Tank System

Regulatory Description: Contain the release of hazardous waste or hazardous constituents to the environment (WAC 173-303-400; 40 CFR 265.193).

A. Single-Shell Tank Implementing Requirements:

1. Requirement: All SSTs shall have a tank integrity assessment by an independent, qualified, registered professional engineer in accordance with WAC 173-303-400 and 40 CFR 265.193(i)(2) as implemented by the requirements established in HFFACO Milestone M-23-24. Single-shell tanks shall not require secondary containment.

   Basis: WAC 173-303-400 and 40 CFR 265.193 require secondary containment for all existing tanks. The SST system was built prior to RCRA and does not have secondary containment. Technical and cost issues make it unfeasible to provide SST system components with secondary containment. In response to this condition, the DOE committed to retrieval of the waste in accordance with the HFFACO Milestone M-45-00, and HFFACO Milestone M-23-24 required the integrity assessment in the implementing requirement.

B. Miscellaneous Underground Storage Tank Implementing Requirements

1. Requirement: All mission essential MUSTs shall have a tank integrity assessment by an independent, qualified, registered professional engineer in accordance with WAC 173-303-400 and 40 CFR 265.193(i)(2) as implemented by the requirements established in HFFACO Milestone M-23-24. Miscellaneous underground storage tanks shall not require secondary containment.

   Basis: WAC 173-303-400 and 40 CFR 265.193 require secondary containment for all existing tanks. The SST system was built prior to RCRA and does not have secondary containment. Technical and cost issues make it unfeasible to provide SST system components with secondary containment. In response to this condition, the DOE committed to closure of the SST system in accordance with the HFFACO Milestone M-45-00, and HFFACO Milestone M-23-24 required the integrity assessment described in the implementing requirement. Currently, the SST system contains no mission essential MUSTs.

2. Requirement: Inactive/not-in-use MUSTs shall not require secondary containment as specified by WAC 173-303-400 and 40 CFR 265.193.

   Basis: WAC 173-303-400 and 40 CFR 265.193 require secondary containment for all existing tanks. The SST system was built prior to

RCRA and does not have secondary containment. Technical and cost issues make it unfeasible to provide SST system components with secondary containment. In response to this condition, the DOE committed to closure of the SST system in accordance with the HFFACO Milestone M-45-00, and HFFACO Milestone M-23-24 required the integrity assessment in the implementing requirement. Inactive/not-in-use MUSTs will not have secondary containment or integrity examinations for the following reasons: First, inactive/not-in-use MUSTs do not and will not receive waste. Second, the DOE already has plans to retrieve and close the tanks in accordance with the SST System Closure Work Plan (DOE/RL-89-16, Rev. 1). And third, significant technical and cost considerations preclude providing secondary containment or integrity examinations.

C. Vessels and Cells in Miscellaneous Structures Implementing Requirements

1. Requirement: Mission essential vessels and cells in miscellaneous structures shall not require secondary containment. Mission essential vessels and cells in miscellaneous structures shall have a tank integrity assessment performed by an independent, qualified, registered professional engineer in accordance with WAC 173-303-400 and 40 CFR 265.193(i)(2) as implemented by the requirements established in HFFACO Milestone M-23-24.

   Basis: WAC 173-303-400 and 40 CFR 265.193 require secondary containment for all existing tanks. The SST system was built prior to RCRA and does not have secondary containment. Technical and cost issues make it unfeasible to provide SST system components with secondary containment. In response to this condition, the DOE committed to closure of the SST system in accordance with the HFFACO Milestone M-45-00, and HFFACO Milestone M-23-24 required the integrity assessment described in the implementing requirement. Currently, the SST system contains no mission essential vessels or cells in miscellaneous structures.

2. Requirement: Inactive/not-in-use vessels and cells in miscellaneous structures shall not require secondary containment as specified by WAC 173-303-400 and 40 CFR 265.193.

   Basis: WAC 173-303-400 and 40 CFR 265.193 require secondary containment for all existing tanks. The SST system was built prior to RCRA and does not have secondary containment. Technical and cost issues make it unfeasible to provide SST system components with secondary containment. In response to this condition, the DOE committed to closure of the SST system in accordance with the HFFACO Milestone M-45-00, and HFFACO Milestone M-23-24 required the integrity assessment in the implementing requirement. Inactive/not-in-use vessels and cells in miscellaneous structures will not have secondary containment

or integrity examinations for the following reasons. First, inactive vessels and cells in miscellaneous structures do not, and will not, receive waste. Second, vessels and cells in miscellaneous structures have been, or will be, placed in safe standby waiting decommissioning and closure. And third, significant technical and cost considerations preclude providing secondary containment or integrity examinations.

4.1.3 Respond to Primary Containment Leaks in the Single-Shell Tank System

Regulatory Description: Remove from service tank systems or secondary containment in response to a leak, or to the result of an assessment that finds any portion of the tanks unfit for use (WAC 173-303-400; 40 CFR 265.196).

A. Single-Shell Tank Implementing Requirements:

1. Requirement: SSTs with a dry waste surface, and less than 24 inches of drainable liquid in the tank bottom shall not require responses to leaks (see Section 5.0 for BMP monitoring for these tanks).

   Basis: Currently available technology cannot directly monitor in-tank liquid levels in a tank with a dry waste surface containing less than 24 inches of drainable liquid in the tank bottom (RPP-9645, Rev. 0). The inability to directly monitor in-tank liquid levels precludes effective leak detection and leak response. Twenty-four SSTs have dry waste surfaces and less than 24 inches of drainable liquid in the tank bottom. See Appendix B for an expanded discussion of this basis.

2. Requirement: SSTs that meet interim stabilization criteria shall not require responses to leaks (see Section 5.0 for BMP monitoring for these tanks).

   Basis: Currently developed or available technologies do not exist for removing additional liquid from a leaking tank meeting interim stabilization criteria, other than total waste retrieval already addressed in the HFFACO Milestone M-45-00. The interim stabilization criteria acknowledge the limitations of further liquid removal from SSTs that meet interim stabilization criteria and for jet pumping have pumpable liquid flow rates of 0.05 gpm or less if jet pumping is used. Since interim stabilization has already removed all liquid that existing tank farm pumping systems can remove, these tanks meet the intent of the regulations while they wait for retrieval.

   Eighty-two SSTs meet the interim stabilization criteria by containing less than 50,000 gallons of drainable interstitial liquid, less than 5,000 gallons of supernate, and having final pumping flow rates of 0.05 gpm or less if jet pumping is used. See Appendix B for an expanded discussion of this rationale.

3. Requirement: SSTs that do not meet interim stabilization criteria require the following responses to leaks: (a) Remove the tank from service;

(b) Immediately contain and inspect visible releases to the environment from tank systems; (c) Report leaks to Ecology within 24 hours of their detection unless the hazardous waste leak or spill involves 1 pound or less of material immediately contained and cleaned up; and (e) File a report with Ecology within 30 days.

Basis: WAC 173-303-400; 40 CFR 265.196. Tanks that do not meet interim stabilization criteria require installation and operation of the emergency pumping system as soon as practicable upon detecting a leak in accordance with the emergency pumping plan. Forty-three SSTs have not completed interim stabilization, or do not meet the interim stabilization criteria because they contain more than 50,000 gallons of drainable interstitial liquid, or more than 5,000 gallons of supernate, or had final pumping flow rates greater than 0.05 gpm if jet pumping was used. See Appendix B for an expanded discussion of this basis.

B. Miscellaneous Underground Storage Tank Implementing Requirements

1. Requirement: Inactive/not-in-use MUSTs that have been interim stabilized or meet interim stabilization criteria shall not require responses to leaks (see Section 5.0 for BMP monitoring for these tanks).

   Basis: A response to a leak in an interim stabilized MUST, or a MUST containing less than 400 gallons of drainable liquid, could only involve the installation and operation of the emergency pumping system. The MUST liquid levels would not cover the pump inlet, or the pump could not recover liquid from these MUSTs. Two of seven inactive/not-in-use MUSTs in the SST system have been interim stabilized or contain less than 400 gallons of drainable liquid. See Appendix B for an expanded discussion of this basis.

2. Requirement: Inactive/not-in-use MUSTs that have not been interim stabilized and do not meet interim stabilization criteria require responses to leaks. Mission essential MUSTs require responses to leaks. The response to a leak will: (a) Remove the MUST from service; (b) Remove pumpable liquid from the MUST at the earliest practicable time; (c) Immediately contain and inspect visible releases to the environment from tank systems; (d) Report leaks to Ecology within 24 hours of their detection unless the hazardous waste leak or spill involves 1 pound or less of material immediately contained and cleaned up; and (e) File a report with Ecology within 30 days.

   Basis: WAC 173-303-400; 40 CFR 265.196(a) through (d). The SST system currently has three MUSTs that have not completed interim stabilization and do not meet interim stabilization criteria. The SST system currently has no mission essential MUSTs. See Appendix B for an expanded discussion of this rationale.

C. Vessels and Cells in Miscellaneous Structure Implementing Requirements

1. Requirement: Inactive/not-in-use vessels and cells in miscellaneous structures that meet interim stabilization criteria shall not require responses to leaks.

   Basis: The inactive/not-in-use vessels and cells in miscellaneous structures do not and will not receive waste, and have been or will be placed in safe standby awaiting decommissioning and closure. These vessels and cells only contain volumes of drainable liquids at or below the limits that can be practically retrieved by existing tank farm pumping systems (i.e., 400 gallons). Four inactive/not-in-use vessels and cells in miscellaneous structures meet interim stabilization criteria because they contain less than 400 gallons of drainable liquid. See Appendix B for an expanded discussion of this basis.

2. Requirement: Inactive/not-in-use vessels and cells in miscellaneous structures that do not meet interim stabilization criteria shall require responses to leaks. Mission essential vessels and cells in miscellaneous structures shall require responses to leaks. The response to a leak will: (a) Remove the system from service; (b) Remove pumpable liquid from the system at the earliest practicable time; (c) Immediately contain and inspect visible releases to the environment from vessels and cells; (d) Report leaks to Ecology within 24 hours of their detection unless the hazardous waste leak or spill involves 1 pound or less of material immediately contained and cleaned up; and (e) File a report with Ecology within 30 days.

   Basis: WAC 173-303-400; 40 CFR 265.196(a) through (d). See Appendix B for an expanded discussion of this rationale.

4.2 CONTROL SINGLE-SHELL TANK SYSTEM TRANSFER COMPONENT LEAKS

4.2.1 Detect Waste Leakage within At-Tank Pits and Between-Tank Pits

Regulatory Description: Detect leakage from failures within at-tank pits and between-tank pits (WAC 173-303-400; 40 CFR 265.193).

A. Implementing Requirements:

1. Requirement: Inactive/not-in-use at-tank and between-tank pits shall not require LDM.

   Basis: At-tank and between-tank pits provide secondary containment for transfer systems contained within the pits and are designed to drain liquids to tanks. Transfer system components that are inactive/not-in-use have been or will be physically or administratively isolated from the mission essential waste transfer systems in accordance with the tank farm

procedures. If not in use, the inactive/not-in-use transfer system cannot receive or otherwise transfer waste; therefore, the inactive/not-in-use pits have no opportunity to receive leakage from these unused transfer system components.

2. Requirement: When in use, mission essential at-tank and between-tank pits will have direct, in-tank liquid level monitoring instruments capable of detecting leaks within 24 hours, or at the earliest practicable time if existing detection technology or site conditions will not allow detection of a release within 24 hours.

   Basis: WAC 173-303-400; 40 CFR 265.193(c)(3).

4.2.2 Contain Waste Leakage within At-Tank Pits and Between-Tank Pits

Regulatory Description: Contain leaks in transfer systems in order to prevent the release or migration of wastes or hazardous constituents to the soil, groundwater, or surface water (WAC 173-303-400; 40 CFR 265.193).

A. Implementing Requirements:

1. Requirement: Inactive/not-in-use at-tank and between-tank pits shall not require secondary containment.

   Basis: At-tank and between-tank pits provide secondary containment for transfer systems contained within the pits and are designed to drain liquids to tanks. Transfer systems that are inactive/not-in-use have been or will be physically or administratively isolated from the mission essential waste transfer systems in accordance with the tank farm procedures. If not in use, the transfer system cannot receive or otherwise transfer waste. The inactive/not-in-use pits have no opportunity to contain leakage from these unused transfer system components. Therefore, application of the requirement for secondary containment is not appropriate based on current and future system configuration.

2. Requirement: When in-use, mission essential at-tank and between-tank pits act as secondary containment for waste transfers, and will have direct, in-tank liquid level monitoring instruments to detect and prevent migration of waste or accumulated liquid out of the tank to the soil, groundwater, or surface water at any time while in use. In-use, mission essential at-tank and between-tank pits will have the ability to collect, contain or drain releases that drain to them until removal of the collected material.

   Basis: WAC 173-303-400; 40 CFR 265.193(a), (b), and (e).

4.2.3 Respond to Waste Leakage in At-Tank Pits and Between-Tank Pits

Regulatory Description: Remove from service the tank system primary containment system in response to a leak, or the result of an assessment that finds any portion of the pits unfit for use (WAC 173-303-400; 40 CFR 265.196).

A. Implementing Requirements:

1. Requirement: Inactive/not-in-use at-tank and between-tank pits shall not require responses to leaks.

   Basis: At-tank and between-tank pits provide secondary containment for transfer systems contained within the pits and are designed to drain liquids to tanks. Inactive/not-in-use pits have been or will be physically or administratively isolated from the mission essential waste transfer systems in accordance with the tank farm procedures. While inactive/not-in-use, the transfer systems cannot receive or otherwise transfer waste; therefore, the inactive/not-in-use pits have no opportunity to contain leakage from these unused transfer system components. Therefore, application of the requirement for responses to leaks is not appropriate based on current and future system configuration.

2. Requirement: When in use, mission essential at-tank and between-tank pits serve as secondary containment for waste transfers, and will have direct, in-pit liquid level monitoring instruments to detect and prevent migration of waste or accumulated liquid out of the system to the soil, groundwater, or surface water at any time while in use. When in use, mission essential at-tank and between-tank pits will have the ability to collect, contain or drain releases that drain to them until removal of the collected material.

   Basis: WAC 173-303-400; 40 CFR 265.196(a), (b) and (e).

4.2.4 Detect Leaks in Single-Shell Tank System Piping

Regulatory Description: Detect failures of the SST system piping (WAC 173-303-400; 40 CFR 265.193).

A. Implementing Requirements:

1. Requirement: Inactive/not-in-use piping shall not require LDM.

   Basis: Transfer systems that are inactive/not-in-use have been or will be physically or administratively isolated from the mission essential transfer systems in accordance with the tank farm procedures. While inactive/ not-in-use, the transfer system cannot receive or otherwise transfer waste. Therefore, application of the requirement for LDM is not appropriate based on current and future system configuration.

2. Requirement: When in use, mission essential piping shall have systems in the pits at each end capable of detecting failures of the transfer system

within 24 hours or at the earliest practicable time if existing detection technology or site conditions will not allow detection of a release within 24 hours.

Basis: WAC 173-303-400; 40 CFR 265.193(c)(3).

4.2.5 Contain Waste Leakage within Piping Secondary Containment

Regulatory Description: Contain leaks in piping in order to prevent the release or migration of wastes or hazardous constituents to the soil, groundwater, or surface water (WAC 173-303-400; 40 CFR 265.193).

A. Implementing Requirements:

1. Requirement: Inactive/not-in-use piping shall not require secondary containment.

   Basis: The SST system piping was designed and constructed prior to RCRA and does not have compliant secondary containment (other than when it passes through pits). Transfer systems that are not in use have been or will be physically or administratively isolated from the mission essential waste transfer systems in accordance with the tank farm procedures. While inactive/not-in-use, the transfer system cannot receive or otherwise transfer waste. Therefore, application of the requirement for secondary containment is not appropriate based on current and future system configuration.

2. Requirement: When in use, mission essential piping shall have either: (a) Secondary containment designed, installed, and operated to prevent any migration of waste or accumulated liquid out of the system to the soil, groundwater, or surface water at any time during use, ***OR*** (b) Pressure testing prior to first use and at least annually thereafter when in use.

   Basis: WAC 173-303-400; 40 CFR 265.193(a); 40 CFR 265.193(i)(2).

4.2.6 Respond to Leakage in Single-Shell Tank System Transfer Piping

Regulatory Description: Remove from service the tank system primary containment system in response to a leak, or the result of an assessment that finds any portion of the pits unfit for use (WAC 173-303-400; 40 CFR 265.196).

A. Implementing Requirements:

1. Requirement: Inactive/not-in-use piping shall be isolated from in-use transfer systems.

   Basis: Transfer piping that is inactive/not-in-use must be physically or administratively isolated from in-use transfer systems (tank farm procedures).

2. Requirement: Mission essential piping that leaks requires the following response: (a) Cease waste transfers and remove the leaking section of piping from service; (b) Remove pumpable liquid at the earliest practicable time; (c) Immediately contain and inspect visible releases to the environment (pit leak detection on double-encased transfer lines satisfies this requirement); (d) Report leaks to Ecology within 24 hours of their detection unless the hazardous waste leak or spill involves 1 pound or less of material immediately contained and cleaned up; and (e) File a report with Ecology within 30 days.

   Basis: WAC 173-303-400; 40 CFR 265.196(a) through (e).

4.3 INSPECTIONS AND EVALUATIONS OF THE SINGLE-SHELL TANK SYSTEM

Regulatory Description: Determine if each existing tank system without secondary containment leaks or is unfit for use (HFFACO Milestone M-23-24).

4.3.1 Assess System Integrity

Regulatory Description: Determine whether mission essential tank systems without secondary containment are leaking or unfit for use. Obtain and keep on file a written assessment reviewed and certified by an independent, qualified, registered professional engineer attesting to the tank system's integrity. The assessment must determine if the tank system has an adequate design, and sufficient structural compatibility with waste stored or treated, to ensure it will not collapse, rupture, or fail. Perform an assessment that considers: design standards used to construct the tank and ancillary equipment; hazardous characteristics of waste handled; existing corrosion protection measures; and the age of the tank system (HFFACO Milestone M-23-24).

A. Implementing Requirements:

1. Requirement: Perform integrity assessment, and maintain associated documents, in accordance with HFFACO Milestone M-23-24.

   Basis: HFFACO Milestone M-23-24.

2. Requirement: Retrieve SST system waste in accordance with HFFACO Milestone M-45-00.

   Basis: HFFACO Milestone M-45-00.

4.3.2 Perform Single-Shell Tank System Inspections

Regulatory Description: Inspect the following at least once each operating day, and document inspection results in the facility operating record: overfill/spill control equipment to ensure good working order; aboveground portions of the system to detect corrosion or releases; monitoring and leak detection equipment to ensure tank systems operate according to design; construction

materials and the surrounding area to detect erosion or signs of releases (WAC 173-303-400; 40 CFR 265.195[a]).

A. Single-Shell Tank Implementing Requirements

1. Requirement: All SSTs shall receive a daily inspection in accordance with tank farm procedures.

   Basis: Tank farm procedures.

B. Miscellaneous Underground Storage Tank Implementing Requirements

1. Requirement: Inactive/not-in-use MUSTs shall not require daily inspections.

   Basis: Inactive MUSTs do not and will not receive waste. These tanks have been removed from service. Therefore, inactive/not-in-use MUSTs do not require daily inspections based on current and future system configuration.

2. Requirement: When in use, mission essential MUSTs shall receive the following inspections daily, and have the results documented in the facility operating record: (a) Inspect overfill/spill control equipment to ensure good working order; (b) Inspect aboveground portions of the system to detect corrosion or releases; (c) Gather data monitoring and leak detection equipment to ensure tank systems operate according to design; and (d) Inspect construction materials and the surrounding area to detect erosion or signs of releases.

   Basis: WAC 173-303-400; 40 CFR 265.195(a).

C. Vessels and Cells in Miscellaneous Structure Implementing Requirements

Requirement: Vessels and cells in Miscellaneous Structures shall receive periodic inspections in accordance with tank farm procedures.

Basis: Tank farm procedures.

D. At-Tank and Between-Tank Pits Implementing Requirements

1. Requirement: Inactive/not-in-use at-tank and between-tank pits shall not require daily inspections.

   Basis: Inactive/not-in-use at-tank and between-tank pits are not involved in the conveyance of waste and have been, or will be, physically isolated from the in-use transfer system. Therefore, at-tank and between-tank pits do not require daily inspection based on current and future system configuration.

2. Requirement: When in use, mission essential at-tank and between-tank pits will receive the following inspections daily, and have the results documented in the facility operating record: (a) Inspect overfill/spill control equipment to ensure good working order; (b) Inspect aboveground

portions of the system to detect corrosion or releases; (c) Gather data from monitoring and leak detection equipment to ensure tank systems operate according to design; and (d) Inspect construction materials and the surrounding area to detect erosion or signs of releases.

Basis: WAC 173-303-400; 40 CFR 265.195(a).

E. Piping Implementing Requirements

1. Requirement: Inactive/not-in-use piping shall not require daily inspections.

   Basis: The 200 East and 200 West Areas contain extensive networks of piping including approximately 1,300 individual transfer lines. The inactive/not-in-use piping has been isolated from the in-use transfer systems. These inactive/not-in-use transfer lines contain a variety of piping configurations including single-walled direct buried, concrete encased, double-wall buried, and aboveground hose-in-hose. Typically, transfer piping was designed to self-drain to pits and pits to drain to MUSTs. In addition, line flushes occurred throughout the transfer campaigns at regular intervals and at the completion of the campaign removing a majority of the constituents of concern from the transfer line. Therefore, inactive/not-in-use piping does not require daily inspection based on current and future system configuration.

2. Requirement: When in use, mission essential piping will receive the following daily inspections and have the results documented in the facility operating record: (a) Inspect overfill/spill control equipment to ensure good working order; (b) Inspect aboveground portions of the system to detect corrosion or releases; (c) Gather data from monitoring and leak detection equipment to ensure tank systems operate according to design; and (d) Inspect construction materials and the surrounding area to detect erosion or signs of releases.

   Basis: WAC 173-303-400; 40 CFR 265.195(a).

4.3.3 Corrective Maintenance

Regulatory Description: Perform repairs on tank systems that leaked or are determined unfit for use prior to returning the tank system to service. This includes filing notification reports on the leaking/unfit for use tank system and certification of the repairs to the tank system performed (WAC 173-303-400; 40 CFR 265.196(d), (e) and (f)).

A. Implementing Requirements:

1. Requirement: Perform repairs on leaking and not-in-service tank systems prior to returning them to service. Report any release to the environment to Ecology within 24 hours of its detection unless the hazardous waste leak or spill is less than or equal to 1 pound and immediately contained and cleaned-up. File notification reports satisfying the requirements of

WAC 173-303-400 and 40 CFR 265.196(d)(3) within 30 days of the detection of a release to the environment.

Basis: WAC 173-303-400; 40 CFR 265.196(d).

2. Requirement: Retrieve SST system waste in accordance with HFFACO Milestone M-45-00.

Basis: HFFACO Milestone M-45-00.

4.4 DESIGN AND CONSTRUCTION

Regulatory Description: Design, install, and operate secondary containment systems to prevent any migration of waste or accumulated liquid out of the system to the soil, groundwater, or surface water at any time during use of the tank system. Design or operate secondary containment systems to contain 100% of the capacity of the largest tank within its boundary (WAC 173-303-400; 40 CFR 265.193).

A. Implementing Requirements

1. Requirement: New structures, systems, and components added to the SST system shall have secondary containment in accordance with WAC 173-303-400 and 40 CFR 265.193.

Basis: WAC 173-303-400; 40 CFR 265.193.

5.0 CURRENT SINGLE-SHELL TANK SYSTEM MONITORING

The current SST system LDM program addresses LDM during waste storage, isolation, and interim stabilization activities. It does not address LDM during SST retrieval covered by the HFFACO M-45-00 Milestone.

Some SSTs have already undergone isolation and/or interim stabilization. Isolation involves sealing off a tank to reduce the probability that liquid will enter the tank. Interim stabilization removes pumpable liquid from a tank.

Milestone M-23-22-T01, "Submit Document Identifying and Describing DOE's Existing SST In-Tank Surveillance and Monitoring Program," of the HFFACO required identification and description of the existing SST in-tank surveillance and monitoring program. The *Single-Shell Tank System Surveillance and Monitoring Program* (RPP-9645, Rev. 0) describes these processes in detail. Section 5.1 briefly describes the procedures and methods used to accomplish these processes. Sections 5.2 and 5.3 briefly describe the monitoring capabilities of SST support systems.

5.1 CURRENT SINGLE-SHELL TANK SYSTEM LEAK DETECTION AND MONITORING

5.1.1 In-Tank Leak Detection

Monitoring for leaks in the SST system is accomplished through in-tank detection systems. In-tank systems provide the ability to monitor in-tank conditions to determine if a leak event has occurred. The SST in-tank leak detection program operates on the assumption that liquid or semi-liquid waste surfaces will decrease in response to a leak, but rigid or solid surfaces (i.e., dry) will not. Liquid surfaces are further broken down into three categories: liquid, partial liquid, and slurry (RPP-9645, Rev. 0). Selection of leak detection methods depends, in part, on the type of waste surface.

One or more of the following instruments monitor tanks that have liquid waste surfaces for leaks.

- **ENRAF™[1] Level Gauges**

  The ENRAF™ gauge is the most accurate level gauge currently used in the tank farms. It tracks level changes in tank waste by using a load cell to monitor the buoyancy of a displacer. It lowers the displacer into the tank until it encounters an upward force from a solid or liquid surface, at which point it stops. It then tracks the position of the displacer, and reports the level of the solid or liquid surface it has contacted. For the purposes of leak detection, the ENRAF™ gauge needs a free liquid surface below the displacer. Two types of ENRAF™ gauges exist: manual and automatic. Operators performing rounds may manually read the output from either the manual or automatic type during rounds. In addition, the output from the automatic type is collected electronically.

---

[1] ENRAF is a trademark of the ENRAF Corporation, Houston, Texas.

In some cases, ENRAF™ gauges are used in tanks with dry waste surfaces for intrusion monitoring. An intrusion is detected when the liquid level in the tank rises above the dry waste surface.

- **Manual Tape**

The manual tape (MT) consists of a measuring tape and plummet. The tape and plummet form an electrical circuit connected to a continuity meter. The tape and plummet are manually lowered into the tank until they contact a conductive surface (i.e., tank waste). In open air, the circuit remains open and the continuity meter displays no current flow. Contacting the waste surface closes the circuit, as indicated on the continuity meter. The level indicated on the tape indicates the level of the waste. To work properly, the plummet must contact a conductive waste surface. Because dry waste surfaces conduct electricity poorly, MTs do not work well in tanks with dry waste surfaces.

- **Food Instrument Corporation Gauges**

The current SST LDM system has two Food Instrument Corporation (FIC) gauges (in Tanks BY-109 and C-102). The FIC gauge operates on the same principles as the MT, but a motor raises and lowers the tape. As with the manual tape, contact with a conductive surface closes an electrical circuit indicating the level of the tank waste. As with the manual tape, the FIC must contact a conductive waste surface to work properly, and therefore does not work well in tanks with dry waste surfaces.

- **Liquid Observation Wells**

Liquid observation wells (LOW) provide leak detection capabilities in tanks with solid waste surfaces. A LOW consists of a 3.5-inch outer diameter tube capped at the bottom and inserted through the waste so the cap rests a nominal 2 inches from the tank bottom, up to several feet from the bottom. The top hangs from a riser flange and is accessible from the surface.

Neutron or gamma radiation scans taken from inside the LOW establish the interstitial liquid level, indicated by a sudden change in the neutron or gamma counts. A plot tracks the interstitial liquid level against an approved baseline to identify unexpected level losses and significant trend changes.

- **In-Tank Intrusion Detection**

The same systems used to detect tank leaks also detect tank intrusions. However, a detection of an intrusion measures an increase in waste levels in response to an intrusion, not a decrease in response to a leak.

The same logic that applies to leak detection also applies to selecting systems for intrusion detection, except that surface level sensing systems will also work for intrusion detection in tanks with solid waste surfaces. These systems will work because a large intrusion may cause an increase in the surface level, whereas a leak will not result in a corresponding decrease in the surface level.

For SSTs with dry waste surfaces and no LOWs, surface-level sensing systems and photographic inspections provide intrusion-monitoring options.

5.1.2 Monitoring in Single-Shell Tank Ancillary Systems

Single-shell tank ancillary systems are monitored through conductivity-based leak detectors, pressure tests, material balance processes, and operator observations. This section briefly describes these processes.

- **Conductivity-Based Leak Detectors in Transfer Systems**

  Conductivity-based leak detectors have two metal elements. When liquid shorts out the elements at the tip of the detector, the connection allows current flow. That current flow opens a relay, sending an alarm. These systems have local audible and visual annunciators. Some systems also have computer monitoring and interlocks that will shut down all transfer activities in the event of an alarm. Systems without computer monitoring and interlocks require manual shutdown by an operator within 30 minutes.

  Prior to each transfer, the system receives testing by opening the relay to verify that the alarm responds properly, and the pumps shut down when interlocked.

