ICD 31 – Interface Control Document for DFLAW Effluent Returns to Double-Shell Tanks

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Department: Project Management

NOTE: **Obtain concurrence and approval signatures on the following page prior to approval of this ICD.**

Approved by: Walt Taylor

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Signature *Date*

BNI Area Project Manager

Issue Status: Approved

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NOTE: This document defines current service needs, future needs, and service gaps. The identified service levels do not represent contractual obligations between service recipient and providers. Future contractual and funding actions to close service gaps will be accomplished by integration between the federal offices as part of the budget planning process.

Interface Signature Page

Interface organizations, as appropriate, sign this sheet indicating concurrence and approval with the ICD contents. These signatures signify that the ICD accurately reflects the current baselines of interface organization's contracts, except as indicated in Appendix A, ICD 31 Issues and Open Items. The BNI Area Project Manager does not approve this ICD until all required signatures on this page have been obtained.

Contractor Concurrence

Organization	Position	Name	Signature	Date
WTP Contractor	ICD 31 Lead	Guy Robertshaw	Guy Robertshaw	6-18-2020
WTP Contractor	ICD 31 Interface Owner	Dave Reinemann	David Reinemann	6-18-2020
TOC	ICD 31 Interface Owner	Todd Wagnon	Todd Wagnon Digitally signed by Todd Wagnon Date: 2020.07.20 06:16:09 -07'00'	
MSC	ICD 31 Interface Owner	N/A		
PRC	ICD 31 Interface Owner	N/A		

DOE Approval

Position	Name	Signature	Date
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ORP Assistant Manager for Tank Farms	Rob Hastings	Robert G. Hastings Digitally signed by Robert G. Hastings Date: 2020.08.05 09:19:31 -07'00'	

History Sheet

Rev	Date	Reason for revision	Revised by
0	14-Sep-2015	Initial issue	D. Reinemann M. Pell
1		Revised per scope document CCN 317096. Rev bars are not used. Incorporated interface change forms 24590-WTP-ICF-MGT-17-0003, 24590-WTP-ICF-MGT-19-0004, and 24590-WTP-ICF-MGT-19-0005.	Guy Robertshaw

Revision Description

ICD Section	Description
All	The ICD has been reformatted in accordance with the requirements of *Interface Control Documents* (24590-WTP-GPP-RAOS-OS-0001, Rev 3).
Acronyms	Updated list.
1.1	Renamed section to “Interface Scope” and added new content.
1.2	Renamed section to “System Overview”, added new content and a block diagram.
1.3	New section to “Interface Functions”.
Table 1	Renamed table to “Function of the DFLAW Effluent Return to Double-Shell Tanks” and revised content to consider aspects that need to be in place for a complete interface.
1.4	New section, “Special Interface Roles”.
2	Moved references to new Section 5 and renamed section, “Interface Background Information,” with expanded subsection discussions.
2.1	New subsection, “Physical Information,” with discussion to address the interface points between WTP and TOC for both the effluent transfer and the control systems used in the operations.
2.1.1	New subsection, “Transfer Pipe Design”
2.1.2	New subsection, “Data Transfer Design”
2.1.3	New Subsection, “Transfer Pipeline Construction and Testing”
2.1.4	New Subsection, “Commissioning”
2.2	New subsection, “Administrative Information”
2.2.1	New subsection, “Safety Information,” with discussion to address potential safety-related issues associated with the interface. Moved appropriote paragraphs from Rev 0 into this section.
2.2.1.1	New subsection “Tank Farms Documented Safety Analysis”
2.2.2	New subsection, “Regulatory Information,” with discussion to provide background regulatory information related to the interface.
2.2.3	New subsection, “Post-Commissioning/Maintenance,” with discussion to provide background information associated with the operation and maintenance aspects of the interface.
2.2.3.1	New subsection, “DFLAW Feed Planning”
2.2.3.2	Added new subsection for DFLAW transfer process. Created new logic diagram as Figure 2.
2.2.3.3	New subsection, “Transfer Pipeline Flushing”
2.2.3.4	New subsection, “Interface Maintenance and Operations”
2.2.4	New subsection, “Interface Schedule”. Created Table 2 showing the DFLAW Feed Interface Milestones from the Integrated Program Schedule.

Revision Description

ICD Section	Description
2.3	Re-named section to, “Acceptance Criteria.” Updated to current requirements. Modified Table 3 showing the Corrosion Control Criteria for DFLAW Effluent Returns to the Tank Farms (TF) Double-shell Tanks (DST) System.
2.3.1	New section, “DFLAW Effluent Compatibility” with updated Table 4 Required Information for Transfer of DFLAW Conditioned Liquid Effluent into the TF DST System.
3.0	New section, “Requirements,” and subsections to address technical, activity level flow down, and programmatic requirements for ICD 031.
3.1	New section to address “Technical Requirements” (Design Criteria). Content is from 24590-WTP-ICF-MGT-19-0004.
3.2	New section to address “Activity Level Requirements”. Content is from 24590-WTP-ICF-MGT-19-0005.
3.3	New section to address “Programmatic Requirements”. Content is from 24590-WTP-ICF-MGT-19-0004.
4	New section, “Requisite Interface Items,” and subsections to address WTP Contractor and TOC interface items.
4.1	New section to address “WTP Contractor Requisite Interface Items”.
4.2	New section to address “TOC Requisite Interface Items” as a placeholder. Content is from 24590-WTP-ICF-MGT-19-0005.
5	New section to address References. Various references were deleted and added to support this revision of ICD 031.

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Acronyms

ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BNI	Bechtel National, Incorporated
BOF	Balance of Facilities
CSER	Criticality Safety Evaluation Report
DEP	direct feed low-activity waste effluent management facility process system
DFLAW	direct feed low-activity waste
DOE	U.S. Department of Energy
DST	double-shell tank
EMF	effluent management facility
ETF	Effluent Treatment Facility
ICD	interface control document
LAW	low-activity waste
LERF	Liquid Effluent Retention Facility
M	molar
NDE	non-destructive examination
NEMA	National Electrical Manufacturers Association
ORP	US Department of Energy, Office of River Protection
PCB	polychlorinated biphenyl
PMB	performance measurement baseline
RAMI	reliability, availability, maintainability, and inspectability
RLD	radioactive liquid waste disposal system
SRNL	Savannah River National Laboratory
TF	Tank Farms
TIC	total inorganic carbon
TOC	Tank Operations Contractor
WAC	Washington Administrative Code
WCA	Waste Compatibility Assessment
WRPS	Washington River Protection Solutions, LLC
WTP	Hanford Tank Waste Treatment and Immobilization Plant

1 Interface Description

1.1 Interface Scope

This interface control document (ICD) describes the physical and administrative interactions that allow for the transfer of conditioned liquid effluent from the Hanford Tank Waste Treatment and Immobilization Plant (WTP) to the Hanford Tank Farms (TF) during direct feed operation of the WTP Low-Activity Waste (LAW) Facility. This mode of operation is known as direct feed LAW (DFLAW); this ICD only applies to DFLAW operation.

The DFLAW liquid effluent is dilute radioactive and (or) dangerous waste liquid effluent generated at WTP as a result of the DFLAW process. This effluent is recycled back to the LAW Facility from the WTP Effluent Management Facility (EMF) during normal DFLAW operations. During an off-normal event, the DFLAW liquid effluent can be conditioned to meet the TF waste acceptance criteria as listed in this ICD for transfer to the TF double-shell tanks (DST); this stream is referred to as "DFLAW conditioned liquid effluent."

The DFLAW liquid effluents are secondary liquid waste streams generated from treatment of the LAW melter offgas streams (submerged bed scrubber condensate and wet electrostatic precipitator drains), flushing and draining of transfer lines to and from the TF, and flushing of process components during DFLAW operations. These effluents from the LAW Facility and effluent from the WTP Analytical Laboratory are blended in the EMF during DFLAW operations. The EMF evaporator concentrates the blended effluent by evaporation to reduce the volume of DFLAW liquid effluent.

Other effluents (LAW Facility caustic scrubber effluent and EMF evaporator condensate) that are deemed suitable for disposal in the Liquid Effluent Retention Facility / Effluent Treatment Facility (LERF/ETF) are collected separately in the WTP EMF for sampling and transfer. This transfer is outside the scope of this ICD and is addressed by *ICD 06 - Interface Control Document for Radioactive, Dangerous Liquid Effluents*, 24590-WTP-ICD-MG-01-006 (BNI 2019m).

1.2 System Overview

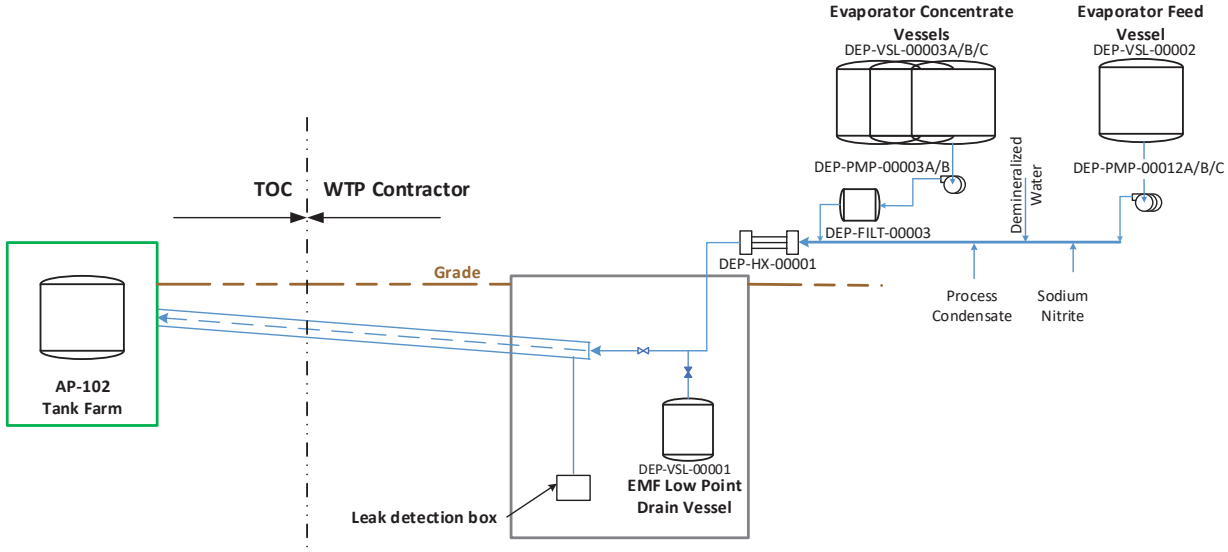
A dedicated pipeline is used to transfer the DFLAW conditioned liquid effluent generated by the WTP from the EMF to an AP Farm tank. The transfer pipeline concept is shown in Figure 1. If more detail on the EMF configuration is needed see *Process Flow Diagram Direct Feed Effluent Transfer (System DEP)*, 24590-BOF-M5-V17T-00011 (BNI 2018v) and *Process Flow Diagram Direct Feed Concentrate Transfer* (System DEP and DVP), 24590-BOF-M5-V17T-00013 (BNI 2018w).

The EMF evaporator feed vessel receives liquid from the LAW submerged bed scrubber condensate/plant wash vessels, the Analytical Laboratory sink drain collection vessel, and the EMF low point drain vessel. Each of these streams passes through the evaporator feed prefilter before entering the evaporator feed vessel; the prefilter has a nominal 5-micron filter element. To increase the pH of the streams, 5 molar (M) caustic can be added to the evaporator feed vessel. During normal operations, the contents of the evaporator feed system are pumped to the EMF evaporator, which concentrates the liquid for recycle to the LAW Facility.

During off-normal operations, the evaporator feed vessel can use its recirculating pumps to deliver the vessel contents to an effluent conditioning pipeline, where the vessel contents are mixed in-line with sodium nitrite solution and sampled. Although the conditioning pipeline includes a mixing tee for adding

condensate or demineralized water, further dilution of this stream is normally not needed. The conditioned liquid effluent is then cooled in a heat exchanger and enters the underground pipeline for transfer to the TF. The EMF has no storage capacity for conditioned liquid effluent.

Figure 1 DFLAW Effluent Transfer Interface



The EMF has the capability to transfer evaporator concentrate to the TF, using the same conditioning process described above. To increase the pH of the concentrate, 5 M caustic can be added to each of the concentrate vessels. The concentrate vessel pumps send concentrate through the evaporator feed prefilter to remove solids, and the filtered concentrate is blended with condensate or demineralized water and sodium nitrite solution through mixing tees in the same conditioning pipeline described above. After conditioning, the effluent can be sampled, cooled, and transferred to the TF as above.

Effluent that is returned to Tank AP-102 under a non-routine situation is stored and managed in the AP-102 tank until designated as DFLAW feed or 242-A Evaporator blend material. Under current planning scenarios, the waste stored in AP-102 will be blended with other DST waste, and then used as DFLAW feed or 242-A Evaporator blend material. The high halide content of the EMF effluent stream will dictate future use, based on waste chemistry and corrosion limits throughout the system, to ensure safe management of the waste.

1.3 Interface Functions

Table 1 presents the general interface functions and corresponding responsibilities for each interfacing contractor. Requirements derived from these functions are listed in Section 3 for each contractor.

Table 1 Functions of the DFLAW Effluent Returns to Double-Shell Tanks Interface

Interface Function	WTP Responsibility	TOC Responsibility
Provide a pipeline for DFLAW effluent transfer.	Provide a transfer line from the EMF Facility to the WTP interface Node 14 as shown in the *Interface control drawing*, 24590-WTP-B2-C12T-00001 (BNI 2019b).	Provide a transfer line from the AP TF to the WTP interface Node 14 as shown on the *Interface control drawing* (BNI 2019b)
Provide data communication for DFLAW effluent transfer.	Provide a signal transmission line from the LAW Facility control system to the WTP interface Node 18.	Provide a signal transmission line from the TF control system to the WTP Interface Node 18.
Define upstream treatment required for DFLAW effluent transfer with provisions for non-compliance.	Meets the TOC waste acceptance criteria.	Develop waste acceptance criteria consistent with the TOC compatibility program, safety basis, and permit requirements.
Coordinate DFLAW effluent composition data for planning.	Provide an effluent profile for each DFLAW campaign[1].	Evaluate WTP effluent profile for each DFLAW campaign.
Establish responsibilities for operation and maintenance.	Develop operating procedures for transfer of conditioned effluent. Maintain transfer system components from the EMF Facility to the WTP Interface Node 14.	Develop operating procedures for transfer of conditioned effluent. Maintain transfer system components from TF to the WTP Interface Node 14.
Establish parameters for effluent transfer and flushing.	Develop transfer parameters consistent with the TOC design. Establish control signals and interlocks for transfer and flushing	Implement transfer parameters consistent with the EMF design. Establish control signals and interlocks for transfer and flushing.
Establish storage capacity.	The WTP Contractor provides storage capacity for unconditioned effluent to reduce impact to WTP Contractor operations.	The TOC provides data review and assessment process capable of minimizing impact of WTP Contractor operations.
Establish a program for qualification and acceptance of conditioned effluent.	Develop the sampling approach and qualification methodology	Develop qualification methodology.

