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Single-Shell Tank System Surveillance and Monitoring Program

D. A. Barnes

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Richland, WA 99352

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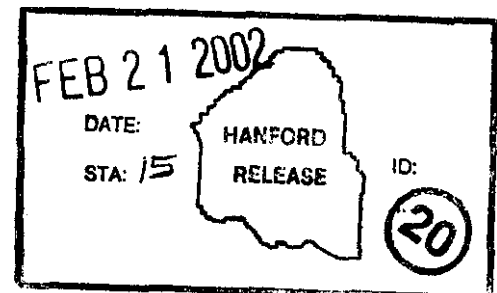
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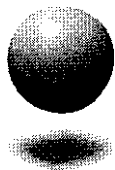


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SINGLE-SHELL TANK SYSTEM SURVEILLANCE AND MONITORING PROGRAM

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Hanford Group, Inc.

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Office of River Protection

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LIST OF TERMS

CCC	Central Command and Control
CFR	<i>Code of Federal Regulations</i>
DCRT	Double Contained Receiver Tank
DOE	U.S. Department of Energy
DST	Double-Shell Tank
ECO	Environmental Compliance Officer
Ecology	Washington State Department of Ecology
FIC	Food Instrument Corporation
HFFACO	<i>Hanford Federal Facility Agreement and Consent Order</i>
ILL	Interstitial Liquid Level
IMUST	inactive miscellaneous underground storage tank
LOW	Liquid Observation Well
MT	Manual Tape
MUST	active miscellaneous underground storage tank
ORP	Office of River Protection
PUREX	plutonium-uranium extraction
RCRA	<i>Resource Conservation and Recovery Act</i>
SACS	Surveillance Analysis Computer System
SST	Single-Shell Tank
TMACS	Tank Monitoring and Control System
TOGT	temporary overground transfer
TS&DA	Tank Surveillance & Data Analysis
WAC	<i>Washington Administrative Code</i>

1.0 INTRODUCTION

1.1 SITE OVERVIEW

The River Protection Project (RPP) mission includes storage, retrieval, immobilization, and disposal of radioactive mixed waste presently stored in 177 underground tanks located in the 200 East **and** 200 West Areas of the U.S. Department of Energy (DOE) Hanford Site. These tanks consist of 149 single-shell tanks (SSTs) constructed between 1943 and 1964 and 28 newer double-shell tanks (DSTs). This report will only address the SST system, and is only applicable to the SST storage function. The SSTs contain a variety of solid and liquid wastes resulting from several decades of nuclear fuel reprocessing and radionuclide recovery processes conducted at the Hanford Site.

The principal regulatory requirements for the SST farms are Washington State *Hazardous Waste Management Act* (HWMA) and **WAC** 173-303.

1.2 BACKGROUND OF MILESTONE

This document deals directly with milestone M-23-22-T01, "Submit Document Identifying and Describing DOE's Existing SST In-Tank Surveillance and Monitoring Program." The M-23 milestone series was signed on August 7, 2001, and the deadline for this specific deliverable is February 28, 2002.

Milestone M-23-22-T01 deals only with SST surveillance and monitoring functions during storage, and specifically excludes other SST functions such as retrieval. The other M-23 series milestone that is relevant to this document is M-23-25, which requires the installation of 24 new liquid observation wells (LOWs). The impact of these installations to the overall *leak* detection monitoring program will be addressed later in this document.

Table 1-1. Milestone Descriptions

M-23 Milestone Number	Description	Due Date
M-23-22-T01	Submit Document Identifying and Describing DOE's Existing SST In-Tank Surveillance and Monitoring Program.	February 28, 2002
M-23-25	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

13 PURPOSE/SCOPE

This document describes the leak detection programs presently being used in the Hanford Single-Shell Tank (SST) System. This system is defined by Revision 7 of the RCRA Part A Form 3 for the SST System (DOE/RL-88-21), The **Hanford Federal Facility Agreement and Consent Order** Appendix C (Ecology et al. 1998), and the **Single Shell Tank System Closure WorkPlan** (DOE/ORP-2001-18, Rev. 0, Draft). This document specifically addresses requirements and programs applicable during waste storage activities only, including interim stabilization.

This document is submitted to meet the **Hanford Federal Facility Agreement and Consent Order** (HFFACO) milestone M-23-22-T01, "Submit Document Identifying and Describing DOE's Existing SST In-Tank Surveillance and Monitoring Program." The seven **key** milestone requirements addressed in this document are listed below, and are taken directly from the milestone language.

- A. Identify and describe the presence or absence of monitoring instruments.
- B. Identify the monitoring instrument date of installation and a DOE assessment as to functionality.
- C. Describe methods or processes utilized for the evaluation of the status of SST system monitoring components.
- D. Identify and describe monitoring frequencies.
- E. Describe the *leak* detection surveillance and monitoring requirements.
- F. Identify the length of time DOE proposes that instruments may be out of service (for maintenance or repair) prior to Ecology notification, and
- G. Describe DOE's proposed change process for modifying specific component *leak* detection instrumentation as component conditions (or instrumentation) changes.

This document will identify the current leak detection requirements and explain the mechanism by which those requirements are being addressed. The technical basis for the current programs will be explained, and areas where requirements are not being met will be identified.

1.4 REQUIREMENTS

The monitoring and surveillance requirements for the SST system are from 40 CFR 265.195. According to WAC 173-303-400(3)(a) for interim status facility standards, the U.S. Environmental Protection Agency (EPA) regulations in 40 CFR 265 are incorporated by reference into the *Washington Administrative Code* regulation.

Table 1-2. Inspections

CFR	Requirement
40 CFR 265.195	The operating record must include documentation of a daily inspection of ■ Overfill/spill control equipment • Aboveground portions of the tank system, if any • Data gathered from monitoring equipment and leak-detection equipment • Construction materials and area immediately surrounding the externally accessible portion of the tank system to detect erosion or signs of releases of hazardous waste. Cathodic protection systems must be inspected within six months of initial installation and annually thereafter to confirm they are functioning properly. All sources of impressed current must be inspected and/or tested at least bimonthly. These inspections must also be entered in the operating record.

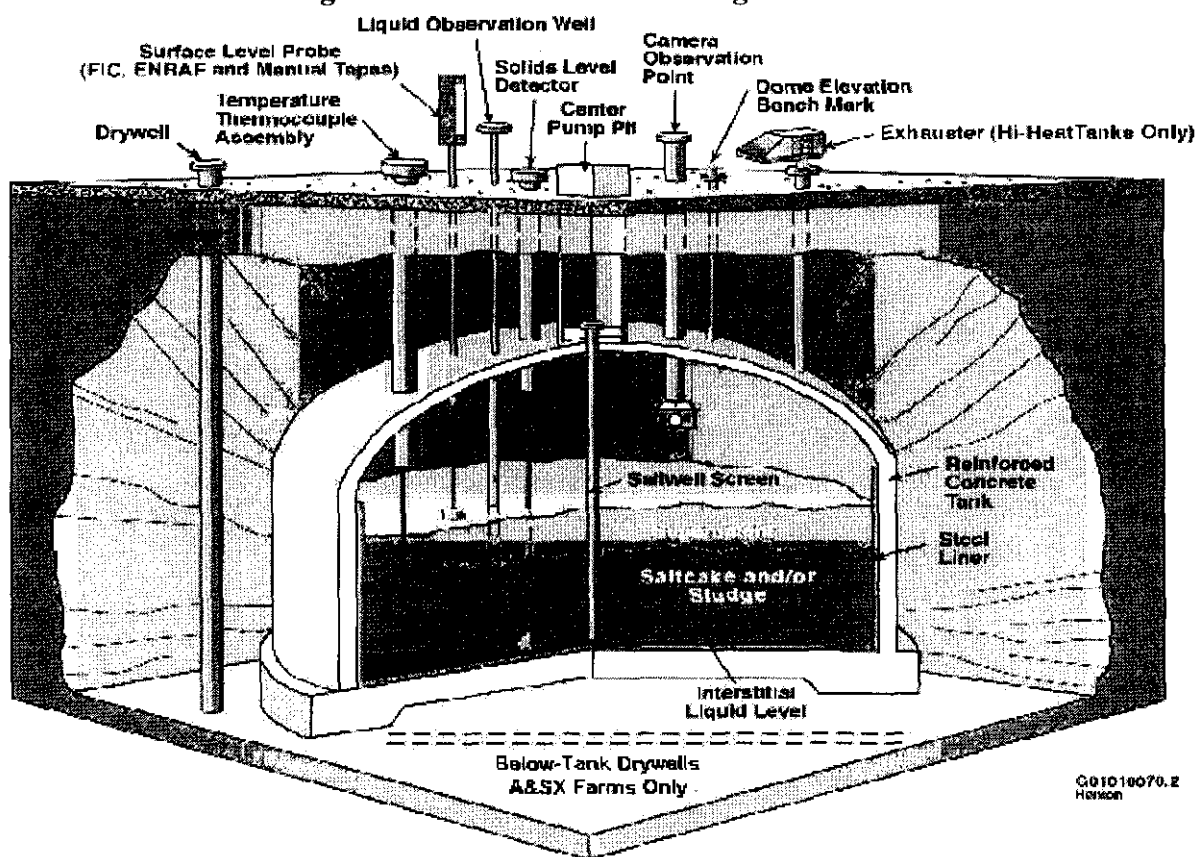
The subsection that applies to surveillance and monitoring is 40 CFR 265.195, "Inspections." This regulation requires documentation of a daily inspection of aboveground portions of the tank system, the area immediately surrounding the externally accessible portion of the tank system, and the data gathered from monitoring and leak-detection equipment.

1.5 SYSTEM DESCRIPTION

All tanks and ancillary equipment and facilities associated with the SST farms are located in the 200 East and 200 West Areas. The 200 Areas are located 22 miles from the nearest residential community of Richland, Washington, and at least 5 miles from the Columbia River.

