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TANK OPERATIONS CONTRACTOR SAMPLING PROJECTIONS FOR FY2022 THROUGH FY2026

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HNF-SD-WM-DQO-001	26	DATA QUALITY OBJECTIVES FOR TANK FARM WASTE COMPATIBILITY PROGRAM
HNF-SD-WM-DQO-014	07	242-A EVAPORATOR DATA QUALITY OBJECTIVES
OSD-T-151-00007	28	OPERATING SPECIFICATIONS FOR THE DOUBLE-SHELL STORAGE TANKS
RPP-10006	18	Methodology and Calculations for the Assignment of Waste Groups for the Large Underground Waste Storage Tanks at the Hanford Site
RPP-13639	16	Caustic Limits Report For Period Ending March 30th, 2020
RPP-20949	02	DATA QUALITY OBJECTIVES FOR THE EVALUATION OF TANK CHEMICAL EMISSIONS FOR INDUSTRIAL HYGIENE TECHNICAL BASIS
RPP-23403	07	SINGLE-SHELL TANK COMPONENT CLOSURE DATA QUALITY OBJECTIVES
RPP-26253	00	TANK WASTE SAMPLER SELECTION CRITERIA AND HIERARCHY
RPP-40149-VOL1	05	Integrated Waste Feed Delivery Plan Volume 1-Process Approach
RPP-43551	00	TANK FARM INTERIM BARRIER DATA QUALITY OBJECTIVES
RPP-44057	02	DATA QUALITY OBJECTIVES TO SUPPORT STRATEGIC PLANNING
RPP-45634	01	DATA QUALITY OBJECTIVES FOR TANK 241-C-301 WASTE TRANSFER AND COMPONENT CLOSURE
RPP-46169	01	DATA QUALITY OBJECTIVES FOR TANK 241-A-350 WASTE TRANSFER AND CLOSURE
RPP-49049	01	DATA QUALITY OBJECTIVES FOR WASTE TRANSFER AND COMPONENT CLOSURE OF THE 244-CR VAULT
RPP-53641	00	Data Quality Objectives for Sr/TRU Precipitation Process Phase I Tests
RPP-54991	01	Multi-Media Sampling Program Data Quality Objectives
RPP-55762	00	Integrated Solubility Model (ISM) Data Quality Objectives
RPP-7614	03	DATA QUALITY OBJECTIVES TO SUPPORT PCB MANAGEMENT IN THE DOUBLE-SHELL TANK SYSTEM
RPP-8532	15	Double-Shell Tanks Chemistry Control Data Quality Objectives
RPP-ASMT-39508	00	EXPERT PANEL OVERSIGHT COMMITTEE ASSESSMENT OF FISCAL YEAR 2008 CORROSION AND STRESS CORROSION CRACKING SIMULANT TESTING PROGRAM
RPP-ASMT-62047	00	Tank Integrity Expert Panel Corrosion Subgroup Comments on Preparing Tank 241-AY-102 for Closure

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13. **Related Documents** ☐N/A

Document Number	Rev.	Title
RPP-PLAN-23827	04	SAMPLING AND ANALYSIS PLAN FOR SINGLE-SHELL TANKS COMPONENT CLOSURE
RPP-PLAN-52884	02	ORSS Sampling and Analysis Plan For Waste Solids in Tank 241-C-107 To Support Tank Closure
RPP-PLAN-58003	05	River Protection Project Integrated Flowsheet Maturation Plan
RPP-PLAN-59975	01	Sampling and Analysis Plan for Post-Retrieval Waste Solids in Tank 241-C-101
RPP-PLAN-60589	04	Annual Sampling and Analysis of 241-AY/AZ Combined Ventilation System Stack Chemical Emissions - CY2020
RPP-PLAN-60685	04	Annual Sampling and Analysis of 241-AP Stack Chemical Emissions - CY2020
RPP-PLAN-61769	01	DFLAW Radioactive Waste Test Platform Program Plan with Technical Information
RPP-PLAN-63040	01	Sampling and Analysis of Portable Exhauster (POR) Chemical Emissions During 241-AX Tank Farm Single-Shell Tank (SST) Retrievals
RPP-PLAN-63150	00	CATCH TANK 241-C-301 SAMPLING AND ANALYSIS PLAN
RPP-PLAN-63451	00	Sampling and Analysis of 241-AW Tank Farm Exhauster Stack Chemical Emissions
RPP-PLAN-63778	06	Multi-Year Operating Plan (MYOP)
RPP-PLAN-63783	00	Tank 241-AN-106 Core Sampling and Analysis Plan - Fiscal Year 2020
RPP-PLAN-63784	00	Monthly Sampling and Analysis of 241-AW Tank Farm Exhauster for Assessment of Dimethyl Mercury Emissions
RPP-PLAN-63909	01	Tank 241-AP-107 Grab Sampling and Analysis Plan in Support of DFLAW Feed Campaign, Chemistry Control and Compatibility Programs
RPP-PLAN-63913	00	Tank 241-AN-106 Grab Sampling and Analysis Plan - Fiscal Year 2020
RPP-PLAN-63937	00	BI-ANNUAL SAMPLING AND ANALYSIS OF 241-AN TANK FARM EXHAUSTER FOR ASSESSMENT OF 1,3-DICHLOROPROPENE EMISSIONS
RPP-PLAN-64240	00	AP-107 Large Volume Sample Collection to Support Platform Testing, Phase 1, FY21
RPP-PLAN-64241	00	AP-107 Large Volume Sample Collection to Support Platform Testing, Phase 2, FY21
RPP-PLAN-64455	00	Tank 241-AP-101 Grab Sampling and Analysis Plan in Support of DFLAW Feed Campaign #3
RPP-PLAN-64519	00	Tank 241-AN-101 Core Sampling and Analysis Plan - Fiscal Year 2021
RPP-PLAN-64585	00	Tank Sampling and Analysis Plan for Residual Solid Waste in Tank 241-AX-104
RPP-PLAN-64640	00	241-AN-101 Grab Sampling and Analysis Plan -Fiscal Year 2021
RPP-RPT-38152	00	DATA QUALITY OBJECTIVES REPORT PHASE 2 CHARACTERIZATION FOR WASTE MANAGEMENT AREA C RCRA FIELD INVESTIGATION/CORRECTIVE MEASURES STUDY
RPP-RPT-43828	01	Refined Use of AN Farm for C Farm Single-Shell Tank Retrieval
RPP-RPT-54509	01	One System - Hanford Tank Waste Characterization Vulnerability Assessment
RPP-RPT-56983	00	One System Report on Plutonium Particulate Criticality Safety Issue Resolution at Hanford Tank Farms and Waste Treatment Plant
RPP-RPT-57991	01	One System River Protection Project Integrated Flowsheet
RPP-RPT-58299	00	Data Quality Objectives for Sampling and Analysis of Tank Farm Stack Odorous Chemical Vapor Emissions
RPP-RPT-58495	01	Final Report for Tank 241-AW-102 Grab Sampling in Support of Evaporator Campaign EC-01, 2015
RPP-RPT-59494	02	Integrated DFLAW Feed Qualification Data Quality Objectives
RPP-SPEC-25386	01	CRITICALITY DATA QUALITY OBJECTIVES FOR TANK SOLIDS SAMPLES
RPP-SPEC-28275	02	CORROSION PROBE DATA QUALITY OBJECTIVES
RPP-SPEC-33590	05	DATA QUALITY OBJECTIVES FOR THE EVALUATION OF STACK CHEMICAL EMISSIONS
RPP-SPEC-47615	00	DOUBLE-SHELL TANK PROCESS WASTE SAMPLING SUBSYSTEM SPECIFICATION

14. **Distribution**

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RPP-26781
Revision 17

Tank Operations Contractor Sampling Projections for FY2022 through FY2026

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Abbreviations and Acronyms

BBI	Best Basis Inventory
CSER	Criticality Safety Evaluation Report
CSS	core sampling system
DFLAW	Direct Feed Low Activity Waste
DOE	United States Department of Energy
DQO	data quality objective
DRI	direct read instrumentation
DST	double-shell tank
Ecology	Washington State Department of Ecology
ERSS	Extended Reach Sluicer System
ETF	Effluent Treatment Facility
FY	fiscal year
HLW	high level waste
IH	Industrial Hygiene
ISM	integrated solubility model
LAW	low activity waste
LAWPS	Low Activity Waste Pretreatment System
LDP	leak detection pit
MARS	Mobile Arm Retrieval System
N/A	not applicable
ORP	U.S. Department of Energy, Office of River Protection
ORSS	Off Riser Sample System
OSD	operating specification document
PCBs	polychlorinated biphenyls
PCHB	Pollution Control Hearings Board
PNNL	Pacific Northwest National Laboratory
POR	portable exhauster
RPP	River Protection Project
SAP	Sampling and Analysis Plan
SST	single-shell tank
TAP	toxic air pollutant
TBD	to be determined
TOC	Tank Operations Contract

TPA	Tri-Party Agreement
TSAP	Tank Sampling and Analysis Plan
TSCR	Tank Side Cesium Removal System
TSR	technical safety requirement
VOC	volatile organic compounds
WFD	Waste Feed Delivery
WRPS	Washington River Protection Solutions, LLC
WTP	Hanford Tank Waste Treatment and Immobilization Plant

1.0 INTRODUCTION

This document was prepared through a joint effort of SST Retrievals, Closure and Corrective Measures, Tank Farm Projects, Sampling Operations, Mission Integration, and Process & Integrity Engineering technical staff. It identifies projected tank farm sampling[1] events and solids level measurements for fiscal year (FY) 2022 (FY2022) through FY2026. Projected sampling events are identified in support of various Tank Operations Contract (TOC) programs, including retrieval and closure, chemistry control, strategic planning, waste feed delivery, environmental, and compatibility. The schedules and drivers for sampling and solids level measurements may change over time. Therefore, this document is revised annually to reflect these changes. Preparation and issuance of this document provides a method to:

- Evaluate the need for samples and solids level measurements which were previously scheduled but have not been completed;
- Identify emerging sampling events and solids level measurements;
- Provide the technical rationale justifying the samples and solids level measurements;
- Prioritize sampling and solids level measurement events; and
- Enable Tank Farm Sampling Operations to estimate resources required to support sampling and solids level measurements.

This report documents the projected core, grab, vapor, residual solids samples, and solids level measurements identified for the operation of the Tank Farms and to support planning for future waste treatment activities. Samples covered in this document support the collection of data for engineering and environmental reasons and not for the purposes of worker protection. These samples and measurements are to be taken from the double-shell tanks (DSTs), single-shell tanks (SSTs), catch tanks, and their supporting systems. Tank exhauster samples that are obtained at specified intervals to meet Hanford Site Radioactive Air Emission License (FF-01) and Air Operating Permit (AOP 00-05-006) requirements are also addressed in this report. Vadose zone soil sampling is discussed in Appendix A. Multi-media sampling is discussed in Appendix B.

Sampling and solids level measurements require significant budget and staffing resources for planning, preparation, and execution. Core, grab, and residual solids sampling are performed by the Sampling Operations team. All vapor samples, except Summa Canister sampling are taken by Industrial Hygiene (IH). Some of the sampling events listed in Table 6-1 through Table 6-20 may compete for limited available resources such as equipment and personnel.

[1] The general term "sample" used in this document may be interpreted to mean any type of liquid, solid, or vapor sample. Specific sample types are identified in the sampling event tables. Soil sampling for the vadose program is included in Appendix A. Multi-Media sampling information is provided in Appendix B.

Additional sampling events and solids level measurements are likely to become necessary as the Hanford Tank Waste Treatment and Immobilization Plant (WTP) feed requirements are fully defined. New drivers for sampling and solids level measurement events and resulting waste characterization data may arise from ongoing and potential future projects, such as Direct Feed Low Activity Waste (DFLAW). Sampling may be required for activities that support the DFLAW project. These activities are expected to include additional DST-to-DST transfers, evaporator campaigns in FY2022-2026, and waste feed certification sampling.

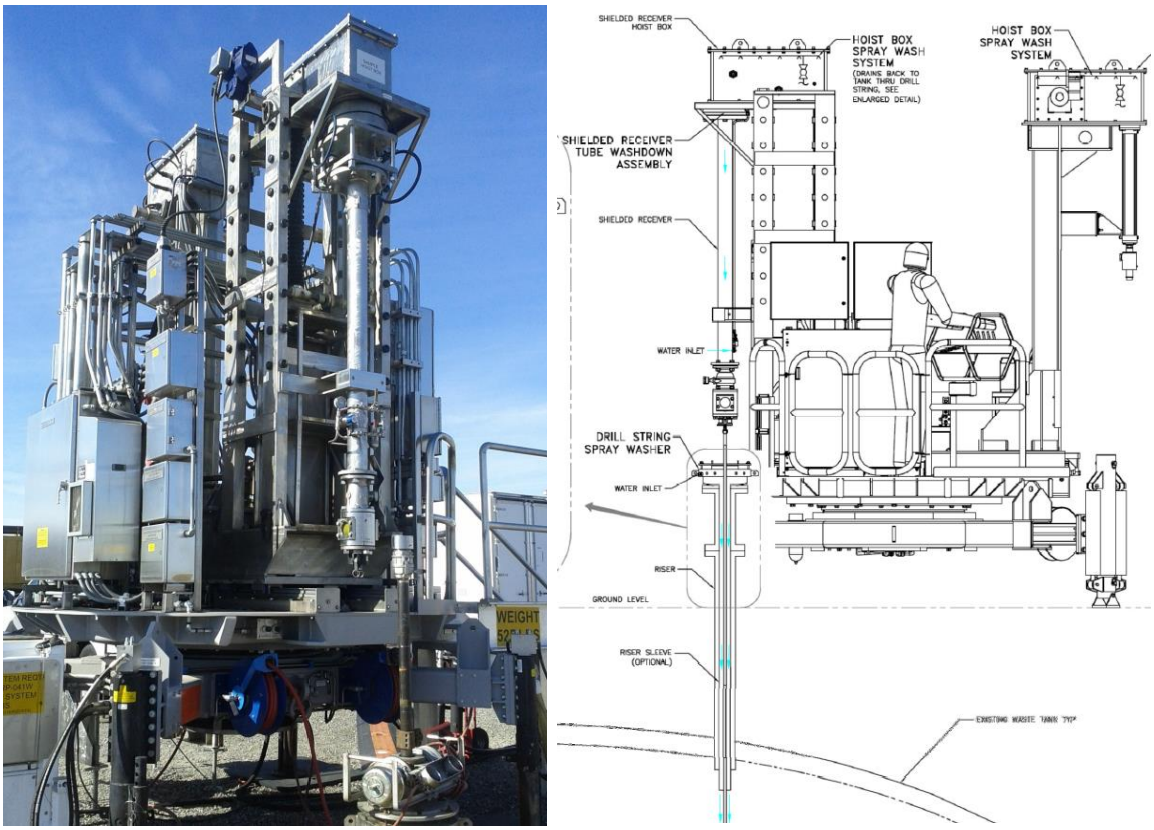
2.0 TANK SAMPLING METHODOLOGIES

Tank sampling is utilized to characterize tank waste to support safe storage and transfer, assess, and mitigate corrosion by supplying the data necessary to model tank conditions, ensure waste compatibility, support SST retrieval operations, and support future delivery of waste feed to the WTP. Current methodologies for acquiring tank samples include core sampling, grab sampling, vapor sampling, and residual solids sampling. Vadose zone sampling is utilized to assess the extent of subsurface contamination in the soil beneath and around the tanks. A description of each type of sampling technique is provided below. Sampling tools currently in development that will be available for use in the next fiscal year are included but other sampling equipment being developed will be added to this document once they are available for use in the field. Requirements for designing new DST process waste sampling systems are documented in RPP-SPEC-47615, *Double-Shell Tank Process Waste Sampling Subsystem Specification*.