[1] A campaign is defined as a volume of staged feed, normally in a 1M gallon DST, that is to be treated using a similar process strategy.

1.4 Special Interface Roles

N/A

2 Interface Background Information

This section only contains background information pertinent to the interface. For requirements, along with their basis, implementation, and configuration management, see Section 3. Other actions needed to complete the interface are listed in Section 4.

2.1 Physical Information

The effluent return line physical interface point is shown as Node 14 on the *Interface Control Drawing*, 24590-WTP-B2-C12T-00001 (BNI 2019b). The interface for the instrument signal lines between the WTP Contractor and the Tank Operations Contractor (TOC) is the telecommunications pole identified as Node 18 on the *Interface Control Drawing.*

2.1.1 Transfer Pipeline

Design requirements for the transfer pipeline are listed in Section 3.1.1 for the WTP Contractor and Section 3.1.2 for the TOC. The TOC provides a new underground pipeline to interface Node 14. The WTP Contractor provides new underground pipeline sections from Node 14 to the EMF.

Although each contractor uses a different pipe specification or pipe code for the new sections of the transfer pipeline, the pipe materials selected by the WTP Contractor and TOC are intended to be equivalent.

The sequence for the effluent return pipeline connection follows the sequence of each contractor's project schedule activities. The WTP Contractor has completed installation of a pipeline section at interface Node 14. Schedule activities and resource availability for each contractor are not expected to align in a manner that facilitates joint integrity testing.

Prior to installing the final connection of the transfer pipeline at completion, each contractor independently constructs and performs pressure testing and any nondestructive examination for their side of the transfer pipeline up to interface Node 14. The WTP contractor plans to cap the encasement line at the interface point to afford the TOC access for preparation and performance of the closure welds. The TOC installs the final pipe spool, performs the closure weld and the necessary nondestructive examination to complete the tie-in of their portion of the line, and installs the remaining insulation (see Section 3.1.2.2 & 3.1.2.3).

2.1.2 Data Transfer

Design requirements for data transfer are listed in Section 3.1.1 for the WTP Contractor and Section 3.1.2 for the TOC Contractor. *Recommended Approach to Control System Interfaces for ICD-05, ICD-06, ICD-30, and ICD-31*, RPP-RPT-61745 (WRPS 2020a) provides the details of the recommended control system concepts for consideration.

2.1.3 Commissioning

Commissioning includes a series of integrated tests of effluent delivery and receipt systems from the WTP to the TF.

Before the first batch transfer, verification of the transfer interface, including equipment, control system functions, and protocols is needed. The TOC and the WTP Contractor may separately test their respective components of the transfer system to verify performance. Commissioning may include an integrated test of the transfer pipeline by transfer of water from the WTP to the AP Tank Farm. The WTP Contractor can provide water for an in-service tightness test of Tank Farm jumper connections as specified by the TOC to demonstrate compliance with tightness testing requirements in the Washington Administrative Code. Description of the verification approach for the transfer system will be developed as part of the WTP commissioning program development (*DFLAW Commissioning Plan*, [BNI 2020a]). The interface contractors will validate interface readiness by completing the activities defined in an *Interface Readiness Plan* (IRP). This plan will be included in a subsequent revision to this ICD and will support each interfacing contractor's readiness program.

During the cold commissioning phase, the WTP Contractor should sample and analyze the DFLAW liquid effluent to validate the adequacy of its method of bounding the projected effluent characteristics (Section 3.3.1.3). However, cold commissioning effluents are not transferred to the DST system.

2.2 Administrative Information

2.2.1 Safety Information

The respective organizations' design requirements include integrated safety management principles and are communicated through the interface in the requirements documents which are identified in Section 3.

No new hazards or accident scenarios are expected to be introduced through this interface that are not adequately controlled by the interface contractors and by controls placed across this interface. A specific Process Hazards Analysis was conducted to evaluate potential hazards associated with the transfers from EMF to DSTs (RPP-RPT-61706, under development by WRPS). The physical and administrative controls to mitigate these risks using a graded approach will be adequately addressed through requirements on each contractor's authorization basis.

Each contractor is responsible to manage and implement its safety management programs. For activities involving the interfacing systems, the demarcation between the WTP Contractor and the TOC safety management programs is at the interface nodes identified on the *Interface Control Drawing* (WTP 2019b), since each contractor is responsible for the design and installation of their side of the transfer pipeline to this point.

Return of DFLAW effluent has been added to the scope of Specification 9 of DOE Contract DE-AC27-01RV14136 (DOE 2000). 24590-WTP-PL-PENG-14-0006, *Secondary Wastes Compliance Plan*, acknowledges the applicability of Specification 9 in Section 6.3.3 and states that WTP's compliance strategy is to meet the requirements of this ICD.

The *Tank Farms Waste Transfer Compatibility Program* (HNF-SD-WM-OCD-015) is a Safety Management Program that provides a formal process for evaluating waste transfers and chemical additions through the preparation of documented Waste Compatibility Assessments. The Compatibility Program implements the requirements established in RPP-29002, *Double-Shell Tank Waste Analysis*

Plan, RPP-7475, *Criticality Safety Evaluation Report for Hanford Tank Farms Facilities*, HNF-IP-1266, *Tank Farm Operations Administrative Controls*, OSD-T-151-00007, *Operating Specifications for the Double-Shell Storage Tanks*, and TFC-ENG-STD-26, *Waste Transfer, Dilution and Flushing Requirements*. The primary purpose of the program is to ensure that sufficient controls are in place to prevent the formation of incompatible mixtures that could cause safety, regulatory, programmatic or operational problems as the result of waste transfer operations. The program defines a consistent means of evaluating compliance with certain Administrative Controls, criticality safety controls, as well as operational, regulatory and programmatic criteria.

2.2.1.1 LAW Facility Documented Safety Analysis

The LAW DSA Section 5.7 *Interface with Technical Safety Requirements from Other Facilities* identifies the applicable administrative controls from the TOC DSA needed to transfer effluent. As a result of the Interface Process Hazards Analysis, the TOC is developing additional controls as SAC 5.8.10, *AP-02D and AP-06A Cover Block Removal* (currently under development). A more complete list of Tank Farm controls for effluent transfer is provided in the following Section 2.2.1.2.

2.2.1.2 Tank Farms Documented Safety Analysis

The RPP-13033, *Tank Farms Documented Safety Analysis* (WRPS 2019d) and HNF-SD-WM-TSR-006, *Tank Farms Technical Safety Requirements* (WRPS 2019b), establish safety controls to protect various Safety SSCs and assumptions. *Tank Farms Operations Administrative Controls*, HNF-IP-1266 (WRPS 2019g), provides further implementation details for the administrative controls. The safety controls established that involve the interface are:

- Limiting Condition for Operation (LCO) 3.1 DST Primary Tank Ventilation Systems
- Administrative Control 5.7, Waste Leak Evaluation Program
- SAC 5.8.5, Waste Transfer System Overpressure and Flow Transient Protection
- SAC 5.8.7, Waste Transfer System Valve Closure Control
- SAC 5.8.8, Freeze Protection
- SAC 5.8.10, AP-02D and AP-06A Cover Block Removal (currently under development)
- Administrative Control 5.9.1, DST and SST Time to Lower Flammability Limit
- Administrative Control 5.9.3, Waste Transfer Associated Cover Installation and Door Closure
- Administrative Control 5.9.4, Waste Characteristics Controls
- Administrative Control 5.9.5, Nuclear Criticality Safety
- Administrative Control 5.9.6, Emergency Preparedness
- Design Feature 6.1, Waste Transfer Primary Piping System

The DST Primary Tank Ventilation System, LCO 3.1, states that the 241-AP farm ventilation system operates with flow of ≥ 8 ft^3/min to receive waste into the 241-AP-102. While the LAW Facility has no action from this LCO, TF would not authorize a return transfer from EMF while the ventilation is not operable.

Time to Lower Flammability Limit, AC 5.9.1, states that a time for LFL analysis for DSTs and a time to LFL analysis for DST annuli be performed based on the bounding waste stream profile. Time to LFL limit and analyses are further described in HNF-IP-1266 (WRPS 2019g) and implemented through HNF-SD-WM-OCD-015, *Tank Farms Waste Transfer Compatibility Program* (WRPS 2020g).

Waste Characteristics Controls, AC 5.9.4, protect assumptions on waste characteristics used to estimate accident consequences by ensuring that unit-liter doses (ULD), unit sum-of-fractions (USOF), and ^{90}Sr and ^{137}Cs concentrations are within the values used in the RPP-13033, *Tank Farms Documented Safety*

Analysis (DSA) (WRPS 2019d), safety analysis. In addition, Waste Characteristics Controls protect assumptions on waste characteristics used to develop controls for flammable gas deflagrations due to gas release events (GRE) by preventing the formation of waste gel in DSTs and SSTs. The Waste Characteristics Controls are further described in HNF-IP-1266 (WRPS 2019g) and implemented through HNF-SD-WM-OCD-015, *Tank Farms Waste Transfer Compatibility Program,* (WRPS 2020g).

Similarly, Nuclear Criticality Safety, AC 5.9.5, ensures that criticality safety controls required by a currently implemented *Criticality Safety Evaluation Report,* (CSER) are implemented during transfers and additions to Tank Farm waste tanks. The Nuclear Criticality Safety, AC 5.9.5 is implemented through HNF-SD-WM-OCD-015, *Tank Farms Waste Transfer Compatibility Program,* (WRPS 2020g).

Emergency Preparedness, AC 5.9.6, requires that waste transfers are terminated and evacuation of TF with ongoing waste transfers following seismic events that could cause waste transfer leaks. In addition, AC 5.9.6 requires that waste transfers are terminated following the detection of waste transfer leaks, except for waste transfer valve stem leakage.

The remaining controls listed support the waste transfer primary piping and its safety function of providing confinement of waste to minimize the likelihood of a waste transfer leak event or consequence.

2.2.2 Regulatory Information

For purposes of preparing a permit modification to transfer operational control of the DFLAW effluent transfer line, the TOC will provide the WTP Contractor with TOC and Professional Engineer certifications and associated supporting (Independent Qualified Registered Professional Engineer and Independent Installation Inspector) documentation to state that the piping was designed and installed in accordance with the applicable requirements of WAC 173-303-640(3).

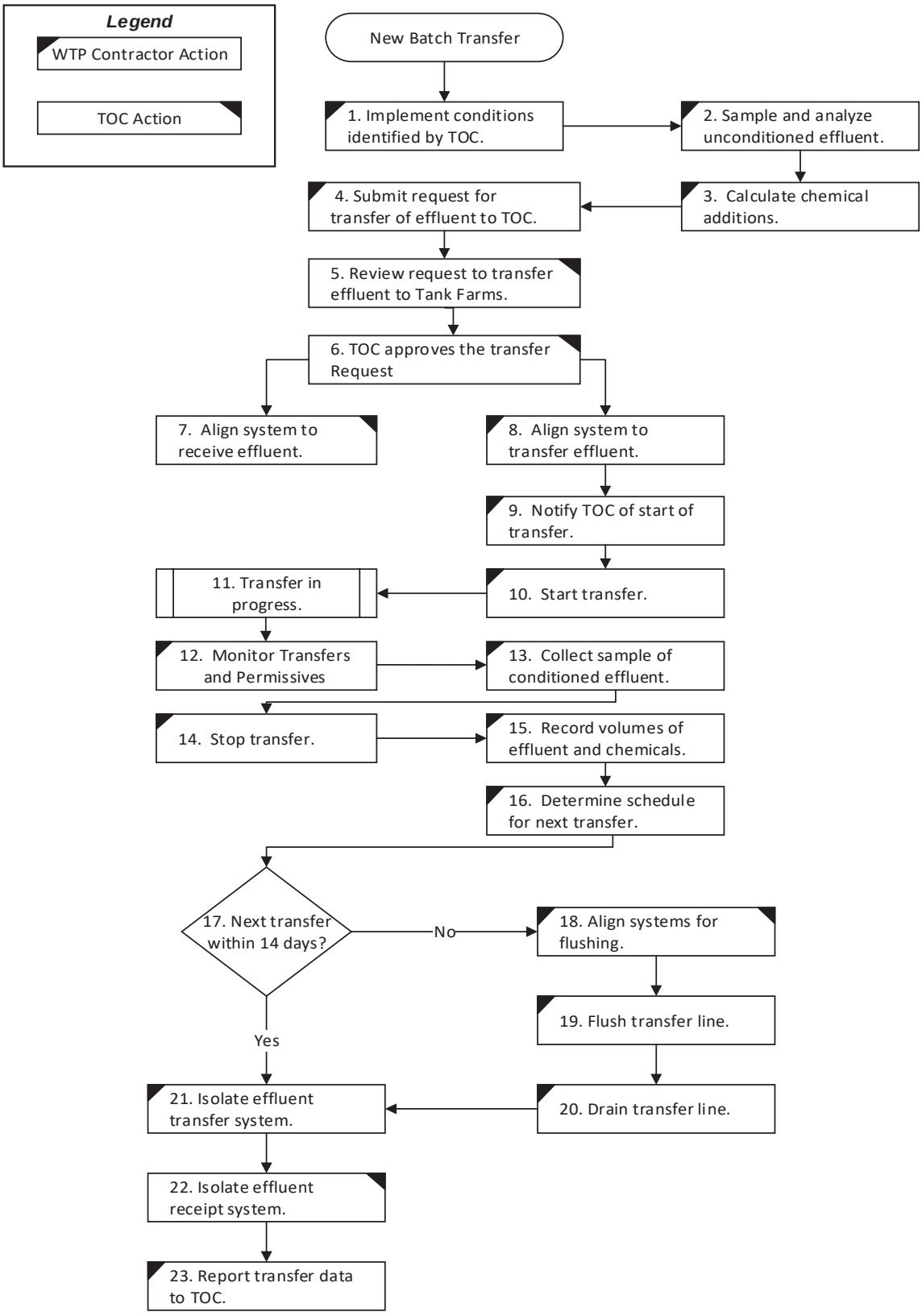
2.2.3 Post-Commissioning/Maintenance

The WTP Contractor operates and maintains the effluent transfer line and leak detection system from the interface at Node 14 on the *Interface Control Drawing* (BNI 2019b) to the WTP Contractor's effluent vessels. The TOC operates and maintains the effluent transfer line from the AP TF to interface Node 14 and the leak detection system at the AP TF.

