



ICD 30 - Interface Control Document for Direct LAW Feed

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NOTE: All Interface Partner concurrence signatures found on the following page shall be obtained prior to approval of this ICD.

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Signature Date

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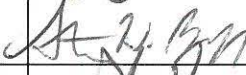
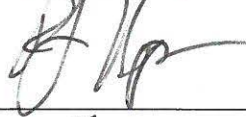

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NOTE: This document defines current service needs, future needs, and service gaps. The identified service levels do not represent contractual obligations between service recipient and providers. Future contractual and funding actions to close service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

Interface Partner Concurrence

Interface partners, as appropriate, will sign this concurrence sheet indicating their concurrence with the ICD contents. These concurrence signatures signify that the ICD accurately reflects the current baselines of interface partner's contracts, except as indicated in Appendix A, Open ICD 30 Issues and Actions. This ICD shall not be approved until all required concurrence signatures on this page have been obtained.

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Acronyms

ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BNI	Bechtel National, Inc.
BOF	Balance of Facilities
CRV	concentrate receipt vessel
CSER	criticality safety evaluation report
DFLAW	direct feed low-activity waste
DOE	US Department of Energy
DQO	data quality objective
DST	double-shell tank
DWP	Dangerous Waste Permit
EMF	effluent management facility
ICD	interface control document
ILAW	immobilized low-activity waste
LAW	low-activity waste
LAWPS	Low-Activity Waste Pretreatment System
LCP	LAW concentrate receipt process system
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
RPP	River Protection Project
SAC	specific administrative control
TBD	to be determined
TF	Tank Farms
TOC	Tank Operations Contractor
TRU	transuranic elements
WAC	Washington Administrative Code
WRPS	Washington River Protection Solutions, LLC
WTP	Hanford Tank Waste Treatment and Immobilization Plant

1 Interface Description

1.1 Interface Definition

This interface control document (ICD) describes the required physical and administrative interactions that allow for the direct transfer of Hanford Tank Farms (TF) treated low-activity waste (LAW) feed by the Tank Operations Contractor (TOC) to the Hanford Tank Waste Treatment and Immobilization Plant (WTP) LAW Facility. This mode of operation is known as direct feed LAW (DFLAW). This document does *not* cover the direct transfer of Hanford tank waste to any other WTP facility.

Note: To ensure alignment with current WTP Contract (DOE Contract DE-AC27-01RV14136 [DOE 2000]) specifications, this ICD describes the interface to support design for DFLAW. The DFLAW interface contained in Table 1 and Sections 2.1.2, 2.1.3, 2.2, 2.3, 2.5, 2.6, and 2.7 of this ICD to support Procurement, Construction, and Commissioning and Operations will not be implemented until captured in a future WTP Contract modification.

1.2 Functional Requirements

Table 1 presents the interface requirements for each responsible organization. Column 1 presents the interface functional requirements. Column 2 presents the WTP Contractor interface responsibilities within the current WTP Contract scope. Column 3 presents the TOC interface responsibilities within the current TOC baseline scope. Column 4 summarizes interface actions for the US Department of Energy (DOE) necessary to support this interface.

The Hanford Low-Activity Waste Pretreatment System (LAWPS) provides treated LAW feed to the WTP LAW Facility. LAWPS functional requirements to support DFLAW operation for treated LAW feed storage, characterization (sampling), transfer monitoring, treated LAW feed delivery, and waste pretreatment are provided in *Project T5L01 Low Activity Waste Pretreatment System Specification*, RPP-SPEC-56967 (WRPS 2015b).

Table 1 Requirements for the Direct LAW Feed Interface

Interface Functional Requirement	The Waste Treatment Plant Contractor will have the following responsibilities when DFLAW Procurement, Construction, and Commissioning scope is authorized and incorporated into the WTP Contract...	The Tank Operations Contractor Will...	DOE Will...
1. The TOC and WTP Contractor will prepare a detailed procedure for transferring treated LAW feed into the WTP Contractor's feed receipt system based on updates to the information in the WTP Dangerous Waste Permit and new TOC dangerous waste permit waste characterization and waste transfer requirements (Section 2.6.1).	1. Prepare jointly with the TOC a detailed procedure for transferring treated LAW feed into the WTP Contractor's feed receipt system.	1. Prepare jointly with the WTP Contractor a detailed procedure for transferring treated LAW feed into the WTP Contractor's feed receipt system.	1. No action.
2. Each contractor will construct their respective sections of the transfer pipeline according to approved procedures, approved permits, and Washington Administrative Code (WAC) 173-303, including code equivalency evaluations as required, to minimize interference during installation of pipelines and supporting system (Section 2.1.1).	2. Coordinate construction activities in accordance with approved procedures, approved permits, and WAC 173-303.	2. Coordinate construction activities in accordance with approved procedures, approved permits, and WAC 173-303.	2. No action.
3. The transfer line physical interface for the treated LAW feed from the LAWPS to the LAW Facility shall be located at the WTP site boundary as shown on the <i>Interface Control Drawing</i> , 24590-WTP-B2-C12T-00001 (BNI 2013c) (Section 2.1.1).	3. Provide pipelines from the WTP LAW concentrate receipt vessels (CRV) to the specified interface point that meet the design criteria provided in this ICD.	3. Provide pipelines from the LAWPS to the specified interface point that meet the design criteria provided in this ICD.	3. No action.
4. This detailed transfer procedure will provide the definition of the permissive/shutdown (interlock) signals required from both contractors (Section 2.1.2). The TOC and the WTP Contractor shall provide monitoring information for their respective transfer lines and feed tank/feed receipt systems to incorporate into the TF Monitoring and Control System (Section 2.1.2).	4. Provide a permissive/shutdown signal (interlock) to the Direct LAW Feed interface for the transfer system operated by the TOC that will incorporate (at a minimum) the WTP Contractor transfer line leak detection system. Exchange monitoring data for the WTP Contractor's transfer line and feed receipt system with the TOC.	4. Receive a permissive/shutdown signal (interlock) from the Direct LAW Feed interface for the transfer system operated by the TOC, which will incorporate (at a minimum) the WTP Contractor transfer line leak detection system. Exchange monitoring data for the TOC's transfer lines and feed tank/feed transfer system with the WTP Contractor.	4. No action.
5. The interface termination box(es) will be NEMA 4 and will be provided by the TOC at the interface point. The TOC will operate and maintain the interface termination box(es) (Section 2.1.2).	5. No action.	5. Provide interface termination boxes at the interface point. Interface termination boxes will connect to the WTP Contractor and TOC-provided permissive/shutdown (interlock) signals. Operate and maintain the interface termination boxes.	5. No action.
6. The WTP Contractor shall operate and maintain the feed transfer line, instrumentation signal lines, and leak detection system from the WTP site boundary to the WTP Contractor's LAW CRVs. The TOC shall operate and maintain the feed transfer line, instrumentation signal lines, and leak detection system from the TF to the WTP site boundary (Section 2.1.3).	6. Operate and maintain the LAW feed transfer system in accordance with approved procedures, approved permits, and WAC 173-303. Operate and maintain the instrumentation signal lines and the leak detection system from the interface point to the WTP Contractor's feed receipt vessel.	6. Operate and maintain the LAW feed transfer system in accordance with approved procedures, approved permits, and WAC 173-303. Operate and maintain the instrumentation signal lines and the leak detection system from the TF to the interface point.	6. No action.
7. The WTP Contractor, the TOC, and ORP shall jointly maintain a transfer plan and schedule for multi-year scheduling of DFLAW feed campaigns and batch transfers to the LAW Facility (Section 2.2.1.3).	7. Maintain jointly with the TOC and ORP a transfer plan and schedule for multi-year scheduling of DFLAW campaign transfers to the WTP. Establish the transfer date for the first batch of each campaign. Request treated LAW feed in a manner that will support the requirements of the WTP Contract.	7. Maintain jointly with the WTP Contractor and ORP a transfer plan and schedule for multi-year scheduling of DFLAW campaign transfers to the WTP. Respond to requests for treated LAW feed and schedule delivery in a manner that will support the requirements of the WTP Contract.	7. Maintain jointly with the TOC and the WTP Contractor a transfer plan and schedule for multi-year scheduling of DFLAW campaign transfers to the WTP.
8. To ensure integration of the TOC and the WTP Contractor operations, the One System organization, as described in the <i>One System Charter</i> , RPP-51471 (WRPS 2014a) will facilitate the establishment of feed vectors and DFLAW feed campaigns to be delivered as feed to the LAW Facility based on contract specifications and mission priorities (Section 2.2.2).	8. Provide input to the TOC for the River Protection Project (RPP) mission LAW feed delivery planning documents to ensure design and operational integration, as described in WTP Contract Section C, Standard 2 (b) (3), "Evaluation of River Protection Project Mission Waste Feed Vector."	8. Be responsible to develop the RPP mission LAW feed delivery planning documents that integrate with and are consistent with WTP Contractor design and operational requirements.	8. Review and approve RPP System Plan assumptions and identify LAW feed vectors for WTP Contractor evaluation. Transmit to the WTP Contractor the selected LAW feed vectors for WTP evaluation.