2.1 CORE SAMPLING

Core sampling is a technique which captures solids, liquids, and highly viscous slurries. Specialized, self-contained core sampling components insert a core drill string containing a retrievable core sampler into the waste. The fluid in the drill string offsets the hydrostatic head at the bit opening to minimize flow of waste into the drill string when a core sampler is retrieved. Two types of core samples may be taken: Push Mode and Rotary. The drill string may be inserted into the waste by pushing a sample bit directly into the waste (Push Mode) or by drilling with cutting bits at the end of the drill string (Rotary). The sampling devices incorporate a variety of seals and closures capable of retaining liquids within the sampler. Controls are established to prevent penetrating the tank shell or igniting flammable gases within the tank. Flanges, top hats, and other adapters are fabricated as required to interface with existing tank risers. Full length or partial cores may be taken, as specified in the individual Tank Sampling and Analysis Plan (TSAP). The type of core sample taken depends on expected tank conditions. Figure 2-1 below shows the core sampling platform, both as a photograph and schematic (RPP-TE-55470, Rev. 0, *Waste Leak Technical Evaluation for the Core Sampling System [CSS]*).

Figure 2-1. Core Sampling System



2.2 LIQUID GRAB SAMPLING TECHNIQUES

Grab sampling is a technique which captures liquids and low-viscosity slurries in sample bottles lowered directly into the waste.

2.2.1 Bottle on a String

Bottles are lowered by a lanyard and positioned within the waste by gravity in a procedure known as "Bottle on a String." Figure 2-2 shows the apparatus used for obtaining grab samples through this procedure (RPP-26253, Rev. 0, *Tank Waste Sampler Selection Criteria and Hierarchy)*. Specialized hoists and holding fixtures lower stoppered bottles to desired elevations in the tank. A sharp pull on the lanyard releases the stopper to admit tank waste for filling. This action can potentially move the entire sampler up through the waste about 4-10 inches, depending on depth of the waste. Usually an additional pull (two total) is used to ensure the stopper is out of the bottle. The bottle stays open while raised through the intervening waste

back to the surface. Samples taken from the waste surface do not employ a stopper. After the samples are raised, they are wiped down and caps are screwed on for shipping.

Two bottle types are shown in Figure 2-3, a clear, wide-mouth bottle and an amber, narrow-mouth bottle (RPP-RPT-58495, Rev. 1, *Final Report for Tank 241-AW-102 Grab Sampling in Support of Evaporator Campaign EC-01, 2015*). The type of sample bottle utilized for a sampling event is chosen to fit the needs of the sample. For example, clear glass bottles may be selected to allow any separable organic layer or solids to be seen, and narrow mouth bottles may be selected for samples under high hydrostatic pressure when pulling the stopper may be difficult.

Figure 2-2. Bottle on a String

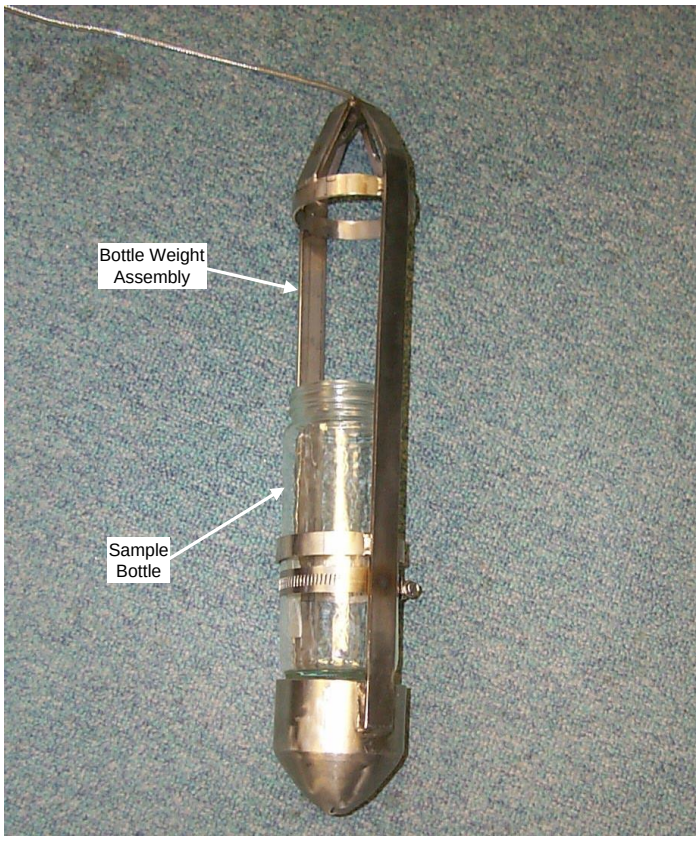


Figure 2-3. Grab Sample Bottles

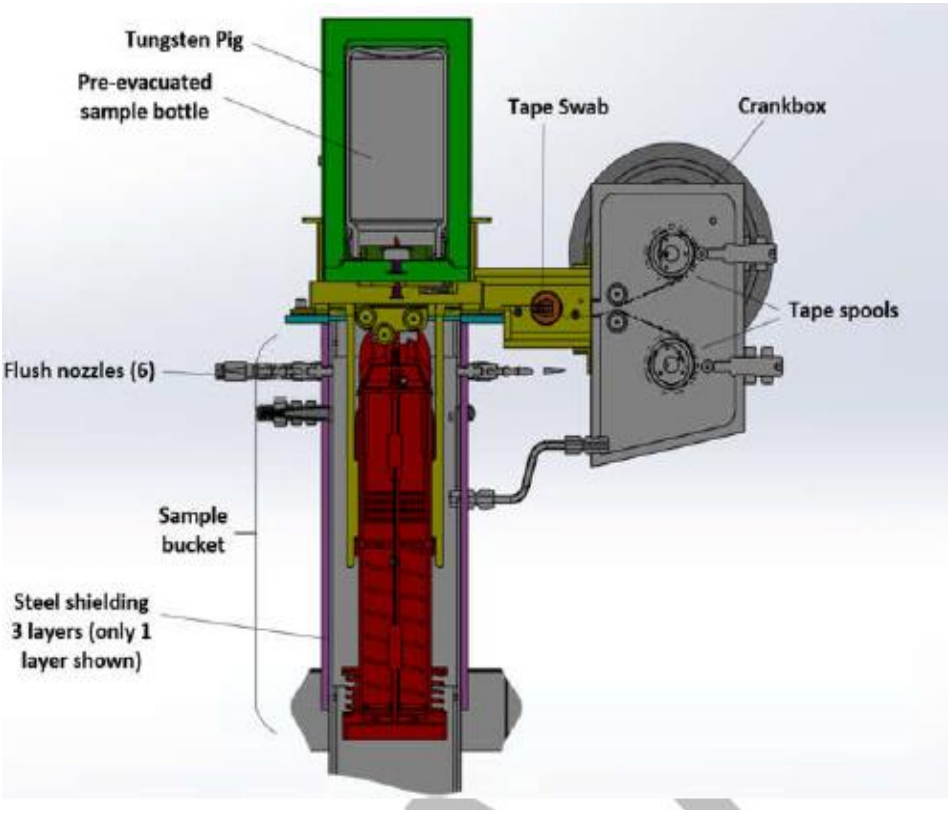
2.2.2 In Process Retrieval Grab Sampling

Another type of grab sampling utilizes a slotted sleeve deployed to position a sample bottle and holder in the vicinity of one of the sluicers inside the tank. No stopper is used. The sample bottle and holder are lowered until it rests on alignment pins in the sleeve to position the mouth of the bottle next to a slot in the sleeve for sampling. An in-tank pump is used to direct liquid via a sluicer into a slot in the sleeve to fill the sample bottle.

2.2.3 Large Volume Shielded Sampler

The large volume shielded sampler is currently in development but could be ready in the upcoming fiscal year (FY2022). The sample collection bucket is equipped with a large diameter needle, which directly transfers the sample into a pre-evacuated bottle (Figure 2-4), already located inside a shielded pig. The pig can then be safely loaded into a cask and case known as the Hedgehog III. No glove box is needed to maintain containment. Once deployed to depth inside the tank, the sample bucket remains stationary during the sample collection. The large volume shielded sampler has the capacity to collect up to 1-liter samples at precise elevations. The incorporated tungsten pig and new shipping container (Hedgehog III) will reduce dose to workers during sampling and transportation activities.

Figure 2-4. Large Volume Shielded Sampler



2.3 VAPOR SAMPLING

Vapor sampling identified in this document is performed using sampling systems connected to sample ports located on ventilation system stacks. This document does not include all vapor sampling conducted by industrial hygiene, only stack sampling for environmental and retrieval vapor sampling. Samples are taken using the appropriate sample media, including but not limited to sample tubes (i.e., sorbent tubes or thermal desorption units) and Summa canisters. Samples are generally taken to ensure tank stack emissions meet discharge requirements. Once the tank farm exhausters are determined to have entered permitted operations, samples from the exhausters at specified assessment intervals are obtained to meet governing Ecology Approval Order requirements.

Retrieval vapor samples are to be taken at the start of retrieval and when approximately 50% of the tank is retrieved. The samples are taken when retrieval activities are ongoing (i.e. when the waste is being disturbed) and when the exhauster is operating. Figure 2-5 below shows an exhauster stack (photo from Washington State Department of Ecology Publication No. 14-05-014).

Figure 2-5. Exhauster Stack

Direct read instrumentation has been implemented for ammonia monitoring in the AP, AY, AZ, AW, SY, and AN Farms. Sampling for dimethyl mercury is likely to be required prior to intrusion mitigation activities in SSTs and prior to deployment of the core sampler, but sampling may not be required for core sampling in DSTs that have previously been evaluated for dimethyl mercury.

2.4 RESIDUAL SOLIDS SAMPLING TECHNIQUES

Currently four methodologies may be employed to collect residual solids samples, as described in RPP-PLAN-23827, *Sampling and Analysis Plan for Single-Shell Tanks Component Closure*:

- Off Riser Sampling System (ORSS)
- Clamshell Sampler
- Finger Trap Sampler
- Slide Hammer Trap Sampler
- Drag Sampler (used with Mobile Arm Retrieval System [MARS] or Extended Reach Sluicer System [ERSS])

2.4.1 Off Riser Sampling System

The ORSS consists of a remotely operated, mobile sampler and a sample carrier. This tool is designed to collect residual waste samples from locations on the tank floor. The ORSS is lowered through a 12-inch or larger diameter riser into a waste tank after completion of retrieval. The sampler is then maneuvered remotely to collect a waste sample. The sampler deposits the waste material into a sample jar located in the sample carrier, which is then raised into the glove bag at the top of the riser. The sample is removed from the glove bag and shipped to a laboratory for analysis. This process is repeated until the required number of samples is collected. Figure 2-6. below shows the ORSS (RPP-PLAN-59975, Rev. 1, *Sampling and Analysis Plan for Post-Retrieval Waste Solids in Tank 241-C-101*).

Figure 2-6. Six-wheeled ORSS Sampler

2.4.2 Clamshell Sampler

The clamshell sampler is a remotely operated end-effector tool designed for obtaining residual waste samples from locations within the tank. It consists of a battery-powered control unit with cable, a push pole adaptor, and a motorized retrieval claw which has been modified to accept a sampling scoop. The sampling scoop may be used repeatedly to collect all samples in a tank and may also be positioned over the waste to be sampled by maneuvering the cable with an extended-reach sluicer. This method may involve using the Foldtrack™[2] (a remote-controlled, track vehicle with a blade in front) to move solids from selected locations to a riser where they can be collected with the clamshell. The Foldtrack-clamshell method is preferred when a Foldtrack retrieval tool is already deployed in the tank. Figure 2-7. below shows the clamshell sampler (WRPS-56490, *C-110 clamshell sampler)* and Figure 2-8 below shows the Foldtrack (WRPS-41511-VA, Rev. 0, *Science & Technology Workshop Tank Waste Retrieval Technology Activities*).