2.2.3.1 Transfer Process

The coordination of the WTP and the TOC to sample and transfer effluent to the AP Farm is shown in Figure 2.

Figure 2 DFLAW Effluent Transfer Logic Diagram



1. **Implement conditions identified by TOC.** The WTP Contractor implements special conditions and other requirements identified by the TOC in the Waste Compatibility Assessment (Section 3.3.1.2) (WCA).
2. **Sample and analyze unconditioned effluent.** For each batch different DFLAW feed campaign, the WTP Contractor samples and analyzes the unconditioned effluent (Section 3.3.1.4). If an analysis from the current DFLAW feed campaign exists, proceed to the next step.
3. **Calculate chemical additions.** The WTP Contractor uses the results from the previous step to determine the chemical additions necessary to meet the corrosion control criteria (Section 3.3.1.4).
4. **Submit request for transfer of effluent to TOC.** The WTP Contractor submits a request to transfer effluent to TOC (Section 3.3.1.5). The request includes expected volume effluent and concentrations of ions important to corrosion mitigation.
5. **Review request to transfer effluent to Tank Farms**. The TOC reviews the request to transfer effluent (Section 3.3.2.2).
6. **Approve the transfer request.** TOC authorizes the transfer request by initiating the "Ready to Receive" permissive signal. (Section 3.3.2.2)
7. **Align system to receive effluent**. The TOC ensures that the correct transfer path is established, verifies that any alarms and interlocks are clear, and sets the ready to receive status.
8. **Align system to transfer effluent**. The WTP Contractor ensures that the correct transfer path is established, verifies that any alarms and interlocks are clear, and sets the ready to transfer status.
9. **Notify TOC of start of transfer.** The WTP Contractor notifies the TOC of the start the transfer of effluent to TF (Section 3.3.1.5).
10. **Start transfer.** The WTP Contractor starts the appropriate EMF effluent transfer pump.
11. **Transfer in progress.** The EMF effluent transfer pump continues to operate as long as the target transfer volume has not been reached and the transfer/receipt permissives are not removed.
12. **Monitor Transfer and Permissives**. During the transfer, the WTP contractors shall perform in-line process monitoring (Examples of the process monitoring data transmitted to TOC may include flow rate, flow totalizer, density, temperature, pH, pump status, valve alignment, vessel levels, etc.) and stop the process in a fail-safe condition such as detection of a leak, removal of a permissive signal, or interlock, or on loss of watch dog signal (Section 3.1.1.13 & 3.1.1.14).
13. **Collect sample of conditioned effluent.** During the transfer, the WTP Contractor collects a sample of conditioned effluent (Section 3.3.1.6d). The sample is analyzed to verify that the corrosion mitigation criteria have been met.
14. **Stop transfer.** The WTP Contractor initiates shutdown of the EMF effluent transfer pump when the target transfer volume is reached or a transfer/receipt permissive is removed. If the transfer was stopped due to a process upset or other off-normal event, refer to Sections 3.3.1.6, 3.3.1.9, 3.3.1.10, and 3.3.2.3.
15. **Record volume of effluent and chemicals.** The WTP Contractor records the volumes of unconditioned and conditioned effluent and chemical additions (Section 3.3.1.6).
16. **Determine schedule for next transfer.** The WTP Contractor evaluates current operations for the next transfer of effluent, considering potential delays.
17. **Next batch transfer within 14 days?** If yes, go to Step 19. If no, proceed to the next step.

18. **Align system for flushing.** The WTP Contractor and the TOC align their respective systems to prepare for transfer line flushing (Section 3.3.1.7).
19. **Flush transfer line.** The WTP Contractor flushes the transfer line with an approved flush solution (Section 3.3.1.7).
20. **Drain transfer line.** The WTP Contractor changes the transfer line valve alignment to drain flush water into the EMF Low Point Drain Vessel.
21. **Isolate effluent transfer system.** The WTP Contractor isolates the EMF effluent transfer system.
22. **Isolate effluent receipt system.** The TOC isolates the effluent receipt system.
23. **Report transfer data to TOC.** The WTP Contractor provides data recorded during the transfer, including volume and analysis of conditioned effluent and flush water, to the TOC (Section 3.3.1.8).

2.2.3.2 Transfer Parameters

Per Section 3.3.4 of the *Waste Transfer, Dilution, and Flushing Requirements,* TFC-ENG-STD-26 (WRPS 2019a), supernatant transfers are not subject to critical velocity requirements. As a result of filtration and dilution, conditioned liquid effluent from the EMF meets the definition of supernatant. Therefore, there is no minimum velocity required for flushing. This is due to the maximum estimated specific gravity for conditioned liquid effluent being less than 1.2 per *DEP Evaporator Concentrate Vessel Transfer/Recirculation Pump Sizing and Line Sizing*, 24590-BOF-MPC-DEP-00007 (BNI 2018f). Per TFC-ENG-STD-26 (WRPS 2019a). Waste with specific gravity less than 1.35 with minimal solids is considered to be supernatant, which is not subject to minimum velocity requirements. Per the *Tank Farms Waste Transfer Compatibility Program,* HNF-SD-WM-OCD-015 (OCD-015, WRPS 2020g), minimal solids are less than 5% by volume.

2.2.3.3 Transfer Flushing

Following any transfers from the EMF to the TF DST system, the WTP Contractor flushes the transfer pipeline as described in TFC-ENG-STD-26 (section 3.3.1.7). The flush water flow rate is determined by WTP Engineering. The WTP Contractor drains the effluent transfer pipeline to the EMF low-point drain vessel after flushing is completed.

2.2.3.4 Interface Maintenance and Operations

The DEP transfer system Operating Manual is being set up to provide operating instructions for the equipment in the EMF DEP system. Sections of this manual for transfers back to the AP-102 tank are under development and will be added at a later date.

As part of inspections required to maintain the Hazardous Waste Permit for the TOC transfer lines, a pneumatic test of the encasement pipe is performed every 10 years at a minimum. The encasement line between Node 13 and the code break valve cannot be isolated during the performance of this test. The TOC plans to coordinate this pneumatic test to ensure the WTP portion of the encasement pipe is not pressurized without WTP knowledge and agreement.

2.2.4 Interface Milestones

Refer to the DFLAW Integrated Schedule for monitoring appropriate interface schedule milestones.

Table 2 DFLAW Feed Interface Milestones

Contractor	Activity ID	Activity Name
WTP	5HLC3WA00371	LAW – Ops - Complete DOE HQ ORR Closure
TOC	Y326-2003-16	Construct – Install AP-02D Equipment
TOC	Y326-2003-74	LAW FEED - CONSTRUCT - Install, Weld, and Test Primary - SN-637/SN-700 Transfer Lines to ICD 30/31
TOC	Y326-TEMP-0209	LAW FEED COMMISSION - Conduct Operational Acceptance Testing

2.3 Acceptance Criteria

Table 3 includes corrosion control design and operating criteria for DFLAW effluent returns to the TFs. Following adjustment, effluent returns meet the requirements provided in Table 1.5.1 (Waste Chemistry Limits) of OSD-T-151-00007 (WRPS 2020).

The TF Waste Transfer Compatibility Program is a safety and environmental management program required by the TF Documented Safety Analysis. The primary purpose of the program is to ensure that sufficient controls are in place to prevent the formation of incompatible mixtures during waste transfer operations. The program defines a consistent means of evaluating transfers for compliance with applicable administrative controls, safety, operational, regulatory, and programmatic criteria. The program is implemented by HNF-SD-WM-OCD-015, (WRPS 2020g); *Tank Farm Operations Administrative Controls*, HNF-IP-1266, Section 5.9.4 (WRPS 2017a); and *Tank Waste Compatibility Assessments,* TFC-ENG-CHEM-P-13 (WRPS 2020d).

Table 3 Corrosion Control Criteria for DFLAW Effluent Returns to the DST System

Corrosion Mitigation Controls (Design)	EMF design for Corrosion control was based upon the following: The current DST Corrosion Mitigation Controls were established for the existing TF waste chemistry. However, control limits for corrosive halides and sulfate in dilute nitrate solutions have not been established. Because DFLAW liquid effluent is expected to have elevated concentration of corrosive halides and sulfate relative to sodium, additional corrosion control limits are provided from *Corrosion Control Requirements for Direct Feed Low-Activity Melter Off Gas Returns to Hanford Tank Farms*, SRNL-L4440-2017-00014 (SRNL 2017). Corrosion control is accomplished as follows: • Control with hydroxide concentration by: a. Verify effluent temperature ≤ 35 °C (or 95 °F) b. Verify $[NO_3^-] \leq 1.5$ M c. Verify $[SO_4^{-2}] \leq 0.2$ M d. Verify [halide] ≤ 0.25 M, where [halide] is the total concentration of $[F^-]$ and $[Cl^-]$ e. Adjust $[OH^-] > 1.0$ M f. Adjust $[NO_2^-] > 0.5$ M **OR** • Control with nitrite concentration by the following: a. Verify effluent temperature ≤ 35 °C (or 95 °F) b. Verify $[OH^-] < 1.0$ M

Table 3 Corrosion Control Criteria for DFLAW Effluent Returns to the DST System

	c. Verify pH ≥ 12 d. Verify [halide] / [NO_3^-] > 0.03, where [halide] is the total concentration of [F^-] and [Cl^-] e. Verify [NO_3^-] ≤ 1.5 M f. Verify [SO_4^{-2}] ≤ 0.2 M g. Verify [halide] ≤ 0.25 M h. Adjust [NO_2^-] to the maximum value of [NO_2^-] > 0.3 M or [NO_2^-] > 10 x [halide]
Corrosion Mitigation Controls (Operations)	During DFLAW operations, returns will meet the Table 3-9 Waste Chemistry Limits for Supernate and Interstitial Liquids in DSTs per HNF-SD-WM-OCD-015, Rev 52 (WRPS 2020g).

2.3.1 DFLAW Effluent Compatibility

Table 4 shows the required information for the TF waste compatibility assessment that applies to the transfer of DFLAW conditioned liquid effluent into the DST system. Information is extracted from Table 4-1 of *Data Quality Objectives for the Tank Farms Waste Compatibility Program*, HNF-SD-WM-DQO-001 (WRPS 2020f).

Table 4 Required Information for Transfer of DFLAW Conditioned Liquid Effluent into the Tank Farm DST System

Data Input[2]	Liquid Unit	Solid[3] Unit	Applicable OCD-15 Waste Compatibility Criteria	Comments
^{238}Pu $^{239/240}Pu$ ^{241}Pu ^{242}Pu ^{233}U ^{235}U ^{238}U	µCi/mL	µCi/g	Source term Criticality safety Flammable gas Feed control Emergency response	Data needed for $^{239/240}Pu$ for radiological source term requirements.
^{241}Am	µCi/mL	µCi/g	Source term Flammable gas Emergency response	Data needed for radiological source term requirements.
Cr Fe Mn Ni	µg/mL	µg/g	Criticality safety Source term	N/A

[2] HNF-SD-WM-DQO-001 requires that Np-237, Cm-233/244, Eu-154, Sm-151, Tc-99, and Co-60 be included in the radiological Unit Liter Dose (ULD) calculation. TOC will pursue an exception to this requirement for returns of WTP EMF effluent to the Tank Farms

[3] As process experience increases, the need to sample all constituents in Table 4 may be reviewed. If the sample contains less than 5% settled solids by volume, analysis of the solids fraction for Table 4 is not performed.