The SST system includes **12** individual SST farms that contain 133 large volume tanks (500,000 to 1 million gallons); 16 smaller volume tanks (55,000 gallons); ancillary equipment associated with the tank farms; active miscellaneous underground storage tanks (MUSTS); inactive miscellaneous underground storage tanks (IMUSTs); and soils contaminated from past spills and *leaks*. The inactive miscellaneous underground storage tanks range in size from 500 to 50,000-gallon capacity and generally only contain residues from operations. Figure 1-1 below represents a SST cross-section, illustrating the location **and** installation of typical equipment.

Figure 1-1. Cross-Section of Single Shell Tank



The SST farms are regulated as interim status Treatment, Storage, and Disposal (TSD) units. These units include pipes, valve pits, vaults, miscellaneous smaller supporting tanks, Unplanned Release Sites (UPR), French drains, condensate tanks, diversion boxes, evaporators, diverter stations, and other miscellaneous facilities. Major groupings of the SST components have been developed. The major groupings along with the elements of the group are shown in Table 1-3.

Major Grouping	Group Elements
Single Shell Tanks	100 Series Tanks 200 Series Tanks
At-Tank Pits	Pump Pits Sluice Pits Heel Pits Saltwell Pits Saltwell Caisson
Between Tank Pits	Diversions Boxes Valve Pits Flush Pits
Piping	Active Piping Inactive Piping
Miscellaneous Underground Storage Tanks (MUSTs)	Active MUSTs Inactive MUSTs
Miscellaneous Structures	Misc. Buildings & Structures - Non-contaminated Vaults Evaporators

The next sections provide brief descriptions of each of the group elements in this table.

1.5.1 Single Shell Tanks

100 Series Tanks

Of the 149 SSTs, 133 are 75 feet in diameter with operating volumes of 530,000, 758,000, and one million gallons. These tanks are collectively referred to as 100 Series tanks.

Most of the 100 Series tanks are arranged in “cascades” of three or four tanks in a farm; when the first tank was filled, waste was allowed to overflow into successive tanks through piping in the sidewalls. Therefore, solids settled out in the first tank and the supernatant was stored in the last tank of the cascade or allowed to overflow to an adjacent crib.

200 Series Tanks

Sixteen smaller tanks or receiver tanks share the same design as the larger tanks, but are only 20 feet in diameter with an operating volume of 55,000 gallons. These tanks are collectively referred to as 200 Series tanks.

1.5.2 At-Tank Pits

Pumps, monitoring equipment, and transfer systems are typically contained in below-grade concrete enclosures with removable reinforced concrete cover blocks. The type and number of pits associated with **an** SST depends on the type of waste stored and the function of the SST. Therefore, not all tanks have all of the types of pits listed. Conductivity-based leak detectors are continuously monitored in all pits that are part of an active transfer route.

Pump Pits

Waste is normally pumped out of the SST through the pump pit, which is usually located at the center of the tank dome.

Sluice Pits

A sluice pit is used to route high-pressure liquids to the sluicer assembly and is located over off-center tank risers.

Heel Pits

A heel pit is used for equipment installation and is located over off-center tank risers.

Saltwell Pits

A saltwell pit is used for installing saltwell pumps and piping, and can be located either near the center of the tank or off-center. If the tank is equipped with a central pump pit, it is often used for this purpose.

Saltwell Caisson

A saltwell caisson is a large, covered pit over the tank dome allowing installation of oversized equipment in the tank, including saltwell pumps. It was typically constructed from a section of corrugated metal pipe to create a caisson over the dome allowing riser access. It served a similar function as the saltwell pits, but the construction technique was somewhat different.

1.5.3 Between Tank Pits

Diversion Boxes, Valve Pits, and Flush Pits

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 are a form of diversion box and are also located below ground. They are particularly useful when transferring 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 shut down 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.

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.

1.5.4 Piping

Extensive piping networks exist within and among tank farms in the 200 East and 200 West Areas so that waste can be transferred to or from any tank in the system. There are a number of different configurations of piping that have been used, including single-wall, direct-buried pipe; concrete-encased piping; double-wall buried piping; and more recently, temporary above grade hose-in-hose piping. Most lines are self-draining to a tank. If there are low points in a pipe run, most have low-point drains that in turn feed into tanks. Encasement leak detectors are installed on tank farm piping encasements, normally on the transfer lines that enter or leave the tank farm. Transfer lines within the tank farms do not typically have separate leak detectors. Pressure testing to verify integrity prior to use and leak detectors in the pits that the lines drain to are the typical leak detection methods used.

Active Piping

Active piping is any piping associated with the SST transfer system that is to be used to support a transfer out of an SST, (excluding retrieval operations). Leak detection capability is maintained during all transfers and continued until ~~the~~ system is physically disconnected from an active transfer route.

Inactive Piping

Inactive piping is associated with the SST transfer system that shall not be used to transfer liquids. Active leak detection capability is not maintained on these components.

1.5.5 Miscellaneous Underground Storage Tanks (MUSTS)

Active MUSTs

The underground storage tanks are used to collect waste drained from waste transfer systems and DST equipment. The four basic designs are direct buried, concrete; direct buried, steel; steel tanks contained in a vault or pit; and concrete vaults with steel liner. Catch tanks can be pumped to a DST via a diversion box through an underground pump-out line. Most of the catch tanks are associated with the DST system and are not addressed in this document.

Inactive MUSTs

A group of small (less than 50,000 gallons) radioactively contaminated, inactive, and abandoned underground storage tanks located in the 200 East and 200 West Areas are collectively termed the IMUSTs. Many of the tanks are directly buried in the ground, and most are catch tanks. Many of the tanks contain sludge and process materials.

1.5.6 Miscellaneous Structures

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 Plutonium-Uranium Extraction (PUREX) facility tank farm sludges to 221-B Plant for fission product removal; provide interim storage for the PUREX facility acid waste feed to 221-B Plant; and receive and distribute the neutralized high-level waste from 221-B Plant. The 244-AR Vault is being cleaned and readied for decontamination and decommissioning.

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.

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 and fission product “crudes” being transported between PUREX and B-Plant. The facility also provided lag storage for PUREX acidified sludge in transit to 244-AR Vault and has been used for routing waste transfers from the 241-C Tank Farm to the 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). Tank 244-TK-CR-003 is still active, but the other tanks are inactive. **All** above grade portions of the facility including steam and air supply lines have been removed. Tank 244-TK-CR-003 liquid level is currently monitored daily with a manual tape. None of the other tanks in the vault complex are monitored.

244-BXR Vault

The 244-BXR Vault is a below grade facility that contains four vertical tanks with dished bottoms and heads, each in its own cell and with its own 45-gallon sump. Tank 244-BXR-001 is constructed of carbon steel; the other three tanks are constructed of stainless steel. Tanks 244-BXR-001 and 244-BXR-011 have capacities of 50,000 gallons; tanks 244-BXR-002 and 244-BXR-003 have capacities of 15,000 gallons. This is an inactive facility and is not monitored.

244-TXR Vault

Similar in configuration to the 244-BXR Vault, the 244-TXR Vault contains three vertical tanks with dished bottoms and heads, each in its own cell and with its own 45-gallon sump. Tank 244-TXR-001 is constructed of carbon steel and has a capacity of 50,000 gallons. The other two tanks (244-TXR-002 and 244-TXR-003) are constructed of stainless steel and have capacities of 15,000 gallons. This is an inactive facility and is not monitored.

244-UR Vault

The 244-UR vault contains four vertical tanks with dished bottoms and heads, each in its own cell. Except for tank TK-UR-004's cell, each cell has a 45-gallon capacity sump. Tank TK-UR-001 is constructed of carbon steel and has a capacity of 50,000 gallons. Tanks TK-UR-002 and TK-UR-003 are constructed of stainless steel and have capacities of 15,000 gallons. TK-UR-004 is constructed of stainless steel and has a capacity of 8,230 gallons. This is an inactive facility and is not monitored.

242-S Evaporator

The 242-S Evaporator facility, located in the 200 West Area, was started-up in November 1973. The evaporation process reduced the volume of radioactive liquid waste by evaporation of water from the feed to produce a concentrated salt solution. The 242-S Evaporator was shut down in November 1980, and was placed in shutdown/standby status in 1981. At that time, all radioactive liquids were removed from the facility, and all tanks, vessels, and lines were flushed. This also included extensive decontamination efforts, and contamination levels were significantly reduced throughout the facility. Radiological controls were removed from the non-process side of the building. Water sources were isolated to prevent intrusion into both the 242-S facility and the S-103 receiver tank. Liquid levels are monitored daily on the primary vessel, the condensate tank, and the pump room sump. The pump room sump and condensate tanks will sound high level alarms if established limits are exceeded to identify piping leakage or intrusion. A leak detector element and alarm is also installed in the condenser room sump.

242-T Evaporator

The 242-T Evaporator Facility was originally constructed in the early 1950s to reduce waste volume and reclaim storage capacity in existing underground waste storage tanks. The process areas of the plant have not been used since 1980. The 242-T Evaporator is an inactive facility, and no leak detection monitoring is currently performed.

1.6 WASTE CONDITIONS AND AVAILABLE INSTRUMENTATION

Most of the waste in the SSTs is in the form of sludge, saltcake, and pumpable and nonpumpable liquids. Sludge consists of the solids precipitated from the neutralization of acid waste before their transfer to the SSTs. Saltcake is made up of the various salts formed from the evaporation of water from the waste. Pumpable liquid exists as supernatant and interstitial liquid in the tanks. Non-pumpable liquid is that liquid attracted to solid particulates by capillary action and cannot drain to the pump within the tank.

The SST waste is comprised primarily of sodium hydroxide; sodium salts of nitrate, nitrite, carbonate, aluminate, and phosphate; and hydrous oxides of aluminum, iron, and manganese. The radioactive components are fission product radionuclides such as strontium-90, cesium-137, and iodine-129, and actinide elements such as uranium, neptunium, plutonium, thorium, and americium.

The SSTs addressed in this document contain mixtures of both liquids and solids, which vary substantially from tank to tank. In general, the waste surfaces can be classed into two groups, those that are still capable of moving or flowing, and those that are too dry or rigid to move. The following discussion specifically addresses those wastes that are still capable of at least a minimum fluid flow.

