RPP-RPT-61279
Revision 0

Single-Shell Tank Farm Leak Inventory Assessments Summary

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Date Published
January 2019

Prepared for the U.S. Department of Energy
Office of River Protection

Contract No. DE-AC27-08RV14800

Approved for Public Release;
Further Dissemination Unlimited

EXECUTIVE SUMMARY

This Assessments Summary report summarizes single-shell tank (SST) farm leak inventory assessments conducted in accordance with RPP-32681, *Process to Assess Tank Farm Leaks in Support of Retrieval and Closure Planning.* These assessments were conducted in support of tank farm closure planning and were performed by teams consisting of technical staff from the Department of Energy Office of River Protection (ORP), State of Washington Department of Ecology (Ecology), and ORP contractors with expertise in past tank farm operations, tank sampling, geophysical logging and other vadose zone characterization, and in tank monitoring systems such as surface level, temperature and liquid observation well interstitial liquid measurements. Information used in the leak inventory assessments was assembled and presented to the team, reviewed and discussed, then documented in tank farm specific leak inventory assessment reports.

Leak inventory assessment reports were developed for each of the SST farms (See Table ES-1) over a period between years 2007 and 2017. These leak inventory assessment reports provide volume and inventory estimates for leaks or releases from tanks designated as "assumed leakers" and for tanks designated as "sound" in HNF-EP-0182, *Waste Tank Summary Report for Month Ending October 31, 2018*. The reports also provide volume estimates for other types of releases in the farms, inventory estimates for Cs-137 for leaks/releases and a basis for estimating other chemical and radionuclide inventories. These were not tank integrity assessments, however, when there appeared to be no leak/release from a tank or if contamination near a tank appeared to be from a source other than a tank leak, an integrity assessment was recommended.
An integrity assessment was also recommended, if there was evidence of a potential leak from a tank currently classified as "sound."

In this report tank "leaks" are defined as unplanned waste releases to the soil caused by a breech or "leak" in a tank steel liner; other unplanned release mechanisms, referred to as "releases", include waste releases from; failed transfer lines, tank cascade lines, tank spare inlet overflows, and spills. Tank integrity assessments conducted to date and results are included in the assessments summary and in Table 4-2 of HNF-EP-0182.

This Assessments Summary presents current and past tank farm leak/release volume estimates, reasons for changes, and tanks recommended for integrity assessments. Only leaks/releases from SSTs or associated with SSTs are included in the Assessments Summary. Planned releases to cribs, trenches or other facilities are not included in this report. For some tank leaks/releases, historical records confirm the waste loss event and provide a strong technical basis for leak volume and inventory estimates. However, for many leaks/releases little data were available and varying degrees of uncertainty or differences exist in the available data. In general, leak/release volume estimates are provided as either an upper bound or range of estimates. The leak/release volumes and inventories are expected to be revised as additional data is obtained through field investigations conducted during the tank farm closure process. These revisions will be incorporated, as appropriate, in future reports.

Table ES-1. Tank Farm Leak Inventory Assessment Reports

Tank Farm	Document Number	Release Dates
A	RPP-ENV-37956, *Hanford 241-A and 241-AX Tank Farms Leak Inventory Assessment Report*	8/20/2008 Rev 0 8/26/2008, Rev 1 9/25/2014, Rev 2 10/18/2017, Rev 3
AX	RPP-ENV-37956, *Hanford 241-A and 241-AX Tank Farms Leak Inventory Assessment Report*	8/20/2008 Rev 0 8/26/2008, Rev 1 9/25/2014, Rev 2 10/18/2017, Rev 3
B	RPP-RPT-49089, *Hanford B-Farm Leak Inventory Assessments Report*	9/19/2011, Rev 0
BX	RPP-RPT-47562, *Hanford BX-Farm Leak Assessments Report*	2/3/2011, Rev 0
BY	RPP-RPT-43704, *Hanford BY-Farm Leak Assessments Report*	1/26/2011, Rev 0
C	RPP-ENV-33418, *Hanford C-Farm Leak Inventory Assessments Report*	6/19/2007, Rev 0 2/26/2008, Rev 1 11/21/2011 Rev 2 3/10/2015, Rev. 3 3/21/2016 Rev 4
S	RPP-RPT-48589, *Hanford S-Farm Leak Assessment Report*	5/19/2011, Rev 0
SX	RPP-ENV-39658, *Hanford SX-Farm Leak Assessments Report*	2/23/2010, Rev 0
T	RPP-RPT-55084, *Hanford T-Farm Leak Inventory Assessment Report*	8/21/2013, Rev 0
TX	RPP-RPT-50870, *Hanford TX-Farm Leak Inventory Assessment Report*	8/15/2013, Rev 0
TY	RPP-RPT-42296, *Hanford TY-Farm Leak Assessments Report*	4/15/2010, Rev 0
U	RPP-RPT-50097, *Hanford 241-U-Farm Leak Inventory Assessment Report*	9/27/2011, Rev 0

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LIST OF TERMS

Abbreviations and Acronyms

bgs	below ground surface
Ecology	State of Washington Department of Ecology
HDW	Hanford Defined Waste
ILL	Interstitial liquid level
ITS	in-tank solidification
IX	ion exchange
ORP	U.S. Department of Energy Office of River Protection
RCRA	*Resource Conservation and Recovery Act of 1976*
SGLS	Spectral gamma logging system
SIM	Soil Inventory Model
SST	Single-shell tank
TRAC	Track Radioactive Components
TWINS	Tank Waste Information Network System
UPR	unplanned release
WMA	waste management area

Units

Ci	Curies
gal	gallons
pCi/g	picocuries per gram

Waste Types

1C	Bismouth phosphate first cycle decontamination/coating waste (1944-1956)
2C	Bismouth phosphate second cycle decontamination/coating waste (1944-1956)
224	Lanthanum fluoride process 224 Building waste (1944-1956)
BL	B Plant low-activity waste (1967-1976)
CSR	Supernatants from which cesium has been removed by ion-exchange (1962-1967) and B Plant Waste Fractionization (1967-1976)
CWP1	PUREX cladding waste, aluminum clad fuel (1956-1960)
CWP2	PUREX cladding waste, aluminum clad fuel (1961-1972)
CWR1	REDOX cladding waste, aluminum clad fuel (1952-1960)
MW1	Bismouth phosphate Metal Waste (1944-1949)
MW2	Bismouth phosphate Metal Waste (1950-1956)
P1	PUREX high-level waste (1956-1962)
P2	PUREX high-level waste (1963-1967)
R1	REDOX high-level waste (1952-1958)
R2	REDOX high-level waste (1959-1966)
R-Sltck	Saltcake from self-concentration in 241-S and 241-SX Farms (1952-1966)
SRR	High-activity waste from B Plant processing of PUREX acidified sludge (PAS), solids centrifuged from AR vault feed, strontium purification wastes after solvent extraction (SX), and ion exchange (IX) rework (1969-1985)
T1-Sltck	Saltcake from the 242-T Evaporator (1951-1955)
T2-Sltck	Saltcake from the last 242-T Evaporator campaign (1965-1976)
TBP	Tributyl phosphate process waste (1952-1957)

1.0 INTRODUCTION

This report summarizes single-shell tank (SST) farm leak inventory assessments conducted from 2007 to 2017 in accordance with RPP-32681, *Process to Assess Tank Farm Leaks in Support of Retrieval and Closure Planning;* tank farm leak inventory assessment process.

In response to comments on the *Initial Single-Shell Tank System Performance Assessment for the Hanford Site* (DOE/ORP-2005-01) and supporting document *Tank Farm Vadose Zone Contamination Estimates* (RPP-23405), the U.S. Department of Energy Office of River Protection (ORP) worked collaboratively with the State of Washington Department of Ecology (Ecology) to develop RPP-32681. The outcome of this process was a series of assessment reports (See Table ES-1) for the SST farms that provide a technical basis for leak/release volume estimates and inventories for tanks and other releases. In these reports "leaks" are defined as unplanned waste releases to the soil caused by a breech or "leak" in a tank steel liner. Other unplanned release mechanisms, classified as "releases" in this report, include; failed transfer lines, tank cascade lines, tank spare inlet overflows, and surface spills.

The tank farm leak inventory assessments were conducted by a team consisting of Ecology, ORP, and ORP contractors with expertise in past tank farm operations, tank sampling, geophysical logging and other vadose zone characterization, and in tank monitoring systems such as surface level, temperature and liquid observation well interstitial liquid level (ILL) measurements. For each tank farm, information was assembled and presented to ORP and Ecology, reviewed and discussed, then documented in an assessment report.

The tank farm leak inventory assessment reports include the following:

- Background Information
  - Tank farm description
  - In-tank and vadose zone monitoring
  - Retained gas evaluations
  - Surface geophysical resistivity explorations
  - Groundwater contamination from leaks/releases
- Assessment discussion and results:
  - Assumed leakers
    - Basis for current leak classification of tank
    - Leak inventory assessment considerations
    - Conclusion and recommendations
  - Sound tanks
  - Other quantified releases
- Other unquantified releases or potential releases
- Planned releases to facilities near a tank farm (Cribs, trenches, etc.)
- Leak inventory assessment meeting summaries (Appendix A).

- Tank farm leak/release information (Appendix B and C)
  - Tank by tank process waste histories
  - Tank surface level measurements
  - Vadose zone logging and sample data

When the tank farm leak inventory assessments started in 2007, 67 of 149 SSTs were designated as "confirmed or assumed leakers." HNF-EP-0182 defines "assumed leaker" as "The integrity classification of a waste storage tank for which surveillance data indicate a loss of liquid attributed to a breach of integrity" (i.e., a breach in the tank liner). Conversely, a sound tank is classified as "the integrity classification of a waste storage tank for which surveillance data indicate no loss of liquid attributed to a breach of integrity."

In the tank farm leak inventory assessments process, inventories of leaks/releases were estimated by multiplying the estimated leak/release volume by the assumed contaminant concentration in the solution released to the soil. The assumed concentration of the solution released is based on process knowledge of the waste composition in the tank at the time the release occurred. Concentrations were based on a combination of sample data near the assumed time of the release (when available) and Hanford Defined Waste (HDW) model waste type concentration estimates (RPP-19822, *Hanford Defined Waste Model – Revision 5.0*). For some major releases, historical records confirm the waste loss event and provide a strong technical basis for leak volume and inventory estimates. However, for many releases little data were available and varying degrees of uncertainty or differences exist in the available data. In general, leak volume estimates are provided as upper bound estimates or ranges of estimates.