Table 4 Required Information for Transfer of DFLAW Conditioned Liquid Effluent into the Tank Farm DST System

Data Input[2]	Liquid Unit	Solid[3] Unit	Applicable OCD-15 Waste Compatibility Criteria	Comments
pH	unitless	n/a	Criticality safety Corrosion Source term	For corrosion used to calculate OH, if pH is < 12.5 (*Double-Shell Tanks Chemistry Control Data Quality Objective*, RPP-8532 [WRPS 2020e]). For criticality safety, pH must be ≥ 5.
Al	µg/mL	µg/g	Source term Flammable gas	N/A
% H_2O	percent	n/a	Flammable gas PCB Organic reactions	N/A
Liquid Density	kg/L	n/a	Flammable gas Line plugging	N/A
Waste Volume	gallon	n/a	Flammable gas Tank bump Emergency response	N/A
Waste Temperature	°F	n/a	Flammable gas Corrosion	N/A
Insoluble solids concentration	volume percent	n/a	n/a	Analysis of solids fraction is not performed if the stream contains less than 5% solids.
^{90}Sr	µCi/mL	µCi/g	Source term Flammable gas Tank bump Feed control Emergency response	Data needed for the radiological source term requirements
^{90}Y	µCi/mL	µCi/g	Source term Emergency response	^{90}Y is obtained with the ^{90}Sr analysis Data needed for the radiological source term requirements
^{137}Cs	µCi/mL	µCi/g	Source term Flammable gas Tank bump Emergency response	Data needed for the radiological source term requirements
Total organic carbon	µg/mL	µg/g	Source term Flammable gas	N/A
Total inorganic carbon (TIC)	µg/mL	µg/g	Source term	N/A

Table 4 Required Information for Transfer of DFLAW Conditioned Liquid Effluent into the Tank Farm DST System

Data Input[2]	Liquid Unit	Solid[3] Unit	Applicable OCD-15 Waste Compatibility Criteria	Comments
NO_2^-	µg/mL	µg/g	Corrosion Source term Flammable gas	N/A
NO_3^-	µg/mL	µg/g	Corrosion Source term Flammable gas	N/A
Na	µg/mL	µg/g	Source term Flammable gas Feed control Line plugging	N/A
OH^-	µg/mL	µg/g	Corrosion Source term Flammable gas Line plugging	For corrosion, calculated from pH if pH is < 12.5 (WRPS 2020e)
Cl^-	µg/mL	µg/g	Source term	N/A
SO_4^{2-}	µg/mL	µg/g	Source term	N/A
PO_4^{3-}	µg/mL	µg/g	Source term Phosphate rule Gel prevention Line plugging	N/A
CO_3^{2-}	µg/mL	µg/g	Source term	TIC analysis satisfies this requirement
Ag	µg/mL	µg/g	Source term	N/A
As	µg/mL	µg/g	Source term	N/A
Be	µg/mL	µg/g	Source term	N/A
Bi	µg/mL	µg/g	Source term	N/A
Ca	µg/mL	µg/g	Source term	N/A
Cd	µg/mL	µg/g	Source term	N/A
Co	µg/mL	µg/g	Source term	N/A
Hg	µg/mL	µg/g	Source term	N/A
K	µg/mL	µg/g	Source term	N/A
Rh	µg/mL	µg/g	Source term	N/A
Si	µg/mL	µg/g	Source term	N/A
Sr	µg/mL	µg/g	Source term	N/A

Table 4 Required Information for Transfer of DFLAW Conditioned Liquid Effluent into the Tank Farm DST System

Data Input[2]	Liquid Unit	Solid[3] Unit	Applicable OCD-15 Waste Compatibility Criteria	Comments
Pb	µg/mL	µg/g	Source term	N/A
La	µg/mL	µg/g	Source term	N/A
W	µg/mL	µg/g	Source term	N/A
Zr	µg/mL	µg/g	Source term	N/A
Zn	µg/mL	µg/g	Source term	N/A
F^-	µg/mL	µg/g	Source term	N/A
Se	µg/mL	µg/g	Source term	N/A
U	µg/mL	µg/g	Source term Criticality	Required for criticality to determine ^{235}U enrichment
Separable organics	unitless	n/a	Organic reactions	State expectation for separable organics in the bounding waste profile.
Energetics	Joules/g	n/a	Organic reactions	State expectation for exotherms exceeding endotherms in the bounding waste profile.
PCB	µg/mL	µg/g	PCB management	State expectation for PCB concentration in the bounding waste profile.

3 Requirements

This section identifies all Technical (Design Criteria), Activity Level, and Programmatic requirements associated with the interfaces defined by the ICD. Specific requirements for implementation by the appropriate contractors are listed in this section only. In addition to the requirement statement, each requirement includes a basis for that requirement, the requirement source document(s), and the implementing document(s) (if known at the time of revision). Source and implementing documents are listed as configuration management items for each requirement.

3.1 Technical Requirements (Design Criteria)

Technical requirements are requirements managed by engineering organizations according to engineering procedures and work processes.

3.1.1 WTP Contractor Technical Requirements

For the WTP Contractor, technical requirements are managed in accordance with *Technical Requirements Management,* 24590-WTP-3DP-G04B-00004 (BNI 2019a). Any changes to the requirements in this sub-section are reviewed with the WTP Manager of Engineering.

3.1.1.1 For effluent transfers of evaporator feed and/or evaporator concentrate to the TFDST system, the WTP Contractor shall provide system capability to meet the corrosion control criteria identified in Table 3.

Requirement Basis:

In the off-normal events that the EMF is unable to process evaporator feed or the LAW Facility is unable to receive evaporator concentrate, resulting in a need to transfer either stream to TF, the WTP systems must have capability to chemically adjust the unconditioned effluent to meet the corrosion control criteria established in SRNL-L4440-2017-00014, *Corrosion Control Requirements for Direct Feed Low-Activity Melter Off Gas Returns to Hanford Tank Farms* (SRNL 2017) and CCN 301830, *Interface Control Form (ICF) 24590-WTP-ICF-MGT-17-0003 for Interface Control Document (ICD) 31, Revision 0 – Update Corrosion Control Criteria Meeting* (BNI 2017b). Unconditioned effluent from evaporator feed vessel DEP-VSL-00002 can be produced from a variety of sources including submerged bed scrubber condensate; wet electrostatic precipitator drains; flushing and draining of transfer lines to and from TF; plant washes from various vessel washes, caustic collection vessel berms, bulge discharges; off-specification DFLAW feed; and other miscellaneous drains/sumps.

Configuration Management Documents:

Requirement Source(s):

- SRNL-L4440-2017-00014, *Corrosion Control Requirements for Direct Feed Low-Activity Melter Off Gas Returns to Hanford Tank Farms* (SRNL 2017)
- OSD-T-151-00007, *Operating Specification for Double-Shell Storage Tanks* (WRPS 2020b)

Implementation:

- 24590-BOF-M6-SHR-00003001, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Caustic Tank SHR-TK-00013* (BNI 2018k)
- 24590-BOF-M6-DEP-00002001, *P&ID - BOF/EMF Direct Feed LAW EMF Process System Evaporator Feed Vessel DEP-VSL-00002* (BNI 2018c)
- 24590-BOF-M6-DEP-00002002, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Evaporator Feed Vessel Recirculation Pumps DEP-PMP-00012A/B/C* (BNI 2018g)
- 24590-BOF-M6-DEP-00002005, *P&ID – BOF/EMF Direct Feed LAW/EMF Process System Evaporator Chemical Mixing DEP-MTEE-00001/0000*2 (BNI 2018i)
- 24590-BOF-M6-DEP-00002006, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Evaporator Concentrate / Feed Vessels LAW Effluent Cooler DEP-HX-00001 (BNI 2018j)*
- 24590-BOF-M6-DEP-00005001, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Evaporator Concentrate Vessel DEP-VSL-00003A* (BNI 2018l)
- 24590-BOF-M6-DEP-00005002, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Evaporator Concentrate Vessel DEP-VSL-00003B* (BNI 2018p)
- 24590-BOF-M6-DEP-00005003, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Evaporator Concentrate Vessel DEP-VSL-00003C* (BNI 2018q)
- 24590-BOF-M6-DEP-00005004, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Evap Conc Vsl Recirculation Transfer Pumps DEP-PMP-00003A/B* (BNI 2018h)

- 24590-BOF-M6-DEP-00006004, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Lag Storage Vessel Recirc Pumps DEP-PMP-00015A/B/C* (BNI 2018m)
- 24590-BOF-M6-DEP-00002004, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Evaporator Feed Vessel Prefilter DEP-FILT-00003* (BNI 2018r)
- 24590-BOF-M6-SNR-00002001, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Sodium Nitrite Tank SNR-TK-00002* (BNI 2018n)
- 24590-BOF-M6-DIW-00002002, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Booster Pump DIW-PMP-00013* (BNI 2018o)
- 24590-BOF-M4C-V11T-00004, *DFLAW EMF Process (DEP) Flowsheet Mass Balance Analysis for Input to Material Selection and Corrosion Assessments* (BNI 2018e)

3.1.1.2 Conditioned effluent transfer piping between the EMF and the Node 14 interface point shall be a double-contained transfer pipeline. The core (inner) pipe shall be 3-inch nominal diameter, schedule 40S, ASTM A 312 grade TP 316L, seamless construction. The encasement (outer) pipe shall be 6-inch nominal diameter, standard wall thickness, ASTM A 106 grade B, seamless construction.

Requirement Basis:

WAC 173-303-640 requires the use of secondary containment such as double-walled piping for the containment and detection of releases. The conditioned effluent transfer line was selected to match the LERF transfer lines originating from the Pretreatment Facility. The interface point location was determined by mutual agreement between WTP and TOC and is located near the WTP site boundary. The interface point is designated as Node 14 as shown on 24590-WTP-B2-C12T-00001, *Interface Control Drawing* (BNI 2019b). The TOC is responsible for providing the transfer line on the TOC-side of the interface point, and the WTP is responsible for providing the transfer line on the WTP-side of the interface point.

Configuration Management Documents:

Requirement Source(s):

- Washington Administrative Code WAC 173-303, *Dangerous Waste Regulations*, Section 173-303-640
- 24590-BOF-MPC-DEP-00005, *DEP Evaporator Feed Vessel Recirculation Pump Sizing (DEP-PMP-00012 A/B/C)* (BNI 2018u)
- 24590-WTP-3PB-P000-TW31A, *Engineering Specification for Piping Class W31A* (BNI 2017a)
- 24590-WTP-B2-C12T-00001, *Interface Control Drawing* (BNI 2019b)

Implementation:

- 24590-BOF-M6-RLD-00012002, *P&ID – BOF Radioactive Liquid Waste Disposal System Underground Transfer Lines* (BNI 2019i)
- 24590-BOF-P3-DEP-ZS00069010, *DEP-ZS-00069-W31A-3 - Balance of Facilities Isometric* (BNI 2016b)
- 24590-BOF-P3-DEP-ZS00069060, *DEP-ZS-00069-W31A-6 - Balance of Facilities Isometric* (BNI 2016a)

3.1.1.3 The WTP Contractor shall provide corrosion protection measures on the underground portion of the conditioned DFLAW effluent outer containment pipe consisting of an epoxy coating followed by a rigid foam insulation protected by a waterproof nonmetallic jacket.

Requirement Basis:

As described in CCN 258399 (BNI 2013a), a corrosion protection strategy of using multiple barriers and protective coatings to isolate the carbon steel outer pipe from the soil to maintain dry non-corroding conditions has been endorsed by a corrosion expert and the Independent Qualified Registered Professional Engineer (IQRPE) to meet WAC 173-303-640. The Washington State Department of Ecology has agreed with this rationale for corrosion protection from the soil environment per CCN 191104 (BNI 2013b).

Configuration Management Documents:

Requirement Source(s):

- Washington Administrative Code WAC 173-303, *Dangerous Waste Regulations*
- 24590-WTP-RPT-ENG-16-015, *Thermally Insulated and High-Density Polyethylene Jacketed Waste Transfer Line NACE SP0169-2013 Evaluation* (BNI 2016c)
- CCN 191104, *Corrosion Assessment of UG Waste Transfer Lines (*BNI 2013b*)*
- CCN 258399, *Response to ORP Question on Cathodic Protection of Tank Farm Transfer Piping (BNI 2013a)*

Implementation:

- 24590-BOF-M6-RLD-00012002, *P&ID – BOF Radioactive Liquid Waste Disposal System Underground Transfer Lines,* Note 5 (BNI 2019i)
- 24590-BOF-CS-80-00152, *DFLAW Rad Transfer Lines Miscellaneous Details Sheet 3* (BNI 2018d)

3.1.1.4 The WTP Contractor shall ensure all conditioned effluent transfer piping between the Effluent Management Facility and the Node 14 interface point is buried a minimum of 3 feet deep to the top of the core (inner) pipe, or other appropriate freeze protection measures are provided.

Requirement Basis:

The WTP *Basis of Design*, 24590-WTP-DB-ENG-01-001, Section 10.1.5.7 (BNI 2019n) establishes the requirement for radioactive waste transfer lines to be buried with ≥ 3 feet of cover to the top of the pipe for freeze protection. This WTP requirement is similar to the interfacing TOC requirement for freeze protection which applies to all physically connected buried/bermed piping in the transfer system (including transfer piping installed by the WTP Contractor). The TOC freeze protection requirement is summarized in HNF-SD-WM-TSR-006, *Tank Farms Technical Safety Requirements* (WRPS 2019b) Specific Administrative Control (SAC) 5.8.8, *Waste Transfer System Freeze Protection* requires air temperature monitoring for physically connected buried/bermed waste transfer piping. Except for buried/bermed waste transfer primary piping where a documented evaluation demonstrates there is no freezing hazard, air temperature monitoring is required in the primary piping encasements to ensure the temperature is > 32 °F (WRPS 2019g). Per HNF-IP-1266, *Tank*

Farm Operations Administrative Controls (WRPS 2019g), there are two exceptions where physically connected buried/bermed waste transfer primary piping does not require freeze protection. One of these exceptions is for waste transfer primary piping that is covered by an equivalent of ≥ 3 feet of soil to the top of the pipe.

Configuration Management Documents:

Requirement Source(s):

- 24590-WTP-DB-ENG-01-001, *Basis of Design* (BNI 2019n)
- HNF-SD-WM-TSR-006, *Tank Farms Technical Safety Requirements* (WRPS 2019b)
- HNF-IP-1266 Section 5.8.8, *Tank Farm Operations Administrative Controls – Waste Transfer System Freeze Protection* (WRPS 2019g)

Implementation:

- 24590-BOF-CS-80-00120, *DFLAW Rad Transfer Lines Overall Key Plan*, Note 4 (BNI 2016d)
- 24590-BOF-CS-80-00131, *DFLAW Rad Transfer Lines LAW Effluent Drain Tank Bldg to LAWPS Building Plan EPS1 and EPS2 – Profile EPS1 STA 9+00 to 10+11.3* (BNI 2016e)
- 24590-BOF-CS-80-00132, *DFLAW Rad Transfer Lines LAW Effluent Drain Tank Bldg to LAWPS Building Plan EPS1 and EPS2 – Profile EPS1 STA 6+00 To 9+00* (BNI 2016f)
- 24590-BOF-CS-80-00133, *DFLAW Rad Transfer Lines LAW Effluent Drain Tank Bldg to LAWPS Building Plan EPS1 and EPS2 – Profile EPS1 STA 3+00 To 6+00* (BNI 2016g)
- 24590-BOF-CS-80-00134, *DFLAW Rad Transfer Lines LAW Effluent Drain Tank Bldg to LAWPS Building Plan EPS1 and EPS2 – Profile EPS1 STA 0+00 To 3+00* (BNI 2016h)

3.1.1.5 The WTP Contractor will provide at least 48 hours of unconditioned effluent storage capacity.

Requirement Basis:

A 48-hour minimum storage capacity for LAW effluents at WTP is necessary to reduce impact to WTP Contractor operations while TOC conducts a data review and assessment process prior to authorizing transfers.