The physical waste properties that govern waste flow, surface level movement in response to a potential leak, and the smoothness of the waste surface being monitored are different for each

tank. Some tanks contain a high percentage of liquids with limited solid content, and exhibit a glassy smooth liquid surface. As the solid content increases and the corresponding percentage of liquid is reduced, solids begin to appear on the surface, either protruding from below or as a floating crust. When the waste consists of a heavy slurry, (similar to partially-set cement), the surface can become very irregular and is often characterized by holes, ledges, and slopes. Although the response to a leak would be different in all of these cases, the waste is assumed to have adequate flow characteristics to show a measurable surface level decrease if the tank were to *leak*. The method of leak detection on these tanks is a daily surface level measurement, looking for any unexpected level decreases.

There are three instruments commonly used to measure waste surface levels in the 149 SSTs. The oldest device still in use is the manual tape, which relies on a metal tape with a plummet contacting an electrically conductive waste surface to initiate current flow by completing a circuit. Detection of current flow indicates the surface level. The next generation device was a Food Instrument Corporation conductivity gauge (FIC), which was very similar to the manual tape, except that the plummet was moved up and down by a motor rather than manually. Like the manual tape, the FIC also requires an electrically conductive waste surface to operate. Since 1994 there has been a program within Tank Farms to replace both of these devices with the ENRAF¹ level gauge. To date, 121 of the 149 tanks have been upgraded to ENRAFTM gauges. The ENRAFTM relies on a sensitive load cell to determine the exact weight of a displacer suspended from a thin wire, and does not require an electrically conductive waste surface. Contact with the waste surface is identified as a loss of displacer weight.

The resolution and repeatability of the surface level data varies with both waste type and gauge design. The condition providing the highest sensitivity to a potential leak is a smooth, pure liquid waste surface combined with the most accurate gauge (ENRAFTM). These measurements are impacted very little by day-to-day variation from either the waste surface or gauge error, and legitimate level decreases can be separated from the minimal data scatter to identify a developing downward trend with a high degree of confidence. **As** the waste surface becomes more irregular or a gauge with lower resolution is used, the degree of data scatter in the normal day-to-day readings increases. This makes it more difficult to separate normal data scatter from a legitimate downward trend (potential leak), and the level decrease must be more pronounced before it can be identified with confidence. For a heavy slurry waste with a highly irregular surface and a low-resolution instrument, the day-to-day readings exhibit a higher degree of normal data scatter. In this case, identifying a legitimate downward data trend would require a larger deviation for a longer time before the trend could be identified with confidence. The Hanford Site SST system exhibits this full range of characteristics, and each tank must be individually evaluated to determine the best leak detection system available for those specific conditions.

131 SSTs have now completed the Interim Stabilization process, commonly known as “saltwell pumping.” One additional tank (C-106) has been sluiced to remove liquids and solids in accordance with the HFFACO. Interim stabilization activities are actively under way on 12 additional tanks, and there is a commitment to complete the remaining five by September 2004. In this process, the drainable liquids in the tank are intentionally pumped out and transferred to

¹ ENRAF is a trademark of the ENRAF Corporation, Houston, Texas

the DST system to reduce the potential environmental impact of a leak to the soil. Interim stabilization reduces the liquid surface until only packed solids are visible on the surface. At this point, the remaining drainable liquid in the tank is referred to as “Interstitial Liquid,” since it only exists within the pore spaces of the solid particles. A liquid interface is formed within the solid matrix between the saturated waste and the drained waste, and the depth of that interface is referred to as the Interstitial Liquid Level (ILL). In this condition, the surface level would probably not decrease if the remaining interstitial liquids were to leak, and measuring surface level changes would not detect the leak.

Some tanks are equipped with a Liquid Observation Well (LOW). An LOW consists of a hollow tube capped at the bottom and inserted through the waste with the cap resting near the tank bottom. The top of the LOW tube extends above ground level, making the interior of the LOW accessible from the surface. This provides a corridor through the waste, which is isolated from all tank contents. Probes are run inside this opening, and the ILL is identified from the resulting profiles. The only in-tank leak detection devices available in the SST system are either surface level gauges or LOWs. The current in-tank leak detection program is based on collecting and interpreting data from these devices.

2.0 TECHNICAL DESCRIPTION AND SUPPORTING INFORMATION

2.1 DERIVATION OF METHODOLOGY – LEAK DETECTION

The current program for single-shell leak detection was first implemented in June 1994, and the basic leak detection protocols have not changed since that time. The discussion below summarizes the leak detection protocols that have been applied in creating and maintaining this program.

The SST in-tank leak detection program is based on the premise that liquid or semi-liquid waste surfaces are expected to decrease in response to a leak, while dry or solid waste surfaces will not. Each of these waste surface conditions will be discussed separately.

2.1.1 Dry Waste Surfaces

The leak detection method for dry surface tanks is an LOW. Neutron scans are run weekly inside the LOWs. A neutron probe provides a direct measurement of the waste moisture content immediately outside and adjacent to the LOW. The ILL interface is characterized by a sudden change in the waste moisture profile, typically a sharp reduction in the neutron count rate. All waste below this interface is considered liquid-saturated, while the waste above the ILL has been either fully or partially drained. ILL depths are plotted and trended over time, and any ILL values that decrease below the established trend indicate a possible tank leak. Gamma scans can also identify the depth of an ILL, but the neutron normally provides a clearer indication and is the instrument of choice in most cases.

Tanks with the ILL within about 24 inches of tank bottom cannot utilize an LOW for leak detection. The probe must collect enough count rate data below the ILL to clearly identify the sharp decrease in counts that is normally seen at the liquid interface. The configuration of the dished tank bottom and other physical limitations of the LOW installation process lead to a condition where neutron data from the bottom 24 inches of any tank is unobtainable. Tanks with extremely low liquid inventories will most likely have a liquid interface below this 24-inch minimum and, therefore, an LOW will not provide leak detection capability.

TX-108 is an example of a tank that has an LOW installed, but the liquid level is now below this minimum, and an accurate liquid interface cannot be identified from the neutron scans. HFFACO Milestone M-23-25 requires the installation of 24 LOWs in tanks that presently have no leak detection capability. Since the depth of the interstitial liquid level in these tanks is not known prior to LOW installation, it is possible that some of these LOWs will not provide the expected leak detection capability. As with TX-108, if the ILL is below about 24 inches, the interface will not be measurable. A similar situation may also exist after tanks complete interim stabilization. The final depth of the ILL when pumping is stopped cannot be predicted, and if it is below the 24-inch minimum, the LOW will not provide leak detection capability.

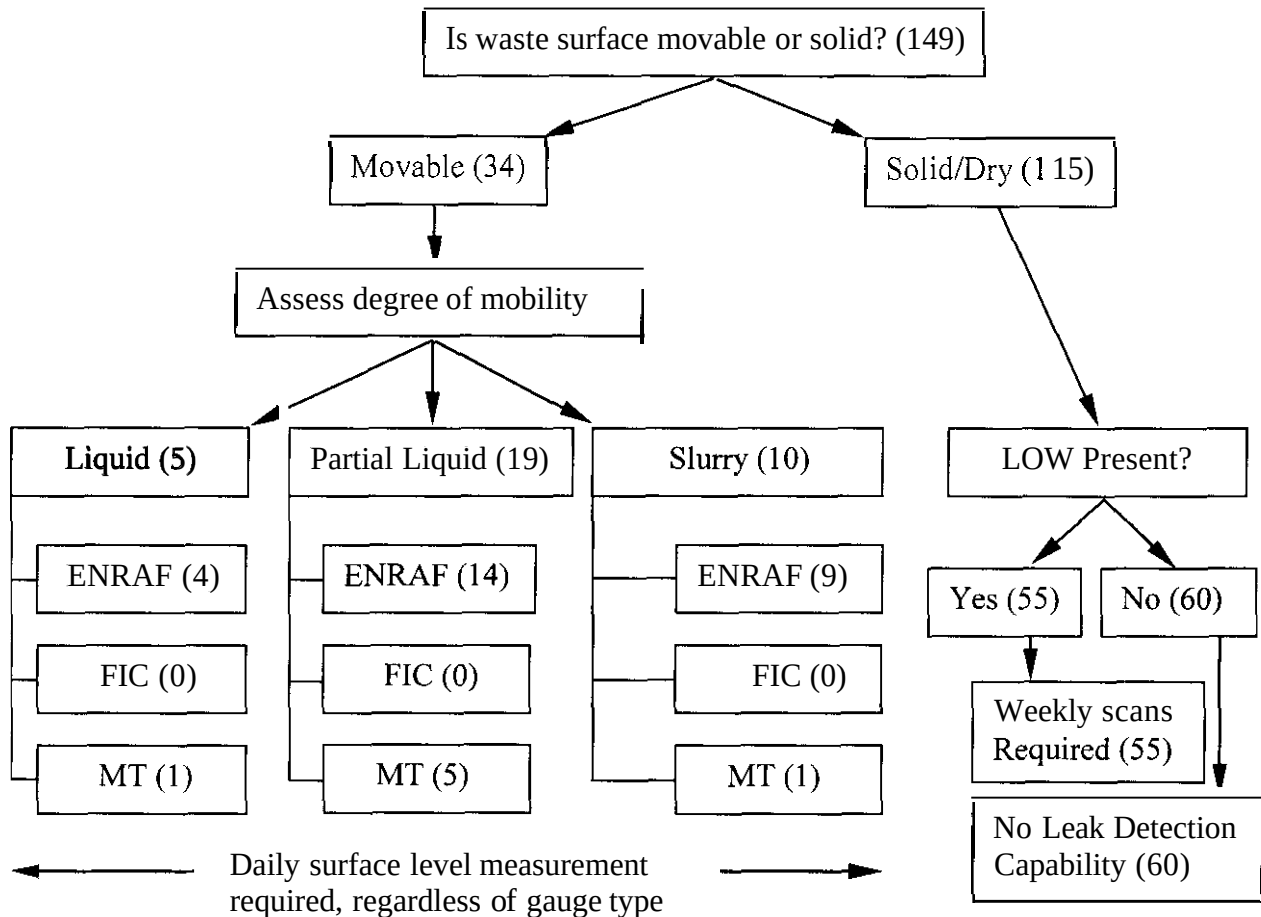
2.1.2 Liquid, Partial-Liquid, and Slurry Waste Surfaces

Surface level measurements are required for leak detection any time the surface level would decrease in response to a *leak*. Each tank's waste surface is evaluated, and put into the appropriate category, (liquid/partial liquid or dry/solid). Any waste surface that is considered fluid enough to register a decrease in response to a *leak* is graded into three categories. These categories are based on the smoothness of the waste surface and the expected degree of data scatter in the surface level measurements. The surfaces range from the smoothest with the most repeatable data, (pure liquid), to an intermediate response involving both liquid and solids, (partial liquid), to the least repeatable response, (heavy slurry). For these three categories, a daily surface level measurement is required for leak detection using whatever gauge exists on the tank. The gauges currently in use **are** ENRAF™, FIC, and Manual Tape. If normal equipment is temporarily out of service, a portable conductive tape device known as a "zip cord" can be used as an alternate.