Table 1 Requirements for the Direct LAW Feed Interface

Interface Functional Requirement	The Waste Treatment Plant Contractor will have the following responsibilities when DFLAW Procurement, Construction, and Commissioning scope is authorized and incorporated into the WTP Contract...	The Tank Operations Contractor Will...	DOE Will...
<p>9. The TOC baseline sampling plans for LAWPS will be initiated during LAWPS conceptual design via the establishment of data quality objectives (DQO) and a Tank Sampling and Analysis Plan (Section 2.5.1.1). Prior to the acceptance of a DFLAW feed campaign, the WTP Contractor will participate in the development of the LAWPS Tank Sampling and Analysis Plan for each campaign for mutual agreement on sample collection, handling, and analytical requirements (Section 2.6.3).</p>	<p>9. Prepare jointly with the TOC a Tank Sampling and Analysis Plan for TOC sampling of each DFLAW qualification double-shell tank (DST) and each treated LAW feed lag storage tank.</p>	<p>9. Prepare jointly with the WTP Contractor a Tank Sampling and Analysis Plan for TOC sampling of each DFLAW qualification DST and each treated LAW feed lag storage tank. TOC will have the lead in production and development of this plan.</p>	<p>9. No action.</p>
<p>10. The maximum batch transfer volume is 9100 gallons (Section 2.7.2). Following the transfer of feed to the WTP Contractor's LAW CRV, the TOC will initiate a single post-transfer flush (Section 2.6.2).</p>	<p>10. Receive up to a 9100 gallon batch of treated LAW feed from the TOC to support 30 metric ton/day melter throughput. Receive post-transfer flush from the TOC.</p>	<p>10. Deliver up to a 9100 gallon batch of treated LAW feed to the WTP Contractor to support 30 metric ton/day melter throughput. Deliver post-transfer flush to the WTP Contractor.</p>	<p>10. No action.</p>
<p>11. The decision to accept the treated LAW feed shall be based upon DFLAW feed and treated LAW feed sample data obtained for comparison to the feed acceptance criteria, after ensuring that data was obtained in accordance with DFLAW DQO requirements (Section 2.3). If the treated LAW feed is compliant with the feed acceptance criteria specified in Table 5 of this ICD, the WTP Contractor will provide ORP with the analytical results and a written recommendation to accept DFLAW feed campaign TBD calendar days prior to the transfer date for the first batch of the campaign (Section 2.3).</p>	<p>11. Review sample results as provided in the <i>Initial Data Quality Objectives for DFLAW Feed Acceptance Criteria</i>¹ (referred to as the DFLAW DQO) to ensure compliance with WTP treated LAW feed acceptance criteria. Report analysis results to ORP. If the treated LAW feed is compliant, provide a written recommendation to ORP for acceptance of the candidate DFLAW feed campaign prior to the transfer date for the first batch of the campaign from the TOC.</p>	<p>11. Provide the DFLAW feed qualification laboratory with samples from the DFLAW qualification DST comprising each campaign and samples from the LAWPS lag storage tanks. The samples must be delivered according to the requirements in the DFLAW DQO. Provide the WTP Contractor with sample results to demonstrate compliance with the WTP treated LAW feed acceptance criteria prior to the projected transfer date of the first batch of the campaign to the WTP. Provide the WTP Contractor with samples of each LAWPS lag storage tank to analyze for glass formulation and immobilized LAW (ILAW) reporting.</p>	<p>11. Authorize transfer of compliant treated LAW feed for the entire DFLAW feed campaign.</p>
<p>12. If the treated LAW feed does not comply with the feed acceptance criteria, the TOC, with support from the WTP Contractor, will prepare an assessment and recommendation for the preferred method(s), if possible and practical, to correct any feed composition or property deficiencies for ORP review and approval (Section 2.3).</p>	<p>12. For any DFLAW feed campaign not accepted, support TOC in the development of an assessment and recommendation of the preferred method(s) to adjust the DFLAW feed for acceptance.</p>	<p>12. For any DFLAW feed campaign not accepted, prepare an assessment and recommendation, with support from the WTP Contractor, of the preferred method(s) to adjust the DFLAW feed for acceptance.</p>	<p>12. Provide review and approval of the assessment and recommendation of the preferred method(s) to adjust the DFLAW feed for acceptance. Provide notification to the Department of Ecology.</p>
<p>13. If a batch of treated LAW feed is found to be noncompliant after transfer to the LAW CRV, the WTP Contractor, with support from the TOC, will prepare an assessment and recommendation to disposition the transferred feed and submit the assessment and recommendation to ORP for review and approval (Section 2.3).</p>	<p>13. If, for any reason, the transferred treated LAW feed is determined to be out of compliance, prepare an assessment and recommendation with TOC support to disposition the treated LAW feed. Provide the assessment to ORP for review and approval.</p>	<p>13. If the transferred feed is determined to be out of compliance, support the WTP Contractor in the development of the assessment and recommendation to disposition the feed.</p>	<p>13. If the transferred feed is determined to be out of compliance, provide review and approval of the assessment and recommendation to disposition the feed. Provide notification to the Department of Ecology.</p>
<p>14. Both contractors will measure the total volumes of treated LAW feed and flush water transferred (Section 2.7.2).</p>	<p>14. Document the volume of treated LAW feed and flush water received, and reconcile differences with the transfer volume recorded by the TOC.</p>	<p>14. Document the volume of treated LAW feed and flush water transferred, and reconcile differences with the receipt volume recorded by the WTP Contractor.</p>	<p>14. No action.</p>
<p>15. The treated LAW feed will control insoluble particle size through filtration with a nominal pore diameter of 0.1 micron (Section 2.3).</p>	<p>15. No action.</p>	<p>15. Provide filters with a nominal pore diameter of 0.1 micron.</p>	<p>15. No action.</p>

¹ The DFLAW DQO document will be developed when the treated LAW feed acceptance criteria are no longer preliminary.

2 Interface Information

2.1 Physical Interfaces

2.1.1 Physical Description

The transfer line physical interface for the treated LAW feed from the LAWPS to the LAW Facility shall be located at the WTP site boundary as shown on the *Interface Control Drawing*, 24590-WTP-B2-C12T-00001 (BNI 2013c) (Open Item #0001). The interface for the instrumentation signal lines between the WTP Contractor and the TOC shall be located at the same interface.

The treated LAW feed transfer pipeline consists of a stainless steel pipe encased in a carbon steel secondary containment pipe (*Double Shell Tank Transfer Piping Subsystem Specification*, HNF-4161 [WRPS 2013]; and *Engineering Specification for Piping Class S32B*, 24590-WTP-3PB-P000-TS32B [BNI 2013a]). The encasement (exterior) pipe has an epoxy coating for corrosion protection and is insulated with rigid-polyurethane foam protected with a waterproof nonmetallic insulation jacket (*Response to ORP Question on Cathodic Protection of Tank Farm Transfer Piping*, CCN 258399 [BNI 2013b]; WRPS reference is under development).

The treated LAW feed transfer pipeline is independent of the transfer pipelines used to provide feed from the TF to the Pretreatment Facility.

See Table 2 and Table 3 of this ICD for the physical characteristics and design parameters of the new sections of the treated LAW feed transfer pipeline (Open Item #0001).

Each contractor will construct their respective sections of the transfer pipeline according to approved procedures, approved permits, and Washington Administrative Code (WAC) 173-303, including code equivalency evaluations as required, to minimize interference during installation of pipelines and supporting system.

Tank Farm Specific Administrative Controls (SAC) HNF-IP-1266, Section 5.8.8, Waste Transfer System Freeze Protection (WRPS 2015a), 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 this temperature is > 32 °F (WRPS 2015a). One of the exemptions from this requirement is waste transfer primary piping covered by an equivalent of ≥ 3 ft of soil to the top of the pipe. This freeze protection requirement also applies to the buried/bermed piping in the transfer system installed by the WTP Contractor.

