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RPP-WTP PDC

Document title: # ICD 19 - Interface Control Document for Waste Feed

Document number: 24590-WTP-ICD-MG-01-019, Rev 7

Contract: DE-AC27-01RV14136 **Contract deliverable:** C.9.1

Department: Project Management

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

Approved by: Brion D. Taki Brion D Taki

Print Name **Signature**

ICD 19 Team Lead and Principal Author

Issue Status: Approved

Date Issued: 9/19/14

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NOTE: **This document contains information pertinent to an accident analysis calculation and receives a safety screening from E&NS, in accordance with procedures, anytime the document is modified.**

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.**

WTP Interface Partner Concurrence

Interface Owners (IOs) including ORP and DOE-RL when appropriate, will sign ICD concurrence sheets indicating their concurrence with the ICD contents. These concurrence signatures signify that the ICD accurately reflects current contract baselines, except as indicated in Appendix A, Open ICD Issues and Actions. This ICD shall not be approved until all concurrence signatures on this page have been obtained.

Organization	Position	Name	Signature	Date
WTP Contractor	ICD 19 Interface Owner	Ray Patterson / Brad Davis		9/11/14
WTP Contractor	One System Operations Manager	Garth Duncan		9/11/14
WTP Contractor	Design Authority	Russell Daniel		9/11/14
TOC	ICD 19 Interface Owner	Stuart Arm		9/11/14
ORP-WTP	ICD 19 Interface Owner	Wahed Abdul		9/12/14
ORP-TF	ICD 19 Interface Owner	Chris Harrington		9/12/14
ORP-WSC	WTP Startup and Commissioning Integration Manager	Ben Harp		9/17/14
ORP-TF	Tank Farms Assistant Manager	Tom Fletcher		9/18/14
ORP-WTP	WTP Assistant Manager	Bill Hamel		9/18/14

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.

History Sheet

Rev	Date	Reason for revision	Revised by
A	16 Jul 2001	Issued for ORP concurrence.	B Taki
0	14 Mar 2002	Provided for ORP Contracting Officer to issue as operative ICDs. Upon issuance, this document will supersede BNFL-5193-ID-19, Rev 6.	T Johnson
1	15 Aug 2002	Semi-annual update.	J Julyk
2	15 Feb 2003	Semi-annual update.	L Pennington
3	15 Aug 2003	Semi-annual update. Combined ICD-20 into ICD-19. Incorporated ICFs: 24590-WTP-ICF-MG-03-003, Combine ICDs 19 and 20; 24590-ICF-WTP-ICF-MG-02-001, Routing Pit; 24590-WTP-ICF-PR-02-001, Entrained Solids.	L Pennington
4	15 April 2008	Complete revision to include waste feed physical property assumptions and parameters for Waste Treatment Plant and to apply new procedural format. Transitioned tracking of all Issues and Action Items to the Action Tracking System as follows: Issue I19-34 → 24590-WTP-ATS-QAIS-07-666, ICD 19 time intervals Issue I19-35 → 24590-WTP-ATS-QAIS-07-667, Delivery location of Tank Farm samples Issue I19-44 → 24590-WTP-ATS-QAIS-07-715, Incorporate criticality safety parameters Issue I19-45 → 24590-WTP-ATS-QAIS-07-668, Reconciliation of WTP waste feed standards with TFC contract Issue I19-46 → 24590-WTP-ATS-QAIS-07-669, WTP-TFC Siphoning prevention Action A19-1 → 24590-WTP-ATS-QAIS-07-674, Identification of WTP-TFC operating procedures required to meet authorization basis Action A19-2 → 24590-WTP-ATS-QAIS-07-670, Reconcile WTP specifications and testing requirements with TFC Action A19-3 → 24590-WTP-ATS-QAIS-07-789, Waste feed lines in-service testing and maintenance procedures Action A19-4 → 24590-WTP-ATS-QAIS-07-780, Waste feed line construction interface with Tank Farm Contractor Action A19-5 → 24590-WTP-ATS-QAIS-07-671, Define emergency transfer parameters (Continued on following page)	Mark N Hall