The current in-tank leak detection program relies on either a surface level measurement for a movable waste surface, (either liquid, partial-liquid, or slurry), or an ILL measurement inside an LOW if the surface is dry. If neither of these options is available, no *leak* detection capability **is** claimed.

The decision tree below (Figure 2-1) summarizes the leak detection logic in the current program. The numbers in each box indicate how many of the 149 SSTs are in each particular category as of January 1, 2002.

Figure 2-1. Leak Detection Logic



Of the 60 SSTs that have no current leak detection, 22 will receive new LOW installations as part of the M-23-25 milestone. Two additional LOWs are being installed in tanks that currently have a liquid surface. Those two have not been interim stabilized yet, and will need the LOW after pumping is complete. The remaining 38 of the 60 tanks that do not have leak detection either have less than 24 inches of total waste or less than 5,000 gallons of total drainable interstitial liquid, which eliminates using an LOW for leak detection.

2.1.3 Discussion of Ancillary Equipment for Interim Stabilization

Three types of systems are used to monitor the interim stabilization process for leaks; conductivity probes, a networked communications system, and a mass balance calculation. In addition, direct-buried lines are pressure tested prior to use to verify integrity.

A conductivity probe is placed in each pit, which is identified as part of the saltwell transfer route. For example, the pit in which the saltwell pump and jumper will be installed, or the valve pit which forms an intermediate station along the transfer route, will each have a conductivity probe installed. There may be pits or other structures in a farm which are not a part of the saltwell transfer route and are not “physically connected” to the transfer route; therefore, active leak detection is not maintained for these facilities.

The conductivity probe is a simple device containing two metal elements which, when contacted by a conductive liquid such as tank waste, will complete an electrical circuit and cause an alarm to be annunciated. These probes are typically placed at the low point in a pit, adjacent to the drain line to provide the optimal location for sensing leaks. The design of the probe sets the nominal sensing level at one inch above the deck of the pit.

The conductivity probe completes a circuit in which an alarm is annunciated, and a further signal is generated. This additional signal is generated by a Programmable Logic Controller (PLC), which transmits a pump shutdown signal to all other saltwell skids in the same loop. All saltwell skids in a single tank farm are in the same interconnected piping system and, therefore, all of them will shut down if a leak is sensed by any single sensor in the group. The shutdown action is fail-safe from the standpoint that it requires a positive signal at all times; if the communications signal is lost for any reason, an alarm is generated and all pumps shut down.

A further leak detection mechanism is the mass balance process. The volume of waste pumped out of the source tank is determined and compared to the rise in level in the receiving tank. A flow measuring device is used on the saltwell skid to monitor the amount of waste leaving the tank; level monitors in the receiving tank monitor the amount of waste entering the tank. Any discrepancy in the mass balance calculation that exceeds normal instrumentation and system error will indicate the potential for a leak; the transfer will be stopped, and an immediate, extensive review will be triggered. Corrective actions will be taken as necessary.

Approved operating procedures control every aspect of each waste transfer, and adherence is rigorously enforced. These procedures dictate the prerequisite actions, which include verifying operability of the leak detection systems prior to transfer, and ensure immediate and complete cessation of pumping in the event of a leak alarm.

2.2 DERIVATION OF METHODOLOGY – INTRUSION DETECTION

Intrusions are detected using the same devices and instruments as leaks. However, with intrusions the system is set up to detect level increases rather than decreases. The only difference between leak detection and 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 3-1 shows all surface level equipment installed, and the comments indicate which gauges are currently used for intrusion detection only.

3.0 SPECIFIC MILESTONE DELIVERABLES

3.1 PRESENCE OR ABSENCE OF MONITORING INSTRUMENTS

3.1.1 Single-Shell Tanks

Table 3-1 identifies and describes the presence or absence of in-tank monitoring instruments in Single Shell Tanks, (M-23-22-TO1, Sub-section A). Table 3-1 lists by tank the leak detection method currently used for leak detection, (ENRAF™, FIC, Manual Tape, ILL, or None), the current surface level gauges or instruments, date of surface level gauge installation, the presence of a LOW, the date of LOW installation, and any applicable comments. Note that the installation date is the date of first available data from that instrument in the Surveillance Analysis Computer System, (SACS), database. The SACS database stores all readily available surveillance data back to approximately 1980, which represents the earliest availability of electronic data. Any equipment installed prior to SACS data is designated by a “less than” symbol followed by the date, e.g., <1980.

It is important to note that all available surface level and LOW instrumentation is listed in the table, whether it is used for leak detection purposes or not. For example, tank 241-AX-102 is the only SST that has two level gauges, an ENRAF™, and a Manual Tape. Both gauges are listed in Table 3-1, although the official leak detection method in column 2 is “None.” Since the tank waste has a dry, solid surface, neither gauge can be used to provide *leak* detection, but the surface level instruments are used to verify that no intrusion has occurred.

Table Legend:

Leak Detection (LD) Method

E	–	ENRAF™ Gauge
F	–	Food Instrument Corporation Gauge (FIC)
I	–	Interstitial Liquid Level (ILL)
MT	=	Manual Tape
N	=	None

Level Gauge

E	–	ENRAF™ Gauge
FIC	=	Food Instrument Corporation Gauge (FIC)
MT	=	Manual Tape

Table 3-1. In-Tank Leak Detection Instrumentation Summary (5 Pages)

Tank	LD Method	Surface Level Gauge	Gauge Install Date	LOW Install	LOW Install Date	Comments
A-101	I	E	Sep-95	Yes	May-83	Dry surface, ENRAF used for intrusion only
A-102	N	FIC	Jan-02			Dry surface, FIC used for intrusion only
A-103	I	E	Jul-96	Yes	Apr-85	Dry surface, ENRAF used for intrusion only

Table 3-1. In-Tank Leak Detection Instrumentation Summary (5 Pages)

Tank	LD Method	Surface Level Gauge	Gauge Install Date	LOW Install	LOW Install Date	Comments
A-104	N	E	Jun-96			Dry surface, ENRAF used for intrusion only
A-105	N	MT	< 1980			Dry surface, MT used for intrusion only
A-106	N	E	Jan-96			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
AX-101	I	E	Sep-95	Yes	Oct-84	Dry surface, ENRAF used for intrusion only
AX-102	N	E	Sep-98			Dry surface, ENRAF used for intrusion only
AX-102	N	MT	< 1981			Not used since ENRAF was installed, 9/98
AX-103	N	E	Sep-95			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
AX-104	N	E	Oct-96			Dry surface, ENRAF used for intrusion only
B-101	N	E	Aug-00			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
B-102	E	E	Mar-95			
B-103	N	E	Jul-00			Dry surface, ENRAF used for intrusion only
B-104	I	E	Aug-00	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
B-105	I	E	Aug-00	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
B-106	E	E	Jul-00			
B-107	N	E	Aug-00			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
B-108	N	E	Aug-00			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
B-109	N	E	Aug-00			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
B-110	I	E	Aug-00	Yes	Nov-94	Dry surface, ENRAF used for intrusion only, ENRAF currently out of service.
B-111	I	E	Aug-00	Yes	Nov-94	Dry surface, ENRAF used for intrusion only
B-112	E	E	Mar-95			
B-201	E	E	Jul-00			
B-202	E	E	Jul-00			
B-203	E	E	Jun-00			
B-204	E	E	Jun-00			
BX-101	E	E	Dec-95			
BX-102	N	E	Jun-96			Dry surface, ENRAF used for intrusion only
BX-103	E	E	Dec-95			
BX-104	E	E	Dec-95			
BX-105	N	E	Mar-96			Dry surface, ENRAF used for intrusion only
BX-106	N	E	Jul-94			Dry surface, ENRAF used for intrusion only
BX-107	E	E	Dec-95			
BX-108	N	E	Jun-96			Dry surface, ENRAF used for intrusion only
BX-109	N	E	Aug-95			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
BX-110	N	E	Jun-96			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
BX-111	I	E	Jun-96	Yes	Apr-85	Dry surface, ENRAF used for intrusion only

Table 3-1. In-Tank Leak Detection Instrumentation Summary (5 Pages)