The Waste Transfer System Freeze Protection SAC also requires air temperature monitoring for waste transfer-associated structures (e.g., valve pits) that are physically connected to a waste transfer pump (WRPS 2015a). During waste transfer operation, air temperature monitoring in the physically connected waste transfer-associated structures is required to ensure that the temperature of components located in the structures is > 32 °F. The same freeze protection requirement also applies to the waste transfer-associated structures in the transfer system installed by the WTP Contractor.

2.1.1.1 LAW Feed Transfer System

The LAW feed transfer system is defined as the transfer pump, pipelines, jumpers, valves, and instrumentation between the LAWPS lag storage tanks and the WTP Contractor destination vessels. The LAW feed transfer system will include existing pipelines and valves in the LAW Facility, which have an established design pressure of 150 psig at a design temperature of 150 °F (*Design Pressure and Design Temperature Calculation for LCP System*, 24590-LAW-MEC-LCP-00002, [BNI 2010c]) (Open Item #0001). The design pressure for new components in the LAW feed transfer system should be equal to or greater than this condition (Open Item #0001).

Because of the existing LAW pipelines and valves, the maximum operating pressure of the transfer system on the WTP side of the interface is limited to 136 psig during transfer of fluids between the TOC and the WTP Contractor under normal conditions. This value provides the minimum 10% design pressure margin required for WTP piping systems (*Design Parameters & Test Pressures for Equipment & Piping*, 24590-WTP-GPG-M-017, [BNI 2014]). Assurance that this limit will not be exceeded is achieved through design or code-compliant relief devices (ASME B31.3-1996).

Rapid positioning of the transfer system valves shall be prevented. Actuation of valves shall be controlled closure (slow to close) to avoid conditions that could lead to water hammer (Open Item #0001). This includes any valves that have a fail-close action.

The LAW feed transfer lines should be designed with a minimum number of fittings since each fitting will increase the amount of turbulence and therefore increase backmixing between the treated LAW feed and the flush water. Elbows should be long-radius. Block valves should be full-flow plug valves. Tees should be oriented for normal flow through the run of the tee.

2.1.2 Interface Controls and Monitoring

As discussed in Section 2.6.1, the TOC and WTP Contractor will prepare a detailed procedure for transferring treated LAW feed into the WTP Contractor's feed receipt system. This detailed transfer procedure will provide the definition of the permissive/shutdown (interlock) signals required from both contractors. The interlock signals from the contractors required for the interface will connect to the interface termination box(es). The interface termination box(es) will be NEMA 4 and will be provided by the TOC at the interface point (BNI 2013c). The TOC will operate and maintain the interface termination box(es). The removal of the interlock signal from the WTP Contractor or from the TOC will initiate a transfer shutdown process to a fail-safe state. Typical TOC inputs to the interlock signal may include leak detection, tank level, valve alignment, and tank ventilation signals. Typical WTP Contractor inputs to the interlock signal may include leak detection, vessel level, valve alignment, transfer timers, and ventilation signals. The TOC and the WTP Contractor shall provide monitoring information for their respective transfer lines and feed tank/feed receipt systems to incorporate into the TF Monitoring and Control System.

2.1.3 Interface Maintenance and Operation

The WTP Contractor shall operate and maintain the feed transfer line, instrumentation signal lines, and leak detection system from the WTP site boundary (interface node TBD [BNI 2013c]) to the WTP Contractor's LAW concentrate receipt vessels (CRV). The TOC shall operate and maintain the feed transfer line, instrumentation signal lines, and leak detection system from the TF to the WTP site boundary (interface node TBD [BNI 2013c]). The TOC and the WTP Contractor will coordinate the leak

detection approach to support permit requirements (Open Item #0001). Responsibilities for LAW feed transfers shall be defined in the LAW feed transfer procedure referred to in Row 1 of Table 1 and described in Section 2.6.1.

2.1.4 Transfer Pipeline Completion and Testing

The sequence for the final LAW feed transfer pipeline connection will be determined once the construction schedules for each contractor have been determined.

The TOC and the WTP Contractor will jointly develop a procedure to test and verify the integrity of the final connection of the feed transfer pipeline. Prior to the completion of the final connections, each contractor may test their respective sections of the feed transfer pipeline.

Table 2 New Primary (Inner) Pipe

Line Number		Design Pressure (psig) (See Notes 1 & 2)		Design Temperature (°F)	
TF	WTP	TF	WTP	TF	WTP
TBD	LCP-PB-00000-S32B-03	TBD	TBD	TBD	TBD
Pipe Characteristic		TF		WTP	
Pipe Code / Pipe Class		TBD		S32B (Pipe Class) (BNI 2013a)	
Nominal Pipe Size (Inch)		TBD		3	
Pipe Material		TBD		ASTM A 312, Grade TP 316L (S32B)	
Pipe Construction		Seamless			
Pipe Schedule		40S			

Notes:

- 1 The pipe materials selected for purchase by the WTP Contractor and TOC will be similar. Any design temperature and pressure discrepancies shown in the tables above do not alter the pipe selection. LAWPS and WTP piping design pressure and temperature will be determined during design.
- 2 Shop and field testing of the inner pipe will be performed in accordance with ASME B31.3, Section 345, Testing.

Table 3 New Encasement Pipe

Line Number		Design/Pneumatic Test Pressure (psig) (See Notes 1, 2, & 3)		Design Temperature (°F)	
TF	WTP	TF	WTP	TF	WTP
TBD	LCP-PB-00000-S32B-03	TBD	50/55	TBD	150
Pipe Characteristic		TF		WTP	
Pipe Code / Pipe Class		TBD		S32B (Pipe Class) (BNI 2013a)	
Nominal Pipe Size (Inch)		TBD		6	
Exterior Insulation Thickness		1.5 ± 0.5 (WRPS under development)		Minimum 1.5 (BNI 2010a)	
Pipe Material		TBD		ASTM A 106, Grade B	
Pipe Construction		Seamless			
Pipe Schedule		Standard Weight			

Notes:

- 1 Pneumatic test pressure for the WTP encasement pipe is limited to 110% of design pressure by ASME B31.3-1996, Section 345.5.4, Test Pressure (ASME B31.3-1996).
- 2 The pipe materials selected for purchase by the WTP Contractor and TOC will be similar. Any design temperature and pressure discrepancies shown in the tables above do not alter the pipe selection. Both the WTP Contractor and TOC have calculations that verify that the encasement pipe will not pressurize (*Time to Pressurize Transfer Pipe's Annular Volume*, 24590-PTF-MOC-10-00005, [BNI 2005]; and *Hanford 200 Area Intra Tank Farm and Cross-Site Transfer Line Encasement Piping Design Pressure Analysis LBB Technical Evaluation*, RPP-12094 [CH2 2002]).
- 3 Shop and field testing of the encasement pipe will be performed in accordance with ASME B31.3, Section 345, Testing.

2.2 Administrative Interfaces

The respective organizations' design requirements include integrated safety management principles and are communicated through the interface in the requirements documents (for example, safety analysis reports), which will be identified in Section 2.4, as available.

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. 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.

The ICD team has not identified any deactivation or reliability, availability, maintainability, and inspectability (RAMI) considerations that require management across the interface. Systematic RAMI assessments of this interface have not been conducted.

2.2.1 Interface Schedule

The ORP-approved baseline schedules for the TOC and the WTP Contractor contain the interface milestones and integrated schedule for this ICD. Activity IDs referenced are from the respective

contractor’s approved baseline. **Note:** Early date represents the earliest planning date for the activity to begin and will be verified with the specific contractor’s most current approved schedules.

2.2.1.1 Milestone 30 A - Construct LAW Feed Transfer Line

This milestone represents the planned construction completion date. The sequence of the final connection has not been determined. For the first contractor to complete construction, the milestone indicates the line is available for the final connection. For the other, it represents the planned date for completing the interface connection with the line provided.

Contractor	Activity ID	Title	Early Date
WTP	TBD	BOF - Construct DFLAW Feed Transfer Line	TBD
TOC	TBD	Construct DFLAW Feed Transfer Line	TBD

2.2.1.2 Milestone 30 B - Initial Transfer of Treated LAW Feed

This milestone represents the planned date to begin transfer of treated LAW feed to the WTP LAW Facility. For the TOC, it represents the planned date to begin transfer of treated LAW feed to the WTP Contractor. For the WTP Contractor, it represents the planned date to begin hot commissioning of the LAW Facility.