In the tank farm leak inventory assessment reports, if releases, previously assumed to be from tank liner leaks, appeared to be from another source or if there appeared to be no release, an integrity assessment (TFC-ENG-CHEM-D-42, "Tank Leak Assessment Process" procedure) was recommended. Likewise, an integrity assessment was recommended if a tank was classified as sound, but a release was identified near the tank that could be from a tank liner leak. The tank farm leak inventory assessment reports also contain recommendations for additional characterization for some releases. These recommendations are included in Chapter 5 of this report. Characterization recommendations will be considered in future data quality objectives workshops in support of performance assessments and corrective action management studies.

The initial focus of the RPP-32681 process was to assess leak inventories for tanks designated in HNF-EP-0182, monthly waste tank summary reports, as assumed leakers. As assessments progressed the scope expanded to all of the tanks and other releases in the farms. Additional assessments were performed and assessment documents were revised for C-Farm and A and AX-Farms as new characterization data was obtained and additional information or incites found as a result of closure investigations and/or development of performance assessments.
This resulted in changes to leak volumes and inventories and identifying additional release sources for these farms.

This report provides a technical basis for tank leak/release volumes to be reported in future revisions of HNF-EP-0182. Chapter 2 describes objectives and scope of this report and the tank farm leak inventory assessment process. Chapter 3 shows the types and sources of information

collected for assessments, Chapter 4 discusses key assessment considerations, Chapter 5 summarizes tank farm leak inventory assessment results, the basis for previous leak volume estimates and basis for current leak volume and inventory estimates, and Chapter 6 is a brief conclusion. Sources of uncertainty in leak volume and inventory estimates are discussed in Chapter 7 of RPP-32681. More detailed evaluations of locations and causes of tank liner leaks, described in Chapter 8 of RPP-32681, are summarized in RPP-RPT-54909, *Hanford Single-Shell Tanks Leak Location and Cause: Summary Report.*

2.0 OBJECTIVES AND SCOPE

The primary purpose of this report is to summarize SST leak/release volumes and inventories from tank farm leak inventory assessment reports (Table ES-1) developed by the RPP-32681 process. Although initial inventory assessments have been completed for all of the tanks and inventory assessment reports are referenced in HNF-EP-0182, few changes to tank leak volume estimates have been made in Table 4-2 of the HNF-EP-0182 monthly reports. This report provides a technical basis to update leak volume estimates in HNF-EP-0182 and a single source summarizing tank farm leak inventory assessment results to date. Planned releases to cribs, trenches or other facilities in or near the tank farms are not included in this Assessment Summary report.

The purpose of the tank farm leak assessment process was to achieve technically defensible leak volume and inventory estimates in support of SST retrieval and closure planning using an established methodology and consistent process.

Questions answered during the process included:

- What is the source of the release?
- When did the release occur?
- If a tank leak, is it a tank bottom or side leak; where is the leak located?
- What type of waste was released?
- What data are available to describe the release?
- What was the past estimate for the release volume and its uncertainty?
- What was the past estimate for the mass of contaminants released and its uncertainty?
- Were there previous analyses of waste released from this facility?
- What is the current volume and inventory for this release?
- Why is the current analysis superior to past estimates?

Descriptions of the tank farm leak estimates for each event included discussions of:

- Source and estimated time of tank leaks
- Waste type and waste composition estimates
- Volume and inventory estimates for leaks, spills, and other unplanned releases to the vadose zone from tank farm equipment and operations, uncertainty estimates or ranges for volumes, concentrations, and inventories
- Inventory calculations for Cs-137, at a minimum, and a technical basis to estimate inventory values for 25 chemicals and 46 radionuclides.

- (Note: The chemicals and radionuclides evaluated in the tank farm leak inventory assessments are the same as those used for Best-Basis Inventory standard constituents in RPP-7625, *Best-Basis Inventory Process Requirements.* These constituents account for approximately 99 weight percent of the chemical content and over 99 percent of the radionuclide activity (Ci), in terms of short and long-term risk (WHC-SD-WM-TI-731, *Predominant Radionuclides in Hanford Site Waste Tanks*).

3.0 INFORMATION EVALUATED IN ASSESSMENTS

As applicable, the information shown in Table 3-1 and other applicable information was evaluated by the assessment team.

Table 3-1. Types of Information and Sources for Tank Farm Leak Inventory Assessments (3 pages).

Type of Information	Examples
In-tank liquid level measurements	Liquid level surveillance records
	Hanford process records
Waste transfer records	RPP-19822, *Hanford Defined Waste Model-Rev. 5*
	WHC-MR-0132, *A History of the 200 Area Tank Farm*
Historical Tank Sampling Results	Historical tank sampling and analysis reports and historical analytical data in the Tank Waste Information Network System (TWINS)
Tank process reports and assessments	HNF-EP-0182, and earlier waste tank summary reports
	LA-UR-97-311, *Waste Status and Transaction Record Summary*
	RPP-RPT-29191, 2006, *Supplemental Information Hanford Tank Waste Leaks*
	Quarterly and monthly tank process records
	Occurrence Reports
	8901832B, 1989, *Single-Shell Tank Leak Volumes*
	HNF-2603, *A Summary and Evaluation of Hanford Site Tank Farm Subsurface Contamination*
	HNF-4872, *Single-Shell Tank Leak History Compilation*
	SD-WM-TI-356, *Waste Storage Tank Status and Leak Detection Criteria*
	RHO-CD-896, *Review of Classification of Nine Hanford Single-Shell "Questionable Integrity" Tanks*
	RPP-10435, *Single-Shell Tank Integrity Assessment Report*
Vadose Zone Program field investigation results	Farm and tank specific grand junction geophysical logging reports and addendums (GJ-HAN)
	HNF-4936, *Subsurface Conditions Description Report for the S-SX Waste Management Area*
	HNF-5507, *Subsurface Conditions Description Report for the B & BX & BY Waste Management Area*
	RPP-7123, *Subsurface Conditions Description Report for the T & TX-TY Waste Management Areas*
	RPP-14430, *Subsurface Conditions Description Report for the C & A-AX Waste Management Areas*
	RPP-15808, *Subsurface Conditions Description Report for the U Waste Management Area*
	HNF-5231, *Historical Vadose Zone Contamination from B, BX, and BY Tank Farm Operations*
	RPP-6285, *Inventory Estimates for Single-Shell Tank Leaks in S and SX Tank Farms*

Table 3-1. Types of Information and Sources for Tank Farm Leak Inventory Assessments (3 pages).

Type of Information	Examples
	RPP-7218, *Preliminary Inventory Estimates for Single-Shell Tank Leaks in T, TX, and TY Tank Farms*
	RPP-7389, *Preliminary Inventory Estimates for Single-Shell Tank Leaks in B, BX, and BY Tank Farms*
	RPP-7494, *Historical Vadose Zone Contamination from A, AX, and C Tank Farm Operations*
	RPP-7580, *Historical Vadose Zone Contamination from U-Farm Operations*
	RPP-7884, *Field Investigation Report for Waste Management Area S-SX*
	RPP-10098, *Field Investigation Report for Waste Management Area B-BX-BY*
	RPP-23752, *Field Investigation Report for Waste Management Area T-TX/TY*
	RPP-20820, *Waste Retrieval Leak Evaluation Report: Single-Shell Tanks*
	DOE/ORP-2005-01, *Preliminary SST Performance Assessment for the Hanford Site*
	RPP-26744, *Hanford Soil Inventory Model, Rev. 1*
	GJO-2003-545-TAC, *Hanford 200 Areas Spectral Gamma Baseline Characterization Project: B-BX-BY WMA and Adjacent Waste Sites Summary Report*
	Tribal and Stakeholder correspondence and related reports
Gross gamma and spectral gamma logging data	RPP-8820, *Analysis and Summary Report of Historical Dry Well Gamma Logs for the 241-A Tank Farm – 200 East*
	RPP-8821, *Analysis and Summary Report of Historical Dry Well Gamma Logs for the 241-AX Tank Farm – 200 East*
	HNF-5433, *Analysis and Summary Report of Historical Dry Well Gamma Logs for the 241-B Tank Farm – 200 East*
	HNF-3531, *Analysis of Historical Gross Gamma Logging Data from BX Tank Farm*
	HNF-3532, *Analysis of Historical Gross Gamma Logging from BY Tank Farm*
	RPP-8321, *Analysis and Summary Report of Historical Dry Well Gamma Logging Logs for the 241-C Tank Farm – 200 East Area*
	HNF-4220, *Analysis and Summary of Historical Dry Well Gamma Logs for S Tank Farm – 200 West*
	HNF-3136, *Analysis Techniques and Monitoring Results, 241-SX Drywell Surveillance Logs*
	RPP-6088, *Analysis and Summary Report of Historical Dry Well Gamma Logs for the 241-T Tank Farm – 200 West*
	RPP-6353, *Analysis and Summary Report of Historical Dry Well Gamma Logs for the 241-TX Tank Farm – 200 West*
	HNF-3831, *Analysis of Historical Gross Gamma Logging Data from 241-TY Tank Farm*
	RPP-7729, *Analysis and Summary Report of Historical Dry Well Gamma Logging Logs for the 241-U Tank Farm 200 West Area*
	Annual geophysical logging monitoring reports

Table 3-1. Types of Information and Sources for Tank Farm Leak Inventory Assessments (3 pages).

Type of Information	Examples
Groundwater data	Annual and quarterly groundwater reports and Hanford Environmental Information System (HEIS) data
Lateral data	RPP-RPT-27605, *Gamma Surveys of Single-Shell Tank Laterals for A and SX Tank Farms*
SGE/direct push data	Surface Geophysical Exploration (SGE) resistivity reports.
	Direct push logging and sample analysis reports

4.0 KEY ASSESSMENT PARAMETERS AND GUIDELINES

The key parameters used to estimate leak/release inventories in the tank farm leak inventory assessment process include:

- Volume of the leaks/release
- Date of the leak/release
- Composition of leak/release

Figure 4-1 shows a schematic of the process.