Tank	LD Method	Surface Level Gauge	Gauge Install Date	LOW Install	LOW Install Date	Comments
BX-112	E	E	Dec-95			
BY-101	I	MT	< 1981	Yes	Aug-84	Dry surface, MT used for intrusion only
BY-102	I	E	May-00	Yes	Aug-84	Dry surface, ENRAF used for intrusion only
BY-103	I	E	Dec-96	Yes	Aug-84	Dry surface, ENRAF used for intrusion only
BY-104	I	MT	< 1981	Yes	Aug-84	Dry surface, MT used for intrusion only
BY-105	I	MT	< 1981	Yes	Apr-85	Dry surface, MT used for intrusion only
BY-106	I	MT	< 1981	Yes	Aug-84	Dry surface, MT used for intrusion only
BY-107	I	MT	< 1981	Yes	Sep-83	Dry surface, MT used for intrusion only
BY-108	N	MT	< 1981			Dry surface, MT used for intrusion only, New LOW scheduled as part of M-23-25
BY-109	I	FIC	< 1981	Yes	Aug-84	Dry surface, FIC used for intrusion only
BY-110	I	E	Jul-97	Yes	Aug-84	Dry surface, ENRAF used for intrusion only
BY-111	I	E	Apr-97	Yes	Sep-81	Dry surface, ENRAF used for intrusion only
BY-112	I	MT	< 1981	Yes	Aug-84	Dry surface, MT used for intrusion only
C-101	N	MT	< 1981			Dry surface, MT used for intrusion only
C-102	N	FIC	< 1983			Dry surface, FIC used for intrusion only, New LOW scheduled as part of M-23-25
C-103	E	E	Aug-94			Current liquid surface uses ENRAF. New LOW scheduled as part of M-23-25.
C-104	N	E	Apr-99			Dry surface, ENRAF used for intrusion only
C-105	N	E	Jul-96			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
C-106	N	E	Sep-94			Dry surface, ENRAF used for intrusion only
C-107	E	E	Apr-95			
C-108	N	MT	< 1981			Dry surface, MT used for intrusion only
C-109	N	MT	< 1981			Dry surface, MT used for intrusion only
C-110	MT	MT	< 1981			
C-111	N	MT	< 1981			Dry surface, MT used for intrusion only
C-112	N	E	Mar-96			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
C-201	N	MT	< 1981			Dry surface, MT used for intrusion only
C-202	N	MT	< 1981			Dry surface, MT used for intrusion only
C-203	N	MT	< 1981			Dry surface, MT used for intrusion only
C-204	N	MT	< 1981			Dry surface, MT used for intrusion only
S-101	E	E	Feb-95	Yes	Aug-84	
S-102	I	E	May-95	Yes	Aug-84	Dry surface, ENRAF used for intrusion only
S-103	E	E	May-94	Yes	Aug-84	
S-104	I	E	Jun-99	Yes	Oct-94	Dry surface, ENRAF used for intrusion only
S-105	I	E	Jul-95	Yes	Aug-84	Dry surface, ENRAF used for intrusion only
S-106	I	E	Jun-94	Yes	Nov-81	Dry surface, ENRAF used for intrusion only
S-107	E	E	Jun-94			Current liquid surface uses ENRAF. New LOW scheduled as part of M-23-25.
S-108	I	E	Jul-95	Yes	Aug-83	Dry surface, ENRAF used for intrusion only
S-109	I	E	Aug-95	Yes	Sep-81	Dry surface, ENRAF used for intrusion only

Table 3-1. In-Tank Leak Detection Instrumentation Summary (5 Pages)

Tank	LD Method	Surface Level Gauge	Gauge Install Date	LOW Install	LOW Install Date	Comments
S-110	I	E	Aug-95	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
S-111	E	E	Aug-94	Yes	Apr-85	
S-112	I	E	May-95	Yes	Sep-81	Dry surface, ENRAF used for intrusion only
SX-101	I	E	May-95	Yes	Aug-84	Dry surface, ENRAF used for intrusion only
SX-102	I	E	May-95	Yes	Aug-84	Dry surface, ENRAF used for intrusion only
SX-103	I	E	May-95	Yes	Aug-84	Dry surface, ENRAF used for intrusion only
SX-104	I	E	May-95	Yes	May-82	Dry surface, ENRAF used for intrusion only
SX-105	I	E	May-95	Yes	Aug-84	Dry surface, ENRAF used for intrusion only
SX-106	I	E	Aug-94	Yes	Aug-84	Dry surface, ENRAF used for intrusion only
SX-107	N	E	Sep-99			Dry surface, ENRAF used for intrusion only
SX-108	N	E	Sep-99			Dry surface, ENRAF used for intrusion only
SX-109	N	E	Sep-98			Dry surface, ENRAF used for intrusion only
SX-110	N	E	Sep-99			Dry surface, ENRAF used for intrusion only
SX-111	N	E	Sep-99			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
SX-112	N	E	Sep-99			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
SX-113	N	E	Sep-99			Dry surface, ENRAF used for intrusion only
SX-114	N	E	Sep-99			Dry surface, ENRAF used for intrusion only
SX-115	N	E	Nov-99			Dry surface, ENRAF used for intrusion only
T-101	N	E	Jun-95			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
T-102	E	E	Jun-94			
T-103	N	E	Jul-95			Dry surface, ENRAF used for intrusion only
T-104	I	E	Jan-96	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
T-105	N	E	Aug-95			Dry surface, ENRAF used for intrusion only
T-106	N	E	Aug-95			Dry surface, ENRAF used for intrusion only
T-107	E	E	Jun-94			
T-108	E	E	Oct-95			
T-109	N	E	Sep-94			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
T-110	I	E	Jun-95	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
T-111	I	E	Jul-95	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
T-112	E	E	Sep-95			
T-201	MT	MT	< 1981			
T-202	MT	MT	< 1981			
T-203	N	MT	< 1981			Dry surface, MT used for intrusion only
T-204	MT	MT	< 1981			
TX-101	E	E	Oct-95			
TX-102	I	E	Apr-96	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
TX-103	N	E	Jan-96			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
TX-104	N	E	Apr-96			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25

Table 3-1. In-Tank Leak Detection Instrumentation Summary (5 Pages)

Tank	LD Method	Surface Level Gauge	Gauge Install Date	LOW Install	LOW Install Date	Comments
TX-105	N	E	Jun-96	Yes	May-82	Dry surface, ENRAF used for intrusion only. Last LOW data, 8/87, LOW damaged, unusable. New LOW scheduled as part of M-23-25
TX-106	I	E	Jun-96	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
TX-107	N	E	May-96			Dry surface, ENRAF used for intrusion only
TX-108	N	E	May-96	Yes	Apr-85	Dry surface, ENRAF used for intrusion only. Last LOW data, 7/94, ILL too low to monitor
TX-109	I	E	Jan-96	Yes	Jun-82	Dry surface, ENRAF used for intrusion only
TX-110	I	E	Jun-96	Yes	May-82	Dry surface, ENRAF used for intrusion only
TX-111	I	E	Jul-96	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
TX-112	I	E	Jul-96	Yes	Sep-81	Dry surface, ENRAF used for intrusion only
TX-113	I	E	Jun-96	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
TX-114	I	E	Jun-96	Yes	Jun-82	Dry surface, ENRAF used for intrusion only
TX-115	I	E	Apr-96	Yes	Jun-82	Dry surface, ENRAF used for intrusion only
TX-116	N	E	Jun-96			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
TX-117	I	E	Jun-96	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
TX-118	I	E	Feb-96	Yes	Sep-81	Dry surface, ENRAF used for intrusion only
TY-101	N	E	Jul-95			Dry surface, ENRAF used for intrusion only
TY-102	E	E	Sep-95			
TY-103	I	E	Oct-95	Yes	Jul-82	Dry surface, ENRAF used for intrusion only
TY-104	E	E	Jul-95			
TY-105	N	E	Dec-95			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
TY-106	N	E	Dec-95			Dry surface, ENRAF used for intrusion only
U-101	MT	MT	<1981			
U-102	I	E	Jan-96	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
U-103	I	E	Jul-94	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
U-104	N	MT	<1981			Dry surface, MT used for intrusion only
U-105	I	E	Jul-94	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
U-106	I	E	Aug-94	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
U-107	E	E	Jul-94	Yes	Apr-85	
U-108	I	E	May-95	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
U-109	I	E	Jul-94	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
U-110	N	E	Jan-96			Dry surface, ENRAF used for intrusion only, New LOW scheduled as part of M-23-25
U-111	I	E	Jan-96	Yes	Apr-85	Dry surface, ENRAF used for intrusion only
U-112	N	MT	<1981			Dry surface, MT used for intrusion only
U-201	MT	MT	<1981			
U-202	MT	MT	<1981			
U-203	N	E	Oct-98			Dry surface, ENRAF used for intrusion only
U-204	E	E	Jun-98			

3.1.2 Ancillary Equipment

This section addresses the current leak detection monitoring components of the SST system that support the storage function, other than the tanks themselves. The tanks were addressed in the previous section. The ancillary equipment section will address the transfer system, (used by the Interim Stabilization program), and additional miscellaneous tanks.

SST Transfer System

The primary group that actively transfers waste within the SST system to support the storage function is the Interim Stabilization program. Transfer of waste into a SST is prohibited, and other types of transfers, (e.g., retrieval), are outside the scope of this document. Before starting a transfer, leak detection capability is established in all impacted lines, pits, and vessels per requirements in the Authorization Basis. The specific equipment and type of leak detectors used varies, depending on the tanks and route involved. This leak detection capability is maintained throughout the transfer by a series of pre-transfer pressure tests, continuous monitoring of conductivity-based leak detector alarms in the pits, and a material balance that compares metered fluids leaving the tank with the measured increase in the receiving vessel. Any discrepancies exceeding the allowable tolerance will terminate the transfer until the discrepancy is resolved. See Section 3.3 for an expanded discussion of equipment and methods used.

The only components of the SST transfer system that maintain leak detection capability are those that are actively being used. If a flowline, pit, or vessel is not being used and is isolated from all active transfer routes, leak detection capability is not maintained and, therefore, no leak detection is claimed. The discussion below centers around the specific transfer system components that were active as of January 1, 2002. If a particular component of the SST transfer system is not specifically addressed or discussed, the reader may assume that it was not in use as of that date, and no leak detection capability is claimed.

The dates listed after each route indicate the date that interim stabilization activities began. On that date, any leak detection equipment required by the Authorization Basis was fully functional. At the completion of interim stabilization activities, the transfer system will be isolated from all active transfer routes, and maintenance of the leak detection system will cease. This results in a situation where the active transfer system is only a small percentage of the total system available, and the active components will constantly change, depending on the tank being interim stabilized.

The SST transfer routes that are currently active are listed below, followed by the date that the transfer was started. For the following systems, all direct-buried flowlines have successfully passed a pressure test prior to startup. All temporary hose-in-hose systems maintain continuous leak detection capability by having the secondary containment hose drain to a pit with an active leak detector. All pits are equipped with a conductivity-type leak detector, which is continuously monitored, and the entire system is tied to a master pump shutdown system that would automatically shut down all pumps in the farm if any component were to indicate a possible leak. Any equipment not specifically mentioned in the list below is assumed to be unused at the present time, and no leak detection capability is claimed.