[2] Foldtrack™ is a registered trademark of Non Entry Systems Ltd, UK Patent Application No: 0718573.9

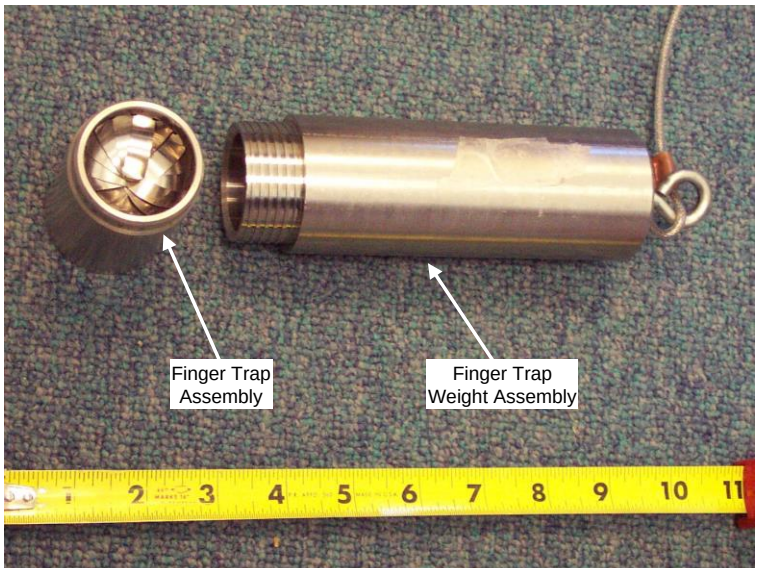
Figure 2-7. Clamshell Sampler

Figure 2-8. Foldtrack Retrieval Tool

2.4.3 Finger Trap Sampler

The finger trap sampler is essentially a short stainless steel pipe that is open at one end. Thin, flexible, overlapping steel blades, designed to hold solids inside the sampler, are located just inside this end. Sampling is performed by dropping the sampler vertically, with the open end at the bottom, onto the waste. Solids are forced from the drop to pass the inwardly flexible steel blades into the sampler and are trapped by the blades. The lower section of the sampler where the sample material is collected is unscrewed from the top section, placed in a jar, and shipped to a laboratory for analysis. Another clean lower section is attached to the sampler for the next sample. Figure 2-9 shows the finger trap sampler (RPP-26253, Rev. 0).

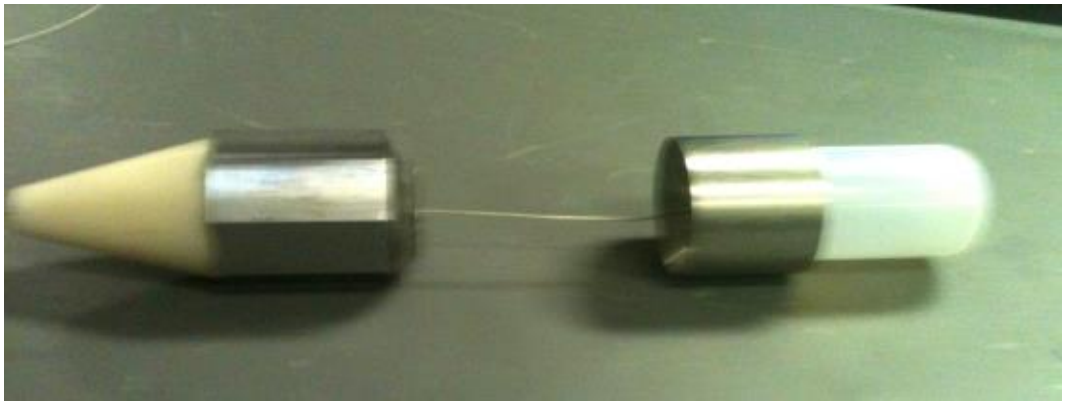
Figure 2-9. Finger Trap Sampler



2.4.4 Drag Sampler

The drag sampler consists of two units connected with a cable. The lower unit is a sample jar attached to a heavy stainless steel shroud, which acts as a funnel to collect solids as the sampler is dragged through the waste. The upper unit is primarily a metal piece that can be attached magnetically to a plate. To collect a sample, the sampler is lowered into a tank through a riser, and the MARS or ERSS is moved to attach the upper unit to a magnetized plate on its arm. The sampler is moved to the desired location, and the lower unit is lowered to the tank bottom and dragged to collect solids. Figure 2-10 shows a drag sampler, with the upper, magnetized unit on the left and the lower collection unit on the right (RPP-PLAN-52884, *Sampling and Analysis Plan for Post-Retrieval Waste Solids in Tank 241-C-107*, Rev. 2).

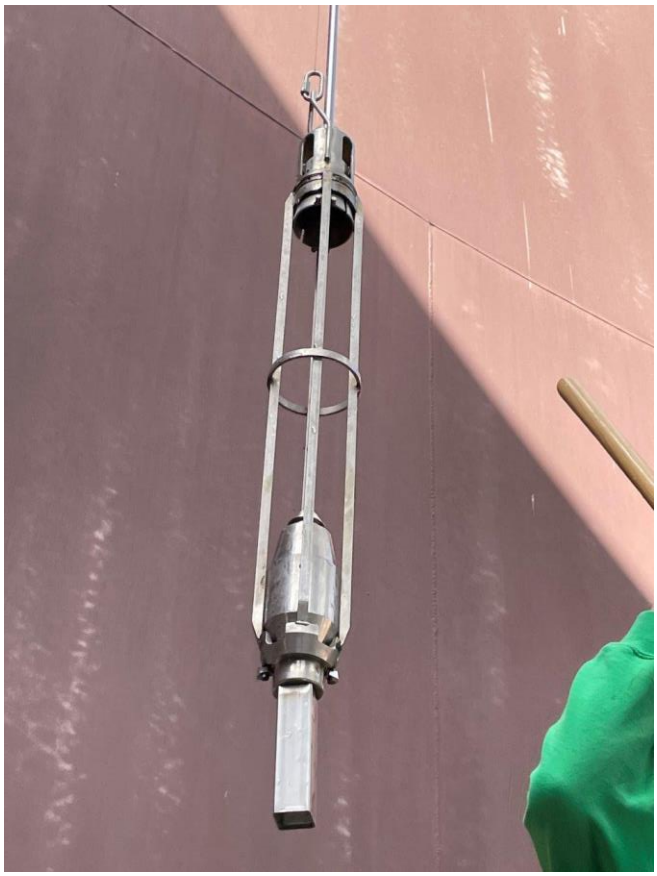
Figure 2-10. Drag Sampler Upper and Lower Units



2.4.5 Slide-Hammer Trap Sampler

The slide hammer sampler, shown in Figure 2-11, consists of a 5-inch sampler attached to a slide-hammer assembly. Operators position the sampler and assembly in the waste and lift the hammer to the top of the assembly where it is released, driving the sampler into the waste. This action is repeated to fill the sampler. Two flaps at the bottom of the sampler hold the material in the sampler as it is retrieved from the tank. The sampler can be removed from the slide-hammer in the glove bag, placed in a jar and shipped to a laboratory for analysis. Another sampler is attached to collect additional samples.

Figure 2-11. Slide-Hammer Trap Sampler



2.4.6 Breaking of Solids

Finally, in the case that residual solid particles are otherwise too large to collect with the sampling devices, a large steel device can be lowered to break up the solids into smaller pieces, which can then be collected by a clamshell sampler. This "solids crusher" is shown in Figure 2-12.

Figure 2-12. Solids Crusher

2.5 RESIDUAL LIQUID SAMPLING TECHNIQUE

Sampling post-retrieval liquid in an SST will not be required when the following conditions are met per Section 8.2.1 of RPP-23403, Rev. 7, *Single-Shell Tank Component Closure Data Quality Objectives*. Conditions vary primarily based on the liquid used to retrieve waste.

- Raw water is used as retrieval liquid, or
- Double-shell tank supernatant is used as retrieval liquid, or
- Chemicals (e.g., caustic or acid) are added to the tank to dissolve residual solids and sufficient liquid is used to rinse the solids.

Residual liquid may be sampled if the above conditions are not met. Liquid samples may be collected using bottle-on-a-string (i.e. grab) samplers by lowering the sampler through the riser into the liquid column in the tank. The size and volume requirements for the sample bottles will be specified in the individual sampling event TSAPs.

2.6 VADOSE ZONE SAMPLING

Sub-surface soil sampling is conducted using a hydraulic hammer direct push rig technology with the capability to push vertically as well as on a slant. Primarily vertical direct pushes are used in the field characterization effort; however, there may be a need to do some slant direct

pushes. Direct push sampling is performed using a drill rig or modified backhoe that is retrofitted with a hydraulic head. Surface samples are collected using hand tools.

2.7 SOLIDS LEVEL MEASUREMENTS

Solids level measurements are commonly taken using one of three methods: a sludge weight, zip cord, or Enraf®[3]. All of these methods use the same principle, involving lowering a plummet on a cable through headspace and/or liquid until the solids surface is detected with a change in weight or slackness of the cable. Further detail of solids level measurement techniques can be found in Appendix C of RPP-10006, Rev. 17, *Methodology and Calculations for the Assignment of Waste Groups for the Large Underground Waste Storage Tanks at the Hanford Site*.

3.0 BASIS FOR SAMPLING PROJECTIONS

The projected sampling events and solids level measurements identified in Table 6-1 through Table 6-20 support the following:

- DST Chemistry Control Program
- Retrieval and Closure, including A/AX-Farm retrieval and closure,
- DST waste transfer and evaporator operations,
- Tank Farm Projects, and
- Mission Integration waste feed delivery and strategic planning initiatives.

These drivers are discussed in the following subsections: Chemistry Control, Retrieval and Closure, Evaporator Campaigns, Mission Integration and Future Projects, and Other Samples and Measurements.

3.1 DST CHEMISTRY CONTROL SAMPLES AND BASIS

The *Operating Specifications for the Double-Shell Storage Tanks*, OSD-T-151-00007 establishes tank waste chemistry limits for corrosion control of the DSTs. Additionally, OSD-T-151-00007 requires a database be kept to track the nitrite, nitrate, fluoride, chloride, and hydroxide concentrations in each DST. This is used to: monitor compliance with the waste chemistry limits, identify patterns of hydroxide consumption important to determining tank sampling frequencies, trend and predict when chemical adjustments are required, and ensure DST waste chemistry is within the established limits.

[3] Enraf® is a trademark of Honeywell International Inc., Morristown, New Jersey.

The DST Chemistry Control Program monitors tank chemistry, recommends sampling priorities, provides input to sampling plans, directs laboratory analysis, evaluates tank contents, and, if needed, recommends recovery activities to maintain tank waste chemistry within the established limits.

Periodic sampling of DST waste is required to populate the OSD-T-151-00007 required database and to demonstrate continued compliance with the OSD-T-151-00007 chemistry control limits. The Caustic Limits Report (RPP-13639, *Caustic Limits Report for Period Ending March 30th, 2020)* serves as the OSD-T-151-00007 required database, and provides the Chemistry Control Program's recommendations for supernatant and solid sampling priorities that are needed for and used to demonstrate compliance with the OSD-T-151-00007 chemistry control limits.

3.2 SST RETRIEVAL AND CLOSURE SAMPLES AND BASIS

Washington River Protection Solutions, LLC (WRPS) conducts sampling activities of the A and AX Tank Farms in furtherance of retrieval activities conducted under the Consent Decree [single-shell tank retrieved under the Consent Decree in *Washington v. DOE*, Case No. CV-08-5085-FVS, as amended (E.D. WA. October 25, 2010)[4]], and remaining SSTs under the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989).

The Consent Decree established the procedure for determining when retrieval of a tank is complete. Per the Consent Decree, the Tank Waste Retrieval Work Plans must identify two retrieval technologies for each tank. If a single technology cannot meet the volume waste residue goal of 360 cubic feet of waste or less for each tank, a second technology is required. If the waste residue goal is satisfied through use of the second technology, retrieval is determined to be complete. If this goal is not achieved, a third technology will be required unless the United States Department of Energy (DOE) and the Washington State Department of Ecology (Ecology) agree that deployment of a third technology is not practicable, using the terminology provided in Appendix C, Part 1 of the Consent Decree.

Sampling is typically conducted during all stages of retrieval: bulk retrieval, hard heel retrieval (if determined to be necessary by the project), and post-retrieval (closure). Vapor samples are also taken during retrieval operations. Samples to support retrieval operations are described below. The projected retrieval samples have been provided by Retrieval Process Engineering and are based on predicted SST retrieval technologies.

[4] The 2010 Consent Decree has been amended thrice. See Amended Consent Decree, Case No. CV-08-5085-RMP (March 11, 2016), Second Amended Consent Decree, Case No. CV-08-5085-RMP (April 12, 2016), and Third Amended Consent Decree, Case No. 2:08-CV-5085-RMP (October 12, 2018). Note that the Amended Consent Decree and Second Amended Consent Decree did not re-publish the provisions of the 2010 Consent Decree but only published those portions of the text that were modified by each decree; consequently, it is necessary to refer to each document to determine whether a particular section has been amended.

3.2.1 Bulk Retrieval

Bulk retrieval is the first phase of retrieval and is intended to remove the majority of the waste in the SST. Bulk retrieval is typically performed using a combination of first and second technologies (e.g., ERSS and high-pressure water for C-101 retrieval). Samples taken during bulk retrieval are process samples driven by corrosion mitigation and waste transfer criteria (see Section 3.1). These samples are usually grab samples from the DST waste receiver tank. Solids measurements may be performed in the receiver tank to ensure requirements are met.

3.2.2 Hard Heel Retrieval

Hard heel retrieval follows bulk retrieval or the limit of the first technologies and incorporates use of a third technology with the intent of removing the remaining waste. Samples of the heel may be needed to determine the appropriate technology to retrieve the hard heel. The sampling method used to obtain these samples will depend on the type of waste remaining and its location in the tank. A series of process samples may be required during hard heel retrieval when chemical dissolution reactions are applied to the tank. These process samples monitor the progress of the reactions and can help determine when the dissolution has reached its limit. Grab samples are typically utilized for the process samples. The liquid is typically not deep enough under the sampling riser for normal grab sampling techniques to be effective. Consequently, a slotted sleeve is typically deployed to position a sample bottle and holder near one of the sluicers inside the tank. The sample bottle and holder are lowered until they rest on alignment pins in the sleeve to position the mouth of the bottle next to a slot in the sleeve for sampling. An in-tank pump directs liquid via a sluicer into a slot in the sleeve to fill the sample bottle. A video camera may be used to assist in aiming the liquid stream at the slot in the sleeve.