4.1 LEAK/RELEASE VOLUME

Previous tank leak volume estimates for tanks classified as assumed leakers are summarized in HNF-EP-0182, Table 4-2. The historical basis for these estimates and criteria for designating tanks as assumed leakers is summarized in Table 5-1. As of January 2019, except for tanks reclassified as "sound," the leak volume estimates in HNF-EP-0182, Table 4-2 have not changed since 1990.

Vadose zone field investigations, reassessment of data and available information, and efforts to develop tank leak/release inventories resulted in different leak/release volume estimates for many of the tanks. Leak/release volume estimates are based on liquid level decreases, flow rate data or geophysical logging data and tank waste concentrations.

The process used to estimate volumes of leaks/releases was as follows:

1. Determine the basis used for previous leak/release volume estimates, if any.

2. Identify additional information (either generated before but not necessarily used for the tank leak or unplanned release (UPR) volume estimates, or subsequently derived information about the leak/release event) that also relates to leak volume estimates.

3. Examine the collective set of information. Begin with liquid level measurements, then review waste composition assumptions and nearby drywell/lateral spectral gamma data and gross gamma data. Table 5-1 identifies data sources and waste volume data types to be examined.

4. Determine the nature and validity of data and previous assessments.

5. Use the valid information to estimate leak/release volumes and uncertainty ranges.

For liquid level decreases in tanks, the decrease, in inches, is multiplied by 2750 gal/inch to calculate a leak/release volume. This is the preferred and simplest method to determine a leak/release volume. However, tank liquid level decreases may be due to factors other than a tank leak/release. This could include changes in liquid levels due to evaporation, gas release

episodes, settling or consolidation of waste, a bulge in the tank bottom, and instrument error. Liquid level changes may also be masked by frequent waste transfers and no liquid level change may be observed for a small leak/release. During operations an uncertainty of ~2" (5,000 gal) was used for manual tape measurements and ~1" (2,000 gal) for other surface level measurements (WHC-SD-WM-TI-356, *Waste Storage Tank Status and Leak Detection Criteria*).

Operations data showing release volume estimates based on flow rates were available for some releases; primarily associated with transfer line releases.

For leak/release volume estimates based on drywell data, the total radioactivity of the plume (generally Cs-137, but sometimes Co-60 or U-238) was estimated based on the extent of radioactive plume indicated by the drywell data and tank visualizations in logging reports and either logging concentration data or assuming Cs-137 is at saturated soil concentration levels (4.0E+7 pCi/g, RPP-ENV-33418, *C-Farm Tank Leak Inventory Assessment Report*, Appendix C). While other gamma isotopes may be detected, Cs-137 is largely immobile and generally provides the best indication to determine the amount of tank waste released to the ground. A leak/release volume is estimated by first multiplying the contaminated sediment volume by Cs-137 concentrations in the soil to calculate Cs-137 activity (Ci), then dividing Cs-137 activity by the assumed concentration of Cs-137 in a tank at the time of release.

4.2 DATE OF LEAK/RELEASE

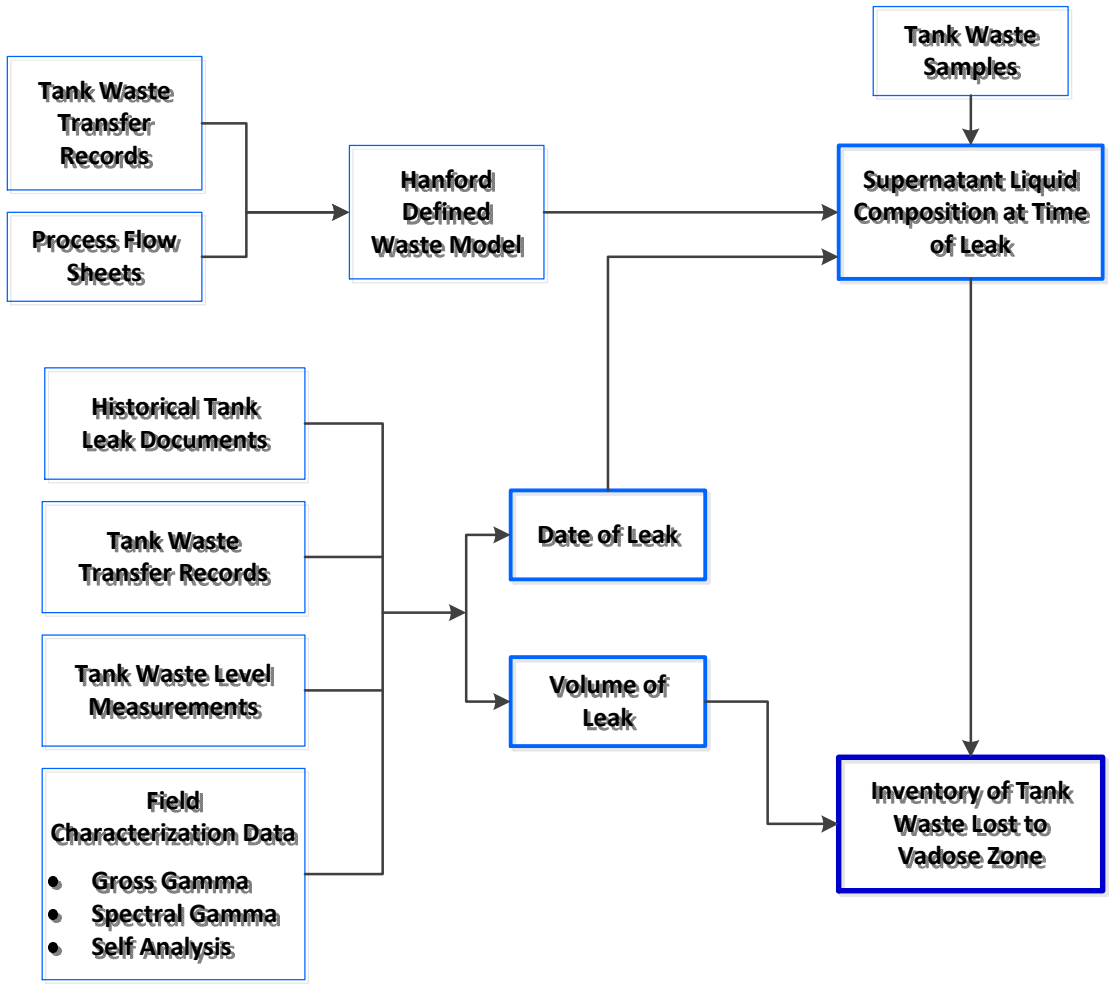
The "date of leak" is when the leak is estimated to have started and the duration. The "date of leak" is important because tank waste compositions changed during decades of tank farm operations as different waste types were routed through the tank farm system. The "date of leak" is less important if waste transfers to a tank were infrequent and the supernatant composition was relatively constant. In most cases involving large confirmed leaks, a liquid level decrease was observed in a tank and a start and end leak date could easily be determined. For small leaks or assumed leaks based only on detected radioactivity increases in nearby drywells the "date of leak" may be highly uncertain depending on the frequency of drywell monitoring. It is difficult to detect and/or measure small liquid level decreases associated with small leaks. The date of the first detection may be quite different from the date of release; e.g., a small volume release may take months to years to reach a drywell, and in the interval, the composition of the supernate may have changed or drywells may not have been installed for many years after a leak occurred.

In general, the "date-of-leak" is after the last waste transfer into a tank and prior to an estimated leak date or when waste status transfer records or liquid level measurements indicate an unexplained liquid-level decrease. When in doubt, a year was selected in which a tank or UPR had a conservatively high waste composition (i.e., a high radioactivity). The "date of leak" is not necessarily the year when a leak was declared and not necessarily when a leak was assumed to have occurred.

4.3 WASTE COMPOSITION

The waste composition at the time of leak is complicated by the many different waste streams that passed through a tank and the lack of detailed information showing how waste streams mixed within the tank system before the leak occurred. Most leaks are assumed to be primarily supernatant releases. Only a few releases were assumed to contain solids particles.

Figure 4-1. Process to Estimate Leak/Release Inventories.



HDW model supernatant concentrations (RPP-19822, *Hanford Defined Waste Model – Revision 5.0*) for an assumed waste type multiplied by the estimated leak volume were recommended to estimate inventories for other constituents, but the HDW concentrations were multiplied by the ratio of Cs-137 in tank samples, assumed to be representative of the waste leaked, to the HDW Cs-concentration for that waste type. This approach assumes the relative proportion of HDW constituents for a given waste type should not vary, and Cs-137 analyses provide a reasonable ratio to adjust all other HDW estimates. Until 2013, Soil Inventory Model (SIM) concentrations for a tank leak/release (RPP-26744), multiplied by Cs-137 ratios (Cs-137 sample result: Cs-137

in SIM) were used for other constituents. The SIM estimates a mixture of HDW waste type concentrations in tank supernatant at the assumed time of a leak/release which should be more accurate. However, due to uncertainties in SIM, plans to revise it, and the need to estimate inventories for releases not included in SIM, a decision was made to use only the predominant HDW waste type to estimate leak/release inventories for constituents other than Cs-137 rather than using SIM estimates. When Cs-137 sample analyses were not available, HDW concentrations for an assumed waste type were used directly to estimate inventories for other constituents.

4.4 LEAK/RELEASE INVENTORY

When the leak/release volume is estimated based on a measured liquid level decrease in a tank, inventory leak estimates are a simple calculation of the liquid waste composition at the time of a leak multiplied by the leak volume. When no apparent liquid level decrease exists or the liquid level changes are inconclusive, a radionuclide inventory (typically Cs-137) is estimated based on vadose zone measurements of contamination from drywells, direct push holes or laterals.
The Cs-137 logging results or saturated Cs-137 concentration in soils is multiplied by the estimated volume of soil impacted by the plume to calculate a Cs-137 inventory (Ci).
The Cs-137 inventory is divided by the Cs-137 concentration of waste leaked (See Section 4.3) to calculate volume.