Configuration Management Documents:

Requirement Source(s):

- 24590-WTP-DB-ENG-01-001, *Basis of Design*, section 6.3.6 (BNI 2019n)

Implementation:

- 24590-BOF-MVC-DEP-00009, *Batch Sizing Calculation of DEP (Direct Feed LAW Effluent Management Facility Process System Vessels: DEP-VSL-00001, -00002, -00003A/B/C, -00004A/B, 00005A/B* (BNI 2018b)

3.1.1.6 The WTP Contractor shall provide the motive force for transferring conditioned effluent to the AP TF.

Requirement Basis:

The transfer distance, volume of effluent, and elevations necessitate the use of mechanical motive force for delivery of effluent to TF. Per TFC-ENG-STD-26, *Waste Transfer, Dilution, and Flushing Requirements* (WRPS 2019a), supernatant with a specific gravity ≤1.35 and containing minimal suspended solids does not require a minimum transfer velocity. Unconditioned effluent from WTP will be filtered to 5 microns or less per 24590-BOF-M6-DEP-00002004, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Evaporator Feed Vessel Prefilter DEP-FILT-00003* (BNI 2018r). Additionally, 24590-WTP-DB-PET-17-001, *Process Inputs Basis of Design for LAW and EMF* (BNI 2017c) establishes that the specific gravity of both the evaporator feed stream (DEP02) and the evaporator concentrate stream (DEP05) will be ≤1.35 (typically much less than 1.35 after further dilution). Therefore, all conditioned effluent transfers to TOC will be supernatant transfers as defined in TFC-ENG-STD-26 (WRPS 2019a), and no interface requirement exists for a minimum transfer velocity of the effluent.

Configuration Management Documents:

Requirement Source(s):

- 24590-WTP-3DG-M11T-00003, *Minimum Flow Velocity for Slurry Lines* (BNI 2019l)
- TFC-ENG-STD-26, *Waste Transfer, Dilution, and Flushing Requirements* (WRPS 2019a)

Implementation:

- 24590-BOF-M6-DEP-00005004, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Evap Conc Vsl Recirculation/Transfer Pumps DEP-PMP-00003A/B* (BNI 2018h)
- 24590-BOF-MPC-DEP-00007, *DEP Evaporator Concentrate Vessel Transfer/Recirculation Pump (DEP-PMP-00003A/B) Sizing and Line Sizing*, Section 7.1 (BNI 2018f)
- 24590-BOF-M6-DEP-00002002, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Evaporator Feed Vessel Recirculation Pumps DEP-PMP-00012A/B/C* (BNI 2018g)
- 24590-BOF-MPC-DEP-00005, *DEP Evaporator Feed Vessel Recirculation Pump Sizing (DEP-PMP-00012 A/B/C)*, Section 6.1.9 (BNI 2018u)
- 24590-BOF-M6-DEP-00006004, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Lag Storage Vessel Recirc Pumps DEP-PMP-00015A/B/C* (BNI 2018m)
- 24590-BOF-M6-SNR-00002001, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Sodium Nitrite Tank SNR-TK-00002* (BNI 2018n)

3.1.1.7 The WTP Contractor shall provide sample point(s) to allow for sampling of the conditioned effluent at a location downstream of all chemical additions.

Requirement Basis:

Sampling of conditioned effluent will be needed to confirm that the chemical adjustments of water, process condensate, sodium hydroxide, and/or sodium nitrite that are performed on evaporator feed from vessel DEP-VSL-00002 or evaporator concentrate from vessels DEP-VSL-00003A/B/C meet TF requirements.

Configuration Management Documents:

Requirement Source(s):

- 24590-WTP-PL-PE-16-0001, *WTP Direct Feed LAW Integrated Processing Strategy Description* (BNI 2019g)
- 24590-WTP-DB-ENG-01-001, *Basis of Design*, Section 6.1.4 and 11.6.7 (BNI 2019n)
- 24590-WTP-RPT-OP-01-001, *Operations Requirements Document*, Section 14.14 (BNI 2019q)
- 24590-WTP-ORDX-OP-15-0049, *Exception to Automatic Process Sampling Requirement* (BNI 2015a)

Implementation:

- 24590-BOF-M6-DEP-00002005, *P&ID – BOF/EMF Direct Feed LAW/EMF Process System Evaporator Chemical Mixing DEP-MTEE-00001/0000*2 (BNI 2018i)
- 24590-CM-POA-AY00-00002-08-00003, *Drawing - Hanford Waste Treatment and Immobilization Plant - Liquid Sampling Station - P&ID Drawing - GE113-200.1* (BNI 2019h)
- 24590-BOF-M0D-DEP-00001, *BOF/EMF Sampling Fume Hood Data Sheet for Fume Hoods and Internal Casework 24590-BOF-AE-DEP-HOOD-00001* (BNI 2019c)

3.1.1.8 The WTP Contractor shall provide sample point(s) to allow for sampling the unconditioned effluent contained in the EMF evaporator feed vessel and the evaporator concentrate vessels.

Requirement Basis:

Sampling of evaporator feed will be required to confirm the bounding waste profile developed for the DFLAW feed campaign is adequate. Additionally, sampling of each batch of evaporator feed from vessel DEP-VSL-00002 and/or evaporator concentrate from vessels DEP-VSL-00003A/B/C will be needed to obtain baseline concentrations of hydroxide, nitrite, nitrate, sulfate, chloride, and fluoride for use in determining the chemical additions necessary to meet the corrosion control criteria in Table 3. The chemical additions may consist of water, process condensate from vessels DEP-VSL-00005A/B, sodium hydroxide, and/or sodium nitrite, as necessary.

Configuration Management Documents:

Requirement Source(s):

- 24590-WTP-PL-PE-16-0001, *WTP Direct Feed LAW Integrated Processing Strategy Description* (BNI 2019g)
- 24590-WTP-DB-ENG-01-001, *Basis of Design*, Sections 6.1.4 and 11.6.7 (BNI 2019n)

- 24590-WTP-RPT-OP-01-001, *Operations Requirements Document*, Section 14.14 (BNI 2019q)
- 24590-WTP-ORDX-OP-15-0049, *Exception to Automatic Process Sampling Requirement* (BNI 2015a)

Implementation:

- 24590-BOF-M6-DEP-00002002, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Evaporator Feed Vessel Recirculation Pumps DEP-PMP-00012A/B/C* (BNI 2018g)
- 24590-BOF-M6-DEP-00005004, *P&ID – BOF/EMF Direct Feed LAW/EMF Process System Evaporator Conc VSL Recirculation/Transfer Pumps DEP-PMP-00003A/B* (BNI 2018h)
- 24590-CM-POA-AY00-00002-08-00003, *Drawing - Hanford Waste Treatment and Immobilization Plant - Liquid Sampling Station - P&ID Drawing - GE113-200.1* (BNI 2019h)
- 24590-BOF-M0D-DEP-00001, *BOF/EMF Sampling Fume Hood Data Sheet for Fume Hoods and Internal Casework 24590-BOF-AE-DEP-HOOD-00001* (BNI 2019c)

3.1.1.9 The WTP Contractor shall provide the capability and the motive force to flush the transfer pipeline with either deionized/demineralized water, raw water, or inhibited water following conditioned effluent transfers from the EMF to the TF DST system. The minimum required flush volume is 1.5 times the transfer line volume.

Requirement Basis:

24590-WTP-RPT-OP-01-001, *Operations Requirements Document* (BNI 2019q) and the TOC Engineering Standard TFC-ENG-STD-26, *Waste Transfer, Dilution, and Flushing Requirements* (WRPS 2019a), require a flush of the waste transfer system following waste transfers to prevent plugs. This same TOC Engineering Standard as well as 24590-WTP-DC-M-06-001, the WTP *Mechanical Systems Design Criteria* (BNI 2019j), define the minimum required flush volume as 1.5 times the transfer line volume. The TOC Engineering Standard also defines the allowable flushing medium from WTP as either deionized/demineralized water, raw water (not available in the EMF), or inhibited water (water treated to prevent corrosion of metal piping, also not available on the WTP site). The use of process condensate water for flushing may be allowed upon receipt of TOC written authorization obtained in accordance with Requisite Interface Item 4.2.1 (24590-WTP-ICF-MGT-19-0005).

Configuration Management Documents:

Requirement Source(s):

- 24590-WTP-RPT-OP-01-001, *Operations Requirements Document*, Section 14.3 (BNI 2019q)
- TFC-ENG-STD-26, *Waste Transfer, Dilution, and Flushing Requirements* (WRPS 2019a)
- 24590-WTP-DC-M-06-001, *Mechanical Systems Design Criteria* (BNI 2019j)

Implementation:

- 24590-BOF-M6-DIW-00002002, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Booster Pump DIW-PMP-00013* (BNI 2018o)
- 24590-BOF-M6-DEP-00002005, *P&ID – BOF/EMF Direct Feed LAW/EMF Process System Evaporator Chemical Mixing DEP-MTEE-00001/00002* (BNI 2018i)
- 24590-BOF-M6-DEP-00006004, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Lag Storage Vessel Recirc Pumps DEP-PMP-00015A/B/C* (BNI 2018m)

3.1.1.10 The WTP Contractor shall provide capability to measure the total volume of conditioned DFLAW effluent and the total volume of flush water transferred to TOC.

Requirement Basis:

The volume of effluent and flush water transferred to TOC is needed for tracking DST inventory and waste chemistry limits.

Configuration Management Documents:

Requirement Source(s):

- OSD-T-151-00007, *Operating Specification for Double-Shell Storage Tanks* (WRPS 2020b)
- 24590-WTP-RPT-OP-01-001, *Operations Requirements Document,* Section 7.1, (BNI 2019q)

Implementation:

- 24590-BOF-M6-DEP-00002006, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Evaporator Concentrate / Feed Vessels LAW Effluent Cooler DEP-HX-00001 (BNI 2018j)*
- 24590-CM-POB-JF13-00004-04-00008, *Datasheet – Datasheet for Rotamass Prime + Ultimate – Sizing and Pressure Drop, Tag No. DEP-FT-8404, RCUP80S-80BA10-0D30-NN00-2-F61* (BNI 2019d)

3.1.1.11 The WTP Contractor shall have the capability to measure the individual volumes of unconditioned evaporator feed, evaporator concentrate, and all chemical additions used in the transfer.

Requirement Basis:

The TOC must track the nitrite, nitrate, and hydroxide concentrations added to each DST to ensure waste chemistry is within the established limits for corrosion mitigation (WRPS 2020b, section 1.5). To demonstrate that the DST corrosion control criteria are satisfied, the WTP Contractor will need to measure the individual volumes of the unconditioned liquid effluent and the additions used in the transfer.

Configuration Management Documents:

Requirement Source(s):

- CCN 277566, *Interface Control Document (ICD) 31 Review Team Meeting – August 5, 2015* (BNI 2015b)
- OSD-T-151-00007, *Operating Specification for Double-Shell Storage Tanks* (WRPS 2020b)

Implementation:

- 24590-BOF-M6-SHR-00003001, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Caustic Tank SHR-TK-00013* (BNI 2018k)
- 24590-BOF-M6-SNR-00002001, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Sodium Nitrite Tank SNR-TK-00002* (BNI 2018n)
- 24590-BOF-M6-DIW-00002002, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Booster Pump DIW-PMP-00013* (BNI 2018o)
- 24590-BOF-M6-DEP-00002002, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Evaporator Feed Vessel Recirculation Pumps DEP-PMP-00012A/B/C* (BNI 2018g)
- 24590-BOF-M6-DEP-00002005, *P&ID – BOF/EMF Direct Feed LAW/EMF Process System Evaporator Chemical Mixing DEP-MTEE-00001/0000*2 (BNI 2018i)
- 24590-BOF-M6-DEP-00006004, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Lag Storage Vessel Recirc Pumps DEP-PMP-00015A/B/C* (BNI 2018m)
- 24590-BOF-M6-DEP-00005004, *P&ID – BOF/EMF Direct Feed LAW EMF Process System Evap Conc Vsl Recirculation/Transfer Pumps DEP-PMP-00003A/B* (BNI 2018h)
- 24590-CM-POA-JF02-00004-04-00003, *Datasheet – Instrument Datasheet Diff Press XMTR (Flow) – Fieldbus, 3.0A Data Sheet Rev. B* (DEP-FT-8493, DEP-FT-8910) (BNI 2018s)
- 24590-CM-POA-JF08-00003-04-00002, *Datasheet – Instrument Data Sheet, Mag Flow XMTR (Integral) – Completed Bechtel Datasheets* (DEP-FT-8182, DEP-FT-8908, DEP-FT-8909, SHR-FT-8309, SNR-FT-8205) (BNI 2019k)
- 24590-CM-POB-JF13-00004-04-00015, *Datasheet Instrument Data Sheet – Coriolis Flowmeter-Fieldbus* (DIW-FT-8214) (BNI 2019e)

3.1.1.12 The WTP Contractor shall provide fiber optic cable and telecommunications equipment between the Node 18 telecommunications interface point and appropriate WTP facilities for transmitting/receiving process monitoring data, handshake signals (e.g., Ready to Transfer, Ready to Receive, Transfer in Progress, Terminate Transfer) and communications watchdog signals associated with the transport of DFLAW conditioned effluent and flush water. This telecommunications interface shall use Process Field Bus (PROFIBUS) communication technology.

Requirement Basis:

Shared contractor control and monitoring signals associated with the transfer of conditioned effluent and flush water to the TF DST will be transmitted between WTP and TOC. Signal transmission from the WTP to the Node 18 telecommunications interface point is WTP responsibility. Signal transmission from the Node 18 telecommunications interface point to AP Farms is TOC responsibility. The Node 18 telecommunications interface point is shown

on the *Interface Control Drawing* (BNI 2019b) near Pole E2476 in junction box 6FX2 (provided by others). Per the WTP *Basis of Design* (BNI 2019n), Profibus is a preferred communications protocol.

Configuration Management Documents:

Requirement Source(s):

- 24590-WTP-DB-ENG-01-001, *Basis of Design* (BNI 2019n)
- 24590-WTP-B2-C12T-00001, *Interface Control Drawing* (BNI 2019b)
- RPP-RPT-61745, *Recommended Approach to Control System Interfaces for ICD-05, ICD-06, ICD-30 and ICD-31* (WRPS 2020a)

Implementation:

- The implementing mechanism(s) and traceability shall be established within the WTP Requirements Management Program. The current implementation status can be obtained from the Engineering Requirement Area Manager (RAM) as identified in 24590-WTP-LIST-RARM-RM-0001, *Designation of Requirement Area Managers and Subject Matter Experts* (BNI 2019f).