Contractor	Activity ID	Title	Early Date
WTP	TBD	Request Initial Transfer of Treated LAW Feed	TBD
TOC	TBD	Initiate Transfer of Treated LAW Feed	TBD

2.2.1.3 LAW Feed Transfer Scheduling

The WTP Contractor, the TOC, and ORP shall jointly maintain a transfer plan and schedule for multi-year scheduling of DFLAW feed campaigns² and batch³ transfers to the LAW Facility (Table 1). This plan and schedule will provide enough detail to implement the long-term planning provided by the One System organization. The transfer plan and schedule shall identify DFLAW feed campaign transfers far enough in advance to allow the design, construction, and startup of any new infrastructure required by either contractor to meet the requirements of the plan and schedule.

2.2.2 Mission Planning Integration

To ensure integration of the TOC and the WTP Contractor operations, the One System organization, as described in the *One System Charter*, RPP-51471 (WRPS 2014a) will facilitate the establishment of feed vectors and DFLAW feed campaigns to be delivered as feed to the LAW Facility based on contract specifications and mission priorities. The WTP Contractor will evaluate the selected feed vectors in accordance with the WTP Contract (DOE 2000) Section C, Standard 2 (b)(3) and will provide inputs prior

² A campaign is defined as all of the batches of treated LAW feed delivered to the WTP LAW Facility from a single qualified DST.

³ A batch is defined as a discrete volume of qualified treated LAW feed transferred from a single LAWPS lag storage tank to a LAW Facility CRV as a volume fraction of a campaign.

to establishing feed vectors and DFLAW feed campaigns. Any changes to feed vector selection will include ORP oversight for improving the projected feed compositions and processability.

2.2.3 Commissioning

The WTP Contract (DOE 2000) provides requirements for accomplishing commissioning. The WTP Contractor and the TOC will coordinate through the One System interface to ensure that treated LAW feed is safely transferred to WTP to support safe and efficient processing during commissioning.

Commissioning will include a series of integrated tests of LAW feed delivery and receipt systems including transfer of water from TF to WTP prior to initiating the first LAW feed transfer. Details for these tests will be developed as part of the commissioning program development (Open Item #0002).

2.2.4 Direct Feed LAW Hot Operations

The current TOC baseline waste feed delivery plan for DFLAW hot operations will be based on the update of the *Integrated Waste Feed Delivery Plan* (under development) and the *RPP Reference Integrated Flowsheet*, RPP-57991 (WRPS 2014d) and the *RPP Reference Operating Plan* (under development).

The treated LAW feed will be transferred in batches of up to 9100 gallons per CRV. This volume includes a small portion of the volume used for post-transfer flushing (Section 2.6.2). The TOC plans to transfer LAW feed batches to fill the WTP Contractor's CRVs in optimum practical quantities to meet the amount of treated LAW feed requested by the WTP Contractor.

2.3 Treated LAW Feed Acceptance

Table 4 and Table 5 summarize the constituents and properties considered to be the general set of treated LAW feed acceptance parameters. Table 5 contains a subset of these parameters that are the treated LAW feed acceptance criteria. The initial data collection requirements for treated LAW feed acceptance will be documented in the *Initial Data Quality Objectives for DFLAW Feed Acceptance Criteria* (Open Item #0003) which is referred to in this ICD as the DFLAW DQO⁴. The DFLAW DQO document is to be jointly developed by the WTP Contractor and the TOC.

Table 4 provides a listing of constituent source documents that apply to the treated LAW feed. The listed constituents include those that will be described in detail in the updates to the *Regulatory Data Quality Objectives Optimization Report*, 24590-WTP-RPT-MGT-04-001 (BNI 2004), and the constituents found in the WTP Contract (DOE 2000) Specification 7 that are not listed specifically in Table 5. The data for the constituents in Table 4 are required for reporting and (or) processability purposes, including compliance assessment. Therefore, the values for the constituents in Table 4 are not actionable limits and are separate from the feed acceptance criteria as used in this ICD. However, the determination and reporting of the values for the constituents in Table 4 will follow the same quality assurance/quality control process as the determination of the values in Table 5 as described in the DFLAW DQO.

⁴ The DFLAW DQO will be developed when the treated LAW feed acceptance criteria is no longer preliminary. The DFLAW DQO will incorporate regulatory DQO and WTP Contract requirements.

Table 4 DFLAW Feed Constituents for Reporting Purposes

Constituents	Notes	Reference
Constituents in the <i>Regulatory Data Quality Objectives Optimization Report</i>	N/A	BNI 2004
Specification 7 list of constituents and concentrations	1	DOE 2000
Total radioactivity in material fed to WTP per year from external sources	2	Health 2006

Notes:

1. Tables TS-7.1 and TS-7.2 in the WTP Contract (DOE 2000) list chemical and radionuclide components for LAW. The concentrations apply to the soluble fraction only.
2. The limit is an accumulated value per year. The WTP Contractor is responsible to track the cumulative value based on treated LAW feed batch analytical results.

The criteria in Table 5 provide the basis for acceptance of treated LAW feed.

The treated LAW feed will control insoluble particle size through filtration with a nominal pore diameter of 0.1 micron, similar to the filter pore requirement of the WTP Pretreatment system (*Engineering Specification for Pretreatment Ultrafilters*, 24590-PTF-3PS-MLFP-T0003, [BNI 2010b]).

Prior to the first batch transfer of treated LAW feed from a LAWPS lag storage tank, the TOC will provide sampling results from the LAWPS lag storage tank to confirm satisfactory operation of the LAWPS (Section 2.5.1.3) to the WTP Contractor. These results are provided TBD days (Open Item #0003) prior to the first batch transfer from the LAWPS lag storage tank.

The decision to accept the treated LAW feed shall be based upon DFLAW feed and treated LAW feed sample data obtained for comparison to the feed acceptance criteria, after ensuring that data was obtained in accordance with DFLAW DQO requirements. This includes sample re-analyses or analyses of additional samples or both. If the treated LAW feed (prior to transfer to WTP) does not meet the feed acceptance criteria, alternative actions as described in the DFLAW DQO shall be taken. No transfers may take place until the WTP Contractor has reviewed the analytical results.

If the treated LAW feed is compliant with the feed acceptance criteria specified in Table 5 of this ICD, the WTP Contractor will provide ORP with the analytical results and a written recommendation to accept DFLAW feed campaign TBD calendar days prior to the transfer date for the first batch of the campaign (Open Item #0003). ORP will review the recommendation and authorize transfers of treated LAW feed for the entire DFLAW feed campaign.

If the treated LAW feed does not comply with the feed acceptance criteria, the TOC, with support from the WTP Contractor, will prepare an assessment and recommendation for the preferred method(s), if possible and practical, to correct any feed composition or property deficiencies for ORP review and approval. This may require an adjustment to the transfer date for the first batch of the campaign.

If a batch of treated LAW feed is found to be noncompliant after transfer to the LAW CRV (Section 2.5.1.4), the WTP Contractor, with support from the TOC, will prepare an assessment and recommendation to disposition the transferred feed and submit the assessment and recommendation to ORP for review and approval.

2.3.1 Criticality Specification

Criticality safety for DFLAW is described in the *Criticality Safety Evaluation Report for Direct Feed to the Low-Activity Waste Facility*, 24590-WTP-CSER-NS-14-0001 (DFLAW CSER) (BNI 2015). The DFLAW CSER provides analysis to demonstrate that a single parameter for plutonium and a single limit for fissile uranium will ensure criticality safety for DFLAW operation. No controls are needed after verification that the treated LAW feed meets the acceptance limits of Table 5.