3.2.3 Post-Retrieval (Closure)

When retrieval of a tank is complete, the residual waste is sampled in accordance with RPP-23403. Per RPP-23403, Section 8.2.2, the most appropriate sampling method will be determined jointly by U.S. Department of Energy, Office of River Protection (ORP), Ecology, and the Tank Farm Contractor. These samples are referred to as “post-retrieval samples,” but may also be referred to as “100% samples.” Note that “100% samples” are not the same as “100% Bulk Retrieval samples,” as 100% of bulk retrieval is only the initial portion of the total retrieval.

3.2.4 Retrieval Vapor Samples

Vapor samples are required from the exhauster stack during active retrieval operations at the beginning of retrieval, and at approximately the 50% retrieval to monitor emissions of selected toxic air pollutants (TAPs). The samples are obtained in accordance with an approved tank farm-specific sampling and analysis plan (SAP).

3.3 242-A EVAPORATOR SAMPLES AND BASIS

Grab samples are taken to support characterization of DST waste for evaporation and to address potential safety issues (e.g., criticality) and potential operational issues (e.g., line plugging and formation of solids) for the 242-A Evaporator (Evaporator) program. The Evaporator program ensures adequate space is available in the DSTs for the retrieval of SST waste through the evaporation of excess liquid in the waste of the DSTs. Liquid under consideration for evaporation is sampled in the Evaporator feed tank 241-AW-102 (AW-102) or before entering AW-102. Due to the solids level impacting the amount of liquid waste that can be stored (prior to evaporation), the solids levels are measured in the main 242-A Evaporator feed tank, all other candidate feed tanks, and in the slurry receiver tank to measure solids deposition from a 242-A Evaporator campaign.

3.4 MISSION INTEGRATION AND FUTURE PROJECTS SAMPLES AND BASIS

Near-term sampling events identified in this document focus on current, planned operational activities. Near term operational plans are described within RPP-PLAN-63778, Rev. 5, *Multi-Year Operating Plan (MYOP)*. RPP-RPT-57991, Rev. 3, *One System River Protection Project Integrated Flowsheet* defines the baseline flowsheet for execution of the River Protection Project (RPP) mission and alludes to sampling needs for future operations. The MYOP demonstrates the interactions between key aspects involved in execution of the flowsheet including SST retrievals, 242-A evaporator campaigns, DST space management, and DFLAW start up and operations. ORP-11242, Rev. 8, *River Protection Project System Plan* (referred to as the "System Plan") describes these same elements in terms of a broader longer term mission focus and includes elements of full WTP operations, SST and DST closure, total processed sodium, supplemental low activity waste (LAW) immobilization treatment capacity, mission durations, WTP pretreatment throughput, and high-level waste (HLW) glass formulation. Anticipated sampling events to support the near term and long-term mission strategy are reflected in this document and additional sampling events are expected to be included in future revisions of this document.

Though the near-term mission strategy has been adapted to focus on DFLAW, the long-term mission strategy involves feeding HLW to WTP. Tank waste core sampling is essential to the long-term mission as it assists in facilitating HLW sludge management planning, supports waste blending strategy development in order to improve the HLW melter operating efficiency, and assesses the degree of waste blending. Recent efforts to define the WTP waste acceptance criteria as well as validating the WTP feed design baseline have revealed a critical need for additional tank waste sample data, particularly rheological data. Gaps and opportunities associated with the waste physical and chemical properties as they relate to the definition and implementation of the RPP Integrated Flowsheet are described in RPP-PLAN-58003, Rev 5, *One System River Protection Project Integrated Flowsheet Maturation Plan*. The data obtained from the tank waste core samples will support a number of ongoing Tank Farms program needs, including safety, waste storage, waste retrieval, and waste feed delivery. Obtaining core sample data from saltcake layers within DSTs supporting DFLAW and retrieved single-shell tank waste is of particular importance. Understanding the potential interactions of saltcake solids and dilute nature of the waste, including raw water additions, may reduce uncertainty in the DFLAW

flowsheet. Sampling and analysis to address large, dense plutonium particulates, a criticality safety concern, was also recommended in RPP-RPT-56983, *One System Report on Plutonium Particulate Criticality Safety Issue Resolution at Hanford Tank Farms and Waste Treatment Plant*.

Sampling also provides support to TOPSim modeling through improving the uncertainty of Best-Basis Inventory (BBI) data by updating calculated estimates with lab analyzed results. TOPSim is a dynamic model that supports system planning efforts by simulating the current planned RPP mission through waste transfers and retrievals, evaporator operations, and WTP operations. Additionally, the Near-Term Operations tool (HISI 4055) is being used to model near-term (nominally 1 to 5 years) of projected operations either separately or in conjunction with TOPSim. BBI data, the official inventory of the Hanford site, is used as an input in both of these mission simulation models. Uncertainty of BBI data quality also has the potential to impact other flowsheet model predictions for DFLAW operations as it impacts the flowsheet model's ability to accurately project compliance to waste acceptance criteria. RPP-PLAN-58003, Rev 5 recommends the basis for BBI uncertainty be improved by obtaining new sampling data for the DFLAW candidate tanks identified in RPP-RPT-54509, Rev. 1, *One System – Hanford Tank Waste Characterization Vulnerability Assessment*. This sampling data could be obtained by re-analyzing archive samples to improve data for constituents of concern identified in RPP-RPT-54509, or by completing sampling and sample analysis for tanks, including tanks AN-101 and AN-106.

3.5 OTHER SAMPLES AND MEASUREMENTS

3.5.1 Solids Level Measurements

Solids level measurements are typically taken whenever a grab or core sample is collected, however, solids levels may also be taken at other times. The measurements do not have to be in conjunction with a sampling event. Drivers for accurate solids level measurements can coincide with SST waste retrieval activities, DST operations which may potentially increase the solids expected in the DSTs (e.g., evaporator campaigns), or waste feed delivery operations needed to prepare and deliver feed to the WTP.

Accurate knowledge of the solids levels in DSTs, as provided by the above drivers, is also needed to support near-term waste transfers, retrievals, evaporator campaigns, Low Activity Waste Pretreatment System (LAWPS) / DFLAW feed preparation, and the Project Summary Schedule (colloquially called the "Big Picture" schedule).

3.5.2 Vapor Samples

Vapor samples and monitoring are required to meet permit requirements associated with operation of stationary DST exhausters and of SST portable exhausters (PORs) during retrievals. Stationary exhauster sampling requirements generally include initial baseline sampling and thereafter, depending on the farm-specific permit, sampling performed for specific waste

disturbing activities and for ongoing monthly, quarterly, bi-annual, and/or annual TAPs emissions assessments. POR sampling intervals during retrieval is discussed in 2.3. Other IH and vapor sampling is not addressed in this document.

4.0 DATA QUALITY OBJECTIVES AND PRIORITIZATION OF SAMPLING

This section describes the data quality objective (DQO) process for determining the number, type, and location of samples and the prioritization of sampling events.

4.1 DATA QUALITY OBJECTIVES

The seven-step DQO process is a scientific process used to determine the type, quantity, and quality of data required to make a decision or perform necessary evaluations. The DQO process is used to determine sampling requirements such as the number, type, and location of samples, as well as, analytical requirements such as analytes of interest, action limits, and quality control requirements. Operational decisions related to waste compatibility, tank waste inventory data, tank status, system planning, and waste feed delivery planning all require knowledge of the depth of solids in the DSTs. Note that solids level measurements taken to support a specific driver, such as 242-A Evaporator operations, are addressed in the solids level measurement tables in Section 6.0.

4.1.1 Waste Compatibility DQO

Waste compatibility is discussed in HNF-SD-WM-DQO-001, *Data Quality Objectives for the Tank Farms Waste Compatibility Program*. The primary goal of the compatibility program is to ensure sufficient controls are in place to prevent the formation of incompatible mixtures which could cause safety, regulatory, programmatic, or operational problems. This DQO was written to ensure appropriate data are collected to support the Compatibility Program decisions, which prevent waste compatibility problems during waste transfers.

4.1.2 242-A Evaporator DQO

The 242-A Evaporator is discussed in HNF-SD-WM-DQO-014, *242-A Evaporator Data Quality Objectives*. The Evaporator DQO addresses sampling requirements for candidate feed tanks, slurry streams, and Evaporator waste streams, including process condensate, cooling water, and steam condensate. This covers sampling for waste entering the Evaporator, waste streams leaving the Evaporator, and waste streams within the Evaporator. Specifications for the data necessary to support the operation of the Evaporator are provided in HNF-SD-WM-DQO-014, as well as, the sampling and analytical activities for that purpose.

4.1.3 Chemistry Control DQO

The *Double-Shell Tanks Chemistry Control Data Quality Objectives*, RPP-8532, ensures the samples required by the Chemistry Control Program are collected during sampling events.

4.1.4 Residual Solids Characterization DQO

Residual solids characterization after completion of SST retrieval is discussed in RPP-23403, *Single-Shell Tank Component Closure Data Quality Objectives* and in Sampling and Analysis Plan (SAP), RPP-PLAN-23827, *Sampling and Analysis Plan for Single-Shell Tanks Component Closure*. This DQO and SAP are applied to sampling events after retrieval has been completed to provide data on the residual waste to address risk assessment, as well as, performance criteria. These samples are typically taken using the ORSS.

4.1.5 SST Retrieval Hard Heel Dissolution DQO(s)

SST retrievals requiring hard heel dissolution each have their own DQO, if applicable (e.g., C-111). Process liquid grab sampling may be conducted during dissolution activities. This is done primarily to support retrieval operations, but also to better understand the effectiveness of the dissolution chemical (e.g., water, caustic, or oxalic acid) on the hard-to-retrieve solids. Process samples are needed to estimate how much solids have dissolved or how much dissolution chemical has been consumed. Timely sample results are needed to determine when a step in the dissolution process has progressed sufficiently so that the next step may proceed. Sample results may also be used to evaluate effectiveness of presoaks and chemical dissolution for future retrieval activities.

4.1.6 Strategic Planning DQO

The Strategic Planning DQO, RPP-44057, *Data Quality Objectives to Support Strategic Planning*, focuses on analytical data collection in support of tank space management, waste feed physical and rheological properties for WTP, secondary liquid waste, LAW feed envelopes, HLW feed envelopes, general waste acceptance criteria action limits, mission duration and waste form quantities, contact-handled transuranic waste, and quantities of pertechnetate. The Strategic Planning DQO is applied to several tanks for long range planning. This DQO is also applied opportunistically to other tanks sampled for other purposes. The DQO is not applied when the waste tank is expected to be altered substantially soon after analytical results are available (such as 50% and 100% retrieved samples or evaporator feed samples). The Strategic Planning DQO is most often applied opportunistically to sampling events under higher priority DQOs.

4.1.7 Integrated Solubility Model (ISM) DQO

RPP-55762, *Integrated Solubility Model (ISM) Data Quality Objectives*, provides for collection of tank waste data that will be used by the Flowsheet Integration group to evaluate the accuracy

of ISM solubility predictions for key tank waste components. This information supports modeling of the RPP mission, including pretreatment and vitrification of retrieved tank farm waste at the WTP. Component solubility is an important factor in RPP mission modeling because even small solubility changes can have large impacts on the management of DST space and the type and quantity of glass waste produced during WTP treatment, and therefore, on the RPP mission duration and lifecycle cost. This DQO is also applied opportunistically to events that have a high probability of yielding samples with liquids and solids in chemical equilibrium.

4.1.8 SST and DST Stack Vapor DQO

SST waste retrieval activities and DST operations emit vapors potentially containing TAPs and criteria air pollutants from DST stationary exhausters or SST PORs. Limits are placed on such emissions in applicable Approval Orders (environmental permits) issued by Ecology. The sampling and analysis of SST and DST exhausters necessary to demonstrate compliance with Approval Order emissions limits is discussed in RPP-SPEC-33590, *Data Quality Objectives for the Evaluation of Stack Chemical Emissions*. The DQO will ensure the appropriate data are collected to verify stack emissions meet discharge requirements.

4.1.9 Worker Protection Vapors DQO

Additionally, vapor samples are collected as discussed in RPP-20949, *Data Quality Objectives for the Evaluation of Tank Chemical Emissions for Industrial Hygiene Technical Basis*. However, the purpose of this DQO is to collect data for worker protection, as opposed to engineering or environmental reasons, and is outside the scope of this document.

4.1.10 Polychlorinated Biphenyl (PCB) Management DQO

Polychlorinated biphenyl (PCB) management is discussed in RPP-7614, *Data Quality Objectives to Support PCB Management in the Double-Shell Tank System*. To comply with the *Framework Agreement for Management of Polychlorinated Biphenyls (PCBs) in Hanford Tank Waste* (Ecology et al. 2000), PCB concentrations must be determined in the existing DST system waste and in waste entering the DST system. This DQO describes the process undertaken to ensure appropriate data is collected to support management of PCBs in the DST system. It should be noted that the Compatibility DQO also requires PCB data to support Ecology et al. 2000. For solids, the required PCB analyses per tank may be met by analyzing individual core composites of two core samples taken from separate risers. Solid grab samples need to be shown to be representative of the solids in the tank to be used to support this DQO.

4.1.11 Multi-Media Sampling DQO

Sampling of non-tank waste matrices such as soil, sediment, liquid and solid waste, and miscellaneous materials are discussed in RPP-54991, *Multi-Media Sampling Program Data Quality Objectives*. Sampling data are used to determine the appropriate disposition of waste streams or to support engineering evaluations.

4.1.12 BBI DQO

The Best-Basis Inventory is the official database for tank waste inventory estimates at the DOE Hanford Site. The BBI is used to develop and maintain radionuclide and chemical waste composition and inventory estimates for all 177 Hanford Site SSTs and DSTs. RPP-RPT-60210, *Data Quality Objectives to Support Best-Basis Inventory (BBI)* typically will be applied opportunistically whenever a tank is sampled and it is determined the BBI could benefit from additional data.

4.1.13 DFLAW DQO

RPP-RPT-59494, *Integrated DFLAW Feed Qualification Data Quality Objectives*, details the activities and requirements needed to meet acceptance criteria for transfer of staged feed to the receipt vessels in the LAWPS and treated feed in LAW facilities.