Routes in A/AX Farm:

- A-101 pump pit via SL-107 to Valve Pit A-A, to Valve Pit A-B (Start date, 7/8/00)
- AX-101 pump pit via SL-108 to Valve Pit AX-A, to Valve Pit AX-B, SL-100 to Valve Pit A-B (Start Date, 7/30/00)
- Valve Pit A-B via SN-650 to tank AP-102 (DST)
- Leak Detection consists of conductivity probes in each valve pit, and each pump pit.
- System is interconnected via the saltwells Master Pump Shutdown (PLC) System.

Routes in BY Farm:

- BY-105 pump pit via temporary overground transfer (TOGT) to 244-BX double-contained receiver tank (DCRT) (part of DST system). Note: OGT systems are temporary only, and are removed after completion. (Start date, 7/12/01)
- BY-106 pump pit via TOGT to BY-105 pump pit, then as above (Start date, 7/12/01)
- Leak Detection consists of conductivity probes in each pump pit and at the DCRT
- System is interconnected via the saltwells Master Pump Shutdown (PLC) System

Routes in S/SX Farm:

- S-102 pump pit via SL-140 to 241-S-A valve pit (Start date, 3/18/99)
- S-109 pump pit via TOGT to 241-S-A valve pit (Start date, 9/23/00)

(Note: S-109 has already been declared Interim Stabilized, and is no longer actively pumping. However, the routing is still physically connected and the *leak* detection system will be maintained until the transfer piping can be isolated.)

- S-111 pump pit via 241-S-C valve pit, then via TOGT to 241-S-A valve pit (Start date, 12/18/01)
- SX-101 pump pit via TOGT to 241-SX-A valve pit (Start date, 11/21/01)
- SX-102 pump pit via TOGT to 241-SX-A valve pit (Start date, 12/15/01)
- SX-103 pump pit via TOGT to 241-SX-A valve pit (Start date, 10/26/00)
- 241-SX-A valve pit via TOGT to 241-S-C valve pit
- 241-S-C valve pit to 241-S-A valve pit via TOGT
- 241-S-A valve pit to SY-B valve pit (DST)
- Leak Detection consists of conductivity probes in each pump pit and at the DCRT
- System is interconnected via the saltwells Master Pump Shutdown (PLC) System

Routes in U Farm:

- U-107 pump pit via TOGT to 241-U-D valve pit (Start date, 9/30/01)
- U-108 pump pit via TOGT to 241-U-D valve pit (Start date, 12/3/01)
- 241-U-D valve pit via SN-216/282 to **SY-A** valve pit (DST)
- Leak Detection consists of conductivity probes in each pump pit and at the DCRT
- System is interconnected via the saltwells Master Pump Shutdown (PLC) System

Miscellaneous Tanks

Most of the catch tanks support DST transfer routes and are part of the DST system. Those tanks will not be addressed, since the DST system is outside the scope of this document. Many of the Inactive Miscellaneous Underground Storage Tanks (IMUSTS) are part of the SST transfer system, and are within the scope of this document. Most of them have been inactive for many years and have no leak detection capability. Only two tanks fall within the scope of the SST ancillary equipment definition and contain leak detection equipment that is routinely monitored, which are summarized below. It should be assumed that if a tank is not specifically mentioned below, it is either outside the scope of this document or currently has no active leak detection instrumentation.

240-S-302

The primary purpose of this 17,700-gallon tank was to receive leakage, spillage, line flushes, and drainage associated with waste transfers through diversion box 240-S-151. It was suspected of leaking as early as 1977, and was officially declared a leaker in 1987. It has since been isolated from all liquid sources and is presently monitored daily with an ENRAF™ gauge.

241-TX-302B

241-TX-302B holds approximately 17,700 gallons. Its primary purpose was to receive drainage from diversion box 241-TX-155. The tank is inactive, stabilized, and isolated from all liquid sources. It is equipped with a manual tape, and levels are recorded daily.

3.2 DATE OF MONITORING INSTRUMENT INSTALLATION AND ASSESSMENT OF FUNCTIONALITY

Table 3-1 in the previous section identifies the SST in-tank monitoring instrument date of installation and a DOE assessment as to functionality, (M-23-22-T01, Sub-section B). Table 3-1 reflects the status of tank monitoring equipment within the scope of this document as of January 1, 2002. All listed equipment is fully functional, unless otherwise noted in the “comments” column.

Section 3.1.2 in the previous section identifies all active transfer routes for the SST transfer system, along with the date that the transfer was initiated. It should be assumed that leak detection capability did not exist in that system prior to the date shown, and that after the transfer is complete and the route isolated from all active transfer routes, leak detection capability will not be maintained. The current Authorization Basis requires that all components of the *leak* detection system be fully functional during a transfer, or the transfer must be immediately terminated until the system is repaired.

3.3 METHODS OR PROCESSES UTILIZED FOR THE EVALUATION OF THE STATUS OF SST SYSTEM MONITORING COMPONENTS

This section describes the methods or processes utilized for the evaluation of the status of SST system monitoring components, (M-23-22-T01, Sub-section C). The processes used to determine whether a leak detection system or component has failed are described below, (by system).

ENRAF Level Gauges

ENRAF™ level gauges are delivered with factory-installed diagnostic software built into each system. If an internal error is detected by the gauge, a fail code is output to the LCD display in place of the usual waste level. If no fail codes are displayed, then the gauge has passed all internal diagnostics. Many of the ENRAF™ gauges are connected to the Tank Monitoring and Control System (TMACS), where tank levels are remotely monitored on a continuous basis electronically. When the gauge issues a fail code, the TMACS screen display will change from green to white, immediately indicating a non-functional gauge. Any loss of communications between the gauge and the central facility will show the same white response.

In addition to the automated diagnostics just described, all surface level and ILL data is reviewed by surveillance personnel at least once per week. **All** unexpected level or trend changes are investigated, and the investigation may include having the gauge field-checked by an instrument technician. Most equipment failures will show up as data deviations, (drift, spikes, flyers, or no response), and are easily identified during weekly data trend reviews. Every SST ENRAF™ gauge is scheduled to be calibrated twice per year. The calibrations are performed to **an** approved maintenance procedure, (5-LCD-300, ENRAF™ Series 854 Displacer Weight Check and Calibration Check), which is based on vendor recommendations.

Manual Tapes

A manual tape is a very simple instrument. Using the tank drawings, a tape is cut to the exact length from the bottom of the tank to the measure point at the tape housing, and is installed “backwards” with the maximum value at the tip of the plummet and zero at the connection point. This means that if the distance from the manual tape housing to the bottom of the tank were exactly 50 feet and the tank was empty, rolling out 50 feet of tape until the plummet just touched the bottom of the tank would yield a reading of “zero.” The waste level would be recorded as “zero,” which would be correct for an empty tank. The tape and plummet are part of a single electrical circuit, and as long as the plummet is hanging in air and not contacting anything conductive, there is no current flow. When the plummet contacts a conductive waste surface, completing the circuit, a meter indicates that current flow has been established. The depth marked on the tape is then recorded as the waste level.

Manual tapes are calibrated when they are initially installed by calculating and cutting the tape to a precise length. Once installed, that length cannot be adjusted, and no “re-calibration” is performed unless the tape is replaced. As the waste surface dries out, which often occurs after interim stabilization, many tanks are left with high resistance waste surfaces. At some point, the waste becomes dry enough that electrical flow is not supported, and a signal is no longer obtained. A manual tape in good working order on a highly conductive surface should be accurate and repeatable to about ¼ inch. As the waste dries out, the accuracy of the device degrades, until ultimately no signal is possible. The drying out of the waste surface is typically observed as increasing levels of data scatter during routine data reviews.

Food Instrument Corporation (FIC) Gauges

There are only three FICs in service at this time, (one each in tanks 241-A-102, 241-BY-109 and 241-C-102). A FIC is functionally equivalent to the Manual Tape, except that the tape and plummet are raised and lowered by a motor rather than manually, and there is an odometer readout instead of reading the tape directly. As with the Manual Tape, an electrically conductive waste surface is required to complete the circuit and obtain a valid reading. As with manual tapes, if the surface is very dry, a high degree of data scatter is usually observed. The FIC is mechanically more complex than the Manual Tape and is subject to mechanical failure. There is an established calibration procedure, which is normally performed annually, and which correlates the odometer readout to the actual tape length.

LOW Surveillance Van and Probes

There are two primary systems on a LOW van, the depth control system and the count rate system. The final product of a LOW survey is a plot of depth versus counts. The van’s depth system must be calibrated each day before the van can be used. The daily depth calibration consists of measuring the depth of a 100-foot well in the garage at the 272-WA facility. The van must determine the well depth within +/- 0.25 inches of its known value to pass the pre-job calibration.

The neutron or gamma probes to be used are also calibrated each day before going to the field. There are neutron and gamma calibration fixtures in the garage, which generate known count rates, and the count rate obtained from the probe must match the standard within the allowable tolerance before it can be used. The count rate system accuracy is less critical than the depth system, since the ILL is determined from the depth of a sudden change in count rates, rather than any absolute count rate value.

In addition to the daily checks just described, there are also comprehensive monthly, quarterly, and annual preventive maintenance procedures for both the vans and the probes. The final and most important quality control measure is looking carefully at all scan data before it is accepted and saved to the database. **All** new scans are compared to a “reference scan,” which allows the reviewer to immediately identify any spikes, drifting, dead zones, or other anomalous probe behavior. If the scan just obtained does not overlay the reference scan very closely, a probe or van problem may be indicated. The majority of electronic problems are identified in this manner. If the scan data is considered “suspect” for any reason, a rerun is requested.

Conductivity-based Leak Detectors for Transfer System

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 immediate alarm to the computer controlling the master pump shutdown. This alarm will result in the immediate shutdown of all transfer activities. There is also a local annunciator, both audible and visible. These systems are designed to be “intrinsically safe,” which means that if the circuit loses power or the circuit opens for any reason, the alarm is sent. Prior to each transfer, the system is tested by opening the relay to verify that the alarm responds properly and the pumps shut down as designed.