Table 5 Treated LAW Feed Acceptance Criteria

Property	Limit	Notes	Reference
Stream Properties			
Feed pH	≥ 12	1	DOE 2015
WTP feed receipt temperature	< 140 °F	N/A	DOE 2015
Feed viscosity	≤ 15 cP	2	DOE 2015
Suspended solids concentration	≤ 3.4 wt%	3, 4, 5	DOE 2015
Feed bulk density	< 1.35 kg/L	6	DOE 2015
Hydrogen generation rate	≤ 8.5E-07 g-mol H ₂ /L/hr @140 °F	N/A	DOE 2015
Waste compatibility	< ± 20 °C	7	DOE 2015
Liquid fraction unit dose	< 1030 Sv/L	N/A	DOE 2015
Separable organics	No visual immiscible layer	8	DOE 2015
Chemical Components			
Sodium concentration	≥ 5 M and ≤ 8 M	9	DOE 2015
Chloride (Cl) ratio	< 3.7E-02 mol/mol sodium	N/A	DOE 2015
Fluoride (F) ratio	< 9.1E-02 mol/mol sodium	N/A	DOE 2015
Sulfate (SO ₄) ratio	< 7.0E-02 mol/mol sodium	10	DOE 2015
Mercury (Hg) ratio	< 1.4E-05 mol/mol sodium	11	DOE 2015
Total organic carbon concentration	< 10 wt%	N/A	DOE 2015
Ammonia (NH ₃) concentration	< 0.04 M	N/A	DOE 2015
PCB concentration	< 50 ppm	N/A	DOE 2015
Radionuclides			
Cesium-137 ratio	< 3.18E-05 Ci/mol sodium	12	DOE 2015
Europium-154 concentration	< 1.8E-05 Ci/L	5	DOE 2015
Cobalt-60 concentration	< 1.1E-06 Ci/L	5	DOE 2015
Strontium-90 ratio	< 1.19E-03 Ci/mol sodium	13	DOE 2015
Technetium-99 concentration	< 4.8E-04 Ci/L	14	DOE 2015
Plutonium-239 concentration	< 3.0E-05 Ci/L	N/A	DOE 2015
Uranium-233 concentration	< 1.6E-07 Ci/L	N/A	DOE 2015
Uranium-235 concentration	< 1.7E-09 Ci/L	N/A	DOE 2015
TRU ratio	< 1.30E-05 Ci/mol sodium	15	DOE 2015
U fissile to U total	< 0.96 wt%	5, 16	DOE 2015

Table 5 Treated LAW Feed Acceptance Criteria

Notes:

- 1 Limit from Ecology 2014 is >7. Limit of >12 is more restrictive.
- 2 Analysis is made on the bulk sample after holding the bulk sample at 25 °C for 8 hours. Property is measured at 25 °C. DFLAW feed value is for a Newtonian fluid.
- 3 Solids to be measured after holding the bulk sample at 25 °C for 8 hours. Definition of suspended solids is provided in Appendix E.
- 4 The TOC filtration system is expected to remove insoluble compounds down to 0.1 micron.
- 5 Value was modified during ICD development.
- 6 Value represents upper limit of “supernate” as defined in *Waste Transfer, Dilution, and Flushing Requirements*, TFC-ENG-STD-26 (WRPS 2014b). This limit reduces the risk of solution near solubility limits with potential for precipitation.
- 7 Per ASTM Method D5058-90 using 10 mL samples. ASTM D5058 provides standard test practices to screen wastes for potentially hazardous reactions. If, after mixing samples, no reactions are observed and no temperature change outside the specified range is observed, then the waste passes the compatibility test.
- 8 The proposed deminimus concentration level for separable organics that could be sent to the WTP without adversely affecting the WTP has been accepted by the DOE (*Acceptance of Contract Deliverable 2.11, Proposed Deminimus Organic Concentration in Received Tank Waste*, CCN 265033 [DOE 2013]).
- 9 For cesium removal by ion exchange in the LAWPS, the expected operating range of sodium concentration is 5 M to 6 M. The LAW Facility can accept up to 8 M sodium based on limits for melter feed viscosity.
- 10 Sulfate in the feed may need to be limited, as preliminary model results show that waste loading in the glass is reduced when sulfur content in the glass is elevated.
- 11 Value is applied to ensure that WTP air permit limits are met.
- 12 Value is estimated based on 6 M sodium LAW feed and 20 wt% Na₂O in the glass at 0.3 Ci/m³ glass loading. The limit of 0.3 Ci/m³ in the ILAW product and called out in Section C.7 (d) (1) (iii) of the WTP Contract (DOE 2000) was developed to support the maintenance concept for the LAW Facility and continues to apply to DFLAW operation.
- 13 Limited to maximum glass loading of 20 Ci/m³.
- 14 Limited to maximum glass loading of 3 Ci/m³.
- 15 Limited to maximum glass loading of 100 nCi/g
- 16 Total uranium is the sum of uranium-233, uranium-235, and uranium-238.

2.4 Configuration Management Items

This section identifies the referenced documents that further define the physical and/or administrative details of the interface. Interface affecting changes to the documents and drawings listed in Table 6 will be provided to the affected parties by the responsible Interface Owner.

Table 6 Interface Configuration Management Items

WTP Documents	Interfacing Organization Documents
24590-WTP-RPT-MGT-04-001, Rev 0, <i>Regulatory Data Quality Objectives Optimization Report</i> (BNI 2004)	HNF-40122, Rev 0, <i>WTP Material at Risk Evaluation of Important Uncertainties and Resulting WTP Design Conservatisms</i> (BNI 2009a)
<i>Initial Data Quality Objectives for Treated LAW Feed Acceptance Criteria</i> (under development)	HNF-4161, Rev 6, <i>Double Shell Tank Transfer Piping Subsystem Specification</i> (WRPS 2013)
24590-WTP-CSER-NS-14-0001, <i>Criticality Safety Evaluation Report for Direct Feed to the Low-Activity Waste Facility</i> (BNI 2015)	HNF-4162, Rev 5, <i>Double Shell Tank Transfer Pump Subsystem Specification</i> (WRPS 2011a)
DFLAW Feed Qualification Program Plan (under development)	HNF-4163, Rev 6, <i>Double Shell Tank Diluent and Flush Subsystem Specification</i> (WRPS 2011b)
	RPP-RPT-57991, Rev 0, <i>One System: Tank Waste Disposition Integrated Flowsheet – River Protection Project Reference Integrated Flowsheet</i> (WRPS 2014d)
	Update of <i>RPP Reference Operating Plan</i> (under development)
	Update of RPP-40149-VOL1, RPP 40149-VOL2, and RPP 40149-VOL3, <i>Integrated Waste Feed Delivery Plan, Volumes 1, 2, & 3</i> (under development)
	TFC-ENG-STD-26, Rev C, <i>Waste Transfer, Dilution, and Flushing Requirements</i> (WRPS 2014b).
	HNF-SD-WM-OCD-015, as amended, <i>Tank Farms Waste Transfer Compatibility Program</i> (WRPS 2014c)
	RPP-SPEC-56967, Rev 3, <i>Project T5L01 Low Activity Waste Pretreatment System Specification</i> , (WRPS 2015b)
WTP Drawings	Interfacing Organization Drawings
24590-WTP-B2-C12T-00001, Rev 2, <i>Interface Control Drawing</i> (BNI 2013c)	(under development)

2.5 Sampling and Analysis

This ICD will be updated to align with the integrated sampling and analysis plans as they are developed (Open Item #0004).

2.5.1 Sampling

2.5.1.1 Tank Sampling and Analysis Plan

The TOC baseline sampling plans for LAWPS will be initiated during LAWPS conceptual design via the establishment of data quality objectives (DQO) and a Tank Sampling and Analysis Plan. The procedures and requirements for performing acceptance criteria analyses using the DFLAW feed and treated LAW feed samples are to be established following the optimization of the DFLAW DQO. The DFLAW DQO and the Tank Sampling and Analysis Plan require input from the WTP Contract specifications, the WTP sample and analysis requirements described in the *Initial Data Quality Objectives for WTP Monitoring and Process Control*, 24590-WTP-RPT-MGT-12-014 (BNI 2012), and from updates to the *Regulatory Data Quality Objectives Optimization Report* (BNI 2004).

2.5.1.2 DFLAW Feed Sample

The TOC will sample the DFLAW qualification double-shell tank (DST) and provide sample analysis results to the WTP Contractor not less than **TBD** calendar days prior to the agreed-upon transfer date for the first batch of each campaign (Open Item #0003). The DFLAW qualification DST will be sampled using a grab sample method. For compliance with the WTP Dangerous Waste Permit (DWP) (Ecology 2014), the TOC will ensure that treated LAW feed does not carry waste codes D001 (ignitability) and D003 (reactivity) when transferred to the LAW Facility. Characterization will be performed on the DFLAW qualification DST prior to transfer to the LAWPS feed DST in conformance with the data quality objectives identified in the DFLAW DQO. The following analyses, at a minimum, will be conducted for each new DFLAW feed campaign in accordance with the methods prescribed in WAC 173-303-110: ammonia, pH, metals, organic acids, mercury, cyanide, volatiles, semi-volatiles, PCBs/pesticides, anions, total organic carbon, and compatibility (ASTM Method D5058-90).