4.1.14 Criticality DQO

RPP-SPEC-25386, *Criticality Data Quality Objectives for Tank Solids Samples*, describes the process that supports the implementation of the criticality safety monitoring required by RPP-7475, *Criticality Safety Evaluation Report for Hanford Tank Farm Facilities* (CSER). This DQO ensures that characterization data for fissile materials and neutron absorbers are collected when waste solids are sampled to support monitoring.

4.1.15 Tank 241-C-301 Waste Transfer and Component Closure DQO

RPP-45634, *Data Quality Objectives for Tank 241-C-301 Waste Transfer and Component Closure*, identifies data requirements for the evaluation of solids retrieval methods and waste transfer methods. In addition, this DQO also develops an integrated sampling and analysis approach that will provide data to satisfy all data needs to close catch tank 241-C-301 in a manner consistent with final closure of Waste Management Area C.

4.1.16 Waste Transfer and Component Closure of the 244-CR Vault DQO

RPP-49049, *Data Quality Objectives for Waste Transfer and Component Closure of the 244-CR Vault*, reports the DQO process undertaken to develop a waste sampling and analysis approach that will provide appropriate data for the 244-CR Vault to support closure of Waste Management Area C.

4.2 DQO TABLES

As appropriate, SAPs, or TSAPs for tank sampling, are prepared for each sampling event – core, grab, vapor, residual solids, vadose, or multi-media samples. The sampling and analysis plans incorporate the requirements delineated in the applicable DQO documents. The applicable DQO documents for each liquid or solid sampling event are identified in Table 4-1 and Table 4-2.

Note that additional DQOs may be applied to a sampling event, if appropriate, when the sampling plan is developed. Additional DQOs may be developed for specific sampling events.

Table 4-1. DQOs Used for Planned Sampling Events

DQO Program	Document
242-A Evaporator	HNF-SD-WM-DQO-014, 2009, *242-A Evaporator Data Quality Objectives*, Rev. 7
BBI DQO[2]	RPP-RPT-60210, *Data Quality Objectives to Support Best-Basis Inventory (BBI)*, Rev. 0
C-301 Component Closure	RPP-45634, 2019, *Data Quality Objectives for Tank 241-C-301 Waste Transfer and Component Closure*, Rev. 1
Chemistry Control	RPP-8532, 2020, *Double-Shell Tanks Chemistry Control Data Quality Objectives*, Rev. 15
CR Vault Tanks Closure	RPP-49049, 2019, *Data Quality Objectives for Waste Transfer and Component Closure of the CR Vault Tanks*, Rev. 1
Criticality DQO for Tank Solids Samples[1]	RPP-SPEC-25386, 2015, *Criticality Data Quality Objectives for Tank Core Samples*, Rev. 1
Integrated DFLAW Feed Qualification DQO	RPP-RPT-59494, 2021, *Integrated DFLAWFeed Qualification Data Quality Objectives*, Rev. 2
Integrated Solubility Model[2]	RPP-55762, 2013, *Integrated Solubility Model (ISM) Data Quality Objectives*, Rev. 0
Multi-Media Sampling	RPP-54991, 2019, *Multi-Media Sampling Program Data Quality Objectives.*
PCB Management[2]	RPP-7614, 2002, *Data Quality Objectives to Support PCB Management in the Double-Shell Tank System*, Rev. 3
SST Component Closure	RPP-23403, 2020, *Single-Shell Tank Component Closure Data Quality Objectives*, Rev. 7 RPP-PLAN-23827, 2016, *Sampling and Analysis Plan for Single-Shell Tanks Component Closure*, Rev. 4
Stack Chemical Emissions	RPP-SPEC-33590, 2020, *Data Quality Objectives for the Evaluation of Stack Chemical Emissions*, Rev. 5
Strategic Planning[2]	RPP-44057, 2015, *Data Quality Objectives to Support Strategic Planning*, Rev. 2
Waste Compatibility	HNF-SD-WM-DQO-001, 2021, *Data Quality Objectives for the Tank Farms Waste Compatibility Program*, Rev. 26
AP-106 Repurposing	RPP-RPT-61212, 2019, *Data Quality Objectives for the 241-AP-106 Repurposing*, Rev. 0

[1] This DQO is automatically invoked on every core sample taken.

[2] This DQO may be used opportunistically when this sample type is taken. Opportunistically means that if sampling is scheduled via another driver, this DQO may be invoked if recent data is not available.

Table 4-2. DQOs Which Do Not Drive Near-Term Sampling Events

DQO Program	Document
241-A-350 Waste Transfer and Closure	RPP-46169, 2010, *Data Quality Objectives for Tank 241-A-350 Waste Transfer and Closure*, Rev. 1
Corrosion Probe	RPP-SPEC-28275, 2009, *Corrosion Probe Data Quality Objectives*, Rev. 2
Sr/TRU Precipitation Process/One System	RPP-53641, 2012, *Data Quality Objectives for Sr/TRU Precipitation Process Phase I Tests*, Rev. 0
SST Corrosion Chemistry	RPP-49674, 2011, *Single-Shell Tanks Corrosion Chemistry Data Quality Objectives*, Rev. 0
Tank Farm Barrier	RPP-43551, 2009, *Tank Farm Interim Barrier Data Quality Objectives*, Rev. 0
Waste Processing and Disposal Combined	PNNL-12163, 1999, *Low-Activity Waste and High-Level Waste Feed Processing Data Quality Objectives*, Rev. 0

Table 4-2. DQOs Which Do Not Drive Near-Term Sampling Events

DQO Program	Document
Waste Processing and Disposal Regulatory	PNNL-12040, 1998, *Regulatory Data Quality Objectives Supporting Tank Waste Remediation System Privatization Project*, Rev. 0

4.3 PRIORITIZATION OF SAMPLING EVENTS

Tank Farm Sampling Operations may not have the capability or funding to perform all projected sampling and solids level measurement events each year. Since the number of projected sampling and solids level measurement events requested may be greater than can be performed by Sampling Operations, sampling event priorities have been derived from identified program needs and regulatory needs to support the necessity for sampling events. These priorities are recommended, based on the conventions provided in Table 4-3.

Table 4-3. Priority Categories

Priority Category[1]	Description of Sampling Requirement
1	Technical Safety Requirement (TSR)/Criticality Safety Control
2	Environmental Permit
3	Tri-Party Agreement (TPA)/Regulatory Milestones
4	Chemistry Control
5	Operating Specifications Document (OSD) Recovery Plan
6	TOC Initiatives
7	Strategic Planning (e.g., WTP, Waste Feed Delivery [WFD], waste vulnerability)
8	Other

[1] The lower the number the higher the priority. Note that there may be situations that warrant sampling that do not align with the priority conventions above. Changes to projected sampling events are initiated via the Project Integration Meeting and Tank Farm Projects Integration Meeting.

The prioritization list is arranged from the most important sampling events (i.e. TSR), to those sampling or solids level measurement events where delay would not result in a failure to meet a critical project need. The recommended Priority Category is included in the Priority/Justification column in Table 6-1 through Table 6-20 for each sampling or solids level measurement event. A brief description of each priority category is provided below.

- Priority 1, TSR/Criticality Safety Control: Samples required to address a potential inadequacy in the safety analysis or to evaluate material at risk against a source term assumption are designated Priority Category 1. Sampling required to establish

compliance with a Criticality Safety Control or to support Criticality Safety Evaluation of fissile material operations is also designated Priority Category 1.

- Priority 2, Environmental Permit: Samples required to demonstrate compliance with environmental permit requirements, such as those identified to meet air emission limits, are designated Priority Category 2. Samples in this category also reflect Administrative Orders from the State of Washington Department of Ecology. Before October 1, 2014, liquid in the 241-AY-102 annulus leak detection pit (AY-102A LDP) was sampled monthly in order to meet action item 11 in Administrative Order Docket # 10618 (Ecology 2014). As of October 2, 2014, sampling of AY-102A LDP will occur only whenever the pit is pumped or a significant change in pH is observed through field measurements (Pollution Control Hearings Board (PCHB) No. 14-041c, *241-AY-102 Settlement Agreement*).
- Priority 3, TPA/Regulatory Milestones: Samples required in support of milestones identified in the *Hanford Facility Agreement and Consent Order* (Ecology et al. 1989) are designated Priority Category 3.
- Priority 4, Chemistry Control: Samples required to mitigate corrosion pursuant to OSD-T-151-00007 are identified in RPP-13639 and designated Priority Category 4 Samples identified in RPP-13639 are updated annually.
- Priority 5, OSD Recovery Plan: Samples identified in OSD Recovery Action Plans are designated Priority Category 5. Recovery Action Plans describe approved actions required to bring tank waste into compliance with OSD chemistry limits.
- Priority 6, TOC Initiatives: TOC initiatives may include sampling events identified as Performance Based Initiatives or other TOC initiatives.
- Priority 7, Strategic Planning (WTP/WFD): Strategic planning sampling events and solids level measurements to support WTP waste acceptance criteria and WFD are designated Priority Category 7. Sampling in support of WFD is currently described in RPP-40149-VOL 2, *Integrated Waste Feed Delivery Plan, Volume 2 – Campaign Plan*. Samples to mitigate potential vulnerabilities described in RPP-RPT-54509 are also designated Priority Category 7.
- Priority 8, Other: This priority category is intended to address sampling event drivers that are not captured in priority categories 1 through 7, above. The specific driver(s) for Priority Category 8 samples are identified in Table 6-1 through Table 6-20, as appropriate.

5.0 PREVIOUS SAMPLING PROJECTIONS REVIEW

WRPS Tank Waste Inventory and Characterization is responsible for maintaining this sampling projections document. This document incorporates the projected sampling events as of June 2021. Major sampling events completed in FY2021 are summarized in Table 5-1.

Table 5-1. Sampling Events Completed in FY2021[1] (3 Sheets)

Source of Sample	Client/Program	Applicable DQOs	Notes
Core Sample			
AN-106	Chemistry Control	RPP-8532 RPP-RPT-60210 RPP-55762 RPP-SPEC-25386 RPP-7614 HNF-SD-WM-DQO-001	**Trigger**: Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **TSAP:** RPP-PLAN-63783, *Tank 241-AN-106 Core Sampling and Analysis Plan – Fiscal Year 2020*
AN-101	Chemistry Control	RPP-8532 RPP-RPT-60210 RPP-55762 RPP-SPEC-25386 RPP-7614 HNF-SD-WM-DQO-001 RPP-44057	**Trigger**: Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **TSAP:** RPP-PLAN-64519, *Tank 241-AN-101 Core Sampling and Analysis Plan – Fiscal Year 2021*
Grab Samples			
AP-107	PNNL (Pacific Northwest National Laboratory)	RPP-PLAN-61243, Appendix B	**Trigger**: PNNL laboratory-scale engineering study of the processability and immobilization of the feed for the DFLAW mission phase. **TSAP**: RPP-PLAN-64240, *AP-107 Large Volume Sample Collection to Support Platform Testing, Phase 1, FY21*
AP-107	PNNL	RPP-PLAN-61243, Appendix B	**Trigger**: PNNL laboratory-scale engineering study of the processability and immobilization of the feed for the DFLAW mission phase. **TSAP:** RPP-PLAN-64241, *AP-107 Large Volume Sample Collection to Support Platform Testing, Phase 2, FY21*
C-301	Retrieval and Closure	RPP-45634	**Trigger**: Obtain data for the evaluation of solids retrieval methods and waste transfer methods. In addition, data were collected to support future closure efforts. **TSAP:** RPP-PLAN-63150, *Catch Tank 241-C-301 Sampling and Analysis Plan*

Table 5-1. Sampling Events Completed in FY2021[1] (3 Sheets)

Source of Sample	Client/ Program	Applicable DQOs	Notes
AN-101	Chemistry Control	RPP-8532 HNF-SD-WM-DQO-001 RPP-RPT-60210	**Trigger**: Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **TSAP:** RPP-PLAN-64640, *Tank 241-AN-101 Grab Sampling and Analysis Plan – Fiscal Year 2021*
AN-106	Chemistry Control	RPP-8532 HNF-SD-WM-DQO-001 RPP-RPT-60210	**Trigger**: Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **TSAP:** RPP-PLAN-63913, *Tank 241-AN-106 Grab Sampling and Analysis Plan – Fiscal Year 2020*
AP-101	Flowsheet Integration	RPP-RPT-59494	**Trigger**: Pre-check of supernatant composition to determine suitability for DFLAW feed campaign #3. **TSAP:** RPP-PLAN-64455, *Tank 241-AP-101 Grab Sampling and Analysis Plan in Support of DFLAW Feed Campaign #3*
AZ-102[2]	Chemistry Control	RPP-8532 HNF-SD-WM-DQO-001 RPP-RPT-60210	**Trigger:** Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **TSAP:** RPP-PLAN-64730, *Tank 241-AZ-102 Grab Sampling and Analysis Plan – Fiscal Year 2021*
AX-104[2]	SST Retrievals	RPP-RPT-60210 RPP-23403	**Trigger**: Retrieval method evaluation if a third retrieval technology is required or for closure analysis if a third retrieval technology is not implemented. **TSAP:** RPP-PLAN-64585, *Tank Sampling and Analysis Plan for Residual Solid Waste in Tank 241-AX-104*
AY-102A[2]	Chemistry Control/Tank Integrity	RPP-8532 RPP-RPT-60210	**Trigger**: Evaluation of annulus space integrity following final flushing and addition of inhibitors. Recommended in RPP-ASMT-62047, *Tank Integrity Expert Panel Corrosion Subgroup Comments on Preparing Tank 241-AY-102 for Closure*. **TSAP:** RPP-PLAN-64788, *Tank 241-AY-102 Annulus Grab Sampling and Analysis Plan – Fiscal Year 2021*
AP-107	Flowsheet Integration	RPP-RPT-59494 RPP-8532 HNF-SD-WM-DQO-001 RPP-RPT-60210	**Trigger**: Qualification sampling for the first DFLAW feed campaign. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits and WTP waste acceptance criteria. **TSAP:** RPP-PLAN-63909, *Tank 241-AP-107 Grab Sampling and Analysis Plan in Support of DFLAW Feed Campaign, Chemistry Control and Compatibility Programs*