- **Direct-Buried Transfer Line Pressure Tests**

  Direct-buried transfer lines are pressure tested prior to being placed in service. Un-encased transfer lines also receive retesting on an annual basis, as long as the transfer continues. The line is filled with water to the required pressure, and the isolation valves are closed on both ends, trapping the pressure. The internal pressure is monitored for the designated period of time, and if the pressure is maintained, the line is satisfactory for use. Any pressure drop that exceeds the tolerance would cause the line to fail.

- **Hose-in-Hose Pressure Tests**

  The primary (inside) hose is pressure tested at the vendor's site before shipping. The primary hose in aboveground transfer lines comprised of multiple segments receives pressure testing in the field after installation. The drainage from the secondary (annular) hose is routed to the nearest pit. If the primary hose were to leak, the fluids would enter the secondary hose and drain to the pit, where the pit leak detector would alarm.

- **Material Balance Process**

  All fluids pumped out of an SST are measured. The receiver tank is typically a double-contained receiver tank or a DST, which shows a corresponding increase in level. The volume sent and the volume received are compared, and any discrepancies that exceed a predetermined value deemed to be acceptable are identified as a potential leak or instrumentation problem. An investigation is immediately initiated. The predetermined value depends on the volume of the system and the resolution of the instrumentation used.

- **Operator Inspections**

  Operators make inspections (called rounds) to assess the general condition of SST farm components on a daily or weekly basis. Operator inspections ensure: (a) Appropriate attention to facility conditions, and (b) Detection of abnormal conditions or adverse trends before structures, systems, and components malfunction or fail. They provide for verification of key equipment parameters and equipment performance indicators.

Operator inspections allow operations personnel to provide prompt notifications to supervisory personnel when operators encounter unusual or unexpected situations. These processes ensure that equipment problems receive the proper attention.

Daily inspections include physical observations of things such as the following:

- Screens,
- Ventilation systems,
- Isolation valve positions,
- Water meters,
- Alarms status and condition,
- Thermocouple readings (when not collected electronically),
- Level measurements in pits and tanks other than SSTs, and
- Level measurements in SSTs (when not collected electronically).

Weekly inspections include recording equipment oil levels and verifying the operational status of pumps and other equipment.

5.1.3 Interim Stabilization

Interim stabilization refers to removal and transfer of drainable liquids from SSTs to DSTs. Currently, an SST achieves interim stabilization when it contains less than 50,000 gallons of drainable interstitial liquid and less than 5,000 gallons of supernate liquid. In addition, if using jet pumping, the flow must drop to 0.05 gpm or less before pumping may be discontinued (Consent Decree CT-99-5076-EFS). Prior interim stabilization criteria differed from the current criteria. As a result, not all interim stabilized SSTs meet current interim stabilization criteria.

Interim stabilization proactively minimizes the potential effects of waste leakage. Of the 149 SSTs, 132 have completed interim stabilization. Ecology and DOE renegotiated SST interim stabilization milestones in Consent Decree CT-99-5076-EFS dated August 16, 1999. The Consent Decree requires completion of all stabilization activities by September 30, 2004 (Table 5-1 lists actual dates for SST interim stabilization covered by the milestones). The new milestones seek to:

- Stabilize tanks posing the greatest environmental risk first,
- Accelerate the interim stabilization schedule to pump 98% of drainable liquid by September 30, 2003, and complete stabilization by September 30, 2004, and
- Increase funding commitments to ensure timely interim stabilization.

Table 5-1. Schedule and Status for Interim Stabilization of Single-Shell Tanks

Tank Designation	Pumping Start Date	Interim Stabilization Date
T-104	March 24, 1996	November 19, 1999
T-110	May 12, 1997	January 5, 2000
SX-104	September 26, 1997	April 26, 2000
SX-106	October 6, 1998	May 5, 2000
S-102	March 18, 1999	--
S-106	April 16, 1999	February 1, 2001
S-103	June 4, 1999	April 18, 2000
U-103	September 26, 1999	September 11, 2000
U-105	December 10, 1999	March 29, 2001
U-102	January 20, 2000	June 19, 2002
U-109	March 11, 2000	April 5, 2002*
A-101	May 6, 2000	--
AX-101	July 29, 2000	--
SX-105	August 8, 2000	August 1, 2002
SX-103	October 26, 2000	--
SX-101	November 22, 2000	--
U-106	August 24, 2000	March 9, 2001
BY-106	July 11, 2001	--
BY-105	July 11, 2001	--
U-108	December 2, 2001	--
U-107	September 29, 2001	--
S-111	December 18, 2001	--
SX-102	December 15, 2001	--
U-111	June 14, 2002	--
S-109	September 23, 2000	June 11, 2001
S-112	September 21, 2002	--
S-101	July 27, 2002	--
S-107	September 4, 2002	--
C-103	November 29, 2002	--

*Formal declaration of completion of interim stabilization has not yet taken place.

5.2 BEST MANAGEMENT PRACTICE MONITORING

This section describes liquid level and liquid intrusion monitoring activities that supplement the LDM requirements specified in Section 4.0. These supplemental monitoring activities, or BMPs, are not derived from the regulations and are therefore included as recommended practices, not as requirements. This section only addresses SST system components that store liquids (i.e., SSTs, MUSTs, and vessels and cells in miscellaneous structures). Appendix A identifies the SST system components subject to BMP monitoring, and Appendix B provides a more extensive discussion of the implementation rationale for LDM and BMPs. No BMPs are applied to other SST system components.

5.2.1 Single-Shell Tanks

The SSTs are currently storing 4.833 million gallons of drainable liquid waste. Based on the logic presented in Section 4.0 (see Figure 4-2), the 149 SSTs are grouped into four groups of tanks. The first group of SSTs includes tanks that are technically feasible to LDM and do not meet the interim stabilization criteria. Currently, 43 tanks containing a total of 3.406 million gallons of drainable liquids (approximately 70.47% of the total drainable liquids) are in this category of tanks. These tanks are leak detection monitored based on the requirements identified in Section 4.0. No supplemental BMPs are applied to this group of tanks.

The second group of SSTs includes tanks that are technically feasible to LDM and meet interim stabilization criteria but are susceptible to exceeding the interim stabilization criteria. Tanks are deemed susceptible to exceeding interim stabilization criteria if they contain more than 40,000 gallons of drainable interstitial liquid waste and have not had intrusion activities completed. Analysis of previously interim stabilized tanks that are suspected to have experienced intrusion events indicate that the average intrusion experienced was approximately 10,000 gallons and that the tanks experienced approximately 1,000 gallons of liquid intrusion per year over a 10-year duration (CHG-0007065-R2). One tank containing a total of 40,000 gallons of drainable liquids (approximately 0.83% of the total drainable liquids) is in this category. As a BMP, this tank is leak detection monitored based on the requirements identified in Section 4.0.

The third group of SSTs includes tanks that either: (a) Are technically feasible to LDM, currently meet the interim stabilization criteria, are not susceptible to exceeding interim stabilization criteria, but have suspect integrity; or (b) have liquid volumes which are not technically feasible to detect and have suspect integrity. A tank is deemed to have suspect integrity if it has been previously declared a known or assumed leaker (HNF-EP-0182, Rev. 173) or was identified in RPP-10435, *Single-Shell Tank System Integrity Assessment Report* as having a bulge or having stored boiling waste. This grouping of SSTs includes 63 tanks that currently store approximately 763,000 gallons of drainable liquids (approximately 15.79% of the total drainable liquids). As a BMP, these tanks are monitored at least annually for liquid intrusions using currently available intrusion monitoring systems supplemented by scheduled visual photographic inspections. The basis for annual monitoring is derived from documented past intrusion events and the fact that these tanks are known or suspected leakers or have integrity issues. Of the four known or potential intrusion events into SSTs previously interim stabilized, only one event has approached a rate of intrusion that exceeded 10,000 gallons over a 12-month period. Most of these tanks have less than 40,000 gallons drainable interstitial liquid waste and hence an intrusion event would be detected in a timely manner to facilitate a response action (i.e., either mitigating the cause of the intrusion or pumping drainable liquids).

The fourth group of SSTs include those SSTs that either: (a) Are technically feasible to LDM, meet interim stabilization criteria, are not deemed susceptible to exceeding interim stabilization criteria, and do not have suspect integrity; or (b) Have liquid volumes which are not technically feasible to detect and do not have suspect integrity. This grouping of SSTs includes 42 tanks that currently store approximately 624,000 gallons of drainable liquids (approximately 12.91% of the total drainable liquids). As a BMP, these tanks are periodically monitored (at least annually) for liquid intrusions using currently available intrusion monitoring system supplemented by scheduled visual photographic inspections. The basis for intrusion monitoring once within a five-year period is derived from documented past intrusion events and the fact that these tanks

are sound tanks with no known integrity issues. Of the four known or potential intrusion events into tanks previously interim stabilized, the average intrusion rate has been approximately 1,000 gallons per year. Most of these tanks have less than 40,000 gallons drainable interstitial liquid waste and hence an intrusion event would be detected in a timely manner to facilitate a response action (i.e., mitigating the cause of the intrusion, pumping drainable liquids, or enhanced monitoring).

5.2.2 Miscellaneous Underground Storage Tanks

Based on known volumes, the MUSTs are currently storing 12,912 gallons of known liquid waste. Based on the logic presented in Section 4.0 (see Figure 4-3), the MUSTs are grouped into four groups of MUSTs. The first group consists of mission essential MUSTs and inactive/not-in-use MUSTs that currently store a known liquid volume that exceeds the interim stabilization criteria for MUSTs (i.e., more than 400 gallons of drainable liquids). This grouping of MUSTs consists of three tanks that currently store approximately 12,615 gallons of drainable liquids (approximately 97.7% of the total known drainable liquids in MUSTs). These MUSTs are leak detection monitored based on the requirements identified in Section 4.0. No BMPs are applied to this group of tanks.

The second group consists of inactive/not-in-use MUSTs that have liquid volumes that meet the interim stabilization criteria (i.e., less than 400 gallons of drainable liquids), but have not been interim isolated. This grouping of MUSTs includes 2 tanks that currently store approximately 297 gallons of drainable liquids (approximately 2.3% of the total known drainable liquids in MUSTs). Since this group of MUSTs has not been interim isolated, as a BMP, these MUSTs are regularly monitored (at least annually) for liquid intrusions using available intrusion detection systems supplemented by scheduled visual photographic inspections.

The third group consists of inactive/not-in-use MUSTs that have liquid volumes that meet the interim stabilization criteria (i.e., less than 400 gallons of drainable liquids), and that are interim isolated. No MUSTs currently fall in this group, but may in the future. As a BMP, these MUSTs are periodically monitored (at least annually) for liquid intrusions using currently available intrusion monitoring system supplemented by scheduled visual photographic inspections.

The fourth group consists of two inactive/not-in-use MUSTs containing an unknown inventory of liquids. These MUSTs require a liquid inventory assessment. Based on the results of that assessment, the MUSTs would be grouped into one of the above three categories and monitored accordingly.

5.2.3 Vessels and Cells in Miscellaneous Structures

Based on the logic presented in Section 4.0 (see Figure 4-4), the 17 vessels, which currently store approximately 21,534 gallons of known liquid waste are grouped into three groups of vessels. The first group consists of mission essential vessels and cells, inactive/not-in-use vessels and cells that contain a known volume of liquid waste and do not meet the interim stabilization criteria (i.e., less than 400 gallons of liquids). This group includes eight vessels containing approximately 26,423 gallons of liquids (approximately 99.02% of the total known drainable liquids in vessels and cells in miscellaneous structures). These vessels are leak detection

monitored based on the requirements identified in Section 4.0. No BMPs are applied to this group of vessels.

The second group consists of vessels and cells known to be dry, and inactive/not-in-use vessels and cells with known liquid volumes that meet interim stabilization criteria (i.e., less than 400 gallons of liquids). This group includes four vessels containing approximately 211 gallons of liquids (approximately 0.98% of the total known drainable liquids in vessels and cells in miscellaneous structures). Based on minimal liquid inventories, no LDM requirements or BMPs are applied to this group of vessels.

The third group consists of inactive/not-in-use vessels and cells that contain an unknown inventory of liquids. These vessels and cells require a liquid inventory assessment. Based on the results of that assessment, the vessels and cells would be grouped in one of the above two categories and monitored accordingly.

6.0 CHANGE CONTROL

This document is a HFFACO Primary Document requiring Ecology review and approval. Once approved, Section 4.0 of this document establishes the F&Rs for SST system LDM. Revisions to the approach described in Section 4.0 will follow the criteria outlined in Section 9.3, "Document Revisions," of the HFFACO. Modifications to Section 4.0 will be assessed using existing criteria. Minor field changes to Section 4.0 (as discussed in Section 12.4 of the HFFACO) can be made by the person in charge of the particular activity (i.e., the CH2M HILL Project Manager or equivalent). Minor field changes are those that have no adverse effect on the technical adequacy of the job or work schedule (i.e., does not impact completion of milestone commitments). Such field changes will be documented in daily logbooks (or equivalent) that are maintained by the project. Revisions/changes to Section 4.0 not considered minor field changes can be made through use of a change notice in accordance with Section 9.3, "Document Revisions," and Section 12.0, "Changes to the Agreement." Major changes to Section 4.0 (those requiring a change notice) or revisions to the plan are further defined by the following criteria:

- Significant change affecting public health or the environment;
- Evaluation of remedial alternatives (i.e., major changes to retrieval technologies and/or programmatic decisions that impact the technical adequacy of the project or impact work schedules); and
- Protection of human health or the environment (i.e., exceeding maximum leak loss limits or major design change to LDM criteria).

This document establishes the LDM baseline and conditions for the SST system. Upon approval of this LDM F&R Document as a Primary Document, the contractor will maintain and update, as necessary, tank farm procedures and internal documents to implement the LDM F&Rs in this document based on existing and changing conditions in the SST system.

The contractor's internal documents will not be subject to the change control process specified in this section. Changes to the contractor's document will be maintained and controlled in accordance with tank farm document control procedures.

This page intentionally left blank.

7.0 REFERENCES

40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities," *Code of Federal Regulations*, as amended.

Atomic Energy Act of 1954, as amended, 42 U.S.C. Sect. 2011 - Sect. 2259.

CHG-0007065-R2, 2001, *Evaluation of 120 SSTs That Have Been Interim Stabilized*, CH2M HILL Hanford Group, Inc., Richland, Washington.

CT-99-5076-EFS, Consent Decree Between the State of Washington, Department of Ecology (Plaintiff), and United States Department of Energy (Defendant), August 16, 1999.

Comprehensive Environmental Response, Compensation , and Liability Act of 1980, 42 USC 9601 et seq.

DOE/RL-89-16, *Single-Shell Tank Closure Work Plan*, Rev. 1, May 1996, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 1996, Close Out Form, "Environmental Compliance Issues Identified in DOE/RL Letter 95-PCA-342 Dated July 6, 1995," Tracking Numbers 5.3 and 5.4, August 7, 1996, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

HNF-4872, Vol. I, Rev. 0, *Single-Shell Tank Leak History Compilation Volume I of II: Summary*, Lockheed Martin Hanford Corporation, Richland, Washington.

HNF-EP-0182, Rev. 161, *Waste Tank Summary Report for Month Ending August 31, 2001*, CH2M HILL Hanford Group, Inc., Richland, Washington.

HNF-EP-0182, Rev. 166, *Waste Tank Summary Report for Month Ending January 1, 2002*, CH2M HILL Hanford Group, Inc., Richland, Washington.

HNF-EP-0182, Rev. 173, *Waste Tank Summary Report for Month Ending August 31, 2002*, CH2M HILL Hanford Group, Inc., Richland, Washington.

HNF-IP-0842, Vol. 4, Section 4.1, Rev. 3c, *Tank Farm Facility Interim Stabilization Evaluation*, CH2M HILL Hanford Group, Inc., Richland, Washington.

HNF-SD-RE-TI-178, Rev. 7, *Single-Shell Tank Leak Stabilization Record*, CH2M HILL Hanford Group, Inc., Richland, Washington.

Moore, S.V., February 2, 2001, Letter to Dr. Harry Boston, U.S. Department of Energy-Office of River Protection, and M. P. (Fran) Delozier, CH2M HILL Hanford Group, Inc., *Dangerous Waste Compliance Inspection of the Single Shell Tank System*.

Resource Conservation and Recovery Act of 1976, as amended, 42 USC 6901 et seq.

RPP-9645, Rev. 0, *Single-Shell Tank System Surveillance and Monitoring Program*, CH2M HILL Hanford Group, Inc., Richland, Washington.

RPP-10435, Rev. 0, *Single-Shell Tank System Integrity Assessment Report*, CH2M HILL Hanford Group, Inc., Richland, Washington.

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

APPENDIX A

LIST OF SINGLE-SHELL TANK SYSTEM COMPONENTS RELATING TO LEAK DETECTION AND MONITORING

This page intentionally left blank.

APPENDIX A

LIST OF SINGLE-SHELL TANK SYSTEM COMPONENTS RELATING TO LEAK DETECTION AND MONITORING

Appendix A provides a list of all individual components in the single-shell tank system related to leak detection and monitoring. The list includes the following features:

- Unique component numbers;
- Descriptions of individual component groupings that mirror the groupings in main text Section 3.0, "Single-Shell Tank System Component Descriptions and Leak Detection Status;"
- Component status (mission essential or inactive/not-in-use); and
- Leak detection and monitoring requirements and best management practices.

Mission Essential Components

Single-Shell Tanks		
Facility Number	**Description**	**LDM or BMP**
241-A-101	100-Series SST	LDM
241-A-102	100-Series SST	BMP Periodic Monitoring
241-A-103	100-Series SST	LDM
241-A-104	100-Series SST	BMP Periodic Monitoring
241-A-105	100-Series SST	BMP Periodic Monitoring
241-A-106	100-Series SST	BMP Periodic Monitoring
241-AX-101	100-Series SST	LDM
241-AX-102	100-Series SST	BMP Periodic Monitoring
241-AX-103	100-Series SST	BMP Periodic Monitoring
241-AX-104	100-Series SST	BMP Periodic Monitoring
241-B-101	100-Series SST	BMP Periodic Monitoring
241-B-102	100-Series SST	BMP Intrusion Monitoring
241-B-103	100-Series SST	BMP Periodic Monitoring
241-B-104	100-Series SST	BMP Intrusion Monitoring
241-B-105	100-Series SST	BMP Periodic Monitoring
241-B-106	100-Series SST	BMP Intrusion Monitoring
241-B-107	100-Series SST	BMP Periodic Monitoring
241-B-108	100-Series SST	BMP Intrusion Monitoring
241-B-109	100-Series SST	BMP Intrusion Monitoring
241-B-110	100-Series SST	BMP Periodic Monitoring
241-B-111	100-Series SST	BMP Periodic Monitoring
241-B-112	100-Series SST	BMP Periodic Monitoring
241-B-201	200-Series SST	LDM
241-B-202	200-Series SST	BMP Intrusion Monitoring
241-B-203	200-Series SST	BMP Periodic Monitoring
241-B-204	200-Series SST	BMP Periodic Monitoring
241-BX-101	100-Series SST	BMP Periodic Monitoring
241-BX-102	100-Series SST	BMP Periodic Monitoring
241-BX-103	100-Series SST	LDM
241-BX-104	100-Series SST	BMP Intrusion Monitoring
241-BX-105	100-Series SST	LDM
241-BX-106	100-Series SST	BMP Intrusion Monitoring
241-BX-107	100-Series SST	BMP Intrusion Monitoring
241-BX-108	100-Series SST	BMP Periodic Monitoring
241-BX-109	100-Series SST	BMP Intrusion Monitoring
241-BX-110	100-Series SST	BMP Periodic Monitoring
241-BX-111	100-Series SST	BMP Periodic Monitoring
241-BX-112	100-Series SST	BMP Intrusion Monitoring
241-BY-101	100-Series SST	BMP Intrusion Monitoring
241-BY-102	100-Series SST	BMP LDM
241-BY-103	100-Series SST	LDM
241-BY-104	100-Series SST	LDM
241-BY-105	100-Series SST	LDM
241-BY-106	100-Series SST	LDM
241-BY-107	100-Series SST	BMP Periodic Monitoring
241-BY-108	100-Series SST	LDM
241-BY-109	100-Series SST	LDM
241-BY-110	100-Series SST	BMP Intrusion Monitoring
241-BY-111	100-Series SST	BMP Intrusion Monitoring

Mission Essential Components

Single-Shell Tanks		
Facility Number	**Description**	**LDM or BMP**
241-BY-112	100-Series SST	BMP Intrusion Monitoring
241-C-101	100-Series SST	BMP Periodic Monitoring
241-C-102	100-Series SST	LDM
241-C-103	100-Series SST	LDM
241-C-104	100-Series SST	BMP Intrusion Monitoring
241-C-105	100-Series SST	BMP Intrusion Monitoring
241-C-106	100-Series SST	LDM
241-C-107	100-Series SST	LDM
241-C-108	100-Series SST	BMP Intrusion Monitoring
241-C-109	100-Series SST	BMP Intrusion Monitoring
241-C-110	100-Series SST	BMP Periodic Monitoring
241-C-111	100-Series SST	BMP Periodic Monitoring
241-C-112	100-Series SST	BMP Intrusion Monitoring
241-C-201	200-Series SST	BMP Periodic Monitoring
241-C-202	200-Series SST	BMP Periodic Monitoring
241-C-203	200-Series SST	BMP Periodic Monitoring
241-C-204	200-Series SST	BMP Periodic Monitoring
241-S-101	100-Series SST	LDM
241-S-102	100-Series SST	LDM
241-S-103	100-Series SST	LDM
241-S-104	100-Series SST	BMP Periodic Monitoring
241-S-105	100-Series SST	BMP Intrusion Monitoring
241-S-106	100-Series SST	LDM
241-S-107	100-Series SST	LDM
241-S-108	100-Series SST	BMP Intrusion Monitoring
241-S-109	100-Series SST	LDM
241-S-110	100-Series SST	BMP Intrusion Monitoring
241-S-111	100-Series SST	LDM
241-S-112	100-Series SST	LDM
241-SX-101	100-Series SST	LDM
241-SX-102	100-Series SST	LDM
241-SX-103	100-Series SST	LDM
241-SX-104	100-Series SST	LDM
241-SX-105	100-Series SST	LDM
241-SX-106	100-Series SST	BMP Periodic Monitoring
241-SX-107	100-Series SST	BMP Periodic Monitoring
241-SX-108	100-Series SST	BMP Periodic Monitoring
241-SX-109	100-Series SST	BMP Periodic Monitoring
241-SX-110	100-Series SST	BMP Periodic Monitoring
241-SX-111	100-Series SST	BMP Periodic Monitoring
241-SX-112	100-Series SST	BMP Periodic Monitoring
241-SX-113	100-Series SST	BMP Periodic Monitoring
241-SX-114	100-Series SST	BMP Periodic Monitoring
241-SX-115	100-Series SST	BMP Periodic Monitoring
241-T-101	100-Series SST	BMP Periodic Monitoring
241-T-102	100-Series SST	LDM
241-T-103	100-Series SST	BMP Periodic Monitoring
241-T-104	100-Series SST	BMP Intrusion Monitoring
241-T-105	100-Series SST	BMP Intrusion Monitoring

Mission Essential Components

Single-Shell Tanks		
Facility Number	**Description**	**LDM or BMP**
241-T-106	100-Series SST	BMP Periodic Monitoring
241-T-107	100-Series SST	BMP Periodic Monitoring
241-T-108	100-Series SST	BMP Periodic Monitoring
241-T-109	100-Series SST	BMP Periodic Monitoring
241-T-110	100-Series SST	LDM
241-T-111	100-Series SST	BMP Periodic Monitoring
241-T-112	100-Series SST	LDM
241-T-201	200-Series SST	LDM
241-T-202	200-Series SST	BMP Intrusion Monitoring
241-T-203	200-Series SST	BMP Intrusion Monitoring
241-T-204	200-Series SST	BMP Intrusion Monitoring
241-TX-101	100-Series SST	BMP Intrusion Monitoring
241-TX-102	100-Series SST	LDM
241-TX-103	100-Series SST	BMP Intrusion Monitoring
241-TX-104	100-Series SST	BMP Intrusion Monitoring
241-TX-105	100-Series SST	BMP Periodic Monitoring
241-TX-106	100-Series SST	LDM
241-TX-107	100-Series SST	BMP Periodic Monitoring
241-TX-108	100-Series SST	BMP Intrusion Monitoring
241-TX-109	100-Series SST	BMP Intrusion Monitoring
241-TX-110	100-Series SST	BMP Periodic Monitoring
241-TX-111	100-Series SST	BMP Intrusion Monitoring
241-TX-112	100-Series SST	BMP Intrusion Monitoring
241-TX-113	100-Series SST	BMP Periodic Monitoring
241-TX-114	100-Series SST	LDM
241-TX-115	100-Series SST	BMP Periodic Monitoring
241-TX-116	100-Series SST	BMP Periodic Monitoring
241-TX-117	100-Series SST	BMP Periodic Monitoring
241-TX-118	100-Series SST	BMP Intrusion Monitoring
241-TY-101	100-Series SST	BMP Periodic Monitoring
241-TY-102	100-Series SST	BMP Intrusion Monitoring
241-TY-103	100-Series SST	BMP Periodic Monitoring
241-TY-104	100-Series SST	BMP Periodic Monitoring
241-TY-105	100-Series SST	BMP Periodic Monitoring
241-TY-106	100-Series SST	BMP Periodic Monitoring
241-U-101	100-Series SST	BMP Periodic Monitoring
241-U-102	100-Series SST	LDM
241-U-103	100-Series SST	BMP Intrusion Monitoring
241-U-104	100-Series SST	BMP Periodic Monitoring
241-U-105	100-Series SST	LDM
241-U-106	100-Series SST	LDM
241-U-107	100-Series SST	LDM
241-U-108	100-Series SST	LDM
241-U-109	100-Series SST	LDM
241-U-110	100-Series SST	BMP Periodic Monitoring
241-U-111	100-Series SST	LDM
241-U-112	100-Series SST	BMP Periodic Monitoring
241-U-201	200-Series SST	BMP Intrusion Monitoring
241-U-202	200-Series SST	BMP Intrusion Monitoring

Mission Essential Components

Single-Shell Tanks		
Facility Number	**Description**	**LDM or BMP**
241-U-203	200-Series SST	BMP Intrusion Monitoring
241-U-204	200-Series SST	BMP Intrusion Monitoring

Vaults (None)

Miscellaneous Underground Storage Tanks (None)

Between-tank Pits - Diversion Boxes		
Facility Number	**Description**	**LDM or BMP**
241-AR-151	Diversion Box	LDM (When In Use)
241-AX-155	Diversion Box	LDM (When In Use)

Between-tank Pits - Valve Pits		
Facility Number	**Description**	**LDM or BMP**
241-AX-A	Valve Pit	LDM (When In Use)
241-S-A	Valve Pit	LDM (When In Use)
241-S-B	Valve Pit	LDM (When In Use)
241-S-C	Valve Pit	LDM (When In Use)
241-S-D	Valve Pit	LDM (When In Use)
241-SX-A	Valve Pit	LDM (When In Use)
241-SX-B	Valve Pit	LDM (When In Use)
241-U-A	Valve Pit	LDM (When In Use)
241-U-B	Valve Pit	LDM (When In Use)
241-U-C	Valve Pit	LDM (When In Use)
241-U-D	Valve Pit	LDM (When In Use)

Between-tank Pits - Flush Pits (None)

At-Tank Pits		
Facility Number	**Description**	**LDM or BMP**
241-A-01H	Distributor Pit	LDM (When In Use)
241-AX-01A	Pump Pit	LDM (When In Use)
241-BY-05A	Pump Pit	LDM (When In Use)
241-BY-06A	Pump Pit	LDM (When In Use)
241-C-02B	Heel Pit	LDM (When In Use)
241-C-03B	Heel Pit	LDM (When In Use)
241-C-04A	Pump Pit	LDM (When In Use)
241-C-04B	Heel Pit	LDM (When In Use)
241-C-04C	Sluice Pit	LDM (When In Use)
241-C-04D	Salt Well Caisson	LDM (When In Use)
241-C-06A	Pump Pit	LDM (When In Use)
241-C-06B	Heel Pit	LDM (When In Use)
241-C-06C	Sluice Pit	LDM (When In Use)
241-S-01A	Pump Pit	LDM (When In Use)
241-S-02B	Distributor Pit	LDM (When In Use)
241-S-07A	Pump Pit	LDM (When In Use)
241-S-09A	Pump Pit	LDM (When In Use)
241-S-11A	Pump Pit	LDM (When In Use)

Mission Essential Components

At-Tank Pits		
Facility Number	**Description**	**LDM or BMP**
241-S-12A	Pump Pit	LDM (When In Use)
241-SX-01A	Pump Pit	LDM (When In Use)
241-SX-02B	Pump Pit	LDM (When In Use)
241-SX-03B	Pump Pit	LDM (When In Use)
241-SX-05A	Pump Pit	LDM (When In Use)
241-U-02B	Distributor Pit	LDM (When In Use)
241-U-07B	Distributor Pit	LDM (When In Use)
241-U-08B	Distributor Pit	LDM (When In Use)
241-U-09A	Pump Pit	LDM (When In Use)
241-U-09B	Distributor Pit	LDM (When In Use)
241-U-11A	Pump Pit	LDM (When In Use)

Miscellaneous Structures (None)

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
SL103	241-U-B	241-U-D-R10	LDM (When In Use)
SL107	241-A-01H	241-A-A-L5	LDM (When In Use)
SL108	241-AX-01A	241-AX-A-L9	LDM (When In Use)
SL111	241-U-02B	241-U-B	LDM (When In Use)
SL113	241-U-C	241-U-D	LDM (When In Use)
SL114	241-U-B	241-U-A	LDM (When In Use)
SL138	241-S	SL-175	LDM (When In Use)
SL140	241-S-102	241-S-A	LDM (When In Use)
SN204	241-U-09A	241-U-C	LDM (When In Use)
SN216/SN282	241-U-D	241-SY-B-L3	LDM (When In Use)
V517	202-S	241-S-151	LDM (When In Use)

Inactive/Not-In-Use Components[1]

Single-Shell Tanks (None)

Vessels and Cells in Miscellaneous Structures		
Facility Number	**Description**	**LDM OR BMP**
244-AR Vault	Vault contains four tanks (244-AR-001 thru -004)	LDM (Cell 3, TK-001, TK-002, TK-003) None (Cell 1, Cell 2, TK-004)
244-CR Vault	Vault contains four tanks (244-CR-001 thru -003 plus 244-CR-011)	LDM (Cell 1, Cell 2, Cell 3, CR-003) TBD (CR-001, CR-002, CR-011)[2] None (Cell 11)
241-AX-IX	Ion-exchange unit	TBD[2]
241-BY-ITS1	In-tank unit solidification	TBD[2]

[2]Application of LDM or BMP dependent on results of a liquid volume assessment.