5.0 TANK FARM LEAK INVENTORY ASSESSMENT RESULTS

The following sections summarize tank farm leak inventory assessment results for all SST farms. Other releases were identified, but could not be quantified. Detailed assessment evaluations are provided in assessment reports (Table ES-1).

Each section in this chapter includes the following:

- Number of tanks designated as assumed leakers and number of sound tanks in a farm.
- Tank integrity assessments completed and changes from previous tank integrity classifications.
- Other unplanned releases in a tank farm. Tanks recommended for integrity evaluations and other recommendations.

Table 5-1, summarizes past and current leak/release volume and inventory estimates for each of the SST farms and includes the following columns:

- Tank or Release Identification Number
- HNF-EP-0182, Rev. 370
  - Integrity Classification
  - Tank leak volume estimate (gal)
- Historical Tank leak volume Basis
- Tank Leak Inventory Assessment Report Number(s) and Date(s) for a farm
  - Leak/release volume estimate (gal)
  - Leak/release volume basis/ reason for change from HNF-EP-0182.
  - Leak/release inventories for Cs-137 (Ci)
  - Basis for concentration estimates.
- Tank Integrity
  - Integrity Status

5.1 A-FARM

There are 6 SSTs in A-Farm. Tanks A-104 and A-105 are classified as “assumed leakers” and tanks A-101, A-102, A-103 and A-106 are classified as “sound.” Leak volumes and inventories were estimated for tanks A-104 and A-105 (RPP-ENV-37956, *Hanford 241-A and 241-AX Tank Farms Leak Inventory Assessment Report*). The leak volume estimate for A-105 includes cooling water. WHC-MR-0264, *Tank 241-A-105 Leak Assessment*, estimates nearly all of the 610 kgal of cooling water added to tank A-105 may have evaporated. WHC-EP-0410, *Tank 241-A-105 Evaporation Estimate 1970 through 1978*, estimates as little as 378 kgal may have evaporated. The estimated volume of cooling water leaked ranges from 0 to 232 kgal.

Tank A-103 was previously classified as an assumed leaker. An integrity assessment was completed for Tank A-103 in 2009 (RPP-ASMT-42278, *Tank 241-A-103 Leak Assessment*

Report). Liquid level decreases in tank A-103, previously assumed to be an indication of a tank leak, were determined to be due to a retained gas release and Cs-137 content in drywell 10-03-07 from tank bottom to 110 ft. bgs (the bottom of the drywell) was from a nearby release. No other tank integrity assessments were recommended for A-Farm tanks. Table 5-1 shows leak volume estimates in HNF-EP-0182, leak/release volume and Cs-137 inventory estimates reported in RPP-ENV-37956, and the basis for the estimates and reasons for changes.

Additional characterization was recommended near tank A-104 to better assess the volume and extent of the leak and for tank A-105 to assess assumptions that waste did not migrate below the laterals or further toward the middle of the tank.

5.2 AX-FARM

All four SSTs in AX-Farm are classified as "sound." Tanks AX-102 and AX-104 were previously classified as assumed leakers and recommended for integrity assessments. No leak volume were estimated for AX-Farm tanks (RPP-ENV-37956, *Hanford 241-A and 241-AX Tank Farms Leak Inventory Assessment Report*). Integrity assessments were completed for these tanks in 2016 (RPP-ASMT-42628, *Tank 241-AX-102 Leak Assessment Report* and RPP-ASMT-57574, *Tank 241-AX-104 Leak Assessment Report*). Dry well contamination near tanks AX-102 and AX-104, previously assumed to be an indication of a tank leak, was determined to be from sources other than a tank leak (see Table 5-2). No other tank integrity assessments were recommended. Table 5-1 shows leak volume estimates in HNF-EP-0182 leak/release volume and Cs-137 inventory estimates reported in RPP-ENV-37956, and the basis for the estimates and reasons for changes.

No additional characterization was recommended for AX-Farm.

5.3 B-FARM

Twelve, 100-series 530 kgal SSTs and four 200-series SSTs (55 kgal) are in B-Farm. Ten of the tanks are classified as "assumed leakers" (B-103, B-105, B-107, B-110, B-111, B-112, B-201, B-202, B-203 and B-204) and all other SSTs are classified as "sound." Leak/release volumes were estimated for 5 of the tanks (B-101, B-105, B-107, B-110 and B-112). There appeared to be little or no release for the other 5 tanks (RPP-RPT-49089, *Hanford B-Farm Leak Inventory Assessments Report*). Integrity assessments were recommended for all of the tanks classified as assumed leakers except for B-107 which showed clear indications of a liner leak. An integrity assessment was also recommended for tank B-106, currently classified as sound. Table 5-1 shows leak volume estimates in HNF-EP-0182, leak/release volume estimates and Cs-137 inventories reported in RPP-RPT-49089, and the basis for estimates and reasons for changes.

The following additional characterization was recommended:

- 3-dimensional resistivity measurements near tank B-110 to help assess the extent of line leaks and potentially distinguish between line leaks or a tank leak.

- Installation of drywells for spectral logging with a high resolution HPGe detection system near the B-Farm 200-series tanks and/or direct push logging and sampling to further characterize waste releases in this area.
- A direct push between tank B-106 and drywell 20-06-06 to determine the source of gamma activity at 50 ft. bgs

5.4 BX-FARM

Twelve, 100-series 530 kgal SSTs are in BX-Farm. Five of the tanks are classified as "assumed leakers" (BX-101, BX-102, BX-108, BX-110 and BX-111) and all other SSTs are classified as "sound." Leak/release volumes were estimated for tanks BX-101 and BX-102, assumed to have leaked and tanks (BX-106 and BX-107), classified as sound. No release was determined for other tanks. Based on dry well data, release volumes, if any, for tanks BX-108, BX-110 and BX-111 appeared to be small (RPP-RPT-47562, *Hanford BX-Farm Leak Assessments Report*). Integrity assessments were recommended for all of the tanks classified as assumed leakers, and an integrity assessment or verification of a transfer line leak was recommended for tank BX-107, classified as sound. Table 5-1 shows leak volume estimates in HNF-EP-0182, leak/release volume estimates reported in RPP-RPT-47562 and the basis for estimates and reasons for changes.

Additional characterization near tank BX-101 and near surface characterization was recommended to better quantify leak/release volumes and inventories.

5.5 BY-FARM

Twelve 100-series 750 kgal SSTs are in BY-Farm. Five of the tanks are classified as "assumed leakers" (BY-103, BY-105, BY-106, BY-107 and BY-108), other SSTs are classified as "sound." Leak/release volumes were estimated for tanks BY-103 and BY-107, assumed to have leaked, and tanks BY-101and BY-102, classified as sound (RPP-RPT-43704, *Hanford BY-Farm Leak Assessments Report*). However, many "sound" tanks showed similar drywell contamination as the tanks designated "assumed leaker," with Co-60 deep in the vadose zone and little Cs-137 or other gamma activity above it, indicating possible migration from a pipeline leak or other source. Also, because of in-tank stabilization (ITS) processes in BY-Farm, liquid level measurements could not be depended on as an indicator of whether a tank leaked and tar rings in some of the tanks indicated potential liner leaks. As a result, integrity assessments were recommended for all of the BY-Farm tanks except BY-103; tank BY-103 showed clear signs of a liner leak. Table 5-1 shows leak volume estimates in HNF-EP-0182, leak/release volume estimates reported in RPP-RPT-43704 and the basis for estimates and reasons for changes.

Additional logging and characterization near tank BY-106 were recommended to further assess any changes in the gamma profile near the tank. Direct push logging and sampling near BY-108 was recommended to investigate a potential transfer line release.

5.6 C-FARM

Twelve 100-series 530 kgal SSTs and four 200-series SSTs (55 kgal) are in C-Farm. Prior to tank farm leak inventory assessments seven of the tanks were classified as "assumed leakers" (C-101, C-110, C-111, C-201, C-202, C-203 and C-204) and all other SSTs were classified as "sound." Leak/release volumes were estimated for tanks C-101 and C-110, assumed to have leaked, and tanks C-104, C-105, C-108 and C-112, classified as sound (RPP-ENV-33418, *Hanford C-Farm Leak Inventory Assessment Report*). Integrity assessments were recommended for all of the tanks classified as assumed leakers, and an integrity assessment or verification of a transfer line leak was recommended for tank C-105, classified as sound. Integrity assessments conducted for tanks C-110 and C-111 concluded the tanks were "sound" and attributed liquid level decreases to a spare inlet overflow and evaporation respectively (RPP-ASMT-38219, *Tank 241-C-110 Leak Assessment Report* and RPP-ASMT-39155, *Tank 241-C-111 Leak Assessment Report*). An informal integrity assessment for tank C-101 concluded liquid level decreases were probably due to an overflow, but a tank leak near the spare inlet could not be ruled out, so it remained classified an assumed leaker (RPP-ENV-33418, Appendix A). Tank C-105 was reclassified as an assumed leaker based on a high activity Cs-137 plume near the tank bottom. Evidence for a release from the cascade line exists and a tank bottom leak could not be ruled out (RPP-ASMT-46452, *Tank 241-C-105 Leak Assessment Completion Report*).

In addition to tank leaks/releases. Three unplanned pipeline releases (UPR-81, UPR-82 and UPR-83) were identified. Leak volumes and inventories were estimated for each of these releases.

Table 5-1 shows leak volume estimates in HNF-EP-0182, leak/release volume estimates reported in RPP-ENV-33418 and the basis for estimates and reasons for changes.

Although leak detection monitoring results show no indication of a tank leak or other releases to the soil during retrieval, spectral gamma logging system (SGLS) drywell logging indicates continued migration of Co-60 in the soil over the past 40 years. If the source of the Co-60 was a tank C-108 liner leak, as has been suggested, then during waste retrieval operations additional contamination could have resulted in a nominal amount of waste being released to the vadose zone that was not detected by the leak detection methods employed. Ecology recommended that in the future, in cases such as tank C-108 where continued migration of contaminants has been observed, leak detection methods undertaken before, during, and after retrieval should be modified to address the specific situation. In particular, drywell moisture data should be taken to the depth of Co-60 in the drywells and not just to 10 ft. below the tank as is normally practiced. Ecology recommended a direct push hole near drywell 30-08-02 to explain the source of Co-60 movement in C-Farm. This was considered as part of the *Resource Conservation and Recovery Act of 1976* (RCRA) Facility Investigation (RFI) for WMA C, but due to the extent of subsurface pipelines, a direct push hole could not be placed in this area.