Table 5-1. Sampling Events Completed in FY2021[1] (3 Sheets)

Source of Sample	Client/ Program	Applicable DQOs	Notes
Vapor Samples			
AN Exhausters	Operations	RPP-SPEC-33590	**Trigger:** Bi-annual ammonia sample. 1,3-Dichloropropene sampling (If waste is transferred from AP farm to AN farm. **SAP:** RPP-PLAN-63937, *Bi-Annual Sampling and Analysis of 241-AN Tank Farm Exhauster for Assessment of 1,3-Dichloropropene Emissions*
AP Exhauster	Operations	RPP-SPEC-33590	**Trigger:** Annual and quarterly samples. **SAP:** RPP-PLAN-60685, *Sampling and Analysis of 241-AP Stack Chemical*
AY/AZ Exhauster	Operations	RPP-SPEC-33590	**Trigger:** Bi-annual and annual samples. Also, stack sampling during transfer of AX-104 and AX-103 tank retrieval waste into AZ-102. **SAP:** RPP-PLAN-60589, *Annual Sampling and Analysis of 241-AY/AZ Combined Ventilation System Stack Chemical Emissions – CY2020*
AW Exhausters	Operations	RPP-SPEC-33590	**Trigger:** Monthly, quarterly, biannual, and annual sampling. **SAP:** RPP-PLAN-63451, *Sampling and Analysis of 241-AW Tank Farm Exhauster Stack Chemical Emissions* RPP-PLAN-63784, *Monthly Sampling and Analysis of 241-AW-Tank Farm Exhauster for Assessment of Dimethyl Mercury Emissions*
AX Portable Exhausters	SST Retrieval and Closure/ Environmental	RPP-SPEC-33590	**Trigger:** Start of retrieval and 50 % retrieval of AX-104 into AZ-102. **SAP:** RPP-PLAN-63040, *Sampling and Analysis of Portable Exhauster (POR) Chemical Emissions During 241-AX Tank Farm Single-Shell Tank (SST) Retrievals*
AX Portable Exhausters	SST Retrieval and Closure/ Environmental	RPP-SPEC-33590	**Trigger:** Start of retrieval of AX-103 into AZ-102. **SAP:** RPP-PLAN-63040, *Sampling and Analysis of Portable Exhauster (POR) Chemical Emissions During 241-AX Tank Farm Single-Shell Tank (SST) Retrievals*

[1] This table identifies sampling events completed or scheduled to be completed in FY2021 as of the fourth quarter of FY2021.

[2] Sampling has not taken place as of release of this document, but is anticipated to be collected prior to the end of the fiscal year.

6.0 SAMPLING EVENT TABLES FOR FY2022 THROUGH FY2026 OR LATER

This section details sampling events projected for FY2022 through FY2026 or later. Table 6-1 through Table 6-20 identify core, grab, vapor, residual solids samples, and solids level measurements projected during this timeframe. With the exception of core sample projections, which are listed in order of priority, tanks are not listed in a particular order within tables. Table spacing has been adjusted to prevent widow/orphan rows. Where possible, the sampling and solids level measurement rationale and events triggering the need for sampling or solids level measurements have been provided to support the justification. A brief explanation of the table column headings is provided below.

- Source of Sample: The source tank from which the sample is taken.
- Client/Program: The TOC organization(s) or program requesting the sample (note that in some instances, one sample serves two or more different clients).
- Priority/Justification: The priority is the recommended Priority Category number as defined in Table 4-3. The justification provides the rationale for taking the sample.
- Applicable DQOs: The DQOs invoked by the sampling event are cited based on analytical data needs. Note that additional DQOs may be applied to a sampling event when the sampling plan is developed. If a DQO needs to be developed to support a sampling event, the text states "DQO to be prepared."
- Notes: The notes provide additional information regarding the sampling event such as the status of the sample, the rationale for taking the sample, the source requirements document, etc.

Vadose zone sampling is addressed in Appendix A and multi-media sampling is addressed in Appendix B.

Table 6-1. Core Samples FY2022[1]

Source of Sample	Client/ Program	Priority[1]/ Justification	Applicable DQOs	Notes
Proposed Core Sampling Events				
AN-102	Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 RPP-55762 RPP-SPEC-25386 RPP-7614	**Trigger**: Evaluate the tank solids interstitial liquid chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. Core sampling is required per OSD-RAP-61917, *Recovery Action Plan for Out-of-Specification Waste Cause by Updated Waste Chemistry Requirements – AN-102*. If supernatant segments are not collected, grab sampling is needed. **Source:** RPP-13639
AW-105	Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 RPP-44057 RPP-55762 RPP-SPEC-25386 RPP-7614	**Trigger:** Evaluate the tank solids interstitial liquid chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. If supernatant segments are not collected, grab sampling is needed. **Source:** RPP-13639

Note: Core sampling events for the purpose of this document entail setting up the sampling equipment on a tank riser, then either taking one or more core segments, or other sample from the tank at that riser. Separate sampling events for programs may be combined if pertaining to the same tank, while maintaining the number of cores requested by each program. (e.g., one core for Chemistry Control Core sampling event and one core for Strategic Planning Core sampling event.).

[1] The resources necessary to obtain 3 core samples are not available at the release of this document, but should be made a priority.

Table 6-2. Grab Samples FY2022 (2 Sheets)

Source of Sample	Client/ Program	Priority/ Justification	Applicable DQOs	Notes
Proposed Grab Sampling Events Double-Shell Tanks				
AP-105	Flowsheet Integration / Chemistry Control	3 / Regulatory Milestone Support 4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 HNF-SD-WM-DQO-001 RPP-RPT-60210 RPP-RPT-59494	**Trigger:** Qualification sampling for the second DFLAW feed campaign. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits and WTP waste acceptance criteria.
AP-101	PNNL	6 / TOC Initiative	RPP-PLAN-61243, Appendix B	**Trigger**: PNNL laboratory-scale engineering study for the DFLAW mission phase. Validate safety basis assumptions on temperature for filtration and ion-exchange. Sampling may be collected in two phases. **Source:** RPP-PLAN-61769, *DFLAW Radioactive Waste Test Platform Program Plan with Technical Information*

Table 6-2. Grab Samples FY2022 (2 Sheets)

Source of Sample	Client/ Program	Priority/ Justification	Applicable DQOs	Notes
AZ-102	Chemistry Control	4 / Determine if waste is in specification	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001	**Trigger**: After AX-103 retrieval operations. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **Source**: RPP-13639
AP-106	Flowsheet Integration / Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger:** Confirmation testing at the completion of the Tank Side Cesium Removal System (TSCR) Technology Demonstration in FY2022, and to determine if the waste is within chemistry control limits. **Source:** RPP-RPT-62113, *Repurposing Completion Report for AP-106*
AP-101	Flowsheet Integration/ Chemistry Control	4 / Determine if waste is in 7 / Strategic Planning	RPP-RPT-59494 RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001	**Trigger**: Pre-check for the fourth DFLAW feed campaign. This sample is to occur after the AZ-102 supernatant transfer to AP-101, currently planned for August 2022.
AP-108	Chemistry Control	4 / Determine if waste is in specification	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001	**Trigger**: Tank is scheduled to receive DFLAW plant wash waste and is not needed if TSCR startup is delayed. Evaluate tank supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. Sample towards the end of water additions to the tank. **Source:** RPP-13639
AN-107	Chemistry Control	4 / Determine if waste is in specification	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001	**Trigger**: Evaluate tank supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **Source:** RPP-13639
AN-102	Chemistry Control	4 / Determine if waste is in specification	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001	**Trigger**: Needed if supernatant is not collected with the core sampler. Evaluate tank supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **Source:** RPP-13639
SY-102	Chemistry Control	4 / Determine if waste is in specification	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001	**Trigger**: Evaluate tank supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **Source:** RPP-13639
AZ-101	Chemistry Control	4 / Determine if waste is in specification	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001	**Trigger**: Evaluate tank supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. Corrosion Probe data indicates the waste could be near corrosion limit. Further evaluation of corrosion probe is needed prior to sampling. **Source:** RPP-13639

Table 6-3. Vapor Samples FY2022[1]

Source of Sample	Client/Program	Priority/ Justification	Applicable DQOs	Notes[4]
AX Portable Exhausters	SST Retrieval and Closure/ Environmental	2 / Required at start & 50 % of retrieval	RPP-SPEC-33590	**Trigger:** Start of retrieval of AX-101 into AZ-102. **SAP:** RPP-PLAN-63040, *Sampling and Analysis of Portable Exhauster (POR) Chemical Emissions During 241-AX Tank Farm Single-Shell Tank (SST) Retrievals*
AN Exhausters 296-A-44 296-A-45	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Bi-annual ammonia sample using direct read instrumentation (DRI) and environmental procedures. Biannual sampling for 1,3-Dichloropropene is directed by a SAP. **SAP:** RPP-PLAN-63937, *Bi-Annual Sampling and Analysis of 241-AN Tank Farm Exhauster for Assessment of 1,3-Dichloropropene Emissions.*[5]
AP Exhauster 296-A-48 296-A-49	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Quarterly ammonia and volatile organic compound (VOC) sampling is collected via DRI and environmental procedures. Annual environmental sampling is directed by a SAP. **SAP:** RPP-PLAN-60685
AW Exhauster 296-A-46 296-A-47	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Bi-annual ammonia sample using DRI and environmental procedures. Baseline, monthly, and annual environmental samples directed by a SAP. **SAP:** RPP-PLAN-63451 and RPP-PLAN-63784
AY/AZ Exhauster 296-A-42	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Quarterly ammonia and VOC sampling is collected via DRI and environmental procedures. Annual and quarterly environmental sampling is directed by a SAP. Also, stack sampling during transfer of AX-101 tank retrieval waste into AZ-102. **SAP:** RPP-PLAN-60589
SY Exhauster	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Quarterly samples for VOC and ammonia using direct read instrumentation and environmental procedures. Annual samples will be directed by a sampling and analysis plan. **SAP:** RPP-PLAN-64784, *Sampling and Analysis of 241-SY Farm Exhauster Stack Chemical Emissions.*

[1] For tanks undergoing retrieval: the need for Vapor Sampling of the receiving DST will be determined by environmental evaluation.

[2] SY Exhausters are planned to be operational August 2021. Within 90 days of installation, baseline samples must be taken for dimethyl mercury and ammonia.

[3] Reserved.

[4] The constituents to be sampled for the annual toxic air pollutant sample events can vary from year to year based on permit requirements and environmental analysis. Permit was issued in December 2019.

[5] 1,3-Dichloropropene sampling required under revision 2 of DE05NWP-001, *Non-Radioactive Air Emissions Notice of Construction Approval Order Conditions and Restrictions DE05NWP-001* (Ecology 2019), which was in issued December 2019, beginning with the first transfer from AP Farm to AN Farm and occur for four sampling events. The transfer has not yet occurred at the release of this document.

Table 6-4. Residual Solids Samples[1] FY2022

Source of Sample	Client/ Program	Priority/ Justification	Applicable DQOs	Notes
Proposed Residual Solids Sampling Events				
AX-103	SST Retrievals	3 / Required after completion of retrieval	RPP-23403	**Trigger**: Completion of retrieval. Completion of retrieval. Residual solids sampling from various locations. The samples are taken to characterize the residual waste to propose a third technology and support closure.

[1] Residual solids sampling techniques may include the clamshell sampler, finger trap sampler, the ORSS, and drag sampler.

Table 6-5. Solids Level Measurements[1] FY2022

Location of Measurement	Client/Program	Priority/ Justification	Applicable DQOs	Notes
N/A	N/A	N/A	N/A[2]	N/A

[1] Solids level measurements are typically taken whenever a grab or core sample is collected.

[2] Solids level (sludge weight) measurements are taken at Evaporator slurry receiver tanks (HNF-SD-WM-DQO-014). However, in FY2021, no Evaporator campaigns are planned that would generate slurry (RPP-PLAN-63778, *Multi-Year Operating Plan (MYOP)*.

Table 6-6. Core Samples FY2023[1]

Source of Sample	Client/Program	Priority[2]/ Justification	Applicable DQOs	Notes
AW-104	Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 RPP-44057 RPP-55762 RPP-SPEC-25386 RPP-7614	**Trigger:** Evaluate the tank solids interstitial liquid chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **Source:** RPP-13639
AW-103	Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 RPP-44057 RPP-55762 RPP-SPEC-25386 RPP-7614	**Trigger:** Evaluate the tank solids interstitial liquid chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **Source:** RPP-13639

[1] The resources necessary to obtain 3 core samples are not available at the release of this document, but should be made a priority.