Miscellaneous Underground Storage Tanks		
Facility Number	**Description**	**LDM or BMP**
241-A-302A	Transfer Tank	LDM
241-AX-151-CT[3]	Catch Tank	TBD[3]
241-BY-ITS2-Tank 2[3]	Catch Tank	TBD[3]
241-S-304	Receiver Tank	BMP Intrusion Monitoring
241-TX-302C	Catch Tank	BMP Intrusion Monitoring
241-U-301B	Catch Tank	LDM
241-UX-302A	Catch Tank	LDM

[3]Application of LDM or BMP dependent on results of a liquid volume assessment.

[1]If an inactive/not-in-use component changes status and becomes mission essential, then the requirements for mission essential components in Section 4.0 of this document apply to that component.

Inactive/Not-In-Use Components

Between-tank Pits – Diversion Boxes		
Facility Number	**Description**	**LDM or BMP**
240-S-151	Diversion Box	None
240-S-152	Diversion Box	None
241-A-152	Diversion Box	None
241-A-153	Diversion Box	None
241-AX-153	Diversion Box	None
241-B-151	Diversion Box	None
241-B-152	Diversion Box	None
241-B-153	Diversion Box	None
241-B-154	Diversion Box	None
241-B-252	Diversion Box	None
241-BR-152	Diversion Box	None
241-BX-153	Diversion Box	None
241-BX-154	Diversion Box	None
241-BX-155	Diversion Box	None
241-BXR-151	Diversion Box	None
241-BXR-152	Diversion Box	None
241-BXR-153	Diversion Box	None
241-BYR-152	Diversion Box	None
241-BYR-153	Diversion Box	None
241-BYR-154	Diversion Box	None
241-C-151	Diversion Box	None
241-C-152	Diversion Box	None
241-C-153	Diversion Box	None
241-C-154	Diversion Box	None
241-C-252	Diversion Box	None
241-CR-151	Diversion Box	None
241-CR-152	Diversion Box	None
241-CR-153	Diversion Box	None
241-S-152	Diversion Box	None
241-SX-151	Diversion Box	None
241-SX-152	Diversion Box	None
241-T-151	Diversion Box	None
241-T-152	Diversion Box	None
241-T-153	Diversion Box	None
241-T-252	Diversion Box	None
241-TR-152	Diversion Box	None
241-TR-153	Diversion Box	None
241-TX-153	Diversion Box	None
241-TX-155	Diversion Box	None
241-TXR-151	Diversion Box	None
241-TXR-152	Diversion Box	None
241-TXR-153	Diversion Box	None
241-TXR-244	Diversion Box	None
241-TY-153	Diversion Box	None
241-U-153	Diversion Box	None
241-U-252	Diversion Box	None
241-UR-151	Diversion Box	None
241-UR-152	Diversion Box	None
241-UR-153	Diversion Box	None
241-UR-154	Diversion Box	None

Inactive/Not-In-Use Components

Between-tank Pits – Diversion Boxes		
Facility Number	**Description**	**LDM or BMP**
241-UR-244	Diversion Box	None
242-B-151	Diversion Box	None
242-T-151	Diversion Box	None

Between-tank Pits – Valve Pits		
Facility Number	**Description**	**LDM or BMP**
241-BY-109	Valve Pit	None
241-C	Valve Pit	None
209-E-WS-3	209-E-WS-3 Critical mass laboratory Valve Pit	None

Between-tank Pits – Flush Pits (None)

At-Tank Pits		
Facility Number	**Description**	**LDM or BMP**
241-A-01A	Pump Pit	None
241-A-01B	Pump Pit	None
241-A-01C	Sluice Pit	None
241-A-02A	Pump Pit	None
241-A-02B	Pump Pit	None
241-A-02C	Receiving Pit	None
241-A-02D	Distribution Pit	None
241-A-03A	Pump Pit	None
241-A-03B	Pump Pit	None
241-A-03C	Pump Pit	None
241-A-03D	Distribution Pit	None
241-A-04A	Pump Pit	None
241-A-04B	Sluice Pit	None
241-A-04C	Sluice Pit	None
241-A-05A	Pump Pit	None
241-A-05B	Sluice Pit	None
241-A-05C	Pump Pit	None
241-A-05D	Sluice Pit	None
241-A-06A	Pump Pit	None
241-A-06B	Sluice Pit	None
241-A-06C	Pump Pit	None
241-A-06D	Distribution Pit	None
241-AX-01B	Pump Pit	None
241-AX-01C	Sluice Pit	None
241-AX-01D	Sluice Pit	None
241-AX-02A	Distribution Pit	None
241-AX-02B	Pump Pit	None
241-AX-02C	Sluice Pit	None
241-AX-02D	Pump Pit	None
241-AX-03A	Distribution Pit	None
241-AX-03B	Pump Pit	None
241-AX-03C	Sluice Pit	None
241-AX-03D	Pump Pit	None
241-AX-04A	Distribution Pit	None
241-AX-04B	Pump Pit	None

Inactive/Not-In-Use Components

At-Tank Pits		
Facility Number	**Description**	**LDM or BMP**
241-AX-04C	Sluice Pit	None
241-AX-04D	Sluice Pit	None
241-B-01A	Pump Pit	None
241-B-01B	Heel Pit	None
241-B-01C	Sluice Pit	None
241-B-02A	Pump Pit	None
241-B-02B	Heel Pit	None
241-B-02C	Sluice Pit	None
241-B-03A	Pump Pit	None
241-B-03B	Heel Pit	None
241-B-03C	Sluice Pit	None
241-B-06A	Pump Pit	None
241-B-08A	Pump Pit	None
241-B-09A	Pump Pit	None
241-B-112A	Pump Pit	None
241-B-04	No pit, covered saltwell caisson	None
241-B-05	No pit, covered saltwell caisson	None
241-B-07	No pit, covered saltwell caisson	None
241-B-104	Pump Pit	None
241-B-105	Pump Pit	None
241-B-107	Pump Pit	None
241-B-109	Pump Pit	None
241-B-110	No pit, covered saltwell caisson	None
241-B-111	No pit, covered saltwell caisson	None
241-B-201	Condenser Vent	None
241-B-202	Condenser Vent	None
241-B-203	Condenser Vent	None
241-B-204	Condenser Vent	None
241-BX-01A	Pump Pit	None
241-BX-01B	Heel Pit	None
241-BX-01C	Sluice Pit	None
241-BX-02A	Pump Pit	None
241-BX-02B	Heel Pit	None
241-BX-02C	Sluice Pit	None
241-BX-03A	Pump Pit	None
241-BX-03B	Heel Pit	None
241-BX-03C	Sluice Pit	None
241-BX-04A	Pump Pit	None
241-BX-04B	Heel Pit	None
241-BX-04C	Sluice Pit	None
241-BX-05A	Pump Pit	None
241-BX-05B	Heel Pit	None
241-BX-05C	Sluice Pit	None
241-BX-06A	Pump Pit	None
241-BX-06B	Heel Pit	None
241-BX-06C	Sluice Pit	None
241-BX-08A	Pump Pit	None
241-BX-110A	Pump Pit	None
241-BX-111A	Pump Pit	None

Inactive/Not-In-Use Components

At-Tank Pits		
Facility Number	**Description**	**LDM or BMP**
241-BX-112A	Pump Pit	None
241-BX-07	No pit, covered saltwell caisson	None
241-BX-09	No pit, covered saltwell caisson	None
241-BX-107	Pump Pit	None
241-BX-109	Pump Pit	None
241-BY-01A	Pump Pit	None
241-BY-01C	Sluice Pit	None
241-BY-01D	Sluice Pit	None
241-BY-02A	Pump Pit	None
241-BY-02B	Heel Pit	None
241-BY-02C	Sluice Pit	None
241-BY-02D	Sluice Pit	None
241-BY-03A	Pump Pit	None
241-BY-03C	Sluice Pit	None
241-BY-03D	Sluice Pit	None
241-BY-04A	Pump Pit	None
241-BY-04C	Sluice Pit	None
241-BY-04D	Sluice Pit	None
241-BY-05C	Sluice Pit	None
241-BY-05D	Sluice Pit	None
241-BY-06C	Sluice Pit	None
241-BY-06D	Sluice Pit	None
241-BY-07A	Pump Pit	None
241-BY-08A	Pump Pit	None
241-BY-09A	Pump Pit	None
241-BY-110A	Pump Pit	None
241-BY-111A	Pump Pit	None
241-BY-111B	Heel Pit	None
241-BY-111C	Sluice Pit	None
241-BY-111D	Sluice Pit	None
241-BY-112A	Pump Pit	None
241-BY-112C	Sluice Pit	None
241-BY-112D	Sluice Pit	None
241-C-07	No pit, covered saltwell caisson	None
241-C-08	No pit, covered saltwell caisson	None
241-C-09	No pit, covered saltwell caisson	None
241-C-110	No pit, covered saltwell caisson	None
241-C-111	No pit, covered saltwell caisson	None
241-C-112	No pit, covered saltwell caisson	None
241-C-01A	Pump Pit	None
241-C-01B	Heel Pit	None
241-C-01C	Sluice Pit	None
241-C-02A	Pump Pit	None
241-C-02C	Sluice Pit	None
241-C-03A	Pump Pit	None
241-C-03C	Sluice Pit	None
241-C-05A	Pump Pit	None
241-C-05B	Heel Pit	None
241-C-05C	Sluice Pit	None

Inactive/Not-In-Use Components

At-Tank Pits		
Facility Number	**Description**	**LDM or BMP**
241-S-02A	Pump Pit	None
241-S-03A	Pump Pit	None
241-S-04A	Pump Pit	None
241-S-05A	Pump Pit	None
241-S-06A	Pump Pit	None
241-S-08A	Pump Pit	None
241-SX-03A	Pump Pit	None
241-SX-04A	Pump Pit	None
241-SX-05B	Heel Pit	None
241-SX-06A	Pump Pit	None
241-SX-07A	Pump Pit	None
241-SX-08A	Pump Pit	None
241-SX-09A	Pump Pit	None
241-SX-10A	Pump Pit	None
241-SX-11A	Pump Pit	None
241-SX-12A	Pump Pit	None
241-SX-13A	Pump Pit	None
241-SX-14A	Pump Pit	None
241-SX-15A	Pump Pit	None
241-T-01A	Pump Pit	None
241-T-01B	Heel Pit	None
241-T-01C	Sluice Pit	None
241-T-02A	Pump Pit	None
241-T-02B	Heel Pit	None
241-T-02C	Sluice Pit	None
241-T-03A	Pump Pit	None
241-T-03B	Heel Pit	None
241-T-04	No pit, covered saltwell caisson	None
241-T-05	No pit, covered saltwell caisson	None
241-T-06	No Pit, covered saltwell caisson	None
241-T-07	No Pit, covered saltwell caisson	None
241-T-08	No Pit, covered saltwell caisson	None
241-T-09	No Pit, covered saltwell caisson	None
241-T-111	No pit, covered saltwell caisson	None
241-T-112	No Pit, covered saltwell caisson	None
241-T-201	No Pit, covered saltwell caisson	None
241-T-202	No Pit, covered saltwell caisson	None
241-T-203	No Pit, covered saltwell caisson	None
241-T-204	No Pit, covered saltwell caisson	None
241-TX-01A	Pump Pit	None
241-TX-01C	Sluice Pit	None
241-TX-01D	Sluice Pit	None
241-TX-02A	Pump Pit	None
241-TX-02C	Sluice Pit	None
241-TX-02D	Sluice Pit	None
241-TX-03A	Pump Pit	None
241-TX-03C	Sluice Pit	None
241-TX-03D	Sluice Pit	None
241-TX-04A	Pump Pit	None

Inactive/Not-In-Use Components

At-Tank Pits		
Facility Number	**Description**	**LDM or BMP**
241-TX-04C	Sluice Pit	None
241-TX-04D	Sluice Pit	None
241-TX-05A	Pump Pit	None
241-TX-05C	Sluice Pit	None
241-TX-05D	Sluice Pit	None
241-TX-06A	Pump Pit	None
241-TX-06C	Sluice Pit	None
241-TX-06D	Sluice Pit	None
241-TX-07A	Pump Pit	None
241-TX-07C	Sluice Pit	None
241-TX-07D	Sluice Pit	None
241-TX-08A	Pump Pit	None
241-TX-08C	Sluice Pit	None
241-TX-08D	Sluice Pit	None
241-TX-09A	Pump Pit	None
241-TX-10A	Pump Pit	None
241-TX-11A	Pump Pit	None
241-TX-12A	Pump Pit	None
241-TX-13A	Pump Pit	None
241-TX-14A	Pump Pit	None
241-TX-15A	Sluice Pit	None
241-TX-15B	Pump Pit	None
241-TX-16A	Pump Pit	None
241-TX-17A	Pump Pit	None
241-TX-18A	Pump Pit	None
241-TY-01A	Pump Pit	None
241-TY-02A	Pump Pit	None
241-TY-03A	Pump Pit	None
241-TY-04A	Pump Pit	None
241-TY-05	No pit, covered saltwell caisson	None
241-TY-06	No pit, covered saltwell caisson	None
241-U-01A	Pump Pit	None
241-U-01B	Heel Pit	None
241-U-01C	Sluice Pit	None
241-U-02A	Pump Pit	None
241-U-03A	Pump Pit	None
241-U-03B	Heel Pit	None
241-U-03C	Sluice Pit	None
241-U-04A	Pump Pit	None
241-U-04B	Heel Pit	None
241-U-04C	Sluice Pit	None
241-U-05A	Pump Pit	None
241-U-05B	Heel Pit	None
241-U-05C	Sluice Pit	None
241-U-06A	Pump Pit	None
241-U-06B	Heel Pit	None
241-U-06C	Sluice Pit	None
241-U-07A	Pump Pit	None
241-U-07C	Sluice Pit	None

Inactive/Not-In-Use Components

At-Tank Pits		
Facility Number	**Description**	**LDM or BMP**
241-U-08A	Pump Pit	None
241-U-08C	Sluice Pit	None
241-U-09C	Sluice Pit	None
241-U-10A	Pump Pit	None
241-U-10B	Distributor Pit	None
241-U-11B	Distributor Pit	None
241-U-12	No pit, covered saltwell caisson	None
241-U-201	No pit	None
241-U-202	No Pit	None
241-U-203	No Pit	None
241-U-204	No Pit	None