A “new campaign” is one that has been sampled and analyzed in accordance with the DFLAW DQO and has received no further additions⁵. Currently, further additions require the resampling and reanalysis unless an exception is approved by Ecology on a case-by-case basis. Water additions and (or) flushes for the purposes of waste transfer are not considered additions when complying with the DWP.

The TOC will provide samples of DFLAW feed to the WTP Contractor to analyze for glass formulation and immobilized LAW (ILAW) reporting.

2.5.1.3 Treated LAW Feed Sample

The sampling and analysis described in this section are required during commissioning and as long as is required during operations to build sufficient confidence in LAWPS process and in-line radiation monitoring performance.

⁵ The mixing of waste from the DFLAW qualification DST with the residual waste feed heel in the LAWPS feed tank is anticipated with the transfer of waste into the LAWPS feed tank. The feed qualification strategy will need to take this into consideration.

The TOC will sample the treated LAW feed to provide verification of adequate performance of the LAWPS process. Sample analysis results will be delivered to the WTP Contractor prior to transfer of feed to the LAW Facility. Sample analysis results will be compared to and used in conjunction with the sample analysis results of the DFLAW feed campaign for qualification of the feed. The treated LAW feed will be sampled and analyzed for the following:

- ^{137}Cs concentration, expressed as a ratio of sodium present, to ensure radionuclide content limits are satisfied
- Transuranic elements (TRU) concentration to ensure the ILAW glass limits are satisfied, unless the limit has been satisfied from the DFLAW feed sample analysis
- Total organic carbon to ensure LAWPS did not introduce organics into the treated LAW feed
- pH to ensure that the treated LAW feed remains within acceptable pH limits
- Concentration of suspended solids to ensure the feed is within limits

The TOC will provide samples of treated LAW feed to the WTP Contractor to analyze for glass formulation and ILAW reporting. Feed from the sampled LAWPS lag storage tank cannot be transferred until the WTP Contractor has reviewed the analysis results.

2.5.1.4 WTP LAW Feed Receipt Sample

In the event of a process upset that could impact the treated LAW feed composition, the WTP Contractor may sample and analyze the feed batch from the WTP LAW CRV to determine whether it complies with the treated LAW feed acceptance criteria. If, after sampling and analysis, the WTP Contractor determines that the feed transferred to the WTP LAW CRV is out of compliance, the WTP Contractor will follow the actions listed in Table 1 and Section 2.3.

2.5.2 Sample Analysis

Once the qualification DST sample has been provided by the TOC, the DFLAW feed qualification laboratory performs analyses to determine feed acceptance. The feed qualification laboratory will also analyze the LAWPS-treated LAW feed sample prior to transfer.

The sample volume, number of samples, required analyses, and quality of data required for the treated LAW feed acceptance criteria will be described in the DFLAW DQO.

2.6 Transfer Procedure

2.6.1 Transfer Procedure Requirements

The TOC and WTP Contractor will prepare a detailed procedure for transferring treated LAW feed into the WTP Contractor's feed receipt system based on updates to the information in the WTP DWP and new TOC dangerous waste permit waste characterization and waste transfer requirements. Appendix D provides draft transfer procedure concepts whose elements should be incorporated in the operating procedure when developed. The draft transfer procedure concepts in Appendix D do not drive requirements on the transfer process; instead, they are used to help identify and understand interfaces between the TOC and the WTP Contractor for planning purposes.

2.6.2 Pipeline Flushing Requirements

Since treated LAW feed is not expected to contain solids, flush liquid is used to push feed in the transfer pipeline to the LAW CRV. Following the transfer of feed to the WTP Contractor's LAW CRV, the TOC will initiate a single post-transfer flush. The volume of water used for the flush is determined by the next planned transfer of feed.

- If the next transfer of feed is expected in less than 72 hours, the TOC will flush the transfer pipeline with a volume of water that is not more than the transfer pipeline volume (1500 gallons [5.68 m³])
- If the next transfer of feed is expected to be more than 72 hours later, then the TOC will flush the transfer pipeline with a volume of water that is at least 1.5 times the transfer pipeline volume (2200 gallons [8.33 m³]) (*Waste Transfer, Dilution, and Flushing Requirements*, TFC-ENG-STD-26 [WRPS 2014b]).

The flush water flow rate is limited to 88 gal/min (Section 2.7.2), but it should not be less than the actual feed transfer rate without exceeding the system design pressure (WRPS 2011b). The WTP Contractor will limit the amount of flush water to the LAW CRV by monitoring total flow and density to detect the end of feed transfer and the beginning of flushing. When the flush water first reaches the CRV, the WTP Contractor will align valves to stop delivery to the CRV and send flush water to the low point drain vessel in the WTP effluent management facility (EMF). When the flow of flush water is stopped, the TOC isolates the transfer pipeline from connected equipment, and the WTP Contractor drains the contents of the pipeline to the low point drain vessel.

When a portion of the transfer pipeline flush water is combined with the feed, the composition of the feed batch is expected to remain compliant with the limits established in Table 5, except that the sodium concentration may decrease. The TOC will communicate the post-transfer flush volume delivered to WTP to allow the WTP Contractor to confirm water volumes delivered to the EMF. The WTP Contractor will also report the volume of flush water received.

2.6.3 Transfer Coordination

Prior to the acceptance of a DFLAW feed campaign, the WTP Contractor will participate in the development of the LAWPS Tank Sampling and Analysis Plan for each campaign for mutual agreement on sample collection, handling, and analytical requirements as described in Section 2.5.1.1. After acceptance of DFLAW feed campaign, but before each batch transfer from the TOC to the LAW Facility, the WTP Contractor will transmit a transfer batch sheet to the TOC for acceptance in order to formally convey the requested quantity, route, and other pertinent parameters related to the specific treated LAW feed transfer. The TOC will respond with acceptance or comments on these transfer parameters. The WTP Contractor and TOC agreement of these parameters is a prerequisite for initiating the transfer operation. The contents of this batch sheet will be developed by the WTP Contractor and coordinated with the TOC per the process defined in a future batch processing methodology report developed for DFLAW. Implementing protocols will be developed at a later date. The coordination process and documentation will be prepared jointly by the WTP Contractor and the TOC during the development of the detailed procedure for transferring treated LAW feed into the WTP Contractor's feed receipt system.

A conceptual transfer sequence with key information exchanges is included in Appendix D.

2.7 Treated LAW Feed Transfer Limitations and Requirements

2.7.1 Treated LAW Feed Transfer Limits

Table 7 Treated LAW Feed Transfer Physical Limits

Transfer Property	Delivery Parameter
System design pressure for new sections of the transfer pipeline	≥ 150 psig (Section 2.1.1)
System design temperature for new sections of the transfer pipeline	≥ 150 °F (Section 2.1.1)
Maximum operating pressure on the WTP side of the interface	≤ 136 psig (Section 2.1.1)
Maximum operating temperature	< 140 °F (Table 5)

2.7.2 LAW Feed Transfer Requirements

Treated LAW feed will be delivered at a maximum transfer flow rate of 88 gal/min based on the design capacity of the LAW CRVs (*LAW Concentrate Receipt Vessels LCP-VSL-00001/00002 Sizing*, 24590-LAW-M6C-LCP-00001 [BNI 2009b]).

The maximum batch transfer volume is 9100 gallons (*LAW Concentrate Receipt Process System (LCP) Data*, 24590-LAW-MVC-LCP-00002 [BNI 2007]). The batch transfer will be monitored by the WTP Contractor for flow rate, total volume, and density. The batch transfer will be monitored with a radiation monitor at the line to stop the transfer if the measured exposure exceeds limits for the LAW Facility.

Both contractors will measure the total volumes of treated LAW feed and flush water transferred.

3 References

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ASTM A 312/A 312M. *Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes*. American Society for Testing and Materials, Easton, MD.

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BNI. 2005. *Time to Pressurize Transfer Pipe's Annular Volume*, 24590-PTF-M0C-10-00005, Rev 0. Bechtel National, Inc., Richland, WA.

BNI. 2007. *LAW Concentrate Receipt Process System (LCP) Data*, 24590-LAW-MVC-LCP-00002, Rev 1. Bechtel National, Inc., Richland, WA.

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BNI. 2010a. *ICD 19, Proposed Table 4 Change*, CCN 225697, dated 09 November 2010. Bechtel National Inc., Richland, WA.