Table 6-7. Grab Samples FY2023

Source of Sample	Client/Program	Priority/ Justification	Applicable DQOs	Notes
Double-Shell Tanks				
AW-102	Flowsheet Integration /Chemistry Control	2 / Evaluation of waste for evaporation	HNF-SD-WM-DQO-014 HNF-SD-WM-DQO-001 RPP-55762 RPP-RPT-60210	**Trigger:** Feed sampling to support EC-13. Blend of AZ-102 and AY-101 waste.
AZ-102	Chemistry Control	4 / Determine if waste is in specification	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001	**Trigger**: After AX-101 retrieval operations. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **Source**: RPP-13639
AP-105	PNNL	6 / TOC Initiative	RPP-PLAN-61243, Appendix B	**Trigger**: PNNL laboratory-scale engineering study for the DFLAW mission phase. Validate safety basis assumptions on temperature for filtration and ion-exchange. **Source:** RPP-PLAN-61769
AP-105	Flowsheet Integration / Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger**: Post-dilution qualification sampling for the third DFLAW feed campaign. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits and WTP waste acceptance criteria.
AP-104	Flowsheet Integration / Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger**: Pre-check sampling for the fifth DFLAW feed campaign. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits and WTP waste acceptance criteria.
AP-106	Flowsheet Integration / Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger**: Determine TSCR treatment effectiveness and confirm modeling projections for DFLAW. Sample after each TSCR campaign. Expect two per year. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits.
Vault Tanks				
244-CR-TK-001	Closure	3 / Retrieval and closure	RPP-49049	**Trigger**: Preparation for retrieval and closure; 3 grab samples
244-CR-TK-002	Closure	3 / Retrieval and closure	RPP-49049	**Trigger**: Preparation for retrieval and closure; 3 grab samples
244-CR-TK-003	Closure	3 / Retrieval and closure	RPP-49049	**Trigger**: Preparation for retrieval and closure; 3 grab samples
244-CR-TK-011	Closure	3 / Retrieval and closure	RPP-49049	**Trigger**: Preparation for retrieval and closure; 3 grab samples

Table 6-8. Vapor Samples[1] FY2023

Source of Sample	Client/Program	Priority/ Justification	Applicable DQOs	Notes[4]
AX Portable Exhausters	SST Retrieval and Closure/ Environmental	2 / Required at start & 50 % of retrieval	RPP-SPEC-33590	**Trigger:** 50% of retrieval of AX-101 into AZ-102. **SAP:** RPP-PLAN-63040, *Sampling and Analysis of Portable Exhauster (POR) Chemical Emissions During 241-AX Tank Farm Single-Shell Tank (SST) Retrievals*
AN Exhausters 296-A-44 296-A-45	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Bi-annual ammonia sample using direct read instrumentation (DRI) and environmental procedures. Biannual sampling for 1,3-Dichloropropene is directed by a SAP. **SAP:** RPP-PLAN-63937[5]
AP Exhauster 296-A-48 296-A-49	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Quarterly ammonia and VOC sampling is collected via DRI and environmental procedures. Annual environmental sampling is directed by a SAP. **SAP:** RPP-PLAN-60685
AW Exhauster 296-A-46 296-A-47	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Biannual ammonia sample using DRI and environmental procedures. Baseline, monthly and annual environmental samples directed by a SAP. **SAP:** RPP-PLAN-63451 and RPP-PLAN-63784
AY/AZ Exhauster 296-A-42	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Quarterly ammonia and VOC sampling is collected via DRI and environmental procedures. Annual and quarterly environmental sampling is directed by a SAP. **SAP:** RPP-PLAN-60589
SY Exhauster	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Quarterly samples for VOC and ammonia using direct read instrumentation and environmental procedures. Annual samples will be directed by a sampling and analysis plan to be developed. **SAP:** RPP-PLAN-64784

[1] For tanks undergoing retrieval: the need for Vapor Sampling of the receiving DST will be determined by environmental evaluation.

[2] SY Exhausters are planned to be operational August 2021. Within 90 days of installation, baseline samples must be taken for dimethyl mercury and ammonia.

[3] Reserved.

[4] The constituents to be sampled for the annual toxic air pollutant sample events can vary from year to year based on permit requirements and environmental analysis.

[5] 1,3-Dichloropropene sampling required under revision 2 of DE05NWP-001 which was in issued December 2019, beginning with the first transfer from AP Farm to AN Farm and occur for four sampling events. The transfer has not yet occurred at the release of this document.

Table 6-9. Residual Solids Samples[1] FY2023

Source of Sample	Client/Program	Priority/ Justification	Applicable DQOs	Notes
N/A	N/A	N/A	N/A[2]	N/A

[1] Residual solids sampling techniques may include the clamshell sampler, fingertrap sampler, the ORSS, and drag sampler.

Table 6-10. Solids Level Measurements[1] FY2023

Location of Measurement	Client/Program	Priority / Justification	Applicable DQOs	Notes
N/A	N/A	N/A	N/A[2]	N/A

[1] Solids level measurements are typically taken whenever a grab or core sample is collected.

[2] Solids level (sludge weight) measurements are taken at Evaporator slurry receiver tanks (HNF-SD-WM-DQO-014).

Table 6-11. Core Samples FY2024[1]

Source of Sample	Client/ Program	Priority[1]/ Justification	Applicable DQOs	Notes
AZ-102	Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 RPP-55762 RPP-SPEC-25386 RPP-7614	**Trigger:** Evaluate the tank solids interstitial liquid chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. Should be collected after retrieval additions are complete. **Source:** RPP-13639
AZ-101	Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 RPP-55762 RPP-SPEC-25386 RPP-7614	**Trigger:** Evaluate the tank solids interstitial liquid chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **Source:** RPP-13639

[1] The resources necessary to obtain 3 core samples in 2021 are not available at the release of this document, but should be made a priority.

Table 6-12. Grab Samples FY2024

Source of Sample	Client/ Program	Priority/ Justification	Applicable DQOs	Notes
Double-Shell Tanks				
AP-105	Flowsheet Integration / Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger**: Post dilution of AP-101 waste in AP-105 qualification sampling for the fourth DFLAW feed campaign. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits and WTP waste acceptance criteria.

Table 6-12. Grab Samples FY2024

Source of Sample	Client/Program	Priority/Justification	Applicable DQOs	Notes
AP-105	Flowsheet Integration / Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger**: Post dilution of AP-101 waste in AP-105 qualification sampling for the fifth DFLAW feed campaign. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits and WTP waste acceptance criteria.
AP-108	Flowsheet Integration / Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger**: Pre-check sampling for the sixth DFLAW feed campaign. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits and WTP waste acceptance criteria.
AP-103	Flowsheet Integration / Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger**: Pre-check sampling for the seventh DFLAW feed campaign. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits and WTP waste acceptance criteria.
AW-102	Flowsheet Integration /Chemistry Control	2 / Evaluation of waste for evaporation	HNF-SD-WM-DQO-014 HNF-SD-WM-DQO-001 RPP-55762 RPP-RPT-60210	**Trigger:** Feed sampling to support EC-14.
AW-103	Flowsheet Integration /Chemistry Control	2 / Evaluation of waste for evaporation	HNF-SD-WM-DQO-014 HNF-SD-WM-DQO-001 RPP-55762 RPP-RPT-60210	**Trigger:** Feed sampling to support EC-15.
AP-101	PNNL	6 / TOC Initiative	DQO to be prepared	**Trigger**: PNNL laboratory-scale engineering study of the processability and immobilization of the feed for the DFLAW mission phase.
SY-103	Chemistry Control	4 / Determine if waste is in specification	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001	**Trigger**: Evaluate the crust chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. Solids grab or core of the crust. **Source**: RPP-13639
AP-106	Flowsheet Integration	7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger**: Determine TSCR treatment effectiveness and confirm modeling projections for DFLAW. Sample after each TSCR campaign. Expect two sampling events per year.

Table 6-13. Vapor Samples[1] FY2024

Source of Sample	Client/ Program	Priority/ Justification	Applicable DQOs	Notes[4]
A Portable Exhausters	SST Retrieval and Closure/ Environmental	2 / Required at start & 50 % of retrieval	RPP-SPEC-33590	**Trigger:** Start of retrieval and 50 % retrieval of A-101 into AP-101.
A Portable Exhausters	SST Retrieval and Closure/ Environmental	2 / Required at start & 50 % of retrieval	RPP-SPEC-33590	**Trigger:** Start of retrieval and 50 % retrieval of A-102 into AP-101.
AN Exhausters 296-A-44 296-A-45	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Bi-annual ammonia sample using direct read instrumentation (DRI) and environmental procedures Biannual sampling for 1,3-Dichloropropene is directed by a SAP. **SAP:** RPP-PLAN-63937[5]
AP Exhauster 296-A-48 296-A-49	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Quarterly ammonia and VOC sampling is collected via DRI and environmental procedures. Annual environmental sampling is directed by a SAP. Also, stack sampling during A-101 and A-102 retrieval into AP-101 **SAP:** RPP-PLAN-60685
AW Exhauster 296-A-46 296-A-47	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Bi-annual ammonia sample using DRI and environmental procedures. Baseline, monthly and annual environmental samples directed by a SAP. **SAP:** RPP-PLAN-63451[3] and RPP-PLAN-63784
AY/AZ Exhauster 296-A-42	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Quarterly ammonia and VOC sampling is collected via DRI and environmental procedures. Annual and quarterly environmental sampling is directed by a SAP. **SAP:** RPP-PLAN-60589
SY Exhauster	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Quarterly samples for VOC and ammonia using direct read instrumentation and environmental procedures. Annual samples will be directed by a sampling and analysis plan to be developed. **SAP:** RPP-PLAN-64784

[1] For tanks undergoing retrieval: the need for Vapor Sampling of the receiving DST will be determined by environmental evaluation.

[2] SY Exhausters are planned to be operational August 2021. Within 90 days of installation, baseline samples must be taken for dimethyl mercury and ammonia.

[3] Reserved.

[4] The constituents to be sampled for the annual toxic air pollutant sample events can vary from year to year based on permit requirements and environmental analysis.

[5] 1,3-Dichloropropene sampling required under revision 2 of DE05NWP-001 which was in issued December 2019, beginning with the first transfer from AP Farm to AN Farm and occur for four sampling events. The transfer has not yet occurred at the release of this document.

Table 6-14. Residual Solids Samples[1] FY2024

Source of Sample	Client/ Program	Priority/ Justification	Applicable DQOs	Notes
AX-101	SST Retrievals	3/ Required after completion of retrieval	RPP-23403	**Trigger:** Completion of retrieval. Residual solids sampling from various locations. The samples are taken to characterize the residual waste to propose a third technology and support closure.

[1] Residual solids sampling techniques may include the clamshell sampler, fingertrap sampler, the ORSS and drag sampler.

Table 6-15. Solids Level Measurements[1] FY2024

Location of Measurement	Client/Program	Priority / Justification	Applicable DQOs [1]	Notes
AP-104	Production Operations Process Engineering	4 / Solids determination for core sample 8 / Process	HNF-SD-WM-DQO-014	**Trigger:** Post evaporator campaign EC-11. AP-104 is the slurry receiver for EC-11. Measurements should be taken 3-6 months after campaign completion but within the designated fiscal year.
AP-103	Production Operations Process Engineering	4 / Solids determination for core sample 8 / Process	HNF-SD-WM-DQO-014	**Trigger:** Post evaporator campaign EC-12. AP-103 is the slurry receiver for EC-12. Measurements should be taken 3-6 months after campaign completion but within the designated fiscal year.
AP-103	Production Operations Process Engineering	4 / Solids determination for core sample 8 / Process	HNF-SD-WM-DQO-014	**Trigger:** Post evaporator campaign EC-13. AP-103 is the slurry receiver for EC-13. Measurements should be taken 3-6 months after campaign completion but within the designated fiscal year.

[1] Solids level measurements are typically taken whenever a grab or core sample is collected and at Evaporator slurry receiver tanks (HNF-SD-WM-DQO-014).

Table 6-16. Core Samples FY2025 or Later[1] (2 Sheets)

Projected Year	Source of Sample	Client/Program	Priority/ Justification	Applicable DQOs	Notes
2025	AN-104	Chemistry Control / Flowsheet Integration	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 RPP-55762 RPP-SPEC-25386 RPP-7614 RPP-44057	**Trigger**: Sample for process information prior to waste group A mitigation efforts. Evaluate the tank solids interstitial liquid chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **Source:** RPP-13639

Table 6-16. Core Samples FY2025 or Later[1] (2 Sheets)

Projected Year	Source of Sample	Client/Program	Priority/ Justification	Applicable DQOs	Notes
2025	AP-102	Chemistry Control	Chemistry Control	RPP-8532 RPP-RPT-60210 RPP-44057 RPP-55762 RPP-SPEC-25386 RPP-7614	**Trigger:** Evaluate the tank solids interstitial liquid chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **Source:** RPP-13639
2026	AP-104	Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 RPP-44057 RPP-55762 RPP-SPEC-25386 RPP-7614	**Trigger:** Evaluate the tank solids interstitial liquid chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **Source:** RPP-13639
2026	AP-107	Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 RPP-44057 RPP-55762 RPP-SPEC-25386 RPP-7614	**Trigger:** Evaluate the tank solids interstitial liquid chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits. **Source:** RPP-13639

[1] The resources necessary to obtain 3 core samples in 2021 are not available at the release of this document, but should be made a priority.

Table 6-17. Grab Samples FY2025 or Later

Projected Year	Source of Sample	Client/ Program	Priority/ Justification	Applicable DQOs	Notes
Double-Shell Tanks					
2025	AP-105	Flowsheet Integration / Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger**: Qualification sampling for the sixth DFLAW feed campaign. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits and WTP waste acceptance criteria. **Source**: RPP-13639
2025	AW-102	Flowsheet Integration /Chemistry Control	2 / Evaluation of waste for evaporation	HNF-SD-WM-DQO-014 HNF-SD-WM-DQO-001 RPP-55762 RPP-RPT-60210	**Trigger:** Feed sampling to support EC-16.
2025	AP-105	Flowsheet Integration / Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger**: Qualification sampling for the seventh DFLAW feed campaign. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits and WTP waste acceptance criteria. **Source**: RPP-13639

Table 6-17. Grab Samples FY2025 or Later

Projected Year	Source of Sample	Client/Program	Priority/ Justification	Applicable DQOs	Notes
2025	AY-101	Flowsheet Integration / Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger**: Pre-check sampling for the eighth DFLAW feed campaign. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits and WTP waste acceptance criteria.
2025	AP-103	Flowsheet Integration / Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger**: Pre-check sampling for the eighth DFLAW feed campaign. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits and WTP waste acceptance criteria.
2025	AP-106	Flowsheet Integration	7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger**: Determine TSCR treatment effectiveness and confirm modeling projections for DFLAW. Sample after each TSCR campaign. Expect two sampling events per year.
2026	AP-105	Flowsheet Integration / Chemistry Control	4 / Determine if waste is in specification 7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger**: Qualification sampling for the eighth DFLAW feed campaign. Evaluate the supernatant chemistry to demonstrate compliance with OSD-T-151-00007 tank waste chemistry limits and WTP waste acceptance criteria.
2026	AW-103	Flowsheet Integration /Chemistry Control	2 / Evaluation of waste for evaporation	HNF-SD-WM-DQO-014 HNF-SD-WM-DQO-001 RPP-55762 RPP-RPT-60210	**Trigger:** Feed sampling to support EC-17.
2026	AP-106	Flowsheet Integration	7 / Strategic Planning	RPP-8532 RPP-RPT-60210 HNF-SD-WM-DQO-001 RPP-RPT-59494	**Trigger**: Determine TSCR treatment effectiveness and confirm modeling projections for DFLAW. Sample after each TSCR campaign. Expect two sampling events per year.