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
103	241-SX-103-03-A	Capped	None
105	241-SX-105	241-SX-152	None
107	241-SX-107-07A-1	241-SX-152	None
108	241-SX-108-08A-1	241-SX-152	None
109	241-SX-109-09A-1	241-SX-152	None
110	241-SX-110-10A-1	241-SX-152	None
111	241-SX-111-11A-1	241-SX-152	None
112	241-SX-112-12A-1	241-SX-152	None
113	241-SX-113-13A-1	241-SX-152	None
114	241-SX-114-14A-1	241-SX-152	None
115	241-SX-115-15A-1	241-SX-152	None
234	241-S-102-02A-A	Unknown	None
235	241-S-102-02A-AA	Unknown	None
312	241-SX-102	Clean Out Boxes-15 Thru 22	None
318	241-SX-102	241-SX-A, SX-B Flush Pit	None
456	241-SX-152	Capped	None
540	241-S-107-07A	241-S-151-L18	None
703	241-TX-109-09A-A	241-T-151-U3	None
704	SN-249	241-TX-109-09A-D	None
704	SN-249	241-TY-103-A	None
704	SN-249	241-TY-102	None
704	SN-249	241-TY-105	None
706	241-TX-105-05A-C	704	None
707	241-TX-06A-A	241-TX-02A-C	None
708	241-TX-102-02A-D	241-TX-103-03A-A	None
709	241-TX-103-03A-C	241-TX-104-04A-A	None
710	241-TX-108-08A-A	241-TX-104-04A-C	None
711	241-TX-107-07A-A	241-TX-108-08A-C	None
714	241-TX-110-10A-C	241-TX-111-11A-A	None
715	241-TX-111-11A-C	241-TX-112-12A-A	None
717	241-TX-118	241-TX-112-012A-C/15B Valve Pit	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
718	241-TX-113-13A	241-TX-115	None
720	241-TX-114	241-15B Valve Pit	None
721	241-TX-114-14A	241-TX-115	None
723	241-TX-118-18A	242-T	None
724	241-TX-111	241-TX-14B Valve Pit	None
724	241-TX-118	242-T	None
724	241-TY-101-01A-A	241-TY-103-03A-A	None
726	241-TY-01A-C	241-TY-102-02A-A	None
727	241-TY-102-02A-C	241-TY-104-04A-C	None
728	241-TX-118	241-TY-104-04A-C	None
730	241-TX-110	241-TX-14B Valve Pit	None
731	241-TX-117-17A	241-TX-118	None
750	241-TX-118-18A	241-TX-TX-115-15A-U2	None
800	241-BY-112-012D-U6	241-BY-111-011D-U6	None
801	241-BY-112-012D-U7	241-BY-111-011D-U7	None
801	244-AR-T-6	241-A-153-A	None
804	241-BY-110-010-A	241-BY-111-A	None
805	241-BY-107-07A-A	241-BY-110-010A-C	None
805	244-AR-T-13	241-A-153-B	None
806	241-BY-102-02A-U8	241-BY-111-011D-U4	None
806	241-BY-104-04D-A	241-BY-107-07A-D	None
807	241-BY-105-05D-A	241-BY-104-04D-C	None
808	241-BY-102	241-BY-105-05D-D	None
809	241-BY-103-03C-A	241-BY-105-05D-C	None
810	241-BY-103-03C-C	241-BY-106-06D-A	None
813	241-BY-108-08A-A	241-BY-107-07A-C	None
814	241-BY-102-02B	241-BY-111-011D-U8	None
814/4002/4028/G026/4001/T031	244-AR Vault-TK-001	PUREX	None
815	241-BY-110-010A-D	241-BX-112-012-A-A	None
816	241-BX-112-012A-C	241-BX-111-011A-A	None
817	241-BX-111-011A-C	241-BX-110-010A-A	None
819	244-AR-Tank-001-T5	244-AR-Tank-003-T14	None
820	241-BX-106-06A-C	241-BX-105-05A-A	None
820	Encasement Drain for V-383, V-384, V-385 from 241-TX-154	241-TX-152-U5	None
821	241-BY-101-01C-A	241-BX-105-05A-C	None
822	241-BX-105-05A	241-B-109-09A-C	None
822	241-BY-101-01C-C	241-BY-104-04D	None
823	241-BX-105-05A-E	241-B-112-012A-A	None
824	241-B-112-012A-C	241-B-108-08A-A	None
826	241-B-109-09A-D	241-B-108-08A-D	None
827	241-B-103-03A-UA	241-B-102-02A-U4	None
829	241-B-106-06A-C	241-B-109-09A-A	None
837	244-AR-Tank-001-2,-3,-4	244-AR-Tank001,002, 003,004	None
1006	205-S	240-S-152-U2	None
1045	240-S-152-U1	204-S	None
1115	240-S-151-U6	202-S	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
1140	240-S-151-U15	202-S	None
1145	240-S-151-U9	202-S	None
1238	202-S	240-S-151-U10	None
1540	240-S-151-U14	202-S	None
1541	240-S-151-U5	202-S	None
3130	240-S-151-U1	202-S	None
3591	240-S-151-U18	202-S	None
3592	240-S-151-U19	202-S	None
3603	240-S-151-U7	Capped	None
3610	240-S-151-U16	202-S	None
3635	240-S-151-U11	202-S	None
3658	240-S-151-U4	202-S	None
3666	240-S-151-U2	202-S	None
4001/T029	PUREX	241-A-B-R12	None
4002	241-AX-151	None Identified	None
4002/T031/G026/402A	PUREX	244-AR	None
4003	241-AX-151	None Identified	None
4003/T037/4017	PUREX	241-AX-152	None
4004	241-AX-151	Capped	None
4004/G341/V029	PUREX	241-A-A-L12	None
4006	241-AX-151	Capped	None
4007	244-AR Vault-T8A	241-AX-151	None
4009	241-AX-151	None Identified	None
4010	241-AX-151-Catch Tank	241-AX-151-F-Cell	None
4011	241-AX-151-Catch Tank	241-AX-151-E-Cell	None
4012	241-CR-153	241-AX-151 D-Cell	None
4013	241-AX-151-D-Cell	241-CR-152-U3A	None
4014	241-AX-151	Capped	None
4016	241-AX-151-Catch Tank Pit	241-AX-151-E-Cell	None
4017	241-AX-151-Washdown	Capped	None
4018	241-AX-151-Washdown	Capped	None
4019	241-AX-151	Capped	None
4020	241-AX-151	Capped	None
4021	241-AY-151-Nozzle 3	241-AX-152-L2	None
4021	241-AY-151	Jumper Box 153-AX	None
4022	241-AX-151-D-CELL	241-AX-152 Pump Pit	None
4024	241-AX-152-B	Capped	None
4026	Jumper Box 153-AX-1	241-AX-101-01A-2	None
4026	Jumper Box 153-AX-1	241-AX-102-02A-2	None
4026	Jumper Box 153-AX-1	241-AX-103-03A-2	None
4026	Jumper Box 153-AX-1	241-AX-104-04A-2	None
4026	241-AX-101-01A-2	Leak Detection Pits-01E, 02E, 03E, 04E	None
4026	241-AX-152	Jumper Box 153-AX-2	None
4030	241-AX-152	241-AX-152-B	None
4044/V029/4004/G341/4029	202A	241-A-B-VPL12	None
4101	241-AX-151	241-A-101	None
4102	241-AX-151	241-A-102	None
4103	241-AX-151	241-A-103	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
4104	241-AX-151	241-A-104	None
4105	241-AX-151	241-A-105	None
4106	241-AX-151	241-A-106	None
4242	240-S-151-U13	202-S	None
4530	241-AY-151-U4	241-A-153-U1	None
4702	241-UX-154-L-6	231-WR-TK-004	None
4703/4859	241-UX-154-L5	241-TX-155-U2	None
4851	241-UX-154-L-4	241-TX-155-U3	None
4878	241-UX-154-L-2	241-WR-TK-002	None
4977	241-UX-152-U4	241-WR-TK-001	None
5002	241-U-103-03A-U1	241-UR-152-L13	None
5006	241-U-102-02A-U1	241-UR-152-L12	None
5012	241-UR-152-U9,11,12	241-UR-151-U9	None
5014	241-U-103-03C-U1	241-UR-152-L10	None
5025	241-UR-152-U10	241-UR-151-U17	None
5032	241-U-103-03A-U2	241-UR-152-U6	None
5035	241-U-103-03C-U2	241-UR-152-U5	None
5037	241-U-102-02A-U3	241-UR-152-L15	None
5038	241-U-102-02A-U2	241-UR-152-U4	None
5041	241-U-102-02C-U2	241-UR-152-U3	None
5053	241-U-102-02C-U1	241-UR-152 Drain	None
5076	241-UR-Tank-001	U-103, 109,108,105,107,102	None
5185	241-TX-15A-U3	241-TXR-151-U11	None
5185	242-T-151-U2	242-T	None
5191	241-TX-115-15A-U1	15-X	None
5193	241-TX-115-15A-U6	15-B Valve Pit	None
5202	251-U-106-06A-U1	241-UR-153-L13	None
5206	241-U-105-05A-U1	241-UR-153-L12	None
5212	241-UR-153-U-9, 11,12	241-UR-151-U8	None
5214	241-U-106-06C-U1	241-UR-153-L10	None
5225	241-UR-151-U16	241-UR-153-U10	None
5232	241-U-106-06A-U2	241-UR-153-U6	None
5235	241-U-106-06C-U2	241-UR-153-U5	None
5237	241-U-105-05A-U3	241-UR-153-L15	None
5238	241-U-105-05A-U2	241-UR-153-U4	None
5241	241-U-105-05C-U2	241-UR-153-U3	None
5402	241-U-109-09A-U1	241-UR-154-L13	None
5406	241-U-108-08A-U1	241-UR-154-L12	None
5410	241-U-107-07A-U1	251-UR-154-L11	None
5412	241-UR-151-U6	241-UR-154-U9,11,12	None
5414	241-U-109-09C-U1	241-UR-154-L10	None
5417	241-U-108-08C-U1	241-UR-154-L7	None
5420	241-U-107-07C-U1	241-UR-154-L9	None
5425	241-UR-151-U15	241-UR-154-U10	None
5431	241-U-107-07A-U3	241-UR-154-L14	None
5432	241-U-109-09A-U2	241-UR-154-U6	None
5435	241-U-109-09C-U2	241-UR-154-U5	None
5437	241-U-108-08A-U3	241-UR-154-L15	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
5438	241-U-108-08A-U2	241-UR-154-U4	None
5441	241-U-108-08C-U2	241-UR-154-U3	None
5444	241-U-107-07A-U2	241-U-154-U2	None
5447	241-U-107-07C-U2	241-U-UR-154-1	None
5507	241-UR-154-L8	241-U-153-L8	None
5601	244-UR-Tank-001	241-U4-151-L5	None
5609	244-UR-Tank-002-U2	251-U4-151-L3	None
5613	244-UR-Tank-001-U2	241-UR-151-L1	None
5622	244-UR-Tank-001-U3	241-UR-151-L7	None
5624	241-UR-152-L8	241-UR-151-U12	None
5625	241-UR-153-U8	241-UR-151-U11	None
5626	241-UR-151-U7	241-UR-154-U8	None
5630	241-UR-152-L1,2,3,4,5,6	241-UR-151-U14	None
5631	241-UR-153-L1,2,3,4,5,6	241-UR-151-U13	None
5632	241-UR-151-U10	241-UR-154-L1,2,3,4,5,6	None
5644	241-UR-151-U-18,19,21	241-UR-151-U-18,19,21	None
5647	244-UR-U1-Tank-001	241-UR-151-L8	None
5648	244-UR-U1-Tank-002	241-UR-151-L10	None
5653	244-UR-Tank-004	241-U4-151-L4	None
6002	241-T-103-03A-U1	241-TR-152-L13	None
6006	241-T-102-02A-U1	241-TR-152-L12	None
6010	241-T-101-01A-U1	241-TR-152-L11	None
6012	241-TR-153-U13	Capped	None
6012	241-TXR-151-U10	Capped	None
6012	241-T-104	244-TX-H	None
6014	241-T-103-03C-U1	241-TR-152-L10	None
6017	241-T-102-02C-U1	241-TR-152-L7	None
6020	241-T-101-01C-U1	241-TR-152-U2	None
6025	241-TXR-151-U20	241-TR-152-U10	None
6031	241-T-101-01A-U3	241-TR-152-L14	None
6032	241-T-103-03A-U2	241-TR-152-U6	None
6035	241-T-103-03C-U2	241-TR-152-U5	None
6037	241-T-02A-U3	241-TR-152-L15	None
6038	241-T-102-02A-U2	241-TR-152-U4	None
6041	241-T-102-02C-U2	241-TR-152-U3	None
6044	241-T-101-01A-U2	241-TR-152-U2	None
6047	241-T-101-01C-U2	241-TR-152-U1	None
6053	241-T-101-01C	241-TR-152 Drain	None
6160	241-TR-152-U9, 11,12	241-TR-153-U2	None
6165	241-TR-153-U6	241-TR-152-L1, 2,3,4,5,6	None
6170	241-TR-152-U8	241-TR-153-U1	None
6202	241-BY-103-03A-U1	241-BYR-152-L13	None
6206	241-BY-102-02A-U1	241-BYR-152-L12	None
6210	241-BY-101-01A-U1	241-BYR-152-L11	None
6214	241-BY-103-03C-U1	241-BYR-152-L10	None
6217	241-BY-102-02C-U1	241-BYR-152-L7	None
6220	241-BY-101-01C-U1	241-BYR-152-L9	None
6232	241-BY-103-03D-U2	241-BYR-152-U6	None
6235	241-BY-103-03C-U2	241-BYR-152-U5	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
6238	241-BY-102-02D-U2	241-BYR-152-U4	None
6241	241-BY-102-02C-U2	241-BYR-152-U3	None
6244	241-BY-101-01D-U2	241-BYR-152-U2	None
6247	241-BY-101-01C-U2	241-BYR-152-U1	None
6249	241-BYR-152-U14	241-BXR-152-U13	None
6253	241-BYR-152/241-BXR-152	241-B-302A	None
6402	241-BYR-153-L13	241-BY-106-06A-U1	None
6406	241-BYR-153-L12	241-BY-105-05A-U1	None
6410	241-BYR-153-L11	241-BY-104-04A-U1	None
6414	241-BYR-153-L10	241-BY-106-06C-U1	None
6417	241-BYR-153-L7	241-BY-105-05C-U1	None
6420	241-BYR-153-L9	241-BY-104-04C-U1	None
6432	241-BYR-153-U6	241-BY-106-06D-U2	None
6435	241-BYR-153-U5	241-BY-106-06C-U2	None
6438	241-BYR-153-U4	241-BY-105-05D-U2	None
6441	241-BYR-153-U3	241-BY-105-05C-U2	None
6444	241-BYR-153-U2	241-BY-104-04D-U2	None
6447	241-BYR-153-U1	241-BY-104-04C-U2	None
6449	241-BYR-153-U14	241-BXR-153-U13	None
7002	241-TX-103-03A-U1	241-TXR-152-L16	None
7006	241-TX-102-02A-U1	241-TXR-152-L15	None
7010	241-TX-101-01A-U1	241-TXR-152-L14	None
7012	241-TXR-152-U10, 12,13	241-TXR-151-U8	None
7014	241-TX-103-03C-U1	241-TXR-152-L13	None
7017	241-TX-102-02C-U1	241-TXR-152-L9	None
7020	241-TX-101-01C-U1	241-TXR-152-L12	None
7025	241-TXR-152-U11	241-TXR-151-U19	None
7031	241-TX-101-01D-U1	241-TR-152-L18	None
7032	241-TX-103-03D-U2	241-TXR-152-U6	None
7035	241-TX-103-03C-U2	241-TXR-152-U5	None
7037	241-TX-102-02D-U1	241-TSR-152-L19	None
7038	241-TX-102-02D-U2	241-TXR-152-U4	None
7041	241-TX-102-02C-U2	241-TXR-152-U3	None
7044	241-TX-101-01D-U2	241-TXR-152-U2	None
7047	241-TX-101-01C-U2	241-TXR-152-U1	None
7159	241-TX-104-04A-U1	241-TXR-152-L17	None
7162	241-TX-104-04C-U1	241-TXR-152-L11	None
7164	241-TX-104-04C-U2	241-TXR-152-U7	None
7166	241-TX-104-04D-U2	241-TXR-152-U8	None
7202	241-TX-107-07A-U1	241-TXR-153-L16	None
7206	241-TX-106-06A-U1	241-TXR-153-L15	None
7210	241-TX-105-05A-U1	241-TXR-153-L14	None
7212	241-TXR-151-U6	241-TXR-153-U10, 12, 13	None
7214	241-TX-107-07C-U1	241-TXR-153-L13	None
7217	241-TX-106-06C-U1	241-TXR-153-L9	None
7220	241-TX-105-05C-U1	241-TXR-153-L12	None
7225	241-TXR-151-U18	241-TXR-153-U11	None
7231	241-TX-105-05D-U1	241-TXR-153-L18	None
7232	241-TX-107-07D-U2	241-TXR-153-U6	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
7235	241-TX-107-07C-U2	241-TXR-153-U5	None
7237	241-TX-106-06D-U1	241-TXR-153-L19	None
7238	241-TX-106-06D-U2	241-TXR-153-U4	None
7241	241-TX-106-06C-U2	241-TXR-153-U3	None
7244	241-TX-105-05D-U2	241-TXR-153-U2	None
7247	241-TX-105-05C	241-TXR-153-U1	None
7359	241-TX-115-015A-U4	241-TXR-153-L17	None
7362	241-TX-108-08C-U1	241-TXR-153-L11	None
7364	241-TX-108-08C-U2	241-TXR-153-U7	None
7366	241-TX-108-08D-U2	241-TXR-153-U8	None
7410	241-BY-111-011A-U1	241-BYR-154-L11	None
7412	241-BYR-154-U9,11,12	241-BXR-151-U4	None
7417	241-BY-112-012C-U1	241-BYR-154-L10	None
7420	241-BY-111-011C-U1	241-BYR-154-L9	None
7425	241-BYR-154-U10	241-BXR-151-U20	None
7431	241-BY-111-011D-U1	241-BYR-154-L14	None
7437	241-BY-112-012D-U1	241-BYR-154-L15	None
7438	241-BY-112-012D-U2	241-BYR-154-U4	None
7441	241-BY-112-012C-U2	241-BYR-154-U3	None
7444	241-BY-111-011D-U2	241-BYR-154-U2	None
7447	241-BY-111-011C-U2	241-BYR-154-U2	None
7601	241-TXR-244-Tank-001	241-TXR-151-L5	None
7609	241-TXR-151-L3	241-TXR-244 Tank 002-U2	None
7613	241-TXR-244-U2-Tank-003	241-TXR-151-L1	None
7616	241-TX-155-L1	241-TXR-151-U2, U3	None
7622	241-TXR-244-U3-Tank-001	241-TXR-151-L7	None
7624	241-TR-153-U14	Capped	None
7624	241-TXR-151-U14	Capped	None
7625	241-TXR-151-U13	241-TXR-153-U9	None
7624	241-TR-153-U14	Capped	None
7624	241-TXR-151-U14	Capped	None
7626	241-TXR-152-U9	241-TXR-151-U7	None
7630	241-TXR-151-U17	241-TR-153-U9	None
7631	241-TXR-151-U15	241-TXR-153-L1, 2,3,4,5,6,7,8	None
7632	241-TXR-152-L1, 2,3,4,5,6,7,8	241-TXR-151-U12	None
7636	241-TXR-151-U5	241-TX-153-L5	None
7644	241-TXR-151-U21, 23, 25	241-TXR-151-U21, 23, 25	None
7647	241-TXR-244-U1-Tank-003	241-TXR-151-L8	None
7648	241-TXR-244-U1-Tank-002	241-TXR-151-L10	None
7765	244-UR Tank 002	241-UR-151 Drain	None
8002	241-C-103-03A-U1	241-CR-152-L13	None
8006	241-C-102-02A-U1	241-CR-152-L12	None
8010	241-C-101-01A-U1	241-CR-152-L11	None
8012	241-CR-152-U9, U11, U12	241-CR-151-U4	None
8014	241-C-103-03C-U1	241-CR-152-L10	None
8017	241-C-102-02C-U1	241-CR-152-L7	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
8020	241-C-101-01C-U1	241-CR-152-L9	None
8021	241-AY-152-U10	241-AX-103-03D-U3	None
8022	241-AY-152-U11	241-AX-103-03C-U5	None
8023	241-AY-152-U14	241-AX-102-02C-U3	None
8024	241-AY-152-U15	241-AX-102-02D-U5	None
8025	241-AY-152-U12	241-AX-101-01D-U3	None
8026	241-AY-152-U13	241-AX-101-01C-U5	None
8027	241-AY-152-U16	241-AX-104-04C-U3	None
8028	241-AY-152-U17	241-AX-104-04D-U5	None
8029	241-AX-103-03A-U4	241-AX-103-03C-U3	None
8030	241-AX-103-03B-U3	241-AX-103-03D-U5	None
8031	241-AX-103-03A-U9	241-AX-103-03B-U5	None
8031	241-C-101-01A-U3	241-CR-152-L14	None
8032	241-AX-104-04D-U3	241-AX-104-04B-U5	None
8032	241-C-103-03A-U2	241-CR-152-U6	None
8033	241-AX-104-04A-U4	241-AX-104-04B-U3	None
8034	241-AX-104-04C-U5	241-AX-104-04A-U4A	None
8035	241-AX-102-02C-U4	241-AX-102-02A-U7	None
8035	241-C-103-03C-U2	241-CR-152-U5	None
8036	241-AX-102-02A-U4	241-AX-102-02B-U3	None
8037	241-AX-102-02B-U5	241-AX-102-02D-U3	None
8037	241-C-102-02A-U3	241-CR-152-L15	None
8038	241-AX-101-01AU4	241-AX-101-01C-U3	None
8038	241-C-102-02A-U2	241-CR-152-U4	None
8039	241-AX-101-01A-U9	241-AX-101-01B-U5	None
8040	241-AX-101-01B-U3	241-AX-101-01D-U5	None
8041	241-AX-101-01A-U6	241-AX-101-01C-U4	None
8041	241-C-102-02C-U2	241-CR-152-U3	None
8042	241-AX-102-02C-U5	241-AX-102-02A-U9	None
8043	241-AX-103-03A-U6	241-AX-103-03C-U4	None
8044	241-AX-104-04C-U4	241-AX-104-04A-U7	None
8044	241-C-101-01A-U2	241-CR-152-U2	None
8047	241-C-101-01C-U2	241-CR-152-U1	None
8061	241-AY-152-L7	241-AX-104-04A-U5	None
8062	241-AX-102-02A-U5	241-AY-152-L6	None
8063	241-AY-152-L5	241-AX-101-01A-U8	None
8064	241-AY-152-L4	241-AX-102/241-AX-103	None
8202	241-C-106-06A-U1	241-CR-153-L13	None
8206	241-C-105-05A-U1	241-CR-153-L12	None
8210	241-C-104-04A-U1	241-CR-153-L11	None
8214	241-C-106-06C-U1	241-CR-153-L10	None
8217	241-C-105-05C-U1	241-CR-153-L7	None
8220	241-C-104-04C-U1	241-CR-153-L9	None
8225	241-CR-153-U10	241-CR-151-U10	None
8231	241-C-104-04A-U3	241-CR-153-L14	None
8232	241-C-106-06A-U2	241-CR-153-U6	None
8235	241-C-106-06C-U2	241-CR-153-U5	None
8237	241-C-105-05A-U3	241-CR-153-L15	None
8238	241-C-105-05A-U2	241-CR-153-U4	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
8241	241-C-105-05C-U2	241-CR-153-U3	None
8244	241-C-104-04A-U2	241-CR-153-U2	None
8247	241-C-104-04C-U2	241-CR-153-U1	None
8552	241-C-201,202,203,204-U2	241-CR-151-U2	None
8555	241-CR-151-U5	241-C-201,202,203,204-U2	None
8601	241-CR-151-L1	244-CR-Tank-001	None
8616	241-CR-151-L5	244-CR-Tank-011-U1	None
8624	241-CR-152-U8	241-CR-151-U7	None
8625	241-CR-153-U8	241-CR-151-U6	None
8630	241-CR-152-L1, 2,3,4,5,6	241-CR-151-U9	None
8631	241-CR-153-L (1-6)	241-CR-151-U8	None
8644	241-CR-151-U12, 13,15	241-CR-151-U12,U13,U15	None
8647	241-CR-151-L4	244-CR-Tank-003-U1	None
8648	241-CR-151-L6	244-CR-Tank-002-U1	None
8653/8618	241-ER-151-L9	241-CR-151-U14	None
8656	241-AX-151	244-CR DCRT Tank 003	None
8900	201-C Valve Box	244-CR-Tank-003-U10	None
9002	241-B-103-03A-U1/03B-U2	241-BR-152-L13	None
9006	241-B-102-02A-U1/02B-U2	241-BR-152-L12	None
9010	241-B-101-01A-U1/01B-U2	241-BR-152-L11	None
9012	241-BXR-151-U8	241-BR-152-U9	None
9014	241-B-103-03C-U1	241-BR-152-L10	None
9017	241-B-102-02C-U1	241-BR-152-L7	None
9020	241-B-101-01C-U1	241-BR-152-L9	None
9025	241-BXR-151-U19	241-BR-152-U10	None
9031	241-B-101-01A-U3	241-BR-152-L14	None
9032	241-B-103-03A-U2	241-BR-152-U6	None
9035	241-B-103-03C-U2	241-BR-152-U5	None
9037	241-B-102-02A-U3	241-BR-152-L15	None
9038	241-B-102-02A-U2	241-BR-152-U4	None
9041	241-B-102-02C-U2	241-BR-152-U3	None
9044	241-B-101-01A-U2	241-BR-152-U2	None
9047	241-B-101-01C-U2	241-BR-152-U1	None
9202	241-BX-103-03A-U1	241-BXR-152-L13	None
9206	241-BX-102-02A-U1	241-BXR-152-L12	None
9212	241-BYR-152-U9,U11,U12	241-BXR-151-U6	None
9212	241-BYR-152-U9,U11,U12	241-BXR-152-U9,U11,U12	None
9214	241-BX-103-03C-U2	241-BXR-152-L10	None
9217	241-BX-102-02C-U1	241-BXR-152-L7	None
9225	241-BYR-152-U10	241-BXR-151-U18	None
9225	241-BYR-152-U10	241-BXR-152-U10	None
9231	241-BX-101-01A-U3	241-BXR-152-L14	None
9232	241-BX-103-03A-U2	241-BXR-152-U6	None
9235	241-BX-103-03C-U1	241-BXR-152-U5	None
9237	241-BX-102-02A-U3	241-BXR-152-L15	None
9238	241-BX-102-02A-U2	241-BXR-152-U4	None
9241	241-BX-102-02C-U2	241-BXR-152-U3	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
9244	241-BX-101-01A-U2	241-BXR-152-U2	None
9247	241-BX-101-01C-U2	241-BXR-152-U1	None
9249	241-BYR-152-U13	241-BXR-152-U14	None
9256	241-BX-103-03B-U2	241-BX-103-03A-U1	None
9263	241-BX-102-02B-U2	241-BX-102-02A-U1	None
9270	241-BX-101-01B-U2	241-BX-101-01A-U1	None
9412	241-BYR-153-U9,U11,U12	241-BXR-151-U3	None
9414	241-BX-106-06C-U1	241-BXR-153-L10	None
9417	241-BX-105-05C-U1	241-BXR-153-L7	None
9420	241-BX-104-04C-U1	241-BXR-153-L9	None
9425	241-BYR-153-U10	241-BXR-151-U17	None
9425	241-BYR-153-U10	241-BXR-153-U10	None
9431	241-BX-104-04A-U3	241-BXR-153-L14	None
9432	241-BX-106-06A-U2	241-BXR-153-U6	None
9435	241-BX-106-06C-U2	241-BXR-153-U5	None
9437	241-BX-105-05A-U3	241-BXR-153-L15	None
9438	241-BX-105-05A-U2	241-BXR-153-U4	None
9441	241-BX-105-05C-U2	241-BXR-153-U3	None
9444	241-BX-104-04A-U2	241-BXR-153-U2	None
9447	241-BX-104-04C-U2	241-BXR-153-U1	None
9449	241-BYR-153-U13	241-BXR-153-U14	None
9463	241-BX-105-05B-U2	9406/9463/241-BX-105-05A-U1	None
9465	241-BX-106-06B-U2	9402/9456/241-BX-106-06A-U1	None
9601	244-BXR-Tank-001	241-BXR-151-L1	None
9604	244-BXR-Tank-003	244-BXR Tank-O01-U2	None
9613	244-BXR-Tank-003-U2	244-BXR Tank 011	None
9616	244-BXR-011-U1	241-BXR-151-L5	None
9622	244-BXR-Tank-001-U3	241-BXR-151-L3	None
9623	241-BYR-154-U8	241-BXR-151-U15	None
9624	241-BXR-151-U12	241-BR-152-U8	None
9626	241-BYR-153-U8	241-BXR-151-U5	None
9626	241-BYR-153-U8	241-BXR-153-U8	None
9630	241-BXR-151-U15	241-BR-152-L1	None
9631	241-BXR-151-U13	241-BXR-152-L1,L2,L3,L4,L5,L6	None
9631	241-BXR-151-U13	241-BYR-152-L1,L2,L3,L4,L5,L6	None
9632	241-BXR-151-U10	241-BYR-151-L1,L2,L3,L4,L5,L6	None
9632	241-BXR-151-U10	241-BXR-153-L1,L2,L3,L4,L5,L6	None
9633	241-BYR-154-L1,L2,L3,L4,L5	241-BXR-151-U9	None
9636	241-BXR-151-U2	241-B-252-U8	None
9644	241-BXR-151-U21,U23,U25	241-BXR-151-U21,U23,U25	None
9647	244-BXR-Tank-003-U1	241-BXR-151-L4	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
9648	244-BXR-Tank-002-U1	241-BXR-151-L6	None
9719	241-BXR-151-U24	241-ER-151-L3	None
9765	241-BXR-151-Drain	244-BXR Vault	None
01A	241-A-101-01A-U7	241-A-153-U5	None
01B	241-A-101-01B-U1	241-A-153-L10	None
01C	241-A-101-01C-U1	241-A-153-L9	None
02A	241-A-102-02A-U7	241-A-153-U4	None
02B	241-A-102-02B-U1	241-A-153-L11	None
03A	241-A-103-03A-U7	241-A-153-U6	None
03B	241-A-103-03B-U1	241-A-153-L12	None
03C	241-A-103-03C-U1	241-A-153-L7	None
04B	241-A-104-04B-U1	241-A-153-L4	None
04C	241-A-104-04C-U1	241-A-153-L3	None
05B	241-A-105-05B-U1	241-A-103-03A-U4	None
05B	241-A-105-05B-U1	241-A-153-L6	None
05C	241-A-105-05C-B	241-A-103-03D/241-A-153-U2	None
05D	241-A-105-05D-U1	241-A-153-L2	None
06A	241-A-106-06A-U7	241-A-153-U3	None
06B	241-A-106-06B-U1	241-A-153-L5	None
06C	241-A-106-06C-U1	241-A-153-L1	None
108/837/8649/8901	221-B	244-CR DCRT	None
153A	241-A-101	241-A-153-Drain	None
223/224/225/226	244-BX-Vault	241-B-106, 105,109	None
223/Unknown	244-BX-Vault	241-B-103	None
Unknown	241-A-102-02C-U1	241-A-153-L8	None
227/228	244-BX-Vault	241-B-108, 111	None
231/232/233/234	244-BX-Vault	241-B-104, 107,110	None
4044	241-AX-151-G Cell	Capped	None
4005/810	241-AX-151-D Cell	244-AR Vault-T9	None
4006	241-AX-151-E Cell	Capped	None
4006/4018	244-AR Vault-T9A	241-AX-152-A	None
4107VO33	241-AX-151-D Cell	241-A-152-U11	None
4510/A107	241-AX-152-7	Capped	None
4859/4703	241-TX-155-U2	241-UX-154-L5	None
5107	241-UR-152-L8	5107/V473/241-UR-153-L11	None
5307	241-UR-153-L8	5107/V473/241-UR-152-L11	None
5507	241-UR-154-L8	5107/V473/241-UR-152-L11	None
6307/V336	241-BYR-152-L8	241-BX-153-U2	None
6443/9453	241-BYR-153 & 241-BXR-153 Drains	241-BX-104-04C	None
7406/9394	241-BY-109-09A-U4	241-BYR-154-L12	None
7406/9394	241-BY-112-012A-U1	241-BY-109-09A-U4	None
7435/9385/V304	241-BYR-154-U5,L13	241-B-252-L15	None
7507/9712	241-BYR-154-L8	B-Swamp	None
814/4015	241-AX-151	Capped	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
819/818	241-BX-106-06A-U4	241-BX-110010C-C	None
833/8618/8612/809	221-B	244-AR Vault-T16A	None
834/8615/8653/818	221-B	244-AR Vault-T10	None
8107	241-CR-152-L8	V844/241-CR-151-L8	None
8636/V105	241-CR-151-U1	241-C-151-L6	None
9210/9270	241-BX-101-01B-U2	241-BXR-152-L11	None
9406/9463	241-BX-105-05A-U1	241-BXR-153-L12	None
9456/9402	241-BX-106-06A-U1	241-BXR-153-L13	None
9470/9410	241-BX-104-04B-U2/04A-U1	241-BX-104-04A/241-BXR-153-L11	None
9625/9212	241-BXR-151-L11	241-BYR-152-U8	None
9625/9212	241-BXR-151-L11	241-BXR-152-U8	None
9653/141	221-B	Capped	None
9653/243	221-B	241-ER-151-L7	None
A101	241-AX-101	241-AX-152-A1	None
A102	241-AX-102	241-AX-152-A2	None
A-103	241-AX-103	241-AX-152-A3	None
A-104	241-AX-104	241-AX-152-A4	None
A4013	241-CR-152-3A	241-AX-151-Washdown	None
B101	241-AX-101	241-AX-152-B1	None
B102	241-AX-102	241-AX-152-B2	None
B-103	241-AX-103	241-AX-152-B3	None
B-104	241-AX-104	241-AX-152-B4	None
BWCTL	241-B-103-03A-C	241-B-106-06A-A	None
BWCTL-M2	241-B-102-02A-A	241-B-108-08A-C	None
C101	241-AX-101	241-AY-501	None
C102	241-AX-102	241-AY-501	None
C-103	241-AX-103	241-AY-501	None
C-104	241-AX-104	241-AY-501	None
D020	PUREX	241-A-151-U19	None
D040	PUREX	241-A-151-U19	None
D070	PUREX	241-A-151-U26	None
D088	PUREX	241-A-151-U25	None
D149	PUREX	241-A-151-U18	None
D186	PUREX	241-A-151-U5	None
D601D505	241-AZ-152	241-AY-152	None
E006	PUREX	241-A-151-U24	None
E167	PUREX	241-A-151-U23	None
F241	PUREX	241-A-151-U21	None
F274	PUREX	241-A-151-U9	None
F377	PUREX	241-A-151-U14	None
F429	PUREX	241-A-151-U13	None
F719	PUREX	241-A-151-U20	None
F791	PUREX	241-A-151-U8	None
G057	PUREX	241-A-151-U17	None
G180	PUREX	241-A-151-U11	None
G212	PUREX	241-A-151-U16	None
M044	PUREX	241-A-151-U10	None
M045	PUREX	241-A-151-U22	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
R-165	PUREX	241-A-151-U12	None
R345	PUREX	241-A-151-U15	None
U039	PUREX	241-A-151-U6	None
U136	PUREX	241-A-151-U7	None
Drain	241-TX-101	241-TXR-152	None
Drain	241-TX-105-05D	241-TXR-153	None
Drain	241-TX-302A	241-TX-153	None
Drain	241-TX-302A	Crib	None
Drain	241-TX-302B	Encasement Drain	None
Drain	241-TX-302B	241-TX-155	None
Drain	241-TXR-244-002-Sump	241-TXR-151	None
Drain	241-TY-302A	241-TY-153	None
Drain	241-U-102-02A	P19 K1 Exhauster	None
Drain	241-U-102-02A-C	Clean Out Boxes-U32,33,34,35	None
Drain	241-U-105-05C-B	241-UA, 241-UB Flush Pits	None
Drain	241-U-105-05C-U1	241-UR-153	None
Drain	241-U-107-07A-B	Clean Out Box-U30,U31	None
Drain	241-U-107-07C	241-UR-154	None
Drain	241-U-108-08A-B	P-20 Exhauster	None
Drain	241-U-108-08A-C	Clean Out Box U-29	None
Drain	241-U-105-05C-C	241-U-A/241-U-B Flush Pits	None
Drain	241-U-111-11A-E	241-U-C/241-U-D Flush Pits	None
Drain	241-U-301-B	241-U-152	None
Drain (BX-302B)	241-BX-155	241-BX-302C	None
Drain Line	241-B-302B	241-B-154	None
Drain Line	241-BX-302B	241-BX-154	None
Drain Line	241-BYR-154	244-BXR Vault-002	None
Drain Line	241-C-102-02B-U3	241-C-Valve Pit-L1	None
Drain Line	241-C-103	241-C-Valve Pit	None
Drain Line	241-C-104-04C	241-CR-153	None
Drain Line	241-C-104-04B-U3	241-C-Valve Pit-L2	None
Drain Line	241-C-107-U1	241-C-Valve Pit-L3	None
Drain Line	241-C-252	Unknown Catch Tank	None
Drain Line	241-C-153 & 241-C-151	Unknown Catch Tank	None
Drain Line	241-S-102-02A-F	241-S-152	None
Drain Line	241-S-107	241-S-B Flush Pit	None
Drain Line	241-S-107	241-S-C Flush Pit	None
Drain Line	241-S-107	241-S-D Flush Pit	None
Drain Line	241-S-302-B	241-S-302-A	None
Drain Line	244-CR-Tank-002	241-CR-151	None
Drain-301	241-C-106-06C-U8	To Metal Filter Drain	None
Drain-301	241-A Farm COBs	241-A-350	None
Drain 302	241-C-106-06C-U9	To Process Building Floor Drain	None
Drain 302	COB A-2	DR-301/241-A-350	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
Drain 303	COB A-5	DR-301/241-A-350	None
Drain 304	COB A-9	DR-301/241-A-350	None
Drain-305	241-A-B Flush Pit	DR-301/241-A-350	None
Drain-306	241-A-A Flush Pit	DR-301/241-A-350	None
Drain-307	241-A-A, A-B Flush Pits	241-A-350	None
Drain-308	COB A-3	DR-301/A-350	None
Drain-309	COB A-4	DR-301/A-350	None
Drain-314	241-AX-COBs	DR-301/A-350	None
Drain-315	COB A-10	DR-317/DR-301/241-A-350	None
Drain-316	COB A-8	DR-317/DR-301/241-A-350	None
Unknown	COB A-11	DR-317/DR-301/241-A-350	None
Drain-318	COB AX-12	DR314/241-AX-102 Riser 24	None
Drain-319	COB AX-14	DR314/241-AX-102 Riser 24	None
Drain-320	COB AX-15	DR314/241-AX-102 Riser 24	None
Drain-321	COB AX-16	DR314/241-AX-102 Riser 24	None
Drain-322	COB AX-17	DR314/241-AX-102 Riser 24	None
Drain-323	COB AX-18	DR314/DR370/241-AX-102 Riser 24	None
Drain-324	COB AX-21	DR314/DR370/241-AX-102 Riser 24	None
Drain-329	COB AX-19	DR314/DR370/241-AX-102 Riser 24	None
Drain-330	COB AX-24	DR325/241-AX-104 Riser 7C	None
Drain-331	COB AX-22	DR314/DR370/241-AX-102 Riser 24	None
Drain-332	COB AX-23	DR314/DR370/241-AX-102 Riser 24	None
Drain-341	C0B A-1	DR-301/241-A-350	None
Drain-342	C0B AX-26	DR333/DR325/241-AX-107 Riser 7C	None
Drain-347	C0B AX-20	DR325/DR307/241-AX-107 Riser 7C	None
Drain-348	C0B AX-25	DR333/DR325/241-AX-107 Riser 7C	None
Drain-349	COB AX-13	DR314/241-AX-102 Riser 24	None
Drain	241-BX-153 Drain	241-B-302A	None
Drain-0029	241-AX-153 Jumper Box	241-AX-152	None
CNDS-02	241-A-401 Condensate Bldg	241-A-401Diverter Caisson	None
CDNS-92	241-A-401 Condensate Bldg	241-A-401Diverter	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
		Caisson	
CDNS-AN-02	241-A-401Diverter Caisson	241-AN-101-01D-B	None
CDNS-AN-92	241-A-401Diverter Caisson	241-AN-101-01D-A	None
Flush	241-UA-L6, L8, L17	241-UA Flush Pit	None
Flush	241-UB-R-17, R-8, R-6	241-UB Flush Pit	None
Flush	241-UC-L6, L8, L17	241-UC Flush Pit	None
Flush	241-UD-R6, R8, R17, R21	241-UD-Flush Pit/R-8	None
Flush Line	241-A-A Flush Pit	241-A-A-L6, L8, L17	None
Flush line	241-A-B-Flush Pit	241-A-102-02B-4	None
Flush Line	241-A-B-R8, R6,R17	241-A-B Flush Pit	None
Flush Line	241-AX-A-L6,L8,L17	241-AX-A-Flush Pit	None
Flush Line	241-AX-B-R6,R8,R17	241-AX-B-Flush Pit	None
Flush Line	241-S-A-L8/L17	241-S-A Flush Pit	None
Flush Line	241-S-B-R6,R8,R17	241-S-B Flush Pit	None
Flush Line	241-S-C-L8,L17	241-S-C Flush Pit	None
Flush Line	241-S-D-R6,R8,R17	241-S-D Flush Pit	None
Flush Line	241-SX-A-L6,L17	241-SX-A Flush Pit	None
Flush Line	241-SX-A-R6,R17	241-SX-B Flush Pit	None
No number	241-UA-L18,L19	241-UB-R18,R19	None
Overflow	241-A-106 Sidewall	241-A-350 Sidewall	None
PL2021	242-B	241-B-106	None
PL-P11	241-BY-112-012D-5A	241-BY-109-09A-U6	None
PL-P22	241-BY-109	241-BY-108-08A-C	None
SL101	241-S-152-Nozzle 1	Blocked	None
SL101	241-UD-R3	Blocked	None
SL102	241-UC-L10	241-UA-L3	None
SL-102	241-A-106-06D-A	241-A-B-R7/COB A8,A9	None
SL104	241-U-109-09B-A	241-UC-L7	None
SL105	241-U-108-08B-A	241-UC-L9	None
SL-105	241-A-103-03D-A	241-A-B-R5	None
SL-106	241-A-B-R10	241-A-102-02D-A	None
SL108	241-U-107-07B-A	241-UD-R9	None
SL108	241-U-110-10B-A	241-UD-R7	None
SL109	241-U-103	241-U-B	None
SL110	241-U-06B	241-UA-L9	None
SL111	241-AX-103-03A-A	241-AX-A-L	None
SL112	241-AX-104-04A-A	241-AX-B-R	None
SL112	241-U-105-05B-A	241-U-A-L7	None
SL115	241-S-A	241-S-C	None
SL116	211-S-B-R10	241-S-D-R3	None
SL117	241-S-C	241-SX-A	None
SL118	241-S-D	241-SX-B	None
SL119	241-S-103-03A-B	241-S-A-L7	None
SL120	241-S-106-B	241-S-A-L9	None
SL-121	241-S-101-01A-B	241-S-B-R5	None
SL122	241-S-105-05A	241-S-B-R9	None
SL123	241-S-109-09A-B	241-S-C-L7	None
SL124	241-S-108-08A-B	241-S-C-L5	None
SL125	241-S-112-12A-B	241-S-C-L9	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
SL126	241-S-D	None Identified	None
SL127	241-S-110-10A	241-S-D-R7	None
SL128	241-S-111-11A-B	241-S-D-R9	None
SL129	241-SX-103	241-SX-A	None
SL130	241-SX-102-02B-B	241-SX-A-L5	None
SL131	241-SX-106-06A-B	241-SX-151-L9	None
SL132	241-SX-105	241-SX-B-R9	None
SL133	241-SX-104-04A-B	241-SX-B-R7	None
SL134	241-S-A-L18	241-S-D-R18	None
SL137	241-SX-101-01A	241-SX-B-R5	None
SL138	241-S-152	242-S Evaporator	None
SL139	241-S-152-4	Capped	None
SL139/SL114	242-S Evaporator	241-S-B	None
SL175	241-S-152-8	Failed	None
SL175/S138	241-SY-A-L3	242-S Evaporator	None
SL176	241-S-152	Failed	None
SL204	241-U-109-09A-A	241-UC-L14	None
SL219	241-S-103-03A-A	241-S-A-L15	None
SN200	241-S-102	241-S-152-5	None
SN200	241-TX-116	244-TX-E	None
SN-200	241-BY-102-02A-U2	SN-200/Capped	None
SN201	241-S-102	241-S-152-7	None
SN201	241-TX-113-13A	SN206	None
SN-201	241-BY-103-U2	SN-200/Capped	None
SN202	241-UC-L12	241-UA-L1	None
SN-202	241-A-B-R11	241-A-106-06C-Nozzle A	None
SN-202	241-BY-105-05A-U2	SN-200/Capped	None
SN203	SN206	241-TX-105-05A	None
SN203	241-BY-106-06A-U2	SN200/Capped	None
SN205	241-U-108-08A-A	241-UC-L15	None
SN203	241-UC-R12	241-UB-R2	None
SN204	244-TX-D	241-TX-117-017A	None
SN-204	241-BY-108-08A-U1	SN207/Capped	None
SN205	SN204	241-TX-114-014A	None
SN-205	241-A-103-03C-A	241-A-B-R14	None
SN-205	241-BY-109-09A-U5	SN207/Capped	None
SN206	SN204	241-TX-110-01A	None
SN206	241-U-107-07A-A	241-UD-R14	None
SN-206	241-A-102-02C-3	241-A-102-02B-3	None
SN-206	241-BY-111-011A-U2	Capped	None
SN207	241-TX-106-06A	SN204	None
SN207	251-U-111-11A-A	241-UD-R20	None
SN-207	241-A-A-L14	241-A-101-01B-A	None
SN-207	241-BY-103-03A	244-BX-D	None
SN-207	241-BY-112-012A	801	None
SN208	241-TX-118-18A	244-TX-C	None
SN-208	241-AX-101-01B-A	241-AX-A-L15	None
SN209	241-TX-115-15A	SN208	None
SN209	241-U-103-03A-A	241-UB-R-15	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
SN-209	241-AX-102-02D-A	241-AX-B-R14	None
SN210	241-TX-111-11A	SN208	None
SN210	241-U-106-06C-A	241-UA-L16	None
SN-210	241-AX-A-L19	241-AX-B-R19	None
SN211	241-AX-103-03D-A	241-AX-A-L14	None
SN-211	241-BY-110-010-A/BY-104-04-U2	244-BX-Nozzle B	None
SN211	241-U-102-02A-A	241-UB-R14	None
SN212	241-AX-104-04B-A	241-AX-B-R15	None
SN212	241-U-105-05C-A	241-UA-L14	None
SN212	241-TX-108-08A	SN211	None
SN213	241-S-102	241-S-A-L1	None
SN213	241-U-111-11A-C	241-UC-L15	None
SN211	241-TX-112-012A	244-TX-B	None
SN213	241-TX-101-01A	SN211	None
SN214	241-TX-102-02A	SN211	None
SN214	241-S-102	241-SB-R1	None
SN215	241-U-111-11A-B	241-UD-R15	None
SN215	241-TX-103-03A	SN211	None
SN215	241-S-A-L14	241-S-C-L1	None
SN216	241-S-152-9	Capped	None
SN216	241-S-B-R12	241-S-D-R1	None
SN216/217	241-BX-107/241-BX-110	244 BX-Nozzle E	None
SN217	241-S-C-L12	241-SX-A-L1	None
SN218	241-S-D-R12	241-SX-B-R1	None
SN220	241-S-106-06A-A	241-S-A-L16	None
SN221	241-S-101-01A-A	241-S-B-R14	None
SN222	241-S-105-05A	241-S-B-R16	None
SN223	241-S-109-09A-A	241-S-C-L15	None
SN224	241-S-108-08A-A	241-S-C-L14	None
SN225	241-S-112-12A-A	241-S-C-L16	None
SN226	241-S-107-07A-A	241-S-D-R14	None
SN227	241-S-110-10A	241-S-D-R15	None
SN228	241-S-111-11A-A	241-S-D-R16	None
SN229	241-SX-103-03B-A	241-SX-A-L15	None
SN230	241-SX-102-02B-A	241-SX-A-L14	None
SN-230/215/214/213	241-BX-104-04B-U1	244-BX-Nozzle A	None
SN231	241-SX-106-06A-A	241-SX-A-L16	None
SN233	241-SX-104-04A-A	241-SX-B-R15	None
SN-235	241-A-102-02B-2	Capped off	None
SN239	241-S-C-L19	241-S-D-R19	None
SN241	241-SX-101-01A-A	241-SX-B-R14	None
SN242	241-S-102-02A-U6	241-S-A-L12	None
SN245	241-S-107-07A	244-S-18	None
SN246	241-S-107-07A	244-S-17	None
SN246	241-S-107-07A-B	241-S-D-R2	None
SN247	241-S-107-07A	244-S-16	None
SN248	241-S-107-07A	244-S-15	None
SN249	241-S-107-07A	244-S-14	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
SN249	244-TX-A	704	None
SN264	241-UD-R5	244-U-A	None
SN265	241-UD-R4	244-U-B	None
SN266	244-U-C	Capped	None
SN275	241-C-VP-U1,U2,U3,U4,U5,U6	244-CR-U15	None
SN281	241-S-152-10	Failed	None
SN282	241-S-152-11	Failed	None
SN-283	242-S Evaporator	241-SY-02E-A	None
SN-284	242-S Evaporator	241-SY-02E-B	None
7624	244-TX-I	241-T-111	None
7624	244-TX-I	244-T-109	None
Unknown	244-AR-Tank001-T15	244-AR-Tank-004-T4	None
U039	PUREX	241-A-151-U6	None
U136	PUREX	241-A-151-U7	None
Unknown	241-A-104-04A-U1	241-A-101-01A-U1	None
Unknown	241-A-104-04A-U2	241-A-105-05C-A	None
Unknown	241-A-105-05A-U1	241-A-102-02A-U1	None
Unknown	241-A-106-06A-U1	241-A-103-03A-U1	None
Unknown	241-B-111	241-B-110	None
Unknown	241-B-112	241-B-111	None
Unknown	241-B-201	241-B-109	None
Unknown	241-BX-102	241-BX-101	None
Unknown	241-BX-103	241-BX-102	None
Unknown	241-BY-106-06D, C	241-BY-109	None
Unknown	241-BY-112	241-BY-111	None
Unknown	241-C-101	241-C-102	None
Unknown	241-C-102	241-C-103	None
Unknown	241-C-101-01B-U1	8010	None
Unknown	241-C-102-02B-U2	Line 8006	None
Unknown	241-C-103-03B-U1	241-C-Valve Pit-L6	None
Unknown	241-C-103-03B-U2	Line 8002	None
Unknown	241-C-104-04B-U2	Line 8210	None
Unknown	241-C-104-04B-U3	241-C-Valve Pit-L2	None
Unknown	241-C-10505B-U3	Capped	None
Unknown	241-C-105-05B-U2	Line 8206	None
Unknown	241-C-106-06B-U2	Line 8202	None
Unknown	241-C-108	241-C-107	None
Unknown	241-C-109	241-C-108	None
Unknown	241-C-110-U1	241-C-Valve Pit-L3	None
Unknown	241-C-111	241-C-110	None
Unknown	241-C-112	241-C-111	None
Unknown	241-C-112	241-C-Valve Pit-L5	None
Unknown	241-S-102-BB/B	Flush Pit	None
Unknown	241-S-103	Clean Out Boxes-9, 10	None
Unknown	241-S-109	Clean Out Boxes-13, 14	None
Unknown	241-S-A-L19	241-S-B-R19	None
Unknown	241-S-C-L18	241-S-D-R18	None
Unknown	241-SX-106	Clean Out Boxes-24, 25	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
Unknown	241-SX-A-L18	241-SX-B-R18	None
Unknown	241-SX-A-L19	241-SX-B-R19	None
Unknown	241-T-101	241-T-102	None
Unknown	241-T-101	241-T-102-02B-U3	None
Unknown	241-T-101-01B-U2	6010	None
Unknown	241-T-101-01B-U3	241-T-105	None
Unknown	241-T-102	241-T-103	None
Unknown	241-T-102-02B-U2	6006	None
Unknown	241-T-103-03B-U2	6002	None
Unknown	241-T-104	241-T-105	None
Unknown	241-T-105	241-T-106	None
Unknown	241-T-107	241-T-108	None
Unknown	241-T-108	241-T-109	None
Unknown	241-T-110	241-T-111	None
Unknown	241-T-111	241-T-112	None
Unknown	241-TX-117	241-TX-118	None
Unknown	241-T-201	241-T-101	None
Unknown	241-T-202	241-T-101	None
Unknown	241-T-203	241-T-101	None
Unknown	241-T-204	241-T-101	None
Unknown	241-TX-105	241-TX-106	None
Unknown	241-TX-106-06A-D	241-TX-107-07A-C	None
Unknown	241-TX-107	241-TX-108	None
Unknown	241-TX-109	241-TX-110	None
Unknown	241-TX-109-09A-C	241-TX-05A-A	None
Unknown	241-TX-110	241-TX-111	None
Unknown	241-TX-110A-A	241-TX-106-06A-C	None
Unknown	241-TX-111	241-TX-112	None
Unknown	241-TX-113	241-TX-114-14A	None
Unknown	241-TX-113	241-TX-114	None
Unknown	241-TX-114	241-TX-115	None
Unknown	241-TX-115	15-X (V615)	None
Unknown	241-TX-116	241-TX-117	None
Unknown	241-TX-117	241-TX-118	None
Unknown	241-TXR-244-Tank-002	241-TXR-244-U1-Tank-001	None
Unknown	241-TXR-244-Tank-003	241-TXR-244-U2-Tank-001	None
Unknown	241-TY-101	241-TY-102	None
Unknown	241-TY-103	241-TY-104	None
Unknown	241-TY-103-03A-A	241-TY-103-C	None
Unknown	241-TY-105	241-TY-106	None
Unknown	242-TA	242-T	None
Unknown	241-UA-L18	241-UB-R-18	None
Unknown	241-UA-L19	241-UB-R19	None
Unknown	241-UC-L18	241-UD-R18	None
Unknown	241-UC-L19	241-UD-R19	None
Unknown	241-UX-302A	291-U Stack	None
Unknown	242-B	241-B-106	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
Unknown	242-S Evaporator	241-S-103	None
Unknown	244-BXR-Tank-002-U2	244-BXR-011	None
Unknown (02C)	241-A-102-02C-U1	241-A-153-L8	None
V004	241-A-152-U2	241-A-151-L22	None
V005	241-A-152-U8	241-A-151-L21	None
V006	241-A-152-U4	241-A-151-L20	None
V007	241-A-152-U6	241-A-151-L17,L18,L19	None
V008	241-A-152-U10	241-A-151-L14,L15,L16	None
V-011	241-A-151-L7,L9	Crib	None
V-014	241-A-151-L5,L6,L11,L12	Tank 216A	None
V-016	241-A-151-L3,L4,L10	Crib	None
V021	241-A-151-L25	241-AW-A-L12	None
V022	241-A-151-L-24	241-AW-B-R12	None
V023	241-A-151-L23	241-AW-B-R11	None
V029	241-A-151-UC	241-A-151-UD	None
V031	241-A-151-UA	241-A-151-UF	None
V032	241-A-106-A-U1/103-03A-U1	241-A-152-U7	None
V038	241-A-152-L6	241-A-101	None
V039	241-A-152-L5	241-A-101	None
V040	241-A-152-L4	241-A-102	None
V041	241-A-152-L3	241-A-102	None
V042	241-A-103	241-A-152-L2	None
V043	241-A-103	241-A-152-L1	None
V044	241-A-152-L10	241-A-104	None
V045	241-A-152-L11	241-A-104	None
V046	241-A-152-L12	241-A-105	None
V047	241-A-152-L13	241-A-105	None
V048	241-A-106	241-A-152-L14	None
V049	241-A-106	241-A-152-L15	None
V050	241-A-152-L7	241-C-104	None
V051	241-A-152-L8	241-C-104	None
V052	241-A-152-L9	Capped	None
V058	241-A-152-A	241-A-152-A	None
V059	241-A-152-B	241-A-152-B	None
V060	241-A-152-C	241-A-302B/241-A-152-C	None
V061	241-A-152-L16	Capped	None
V100	241-C-151-L1	241-C-153-U9	None
V1000	241-CR-152	244-CR Vault-U14	None
V1001	241-CR-152-U4A	241-CR-153-U3A	None
V1002	241-CR-152-U6A	241-CR-153-U1A	None
V101	241-C-153	Capped	None
V101	241-C-151-L2	241-C-104-04A-U4	None
V102	241-C-101	241-C-151-L4	None
V103	241-C-105	241-C-151-L3	None
V104	241-C-101	241-C-151-L5	None
V105/8636	241-C-151-L6	241-CR-151-U1	None
V107	241-C-252-U4	241-C-151-L8	None
V108/812	241-C-151-U1	244-AR-Tank-002-T9	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
V109	241-C-151-U2	241-A-101	None
V110	241-C-151-U3	244-CR Vault-U12	None
V113	241-C-151	241-AX-101-01A	None
V113	241-C-151	241-AX-103-03A-1	None
V115	241-C-105-05A-U8	241-C-152-L1	None
V118	241-C-152-L4	241-C-153-U6	None
V119	241-C-152-L5	241-C-153-U5	None
V120	241-C-152-L6	241-C-153-U4	None
V121	241-C-152	Capped	None
V122	241-C-105-05A-U4	241-C-152-L8	None
V130	241-B-154-L8	241-C-152-U4	None
V136	241-C-153-L1	None Identified	None
V137	241-C-153-L2	241-C-110	None
V138	241-C-110	241-C-153-L3	None
V139	241-C-110	241-C-153-L4	None
V140	241-C-110	241-C-153-L5	None
V141	241-C-153-L6	Capped	None
V142	241-C-153-L7	Capped	None
V143	241-C-107	241-C-153-L8	None
V144	241-C-107	241-C-153-L9	None
V145	241-C-107	241-C-153-L10	None
V147	241-C-153-L1`2	None Identified	None
V148	241-C-104	241-C-153-L13	None
V149	241-C-104	241-C-153-L14	None
V150	241-C-104	241-C-153-L15	None
V156	241-C-201	241-C-252-L1	None
V157	241-C-201	241-C-252-L2	None
V158	241-C-202	241-C-252-L3	None
V159	241-C-202	241-C-252-L4	None
V160	241-C-203	241-C-252-L5	None
V161	241-C-203	241-C-252-L6	None
V162	241-C-204	241-C-252-L7	None
V163	241-C-204	241-C-252-L8	None
V172	241-C-252-U1	241-C-109/241-C-112	None
V175	241-C-252-U5	201-C Hot Semi Works	None
V200	241-B-154-U7	221-B	None
V2000	241-BXR-152-U1A	241-BX-155-L9	None
V2001	241-BX-155-L10	241-BR-152-U1A	None
V201	241-B-154-U8	241-B-302B Catch Tank	None
V203	241-B-154-L2	Crib	None
V204	241-B-154-L3	Sump	None
V208	241-B-154-L7	241-B-152-U6	None
V209	241-B-154-L9	241-B-152-U5	None
V210/V111	241-B-154-L10	241-C-151-U4	None
V211	241-B-154-L11	241-B-152-U4	None
V213	241-B-154-L13	241-B-151-U4	None
V214/8902	241-B-154-L14	221-B	None
V215	241-B-154-L15	241-B-151-U3	None
V219	241-ER-151-L2	Capped	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
V225	241-B-151-U1	241-ER-151-L10	None
V228	241-CR-153-U6A	241-ER-153-7	None
V230	241-B-153-U1	241-B-151-L1	None
V231	241-B-153-U8	241-B-151-L2	None
V233	241-B-151-L4	241-B-101	None
V234	241-B-151-L5	241-B-101	None
V235	241-BX-153-U3	241-B-151-L6	None
V236	241-BX-153-U11	241-B-151-L7	None
V237	241-B-151-L8	241-BX-101	None
V238	241-B-151/B-153/B-252 Drains	241-B-301B Catch Tank	None
V240	241-B-152-U3	241-B-151-U5	None
V242	241-BX-153-U4	241-B-152-L1	None
V243	241-V-252-U6	241-B-152-L2	None
V244	244-CR Vault	241-ER-153	None
V245	241-B-153-U6	241-B-153-L4	None
V246	241-B-153-U5	241-B-152-L5	None
V247	241-B-153-U4	241-B-153-L6	None
V250	241-B-152-L11	241-B-106	None
V252	241-BX-153-U6	241-B-152-L11	None
V253	241-BX-153-U5	241-B-152	None
V260	241-B-153-L2	241-B-111	None
V261	241-B-153-L3	241-B-110	None
V262	241-B-153-L4	241-B-110	None
V263	241-B-153-L5	241-B-110	None
V266	241-B-153-L8	241-B-107	None
V267	241-B-153-L9	241-B-107	None
V268	241-B-153-L10	241-B-107	None
V271	241-B-153-L13	241-B-104	None
V272	241-B-153-L14	241-B-104	None
V273	241-B-153-L15	241-B-104	None
V282	241-BX-155-U2	241-BX-154-L3	None
V283	241-BX-155-U3	241-BX-154-L4	None
V284	241-BX-155-U4	241-BX-154-L5	None
V285	241-BX-154-L6	241-B-252-U5	None
V289	241-BX-154-U9	241-BX-302B	None
V290	241-BX-201	241-B-252-L1	None
V291	241-BX-201	241-B-252-L2	None
V292	241-BX-202	241-B-252-L3	None
V293	241-BX-202	241-B-252-L4	None
V294	241-BX-203	241-B-252-L5	None
V295	241-BX-203	241-B-252-L6	None
V296	241-BX-204	241-B-252-L7	None
V297	241-BX-204	241-B-252-L8	None
V305	241-B-252-L16	241-BY-109	None
V307	242-B-151-L1	241-B-108	None
V308	242-B-151-L2	241-B-109	None
V309	242-B-151-L3	241-B-107	None
V310	242-B-151-L4	241-B-105	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
V311	242-B-151-L5	241-B-104	None
V312	241-B-104	241-B-151-Drain	None
V313	242-B-151-U1	242-B Evaporator	None
V314	242-B Evaporator	Cut and Capped	None
V315	241-BX-155-L2	241-B-151-U6	None
V316	241-BX-153-U9	241-BX-155-L3	None
V317	241-BX-153-U8	241-BX-155-L4	None
V318	241-BX-153-U7	241-BX-155-L5	None
V319	241-BX-155-L6	241-B-152-U2	None
V323	241-BX-155-U7	241-BX-302C	None
V329	241-B-154-U1	221-B	None
V330	241-B-154-U2	221-B	None
V331	241-B-154-U3	221-B	None
V332	241-B-154-U4	221-B	None
V333	241-B-154-U5	221-B	None
V334	241-B-154-U6	221-B	None
V335	221-B	241-BX-154-U1	None
V336	241-BX-154-U2	221-B	None
V337	241-BX-154-U3	221-B	None
V338	241-BX-153-U12	241-B-302A	None
V339	241-BX-154-U5	221-B	None
V340	241-BX-154-U6	221-B	None
V341	241-BX-154-U7	221-B	None
V342	241-BX-110	241-BX-153-L4	None
V342	241-BX-154-U8	221-B	None
V343	241-BX-110	241-BX-153-L5	None
V344	241-BX-110	241-BX-153-L6	None
V345	241-BX-109	241-BX-153-L11	None
V346	241-BX-107	241-BX-153-L8	None
V347	241-BX-107	241-BX-153-L9	None
V348	241-BX-107	241-BX-153-L10	None
V349	241-BY-104	241-BX-153-L12	None
V350	241-BX-112	241-BX-153-L7	None
V351	241-BX-104	241-BX-153-L13	None
V352	241-BX-104	241-BX-153-L14	None
V353	241-BX-104	241-BX-153-L15	None
V355	241-BX-101	241-BX-153-L17	None
V365	241-ER-151-U8	Flow meter Box	None
V374	241-UX-154-U6*	221-U	None
V375	241-UX-154-U9*	241-TX-155-U17	None
V376	241-UX-154-U10*	241-TX-155-U15	None
V382	241-UX-154-L3*	241-TX-155-U11	None
V383	241-TX-154-L7	Capped	None
V384	241-TX-154-7	Capped	None
V385	241-TX-154-L7	Capped	None
V386	241-TX-155-L8	Capped	None
V388	241-TX-155-U12	Capped	None
V391	241-TX-154-L3	241-TX-155-U16	None
V392	241-TX-154-L2	241-TX-155-U18	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
V393	241-TX-302B	241-TX-155-U19	None
V394	241-TX-155-A1	241-TX-155-A2	None
V395	241-TX-155-B1	241-TX-155-B2	None
V396	241-TX-155-L2	241-TX-153-U15	None
V397	241-TX-155-L4	241-TX-153-U14	None
V399	241-T-152-U7	241-TX-155-U6	None
V401	241-TX-155-L8	241-TX-153-U12	None
V402	3241-TX-155-L9	Capped	None
V403	241-TX-155-L10	241-TX-153-U11	None
V405	241-T-152-U3	241-TX-155-L12	None
V406	241-TX-155-L13	Capped	None
V407	241-TX-155-L14	241-TX-153-U6	None
V487	241-U-201	241-U-252-L1	None
V408	241-TX-155-L15	Capped	None
V408	244-TX-0	241-TX-152 Drain	None
V409	241-TX-155-L16	241-TX-153-U4	None
V410	241-TX-155-L17	Capped	None
V410	241-U-151-U2	241-TX-155-L17	None
V411	241-T-151-U2	241-TX-155-L18	None
V412	241-TX-155-L19	Blocked	None
V413	241-TX-155-L20	241-TX-153-U3	None
V416	241-U-152-U1	241-TX-153-U10	None
V426	241-U-152-L4	241-U-153-U6	None
V427	241-U-152-L5	241-U-153-U5	None
V428/V461	241-U-152-L6	241-U-153-U4	None
V450	241-U-153-U9	241-U-151-L1	None
V445	241-U-151-U1	241-T-151-L6	None
V458	241-U-153-U1	240-S-151-L9	None
V459	241-U-153-U2	240-S-151-L15	None
V460	241-U-153-U3	240-S-151	None
V465	241-U-153-L3	241-U-110	None
V466	241-U-153-L4	241-U-110	None
V467	241-U-153-L5	241-U-110	None
V470	241-U-153-L8	241-U-107	None
V471	241-U-153-L9	241-U-107	None
V472	241-U-153-L10	241-U-107	None
V473/5107/5507/5307	241-U-153-L11	241-UR-154-L8/-UR-153-L8/UR-152-L8	None
V488	241-U-201	241-U-252-L2	None
V489	241-U-202	241-U-252-L3	None
V490	241-U-202	241-U-252-L4	None
V491	241-U-203	241-U-252-L5	None
V492	241-U-203	241-U-252-L6	None
V493	241-U-204	241-U-252-L7	None
V494	241-U-204	241-U-252-L8	None
V5006	241-S-104-04A	241-S-107-07A	None
V508	240-S-151-L17	241-S-151-U6	None
V509	240-S-151-L16	241-S-151-U7	None
V512	240-S-151-L13	241-S-151-U10	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
V513	240-S-151-L12	241-S-151-U11	None
V514	240-S-151-L6/241S-151-U12	Capped	None
V515	240-S-151-L9	241-S-151-U14	None
V516	240-S-151-L7	241-S-151-U15	None
V517	240-S-151-L5	Capped	None
V517	241-S-151-U16	REDOX Lab Waste	None
V519	240-S-151-L2	241-S-151-U18	None
V526	241-SX-151-U13	241-S-151-L4	None
V527	241-SX-151-U10	241-S-151-L5	None
V528	241-SX-151-U8	241-S-151-L6	None
V529	241-SX-151-U6	241-S-151-L7	None
V530	241-SX-151-U4	241-S-151-L5	None
V533	241-S-151-L11	Crib	None
V534	241-S-110	241-S-151-L12	None
V535	241-S-110	241-S-151-L13	None
V536	241-S-107	241-S-151-L14	None
V537	241-S-107	241-S-151-L15	None
V538	241-S-104	241-S-151-L16	None
V539	241-S-104	241-S-151-L17	None
V541	241-S-101/101 S Caisson	241-S-151-L19	None
V542	241-S-304	241-S-151	None
V543	241-S-304	241-S-151	None
V544	240-S-151-L1	216-S Swamp	None
V547	240-S-151-L8	216-S Crib	None
V548	240-S-151-L10	V544/216 S Swamp	None
V550	240-S-151	V544/216-S Swamp	None
V552	240-S-151-U3	240-S-152-L2	None
V553	240-S-151-U8	240-S-142-L3	None
V554	240-S-151-L12	241-S-302-CT	None
V555	240-S-152-L1	240-S-151-U17	None
V563	241-SX-151-U1	241S-302A	None
V564	241-SX-151-U11	241-SX-151-U2	None
V566	241-SX-151-U9	241-SX-151-U5	None
V567/V581	241-SX-151-U7	241-SX-152	None
V569	241-SX-302-A	241-SX-151-L1	None
V570	241-SX-110	241-SX-151-L2	None
V571	241-SX-111	241-SX-151-L2	None
V572	241-SX-112	241-SX-151-L4	None
V574	241-SX-109	241-SX-151-L6	None
V575	241-SX-108	241-SX-151-L7	None
V576	241-SX-107	241-SX-151-L8	None
V577	241-SX-151-L9	241-SX-152	None
V578	241-SX-101	241-SX-151-L10	None
V579	241-SX-102	241-SX-151-L11	None
V580	241-SX-103-03	241-SX-151-L12	None
V582	241-SX-106	241-SX-151-L14	None
V583	241-SX-105	241-SX-151-L15	None
V584	241-SX-104	241-SX-151-L16	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
V591	241-SX-114	241-SX-151-L23	None
V595	241-SX-302-A	241-SX-152	None
V596	241-TX-153-U1	241-TX-302A	None
V597	241-TY-153-L1	241-TX-153-U2	None
V600	241-TXR-152-U14	241-TXR-153-U14/241-TX-153-U8	None
V6002	241-TR-152-U13	241-T-103-03A-U1	None
V6006	241-TR-152-U12	241-T-102-02A-U1	None
V601	241-T-152-L10	241-TX-153-U9	None
V6010	241-TR-152-L11	241-T-101-01A-U1	None
V603	241-TX-153-A1	241-TX-153-A2	None
V604	241-TX-153-B1	241-TX-153-B2	None
V606	241-TX-153-C2	219-1 Crib	None
V608	241-TX-101	241-TX-153-L2	None
V609	241-TX-101	241-TX-153-L3	None
V610	241-TX-153-L4	242-T Evaporator	None
V612	241-TX-105	241-TX-153-L6	None
V613	241-TX-105	241-TX-153-L7	None
V615	241-TX-115/15-X	241-TX-153-L9	None
V616	241-TX-118	241-TX-153-L10	None
V617	241-TX-107	241-TX-153-L11	None
V618	241-TX-109	241-TX-153-L12	None
V619	241-TX-109	241-TX-153-L13	None
V621	241-TX-113	241-TX-153-L15	None
V622	241-TX-113	241-TX-153-L16	None
V625	241-TX-116	241-TX-153-L19	None
V644	241-TY-103	241-TY-153-L7	None
V645	241-TY-103	241-TY-153-L8	None
V648	241-TY-101	241-TY-153-L11	None
V649	241-TY-101	241-TY-153-L12	None
V653	241-T-151-U3	221-T	None
V654	241-T-151-U4	221-T	None
V657	241-T-151-L1	241-T-153-U1	None
V658	241-T-151-L2	241-T-153-U8	None
V660	241-T-101	241-T-151-L4	None
V661	241-T-101	241-T-151-L5	None
V663	241-T-151-L8	Crib	None
V664	241-T-151/241-T-152/241-T-153	241-T-302B	None
V667	241-T-152-U4	221-T	None
V668	241-T-152-U5	221-T	None
V669	241-T-152-U6	221-T	None
V671	241-T-152-U9	224-T	None
V675	241-T-153-U5	241-T-152-U4	None
V676	241-T-153-U6	241-T-152-U5	None
V677	241-T-152-L6	241-T-153-U4	None
V690	241-T-110	241-T-153-L2	None
V691	241-T-110	241-T-153-L4	None
V692	241-T-110	241-T-153-L5	None