5.7 S-FARM

Twelve 100-series 750 kgal SSTs are in S-Farm. One of the tanks (S-104) was classified as an assumed leaker and a leak/release volume was estimated, all other SSTs are classified as "sound"

and no other leak/release volumes were determined (RPP-RPT-48589, *Hanford S-Farm Leak Assessment Report)*. An integrity assessment, recommended for tank S-104, concluded releases were due to an overflow and spare inlet release, and the tank was reclassified as "sound" (RPP-ASMT-62316, *Leak Assessment Report for Tank 241-S-104*). Table 5-1 shows leak volume estimates in HNF-EP-0182, leak/release volume estimates reported in RPP-RPT-48589 and the basis for estimates and reasons for changes.

High activity near the base of tank S-102 was previously attributed to a transfer line leak. Spectral gamma logging in 2004 indicated a small increase in Cs-137 activity (36 pCi/g to 123 pCi/g) at 45 ft., compared to logging results obtained in 1996. Future investigations were recommended as part of the correctives action process to further assess the path and inventory of the tank S-104 release and to assess the nature and depth of migration of releases near tanks S-102 and S-103 and east of the 242 Evaporator.

5.8 SX-FARM

Fifteen 100-series 1,000 kgal SSTs are in SX-Farm. Prior to leak inventory assessments nine of the tanks were classified as "assumed leakers" (SX-104, SX-108, SX-109, SX-110, SX-111, SX-112, SX-113, SX-114, and SX-115), other SSTs were classified as "sound." Leak/release volumes were estimated for all of the tanks assumed to have leaked except tanks SX-104 and SX-110. No leaks/releases were identified for tanks classified as sound (RPP-ENV-39658, *Hanford SX-Farm Leak Assessments Report*).

Leak volume estimates for SX-108 include water losses. The estimated Cs-137 inventory for the SX-108 tank leak was 78,000 Ci on December 1965 based on vadose zone data and kriging analyses. The Cs-137 concentration for sample data from tank SX-108 taken December 1965 was 7.22 Ci/gal. This equates to a leak volume of 11,000 gal (78,000/7.22). Because water was added to the tank, the leak concentration was likely below 7.22 Ci/gal after mid-1965 and the leak volume larger. Between 1964 and 1970 liquid level decreases of 101,000 gal were observed, with 0 to 51,000 gal attributed to losses to the atmosphere. The estimated undiluted tank waste leak volume based on Cs-137 vadose zone data was 11,000 gal. The remainder is attributed to water losses to the ground.

Integrity assessments were recommended and conducted for tanks SX-104 and SX-110 (RPP-ASMT-48143, *Tank 241-SX-104 Leak Assessment Completion Report* and RPP-ASMT-47140, *Tank 241-SX-110 Leak Assessment Report*). The integrity assessments concluded that both tanks should be reclassified as "sound." Small liquid level decreases were attributed to evaporation and ILL decreases in tank SX-104 were attributed to misinterpretation of the ILL. Based on current ILL interpretations the liquid level in tank SX-104 is continuing to decrease. Table 5-1 shows leak volume estimates in HNF-EP-0182, leak/release volume estimates reported in RPP-ENV-39658 and the basis for estimates and reasons for changes.

Additional investigations of tank SX-104 ILL decreases are in progress.

5.9 T-FARM

Twelve 100-series 530 kgal and four 200-series 55 kgal SSTs are in T-Farm. Seven of the tanks were classified as "assumed leakers" at the time of the T-Farm leak inventory assessments (T-101, T-103, T-106, T-107, T-108, T-109 and T-111) and all other SSTs in this farm were classified as "sound." Leak/release volumes were estimated for four of the tanks assumed to have leaked (T-101, T-103, T-106 and T-111) and a small release for tank T-102, classified as sound. No other leaks/releases were identified in T-Farm (RPP-RPT-55084, *Hanford T-Farm Leak Inventory Assessment Report*). Integrity assessments were recommended for tanks T-101, T-103, T-107, T-108 and T-109, classified as assumed leakers and for "sound" tanks T-102 and T-105. Based on increased drywell activity, integrity assessments were conducted for Tanks T-102 and T-105, the assessment concluded, pending additional data, both tanks should remain classified "sound" (RPP-ASMT-55500). An integrity assessment was also completed for Tank T-101 (RPP-ASMT-62935). The integrity assessment concluded that a release occurred due to a spare inlet overflow and the tank should be re-classified as sound. The integrity assessment also concluded that the release from tank T-101 was likely much smaller than was previously estimated in RPP-RPT-55084 because the releases occurred later and for a shorter duration than previously assumed and the Cs-137 concentration of the waste in the tank at the time of the release was significantly greater. Table 5-1 shows leak volume estimates in HNF-EP-0182, leak/release volume estimates reported in RPP-RPT-55084 and the basis for estimates and reasons for changes.

Direct push logging and sampling was recommended to investigate the source of increased Cs-137 gamma activity in drywell 50-02-05 between tanks T-102 and T-105. Characterization near the spare inlets was recommended to further assess the source of Cs-137 and Co-60 in drywells 50-07-03 and 50-07-07, the inventory of waste released to the soil and tank T-107 integrity.

5.10 TX-FARM

Eighteen 100-series 750 kgal SSTs are in TX-Farm. Eight of the tanks were classified as "assumed leakers" at the time of the TX-Farm leak inventory assessments (TX-105, TX-107, TX-110, TX-113, TX-114, TX-115, TX-116 and TX-117) and all other SSTs in this farm were classified as "sound." Leak/release volumes were estimated for tanks TX-105, TX-107 and TX-110 assumed to have leaked and for tanks TX-104 and TX-118 classified as sound. No other leaks/releases were identified in TX-Farm (RPP-RPT-50870, *Hanford TX-Farm Leak Inventory Assessment Report*). Integrity assessments were recommended for all of these tanks except TX-110 and TX-114 which appeared to be tank liner leaks and TX-118 which was a likely a cascade or transfer line release. Table 5-1 shows leak volume estimates in HNF-EP-0182, leak/release volume estimates reported in RPP-RPT-50870 and the basis for estimates and reasons for changes.

It was noted that the release volume estimates for TX-104, TX-105 and TX-107 are based on a limited data set and additional direct push logging was recommended as part of future TX-Farm investigations to better estimate the source, distribution and inventory of releases near these tanks.

5.11 TY-FARM

Six 100-series 750 kgal SSTs are in TY-Farm. Five of the six tanks were classified as "assumed leakers" at the time of the T-Farm leak inventory assessments (TY-101, T-103, T-104, T-105, and TY-106) and TY-102 was classified as "sound." Leak/release volumes were estimated for all of these tanks except tanks TY-101 and TY-102. There was no evidence of a release near these tanks and an integrity assessment was recommended for tank TY-101 (RPP-RPT-42296, *Hanford TY-Farm Leak Assessment Report*). Table 5-1 shows leak volume estimates in HNF-EP-0182, leak/release volume estimates reported in RPP-RPT-42296 and the basis for estimates and reasons for changes.

No additional characterization was recommended for TY-Farm.

5.12 U-FARM

Twelve 100-series 530 kgal and four 200-series 55 kgal SSTs are in U-Farm. Four of the tanks are classified as "assumed leakers" (U-101, U-104, U-110 and U-112) and all other SSTs in this farm were classified as "sound." Leak/release volumes were estimated for all of these tanks classified as assumed leakers. An integrity assessment was recommended for tank U-101 (RPP-RPT-50097, *Hanford 241-U-Farm Leak Inventory Assessment Report).* Table 5-1 shows leak volume estimates in HNF-EP-0182, leak/release volume estimates reported in RPP-RPT-50097 and the basis for estimates and reasons for changes.

Additional characterization of the vadose zone near tank U-101 was recommended to further assess whether U-101 leaked and the inventory of the leak or release. In particular, deep direct push logging (if possible) and samples near the spare inlets to investigate a potential overflow were recommended. It was noted that there are no drywells near the 200 series tanks. Additional drywells and/or direct push logging near these tanks was recommended in support of future U-Farm corrective actions and closure activities.

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
A-103	A	Sound	5,500	Previously classified assumed leaker based on 2" liquid level decrease 10/1981-3/1987	0	Liquid level decrease due to retained gas release. No subsurface contamination.	N/A	N/A	Re-classified as sound (RPP-ASMT-42278)
A-104	A	Assumed Leaker	500-2500	Increased radioactivity. Leak volume apparently from PNL-4688, basis not stated.	~2,000	Best estimate determined to be based on vadose zone lateral data, ARH-LD-206B. Insignificant change.	1330	Cs-137 (Ci) ARH-LD-207B, P1 waste, HDW	Assumed Leaker
A-105	A	Assumed Leaker	10,000-277,000	WHC-MR-0264 lateral temperature data, cooling water additions and evaporation calculations. 0-232,000 gal of cooling water leaked.	2,000 to 40,000 plus 0 to 232,000 cooling water	Similar to WHC-MR-0264 leak volume estimates but using a different approach. Emphasizes differences between **waste** volume and cooling water volume leaked. New estimates based on Cs-137 tank lateral logging. Leak volume ranges based on Cs-137 composition for 2 waste types.	24,500	Cs-137 May 1965 sample, P1 and CSR waste, HDW	Assumed Leaker
A-Other SSTs	A	Sound	N/A	N/A	0	N/A	N/A	N/A	sound
AX-102	AX	Sound	3,000	Previously classified assumed leaker based on liquid level decrease in 1984	0	Liquid level decreases due to evaporation. Low activity in drywells due to small transfer line release. No gamma in AX-102 LDP.	N/A	N/A	Re-classified as sound (RPP-ASMT-42628)
AX-104	AX	Sound	8,000	Previously classified assumed leaker based on low drywell radioactivity, leak volume not determined (used average of other leaks).	Assume 0	Low radioactivity in 11-04-01 from small transfer line release. Historical Ru-106 activity in 11-04-08 likely from migration. Very low gamma in AX-104 LDP (not tank waste). Release volume not determined (but negligible based on low gamma).	N/A	N/A	Integrity Assessment recommended (RPP-ASMT-57574)