3.1.1.13 The WTP Contractor shall provide capability to transmit process monitoring data to the TOC for incorporation into the TF Monitoring and Control System.

Requirement Basis:

Capability to transmit process monitoring data to the TFs Monitoring and Control System is needed. This data link is intended to allow TFs to see WTP process monitoring data during transfers and during flushes. Examples of the process monitoring data transmitted to TOC may include flow rate, flow totalizer, density, temperature, pH, pump status, valve alignment, vessel levels, etc.

Configuration Management Documents:

Requirement Source(s):

- 24590-WTP-RPT-OP-01-001, *Operations Requirements Document*, Sections 7.1 and 11 (BNI 2019q)
- RPP-RPT-61745, *Recommended Approach to Control System Interfaces for ICD-05, ICD-06, ICD-30 and ICD-31* (WRPS 2020a)

Implementation:

- The implementing mechanism(s) and traceability shall be established within the WTP Requirements Management Program. The current implementation status can be obtained from the Engineering RAM as identified in 24590-WTP-LIST-RARM-RM-0001, *Designation of Requirement Area Managers and Subject Matter Experts* (BNI 2019f).

3.1.1.14 The WTP monitoring and control system shall have capability to stop a transfer and establish a fail-safe condition upon:

a) detection of a leak by either the WTP or the TOC transfer line leak detection system, or

b) removal of permissive signal, or interlock, or on loss of watchdog signals.

Requirement Basis:

During the transfer process, a means of stopping transfer flow and establishing a fail-safe condition is necessary if an upset condition is detected in either the WTP transfer line, the TOC transfer line, or the associated monitoring and control system(s). WAC 173-303-640 requires the flow of dangerous waste to be immediately stopped for leaks or spills from tank systems (including piping) to prevent further release of dangerous waste to the environment and to allow inspection and repair of the system to be performed.

Configuration Management Documents:

Requirement Source(s):

- Washington Administrative Code WAC 173-303, *Dangerous Waste Regulations*, Section 173-303-640
- 24590-WTP-RPT-OP-01-001, *Operations Requirements Document*, Section 7.1 and 11.10 (BNI 2019q)
- 24590-WTP-DB-ENG-01-001, *Basis of Design,* Section 14.10.1.3.6 (BNI 2019n)
- RPP-RPT-61745, *Recommended Approach to Control System Interfaces for ICD-05, ICD-06, ICD-30 and ICD-31* (WRPS 2020a)

Implementation:

- The implementing mechanism(s) and traceability shall be established within the WTP Requirements Management Program. The current implementation status can be obtained from the Engineering RAM as identified in 24590-WTP-LIST-RARM-RM-0001, *Designation of Requirement Area Managers and Subject Matter Experts* (BNI 2019f).

3.1.1.15 Automatic valve operator closure devices shall be sufficiently slow to prevent damage from fluid-induced water hammer.

Requirement Basis:

Damaging fluid pressure transients may potentially be generated upon the rapid closure of automatic valves due to sudden change in liquid flow rates. These pressure transients must be controlled within the design pressure allowables of ASME B31.3, *Process Piping*.

Configuration Management Documents:

Requirement Source(s):

- 24590-WTP-RPT-OP-01-001, *Operations Requirements Document*, Section 14.4 (BNI 2019q)
- 24590-WTP-DB-ENG-01-001, *Basis of Design,* Section 11.7.4 (BNI 2019n)
- TFC-ENG-FACSUP-C-27, *Interfacing Water System Overpressure and Flow Transient Protection,* Section 4.5.7 (WRPS 2018c)

- RPP-CALC-63795, *EMF Return Hydraulic Transient Analysis* (currently under development)

Implementation:

- The implementing mechanism(s) and traceability shall be established within the WTP Requirements Management Program. The current implementation status can be obtained from the Engineering RAM as identified in 24590-WTP-LIST-RARM-RM-0001, *Designation of Requirement Area Managers and Subject Matter Experts* (BNI 2019f).

3.1.2 Tank Operating Contractor (TOC) Technical Requirements

3.1.2.1 Conditioned effluent transfer piping from the Node 14 interface point to the AP Farm DST shall be a double-contained transfer pipeline. The core (inner) pipe shall be compatible with the WTP 3-inch nominal diameter, schedule 40S, ASTM A 312 grade TP 316L, seamless construction pipe at the interface point. The encasement (outer) pipe shall be compatible with the WTP 6-inch nominal diameter, standard wall thickness, ASTM A 106 grade B, seamless construction pipe at the interface point.

Requirement Basis:

WAC 173-303-640 requires the use of secondary containment such as double-walled piping for the containment and detection of releases. The interface point location was determined by mutual agreement between WTP and TOC and is located at the WTP site boundary and is designated as Node 14 as shown on the *Interface Control Drawing*, 24590-WTP-B2-C12T-00001 (BNI 2019b). The piping on the WTP side of the interface point will be pipe class W31A (BNI 2017a). The TOC is responsible for providing compatible transfer line on the TOC-side of the interface point.

Configuration Management Documents:

Requirement Source(s):

- Washington Administrative Code WAC 173-303, *Dangerous Waste Regulations*, Section 173-303-640
- HNF-4161, *Double-Shell Tank Transfer Piping Subsystem Specification* (WRPS 2013)
- 24590-WTP-3PB-P000-TW31A, *Engineering Specification for Piping Class W31A* (BNI 2017a)
- 24590-WTP-B2-C12T-00001, *Interface Control Drawing* (BNI 2019b)

Implementation:

- Implementing mechanisms for this requirement shall be established by the TOC.

3.1.2.2 The TOC shall ensure:

a) All core (inner) pipe components installed in the conditioned DFLAW effluent transfer piping between AP Farm and the Node 14 interface point are compatible with the WTP piping design pressure/temperature of 195 psig at 138 °F.

b) All encasement (outer) pipe components installed in the conditioned DFLAW effluent transfer piping between AP Farm and the Node 14 interface point are compatible with the WTP piping design pressure/temperature of 50 psig at 150 °F.

Requirement Basis:

WTP transfer piping design is complete and is based on the design pressures and temperatures calculated in 24590-BOF-M6C-RLD-00002, *Pressure and Temperature for the RLD and DEP Pipelines from the EMF to the ICD 06 and ICD 31 Interface Point Nodes for DFLAW Operations* (BNI 2018a) for the inner pipe and derived from the WTP *Basis of Design*, 24590-WTP-DB-ENG-01-001 (BNI 2019n) for the outer pipe. For interface compatibility with the WTP transfer piping design, the TOC transfer piping must be compatible with these same values.

Configuration Management Documents:

Requirement Source(s):

- 24590-BOF-M6C-RLD-00002, *Pressure and Temperature for the RLD and DEP Pipelines from the EMF to the ICD 06 and ICD 31 Interface Point Nodes for DFLAW Operations* (BNI 2018a)
- 24590-WTP-DB-ENG-01-001, *Basis of Design* (BNI 2019n)

Implementation:

- Core (inner) piping: RPP-SPEC-62029, *Waste Feed Delivery: Tank Farm System Infrastructure Upgrades Specification* (WRPS 2019f). Per section 3.5.6.a of this specification, TOC core (inner) piping is 400 psi at 200°F.
- Encasement (outer) piping: Implementing mechanisms for this requirement shall be established by the TOC.

3.1.2.3 The TOC shall provide corrosion protection measures on the TOC underground portion of the conditioned DFLAW outer containment pipe consisting of an epoxy coating followed by a rigid foam insulation protected by a waterproof nonmetallic jacket.

Requirement Basis:

A corrosion protection strategy of using multiple barriers and protective coatings to isolate the carbon steel outer pipe from the soil to maintain dry non-corroding conditions has been endorsed by the Independent Qualified Registered Professional Engineer (IQRPE) to meet WAC 173-303-640, as described in WRPS 2012.

Configuration Management Documents:

Requirement Source(s):

- Washington Administrative Code WAC 173-303, *Dangerous Waste Regulations*
- WRPS-1104067, *Contract Number DE-AC27-08RV14800 – Washington River Protection Solutions LLC Evaluation of Cathodic Protection for Waste Treatment and Immobilization Plant Waste Transfer Lines* (WRPS 2012)

Implementation:

- Implementing mechanisms for this requirement shall be established by the TOC.

3.1.2.4 The TOC shall ensure all conditioned effluent transfer piping between AP Farm and the Node 14 interface point is buried an equivalent of 3 feet deep to the top of the core (inner) pipe, or other appropriate freeze protection measures are provided.

Requirement Basis:

The WTP *Basis of Design*, Section 10.1.5.7 (BNI 2019n) establishes the requirement for radioactive waste transfer lines to be buried with ≥ 3 feet of cover to the top of the pipe for freeze protection. This WTP requirement is similar to the interfacing TOC requirement for freeze protection which applies to all physically connected buried/bermed piping in the transfer system. The TOC freeze protection requirement is summarized in HNF-SD-WM-TSR-006, *Tank Farms Technical Safety Requirements* (WRPS 2019b) Specific Administrative Control (SAC) 5.8.8, *Waste Transfer System Freeze Protection* requires air temperature monitoring for physically connected buried/bermed waste transfer piping. Except for buried/bermed waste transfer primary piping where a documented evaluation demonstrates there is no freezing hazard, air temperature monitoring is required in the primary piping encasements to ensure the temperature is > 32 °F (WRPS 2019g). Per HNF-IP-1266, *Tank Farm Operations Administrative Controls* (WRPS 2019g), there are two exceptions where physically connected buried/bermed waste transfer primary piping does not require freeze protection. One of these exceptions is for waste transfer primary piping that is covered by an equivalent of ≥ 3 feet of soil to the top of the pipe.

Configuration Management Documents:

Requirement Source(s):

- HNF-SD-WM-TSR-006, *Tank Farms Technical Safety Requirements* (WRPS 2019b)
- HNF-IP-1266 Section 5.8.8, *Tank Farm Operations Administrative Controls – Waste Transfer System Freeze Protection* (WRPS 2019g)
- 24590-WTP-DB-ENG-01-001, *Basis of Design* (BNI 2019n)

Implementation:

- Implementing mechanisms for this requirement shall be established by the TOC.

3.1.2.5 Measures to prevent unplanned siphoning or backflow shall be incorporated in the TOC's conditioned effluent transfer line design.

Requirement Basis:

AP Farm is at a higher elevation than the EMF low-point drain vessel, therefore mitigation of unplanned siphoning needs to be demonstrated.

Configuration Management Documents:

Requirement Source(s):

- 24590-WTP-RPT-OP-01-001, *Operations Requirements Document*, Section 7.1 (BNI 2019q)

Implementation:

- Implementing mechanisms for this requirement shall be established by the TOC.

3.1.2.6 The TOC shall provide fiber optic cable and telecommunications equipment between the Node 18 telecommunications interface point and AP Farm for receiving monitoring data, handshake signals (e.g., Ready to Transfer, Ready to Receive, Transfer in Progress, Terminate Transfer, etc.) and communications watchdog signals associated with the transport of conditioned effluent and flush water. This telecommunications interface shall use Process Field Bus (PROFIBUS) communication technology.

Requirement Basis:

Shared contractor control and monitoring signals associated with the transport of conditioned effluent and flush water will be transmitted between WTP and TOC. Signal transmission from the WTP to the Node 18 telecommunications interface point is the WTP Contractor's responsibility. Signal transmission from the Node 18 telecommunications interface point to AP Farm is TOC responsibility. The Node 18 telecommunications interface point is shown on the *Interface Control Drawing* (BNI 2019b) near Pole E2476 in junction box 6FX2. Per the WTP *Basis of Design* (BNI 2019n), Profibus is a preferred communications protocol.

Configuration Management Documents:

Requirement Source(s):

- RPP-RPT-61745, *Recommended Approach to Control System Interfaces for ICD-05, ICD-06, ICD-30 and ICD-31* (WRPS 2020a)
- 24590-WTP-DB-ENG-01-001, *Basis of Design* (BNI 2019n)
- 24590-WTP-B2-C12T-00001, *Interface Control Drawing* (BNI 2019b)

Implementation:

- Implementing mechanisms for this requirement shall be established by the TOC.

3.1.2.7 The TOC shall provide capability to transmit process monitoring data to WTP for incorporation into the WTP control system.

Requirement Basis:

Capability to transmit process monitoring data to the WTP control system is needed. Examples of the process monitoring data transmitted to WTP may include leak detection data and AP-102 tank level data.

Configuration Management Documents:

Requirement Source(s):

- HNF-4155, *Double-Shell Tank Monitor and Control Subsystem Specification* (WRPS 2014)
- HNF-4161, *Double-Shell Tank Transfer Piping Subsystem Specification* (WRPS 2013)
- RPP-RPT-61745, *Recommended Approach to Control System Interfaces for ICD-05, ICD-06, ICD-30 and ICD-31* (WRPS 2020a)

Implementation:

- Implementing mechanisms for this requirement shall be established by the TOC.

3.1.2.8 The TOC shall have capability to remove a permissive signal to the WTP control system to alert WTP to stop the transfer and establish a fail-safe state if an off-normal condition is detected.

Requirement Basis:

HNF-5136, *Functional Analysis for Double-Shell Tank Subsystems* (WRPS 2011) establishes a set of system functions necessary to respond to an off-normal set of conditions. Such functions include stopping the transfer of waste into DSTs in response to off-normal conditions. If an off normal condition is detected (such as a leak in the TOC transfer line, or the loss of a communications watchdog signal), then capability to transmit a terminate transfer signal/interlock to WTP is necessary to alert WTP to halt an in-progress transfer and establish a fail-safe condition.

Configuration Management Documents:

Requirement Source(s):

- HNF-5136, *Functional Analysis for Double Shell Tank Systems* (WRPS 2011)
- RPP-RPT-61745, *Recommended Approach to Control System Interfaces for ICD-05, ICD-06, ICD-30 and ICD-31* (WRPS 2020a)

Implementation:

- Implementing mechanisms for this requirement shall be established by the TOC.

3.2 Activity Level Requirements

3.2.1 Waste Treatment Plant (WTP) Contractor Activity Level Requirements

No activity level requirements were identified for the WTP Contractor.

3.2.2 Tank Operating Contractor (TOC) Activity Level Requirements

No activity level requirements were identified for the TOC.