Inactive/Not-In-Use Components

Piping Transfer Lines			
Line Number	**Connecting Facility**	**Connecting Facility**	**LDM or BMP**
V695	241-T-107	241-T-153-L8	None
V696	241-T-107	241-T-153-L9	None
V697	241-T-107	241-T-153-L10	None
V698	241-T-106	241-T-153-L11	None
V699	241-T-105	241-T-153-L12	None
V700	241-T-104	241-T-153-L13	None
V701	241-T-104	241-T-153-L14	None
V702	241-T-104	241-T-153-L15	None
V707	221-T-Section 10	Unknown	None
V711	241-T-201	241-T-252-L1	None
V712	241-T-201	241-T-252-L2	None
V713	241-T-202	241-T-252-L3	None
V714	241-T-202	241-T-252-L4	None
V714	PUREX-F16	241-AR-151-2	None
V715	241-T-203	241-T-252-L5	None
V716	241-T-203	241-T-252-L6	None
V716	241-U-301-B	244-U Vault-E	None
V717	241-T-204	241-T-252-L7	None
V718	241-T-204	241-T-252-L8	None
V718/817	241-AR-151-10	244-AR Vault-T-15	None
V727	241-T-301-B	241-T-252 Drain	None
V730	221-T	241-TX-154-U1	None
V732	221-T	241-TX-154-U2	None
V734	221-T	241-TX-154-U4	None
V735	221-T	241-TX-154-U5	None
V736	241-TX-154-L6	291-5 STACK	None
V737	221-T	241-TX-154-U7	None
V738	221-T	241-TX-154-U8	None
V739	241-TX-154-U9	241-TX-302C Catch Tank	None
V743	221-B	241-C-154	None
V762/4853	241-SX-152	241-UX-154-L9	None
V827	241-TX-113	241-T-151-L2	None
V831	241-TX-114/TX-14B Valve Pit	242-T-151-L1	None
V839	241-C-154	201-C Hot Semi Works	None
V843	241-C-102	241-CR-151-L9	None
V844	241-C-102	241-CR-151-L8	None

APPENDIX B

RATIONALE AND JUSTIFICATION FOR IMPLEMENTING REQUIREMENTS AND BEST MANAGEMENT PRACTICES

This page intentionally left blank.