BNI. 2010b. *Engineering Specification for Pretreatment Ultrafilters*, 24590-PTF-3PS-MLFP-T0003, Rev 1. Bechtel National Inc., Richland, WA.

BNI. 2010c. *Design Pressure and Design Temperature Calculation for LCP System*, 24590-LAW-MEC-LCP-00002, Rev 0. Bechtel National, Inc., Richland, WA.

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BNI. 2013a. *Engineering Specification for Piping Class S32B*, 24590-WTP-3PB-P000-TS32B, Rev 25. Bechtel National, Inc., Richland, WA.

BNI. 2013b. *Response to ORP Question on Cathodic Protection of Tank Farm Transfer Piping*, CCN 258399, dated 10 July 2013. Bechtel National Inc., Richland, WA.

BNI. 2013c. *Interface Control Drawing*, 24590-WTP-B2-C12T-00001, Rev 2. Bechtel National Inc., Richland, WA.

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BNI. 2015. *Criticality Safety Evaluation Report for Direct Feed to the Low-Activity Waste Facility*, 24590-WTP-CSER-NS-14-00001. Bechtel National, Inc., Richland, WA.

CH2. 2002. *Hanford 200 Area Intra Tank Farm and Cross-Site Transfer Line Encasement Piping Design Pressure Analysis LBB Technical Evaluation*, RPP-12094, Rev 0. CH2M HILL Hanford Group, Inc., Richland, WA.

DOE. 2000. DOE Contract No. DE-AC27-01RV14136, *Hanford Tank Waste Treatment and Immobilization Plant*, as amended. US Department of Energy, Richland Operations Office, Richland, WA.

DOE. 2013. *Acceptance of Contract Deliverable 2.11, Proposed Deminimus Organic Concentration in Received Tank Waste*, CCN 265033, dated 17 December 2013. US Department of Energy, Office of River Protection, Richland, WA.

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WAC 173-303. *Dangerous Waste Regulations*. Washington Administrative Code. Olympia, WA.

WRPS. 2011a. *Double Shell Tank Transfer Pump Subsystem Specification*, HNF-4162, Rev 5. Washington River Protection Solutions, Richland, WA.

WRPS. 2011b. *Double Shell Tank Diluent and Flush Subsystem Specification*, HNF-4163, Rev 6. Washington River Protection Solutions, Richland, WA.

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WRPS. 2014b. *Waste Transfer, Dilution, and Flushing Requirements*, TFC-ENG-STD-26, Rev C. Washington River Protection Solutions, Richland, WA.

WRPS. 2014c. *Tank Farms Waste Transfer Compatibility Program*, HNF-SD-WM-OCD-015, as amended. Washington River Protection Solutions, Richland, WA.

WRPS. 2014d. *One System: Tank Waste Disposition Integrated Flowsheet – River Protection Project Reference Integrated Flowsheet*, RPP-RPT-57991, Rev 0 (24590-WTP-RPT-MGT-14-023). Washington River Protection Solutions, Richland, WA.

WRPS. 2015a. *Tank Farms Operations Administrative Controls*, HNF-IP-1266, Section 5.8.8, Waste Transfer System Freeze Protection, Rev 2e. Washington River Protection Solutions, Richland, WA.

WRPS. 2015b. *Project T5L01 Low Activity Waste Pretreatment System Specification*, RPP-SPEC-56967, Rev 3. Washington River Protection Solutions, Richland, WA.

Appendix A - Open ICD 30 Issues and Actions

Issue / Action #	Tracking #	Issue / Action Description	Contract or Baseline (In-Out-N/A)		Affected Page(s)
			WTP	TOC ¹	
I30-01	24590-WTP-ATS-MGT-15-0431	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, startup, and commissioning scope that is currently outside the current specification in the WTP Contract.	Out	N/A	1-3 5-10 15-18
I30-02	WTP: 24590-WTP-ATS-MGT-15-0432 TOC Schedule Activity: WFQ-0625	Analysis of DFLAW feed samples from the qualification DST is not identified as either the TOC or the WTP Contractor scope.	Out	Out	15

Notes:

¹ TOC Baseline referenced here is the lifecycle performance measurement baseline (PMB) which includes both WRPS and DOE owned scope. The approved ICDs are one of the baseline documents that comprise the technical scope for the TOC Life-Cycle PMB.

Appendix B - Issues and Actions Closed Since Last Revision

Issue / Action #	Tracking #	Issue / Action	Date Closed	Resolution
None				

Appendix C - ICD 30 Open Items List

NOTE: The *Interface Management Plan*, 24590-WTP-PL-MG-01-001, defines ICD Issues as a contract technical, regulatory or nuclear safety baseline incompatibility for a WTP interface partner across a WTP Interface, or an incomplete WTP interface. There are also items that may not meet the definition of ICD Issues. New open items are added to each ICD revision as Appendix C with a tracking number or schedule ID that would serve to track their completion outside the ICD. Open items are removed from the ICD in the next revision following their introduction.

Item #	Description	Originator	Status
		Actionee	
0001	<p>The following design information is needed for this ICD:</p> <ul style="list-style-type: none"> Location of the interface will be determined by engineering studies involving the WTP Contractor and the TOC. A new interface location requires revision to the Interface Control Drawing (BNI 2013c). TOC and WTP Contractor will provide pipe design information for Table 2 and Table 3 when available. Current design of LAW LCP piping is 150 psig at 150 °F. If LAWPS feed delivery system design pressure is higher, the WTP Contractor needs to evaluate protection of installed piping. TOC will provide system design pressure and temperature based on LAWPS feed delivery system. Actuated valves inside LAW LCP bulge may require modification to meet the slow to close condition. The TOC and the WTP Contractor will coordinate the leak detection approach to support permit requirements. 	Dave Reinemann (WTP Contractor)	Open
		Mike Leonard (TOC) Paul Porcaro (WTP Contractor)	TOC Schedule Activity ID: WM5280 WTP Schedule Activity ID: 3ED1000008
0002	Establish commissioning integration strategies for DFLAW and LAW cold commissioning activities that include testing and transfer from the LAWPS to the LAW Facility.	Ross Hamlett (WTP Contractor)	Open
		Ross Hamlett (WTP Contractor) John Corbett (TOC)	TOC: Schedule Activity ID: WFQ-0260 WTP: 24590-WTP-ATS- MGT-15-0438
0003	<p>The following interface information is needed to support the development of the DFLAW DQO: The new DQO document needs to address the feed acceptance criteria specific to DFLAW. One System has the responsibility for developing the DQO.</p> <ul style="list-style-type: none"> Determine the timing of sampling, delivery of results, and feed acceptance with the transfer date for the first batch of each campaign. The requirements for sampling the DFLAW qualification DST to meet DQO requirements need to be determined. 	Dave Reinemann / David Blumenkranz (WTP Contractor)	Open
		Stuart Arm (TOC) Bob Henckel (WTP Contractor)	TOC Schedule Activity ID: WFQ-0105 WTP Schedule Activity ID: 3ED4702030

Item #	Description	Originator	Status
		Actionee	
0004	<p>The development of the DFLAW feed qualification program will need to address the following concerns:</p> <ul style="list-style-type: none"> • Include in the ICD that, aside from water additions, a source tank is to be locked out from additional waste transfers, or re-sampling will be required, with the exception of transfers to the LAWPS staging/feed tank. (David Blumenkranz, WTP Contractor) • Include in the ICD that TOC is to provide WTP with source tank samples for analysis at a qualified lab and results will be used in combination with data for the heel of previously staged LAWPS staging/feed tank to characterize the LAWPS feed after source tank additions. The contribution of the new source tank, the previous heel, and any water additions must be used to generate the data required by Table 4. (David Blumenkranz, WTP Contractor) • ILAW glass fabrication is a required Waste Feed Qualification activity per recommendation contained in EFRT Issue M5 closure documentation. (Peter Benson, WTP Contractor) • Method of tracking data for regulatory analytes back to the source tank is not established. (Ross Hamlett, WTP Contractor) • Regulatory DQO and WTP Contract Specification 7 do not apply to DFLAW acceptance. Although it applies to staged LAW DST feed, WTP Contract, permit or LAW Facility requirements do not apply at the DST because TOC is further treating this waste. (Aruna Arakali, WTP Contractor) • Analysis of regulatory analytes on untreated feed is not sufficient to satisfy the WTP Dangerous Waste Permit. The grab sample either has to be treated (i.e., filtration, ion-exchange), and then analyzed for the regulatory analytes, or the analysis for the regulatory analytes has to be moved to the LAWPS sample. (Peter Benson, WTP Contractor) • Data for WTP permit and glass formulation compliance must apply to corresponding received feed, not to altered feed. (Aruna Arakali, WTP Contractor) • The sample of pretreated LAW feed from the LAWPS will need to be provided with adequate time for the WTP Contractor to determine waste acceptability, glass formulation, and documentation. This sample should be designated as a WTP process “hold point” while these determinations are completed. (Jim Nelson, WTP Contractor) 	Originator is listed with the specific concern	<p>Open</p> <p>TOC Schedule Activity ID: WFQ-0110</p> <p>WTP: 24590-WTP-ATS-MGT-15-0432</p>
		Stuart Arm (TOC) Bob Henckel (WTP Contractor)	