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
AX-Other SSTs	AX	Sound	N/A	N/A	0	N/A	N/A	N/A	sound
B-101	B	Assumed Leaker	8,000	Low drywell radioactivity, leak volume not determined (used average of other leaks).	~2,000	Spectral gamma logging system (SGLS) drywell Cs-137 activity and composition of 1975 B-101 tank waste sample. Potential sources other than tank leak.	450	Cs-137 1975 sample, BL waste, HDW	Integrity Assessment recommended
B-103	B	Assumed Leaker	8,000	Low drywell radioactivity, leak volume not determined (used average of other leaks).	Not determined. Assumed 0	Activity decayed and not detected in SGLS. Activity attributed to migration. Leak unlikely. Release volume not determined, but negligible based on low gamma.	N/A	N/A	Integrity Assessment recommended
B-105	B	Assumed Leaker	8,000	Drywell radioactivity, leak volume not determined (used average of other leaks).	111,000	Leak volume assumes a cascade line release; could be tank leak. Volume based on SGLS drywell logs Cs-137 activity at 3 locations and composition of 1975 B-105 tank waste sample.	21,000	Cs-137 1975 sample, BL waste, HDW	Integrity Assessment recommended
B-106	B	Sound	N/A	N/A	0	Volume included with B-105 estimate	N/A	N/A	Assumed Leaker
B-107	B	Assumed Leaker	8,000	3” Liquid level decrease from 5/68 to 8/69	14,000 in report. Should be 22,000	1965/67 liquid level decrease is 14,000 gal reported in RPP-RPT-49089 before 1968. Total is 22 kgal (RPP-RPT-54913).	1,100	CWP2 waste, HDW	Integrity Assessment recommended
B-110	B	Assumed Leaker	10,000	3” Liquid level decrease from 9/69-8/71.	13,000	Transfer record does not indicate liquid level decrease. Volume based on SGLS drywell logs Cs-137 activity and SRR waste composition estimates.	26,000	SRR waste, HDW	Integrity Assessment recommended

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
B-111	B	Assumed Leaker	8,000	3” Liquid level decrease from 3/72-6/73	Not determined. Assumed 0	Liquid level decrease in 1972 not found. Multiple potential sources for low activity (100 c/s) in drywell. Release volume not determined but appears negligible based on low gamma.	N/A	N/A	Integrity Assessment recommended
B-112	B	Assumed Leaker	2,000	From Baumhardt letter (8901832B), no basis given, may be 2” uncertainty in manual tape measurements.	Not determined. Assumed 0	Non-tank sources for low gamma (<10 pCi/g). Release volume not determined, but appears negligible based on low gamma.	N/A	N/A	Integrity Assessment recommended
B-201	B	Assumed Leaker	1,200	6” Liquid level decrease 4/68 to 6/71 (RHO-CD-896).	Not determined. Assumed 0	10” decrease preceded by 30” increase. Gas release event (GRE) and no release to ground likely.	N/A	N/A	Integrity Assessment recommended
B-203	B	Assumed Leaker	300	Liquid level decrease based on 1981 photo review.	Not determined. Assumed 0	Manual tape levels increased and decreased, net 0.75” decrease from 1973 to 1987. Below 2” criteria for detectable leak for this tank. No release likely.	N/A	N/A	Integrity Assessment recommended
B-204	B	Assumed Leaker	400	11/1983 report of Liquid level decreases, solids settling and intrusions. Volume from Baumhardt letter (8901832B).	Not determined. Assumed 0	Manual tape levels increased and decreased, net 0.25” decrease from 1973 to 1987. Below 2” criteria for detectable leak for this tank. No release likely.	N/A	N/A	Integrity Assessment recommended
B-other SSTs	B	Sound	N/A	N/A	0	N/A	N/A	N/A	sound

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
BX-101	BX	Assumed Leaker	8,000	Low drywell radioactivity, leak volume not determined (used average of other leaks).	<900	Sluice pit riser leak. Volume based on SGLS drywell logs Cs-137 activity and B-Plant ion exchange CSR waste composition estimates.	<700	Cs-137 sample, CSR waste, HDW	Integrity Assessment recommended
BX-102	BX	Assumed Leaker	70,000	Drywell gamma, assumed all Cs-137 (ARH-2035).	<140,000	SGLS and direct push shows mostly Uranium and ~300 Ci of Cs-137 from 91,600 gal 1951 Metal Waste (MW) spare inlet overflow (HW-20742) and a second release of ion exchange waste after 1962. Second release could be as high as 40,000 Ci Cs-137/50,000 gal based on drywell data and 1970 Cs-137 sample data.	40,000	See volume basis	Integrity Assessment recommended
BX-106	BX	Sound	N/A	N/A	Not determined. Assumed 2,000	Tank sound per RPP-9752. Overflow and spare inlet release. No release volume could be estimated from 21-06-05 Cs-137 data.	N/A	N/A	sound
BX-107	BX	Sound	N/A	N/A	Not determined. Assumed 2,000	High drywell activity attributed to transfer line release documented in WHC-SD-WM-TI-356, but not verified. Could be tank leak. Release volume could be estimated from 21-07-06 and 21-10-03 drywell Cs-137 data.	N/A	N/A	Integrity Assessment recommended

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
BX-108	BX	Assumed Leaker	2,500	1.9" liquid level decrease 7/73 to 2/83. Vol from SD-WM-TI-356	Not determined. Assumed 2000	SD-WM-TI-356 notes liquid level data is suspect. Possible overflow or transfer leak. Could be tank leak. Volume could be estimated from 21-08-07 and 21-11-03 drywell Cs-137 data.	N/A	N/A	Integrity Assessment recommended
BX-110	BX	Assumed Leaker	8,000	Based on increased drywell activity. Leak volume not determined, average of other leaks	Not determined. Assumed 8,000	Release attributed to transfer line leak (SD-WM-TI-356), but could not be verified. Could also be overflow or tank leak. Volume could be estimated from Cs-137 activity. Assumed >8,000 due to high Cs-137 concentration in 21-10-03.	N/A	N/A	Integrity Assessment recommended
BX-111	BX	Assumed Leaker	8,000	Based on drywell increased activity. Volume not determined, average of other leaks	Not determined. Assumed 2,000	Release attributed to transfer line leak (SD-WM-TI-356), but could not be verified. Could also be overflow, but peak activity near tank base indicates possible tank leak. Volume could be estimated from high Cs-137 activity.	N/A	N/A	Integrity Assessment recommended
BX-Other SSTs	BX	Sound	N/A	N/A	0	N/A	N/A	N/A	sound
BY-101	BY	Sound	N/A	N/A	Not determined. Assumed 2,000	No volume estimated, based on drywells possible small release. Does not appear to be a tank leak. Volume could be estimated from low Cs-137 activity.	N/A	N/A	Integrity Assessment recommended

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
BY-102	BY	Sound	N/A	N/A	Not determined. Assumed 2,000	No volume estimated. Drywell gamma appears to be lateral migration from BY-103 release, but small Cs-137 peaks and tar rings indicate possible tank liner leak. Volume could be estimated from low Cs-137 activity.	N/A	N/A	Integrity Assessment recommended
BY-103	BY	Assumed Leaker	<5,000	From PNL-4688, but no documented basis. May be 2" uncertainty in manual tape measurements. No liquid decrease measured.	<5,000	No change, reasonable upper limit, drywell data indicates the leak may be smaller.	N/A	N/A	Integrity Assessment recommended
BY-104	BY	Sound	N/A	N/A	Not determined. Assumed 2,000	No volume estimated. Drywell gamma appears to be lateral migration from BY-107 release, but small Cs-137 peaks and restricted use status indicate possible tank liner leak. Volume could be estimated from low Cs-137 activity.	N/A	N/A	Integrity Assessment recommended
BY-105	BY	Assumed Leaker	8,000	Based on 1974 increased drywell activity. Volume not determined, average of other leaks.	Not determined. Assumed 2,000	1995 drywell data indicates not a tank leak. Drywell gamma activity likely migration from surface or BY-108. Volume not quantified.	N/A	N/A	Integrity Assessment recommended
BY-106	BY	Assumed Leaker	8,000	Based on observed tar rings. Volume not determined, average of other leaks	Not determined. Assumed 2,000	No volume estimated. Drywell gamma appears to be lateral migration from BY-108 or other release, but small Cs-137 peaks and tar rings indicate possible tank liner leak. Volume could be estimated from low Cs-137 activity.	N/A	N/A	Integrity Assessment recommended

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
BY-107	BY	Assumed Leaker	15,100	5.5" Liquid level decrease 6/73 to 4/74.	Assumed 23,000	Liquid level decrease attributed to a collapsing waste surface. Gamma activity explained by 23,000 gal 1C waste transfer line release near tank (HW-28471) and lateral migration from other sources due to high soil moisture from french drain and raw water outlet.	N/A	N/A	Integrity Assessment recommended
BY-108	BY	Assumed Leaker	<5,000	Assumed leaker based on 1971 increased drywell gamma activity. No basis found for volume. May be 2" uncertainty in manual tape measurements. No liquid measurements found before 1972.	Not determined. Assumed 5,000	Several potential sources for drywell contamination, including a tank leak. Volume could be estimated from near surface Cs-137 drywell activity. Assumed 5,000 gal based on high surface gamma activity in drywell 22-08-01 and no measured liquid level decrease.	N/A	N/A	Integrity Assessment recommended
BY-109	BY	Sound	N/A	N/A	Not determined. Assumed 2,000	No volume estimated. Drywell gamma appears to be due to pipeline leak near BY-109, but small Cs-137 peaks and restricted use status due to tar rings indicates possible tank liner leak. Volume could be estimated from low Cs-137 activity.	N/A	N/A	Integrity Assessment recommended
BY-110	BY	Sound	N/A	N/A	Not determined. Assumed 0	No volume estimated. Drywell gamma appears to be due to transfer line leak near BY-107. Restricted use status due to tar rings indicates possible small tank liner leak.	N/A	N/A	Integrity Assessment recommended