CONTENTS

B1.0 INTRODUCTION B-1

B2.0 SINGLE-SHELL TANK SYSTEM LEAK LOSS RISK REDUCTION B-3
- B2.1 LIQUID MINIMIZATION AND CONTROL B-4
- B2.2 CONTAMINATION MIGRATION MITIGATION B-6
- B2.3 OPERATIONAL RISK EVENT MITIGATION B-7
  - B2.3.1 Waste Conditions that Lead to Leaks B-7
  - B2.3.2 Modified Waste Management Practices B-8

B3.0 LEAK DETECTION AND LIQUID INTRUSION MONITORING B-9
- B3.1 SINGLE-SHELL TANKS B-27
- B3.2 MISCELLANEOUS UNDERGROUND STORAGE TANKS B-29
- B3.3 VESSELS AND CELLS IN MISCELLANEOUS STRUCTURES B-30

B4.0 REFERENCES B-33

TABLES

Table B-1. Current Liquid in the Single-Shell Tank System B-4

Table B-2. Schedule and Status for Interim Stabilization of Single-Shell Tanks B-5

Table B-3. Surface Level In-Tank Liquid Detection Instrumentation B-9

Table B-4. Summary of Leak Detection Requirements and Bases B-15

Table B-5. Single-Shell Tanks Not Meeting Interim Stabilization Criteria B-27

Table B-6. Single-Shell Tanks with Suspect Integrity Requiring Periodic Monitoring B-28

Table B-7. Single-Shell Tanks Requiring Intrusion Monitoring B-29

Table B-8. Vessels in Miscellaneous Structures Requiring Leak Detection and Monitoring B-30

Table B-9. Vessels in Miscellaneous Structures not Requiring Leak Detection and Monitoring B-31

Table B-10. Vessels in Miscellaneous Structures with Unknown Liquid Volumes B-31

This page intentionally left blank.

ABBREVIATIONS AND ACRONYMS

BMP	best management practice
CFR	*Code of Federal Regulations*
DOE	U.S. Department of Energy
DST	double-shell tank
Ecology	Washington State Department of Ecology
HFFACO	*Hanford Federal Facility Agreement and Consent Order*
LDM	leak detection and monitoring
MUST	miscellaneous underground storage tank
ORP	Office of River Protection
RCRA	*Resource Conservation and Recovery Act of 1976*
SST	single-shell tank
WAC	*Washington Administrative Code*
WMA	waste management area

This page intentionally left blank.

APPENDIX B

RATIONALE AND JUSTIFICATION FOR IMPLEMENTING REQUIREMENTS AND BEST MANAGEMENT PRACTICES

B1.0 INTRODUCTION

This appendix outlines the rationale and justification for the single-shell tank (SST) system leak detection and monitoring (LDM) implementing requirements defined in Section 4.0, "Leak Detection and Monitoring Functions and Requirements," and the non-leak detection monitoring best management practices (BMPs) identified in main text Section 5.0, "Current Single-Shell Tank System Monitoring." The implementing requirements address LDM parameters for SSTs, miscellaneous underground storage tanks, vessels and cells in miscellaneous structures, pits, and piping. The requirements were developed based on regulatory and technical analyses (e.g., limits of LDM technology, operational status of system components). The BMPs were developed based on technical analyses and implementing operational practices that meet the goal of operating the tank farms in a manner that is protective of human health and the environment.

For the past 25 years, the U.S. Department of Energy (DOE) has worked to significantly mitigate risks posed by liquids stored in the Hanford Site SST system. These efforts have included the following:

- Removing drainable liquids from the SSTs with a scheduled completion in 2004.
- Ending waste additions to the SSTs in 1980.
- Resolving high-heat and other safety issues that posed risks to the integrity of the tanks.
- Transferring more than 2 million gallons of waste from SSTs to safer storage in double-shell tanks (DSTs).
- Isolating tanks from the potential of liquid intrusions from surrounding tank systems (e.g., water lines, pipes) and minimizing infiltration of liquids from the natural environment into the soils surrounding the tanks.

Work to minimize the potential for leak loss has been augmented by efforts to monitor the nature and extent of contamination previously leaked to the environment through drywell monitoring of soil conditions and groundwater monitoring via a network of *Resource Conservation and Recovery Act of 1976* (RCRA) groundwater monitoring wells. The proposed approach to monitoring for future releases from SSTs and associated ancillary equipment has been adopted to fill gaps in the current liquid monitoring system based on the current condition of the SST system and to meet current regulatory requirements identified in the main text, Section 4.0.

This page intentionally left blank.

B2.0 SINGLE-SHELL TANK SYSTEM LEAK LOSS RISK REDUCTION

The risk posed by liquids in the SST system has been, and will continue to be, significantly mitigated. The following sections outline action taken to:

- Minimize and control liquid waste in the SST system,
- Mitigate the potential for contaminant migration from past and future SST system leaks,
- Reduce potential for an operational condition that would result in a leak event, and
- Monitor and detect past and future leaks from the SST system.

The SSTs and their associated ancillary equipment are treatment, storage, and disposal units as defined in "Dangerous Waste Regulations" (*Washington Administrative Code* [WAC] 173-303). The DOE and the Washington State Department of Ecology (Ecology) concur that the SST systems do not have secondary containment and other features required under RCRA and cannot be brought into compliance with WAC 173-303-640. Due to the noncompliance of the SST system tank farms (i.e., tanks and ancillary equipment) are regulated under a Part A interim status permit as defined in WAC 173-303-400 (interim status facility standards). Under Part A regulations, known and suspected releases from 67 of the 149 SSTs have been reported to Ecology and DOE has responded to the reported leak events in accordance with response actions to leaks or spills per WAC 173-303-640. The DOE response actions have been negotiated with Ecology and included in milestones in the *Hanford Federal Facility Agreement and Consent Order* (HFFACO) (Ecology et al. 1989). A response to leaks has not been limited to the 67 assumed leakers. The same response actions have been applied to all 149 SSTs. The following are actions that have been taken to meet those requirements.

- In 1980, DOE completed "cessation of use" of all SSTs (i.e., leakers and nonleakers). Cessation of use included preventing "flow or addition of wastes" to the SST system.
- In 2004, based on consent decree CT-99-5076-EFS, DOE will have completed removal of "as much of the waste as is necessary to prevent further release of dangerous waste to the environment" (interim stabilization to remove drainable liquids that posed a leak potential and intrusion prevention to limit the potential for new liquids to enter stabilized SSTs). While WAC 173-303 requires removal of waste from SSTs with leaks, DOE and Ecology agreed that all SSTs would have liquid waste removed to the extent practical and actions would be taken to limit the potential for liquid intrusion into SSTs to mitigate the potential for further releases to the environment.
- The DOE has implemented a RCRA Corrective Action Process, as defined in HFFACO, Section 7.0, to comply with requirements defined in WAC 173-303-640 for investigation of past tank leaks and implementation of corrective measure, where appropriate, to "avoid or limit additional releases, or to control subsurface movement of contaminants to minimize additional insult to human health and the environment from SST waste," including isolating water lines and constructing berms to control stormwater runoff. The RCRA Corrective Action Process is addressing past tank leaks and spills from tanks and ancillary equipment in the S, SX, T, TX, TY, B, BX, and BY tank farms.

- The DOE is completing initial interim measures to "Prevent further migration of the leak or spill to soils or surface water." These initial interim measures are "designed to minimize intrusion and contaminant migration to groundwater" (HFFACO Change Number M-45-98-03). By the end of 2002, DOE will have completed disconnecting waterlines and testing waterlines, completed placement of berms and run-on controls at all tank farms, and placed leak-tight caps on drywells.
- The DOE has agreed to a schedule that will result in the "removal of waste from tank system or secondary containment system" as soon as practical (under HFFACO Milestone M-45-00).

B2.1 LIQUID MINIMIZATION AND CONTROL

Interim stabilization efforts have reduced the risk of liquid releases from SSTs by reducing the volume of drainable liquid waste in the SST system and limiting the potential for liquid intrusions into the SST system. From an estimated inventory of 74 million gallons of waste in SSTs in 1967, the total waste volume stored in the SST system has been reduced to just over 35 million gallons of liquid and solid waste. Interim stabilization efforts have reduced the drainable liquids in SSTs to an estimated 4.833 million gallons as of August 31, 2002. Currently, the SSTs contain approximately 99.29% of the total liquid volume stored in the entire SST system. Table B-1 presents the current liquid inventory in the various components of the SST system.

Table B-1. Current Liquid in the Single-Shell Tank System

SST System Component	Liquid Waste Volume (gal)	Percent
SSTs	4,833,000	99.29%
MUSTs	12,912	0.27%
Miscellaneous Structures	21,634	0.44%
At-Tank Pits	0	0.00%
Between-Tank Pits	0	0.00%
Transfer Lines	0	0.00%
Total	**4,867,546**	**100.00%**

Adapted from HNF-EP-0182, Rev. 173.

MUST = miscellaneous underground storage tank
SST = single-shell tank

Interim stabilization refers to the removal and transfer of pumpable liquids (i.e., the supernate plus the amount of interstitial liquid capable of being pumped) from SST system components (i.e., SSTs, miscellaneous underground storage tanks [MUST], and ancillary tanks) to DSTs. An SST is considered interim stabilized if it contains less than 50,000 gallons of drainable interstitial liquids, less than 5,000 gallons of supernate, and the measured maximum pumpout rate is less than 0.05 gallons per minute if jet pumping is used (Consent Decree CT-99-5076-EFS).
A MUST or ancillary tank is considered interim stabilized if it contains less than 400 gallons of

liquids or less than 5,000 gallons of supernate that cannot be transferred by tanker truck (HNF-IP-0842, Volume 4, Section 4.1, Rev. 3c).

The interim stabilization program for Hanford Site SSTs began with the pumping of Tank BY-107 that achieved interim stabilization in August 1979. Tanks A-104, BX-101, and SX-115 were the first SSTs to be declared interim stabilized in September 1978 (WHC-EP-0182, Rev. 79). Each month, a waste tank summary report is issued that declares the current status of all waste tanks. Tables in that report list the completion dates and stabilization method for each of the interim stabilized SSTs, as well as the schedule to complete interim stabilization activities for the remaining SSTs (Table B-2).

Single-shell tank interim stabilization milestones were renegotiated in 1999 and were identified in a Consent Decree (CT-99-5076-EFS) between the State of Washington, Ecology, and the DOE, dated August 16, 1999. According to the Consent Decree, all interim stabilization activities for SSTs are to be completed by September 30, 2004.

Table B-2. Schedule and Status for Interim Stabilization of Single-Shell Tanks (1 Sheets)

Tank Designation	Pumping Start Date	Interim Stabilization Date
T-104	March 24, 1996	November 19, 1999
T-110	May 12, 1997	January 5, 2000
SX-104	September 26, 1997	April 26, 2000
SX-106	October 6, 1998	May 5, 2000
S-102	March 18, 1999	--
S-106	April 16, 1999	February 1, 2001
S-103	June 4, 1999	April 18, 2000
U-103	September 26, 1999	September 11, 2000
U-105	December 10, 1999	March 29, 2001
U-102	January 20, 2000	June 19, 2002
U-109	March 11, 2000	April 5, 2002*
A-101	May 6, 2000	--
AX-101	July 29, 2000	--
SX-105	August 8, 2000	August 1, 2002
SX-103	October 26, 2000	--
SX-101	November 22, 2000	--
U-106	August 24, 2000	March 9, 2001
BY-106	July 11, 2001	--
BY-105	July 11, 2001	--
U-108	December 2, 2001	--
U-107	September 29, 2001	--
S-111	December 18, 2001	--
SX-102	December 15, 2001	--

Table B-2. Schedule and Status for Interim Stabilization of Single-Shell Tanks (1 Sheets)

Tank Designation	Pumping Start Date	Interim Stabilization Date
U-111	June 14, 2002	--
S-109	September 23, 2000	June 11, 2001
S-112	September 21, 2002	--
S-101	July 27, 2002	--
S-107	September 4, 2002	--
C-103	November 29, 2002	--

*Formal declaration of completion of interim stabilization has not yet taken place.

Of the 149 SSTs, 132 have completed interim stabilization. The interim stabilization of SSTs milestones were created to:

- Stabilize tanks posing the greatest environmental risk first;
- Accelerate the interim stabilization schedule to be completed by September 30, 2004, and 98% of the remaining pumpable liquid removed by September 30, 2003; and
- Increase funding commitments to ensure timely interim stabilization.

Since 1980, DOE has prohibited the intentional addition of new liquid wastes to the SST system. The DOE has also implemented intrusion prevention actions to limit the potential for intrusion of liquids into the interim stabilized tanks. Intrusion prevention is accomplished through isolation of the tank from risers, pipes, pits, cells, vaults and other engineered systems in a manner that will withstand the pressure of 12 inches of water (HNF-IP-0842, Volume 4, Section 4.2, Rev. 0e).

Intrusion prevention has been completed on 108 of the interim stabilized SSTs, and another 40 SSTs have been partially isolated (i.e., risers and other engineered systems needed to support future interim stabilization actions are not sealed) (HNF-EP-0182, Rev. 173).

Of the seven SST system MUSTs, two have been interim stabilized or meet interim stabilization criteria. The MUSTs currently contain a total known liquid volume of 12,912 gallons (0.27% of the total liquid volume in the SST system).

In addition to the SSTs and MUSTs, ancillary vessels and cells in miscellaneous structures account for an additional 21,634 gallons of known liquid volume or 0.44% of the total SST system liquids.

B2.2 CONTAMINATION MIGRATION MITIGATION

The risk of released contamination migrating in the soils surrounding SSTs to groundwater has been reduced, limiting the potential of environmental and human health consequences from past and future leak events. Past leaks from approximately 67 tanks have resulted in about 1 million gallons of released waste within the tank farms. Recent analysis in support of the waste management area (WMA) S-SX field investigation report has demonstrated that migration of tank leaks has been enhanced by tank farm operations and physical conditions (RPP-7884). To address this condition, initial interim measures have been adopted by the Office of River

Protection (ORP) to limit migration of past tank releases. These same initial interim measures would limit the potential migration of future release from the tanks during waste storage and management. Initial interim measures are mitigating measures that can be performed without the need of a formal regulatory process. The Tank Farm Vadose Zone Project has performed the following initial interim measures.

- Leak-tight capping of boreholes. Because boreholes are in active WMAs, their caps often break because of accidents. All borehole caps were replaced in 1999.
- Cutting off waterlines and leak testing mission essential waterlines. Leaking waterlines can have a major impact on the transport of contaminants from past tank leaks and spills in the tank farms (RPP-7884). All waterlines going to the SST farms have been classified based on their potential future use. All unnecessary waterlines in the 200 West Area have been cut and capped outside of the tank farm fence lines. The same processes are being conducted at the 200 East tank farms and should be completed by December 2002.
- Constructing upgradient run-on controls for the tank farms. There have been many instances when ponds of water have been standing in the tank farms. This has been caused by water running onto the tank farms following rapid snowmelts and other events. Barriers (essentially berms) have been constructed around the SST farms where the natural topography does not provide a barrier to water run-on. All tank farm changes to control run on should be completed in December 2002.

B2.3 OPERATIONAL RISK EVENT MITIGATION

The probability of a new leak loss event during tank farm operations has been mitigated. The following sections outline actions that have been taken to mitigate the potential for a new tank leak resulting from waste operating and management practices.

B2.3.1 Waste Conditions that Lead to Leaks

Storage of high-heat waste in aging SSTs was among the operating and management practices that contributed to the occurrence of tank leaks. For example, in the 1950s and 1960s five tanks experienced bulged bottoms attributable to expansion and compromise of the steel liner bottom resulting from the addition of boiling wastes to the tanks. One additional tank also experienced a bulge from unknown causes. A cesium and strontium capsule program removed heat-generating cesium and strontium from the tank waste for safer storage. Excessive heat in the tanks has been associated with five SSTs experiencing bulging bottoms resulting in leaks. The waste in the capsule program was either retrieved from tanks or extracted from the waste at the processing facilities enroute to the tanks. The majority of the strontium was removed from tank waste sludges in eight tanks in the A and AX tank farms. Cesium, which is relatively soluble in the waste liquid, was recovered from numerous tanks. Removing the cesium and strontium reduced the heat generation in the tanks and provided for safer storage of the remaining waste. The cesium and strontium were converted to chloride and fluoride salts, respectively, and encapsulated for storage. The retrieval and processing activities started in 1967 and lasted until 1985.

Radioactive decay of the high-level radioactive waste sludge in Tank C-106 resulted in excessive heat buildup. Beginning in mid-1971, water was added periodically to keep the sludge wet and

to reduce the heat by evaporative cooling. This continuous addition of water raised concerns that the old SST could leak radioactive waste into the underlying soil. Over 95% of the sludge in the tank was removed in 1999, eliminating the high-heat safety concern. This retrieval campaign also demonstrated the capability to operate waste retrieval systems under modern safety and operating requirements.

Through the late 1980s and early 1990s, there was widespread concern surrounding the safety of SSTs. A tank Watch List was created in response to a 1990 public law known as the Wyden Amendment (Public Law 101-510, Section 3137 [1990]). The list represented those tanks that may have serious potential for release of radioactive waste to the environment because of increases in temperature or pressure. The safety issues were resolved and the last of the 54 Watch List tanks were removed from the list in 2001, mitigating the potential for accident conditions that could result in a leak loss event.

B2.3.2 Modified Waste Management Practices

The ORP has improved Hanford Site tank farm waste transfer systems to minimize the potential for leak losses during waste transfer operations. Among the improvements: construction of a modern, cross-site transfer line that complies with current regulations and is capable of transferring waste from the 200 West Area to the 200 East Area and eventual waste treatment and immobilization. The new transfer lines replaced six transfer lines that were 45 years old and single-walled. At least four of the six old transfer lines had either plugged or leaked over the years. The ORP also has relied on modern aboveground, temporary, hose-in-hose transfer lines to transfer waste from SSTs to DSTs during interim stabilization. Use of the hose-in-hose transfer lines limits use of aged underground pipes (many of which have leaked or are not double-walled) and hence reduces the likelihood to leak waste to the environment when carrying liquid waste.

B3.0 LEAK DETECTION AND LIQUID INTRUSION MONITORING

Single-shell tanks are subject to leak detection and liquid intrusion monitoring as described in this section. The basis for requirements for LDM for SST components is provided in this section.

B3.1 LIQUID INTRUSION MONITORING

Intrusions are detected using the same devices and instruments used for detecting leaks. However, with intrusions the system is set up to detect liquid level increases rather than decreases. The only difference between leak detection and liquid intrusion detection is that the surface level device can always be used for intrusion detection, even on a dry surface. While the dry surface will not decrease in response to a leak, it will register an increase if a large enough intrusion occurs. Once a liquid surface is re-established, the gauge will show a continued increase, and the intrusion will be detected. Table B-3 shows all surface level equipment installed and the comments indicate which gauges are currently used for intrusion detection only.

Table B-3. Surface Level In-Tank Liquid Detection Instrumentation (1 Sheets)

Tank	Surface Level Gauge	LOW Installed?	Comments
A-101	E	Yes	Dry surface, ENRAF™ used for intrusion only
A-102	E	--	Dry surface, ENRAF™ used for intrusion only
A-103	E	Yes	Dry surface, ENRAF™ used for intrusion only
A-104	E	--	Dry surface, ENRAF™ used for intrusion only
A-105	E	--	Dry surface, ENRAF™ used for intrusion only
A-106	E	Yes	Dry surface, ENRAF™ used for intrusion only
AX-101	E	Yes	Dry surface, ENRAF™ used for intrusion only
AX-102	E	--	Dry surface, ENRAF™ used for intrusion only
AX-102	E	--	Dry surface, ENRAF™ used for intrusion only
AX-103	E	Yes	Dry surface, ENRAF™ used for intrusion only
AX-104	E	--	Dry surface, ENRAF™ used for intrusion only
B-101	E	Scheduled under M-23-25	Dry surface, ENRAF™ used for intrusion only
B-102	E	--	--
B-103	E	--	Dry surface, ENRAF™ used for intrusion only
B-104	E	Yes	Dry surface, ENRAF™ used for intrusion only
B-105	E	Yes	Dry surface, ENRAF™ used for intrusion only
B-106	E	--	--
B-107	E	Scheduled under M-23-25	Dry surface, ENRAF™ used for intrusion only

Table B-3. Surface Level In-Tank Liquid Detection Instrumentation (1 Sheets)

Tank	Surface Level Gauge	LOW Installed?	Comments
B-108	E	Scheduled under M-23-25	Dry surface, ENRAF™ used for intrusion only
B-109	E	Scheduled under M-23-25	Dry surface, ENRAF™ used for intrusion only
B-110	E	Yes	Dry surface, ENRAF™ used for intrusion only
B-111	E	Yes	Dry surface, ENRAF™ used for intrusion only
B-112	E	--	--
B-201	E	--	--
B-202	E	--	--
B-203	E	--	--
B-204	E	--	--
BX-101	E	--	--
BX-102	E	--	Dry surface, ENRAF™ used for intrusion only
BX-103	E	--	--
BX-104	E	--	--
BX-105	E	--	Dry surface, ENRAF™ used for intrusion only
BX-106	E	--	Dry surface, ENRAF™ used for intrusion only
BX-107	E	--	--
BX-108	E	--	Dry surface, ENRAF™ used for intrusion only
BX-109	E	Scheduled under M-23-25	Dry surface, ENRAF™ used for intrusion only
BX-110	E	Yes	Dry surface, ENRAF™ used for intrusion only
BX-111	E	Yes	Dry surface, ENRAF™ used for intrusion only
BX-112	E	--	--
BY-101	MT	Yes	Dry surface, MT used for intrusion only
BY-102	E	Yes	Dry surface, ENRAF™ used for intrusion only
BY-103	E	Yes	Dry surface, ENRAF™ used for intrusion only
BY-104	MT	Yes	Dry surface, MT used for intrusion only
BY-105	MT	Yes	Dry surface, MT used for intrusion only
BY-106	MT	Yes	Dry surface, MT used for intrusion only
BY-107	MT	Yes	Dry surface, MT used for intrusion only
BY-108	MT	Yes	Dry surface, MT used for intrusion only.
BY-109	FIC	Yes	Dry surface, FIC used for intrusion only
BY-110	E	Yes	Dry surface, ENRAF™ used for intrusion only
BY-111	E	Yes	Dry surface, ENRAF™ used for intrusion only

Table B-3. Surface Level In-Tank Liquid Detection Instrumentation (1 Sheets)

Tank	Surface Level Gauge	LOW Installed?	Comments
BY-112	MT	Yes	Dry surface, MT used for intrusion only
C-101	E	--	Dry surface, ENRAF™ used for intrusion only
C-102	E	Scheduled under M-23-25	Dry surface, ENRAF™ used for intrusion only
C-103	E	Scheduled under M-23-25	Current liquid surface uses ENRAF™
C-104	E	--	Dry surface, ENRAF™ used for intrusion only
C-105	E	Scheduled under M-23-25	Dry surface, ENRAF™ used for intrusion only
C-106	E	--	Dry surface, ENRAF™ used for intrusion only
C-107	E	--	--
C-108	E	--	Dry surface, ENRAF™ used for intrusion only
C-109	E	--	Dry surface, ENRAF™ used for intrusion only
C-110	E	--	--
C-111	MT	--	Dry surface, MT used for intrusion only
C-112	E	Scheduled under M-23-25	Dry surface, ENRAF™ used for intrusion only
C-201	MT	--	Dry surface, MT used for intrusion only
C-202	E	--	Dry surface, ENRAF™ used for intrusion only
C-203	MT	--	Dry surface, MT used for intrusion only
C-204	MT	--	Dry surface, MT used for intrusion only
S-101	E	Yes	--
S-102	E	Yes	Dry surface, ENRAF™ used for intrusion only
S-103	E	Yes	--
S-104	E	Yes	Dry surface, ENRAF™ used for intrusion only
S-105	E	Yes	Dry surface, ENRAF™ used for intrusion only
S-106	E	Yes	Dry surface, ENRAF™ used for intrusion only
S-107	E	Yes	Current liquid surface uses ENRAF™
S-108	E	Yes	Dry surface, ENRAF™ used for intrusion only
S-109	E	Yes	Dry surface, ENRAF™ used for intrusion only
S-110	E	Yes	Dry surface, ENRAF™ used for intrusion only
S-111	E	Yes	--
S-112	E	Yes	Dry surface, ENRAF™ used for intrusion only
SX-101	E	Yes	Dry surface, ENRAF™ used for intrusion only
SX-102	E	Yes	Dry surface, ENRAF™ used for intrusion only

Table B-3. Surface Level In-Tank Liquid Detection Instrumentation (1 Sheets)