Direct-buried Flowline Pressure Tests

Direct-buried flowlines are pressure tested prior to being placed in service, and are retested 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 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 a SST are measured. The receiver tank is typically a DCRT or a DST, which shows a corresponding increase in level. The volume sent and the volume received are

compared, and any discrepancies that exceed the allowable tolerance is identified as a potential leak or instrumentation problem. An investigation is immediately initiated. The allowable tolerance depends on the volume of the system and the resolution of the instrumentation used.

3.4 MONITORING FREQUENCIES

This section identifies and describes the monitoring frequencies for leak detection and intrusion devices, (M-23-22-T01, Sub-section D). The primary in-tank leak detection instruments and their frequencies are listed in Table 3-2. 40 CFR 265.195 requires inspections of leak detection equipment and data on a daily basis. For all tanks using the surface level device for primary leak and intrusion detection, the frequency is daily. For all tanks using the LOW scan for primary leak and intrusion detection, the frequency is weekly. If the surface level device is being used for intrusion detection only, (*dry* or rigid surface), then the frequency is quarterly.

In addition to the surface level frequencies described above, every LOW is scanned each week, even if it is not the designated primary device. This is because regular data is required to maintain a statistically valid baseline in case the primary surface level device fails and the LOW must be used as a backup. The LOW data cannot be effectively analyzed unless the baseline and tolerances are maintained, which requires a minimum data set to be statistically valid. As a general rule, the more data points that are included in the data set used to determine the baseline, the more statistically valid that baseline becomes. Similarly, all surface level devices are read at least once per quarter, even if they are not being used for primary leak detection. This is to provide a long-term trend of surface level changes, calculation of waste volumes, confirmation that the device is still functional, and verification that an intrusion has not occurred.

Data from all devices listed in Table 3-2 is collected at the specified frequency, with the following exceptions:

1. During active waste pumping in-tank leak detection methods are not applicable. This is because the liquid level is expected to decrease in response to planned activities. If monitoring equipment is operable during pumping, the data should continue to be taken at the frequency specified in Table 3-2. If monitoring equipment fails during pumping, it may remain out of service during active pumping, but if the pumps are shut down for 30 days or more, regularly scheduled monitoring must resume. Upon completion of pumping, routine monitoring at the frequency specified in Table 3-2 resumes.
2. Failure to obtain a reading within the specified frequency is permitted for up to 72 hours when safety of personnel or performance of equipment will be adversely affected by weather or other conditions. Deviations are permitted by a letter signed by the managers of Central Command and Control (CCC), and Tank Surveillance and Data Acquisition (TS&DA), or their delegates. Examples include extreme weather conditions, including dust storms, snow and ice, which would make tank farm entry unsafe.

3. If specified surveillance equipment has failed and is out of service, the current program allows up to 14 days for repair. There are also special circumstances where extensions beyond 14 days can be allowed. See Section 3.6 for details.

Frequency Requirements for Ancillary Equipment

The leak detection equipment used during interim stabilization includes pressure testing, conductivity-based leak detectors in all pits, and a material balance calculation.

During pumping operations, the process is continuously monitored for leaks via an automated sensing and shutdown system. Each saltwell loop (consisting of the tanks in a specific geographical area such as A and AX Farms) is tied together physically through the transfer piping, and electronically through the communications network. In the event of a detected leak anywhere in the system, all pumps in the network will shut down and an alarm will be annunciated. Leak detectors are monitored continuously.

Transfer line walkdowns are performed for radiological survey purposes at least every twelve hours; some lines may be examined more frequently depending on circumstances.

Material balance calculations are performed at two-hour intervals during a transfer to confirm expected transfer rates and provide early notification of potential leakage.

The saltwell pumping program is a waste transfer system and has no storage capability; therefore, if no pumping is in progress, no active transfer system leak detection is maintained.

Functional testing of the leak detection system is performed on a quarterly basis in accordance with approved procedures. This testing simulates a leak by inserting a signal at the leak detection input and verifying the system shuts down all connected saltwell pumps.

3.5 LEAK DETECTION SURVEILLANCE AND MONITORING REQUIREMENTS

This section describes the *leak* detection surveillance and monitoring requirements, (M-23-22-T01, Sub-section E). Table 3-2 lists the primary and backup leak detection devices and the frequency of data that is obtained. It also identifies the waste surface as of January 1, 2002, (L for “liquid”, P for “partial liquid,” S for “Slurry,” and D for “Dry”), and whether the tank exhibits a seasonal level change or not. The last two items are used in conjunction with the level gauge installed to establish the allowable deviation from baseline. The monitoring described in Table 3-2 is reflected in daily operating round sheets and procedures.

All **data** that are used for leak detection purposes have established baselines and allowable increase and decrease limits. A baseline can consist of either a fixed value that does not change over time, or a sloping baseline. A sloping baseline has a built-in rate of change, expressed in “inches per year” and is applied when a tank has an obvious long-term increasing or decreasing linear trend. Long-term decreases are usually caused by evaporation, and are common in actively ventilated tanks. Increases are usually caused by gas retention leading to waste swelling, condensation, or long-term chemical interactions within the waste. Additionally, many tanks exhibit increasing or decreasing trends for extended time periods following interim stabilization. A sloping baseline is determined by a best-fit least squares linear regression of the raw data. Most, although not all, surface level baselines are fixed values, while ILL baselines are always determined using the linear regression with a resulting slope. The method of establishing baselines and approving changes to an existing baseline are procedurally controlled.

Surface Levels

Two key factors determine the allowable limits for surface level changes: the liquid fraction, (which dictates the expected smoothness and repeatability of the waste surface), and the resolution of the measuring instrument being used. As the variability of the waste surface changes from a pure liquid surface to a partial liquid surface, then to a slurry, the allowable tolerance for a given level device increases. This is because the expected data scatter increases, making it more difficult to tell a legitimate decreasing trend (potential leak) from normal day-to-day scatter. Likewise, as the available instrument changes from a high-resolution device (ENRAF™) to a lower resolution device (FIC or manual tape), the allowable tolerance also increases. The result is a system where the device with the highest resolution on the most repeatable waste surface has the tightest tolerance, and the tolerance gets larger as either surface conditions or instrumentation changes.

Some tanks exhibit a significant seasonal variation in surface level. These surface levels typically increase and decrease with seasonal temperature. If the allowable tolerance is excessively tight, it can be exceeded as a result of these normal seasonal variations. For the tightest tolerance, the allowable change is doubled if the tank exhibits a strong seasonal variation.

Liquid Observation Well (LOW) Data

All LOW scans have established baselines that are based on a best-fit linear regression of the computed ILL values. This process yields a “baseline” which consists of a line with a specific slope, expressed in “inches per year.” The analysis also yields the standard deviation of the data set, which is a direct indication of the data scatter. The standard deviation can vary substantially from one tank to another, depending on the shape of the neutron response. ILL features that show very sharp, large scale changes over a short distance can be determined very precisely, and tend to have smaller standard deviations than flatter, more rounded profiles. In addition, some tanks have a very large response to barometric pressure changes, which increases the calculated standard deviation value. An upper and lower limit of 3 standard deviations or 1.2 inches from baseline, (whichever is larger), is established for each tank. 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.

The two probe types currently in use are neutron and gamma. Whichever probe provides the sharpest and most repeatable ILL measurement is designated “primary” for that tank. The other probe is designated as the “secondary” probe.

The magnitudes of allowable decrease tolerances (*leak* detection) and increase tolerances (intrusion detection) are identical, but in opposite directions. The approved baseline typically has a symmetrical band above and below it for the allowable limits, and if either the lower or the upper limit is reached, a *leak* or intrusion is implied, respectively. The technical basis for establishing upper intrusion limits is identical to establishing lower *leak* detection limits. No leak detection capability is provided for tanks with dry surface conditions without LOWs, however, large scale intrusions can be detected via surface level devices, and the intrusion limit is set at 3 inches above the surface level baseline.

Table 3-2 lists the current primary and backup leak detection devices for each SST, along with the designated monitoring frequency. It also provides the assumed waste surface (Liquid, Partial-Liquid, Slurry, or Dry). The combination of waste surface and designated primary instrument is used to determine the allowable deviation from baseline before a leak evaluation is required.

Table Legend:

- L - Assumed liquid surface under surface level measurement device
- P - Assumed partial liquid/floating crust surface under surface level measurement device
- S - Assumed slurry surface at least partially supported by liquid under surface level measurement device
- Dry • Assumed dry or solid surface independent of liquid level under surface level measurement device
- D - Daily
- W - Weekly

Table 3-2. Single Shell Tank Leak Detection Methods (4 Pages)

Tank	Primary Leak Detection	Primary Leak Detection Monitoring Frequency	Backup Leak Detection or Survey Method	Backup Leak Detection Monitoring Frequency	Assumed Tank Waste Surface	Seasonal Level Change
A-101	LOW	W	None	NA	Dry	NA
A-102	None	NA	None	NA	Dry	NA
A-103	LOW	W	None	NA	Dry	NA
A-104	None	NA	None	NA	Dry	NA
A-105	None	NA	None	NA	Dry	NA
A-106	None	NA	None	NA	Dry	NA
AX-101	LOW	W	None	NA	Dry	NA
AX-102	None	NA	None	NA	Dry	NA
AX-103	None	NA	None	NA	Dry	NA
AX-104	None	NA	None	NA	Dry	NA
B-101	None	NA	None	NA	Dry	NA
B-102	ENRAF	D	None	NA	P	No
B-103	None	NA	None	NA	Dry	NA
B-104	LOW	W	None	NA	Dry	NA
B-105	LOW	W	None	NA	Dry	NA
B-106	ENRAF	D	None	NA	S	No
B-107	None	NA	None	NA	Dry	NA
B-108	None	NA	None	NA	Dry	NA
B-109	None	NA	None	NA	Dry	NA
B-110	LOW	W	None	NA	Dry	NA
B-111	LOW	W	None	NA	Dry	NA
B-112	ENRAF	D	None	NA	P	No
B-201	ENRAF	D	None	NA	S	No
B-202	ENRAF	D	None	NA	S	No
B-203	ENRAF	D	None	NA	S	No
B-204	ENRAF	D	None	NA	S	No
BX-101	ENRAF	D	None	NA	P	No
BX-102	None	NA	None	NA	Dry	NA
BX-103	ENRAF	D	None	NA	P	No
BX-104	ENRAF	D	None	NA	S	No
BX-105	None	NA	None	NA	Dry	NA
BX-106	None	NA	None	NA	Dry	NA
BX-107	ENRAF	D	None	NA	P	No
BX-108	None	NA	None	NA	Dry	NA
BX-109	None	NA	None	NA	Dry	NA