3.3 Programmatic Requirements

3.3.1 Waste Treatment Plant (WTP) Contractor Programmatic Requirements

3.3.1.1 The WTP Contractor shall develop, maintain, and submit a bounding waste stream profile sheet (WSPS) supported by evidentiary data or model validation to the TOC for all conditioned effluent (evaporator feed and/or evaporator concentrate) that may be generated and sent to the TFs DST system annually. The WSPS shall:

a) Be a bounding projection of conditioned effluent.
b) Identify the source or process generating the waste stream.
c) Include the estimated volume of transfers and flushes.
d) Address the required information identified in Table 4.
e) List the applicable dangerous waste codes.

Requirement Basis:

The regulatory basis for the waste stream profile is WAC 173-303-300, *Dangerous Waste Regulations – General Waste Analysis,* which requires the facility owner or operator to confirm his knowledge about a dangerous waste before he stores, treats, or disposes of it. Per RPP-29002, *Double-Shell Tank Waste Analysis Plan* (WRPS 2019c), the waste description should include information on the physical and chemical properties of the waste; identification of the source or process generating the waste stream; expected volume of waste, including flush volume; applicable dangerous waste numbers; available analytical data; and should include relevant QA/QC documentation to address data uncertainty.

HNF-SD-WM-OCD-015, *Tank Farms Waste Transfer Compatibility Program* (WRPS 2020g), and RPP-29002 (WRPS 2019c) require a completed waste stream profile to be submitted to the TOC by the generator for use in developing a Waste Compatibility Assessment (WCA) for each waste stream entering the DST system. Table 4 shows the information required for the TF WCA applicable to the transfer of DFLAW liquid effluent. This information was extracted from Table 4-1 of the *Data Quality Objectives for the Tank Farm Waste Compatibility Program*, HNF-SD-WM-DQO-001 (WRPS 2020f).

Treated LAW feed received by WTP will be a blend of multiple feed campaigns. Consequently, the evaporator feed and recycle composition will change throughout the process. The effluent projections should be prepared and assessed against the ranges of feed projected over the course of one year. Additionally, the TOC is currently planning an administrative constraint to reserve 100 kgal of DST space in the receipt tank. An annual return volume estimate will allow the TOC to evaluate additional actions such as increasing reserve space or determining if the WTP Contractor needs to establish alternate methods to manage effluent beyond the available reserve capacity within TFs.

Configuration Management Documents:

Requirement Source(s):

- WAC 173-303, *Dangerous Waste Regulations*
- HNF-SD-WM-DQO-001, *Data Quality Objectives for Tank Farm Waste Compatibility Program*, Table 4-1 (WRPS 2020f)

- HNF-SD-WM-OCD-015, *Tank Farms Waste Transfer Compatibility Program*, (WRPS 2020g)
- RPP-29002, *Double-Shell Tank Waste Analysis Plan*, (WRPS 2019c)

Implementation:

- 24590-WTP-RPT-PENG-15-006, *Production Documentation for Secondary Wastes* (BNI 2018t)

3.3.1.2 The WTP Contractor shall ensure that any special conditions and/or requirements (if any) identified in the approved WCA received from the TOC are implemented prior to initiating batch transfer(s) of conditioned effluent.

Requirement Basis:

Approved WCAs produced by TOC may contain additional requirements and conditions that must be met for the WCA determination to be valid. These additional conditions may not be known until completion of the WCA. Per TFC-ENG-CHEM-P-13 (WRPS 2020d), these requirements and conditions (if any) will be listed in Section 3 of the approved WCA.

Configuration Management Documents:

Requirement Source(s):

- RPP-29002, *Double-Shell Tank Waste Analysis Plan*, (WRPS 2019c)
- TFC-ENG-CHEM-P-13, *Tank Waste Compatibility Assessments* (WRPS 2020d)
- HNF-SD-WM-DQO-001, *Data Quality Objectives for Tank Farm Waste Compatibility Program* (WRPS 2020f)
- HNF-SD-WM-OCD-015, *Tank Farms Waste Transfer Compatibility Program* (WRPS 2020g).

Implementation:

- The implementing mechanism(s) and traceability shall be established within the WTP Requirements Management Program. The current implementation status can be obtained from the Mission Integration RAM as identified in 24590-WTP-LIST-RARM-RM-0001, *Designation of Requirement Area Managers and Subject Matter Experts* (BNI 2019f).

3.3.1.3 For each DFLAW feed campaign (feed from a different source tank), the WTP Contractor shall ensure that:

a) One sample of unconditioned effluent (evaporator feed or evaporator concentrate) is taken on a campaign-wide basis and analyzed for the information contained in Table 4. If the sample contains less than 5% settled solids by volume, analysis of the solids fraction for Table 4 is not performed. For the Table 4 parameters where WTP sample analysis is not available, process knowledge and/or modeling data may be used as an alternative.
b) A calculation is performed to determine the chemical additions of water, process condensate, caustic, and/or sodium nitrite necessary to be added to the unconditioned effluent stream to meet the corrosion control criteria contained in Table 3.

c) The results from a) and b) shall be used to estimate the profile for conditioned effluent. Compare the estimated profile with the initial profile and determine whether the initial waste stream profile sheet (WSPS) was bounding.
   1) the unconditioned effluent sample analysis results, and
   2) the projected chemical properties of the conditioned effluent after making the calculated chemical additions.

d) If the determination indicates the initial waste stream profile sheet (WSPS) was not bounding, disallow further batch transfers of conditioned effluent until a revised or new WSPS and associated *Waste Compatibility Assessment* are completed.

Requirement Basis:

Confirmation that the waste stream profile (WSPS) was bounding is required to validate the results of the WCA. This confirmation is needed once during each DFLAW feed campaign. As process experience increases, the need to sample all constituents in Table 4 may be reviewed.

Configuration Management Documents:

Requirement Source(s):

- RPP-29002, *Double-Shell Tank Waste Analysis Plan*, (WRPS 2019c)
- HNF-SD-WM-DQO-001, *Data Quality Objectives for s Waste Compatibility Program* (WRPS 2020f)
- HNF-SD-WM-OCD-015, *Tank Farms Waste Transfer Compatibility Program* (WRPS 2020g)

Implementation:

- The implementing mechanism(s) and traceability shall be established within the WTP Requirements Management Program. The current implementation status can be obtained from the Mission Integration RAM as identified in 24590-WTP-LIST-RARM-RM-0001, *Designation of Requirement Area Managers and Subject Matter Experts* (BNI 2019f).

3.3.1.4 For each individual batch transfer of effluent to the TF DST system, the WTP Contractor shall sample the evaporator feed and/or evaporator concentrate, as applicable, and analyze the sample(s) for pH, hydroxide, nitrite, nitrate, sulfate, chloride, and fluoride. Based on the sample analysis results, the WTP Contractor shall calculate the necessary chemical additions of water, process condensate, caustic, and/or sodium nitrite to meet the *Corrosion Control Criteria for DFLAW Effluent Returns to the DST System* contained in Table 3.

Requirement Basis:

Sampling of the unconditioned DFLAW feed or evaporator effluent will be necessary prior to each batch transfer of evaporator effluent to the DST system to determine the chemical constituents and calculate the chemical additions necessary to meet the TF DST system corrosion control criteria contained in Table 3, which were extracted from SRNL-L4440-2017-00014, *Corrosion Control Requirements for Direct Feed Low-Activity Melter Off Gas Returns to Hanford Tank Farms* (SRNL 2017).

Configuration Management Documents:

Requirement Source(s):

- RPP-29002, *Double-Shell Tank Waste Analysis Plan*, (WRPS 2019c)
- SRNL-L4440-2017-00014, *Corrosion Control Requirements for Direct Feed Low-Activity Melter Off Gas Returns to Hanford Tank Farms* (SRNL 2017)

Implementation:

- The implementing mechanism(s) and traceability shall be established within the WTP Requirements Management Program. The current implementation status can be obtained from the Mission Integration RAM as identified in 24590-WTP-LIST-RARM-RM-0001, *Designation of Requirement Area Managers and Subject Matter Experts* (BNI 2019f).

3.3.1.5 The WTP Contractor shall submit a request to TOC to begin transferring conditioned effluent to the TF DST system.

a) The request shall include the expected volume and proposed schedule of the transfer.
b) The request shall include the projected concentrations of hydroxide, nitrite, nitrate, sulfate, chloride, and fluoride in the conditioned effluent after making necessary chemical additions.
c) A "Ready to Transfer" permissive signal shall be initiated in the WTP Control System prior to the transfer.
d) The conditioned effluent transfer to the DST system shall not begin until a "Ready to Receive" permissive signal is received from the TFs Monitoring and Control System indicating transfer authorization.

Requirement Basis:

The expected volumes and final states of the conditioned effluent needs to be evaluated by TOC for compliance with the established Table 3 corrosion control criteria prior to allowing waste transfer(s) into the DST system. Per section 1.5 of WRPS 2020b, compliance may be demonstrated by sample analysis or by calculations of final waste chemistry conditions. The TOC may require up to 48 hours to evaluate and authorize the WTP transfer request (see requirement 3.3.2.2).

Configuration Management Documents:

Requirement Source(s):

- SRNL-L4440-2017-00014, *Corrosion Control Requirements for Direct Feed Low-Activity Melter Off Gas Returns to Hanford Tank Farms* (SRNL 2017)
- OSD-T-151-00007, *Operating Specification for Double-Shell Storage Tanks* (WRPS 2020b)
- RPP-RPT-61745, *Recommended Approach to Control System Interfaces for ICD-05, ICD-06, ICD-30 and ICD-31* (WRPS 2020a)

Implementation:

- The implementing mechanism(s) and traceability shall be established within the WTP Requirements Management Program. The current implementation status can be obtained from the Mission Integration RAM as identified in 24590-WTP-LIST-RARM-RM-0001, *Designation of Requirement Area Managers and Subject Matter Experts* (BNI 2019f).

3.3.1.6 The WTP Contractor's conditioned effluent transfer process shall ensure the following controls are implemented:

a) Chemical additions (water, process condensate, caustic, sodium nitrite) shall be performed as necessary to ensure the conditioned effluent meets the Table 3 *Corrosion Control Criteria for DFLAW Effluent Returns to the DST System.*
b) The individual volumes of unconditioned effluent and chemical additions used in the transfer shall be measured.
c) The total volume of conditioned effluent transferred shall be measured and recorded at a location downstream of all chemical additions.
d) The conditioned effluent shall be sampled at a location downstream of all chemical additions and analyzed for hydroxide, nitrite, nitrate, sulfate, chloride, and fluoride.
e) The transfer shall be terminated if WTP monitoring instrumentation indicates that the Table 3 *Corrosion Control Criteria for DFLAW Effluent Returns to the DST System* for pH and/or temperature are not being met during the transfer. The pH or temperature deficiencies shall be corrected before restarting the transfer.

Requirement Basis:

Objective evidence to monitor and validate waste chemistry limits in the DST system is needed by the TOC. The controls discussed above will be used to ensure the final DST waste chemistry is within established limits.

Configuration Management Documents:

Requirement Source(s):

- CCN 277566, *Interface Control Document (ICD) 31 Review Team Meeting August 5, 2015* (BNI 2015b)
- OSD-T-151-00007, *Operating Specification for Double-Shell Storage Tanks* (WRPS 2020b)
- SRNL-L4440-2017-00014, *Corrosion Control Requirements for Direct Feed Low-Activity Melter Off Gas Returns to Hanford Tank Farms* (SRNL 2017)

Implementation:

- The implementing mechanism(s) and traceability shall be established within the WTP Requirements Management Program. The current implementation status can be obtained from the Mission Integration RAM as identified in 24590-WTP-LIST-RARM-RM-0001, *Designation of Requirement Area Managers and Subject Matter Experts* (BNI 2019f)

3.3.1.7 The WTP Contractor shall flush the transfer pipeline within 14 calendar days of each transfer, subject to the following conditions:

a) The flush may be substituted by another effluent transfer, which is then subject to the same flush requirements.
b) The flush volume shall be at least 1.5 times the transfer pipeline volume. The flush volume shall be minimized to the extent practical to preserve DST space.
c) Flushing mediums pre-approved by the TOC for use include raw water, inhibited water, or deionized/demineralized water. The use of potable water is not allowed.
d) The use of WTP process condensate water for flushing shall only be allowed with written TOC authorization obtained in accordance with Requisite Interface Item 4.2.1.

Requirement Basis:

Potential exists to plug or fail a waste transfer line during transfer of waste to and from waste treatment facilities. This flushing requirement is derived from previous Hanford waste transfer experience summarized in TFC-ENG-STD-26 (WRPS 2019a) and is intended to protect the waste transfer piping from solids formation.

Configuration Management Documents:

Requirement Source(s):

- TFC-ENG-STD-26, *Waste Transfer, Dilution, and Flushing Requirements* (WRPS 2019a)
- 24590-WTP-RPT-OP-01-001, *Operations Requirements Document* (BNI 2019q)

Implementation:

- The implementing mechanism(s) and traceability shall be established within the WTP Requirements Management Program. The current implementation status can be obtained from the Mission Integration RAM as identified in 24590-WTP-LIST-RARM-RM-0001, *Designation of Requirement Area Managers and Subject Matter Experts* (BNI 2019f)

3.3.1.8 The WTP Contractor will provide transfer data to the TOC to verify that the Table 3 *Corrosion Control Criteria for DFLAW Effluent Returns to the DST System* has been met for each batch of conditioned effluent transferred to the DST system. This data shall include:

a) The total volume of conditioned effluent transferred to the DST system.
b) The conditioned effluent sample analysis results for hydroxide, nitrite, nitrate, sulfate, chloride, and fluoride.
c) A summary of pH and temperature measurement data taken during the conditioned effluent transfer.
d) The total volume and type of flush water (e.g., raw water, inhibited water, deionized/demineralized water, or process condensate) transferred to the DST system.

Requirement Basis:

The Table 3 *Corrosion Control Criteria for DFLAW Effluent Returns to the Tank Farms DST* are the corrosion control criteria established by the TOC for receiving conditioned effluent

from WTP to maintain established DST waste chemistry limits. Data is needed by the TOC to ensure these corrosion control criteria are met and for TOC to be able to track nitrite, nitrate, and hydroxide concentrations in each DST.