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
BY-111	BY	Sound	N/A	N/A	Not determined. Assumed 0	No volume estimated. Drywell gamma shows potential near surface releases. Tank leak unlikely. Small release volume could be estimated from low Cs-137 activity.	N/A	N/A	Integrity Assessment recommended
BY-112	BY	Sound	N/A	N/A	Not determined. Assumed 0	No volume estimated. Drywell gamma appears to be due to pipeline leak associated with BY-109.	N/A	N/A	Integrity Assessment recommended
C-101	C	Assumed Leaker	20,000	Liquid level decrease.	<37,000	New volume based on liquid level decrease. Likely overflow and spare inlet release.	900	Based on drywell Cs-137 plume estimate and leak volume, 98% CWP1 and 2% P1 waste, HDW	No change, but Sound to 54" from bottom.
C-104	C	Sound	0	N/A	28,000	Volume based on drywell gamma data and liquid level decrease in 1965.	80	CWP1 waste, HDW	sound
C-105	C	Assumed Leaker	2,000	Previously classified sound with no volume. Assumed cascade line and/or transfer line release. Volume updated based on lateral data and Rev. 0 leak assessment.	2,000-20,500	Volume estimate based on high gamma activity in drywell 30-05-07. High range assumes larger plume under tank.	4,200-42,000	Cs-137 1969 IX feed sample, P2 waste, HDW	Re-classified as assumed leaker (RPP-ASMT-46452)
C-108	C	Sound	N/A	N/A	18,000	Volume based on Cs-137, Co-60 and soil moisture drywell/direct push data.	52	CWP1 waste, HDW	Integrity Assessment recommended

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
C-110	C	Sound	2,000	Previously classified assumed leaker based on 1977 increased drywell gamma activity. Basis for volume was uncertainty in liquid level measurements (Baumhardt letter, (8901832B)). No liquid decrease observed.	<2,000	Spare inlet release. Volume unchanged, consistent with drywell data.	350	Cs-137, 1975 sample, CSR waste, HDW	Re-classified as sound (RPP-ASMT-38219)
C-111	C	Sound	5,500	Previously classified assumed leaker based on liquid level decrease	0	Liquid level decrease explained by evaporation. No drywell gamma.	N/A	N/A	Re-classified as sound (RPP-ASMT-39155)
C-112	C	Sound	0	N/A	7,000	Transfer line leak. Volume estimate based on drywell Cs-137 data.	20	CWP1 waste, HDW	Integrity Assessment recommended
C-201		Assumed Leaker	550	Liquid level decrease.	0	Liquid level decrease accounted for by evaporation.	N/A	N/A	Integrity Assessment recommended
C-202		Assumed Leaker	450	Liquid level decrease.	0	Liquid level decrease accounted for by evaporation.	N/A	N/A	Integrity Assessment recommended
C-203		Assumed Leaker	400	Liquid level decrease.	0	Liquid level decrease accounted for by evaporation.	N/A	N/A	Integrity Assessment recommended
C-204		Assumed Leaker	350	Liquid level decrease.	0	Liquid level decrease accounted for by evaporation.	N/A	N/A	Integrity Assessment recommended
C-other SSTs	C	Sound	N/A	N/A	0	N/A	N/A	N/A	sound
UPR-81	C	N/A	N/A	N/A	36,000	Transfer line release, volume reported in RHO-CD-673.	340	Cs-137 Ci (RHO-CD-673), CWP2 waste, HDW	N/A

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
UPR-82	C	N/A	N/A	N/A	2,600	Transfer line release. Volume based on Soil sample and direct push data(RHO-CD-673 and RPP-35484)	5,400	Cs-137 1969 sample, P2 waste, HDW	N/A
UPR-86	C	N/A	N/A	N/A	17,000	Transfer line release, volume appears to be based on a mass balance (RHO-CD-673). Direct push logging data indicate this estimate is high.	11,500	Cs-1371971 sample, P2 waste, HDW	N/A
S-104	S	Sound	24,000	Previously classified assumed leaker based on liquid level decrease.	24,000	No change in release volume, based on liquid level decrease and consistent with Cs-137 plume. Attributed to spare inlet release.	8,200	Cs-137 1972 and 1994 samples, R1 and CWR1 waste, HDW.	Re-classified as sound (RPP-ASMT-62316)
S-other SSTs	S	Sound	N/A	N/A	0	N/A	N/A	N/A	sound
SX-104	SX	Sound	6,000	Previously classified assumed leaker based on ILL decrease.	0	Liquid level decreases accounted for by evaporation. Assessment concluded previous ILL interpretations were not correct. The ILL is continuing to decrease and is being further investigated.	0	N/A	Re-classified as sound (RPP-ASMT-48143) New investigations pending
SX-107	SX	Assumed Leaker	<5,000	Volume from PNL-4688, but no documented basis. May be 2" uncertainty in manual tape measurements. No liquid level decrease measured.	6,000	Cs-137 inventory (Ci) based on kriging analyses of Cs-137 drywell and lateral data. Leak volume based on kriging analysis and REDOX tank waste composition. Volume could be larger if waste was more diluted.	14,500	R2 waste, HDW	Assumed Leaker
SX-108	SX	Assumed Leaker	2,400-35,000	2,400 gal leak before mid-1965 based on Cs-137 lateral data, 0 to 33,000 gal leak	11,000 plus 39,000-90,000 water losses	Cs-137 inventory (Ci) based on kriging analyses of Cs-137 drywell and lateral data.	34,900	Cs-137 1965 sample, R2 waste, HDW	Assumed Leaker

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
				from 3/67 to 8/68 based on liquid level decrease in tank photos (BNWL-CC-701). Decrease after 3/67 likely mostly evap (WHC-MR-300).		Volume based on 2,400 gal leak before mid-1965, and liquid level decreases after mid-1965, less the range of estimated water losses from the exhaust system.			
SX-109	SX	Assumed Leaker	<10,000	Based on comparison of drywell and lateral gamma activity for SX-109 with activity for SX-108 (WHC-MR-0301). Earlier reports showed 1,000 gal.	1,000	Cs-137 inventory (Ci) based on kriging analyses of Cs-137 drywell and lateral data. Volume based on kriging analysis and assumed Cs-137 composition of the leak (RPP-7884).	2,300	R2 waste, HDW	Assumed Leaker
SX-110	SX	Sound	5,500	Previously classified assumed leaker based on 1969 liquid level decrease	0	No dry well or lateral indication of leak. Integrity assessment concluded small liquid level decrease is accounted for by evaporation.	0	N/A	Re-classified as sound (RPP-ASMT-47140)
SX-111	SX	Assumed Leaker	2,000	500 to 2,000 gal leak based on increased lateral gamma readings (ARHCO-051474 and -051574).	2,800	Volume based on 27 day liquid level decrease, minus previous decrease rates for evaporation only (ARHCO-051574).	1,800	Cs-137 1974 sample, R-Sltck waste, HDW	Assumed Leaker
SX-112	SX	Assumed Leaker	30,000	Liquid level decrease. Volume probably rounded up from ARH-1100-DEL report.	27,000	Liquid level and operations records (ARH-1100-DEL).	19,200	Cs-137 ARH-1100-DEL, R2 waste, HDW	Assumed Leaker
SX-113	SX	Assumed Leaker	15,000	Liquid level decrease during 1962 leak test to assess liner bulge (HW-75714).	15,000	No change. No gamma detected in laterals before leak test.	4,100	Cs-137 1962 sample, R1 waste, HDW	Assumed Leaker
SX-114	SX	Assumed Leaker	8,000	Based on increased gamma activity in drywells. Volume not determined, average of other leaks.	<2,000	Low gamma (Ru-106) activity in drywells, but no liquid level decrease. Vol based on uncertainty in liquid level measurements, appears to be	1,300	Cs-137 assumed same as 1974 SX-111 sample, R-Sltck waste, HDW	Assumed Leaker

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
						much less based on gamma data.			
SX-115	SX	Assumed Leaker	50,000	Liquid level decrease in 1965 (RL-SEP-706-DEL).	51,000	Upper volume in HW-83906-E-RD).	16,800	Cs-137 1964 sample, R-Sltck waste, HDW	Assumed Leaker
SX-other SSTs	SX	Sound	N/A	N/A	0	N/A	N/A	N/A	sound
T-101	T	Assumed Leaker	7500	Based on 2.6" liquid level decrease in 1992. (Shown to be instrument error (WHC-EP-0873).	28,000	Likely spare inlet overflow. Release volume estimate based on drywell Cs-137 data and 1974 Cs-137 sample concentration.	1,300	Cs-137 1974 sample, assumed same as 1972 release, R2 waste, HDW	Re-classified as sound (RPP-ASMT-62935)
T-102	T	Sound	0	N/A	50-500	Gamma activity in drywell 50-02-05. D-42 inconclusive.		Cs-137 1974 sample, CWP2, HDW	Integrity Assessment recommended
T-103	T	Assumed Leaker	<1000	0.3" liquid level decrease.	1,300	Likely spare inlet release due to overfilling tank. Volume based on vadose zone data "on the order of 5 cubic meters = 1,300 gal (ARH-2874).	600	Cs-137 1974 sample, CSR waste, HDW	Integrity Assessment recommended
T-105	T	Sound	0	N/A	0	Gamma activity in drywell 50-02-05. D-42 inconclusive. Volume assigned to T-102.	N/A	N/A	Integrity Assessment recommended
T-106	T	Assumed Leaker	115,000	Liquid level decrease.	115,000	No change	20,000	C-137 RHO-ST-14, CSR waste, HDW	Assumed Leaker
T-107	T	Assumed Leaker	8,000	Dry well gamma increase. Volume not determined, average of other leaks.	Not determined. Assumed 2,000	Volume not determined. OR-76-30 suggests not a tank leak. Additional data recommended, only 3 drywells show <100 pCi/g Cs-137 and no Co-60. 0.4" liquid decrease, could be basis for <2000 gal leak.	N/A	CSR waste, HDW	Integrity Assessment recommended