Table 3-2. Single Shell Tank Leak Detection Methods (4 Pages)

Tank	Primary Leak Detection	Primary Leak Detection Monitoring Frequency	Backup Leak Detection or Survey Method	Backup Leak Detection Monitoring Frequency	Assumed Tank Waste Surface	Seasonal Level Change
BX-110	None	NA	None	NA	Dry	NA
BX-111	LOW	W	None	NA	Dry	NA
BX-112	ENRAF	D	None	NA	S	No
BY-101	LOW	W	None	NA	Dry	NA
BY-102	LOW	W	None	NA	Dry	NA
BY-103	LOW	W	None	NA	Dry	NA
BY-104	LOW	W	None	NA	Dry	NA
BY-105	LOW	W	None	NA	Dry	NA
BY-106	LOW	W	None	NA	Dry	NA
BY-107	LOW	W	None	NA	Dry	NA
BY-108	None	NA	None	NA	Dry	NA
BY-109	LOW	W	None	NA	Dry	NA
BY-110	LOW	W	None	NA	Dry	NA
BY-111	LOW	W	None	NA	Dry	NA
BY-112	LOW	W	None	NA	Dry	NA
C-101	None	NA	None	NA	Dry	NA
C-102	None	NA	None	NA	Dry	NA
C-103	ENRAF	D	None	NA	L	No
C-104	None	NA	None	NA	Dry	NA
C-105	None	NA	None	NA	Dry	NA
C-106	None	NA	None	NA	Dry	NA
C-107	ENRAF	D	None	NA	S	No
C-108	None	NA	None	NA	Dry	NA
C-109	None	NA	None	NA	Dry	NA
C-110	MT	D	None	NA	S	No
C-111	None	NA	None	NA	Dry	NA
C-112	None	NA	None	NA	Dry	NA
C-201	None	NA	None	NA	Dry	NA
C-202	None	NA	None	NA	Dry	NA
C-203	None	NA	None	NA	Dry	NA
C-204	None	NA	None	NA	Dry	NA
S-101	ENRAF	D	LOW	W	P	No
S-102	LOW	W	None	NA	Dry	NA
S-103	ENRAF	D	LOW	W	S	No
S-104	LOW	W	None	NA	Dry	NA
S-105	LOW	W	None	NA	Dry	NA
S-106	LOW	W	None	NA	Dry	NA
S-107	ENRAF	D	None	NA	P	Yes
S-108	LOW	W	None	NA	Dry	NA

Table 3-2. Single Shell Tank Leak Detection Methods (4 Pages)

Tank	Primary Leak Detection	Primary Leak Detection Monitoring Frequency	Backup Leak Detection or Survey Method	Backup Leak Detection Monitoring Frequency	Assumed Tank Waste Surface	Seasonal Level Change
S-109	LOW	W	None	NA	Dry	NA
S-110	LOW	W	None	NA	Dry	NA
S-111	ENRAF	D	LOW	W	L	Yes
S-112	LOW	W	None	NA	Dry	NA
SX-101	LOW	W	None	NA	Dry	NA
SX-102	LOW	W	None	NA	Dry	NA
SX-103	LOW	W	None	NA	Dry	NA
SX-104	LOW	W	None	NA	Dry	NA
SX-105	LOW	W	None	NA	Dry	NA
SX-106	LOW	W	None	NA	Dry	NA
SX-107	None	NA	None	NA	Dry	NA
SX-108	None	NA	None	NA	Dry	NA
SX-109	None	NA	None	NA	Dry	NA
SX-110	None	NA	None	NA	Dry	NA
SX-111	None	NA	None	NA	Dry	NA
SX-112	None	NA	None	NA	Dry	NA
SX-113	None	NA	None	NA	Dry	NA
SX-114	None	NA	None	NA	Dry	NA
SX-115	None	NA	None	NA	Dry	NA
T-101	None	NA	None	NA	Dry	NA
T-102	ENRAF	D	None	NA	P	No
T-103	None	NA	None	NA	Dry	NA
T-104	LOW	W	None	NA	Dry	NA
T-105	None	NA	None	NA	Dry	NA
T-106	None	NA	None	NA	Dry	NA
T-107	ENRAF	D	None	NA	P	No
T-108	ENRAF	D	None	NA	P	No
T-109	None	NA	None	NA	Dry	NA
T-110	LOW	W	None	NA	Dry	NA
T-111	LOW	W	None	NA	Dry	NA
T-112	ENRAF	D	None	NA	P	No
T-201	MT	D	None	NA	P	No
T-202	MT	D	None	NA	P	No
T-203	None	NA	None	NA	Dry	NA
T-204	MT	D	None	NA	P	No
TX-101	ENRAF	D	None	NA	P	No
TX-102	LOW	W	None	NA	Dry	NA
TX-103	None	NA	None	NA	Dry	NA
TX-104	None	NA	None	NA	Dry	NA

Table 3-2. Single Shell Tank Leak Detection Methods (4 Pages)

Tank	Primary Leak Detection	Primary Leak Detection Monitoring Frequency	Backup Leak Detection or Survey Method	Backup Leak Detection Monitoring Frequency	Assumed Tank Waste Surface	Seasonal Level Change
TX-105	None	NA	None	NA	Dry	NA
TX-106	LOW	W	None	NA	Dry	NA
TX-107	None	NA	None	NA	Dry	NA
TX-108	None	NA	None	NA	Dry	NA
TX-109	LOW	W	None	NA	Dry	NA
TX-110	LOW	W	None	NA	Dry	NA
TX-111	LOW	W	None	NA	Dry	NA
TX-112	LOW	W	None	NA	Dry	NA
TX-113	LOW	W	None	NA	Dry	NA
TX-114	LOW	W	None	NA	Dry	NA
TX-115	LOW	W	None	NA	Dry	NA
TX-116	None	NA	None	NA	Dry	NA
TX-117	LOW	W	None	NA	Dry	NA
TX-118	LOW	W	None	NA	Dry	NA
TY-101	None	NA	None	NA	Dry	NA
TY-102	ENRAF	D	None	NA	L	Yes
TY-103	LOW	W	None	NA	Dry	NA
TY-104	ENRAF	D	None	NA	P	No
TY-105	None	NA	None	NA	Dry	NA
TY-106	None	NA	None	NA	Dry	NA
U-101	MT	D	None	NA	L	No
U-102	LOW	W	None	NA	Dry	NA
U-103	LOW	W	None	NA	Dry	NA
U-104	None	NA	None	NA	Dry	NA
U-105	LOW	W	None	NA	Dry	NA
U-106	LOW	W	None	NA	Dry	NA
U-107	ENRAF	D	LOW	W	L	Yes
U-108	LOW	W	None	NA	Dry	NA
U-109	LOW	W	None	NA	Dry	NA
U-110	None	NA	None	NA	Dry	NA
U-111	LOW	W	None	NA	Dry	NA
U-112	None	NA	None	NA	Dry	NA
U-201	MT	D	None	NA	P	No
U-202	MT	D	None	NA	P	No
U-203	None	NA	None	NA	Dry	NA
U-204	ENRAF	D	None	NA	P	No

3.6 LENGTH OF TIME THAT INSTRUMENTS MAY BE OUT OF SERVICE (FOR MAINTENANCE OR REPAIR) PRIOR TO ECOLOGY NOTIFICATION

The current SST leak detection program states that normal allowable repair time for failed instruments is 14 days, but this can be exceeded by issuing **an** extension letter from the Environmental Compliance Officer (ECO). Before issuing the extension letter, the current program includes voluntary notification of Ecology by the ECO. Although this voluntary notification is part of the current *leak* detection program, it is not based on any legal requirement. There is no regulatory requirement to notify a regulator of failed equipment.

If an instrument is out of service long enough to generate a violation under the current program, an Occurrence Report is normally issued to document the violation. Ecology is on routine distribution for all Occurrence Reports, and would be automatically informed of the instrument problem, should a violation occur.

Other than receiving routine copies of all Occurrence Reports, DOE proposes that no additional notification requirements be implemented.

3.7 SURVEILLANCE AND MONITORING CHANGE PROCESS

This section describes DOE's proposed change process for modifying specific component *leak* detection instrumentation as component conditions (or instrumentation) changes, (M-23-22-T01, Sub-section G).

One of the deliverables for the M-23 milestone series is M-23-23, "Submit Single Shell Tank System Leak Detection and Monitoring Functions and Requirements Document for Ecology Approval," (F&R document), which is due March 31, 2002. This document will clearly outline monitoring requirements, including any necessary instrumentation upgrades.

4.0 REFERENCES

- 40 CFR 265, 1998, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities," *Code of Federal Regulations*, as amended.
- DOE/ORP-2001-18, 2002, draft, *Single-Shell Tank System Closure Work Plan*, Rev. 0, draft, (formerly DOE/RL-89-16), U.S. Department of Energy, Office of River Protection, Richland, Washington.
- DOE/RL-88-21, *Hanford Facility Dangerous Waste Part A Permit Application*, "Form 3 – Dangerous Waste Permit Application," Section 4.0, Rev. 7, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- Ecology, EPA, and DOE, 1998, *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.
- M-23-01-01, *Hanford Federal Facility Agreement and Consent Order Change Control Form*, Washington State Department of Ecology, Olympia, Washington, dated August, 2001.
- RCRA, *Resource Conservation and Recovery Act of 1976*, as amended, 42 USC 6901 et seq.
- Tank Farms Maintenance Procedure 5-LCD-300, *ENRAF Series 854 Displacer Weight Check and Calibration Check*, November 2001
- WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

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