Tank	Surface Level Gauge	LOW Installed?	Comments
SX-103	E	Yes	Dry surface, ENRAF™ used for intrusion only
SX-104	E	Yes	Dry surface, ENRAF™ used for intrusion only
SX-105	E	Yes	Dry surface, ENRAF™ used for intrusion only
SX-106	E	Yes	Dry surface, ENRAF™ used for intrusion only
SX-107	E	--	Dry surface, ENRAF™ used for intrusion only
SX-108	E	--	Dry surface, ENRAF™ used for intrusion only
SX-109	E	--	Dry surface, ENRAF™ used for intrusion only
SX-110	E	--	Dry surface, ENRAF™ used for intrusion only
SX-111	E	Scheduled under M-23-25	Dry surface, ENRAF™ used for intrusion only
SX-112	E	Scheduled under M-23-25	Dry surface, ENRAF™ used for intrusion only
SX-113	E	--	Dry surface, ENRAF™ used for intrusion only
SX-114	E	--	Dry surface, ENRAF™ used for intrusion only
SX-115	E	--	Dry surface, ENRAF™ used for intrusion only
T-101	E	Scheduled under M-23-25	Dry surface, ENRAF™ used for intrusion only
T-102	E	--	--
T-103	E	--	Dry surface, ENRAF™ used for intrusion only
T-104	E	Yes	Dry surface, ENRAF™ used for intrusion only
T-105	E	--	Dry surface, ENRAF™ used for intrusion only
T-106	E	--	Dry surface, ENRAF™ used for intrusion only
T-107	E	--	--
T-108	E	--	--
T-109	E	Scheduled under M-23-25	Dry surface, ENRAF™ used for intrusion only
T-110	E	Yes	Dry surface, ENRAF™ used for intrusion only
T-111	E	Yes	Dry surface, ENRAF™ used for intrusion only
T-112	E	--	--
T-201	E	--	--
T-202	E	--	--
T-203	E	--	Dry surface, ENRAF™ used for intrusion only
T-204	E	--	--
TX-101	E	--	--
TX-102	E	Yes	Dry surface, ENRAF™ used for intrusion only

Table B-3. Surface Level In-Tank Liquid Detection Instrumentation (1 Sheets)

Tank	Surface Level Gauge	LOW Installed?	Comments
TX-103	E	Scheduled under M-23-25	Dry surface, ENRAF™ used for intrusion only
TX-104	E	Scheduled under M-23-25	Dry surface, ENRAF™ used for intrusion only
TX-105	E	Scheduled under M-23-25	Dry surface, ENRAF™ used for intrusion only
TX-106	E	Yes	Dry surface, ENRAF™ used for intrusion only
TX-107	E	--	Dry surface, ENRAF™ used for intrusion only
TX-108	E	Yes	Dry surface, ENRAF™ used for intrusion only
TX-109	E	Yes	Dry surface, ENRAF™ used for intrusion only
TX-110	E	Yes	Dry surface, ENRAF™ used for intrusion only
TX-111	E	Yes	Dry surface, ENRAF™ used for intrusion only
TX-112	E	Yes	Dry surface, ENRAF™ used for intrusion only
TX-113	E	Yes	Dry surface, ENRAF™ used for intrusion only
TX-114	E	Yes	Dry surface, ENRAF™ used for intrusion only
TX-115	E	Yes	Dry surface, ENRAF™ used for intrusion only
TX-116	E	Yes	Dry surface, ENRAF™ used for intrusion only
TX-117	E	Yes	Dry surface, ENRAF™ used for intrusion only
TX-118	E	Yes	Dry surface, ENRAF™ used for intrusion only
TY-101	E	--	Dry surface, ENRAF™ used for intrusion only
TY-102	E	--	--
TY-103	E	Yes	Dry surface, ENRAF™ used for intrusion only
TY-104	E	--	--
TY-105	E	Yes	Dry surface, ENRAF™ used for intrusion only
TY-106	E	--	Dry surface, ENRAF™ used for intrusion only
U-101	MT	--	--
U-102	E	Yes	Dry surface, ENRAF™ used for intrusion only
U-103	E	Yes	Dry surface, ENRAF™ used for intrusion only
U-104	MT	--	Dry surface, MT used for intrusion only
U-105	E	Yes	Dry surface, ENRAF™ used for intrusion only
U-106	E	Yes	Dry surface, ENRAF™ used for intrusion only
U-107	E	Yes	--
U-108	E	Yes	Dry surface, ENRAF™ used for intrusion only
U-109	E	Yes	Dry surface, ENRAF™ used for intrusion only
U-110	E	Y	Dry surface, ENRAF™ used for intrusion only

Table B-3. Surface Level In-Tank Liquid Detection Instrumentation (1 Sheets)

Tank	Surface Level Gauge	LOW Installed?	Comments
U-111	E	Yes	Dry surface, ENRAF™ used for intrusion only
U-112	MT	--	Dry surface, MT used for intrusion only
U-201	MT	--	--
U-202	MT	--	--
U-203	E	--	Dry surface, ENRAF™ used for intrusion only
U-204	E	--	--

Adapted from RPP-9645, Rev. 0.

Level Gauge

E	=	ENRAF™ Gauge[1]
FIC	=	Food Instrument Corporation Gauge (FIC)
MT	=	Manual Tape
LOW	=	liquid observation well

[1]ENRAF is a trademark of the ENRAF Corporation, Houston, Texas.

B3.2 LEAK DETECTION REQUIREMENTS

As indicated in Section 4.0 of the main text, the SST system structures have been grouped according to their functional uses as either containment structures or transfer components. Containment structures include SSTs, MUSTs, and vessels and cells in miscellaneous structures. The following sections discuss the leak detection and liquid intrusion monitoring based on the requirements identified in the main text in Section 4.0 and the BMPs identified in the main text in Section 5.0. Transfer components include pipes and pits. Table B-4 summarizes the requirements identified in Section 4.0 and the associated rational for the implementation of the requirements.

Table B-4. Summary of Leak Detection Requirements and Bases (1 Sheets)

Ref.	Requirement	Basis
4.1.1(A)(1)	SSTs that are not technically feasible to LDM (i.e., a dry waste surface, and less than 24 inches of drainable liquid in the tank bottom) shall not require LDM (see Section 5.0 of the main text for BMP monitoring for these tanks). SSTs that are not technically feasible to LDM and have suspect integrity or SSTs where LDM is technically feasible, meet interim stabilization criteria, are not susceptible to exceeding interim stabilization criteria, and have suspect integrity are required to have annual periodic monitoring as a BMP.	Currently available technology cannot directly monitor in-tank liquid levels in a tank with a dry waste surface containing less than 24 inches of drainable liquid in the tank bottom (RPP-9645, Rev. 0). Twenty-four SSTs have dry waste surfaces and less than 24 inches of drainable liquid in the tank bottom. Sixty-three SSTs are subject to annual periodic monitoring as a BMP.
4.1.1(A)(2)	SSTs that are not technically feasible to LDM and do not have suspect integrity or SSTs where LDM is technically feasible, that meet interim stabilization criteria, do not have a susceptibility to exceeding the interim stabilization criteria, and do not have suspect integrity shall have a reduced monitoring frequency due to reduced risk. These tanks are required to have annual intrusion monitoring as a BMP (see Section 5.0 of the main text for BMP monitoring for these tanks).	The primary response to a leak in an SST is to respond immediately to remove pumpable liquid. Interim stabilization typically removes liquid waste until the retrieval rate drops to 0.05 gpm or less if jet pumping is used. At this point, capillary action prevents most of the remaining liquid from draining from the tank solids. Therefore, interim stabilization has already removed liquids to the extent practical. If a leak occurred in an SST meeting interim stabilization criteria, the leak would likely occur at a very low rate thus minimizing the extent of the leak. The low leak rate would also make detecting the leak difficult. Moreover, if a leak occurred and it was detected, additional pumping would not result in the removal of liquid beyond established practical limits in SSTs with pumpable liquid flow rates less than 0.05 gpm if jet pumping is used. Forty-two SSTs are subject to annual intrusion monitoring as a BMP.

Table B-4. Summary of Leak Detection Requirements and Bases (1 Sheets)

Ref.	Requirement	Basis
4.1.1(A)(3)	SSTs where LDM is technically feasible that do not meet interim stabilization criteria, or meet the interim stabilization criteria but have a susceptibility to exceeding the interim stabilization criteria, shall require weekly LDM.	Tanks that do not meet interim stabilization criteria require direct measurement of the liquid level for leak monitoring in accordance with WAC 173-303-400 and 40 CFR 265.193. Forty-three SSTs are technically feasible to LDM and do not meet the interim stabilization criteria. One additional SST is technically feasible to LDM, and meets the interim stabilization criteria, but has a susceptibility to exceeding the criteria because it has not been isolated against intrusion and contains 40,000 gallons or more of drainable interstitial liquid waste.
4.1.1(B)(1)	Inactive/not-in-use MUSTs that have been interim stabilized or meet interim stabilization criteria, shall not require LDM. MUSTs that are physically isolated are required to have annual intrusion monitoring as a BMP and MUSTs that are not physically isolated are required to have annual periodic monitoring as a BMP (see Section 5.0 of the main text for BMP monitoring for these tanks).	A response to a leak in an interim stabilized MUST, or MUST containing less than 400 gallons of drainable liquid, could only involve the installation and operation of the emergency pumping system. The MUST liquid levels would not cover the pump inlet, or the pump could not recover liquid from these MUSTs. Therefore, these MUSTs do not require liquid level monitoring. Two of 7 inactive/not-in-use MUSTs have been interim stabilized or meet the interim stabilization criteria and are not physically isolated. Miscellaneous underground storage tanks have been interim stabilized or meet the interim stabilization criteria and are physically isolated.
4.1.1(B)(2)	Inactive/not-in-use MUSTs that have not been interim stabilized and do not meet interim stabilization criteria shall require LDM. Mission essential MUSTs shall require LDM. LDM systems shall have the ability to detect leaks at the earliest practicable time allowed by existing detection technology and existing tank conditions.	WAC 173-303-400; 40 CFR 265.193(c)(3). Three MUSTs have not been interim stabilized or do not meet the interim stabilization criteria and have a known volume of drainable liquid. Zero MUSTs are mission essential.
4.1.1(B)(3)	Inactive/not-in-use MUSTs with an indeterminate volume of drainable liquid waste shall have a liquid volume assessment.	Inactive/not-in-use MUSTs with indeterminate liquid waste volumes require assessments to determine if they meet interim stabilization criteria. Based on those assessments, the requirements appropriate to their classification will be imposed. Two inactive/not-in-use MUSTs in the SST system have indeterminate liquid waste volumes.

Table B-4. Summary of Leak Detection Requirements and Bases (1 Sheets)

Ref.	Requirement	Basis
4.1.1(C)(1)	Vessels and cells in miscellaneous structure that are empty and inactive/not-in-use vessels and cells in miscellaneous structures that meet interim stabilization criteria shall not require LDM.	The inactive/not-in-use vessels and cells in miscellaneous structures do not and will not receive waste. These vessels and cells have been retrieved to the extent possible, or contain less liquid waste than currently retrievable. Leak detection is therefore not required. Four vessels and cells in miscellaneous structures are either empty or are inactive/not-in-use and meet the interim stabilization criteria because they contain less than 400 gallons of drainable liquid.
4.1.1(C)(2)	Inactive/not-in-use vessels and cells in miscellaneous structures that do not meet interim stabilization criteria require LDM. Mission essential vessels and cells in miscellaneous structures require LDM. LDM systems shall have the ability to detect leaks at the earliest practicable time allowed by existing detection technology and existing tank conditions.	WAC 173-303-400; 40 CFR 265.193(c)(3). Eight vessels and cells are either mission essential or are inactive/not-in-use and do not meet the interim stabilization criteria.
4.1.1(C)(3)	Inactive/not-in-use vessels and cells in miscellaneous structures with an indeterminate volume of drainable liquid waste shall have a liquid volume assessment.	Inactive/not-in-use vessels and cells in miscellaneous structures with indeterminate liquid waste volumes require a liquid volume assessment to determine if they meet interim stabilization criteria because then contain less than 400 gallons of liquid waste. Based on those assessments, the requirements appropriate to their classification will be imposed. Five inactive/not-in-use vessels and cells in miscellaneous structures have an indeterminate liquid waste volume.
4.1.2(A)	All SSTs shall have a tank integrity assessment by an independent, qualified, registered professional engineer in accordance with WAC 173-303-400 and 40 CFR 265.193(i)(2) as implemented by the requirements established in HFFACO Milestone M-23-24. SSTs shall not require secondary containment.	WAC 173-303-400 and 40 CFR 265.193 require secondary containment for all existing tanks. The SST system was built prior to RCRA and does not have secondary containment. Technical and cost issues make it unfeasible to provide SST system components with secondary containment. In response to this condition, the DOE committed to retrieval of the waste in accordance with the HFFACO Milestone M-45-00, and HFFACO Milestone M-23-24 required the integrity assessment in the implementing requirement.
4.1.2(B)(1)	All mission essential MUSTs shall have a tank integrity assessment by an independent, qualified, registered professional engineer in accordance with WAC 173-303-400 and 40 CFR 265.193(i)(2) as implemented by the requirements established in HFFACO	WAC 173-303-400 and 40 CFR 265.193 require secondary containment for all existing tanks. The SST system was built prior to RCRA and does not have secondary containment. Technical and cost issues make it unfeasible to provide SST system components with secondary containment.

Table B-4. Summary of Leak Detection Requirements and Bases (1 Sheets)

Ref.	Requirement	Basis
	Milestone M-23-24. MUSTs shall not require secondary containment.	In response to this condition, the DOE committed to retrieval of the waste in accordance with the HFFACO Milestone M-45-00, and HFFACO Milestone M-23-24 required the integrity assessment described in the implementing requirement. Currently, the SST system contains no mission essential MUSTs.
4.1.2(B)(2)	Inactive/not-in-use MUSTs shall not require secondary containment as specified by WAC 173-303-400 and 40 CFR 265.193.	WAC 173-303-400 and 40 CFR 265.193 require secondary containment for all existing tanks. The SST system was built prior to RCRA and does not have secondary containment. Technical and cost issues make it unfeasible to provide SST system components with secondary containment. In response to this condition, the DOE committed to retrieval of the waste in accordance with the HFFACO Milestone M-45-00, and HFFACO Milestone M-23-24 required the integrity assessment in the implementing requirement. Inactive/not-in-use MUSTS will not have secondary containment or integrity examinations for the following reasons: First, inactive/not-in-use MUSTs do not and will not receive waste. Second, the DOE already has plans to retrieve and close the tanks in accordance with the SST System Closure Work Plan (DOE/RL-89-16, Rev. 1). And third, significant technical and cost considerations preclude providing secondary containment or integrity examinations.
4.1.2(C)(1)	Mission essential vessels and cells in miscellaneous structures shall not require secondary containment. Mission essential vessels and cells in miscellaneous structures shall have a tank integrity assessment performed by an independent, qualified, registered professional engineer in accordance with WAC 173-303-400 and 40 CFR 265.193(i)(2) as implemented by the requirements established in HFFACO Milestone M-23-24.	WAC 173-303-400 and 40 CFR 265.193 require secondary containment for all existing tanks. The SST system was built prior to RCRA and does not have secondary containment. Technical and cost issues make it unfeasible to provide SST system components with secondary containment. In response to this condition, the DOE committed to retrieval of the waste in accordance with the HFFACO Milestone M-45-00, and HFFACO Milestone M-23-24 required the integrity assessment described in the implementing requirement. Currently, the SST system contains no mission essential vessels or cells in miscellaneous structures.

Table B-4. Summary of Leak Detection Requirements and Bases (1 Sheets)

Ref.	Requirement	Basis
4.1.2(C)(2)	Inactive/not-in-use vessels and cells in miscellaneous structures shall not require secondary containment as specified by WAC 173-303-400 and 40 CFR 265.193.	WAC 173-303-400 and 40 CFR 265.193 require secondary containment for all existing tanks. The SST system was built prior to RCRA and does not have secondary containment. Technical and cost issues make it unfeasible to provide SST system components with secondary containment. In response to this condition, the DOE committed to retrieval of the waste in accordance with the HFFACO Milestone M-45-00, and HFFACO Milestone M-23-24 required the integrity assessment in the implementing requirement. Inactive/not-in-use vessels and cells in miscellaneous structures will not have secondary containment or integrity examinations for the following reasons. First, inactive vessels and cells in miscellaneous structures do not, and will not, receive waste. Second, vessels and cells in miscellaneous structures have been, or will be, placed in safe standby waiting decommissioning and closure. And third, significant technical and cost considerations preclude providing secondary containment or integrity examinations.
4.1.3(A)(1)	SSTs with a dry waste surface, and less than 24 inches of drainable liquid in the tank bottom shall not require responses to leaks (see Section 5.0 of the main text for BMP monitoring for these tanks).	Currently available technology cannot directly monitor in-tank liquid levels in a tank with a dry waste surface containing less than 24 inches of drainable liquid in the tank bottom (RPP-9645, Rev. 0). The inability to directly monitor in-tank liquid levels precludes effective leak detection and leak response. Forty-three SSTs have dry waste surfaces and less than 24 inches of drainable liquid in the tank bottom.

Table B-4. Summary of Leak Detection Requirements and Bases (1 Sheets)

Ref.	Requirement	Basis
4.1.3(A)(2)	SSTs that meet interim stabilization criteria shall not require responses to leaks (see Section 5.0 of the main text for BMP monitoring for these tanks).	Currently developed or available technologies do not exist for removing additional liquid from a leaking tank meeting interim stabilization criteria, other than total waste retrieval already addressed in the HFFACO M-45 milestones. The interim stabilization criteria acknowledge the limitations of further liquid removal from SSTs meeting interim stabilization criteria that have pumpable liquid flow rates of 0.05 gpm or less if jet pumping is used. Accordingly, no effective response exists for responding to a leak in an SST meeting interim stabilization. Eighty-two SSTs meet the interim stabilization criteria by containing less than 50,000 gallons of drainable interstitial liquid, and less than 5,000 gallons of supernate, and having final pumping flow rates of 0.05 gpm or less if jet pumping is used.
4.1.3(A)(3)	SSTs that do not meet interim stabilization criteria require the following responses to leaks: (a) Remove the tank from service; (b) Immediately contain and inspect visible releases to the environment from tank systems; (c) Report leaks to Ecology within 24 hours of their detection unless the hazardous waste leak or spill involves one pound or less of material immediately contained and cleaned up; and (e) File a report with Ecology within 30 days.	WAC 173-303-400 and 40 CFR 265.196; Tanks that do not meet interim stabilization criteria require installation and operation of the emergency pumping system as soon as practicable upon detecting a leak in accordance with the emergency pumping plan. Forty-three SSTs have not completed interim stabilization, or do not meet the interim stabilization criteria because they contain more than 50,000 gallons of drainable interstitial liquid, or more than 5,000 gallons of supernate, or had final pumping flow rates greater than 0.05 gpm if jet pumping was used.
4.1.3(B)(1)	Inactive/not-in-use MUSTs that have been interim stabilized or meet interim stabilization criteria shall not require responses to leaks (see Section 5.0 of the main text for BMP monitoring for these tanks).	A response to a leak in an interim stabilized MUST, or a MUST containing less than 400 gallons of drainable liquid could only involve the installation and operation of the emergency pumping system. Tank liquid levels would not cover the pump inlet, or the pump could not recover liquid from these tanks. Two inactive/not-in-use MUSTs in the SST system have been interim stabilized or contain less than 400 gallons of drainable liquid.

Table B-4. Summary of Leak Detection Requirements and Bases (1 Sheets)

Ref.	Requirement	Basis
4.1.3(B)(2)	Inactive/not-in-use MUSTs that have not been interim stabilized and do not meet interim stabilization criteria require responses to leaks. Mission essential MUSTs require responses to leaks. The response to a leak will: (a) Remove the tank from service; (b) Remove pumpable liquid from the tank at the earliest practicable time; (c) Immediately contain and inspect visible releases to the environment from tank systems; (d) Report leaks to Ecology within 24 hours of their detection unless the hazardous waste leak or spill involves one pound or less of material immediately contained and cleaned up; and (e) File a report with Ecology within 30 days.	WAC 173-303-400; 40 CFR 265.196(a) through (d)
4.1.3(C)(1)	Inactive/not-in-use vessels and cells in miscellaneous structures that meet interim stabilization criteria shall not require responses to leaks.	The inactive/not-in-use vessels and cells in miscellaneous structures do not and will not receive waste, and have been or will be placed in safe standby awaiting decommissioning and closure. These vessels and cells only contain volumes of drainable liquids at or below the limits that can be practically retrieved by existing tank farm pumping systems (i.e., 400 gallons). Four inactive/not-in-use vessels and cells in miscellaneous structures meet interim stabilization criteria because they contain less than 400 gallons of drainable liquid.
4.1.3(C)(2)	Inactive/not-in-use vessels and cells in miscellaneous structures that do not meet interim stabilization criteria shall require responses to leaks. Mission essential vessels and cells in miscellaneous structures shall require responses to leaks. The response to a leak will: (a) remove the system from service; (b) Remove pumpable liquid from the system at the earliest practicable time; (c) Immediately contain and inspect visible releases to the environment from tank systems; (d) Report leaks to Ecology within 24 hours of their detection unless the hazardous waste leak or spill involves one pound or less of material immediately contained and cleaned up; and (e) File a report with Ecology within 30 days.	WAC 173-303-400; 40 CFR 265.196(a) through (d).

Table B-4. Summary of Leak Detection Requirements and Bases (1 Sheets)

Ref.	Requirement	Basis
4.2.1(A)(1)	Inactive/not-in-use at-tank and between-tank pits shall not require LDM.	At-tank and between-tank pits provide secondary containment for transfer systems contained within the pits and are designed to drain liquids to tanks. Transfer system components that are inactive/not-in-use have been or will be physically or administratively isolated from the mission essential waste transfer systems in accordance with the tank farm procedures. If not in use, the inactive/not-in-use transfer system cannot receive or otherwise transfer waste; therefore, the inactive/not-in-use pits have no opportunity to receive leakage from these unused transfer system components.
4.2.1(A)(2)	When in-use, mission essential at-tank and between-tank pits shall have systems capable of detecting failures of the primary containment structure within 24 hours or at the earliest practicable time if existing detection technology or site conditions will not allow detection of a release within 24 hours.	WAC 173-303-400; 40 CFR 265.193(c)(3)
4.2.2(A)(1)	Inactive/not-in-use at-tank and between-tank pits shall not require secondary containment.	At-tank and between-tank pits provide secondary containment for transfer systems contained within the pits and are designed to drain liquids to tanks. Transfer systems that are inactive/not-in-use have been or will be physically or administratively isolated from the mission essential waste transfer systems in accordance with the tank farm procedures. If not in use, the transfer system cannot receive or otherwise transfer waste. The inactive/not-in-use pits have no opportunity to contain leakage from these unused transfer system components. Therefore, application of the requirement for secondary containment is not appropriate based on current and future system configuration.
4.2.2(A)(2)	When in-use, mission essential at-tank and between-tank pits serve as secondary containment and will have direct, in-tank liquid level sensing instruments to detect and prevent any migration of waste or accumulated liquid out of the system to the soil, groundwater, or surface water at any time while in use. In-use, mission essential at-tank and between-tank pits will have the ability to collect, contain or drain releases that drain to them until removal of the collected material.	WAC 173-303-400; 40 CFR 265.193(a), (b), and (e)

Table B-4. Summary of Leak Detection Requirements and Bases (1 Sheets)

Ref.	Requirement	Basis
4.2.3(A)(1)	Inactive/not-in-use at-tank and between-tank pits shall not require responses to leaks.	At-tank and between-tank pits provide secondary containment for transfer systems contained within the pits and are designed to drain liquids to tanks. Inactive/not-in-use pits have been or will be physically or administratively isolated from the mission essential waste transfer systems in accordance with the tank farm procedures. While inactive/not-in-use, the transfer systems cannot receive or otherwise transfer waste; therefore, the inactive/not-in-use pits have no opportunity to contain leakage from these unused transfer system components. Therefore, application of the requirement for responses to leaks is not appropriate based on current and future system configuration.
4.2.3(A)(2)	When in-use, mission essential at-tank and between-tank pits serve as secondary containment for waste transfers, and will have direct, in-pit liquid level monitoring instruments to detect and prevent migration of waste or accumulated liquid out of the system to the soil, groundwater, or surface water at any time while in use. When in use, mission essential at-tank and between-tank pits will have the ability to collect, contain or drain releases that drain to them until removal of the collected material.	WAC 173-303-400; 40 CFR 265.196(a), (b) and (e)
4.2.4(A)(1)	Inactive/not-in-use piping shall not require LDM.	Transfer systems that are inactive/not-in-use have been or will be physically or administratively isolated from the mission essential transfer systems in accordance with the tank farm procedures. While inactive/not-in-use, the transfer system cannot receive or otherwise transfer waste. Therefore, application of the requirement for LDM is not appropriate based on current and future system configuration.
4.2.4(A)(2)	When in use, mission essential piping shall have systems in the pits at each end capable of detecting failures of the transfer system within 24 hours or at the earliest practicable time if existing detection technology or site conditions will not allow detection of a release within 24 hours.	WAC 173-303-400; 40 CFR 265.193(c)(3)

Table B-4. Summary of Leak Detection Requirements and Bases (1 Sheets)

Ref.	Requirement	Basis
4.2.5(A)(1)	Inactive/not-in-use piping shall not require secondary containment.	The SST system piping design and constructed prior to RCRA does not have compliant secondary containment (other than when it passes through pits). Transfer systems that are not in use have been or will be physically or administratively isolated from the mission essential waste transfer systems in accordance with the tank farm procedures. While inactive/not-in-use, the transfer system cannot receive or otherwise transfer waste. Therefore, application of the requirement for secondary containment is not appropriate based on current and future system configuration.
4.2.5(A)(2)	When in use, mission essential piping shall have either: (a) Secondary containment designed, installed, and operated to prevent any migration of waste or accumulated liquid out of the system to the soil, groundwater, or surface water at any time during use, ***OR*** (b) Pressure testing prior to first use and at least annually thereafter while in use.	WAC 173-303-400; 40 CFR 265.193(a); 40 CFR 265.193(i)(2)
4.2.6(A)(1)	Inactive/not-in-use piping shall be isolated from in-use transfer systems.	Transfer piping that is inactive/not-in-use must be physically or administratively isolated from in-use transfer systems (tank farm procedures).
4.2.6(A)(2)	Mission essential piping that leaks requires the following response: (a) Cease waste transfers and remove the leaking section of piping from service; (b) Remove pumpable liquid at the earliest practicable time; (c) Immediately contain and inspect visible releases to the environment (pit leak detection on double-encased transfer lines satisfies this requirement); (d) Report leaks to Ecology within 24 hours of their detection unless the hazardous waste leak or spill involves one pound or less of material immediately contained and cleaned up; and (e) File a report with Ecology within 30 days.	WAC 173-303-400; 40 CFR 265.196(a) through (e)
4.3.1(A)(1)	Perform integrity assessment, and maintain associated documents, in accordance with M-23-24.	HFFACO M-23-24.
4.3.1(A)(2)	Retrieve SST system waste in accordance with HFFACO Milestone M-45-00.	HFFACO Milestone M-45-00.
4.3.2(A)	All SSTs shall receive a daily inspection in accordance with tank farm procedures	Tank farm procedures.