Configuration Management Documents:

Requirement Source(s):

- SRNL-L4440-2017-00014, *Corrosion Control Requirements for Direct Feed Low-Activity Melter Off Gas Returns to Hanford Tank Farms* (SRNL 2017)
- OSD-T-151-00007, *Operating Specification for Double-Shell Storage Tanks* (WRPS 2020b)

Implementation:

- The implementing mechanism(s) and traceability shall be established within the WTP Requirements Management Program. The current implementation status can be obtained from the Mission Integration RAM as identified in 24590-WTP-LIST-RARM-RM-0001, *Designation of Requirement Area Managers and Subject Matter Experts* (BNI 2019f).

3.3.1.9 If a conditioned effluent transfer is found to be outside the applicable acceptance criteria limits after the effluent transfer is completed, the WTP Contractor will:

a) Provide the TOC the individual volumes of unconditioned effluent and chemical additions used in the transfer, and any additional pertinent information not previously provided.
b) Prepare a joint assessment with the TOC to recommend the preferred method(s), if possible and practical, to correct any effluent composition or property deficiencies for DOE review and approval for subsequent transfers.

Requirement Basis:

The Table 3 *Corrosion Control Criteria for DFLAW Effluent Returns to the DST System* are the corrosion control criteria established by the TOC for receiving conditioned effluent from WTP to maintain established DST waste chemistry limits. If a transfer is found to be outside the limits, a joint assessment would be used to identify potential corrective actions for DOE consideration on subsequent transfers. Additional information, including the individual volumes of unconditioned effluent and chemical additions used in the transfer may provide insight to determining the cause and potential corrective actions moving forward.

Configuration Management Documents:

Requirement Source(s):

- SRNL-L4440-2017-00014, *Corrosion Control Requirements for Direct Feed Low-Activity Melter Off Gas Returns to Hanford Tank Farms* (SRNL 2017)
- HNF-SD-WM-DQO-001, *Data Quality Objectives for Tank Farm Waste Compatibility Program* (WRPS 2020f)

Implementation:

- The implementing mechanism(s) and traceability shall be established within the WTP Requirements Management Program. The current implementation status can be obtained from the Mission Integration RAM as identified in 24590-WTP-LIST-RARM-RM-0001, *Designation of Requirement Area Managers and Subject Matter Experts* (BNI 2019f)

3.3.1.10 The WTP Contractor will perform additional sampling and analysis of DFLAW effluent under any one of the following conditions:

a) A process upset condition occurs that could result in a change in the composition of the DFLAW conditioned liquid effluent.
b) A different feed stream (such as a feed from a different source tank) is introduced into the WTP LAW Facility.
c) The WTP Contractor and the TOC agree to additional sampling and analysis (for example, trend analysis).
d) Additional sampling and analysis required for regulatory or permit compliance at the WTP LAW Facility and (or) TF.
e) Complete or partial loss of data, controls, and monitoring interface.

Requirement Basis:

While campaign data provides a discrete point of sample data, the received treated LAW feed received by WTP will be a blend of multiple feed campaigns per RPP-40149-VOL1, *Integrated Waste Feed Delivery Plan Volume 1 – Process Approach* (WRPS 2019e). Continual campaign blending is anticipated and the evaporator feed and recycle composition may change throughout the process. Therefore, when different feed streams are introduced in the LAW Facility, verification that the waste stream profile (WSPS) is still bounding is necessary. Additionally, sampling and analysis will also be required for any process upset conditions in the LAW Facility that could result in changed composition of the recycle effluent; loss of data monitoring capability; or additional samples that may be required for regulatory/permit compliance as operating permits are issued.

Configuration Management Documents:

Requirement Source(s):

- 24590-WTP-PL-PENG-18-0014, *DFLAW Integrated Sampling and Analysis Plan (ISAP)* (BNI 2019o)
- RPP-40149-VOL1, *Integrated Waste Feed Delivery Plan Volume 1 – Process Approach* (WRPS 2019e)

Implementation:

- The implementing mechanism(s) and traceability shall be established within the WTP Requirements Management Program. The current implementation status can be obtained from the Mission Integration RAM as identified in 24590-WTP-LIST-RARM-RM-0001, *Designation of Requirement Area Managers and Subject Matter Experts* (BNI 2019f)

3.3.1.11 The WTP Contractor shall ensure effluent transfers to the TOC (including flushes) do not exceed 100,000 gallons per year without further evaluation and approval by TOC.

Requirement Basis:

The TOC is currently planning an administrative constraint to reserve 100 kgal of DST space in the receipt tank for WTP effluent returns.

Configuration Management Documents:

Requirement Source(s):

- 24590-WTP-RPT-MGT-14-023, *One System River Protection Project Integrated Flowsheet* (RPP-RPT-57991), Table 5-1 (BNI 2019p)
- RPP-40149-VOL1, *Integrated Waste Feed Delivery Plan Volume 1 – Process Approach* (WRPS 2019e)

Implementation:

- The implementing mechanism(s) and traceability shall be established within the WTP Requirements Management Program. The current implementation status can be obtained from the Mission Integration RAM as identified in 24590-WTP-LIST-RARM-RM-0001, *Designation of Requirement Area Managers and Subject Matter Experts* (BNI 2019f).

3.3.2 Tank Operating Contractor (TOC) Programmatic Requirements

3.3.2.1 The TOC shall develop a WCA for each DFLAW campaign based on the waste stream profile sheet (WSPS) that was received from WTP. Transmit a copy of the WCA to the WTP Contractor listing conditions and requirements (if any) that must be satisfied prior to transfer.

Requirement Basis:

The TOC Waste Transfer Compatibility Safety Management Program is a safety management program described in RPP-13033, *Tank Farms Documented Safety Analysis*, (WRPS 2019d) and required by HNF-SD-WM-TSR-006, *Tank Farms Technical Safety Requirements* (WRPS 2019b). The Waste Transfer Compatibility Safety Management Program is described in HNF-SD-WM-OCD-015, *Tank Farms Waste Transfer Compatibility Program* (WRPS 2020g) and provides a formal process for determining waste compatibility through the preparation of documented WCAs for waste transfers to DSTs. The primary purpose of the program is to ensure that sufficient controls are in place to prevent the formation of incompatible mixtures during waste transfer operations to DSTs.

Configuration Management Documents:

Requirement Source(s):

- RPP-13033, *Tank Farms Documented Safety Analysis*, (WRPS 2019d)
- HNF-SD-WM-DQO-001, *Data Quality Objectives for Tank Farm Waste Compatibility Program* (WRPS 2020f)
- HNF-SD-WM-OCD-015, *Tank Farms Waste Transfer Compatibility Program* (WRPS 2020g)
- RPP-29002, *Double-Shell Tank Waste Analysis Plan*, (WRPS 2019c)
- HNF-SD-WM-TSR-006, *Tank Farms Technical Safety Requirements* (WRPS 2019b)

Implementation:

- TFC-ENG-CHEM-P-13, *Tank Waste Compatibility Assessments* (WRPS 2020d)

3.3.2.2 Within 48 hours of receiving a transfer request from the WTP Contractor for each batch of conditioned effluent, the TOC shall either:

a) Authorize the transfer based on the information provided by initiating a "Ready to Receive" permissive signal in the TFs Monitoring and Control System, or
b) Provide technical direction to the WTP Contractor on further adjustments that are necessary to meet the *Corrosion Control Criteria for DFLAW Effluent Returns to the DST System* contained in Table 3.

Requirement Basis:

The WTP Contractor has constructed the Waste Treatment Plant to provide at least 48 hours of DFLAW unconditioned effluent storage capacity as described in the WTP *Basis of Design* (BNI 2019n). Timely evaluation of transfer requests is necessary to avoid impacting WTP operations.

Configuration Management Documents:

Requirement Source(s):

- 24590-WTP-DB-ENG-01-001, *Basis of Design*, section 6.3.6 (BNI 2019n)

Implementation:

- Implementing mechanisms for this requirement shall be established by the TOC.

3.3.2.3 If a conditioned effluent transfer is found to be outside the applicable acceptance criteria limits after the effluent transfer is completed, the TOC and the WTP Contractor will prepare a joint assessment and recommend the preferred method(s), if possible and practical, to correct any effluent composition or property deficiencies for DOE review and approval for subsequent transfers.

Requirement Basis:

The Table 3 *Corrosion Control Criteria for DFLAW Effluent Returns to the DST System* are the corrosion control criteria established by TOC for receiving conditioned effluent from WTP and maintain established DST waste chemistry limits for corrosion control. If a transfer is found to be outside the limits, a joint assessment would be used to identify potential corrective actions for DOE consideration on subsequent transfers.

Configuration Management Documents:

Requirement Source(s):

- SRNL-L4440-2017-00014, *Corrosion Control Requirements for Direct Feed Low-Activity Melter Off Gas Returns to Hanford Tank Farms* (SRNL 2017)
- HNF-SD-WM-DQO-001, *Data Quality Objectives for Tank Farm Waste Compatibility Program* (WRPS 2020f)

Implementation:

- Implementing mechanisms for this requirement shall be established by the TOC.

3.3.2.4 The TOC will notify the WTP Contractor of the following:

- Any operations interruptions of more than 14 days that could impact the ability of AP-02D to receive waste.
- Cover block removal of the AP-02D pit that requires administrative lockout or isolation of active waste transfer pumps.
- Any maintenance activities that require coordination of lockout/tagout across the interface.

Requirement Basis:

Notification of significant TOC shutdowns allows the WTP Contractor to plan for contingencies in the event of evaporator shutdown. Advance notice, if possible, could provide time for the WTP Contractor to plan such activities. The duration for interruption of operations is based on TFs standard *Waste Transfer, Dilution, and Flushing Requirements* (WRPS 2019a), which requires a transfer line to be flushed if there are no transfers within 14 days.

SAC 5.8.10, *AP-02D and AP-06A Cover Block Removal* (under development by WRPS) will require the motive force (i.e., electrical power, steam, hydraulic power, air) to WTP pumps that can misroute waste to Tank Farms to be removed and secured, or the SN-637 or SN-700 transfer line to be physically disconnected from the pumps by installing and securing a blind flange downstream of the source of pressurized waste prior to removing the cover block on the 241-AP-06A or 241-AP-02D waste transfer-associated structure. The impacted WTP pumps have been identified as:

- RLD-PMP-00003A/B in the LAW
- RLD-PMP-00001 A/B in the LAW
- RLD-PMP-00182 A/B in the LAB
- DEP-PMP-00001 A/B in the EMF
- DEP-PMP-00003A/B in the EMF
- DEP-PMP-00012 A/B/C in the EMF
- DEP-PMP-00031 in the EMF

The safety function of the SAC is to protect the facility worker from waste leaks due to a misroute from the WTP during maintenance work activities in the 241-AP-06A and 241-AP-02D waste transfer-associated structures. The safety function is provided by requiring the motive force (i.e., electrical power, steam, hydraulic power, air) to WTP pumps that can misroute waste to Tank Farms to be removed and secured, or the SN-637 or SN-700 transfer line to be physically disconnected from the pumps by installing and securing a blind flange downstream of the source of pressurized waste prior to removing the cover block on the 241-AP-06A or 241-AP-02D waste transfer-associated structure.

Configuration Management Document(s):

Requirement Source(s):

- *ICD 24590-WTP-ICD-MG-01-030, Rev 1, Programmatic Requirements Meeting (Concepts B: Batch Transfer Process),* CCN 314460 (BNI 2019r)
- *Interface Process Hazard Analysis Control Decision Meeting Minutes*, WRPS-2000823 (WRPS 2020c)

Implementation:

- Implementing mechanisms for this requirement will be provided by the TOC.

4 Requisite Interface Items

Some interfaces may have additional actions to be performed to establish a complete interface. Any of these actions that do not fall into the above requirements categories are listed as requisite interface items. These items are typically single actions to be performed prior to commissioning. A requisite interface item is considered completed when objective evidence is provided to verify the action was performed. The requisite interface items are excluded from the WTP Requirements Management Program and associated procedures. The Mission Integration Requirements Area Manager may use the requirements management tool to track requisite interface items.

4.1 WTP Contractor Requisite Interface Items

N/A

4.2 TOC Requisite Interface Items

4.2.1 TOC shall evaluate the acceptability of using process condensate from the WTP process condensate lag storage vessels DEP-VSL-00005A/B as an alternate water source for flushing the conditioned effluent transfer line from the EMF to the TF AP-102 DST. If determined acceptable for use, provide written authorization to the WTP Contractor allowing for process condensate use as a conditioned effluent transfer line flushing medium.

Note: process condensate, which would normally be sent from WTP to the Liquid Effluent Retention Facility/Effluent Treatment Facility (LERF/ETF) for treatment and disposal, has been proposed as an alternate water source for flushing the conditioned effluent transfer line between the EMF and AP-102 DST. However, TFs standard TFC-ENG-STD-26, *Waste Transfer, Dilution, and Flushing Requirements* (WRPS 2019a) does not currently recognize process condensate as an acceptable flushing medium.

5 References

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Appendix A - ICD 31 Issues and Open Items

NOTE: This appendix lists open ICD issues, ICD issues that have been closed since the last revision, and new ICD open items. New open items are added to each ICD revision with a tracking number or schedule activity to track their completion outside the ICD. Open items are removed from the ICD in the next revision following their introduction.

Issue/Action/ Open Item No.	Description	Tracking No	Responsible Org.	Responsible Actionee	Originator	Status/ Due Date	Support Information / Basis for Closure	Comments
Issue I31-01	Table 1 and Sections 2.1.2, 2.1.3, 2.2, 2.3, 2.5, 2.6, and 2.7 of this ICD contain scope that is beyond the design phase for DFLAW. For implementation of these sections, complete a WTP Contract modification to include DFLAW procurement, construction, start-up, and commissioning scope that is currently outside the current specification in the WTP Contract.	24590-WTP-ATS-MGT-15-0431	WTP			Closed 3-31-2017	Closure of this issue was implemented by BNI contract modification #384. ORP approval to support closure of ATS item 24590-WTP-ATS-MGT-15-0431 is evidenced by CCN 293870, issued 12/21/2016. Formal ORP concurrence to close this contract issue as ICD30-01 was received on 03/09/2017 (CCN 289152).	
	ICD-031 has no open items							

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Document for Signature

Document Number: 24590-WTP-ICD-MG-01-031 **Rev:** 1

	Participants	Signature	Completed	Status	Result	Comments
Final Approver	**8/5/2020 5:08 PM**					
	Taylor, Walt		8/6/2020 4:09 PM	Completed	Approve	