Appendix D - Draft Transfer Procedure Concepts

	Responsibility	Action	Why Needed
1	WTP Contractor	WTP Contractor requests transfer of compliant treated LAW feed.	WTP Contractor communicates need to receive next batch of treated LAW feed including: <ul style="list-style-type: none"> • Campaign number • Scheduled transfer start time • Transfer volume • Intended transfer path
2	TOC	Acknowledge request for transfer of qualified LAW feed.	TOC concurs with transfer details above.
3	WTP Contractor	WTP Contractor internal pre-requisites and entry conditions met.	WTP Contractor internal system and administrative requirements met, including: <ul style="list-style-type: none"> • Tank space available • No transfer line leak detection alarms • LAW feed qualification acceptance
4	TOC	TOC internal prerequisites and entry conditions met.	TOC internal system and administrative requirements met including: <ul style="list-style-type: none"> • Pre-transfer mixing complete • Flush water staged (LAW feed)
5	WTP Contractor	WTP Contractor aligns to receive transfer.	Align system to receive feed and clear transfer and to clear permissives and interlocks.
6	TOC	TOC aligns for transfer to WTP.	Align system to transfer LAW feed to WTP.
7	TOC	Verify applicable leak detectors in transfer path are not in alarm.	Ensure no inadvertent environmental discharges.
8	WTP Contractor	Set transfer permissive hand switch.	Completes logic to enable TOC transfer pump, including: <ul style="list-style-type: none"> • No leak detection alarms on transfer line • System lineup to a receipt vessel • LAW Facility operator hand switch set
9	TOC	Notify and initiate LAW feed transfer.	Transfer LAW feed.
10	WTP Contractor	Monitor vessel levels and other process indicators.	Monitor during transfer to identify upset conditions.
11	TOC	Monitor vessel levels and other process indicators.	Monitor during transfer to identify upset conditions.
12	WTP Contractor	Align transfer path to additional receipt vessel if needed.	Delivery of feed to both CRVs in one transfer reduces volume of flush water.
13	WTP Contractor	Terminate transfer by removing permissive if necessary due to upset or exceeding target volume.	WTP Contractor may terminate the transfer if needed due to process upset or if transfer exceeds target volume.
14	TOC	Terminate LAW feed transfer upon reaching target volume.	Terminate once agreed volume of LAW feed is transferred.

	Responsibility	Action	Why Needed
15	TOC	Initiate post-transfer flush.	Flush line to clear residual feed.
16	WTP Contractor	Align flush through required flow paths.	Flush water through lines and dead legs filled by the transfer.
17	WTP Contractor	Terminate flush by removing permissive if necessary due to upset of exceeding target volume.	WTP Contractor may terminate the flush if needed due to process upset or if flush exceeds target volume.
18	TOC	Terminate flush.	Minimize water sent to WTP.
19	WTP Contractor	Remove transfer permissive via hand switch.	Remove transfer permissive from the TOC to the WTP Contractor to prevent inadvertent transfers.
20	TOC	Align valves to facilitate draining of transfer line by WTP Contractor.	Prevent inadvertent transfer and siphon.
21	WTP Contractor	Align valves to drain transfer line.	Eliminate standing water in transfer line as corrosion mitigation.
22	WTP Contractor	Secure lineup for LAW feed receipt.	Align for next operational activity.
23	TOC	Secure lineup for LAW feed transfer.	Align for next operational activity.
24	WTP Contractor	Transmit amount of material received as indicated by WTP instrumentation.	Volumetric balance for transfer.
25	TOC	Transmit amount of material received as indicated by TOC instrumentation.	Volumetric balance for transfer.

Appendix E - Definitions

This appendix was developed as a reference to standardize the definition of terms used for direct LAW feed between the TOC, the WTP Contractor, and ORP. Of particular importance is the WTP Contractor's definition of the terms which are used to determine the acceptance criteria values in Table 5.

General Definitions

- **Batch**
A discrete volume of qualified treated LAW feed transferred from a single LAWPS lag storage tank to a LAW Facility CRV as a volume fraction of a campaign.
- **Campaign**
All of the batches of treated LAW feed delivered to the LAW Facility from a single qualified DST.
- **Concentrate Receipt Vessel (CRV)**
The CRVs are part of the LAW concentrate receipt process system (LCP). The two vessels are designed to receive concentrated LAW feed from the Pretreatment Facility and then transfer the feed to the LAW melter feed process system (LFP). In DFLAW operation, these vessels will receive treated LAW feed from the LAWPS and will function as feed receipt vessels.
- **DFLAW Feed**
Tank waste upstream of the LAWPS that has been selected for processing in the LAWPS.
- **Flush Water**
Strained raw water without addition of sodium hydroxide or sodium nitrite.
- **Separable Organics**
Separable organics are organic compounds (carbon based molecules) that are present in concentrations beyond their saturation point. The saturation point for a sample is determined by holding it at 25 °C for 8 hours. If the organic species separates as a solid or liquid under these conditions, the organic is deemed "separable."
- **Suspended Solids**
Suspended solids in treated LAW feed is a measurement of the dry weight of solids not dissolved in the carrier solution and is defined as the product of centrifuging the feed, separating and drying the solids, and removing the dissolved solids contribution. Results are expressed in weight percent solids in the treated LAW feed.
- **Treated LAW Feed**
The stream produced by the LAWPS to be delivered to WTP.
- **Treated LAW Feed Acceptance Criteria**
Quantified limitations on treated LAW feed parameters established to protect the WTP design or safety basis and meet environmental permit requirements.
- **Treated LAW Feed Transfer Physical Limits**
Those physical limitations imposed upon the transfer of treated LAW feed to ensure the physical integrity of the transfer system and process stability.

- **WTP Contractor**

The WTP Contract (DOE 2000) defines two WTP Contractors. The first is the WTP Contractor (referred to as the “Contractor” in the WTP Contract) who is responsible for designing, constructing, commissioning, and supporting the transition of the WTP to the WTP Operating Contractor (referred to as the “Operations Contractor” in the WTP Contract) to be selected by DOE. The term “WTP Contractor” used within this ICD applies to the “Contractor” as defined in the WTP Contract (DOE 2000).

- **WTP Operations Contractor**

The WTP Contract (DOE 2000) defines two WTP Contractors. The first is the WTP Contractor (referred to as the “Contractor” in the WTP Contract) who is responsible for designing, constructing, commissioning, and supporting the transition of the WTP to the WTP Operating Contractor (referred to as the “Operations Contractor” in the WTP Contract) to be selected by DOE. The term “WTP Operations Contractor” used within this ICD applies to the “Operations Contractor” as defined in the WTP Contract (DOE 2000).

Treated LAW Feed Acceptance Criteria (Table 5) Definitions

- **Feed Receipt Temperature**

Monitored in the TOC LAWPS lag storage tank or transfer line during the entirety of the feed transfer.

- **Hydrogen Generation Rate**

Determined using the entire slurry and at the temperature listed. Result is determined from the measured hydrogen generation rate (g-mol H₂/L/hr) and the volume tested (L). The hydrogen generation rate (g-mol H₂/L/hr) is to be determined by sample and analysis.

- **Feed Bulk Density**

Density of the entire stream, including any solids present. Results are to be determined after holding the sample at 25 °C for 8 hours.

- **Feed Viscosity**

Viscosity of the entire stream, including any solids present. Results are to be determined after holding the sample at 25 °C for 8 hours.

- **Solids Concentration**

See general definition section for definition of suspended solids. Results are expressed in weight percent solids (mass of dry solids / mass of slurry) and are to be determined after holding the sample at 25 °C for 8 hours.