Table B-4. Summary of Leak Detection Requirements and Bases (1 Sheets)

Ref.	Requirement	Basis
4.3.2(B)(1)	Inactive/not-in-use MUSTs shall not require daily inspections.	Inactive MUSTs do not and will not receive waste. These tanks have been removed from service. Therefore, inactive/not-in-use MUSTs do not require daily inspections based on current and future system configuration.
4.3.2(B)(2)	When in use, mission essential MUSTs shall receive the following inspections daily, and have the results documented in the facility operating record: (a) Inspect overfill/spill control equipment to ensure good working order; (b) Inspect aboveground portions of the system to detect corrosion or releases; (c) Gather data monitoring and leak detection equipment to ensure tank systems operate according to design; and (d) Inspect construction materials and the surrounding area to detect erosion or signs of releases.	WAC 173-303-400; 40 CFR 265.195(a)
4.3.2(C)	Vessels and cells in miscellaneous structures shall receive inspections in accordance with tank farm procedures	Tank farm procedures.
4.3.2(D)(1)	Inactive/not-in-use at-tank and between-tank pits shall not require daily inspections.	Inactive/not-in-use at-tank and between-tank pits are not actively involved in the conveyance of waste and have been or will be physically isolated from the in-use transfer system. Therefore, at-tank and between-tank pits do not require daily inspection based on current and future system configuration.
4.3.2(D)(2)	When in use, mission essential at-tank and between-tank pits will receive the following inspections daily, and have the results documented in the facility operating record: (a) Inspect overfill/spill control equipment to ensure good working order; (b) Inspect aboveground portions of the system to detect corrosion or releases; (c) Gather data from monitoring and leak detection equipment to ensure tank systems operate according to design; and (d) Inspect construction materials and the surrounding area to detect erosion or signs of releases.	WAC 173-303-400; 40 CFR 265.195(a)
4.3.2(E)(1)	Inactive/not-in-use piping shall not require daily inspections.	The 200 East and 200 West Areas contain extensive networks of piping including approximately 1,300 individual transfer lines. The inactive/not-in-use piping has been isolated from the in-use transfer systems. These inactive/not-in-use transfer lines contain a variety of piping configurations including single-walled direct buried, concrete encased, double-wall buried, and aboveground hose-in-

Table B-4. Summary of Leak Detection Requirements and Bases (1 Sheets)

Ref.	Requirement	Basis
		hose. Typically, transfer piping was designed to self-drain to pits and pits to drain to MUSTs. In addition, line flushes occurred throughout the transfer campaigns at regular intervals and at the completion of the campaign removing a majority of the constituents of concern from the transfer line. Therefore, inactive/not-in-use piping does not require daily inspection based on current and future system configuration.
4.3.2(E)(2)	When in use, mission essential piping will receive the following daily inspections, and have the results documented in the facility operating record: (a) Inspect overfill/spill control equipment to ensure good working order; (b) Inspect aboveground portions of the system to detect corrosion or releases; (c) Gather data from monitoring and leak detection equipment to ensure tank systems operate according to design; (d) Inspect construction materials and the surrounding area to detect erosion or signs of releases	WAC 173-303-400; 40 CFR 265.195(a)
4.3.3(A)(1)	Perform repairs on leaking and not in service tank systems prior to returning them to service. Report any release to the environment to Ecology within 24 hours of its detection unless the hazardous waste leak or spill is less than or equal to one pound and immediately contained and cleaned-up. File notification reports satisfying the requirements of WAC 173-303-400 and 40 CFR 265.196(d)(3) within 30 days of the detection of a release to the environment.	WAC 173-303-400; 40 CFR 265.196(d)
4.3.3(A)(2)	Retrieve SST system waste in accordance with HFFACO Milestone M-45-00.	HFFACO Milestone M-45-00.
4.4(A)	New structures, systems and components added to the SST system shall have secondary containment in accordance with WAC 173-303-400 and 40 CFR 265.193.	WAC 173-303-400; 40 CFR 265.193

BMP = best management practice
CFR = *Code of Federal Regulations*
DOE = U.S. Department of Energy
Ecology = Washington State Department of Ecology
HFFACO = *Hanford Federal Facility Agreement and Consent Order*
LDM = leak detection and monitoring
MUST = miscellaneous underground storage tank
SST = single-shell tank
WAC = *Washington Administrative Code*

B3.3 SINGLE-SHELL TANKS

Based on the requirements for LDM identified in Section 4.0 of the main text and the BMPs identified in Section 5.0, the SSTs are grouped into four groups of tanks. The first group of SSTs are tanks that are technically practical to monitor for leak losses and that do not meet the interim stabilization criteria. Currently, 43 tanks fall into this category of tanks. These tanks are leak detection monitored based on the requirements identified in Section 4.0. The tanks included in this group are listed in Table B-5 and include the following tanks:

- Tanks that have not yet completed interim stabilization,
- Tanks that have completed interim stabilization, but now exceed the interim stabilization criteria because they contain more than 50,000 gallons of drainable interstitial liquid and/or 5,000 gallons of supernate, or
- Tanks that had pumpable flow rates greater than 0.05 gpm if jet pumping was used.

These 43 tanks account for 3.406 million gallons (70.47%) of the drainable liquids currently stored in SSTs.

Table B-5. Single-Shell Tanks Not Meeting Interim Stabilization Criteria

241-A-101	241-C-107	241-T-102
241-A-103	241-S-103	241-T-110
241-AX-101	241-S-106	241-T-112
241-B-201	241-S-101	241-T-201
241-BX-103	241-S-102	241-TX-102
241-BX-105	241-S-107	241-TX-106
241-BY-103	241-S-109	241-TX-114
241-BY-104	241-S-111	241-U-102
241-BY-105	241-S-112	241-U-105
241-BY-106	241-SX-101	241-U-106
241-BY-108	241-SX-102	241-U-107
241-BY-109	241-SX-103	241-U-108
241-C-102	241-SX-104	241-U-109
241-C-103	241-SX-105	241-U-111
241-C-106		

The second group of SSTs consists of tanks that are technically practical to monitor for leak losses, have been interim stabilized, but have a susceptibility to exceeding the interim stabilization criteria because intrusion prevention actions have not been completed to fully mitigate the potential for an intrusion event. One tank falls into this grouping (BY-102). The tank currently stores in excess of 40,000 gallons drainable interstitial liquid waste, and has a volume of drainable liquid of 40,000 gallons. Analysis of previously interim stabilized tanks that

are suspected to have experienced intrusion events (i.e., A-103, BX-103, BY-103. C-102, T-102, TX-104, TX-112) indicates that the tanks experienced an average of approximately 1,000 gallons of liquid intrusion per year over a 10-year duration (CHG-0007065-R2). These tanks are leak detection monitored based on the requirements identified in Section 4.0 of the main text.

The third group of tanks consists of SSTs that are technically practical to monitor for leak losses, have been interim stabilized and meet the interim stabilization criteria, have no susceptibility to exceeding the interim stabilization criteria, and have suspect integrity. It also includes SSTs that have waste characteristics that make it technically unfeasible to detect leaks, and have suspect integrity. Tanks technically unfeasible to leak detect have dry waste surfaces, and drainable liquid levels less than 24 inches. Suspect integrity is defined as any tank that has been previously declared a known or assumed leaker or is identified in RPP-10435 as having stored boiling waste or having a bulge (tanks in the A, AX, SX tank farms). Table B-6 identifies the 63 tanks that fall into this grouping. These tanks currently store approximately 763,000 gallons of drainable liquids (15.79% of the total drainable liquids). These tanks are periodically monitored (at least annually) based on the BMPs identified in Section 5.0 of the main text using currently available monitoring systems supplemented by scheduled visual photographic inspections. The basis for annual monitoring derives from documented past intrusion events and the fact that these tanks are known or suspected leakers or have integrity issues. Of the four known or potential intrusion events into tanks previously interim stabilized, only one event has approached a rate of intrusion that exceeded 10,000 gallons over a 12-month period. Most of these tanks have less than 40,000 gallons of drainable interstitial liquid waste and hence an intrusion event would be detected in a timely manner to facilitate a response action (i.e., either mitigating the cause of the intrusion or pumping drainable liquids).

Table B-6. Single-Shell Tanks with Suspect Integrity Requiring Periodic Monitoring

241-A-102	241-BX-101	241-SX-108	241-TX-107
241-A-104	241-BX-102	241-SX-109	241-TX-110
241-A-105	241-BX-108	241-SX-110	241-TX-113
241-A-106	241-BX-110	241-SX-111	241-TX-115
241-AX-102	241-BX-111	241-SX-112	241-TX-116
241-AX-103	241-BY-107	241-SX-113	241-TX-117
241-AX-104	241-C-101	241-SX-114	241-TY-101
241-B-101	241-C-110	241-SX-115	241-TY-103
241-B-103	241-C-111	241-T-101	241-TY-104
241-B-105	241-C-201	241-T-103	241-TY-105
241-B-107	241-C-202	241-T-106	241-TY-106
241-B-110	241-C-203	241-T-107	241-U-101
241-B-111	241-C-204	241-T-108	241-U-104
241-B-112	241-S-104	241-T-109	241-U-110
241-B-203	241-SX-106	241-T-111	241-U-112
241-B-204	241-SX-107	241-TX-105	

The final group of tanks consists of SSTs are technically practical to monitor for leak losses, have been interim stabilized and meet the interim stabilization criteria, have no susceptibility to exceeding the interim stabilization criteria, and do not have suspect integrity. It also includes SSTs that have waste characteristics that make it technically unfeasible to detect leaks, and do not have suspect integrity. In all 42 tanks are include in this grouping (Table B-7). These 42 tanks currently store approximately 624,000 gallons of drainable liquids (12.91% of the total drainable liquids). These tanks are monitored (at least annually) for liquid intrusions based on the BMPs identified in Section 5.0 of the main text using currently available intrusion monitoring system supplemented by scheduled visual photographic inspections. The basis for annual intrusion monitoring is derived from documented past intrusion events and the fact that these tanks are sound tanks with no known suspect integrity issues. Of the four known or potential intrusion events into tanks previously interim stabilized, the average intrusion rate has been approximately 1,000 gallons per year. Most of these tanks have less than 40,000 gallons drainable interstitial liquid waste and hence an intrusion event would be detected in a timely manner to facilitate a response action (i.e., mitigating the cause of the intrusion, pumping drainable liquids, or enhanced monitoring).

Table B-7. Single-Shell Tanks Requiring Intrusion Monitoring

241-B-102	241-BY-101	241-S-110	241-TX-111
241-B-104	241-BY-110	241-T-104	241-TX-112
241-B-106	241-BY-111	241-T-105	241-TX-118
241-B-108	241-BY-112	241-T-202	241-TY-102
241-B-109	241-C-104	241-T-203	241-U-103
241-B-202	241-C-105	241-T-204	241-U-201
241-BX-104	241-C-108	241-TX-101	241-U-202
241-BX-106	241-C-109	241-TX-103	241-U-203
241-BX-107	241-C-112	241-TX-104	241-U-204
241-BX-109	241-S-105	241-TX-108	
241-BX-112	241-S-108	241-TX-109	

B3.4 MISCELLANEOUS UNDERGROUND STORAGE TANKS

Based on the requirements for LDM identified in Section 4.0 of the main text and the BMPs identified in Section 5.0 of the main text, the MUSTs are grouped into four groups of tanks. The first group consists of mission essential MUSTs (the SST system currently contains no mission essential MUSTs), and non-interim stabilized MUSTs that store a known liquid volume that exceeds the interim stabilization criteria for MUSTs (241-A-302A, 241-U-301B, and 241-UX-302A). These 3 tanks contain approximately 12,615 gallons of liquids. These tanks are leak detection monitored based on the requirements identified in Section 4.0.

The MUSTs in the second group have been declared interim stabilized or meet the interim stabilization criteria (i.e., less than 400 gallons of drainable liquids) and are interim isolated. No MUSTs currently fall in this category but may in the future. These MUSTs are monitored (at

least annually) for liquid intrusions based on the BMPs identified in Section 5.0 of the main text using currently available intrusion monitoring systems supplemented by scheduled visual photographic inspections.

The MUSTS in the third group have been declared interim stabilized or meet the interim stabilization criteria, but have not been interim isolated. There are two MUSTs in this group: 241-S-304 and 241-TX-302C. These MUSTs currently store approximately 267 gallons of liquids. These MUSTs are periodically monitored (at least annually) for liquid intrusions based on the BMPs identified in Section 5.0 using currently available intrusion monitoring system supplemented by scheduled visual photographic inspections.

The remaining group of MUSTs consists of two MUSTs that contain an unknown inventory of liquids: 241-AX-151-CT and 241-BY-ITS2-Tank 2. These MUSTs require a liquid inventory assessment. Based on the results of that assessment, the MUSTs would be grouped into one of the three other categories and monitored accordingly.

B3.5 VESSELS AND CELLS IN MISCELLANEOUS STRUCTURES

Based on the requirements for LDM identified in Section 4.0 of the main text, the 17 vessels and cells in miscellaneous structures are grouped into three groups of vessels. Collectively these vessels store approximately 21,634 gallons of liquids (less than 1% of the liquids stored in the SST system).

The first group consists of eight vessels and cells that store a known liquid volume that exceeds the interim stabilization criteria (400 gallons). These vessels contain approximately 21,423 gallons of liquids. These vessels are leak detection monitored based on the requirements identified in Section 4.0. Table B-8 identifies the vessels in this group.

Table B-8. Vessels in Miscellaneous Structures Requiring Leak Detection and Monitoring

244-AR Cell 3	244-AR TK-003	244-CR Cell 3
244-AR TK-001	244-CR Cell 1	244-CR-CR-003
244-AR TK-002	244-CR Cell 2	

The second group consists of vessels and cells that have liquid volumes that meet the interim stabilization criteria (e.g., less than 400 gallons of drainable liquids) or are known to be empty. This group contains four vessels and cells. These vessels store approximately 211 gallons of liquids. These vessels do not require LDM based on their inability to leak significant volumes of liquid, their locations in facilities that would help to contain any leaks that occurred, and the technical impracticalities of retrieving such small volumes of liquid. Table B-9 identifies the vessels in this group.

Table B-9. Vessels in Miscellaneous Structures not Requiring Leak Detection and Monitoring

244-AR Cell 1*	244-AR TK-004*
244-AR Cell 2*	244-CR Cell 11

*Additional monitoring may be required under *Hanford Federal Facility Agreement and Consent Order* Milestone M-45-11.

The remaining group of five vessels and cells contain an unknown inventory of liquids. These vessels require a liquid inventory assessment. Based on the results of that assessment, the vessels would be grouped into one of the two other categories and monitored accordingly. Table B-10 identifies the vessels in this group.

Table B-10. Vessels in Miscellaneous Structures with Unknown Liquid Volumes

241-AX-IX Ion Exchange Unit	244-CR CR-002
241-BY-ITS1 In-Tank Solidification Unit	244-CR-011
244-CR CR-001	

This page intentionally left blank.

B4.0 REFERENCES

40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations*, as amended.

CHG-0007065-R2, 2001, *Evaluation of 120 SSTs That Have Been Interim Stabilized*, CH2M HILL Hanford Group, Inc., Richland, Washington.

CT-99-5076-EFS, 1999, Consent Decree between the State of Washington, Department of Energy (Plaintiff), and the United States Department of Energy (Defendant), August 16, 1999.

DOE/RL-89-16, *Single-Shell Tank Closure Work Plan*, Rev. 1, May 1996, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Richland, Washington.

HNF-EP-0182, Rev. 173, *Waste Tank Summary Report for Month Ending August 31, 2002*, CH2M HILL Hanford Group, Inc., Richland, Washington.

HNF-IP-0842, Vol. 4, Section 4.1, Rev. 3c, *Tank Farm Facility Interim Stabilization Evaluation*, CH2M HILL Hanford Group, Inc., Richland, Washington.

HNF-IP-0842, Vol. 4, Section 4.2, Rev. 0e, *Tank Farm Facility Interim Isolation*, CH2M HILL Hanford Group, Inc., Richland, Washington.

Public Law 101-510, Section 3137, 1990, *Safety Measures for Waste Tanks at Hanford Nuclear Reservation*, U.S. Congress, Washington, D.C. [Also referred to as the Wyden Amendment.]

Resource Conservation and Recovery Act of 1976, Public Law 94-580, 90 Stat. 2795, 42 USC 901 et seq.

RPP-7884, 2001, *Field Investigation Report for Waste Management Area S-SX*, Draft, CH2M HILL Hanford Group, Inc., Richland, Washington.

RPP-9645, 2002, *Single-Shell Tank System Surveillance and Monitoring Program*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

RPP-10435, 2002, *Single-Shell Tank System Integrity Assessment Report*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

WHC-EP-0182, Rev. 79, *Waste Tank Summary for Month Ending October 31, 1994*, Westinghouse Hanford Company, Richland, Washington.

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

This page intentionally left blank.

APPENDIX C
COST ANALYSIS

This page intentionally left blank.

APPENDIX C

COST ANALYSIS

This appendix provides rough order of magnitude budgetary estimates to accomplish the leak detection and monitoring system and programmatic upgrades needed to achieve compliance with the requirements established by this document.

All single-shell tank system components requiring leak detection and monitoring are specified in Appendix A. Appendix A lists the single-shell tanks, miscellaneous underground storage tanks, and vessels and cells in miscellaneous structures that require leak detection and monitoring as defined by this document.

Maintenance and surveillance costs are not included due to high variability based on the application. Costs associated with procedure changes due to leak detection and monitoring requirement changes are not included since costs will vary based on whether non-related changes are being incorporated into the subject procedures at the time.

Liquid Volume Assessment Cost Estimate

Activity ID	Activity	Cost ($)	Labor (hours)	Labor Category & Rates ($/hr)								
				Field Work Supervisor	Nuclear Process Operator	Radiation Protection Technician	Pipefitter	Camera Crew	Engineering	Planner	Radiation Control	Industrial Safety
				80	**55**	**65**	**55**	**55**	**70**	**65**	**70**	**40**
01	Perform Field Walkdown	820.00	12	4	4	--	--	--	4	--	--	--
02	Prepare Fieldwork Installation Package	3,880.00	56	--	--	--	--	--	8	40	8	4
03	Prepare Radiation Work Permit	2,800.00	40	--	--	--	--	--	--	--	40	--
04	Hold Enhanced Work Planning Meeting	3,100.00	48	4	8	4	8	12	4	4	4	4
05	Revise and Approve Work Package	1,040.00	14	2	--	--	--	--	2	8	2	2
06	Field Work Preparation	3,240.00	48	8	16	8	16	--	--	--	--	8
07	Perform Manual Tape Measurement / Video Inspection	4,460.00	68	8	16	8	16	12	8	--	--	8
08	Restore Field Conditions	1,620.00	24	4	8	4	8	--	--	--	--	4
					--							
	Sub total	20,960.00	310	30	52	24	48	24	26	52	54	30
	Contingency @ 30%	6,288.00					--					
	Total	**27,248.00**					--					

Assumptions: (1) Tanks readily accessible through available risers.
(2) Adequate liquid volume estimates can be made with manual tape and video data.

APPENDIX D
SCHEDULE ANALYSIS

This page intentionally left blank.

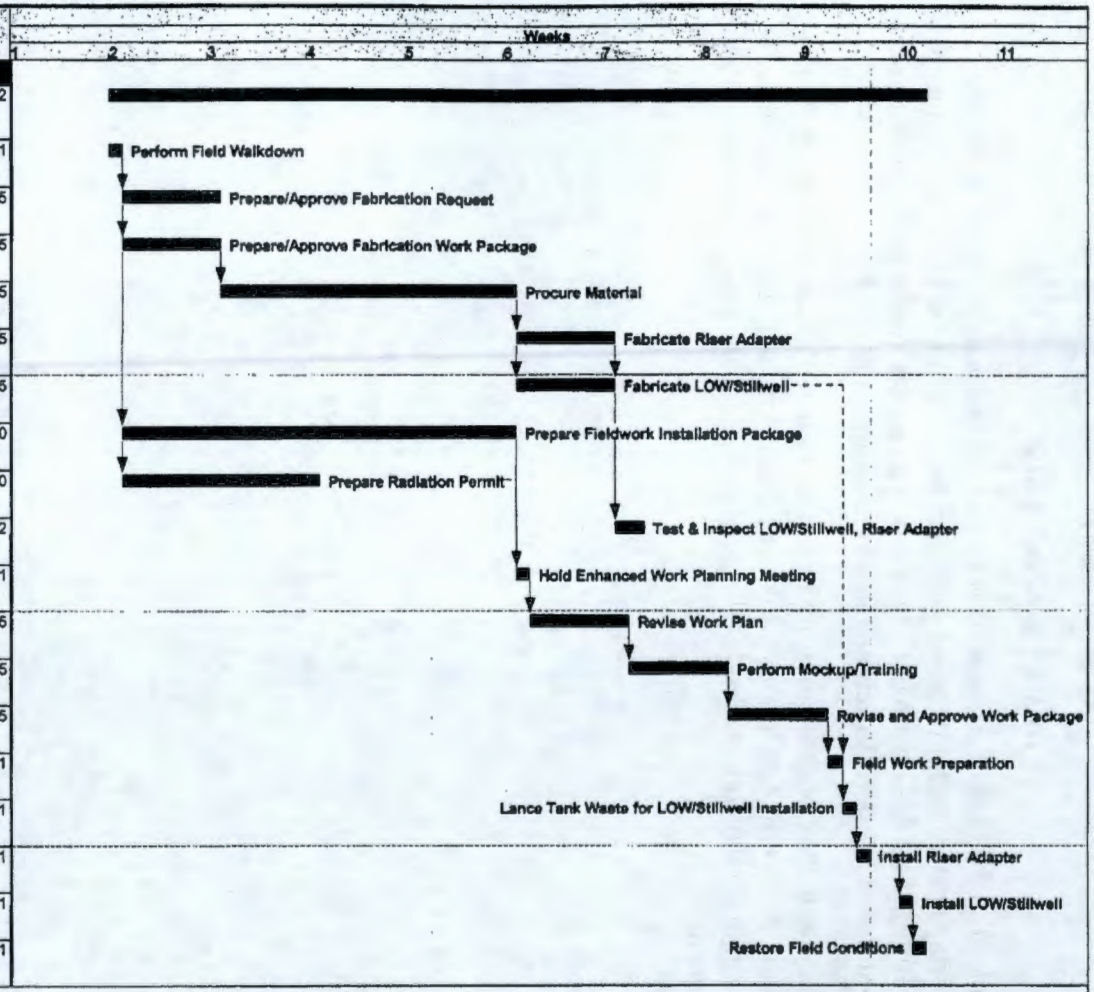
APPENDIX D

SCHEDULE ANALYSIS

This appendix provides rough order of magnitude schedule estimates to accomplish the leak detection and monitoring system and programmatic upgrades needed to achieve compliance with the requirements established by this document. This schedule shows estimated durations to perform upgrades, but does not establish actual dates to accomplish the work.

All single-shell tank system components requiring leak detection and monitoring are specified in Appendix A. Appendix A lists the single-shell tanks, miscellaneous underground storage tanks, and vessels and cells in miscellaneous structures that require leak detection and monitoring as defined by this document.

Activity ID	Activity Description	Orig Dur
Liquid Observation Well/Stillwell		
Total		42
01	Perform Field Walkdown	1
02	Prepare/Approve Fabrication Request	5
03	Prepare/Approve Fabrication Work Package	5
04	Procure Material	15
05	Fabricate Riser Adapter	5
06	Fabricate LOW/Stillwell	5
07	Prepare Fieldwork Installation Package	20
08	Prepare Radiation Permit	10
09	Test & Inspect LOW/Stillwell, Riser Adapter	2
10	Hold Enhanced Work Planning Meeting	1
11	Revise Work Plan	5
12	Perform Mockup/Training	5
13	Revise and Approve Work Package	5
14	Field Work Preparation	1
15	Lance Tank Waste for LOW/Stillwell Installation	1
16	Install Riser Adapter	1
17	Install LOW/Stillwell	1
18	Restore Field Conditions	1



JP01

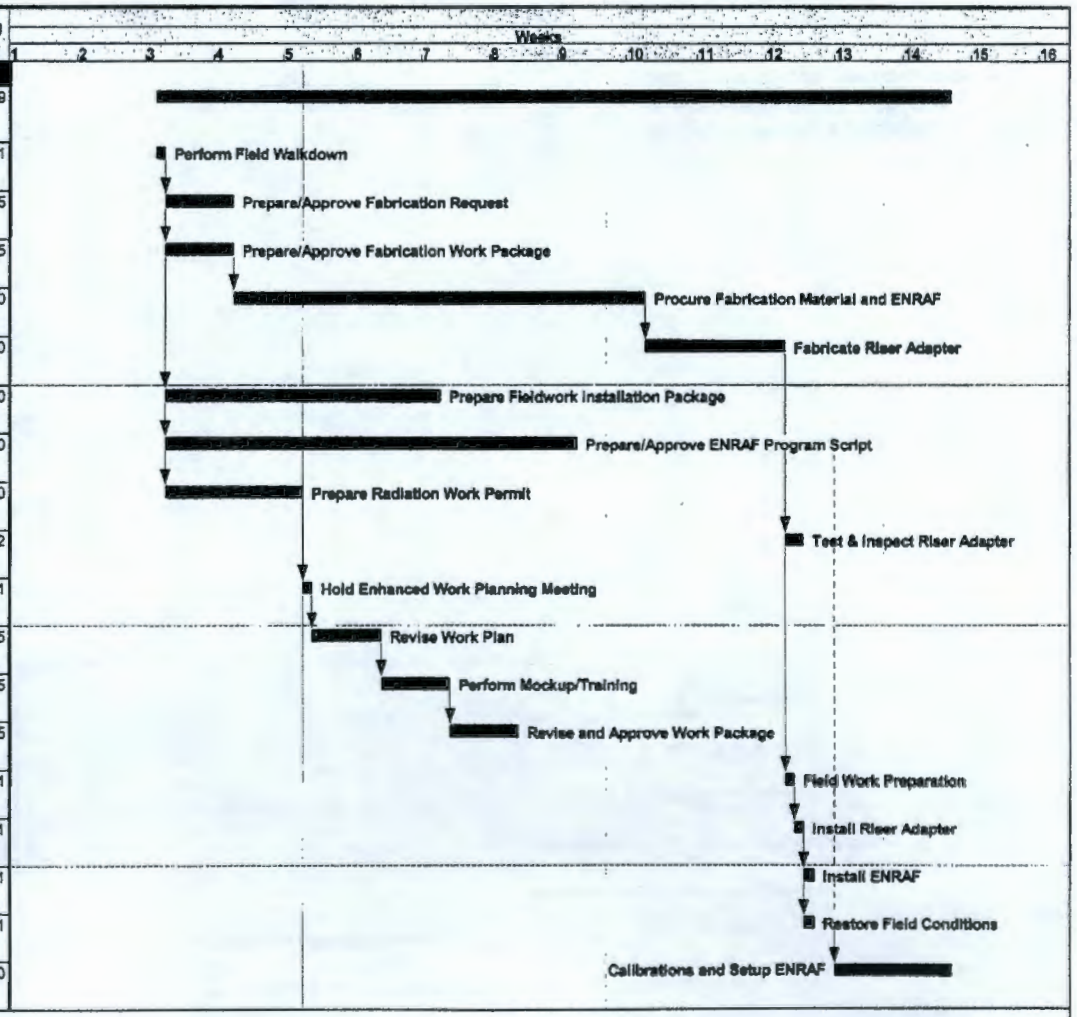
Sheet 1 of 1

Liquid Observation Well/Stillwell
Draft Schedule

Early Bar
Progress Bar
Critical Activity

© Primavera Systems, Inc.

Activity ID	Activity Description	Orig Dur
ENRAF		
Total		59
01	Perform Field Walkdown	1
02	Prepare/Approve Fabrication Request	5
03	Prepare/Approve Fabrication Work Package	5
04	Procure Fabrication Material and ENRAF	30
05	Fabricate Riser Adapter	10
06	Prepare Fieldwork Installation Package	20
07	Prepare/Approve ENRAF Program Script	30
08	Prepare Radiation Work Permit	10
09	Test & Inspect Riser Adapter	2
10	Hold Enhanced Work Planning Meeting	1
11	Revise Work Plan	5
12	Perform Mockup/Training	5
13	Revise and Approve Work Package	5
14	Field Work Preparation	1
15	Install Riser Adapter	1
16	Install ENRAF	1
17	Restore Field Conditions	1
18	Calibrations and Setup ENRAF	10



JP02

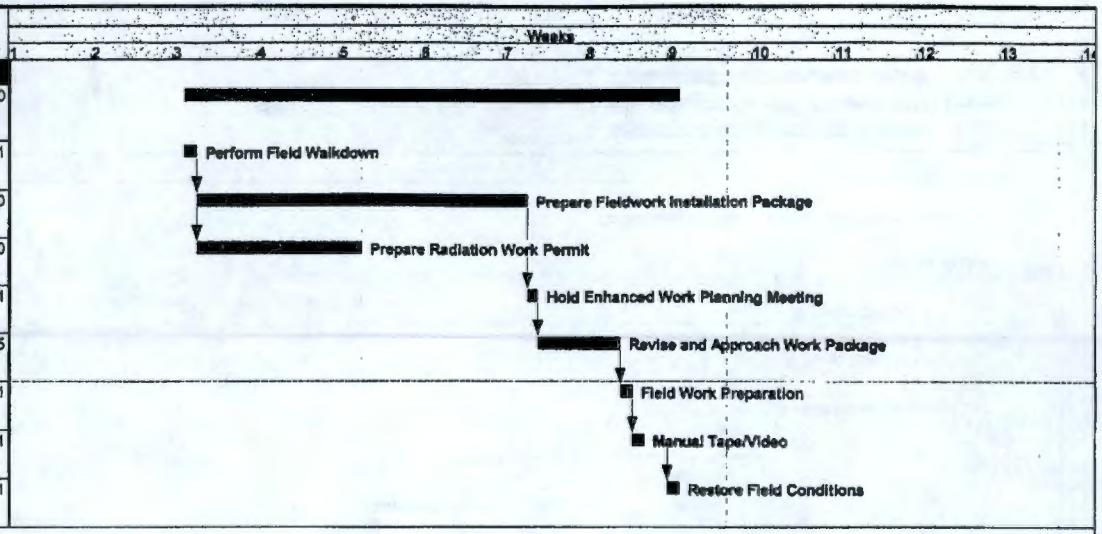
Sheet 1 of 1

ENRAF
Draft Schedule

Early Bar
Progress Bar
Critical Activity

© Primavera Systems, Inc.

Activity ID	Activity Description	Orig Dur
Must/Tanks in Misc. Structures		
Total		30
01	Perform Field Walkdown	1
02	Prepare Fieldwork Installation Package	20
03	Prepare Radiation Work Permit	10
04	Hold Enhanced Work Planning Meeting	1
05	Revise and Approach Work Package	5
06	Field Work Preparation	1
07	Manual Tape/Video	1
08	Restore Field Conditions	1



JP03

Sheet 1 of 1

MUST/TANKS IN MISC STRUCTURES
Draft Schedules

Early Bar
Progress Bar
Critical Activity

© Primavera Systems, Inc.