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
T-108	T	Assumed Leaker	<1000	0.3" liquid level decrease.	0	Liquid level data inconclusive. Drywell contamination from T-106.	N/A	N/A	Integrity Assessment recommended
T-109	T	Assumed Leaker	<1000	1974 Increased drywell readings and 0.3" liquid level decrease (OR-74-108).	0	Liquid level data inconclusive. Drywell contamination attributed to migration from T-106. Possible small spill near ground surface, likely negligible volume.	N/A	N/A	Integrity Assessment recommended
T-111	T	Assumed Leaker	3,500	1974 Increased drywell readings and >0.3" liquid level decrease (HNF-4872), <1,000 gal. Updated estimate 2,500 gal from 1995 to 2014 plus 1,000 gal before 1994 (RPP-RPT-54964, Rev. 2).	3,500	Assessment report shows continued liquid level decrease between 1,000 and 3,900 gal. 2,100 is average (RPP-RPT-54964, Rev. 1). Updated since then to 3,500 gal (RPP-RPT-54964, Rev. 2).	<2	Cs-137 and other concentration estimates based on 2013 T-111 BBI. No liquid samples for this tank.	Assumed Leaker
T-other SSTs	T	Sound	N/A	N/A	0	N/A	N/A	N/A	sound
TX-104	TX	Sound	N/A	N/A	8,300 to 25,000	Overfilled and likely spare inlet release. Could be a tank liner leak. Volume estimate based on drywell and borehole U-238 data and the HDW model composition of metal waste.	800-2,500	MW1, HDW	Integrity Assessment recommended
TX-105	TX	Assumed Leaker	8,000	1977 Liquid level decrease. Volume not determined, average of other leaks.	50,000 to 125,000	Overfilled and likely spare inlet release. Could be a tank liner leak. Volume estimate based on drywell and borehole U-238 data and the HDW model composition of metal waste.	5,000-12,500	MW2 waste, HDW	Integrity Assessment recommended
TX-107	TX	Assumed Leaker	2,500	Increased activity in drywells and liquid level decreases. Volume basis not given.	1,300	Volume and inventory estimates based on Co-60 drywell data and visualizations	1,030	SRR waste, HDW	Assumed Leaker

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
						and HDW model isotope concentrations for SRR waste.			
TX-110	TX	Assumed Leaker	8,000	Classification based on increased drywell activity. Basis for volume not determined, average of other leaks.	0	Releases near TX-110 attributed to migration from TX-114 or a tank leak. Inventory and volume estimates included with TX-114 estimates.	N/A	Included with TX-114 estimate	Integrity Assessment recommended
TX-113	TX	Assumed Leaker	8,000	Classification based on increased drywell activity. Basis for volume not determined, average of other leaks.	0	Releases near TX-113 attributed to TX-114.	N/A	Included with TX-114 estimate	Integrity Assessment recommended
TX-114	TX	Assumed Leaker	8,000	Classification based on increased drywell activity. Basis for volume not determined, average of other leaks.	~7000	Leak volume and inventory based on drywell Cs-137 activity and 1974 TX-114 Cs-137 sample.	6,000	1974 tank sample, T-Saltcake, HDW	Assumed Leaker
TX-115	TX	Assumed Leaker	8,000	Classification based on increased drywell activity. Basis for volume not determined, average of other leaks.	0	Neither drywells nor surface level measurements indicate a release from this tank.	N/A	N/A	Integrity Assessment recommended
TX-116	TX	Assumed Leaker	8,000	Classification based on increased drywell activity. Basis for volume not determined, average of other leaks.	0	Neither drywells nor surface level measurements indicate a release from this tank.	N/A	N/A	Integrity Assessment recommended
TX-117	TX	Assumed Leaker	8,000	Classification based on increased drywell activity. Basis for volume not determined, average of other leaks.	0	Neither drywells nor surface level measurements indicate a release from this tank.	N/A	N/A	Integrity Assessment recommended

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
TX-118	TX	Sound	No estimate	N/A	1,320	Transfer or cascade line release, volume and inventory estimates based on Cs-137 drywell data and visualizations and HDW model Cs-137 concentrations for T2-Saltcake.	3,600	T-Sltck waste, HDW	sound
TX-other SSTs	TX	Sound	No estimate	N/A	N/A	N/A	N/A	N/A	sound
TY-101	TY	Assumed Leaker	1,000	0.35 in liquid level decrease assumed in 1973	0	Liquid decrease attributed to instrument uncertainty. Low, mobile drywell activity attributed to migration from TY-103.	N/A	N/A	Integrity Assessment recommended
TY-102	TY	Sound	N/A	N/A	0	N/A	N/A	N/A	sound
TY-103	TY	Assumed Leaker	3,000	High increase in drywell activity in 1973. Volume estimate based on liquid level decrease (Luening letter, 1973).	3,600	Revised leak volume based on liquid level measurements (ARH-2416-RD DEL, p.94).	422	Cs-137 1973 sample, T2-Saltcake waste, HDW	Assumed Leaker
TY-104	TY	Assumed Leaker	1,400	Based on liquid level decrease.	1,400	Volume based on 0.5" liquid level decrease. Cs-137 inventory based on 1974 sample.	0.2	Cs-137 1974 sample, TBP waste, HDW	Assumed Leaker
TY-105	TY	Assumed Leaker	35,000	Liquid level decrease in 1960 and drywell data. Volume reported as based on waste transfer discrepancy.	30,000-43,000	35,000 gal appears to be the volume of condensate pumped in 1959 (LA-UR-97-311). Transfer records show a 30,400 gal decrease and an additional discrepancy between records of 13,000 gal.	1.200-1,700	TBP waste, HDW	Assumed Leaker
TY-106	TY	Assumed Leaker	20,000	Classified based on liquid level decreases and drywell	18,000	Changed to liquid level decrease volume from Aug-Oct 1959 (HW-83906 D RD).	720	TBP waste, HDW	Assumed Leaker

Table 5-1. SST Farm Leak/Release Volume and Inventory Estimates (17 pages)

		HNF-EP-0182		Tank Farm Leak Inventory Assessment Results (Summarized from Table ES-1 Reports)					Tank Integrity
Tank	**Farm**	**Tank Integrity**	**Leak Volume (gal)**	**Basis for Leak Volumes in HNF-EP-0182**	**Leak/Release Volume (gal)[1]**	**Leak/Release Volume Basis**	**Cs-137 (Ci) Decayed to 1/1/2001**	**Conc. Basis for Inventory**	**Integrity Status**
				data. Volume appears to be rounded up.					
U-101	U	Assumed Leaker	30,000	Based on 11/1959 to 6/1960 liquid level decreases.	0-30,000	Neither drywells nor direct push probe holes show gamma activity near U-101. Possibly missed, but liquid level measurements for U-101 were unreliable and inconsistencies in reports. A smaller release or no release is possible.	0-7,400	Cs-137 1965 sample, R2 waste, HDW	Integrity Assessment recommended
U-104	U	Assumed Leaker	55,000	Classified leaker due to liquid level decrease and drywell data. Volume based on liquid level decrease but not well supported.	<109,000	Tank bulged so liquid levels may not be accurate. Volume estimate revised based on drywell and direct push data indicating a large U-238 plume (7 Ci) and soil moisture measurements. Volume depends on composition of waste released.	7 Ci U-238	Based on drywell data, estimated 46,000 lbs. of -238 released. MW2 waste, HDW	Assumed Leaker
U-110	U	Assumed Leaker	5,000-8,100	Liquid level decrease in 1975 and drywell data. Operations records indicate 5,000 to 6,000 gal. basis for 8,100 not found. Decreases may be masked by frequent transfers (SD-WM-TI-356)	5-25,000	No change in lower bound. Upper bound changed based on drywell Cs-137 data and 10/1975 sample.	126	Cs-137 1975 sample, 222-S lab waste and C1 waste.	Assumed Leaker
U-112	U	Assumed Leaker	8,500	Based on 3" liquid level decrease from 2/69 to 3/70.	8,500-57,000	Change due additional liquid level decreases not accounted for between 1964 and 1969 (RPP-20820).	24,000	R2 waste, HDW	Assumed Leaker
U-other SSTs	U	Sound	N/A	N/A	0	N/A	N/A		sound

[1] Except as noted, potential leak/release volumes not determined in leak inventory assessment reports were assumed to be zero if attributed to another tank, if no liquid level decrease and if drywell data shows gamma activity < 100 pCi/g. Leak release volumes were assumed to be 2,000 if drywell gamma activity is greater than 100 and less than 1,000 pCi/g.

6.0 SUMMARY AND CONCLUSIONS

This Assessments Summary report summarizes single-shell tank (SST) farm leak inventory assessment reports for each of the SST farms. The assessments were conducted between 2007 and 2017 by staff from Ecology, ORP and ORP contractors. Table 5-1 of this report summarizes current and past tank farm leak/release volume estimates, current leak/release inventory estimates for Cs-137, reasons for changes in leak volume estimates, and identifies tanks for which recommendations were made to reassess current tank integrity classifications in HNF-EP-0182.

Overall, upper leak/release volume estimates in the tank farm leak inventory assessment reports increased by ~300,000 gal compared to tank leak volume estimates in HNF-EP-0182 as of October 31, 2018.

The new leak/release volume estimates in this report are higher for some tanks, lower for some tanks and some did not change. Some newer leak/release volume estimates are based on characterization data or operations information which were not available or not considered in the past. In the past, nearby low gamma activity measured in drywells was attributed to a tank leak, but a leak volume could not be determined. For these questionable integrity tanks, leak volumes were estimated as an average of other “known” leak volumes. Many of the questionable integrity tanks appear not to have leaked. A basis was determined for each of the new leak/release volumes and inventories. The leak/release volumes include both tank liner leaks and other releases including releases from overflowing spare inlets, transfer line releases and spills during operations. The new volume are for both tanks currently classified as assumed leakers and tanks classified as sound and were developed as upper bound estimates in support of performance assessments for tank farm closure. Current leak volumes in HNF-EP-0182 were estimated only for tanks classified as assumed leakers and attributed only to tank liner leaks.

While a basis was established for each of the new leak/release volumes and inventories, many of the new estimates are still based on limited data and are uncertain. Leak volume and inventory estimates will be revised, as needed, as additional data is obtained through field investigations conducted during the tank farm closure process.

7.0 REFERENCES

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