Table 6-18. Vapor Samples[1] FY2025 or Later

Projected Year	Source of Sample	Client/Program	Priority/ Justification	Applicable DQOs	Notes[4]
2025	A Portable Exhausters	SST Retrieval and Closure/ Environmental	2 / Required at start & 50 % of retrieval	RPP-SPEC-33590	**Trigger:** Start of retrieval and 50 % retrieval of A-106 into AP-101.
2025	A Portable Exhausters	SST Retrieval and Closure/ Environmental	2 / Required at start & 50 % of retrieval	RPP-SPEC-33590	**Trigger:** Start of retrieval of A-103 into AP-101.
2026	A Portable Exhausters	SST Retrieval and Closure/ Environmental	2 / Required at start & 50 % of retrieval	RPP-SPEC-33590	**Trigger:** 50% retrieval of A-103 into AP-101.
2026	A Portable Exhausters	SST Retrieval and Closure/ Environmental	2 / Required at start & 50 % of retrieval	RPP-SPEC-33590	**Trigger:** Start of retrieval and 50 % retrieval of A-104 into AP-101.

Table 6-18. Vapor Samples[1] FY2025 or Later

Projected Year	Source of Sample	Client/Program	Priority/ Justification	Applicable DQOs	Notes[4]
2025 & 2026	AN Exhausters 296-A-44 296-A-45	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Bi-annual ammonia sample using direct read instrumentation (DRI) and environmental procedures Biannual sampling for 1,3-Dichloropropene is directed by a SAP. **SAP:** RPP-PLAN-63937[5].
2025 & 2026	AP Exhauster 296-A-48 296-A-49	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Quarterly ammonia and VOC sampling is collected via DRI and environmental procedures. Annual environmental sampling is directed by a SAP. Also, stack sampling during retrieval of A-106, A-103, and A-104 into AP-101. **SAP:** RPP-PLAN-60685
2025 & 2026	AW Exhauster 296-A-46 296-A-47	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Bi-annual ammonia sample using DRI and environmental procedures. Baseline, monthly and annual environmental samples directed by a SAP. **SAP:** RPP-PLAN-63451 and RPP-PLAN-63784
2025 & 2026	AY/AZ Exhauster 296-A-42	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Quarterly ammonia and VOC sampling is collected via DRI and environmental procedures. Annual and quarterly environmental sampling is directed by a SAP. **SAP:** RPP-PLAN-60589
2025 & 2026	SY Exhauster	Operations	2 / Required by permit	RPP-SPEC-33590	**Trigger:** Quarterly samples for VOC and ammonia using direct read instrumentation and environmental procedures. Annual samples will be directed by a sampling and analysis plan to be developed. **SAP:** RPP-PLAN-64784

[1] For tanks undergoing retrieval: the need for Vapor Sampling of the receiving DST will be determined by environmental evaluation.

[2] SY Exhausters are planned to be operational August 2021. Within 90 days of installation, baseline samples must be taken for dimethyl mercury and ammonia.

[3] Reserved.

[4] The constituents to be sampled for the annual toxic air pollutant sample events can vary from year to year based on permit requirements and environmental analysis.

[5] 1,3-Dichloropropene sampling required under revision 2 of DE05NWP-001 which was in issued December 2019, beginning with the first transfer from AP Farm to AN Farm and occur for four sampling events. The transfer has not yet occurred at the release of this document.

Table 6-19. Residual Solids Samples[1] FY2025 or Later

Projected Year	Source of Sample	Client/Program	Priority/ Justification	Applicable DQOs	Notes
2025	A-101	SST Retrievals	3/ Required after completion of retrieval	RPP-23403	**Trigger:** Completion of retrieval. Residual solids sampling from various locations. The samples are taken to characterize the residual waste to propose a third technology and support closure.
2025	A-102	SST Retrievals	3/ Required after completion of retrieval	RPP-23403	**Trigger:** Completion of retrieval. Residual solids sampling from various locations. The samples are taken to characterize the residual waste to propose a third technology and support closure.
2025	A-106	SST Retrievals	3/ Required after completion of retrieval	RPP-23403	**Trigger:** Completion of retrieval. Residual solids sampling from various locations. The samples are taken to characterize the residual waste to propose a third technology and support closure.
2026	A-103	SST Retrievals	3/ Required after completion of retrieval	RPP-23403	**Trigger:** Completion of retrieval. Residual solids sampling from various locations. The samples are taken to characterize the residual waste to propose a third technology and support closure.

[1] Residual solids sampling techniques may include the clamshell sampler, fingertrap sampler, the ORSS and drag sampler.

Table 6-20. Solids Level Measurements[1] FY2025 or Later

Projected Year	Source of Sample	Client/Program	Priority/ Justification	Applicable DQOs	Notes
2025	AP-104	Production Operations Process Engineering	4 / Solids determination for core sample 8 / Process	HNF-SD-WM-DQO-014	**Trigger:** Post evaporator campaign EC-14. AP-104 is the slurry receiver for EC-14. Measurements should be taken 3-6 months after campaign completion but within the designated fiscal year.
2025	AW-104	Production Operations Process Engineering	4 / Solids determination for core sample 8 / Process	HNF-SD-WM-DQO-014	**Trigger:** Post evaporator campaign EC-15. AW-104 is the slurry receiver for EC-15. Measurements should be taken 3-6 months after campaign completion but within the designated fiscal year.
2026	AP-108	Production Operations Process Engineering	4 / Solids determination for core sample 8 / Process	HNF-SD-WM-DQO-014	**Trigger:** Post evaporator campaign EC-16. AP-108 is the slurry receiver for EC-16. Measurements should be taken 3-6 months after campaign completion but within the designated fiscal year.
2026	AP-103	Production Operations Process Engineering	4 / Solids determination for core sample 8 / Process	HNF-SD-WM-DQO-014	**Trigger:** Post evaporator campaign EC-17. AP-103 is the slurry receiver for EC-17. Measurements should be taken 3-6 months after campaign completion but within the designated fiscal year.

[1] Solids level measurements are typically taken whenever a grab or core sample is collected and at Evaporator slurry tanks (HNF-SD-WM-DQO-014).

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APPENDIX A
VADOSE SAMPLING

VADOSE SAMPLING

The vadose program soil samples utilize some of the same resources that are used for tank farm sampling. Sub-surface soil sampling will be conducted using a hydraulic hammer direct push rig technology with the capability to push vertically as well as on a slant. Primarily vertical direct pushes will be used in the field characterization effort; however, there may be a need to do some slant direct pushes. Direct push is typically done by using a drill rig or modified backhoe that is retrofitted with a hydraulic head; however, alternative methods may be used.

Note: Tables A-1 through A-5 identify the collection of samples for closure activities expected to occur during FY2022 through FY2026.

Table A-1. Samples for FY2022

Source of Sample	Client	Priority/ Justification	Applicable DQOs/FSAP	Notes
WMA A-AX	Closure	3 / Characterize for pre-RFI/CMS	RPP-RPT-60227, *Data Quality Objectives for Vadose Zone Characterization of Waste Management Area A-AX*	20 direct push locations with 3 sample depths (~50 samples) and 5 of these 20 locations with 7 additional sample depths (~55 samples)
U Farm	Interim Measures	1/Interim Measure Soil samples	RPP-PLAN-63698, *Field Sampling and Analysis Plan for Soil Samples in Support of Interim Measures at 241-U Tank Farm*	5 direct push locations with approximately 6 sample depths (~30 samples)

Terms:
RFI/CMS = RCRA Facility Investigation/Corrective Measures Study
WMA = Waste Management Area

Table A-2. Samples for FY2023

Source of Sample	Client	Priority/Justification	Applicable DQOs/FSAP	Notes
WMA C	Closure	3 / Waste Characterization for Retrieval	RPP-49049, *Data Quality Objectives for Waste Transfer and Component Closure of the 244-CR Vault*	CR Vault (12 samples from tanks and vault cells)
WMA A-AX	Closure	3 / Characterize for pre-RFI/CMS	RPP-RPT-60227	2 direct push locations with approximately 10 sample depths (~20 samples)
B Farm	Interim Measures	1/Interim Measure Soil samples	RPP-RPT-60227	5 direct push locations with approximately 6 sample depths (~30 samples)

Terms:
RFI/CMS = RCRA Facility Investigation/Corrective Measures Study
WMA = Waste Management Area

Table A-3. Samples for FY2024

Source of Sample	Client	Priority/Justification	Applicable DQOs	Notes
TBD	Interim Measures	1/Interim Measure Soil samples	TBD	5 direct push locations with approximately 6 sample depths (~30 samples)

Terms:
TBD = To be determined

Table A-4. Samples for FY2025

Source of Sample	Client	Priority/Justification	Applicable DQOs	Notes
TBD	Interim Measures	1/Interim Measure Soil samples	TBD	5 direct push locations with approximately 6 sample depths (~30 samples)

Terms:
TBD = To be determined

Table A-5. Samples for FY2026

Source of Sample	Client	Priority/Justification	Applicable DQOs	Notes
TBD	Interim Measures	1/Interim Measure Soil samples	TBD	5 direct push locations with approximately 6 sample depths (~30 samples)

Terms:
TBD = To be determined

REFERENCES

RPP-49049, 2019, *Data Quality Objectives for Waste Transfer and Component Closure of the 244-CR Vault*, Rev. 1, Washington River Protection Solutions, LLC, Richland, Washington.

RPP-PLAN-63698, 2020, *Field Sampling and Analysis Plan for Soil Samples in Support of Interim Measures at 241-U Tank Farm*, Rev. 0, Washington River Protection Solutions, LLC, Richland, Washington.

RPP-RPT-60227, 2019, *Data Quality Objectives for Vadose Zone Characterization of Waste Management Area A-AX*, Rev. 1, Washington River Protection Solutions, LLC, Richland, Washington.

APPENDIX B
MULTI-MEDIA SAMPLES

MULTI-MEDIA SAMPLING

The Multi-Media Sampling Program is used for obtaining waste characterization samples from various media to allow for the appropriate disposition of waste streams. Multi-media samples can cover a wide range of media (liquid, soil, sediment, waste, etc.) but do not include DST or SST waste. Multi-Media sampling events are requested on an as-needed basis by various organizations. Multi-media samples completed in FY2021 as well as samples projected for FY2022 are included below. Some samples are designated as TBD (to be determined) in Table B-2, as additional sampling events are determined per request.

Table B-1. Multi-Media Samples Completed in FY2021

Source of Sample	Client	Applicable DQOs	Notes
AZ-301	Environmental	RPP-54991	AZ-301-COND-TK-001 collects and stores condensate from the AY and AZ Farm ventilation system. This sample would fulfill the CY2020 and/or CY2021 instance of annual sampling of AZ-301-COND-TD-001 to confirm the liquid properties have not changed significantly before being sent to ETF for disposal.
Soil near LERF[1]	Environmental / ETF	RPP-54991	Calendar year 2021 instance of annual soil deposition sampling to fulfill a monitoring requirement in the Radioactive Air Emissions License for the Department of Energy Richland Office Hanford Site issued by the State of Washington Department of Health Office of Radiation Protection (RAEL-FF-01), for the LERF Basins 42, 43, and 44, which are listed emission units #148, #147, and #146, respectively. **Source:** RPP-PLAN-62154, Rev. 3
Carboy discovered at 242-A Evaporator	Waste Services / ETF	RPP-54991	To determine whether the contents of a carboy discovered at the 242-A Evaporator exceed regulatory limits for characteristic constituents and criteria as defined in WAC 173-303, "Dangerous Waste Restrictions," and Title 40, *Code of Federal Regulations* (CFR), Part 268.

Notes:

[1]Sampling is currently projected to be completed within the fiscal year at the release of this document.

Terms:

ETF = Effluent Treatment Facility, LERF = Liquid Effluent Retention Facility, TEDF = Treated Effluent Disposal Facility

Table B-2. Multi-Media Samples in FY2022 (2 Sheets)

Source of Sample	Client	Applicable DQOs	Notes
AZ-301	Environmental	RPP-54991	AZ-301-COND-TK-001 collects and stores condensate from the AY and AZ Farm ventilation system. This sample would fulfill the CY2020 and/or CY2021 instance of annual sampling of AZ-301-COND-TD-001 to confirm the liquid properties have not changed significantly before being sent to ETF for disposal.
Soil near LERF	Environmental / ETF	RPP-54991	Annual soil deposition sampling to fulfill a monitoring requirement in the Radioactive Air Emissions License for the Department of Energy Richland Office Hanford Site issued by the State of Washington Department of Health Office of Radiation Protection (RAEL-FF-01), for the LERF Basins 42, 43, and 44, which are listed emission units #148, #147, and #146, respectively.

Table B-2. Multi-Media Samples in FY2022 (2 Sheets)

Fluorescein testing at 242-A Evaporator	ETF	RPP-54991	A liquid tracer leak test is used to verify the integrity of the currently installed reboiler, as described in the *242-A Evaporator Documented Safety Analysis*, HNF-14755.
TBD	TBD	RPP-54991	FSAP to be written for requested event.

Terms:
ETF = Effluent Treatment Facility, LERF = Liquid Effluent Retention Facility, TEDF = Treated Effluent Disposal Facility

REFERENCES

HNF-14755, 2021, *242-A Evaporator Documented Safety Analysis*, Rev. 6H, Washington River Protection Solutions, LLC, Richland, Washington.

RAEL-FF-01, 2017, "Radioactive Air Emissions License for the Department of Energy Richland Office Hanford Site," the State of Washington Department of Health Office of Radiation Protection – Radioactive Air Emissions, Richland, Washington.

RPP-54991, 2019, *Multi-Media Sampling Program Data Quality Objectives*, Rev. 1, Washington River Protection Solutions, LLC, Richland, Washington.

RPP-PLAN-62154, 2020, *Field Sampling and Analysis Plan for Soil Deposition Sampling near LERF Basins*, Rev. 3, Washington River Protection Solutions, LLC, Richland, Washington.