History Sheet

Rev	Date	Reason for revision	Revised by
4 (cont.)		Action A19-6 → 24590-WTP-ATS-QAIS-07-724, Address potential for plugged transfer line	Mark N Hall
		Action A19-7 → 24590-WTP-ATS-QAIS-07-788, Align WTP / TFC schedule dates for transfer of feed	
		Action A19-8 → 24590-WTP-ATS-QAIS-07-725, Develop LAW and HLW feed requirements for WTP hot operations	
		Action A19-9 → 24590-WTP-ATS-QAIS-07-706, Develop and approve a waste feed transfer schedule	
		Action A19-10 → 24590-WTP-ATS-QAIS-07-707, Include criticality safety limits from CSER into ICD 19	
		Action A19-11 → 24590-WTP-ATS-QAIS-07-708, Address uncertainties in WTP criticality safety limits	
		Action A19-12 → 24590-WTP-ATS-QAIS-07-709, Define WTP and TFC roles and responsibilities for assuring compliance with the criticality safety limits	
		Action A19-13 → 24590-WTP-ATS-QAIS-07-710, Mitigation process for waste batches outside criticality safety limits	
		Action A19-14 → 24590-WTP-ATS-QAIS-07-711, Develop criticality specification for the WTP receipt vessels	
		Action A19-15 → 24590-WTP-ATS-QAIS-07-712, Review and optimize the process for authorizing and scheduling waste transfers	
		Action A19-16 → 24590-WTP-ATS-QAIS-07-713, Define criteria for when a hot pre-flush is required	
5	10 August 2011	Addresses ORP concerns following issuance of 24590-WTP-ICD-MG-01-019, Rev 4 (CCN 177718)	John Olson
		AND	
		ORP Letter to N. F. Grover dated Aug 1, 2008, *Contract No. DE-AC27-01RV14136 - Direction to Make Changes and Re-Issue Interface Control Documents (ICD) 5, 6, 9, 11, 12, and 19* (CCN 183784)	
6	30 Sep 2013	Periodic update.	Eric Slaathaug
7	19 Sep 2014	Incorporated 24590-WTP-ICF-ENG-13-0001 (BNI 2014b).	Brion Taki
		Closed ICD Issues I19-47, *Reconcile WTP/TOC Sampling Plan Incompatibilities* and I19-48, *There Is an Incompatibility Between the Maximum Waste Feed Particle Size-Density Combination Described in the WTP BOD and the TOC Lifecycle PMB to Provide Waste Feed Within That Constraint.*	
		Closed Open Items #0009, #0015, #0016, #0017, #0018, #0019, #0020, #0021, #0022, #0023, #0024, #0025, #0026, #0027, #0028, #0029, #0030, #0031, and #0032.	

Revision Description

ICD Section	Description
Concurrence Sheet	Added WTP Contractor One System Operations Manager, WTP Contractor Design Authority, ORP-WSC WTP Startup and Commissioning Integration Manager, and ORP-TF Tank Farms Assistant Manager as providing concurrence.
Acronyms	Added PMB as acronym for Performance Measurement Baseline.
2.1.1	Replaced "SN-701 should not be used for transporting or receiving HLW feeds …" in the last paragraph on page 1 with "Based on the current WTP design depicted on P&IDs 24590-PTF-M6-FRP-00003001 (BNI 2011d) and 24590-PTF-M6-PWD-00057 (BNI 2008), and safety basis requirements identified in Section 5.5.22.1 of the *Preliminary Documented Safety Analysis to Support Construction Authorization; PT Facility Specific Information* (BNI 2014a) and Section 6 of the *Basis of Design* (BNI 2011c), SN-701 must not be used …" Added the following text to the paragraph after Table 4: "TOC also has a requirement for freeze protection on waste transfer-associated structures (e.g., valve pits) that are physically connected to a waste transfer pump not under administrative lock (WRPS 2014d). Therefore, air temperature monitoring in waste transfer-associated structures is required during active waste transfers."
2.2.1	Replaced "… in the event the decision is made to remove 241-AY-102 from service" with "as a result of the decision to remove 241-AY-102 from service and to retrieve waste from 241-AY-102 to another DST."
2.3.1	In conjunction with closure of ICD Issue I19-47, deleted the following bullet item: • Reconciliation of requirements and capabilities is ongoing (ICD Issue I19-47, Reconcile WTP/TOC Sampling Plan Incompatibilities, 24590 WTP-ATS-MGT-11-0559, TOC WBS 5.03.01.07.03, WFD Tank Mixing and Sampling).
2.4.2	Replaced "(7500 gallons [28.39 m^3]) total" with "(WRPS 2014b) for a total flush volume of not more than 7500 gallons (28.39 m^3)."
2.5.2	Deleted the second sentence in the first paragraph, the first sentence in the second paragraph, and the second sentence in the third paragraph.
2.6	Added the following text to more accurately reflect the relationship between the WAC and the WAC-DQO: "Data from bench-scale testing of unit operations for each new waste campaign will also be used to specify the volume of feed to be transferred. Since qualification data establish acceptable range for parameters in WTP identified campaigns, the feed receipt volume in WTP receipt vessels shall be based on the waste feed qualification data (BNI 2013a) to ensure campaign-specific waste processing strategy."
2.6, Table 6	Deleted second sentence in footnote 1 in conjunction with closure of ICD 19 Open Item #0026.
2.6, Table 7	Updated Note 3 to reflect current status. Deleted Notes 7, 9, and 17 with existing notes renumbered accordingly. Added Note 19 to median particle size and arithmetic average particle hardness properties in conjunction with closure of ICD 19 Open Item #0015. Added Note 20 to HLW feed slurry rheology in conjunction with closure of ICD 19 Open Item #0031.
2.6.2, Table 7, 3, App C, App E	Incorporated 24590-WTP-ICF-ENG-13-0001(BNI 2014b).

Revision Description

ICD Section	Description
2.8, Table 8	Added the following WTP documents to the Interface Configuration Management Items table: • 24590-WTP-PSAR-ESH-01-002-02, *Preliminary Documented Safety Analysis to Support Construction Authorization; PT Facility Specific Information.* • 24590-WTP-PL-OP-12-0004, *Waste Feed Qualification Program Plan.*
3	Added the following documents as references: • Added 24590-PTF-M6-PWD-00057, *PTF – P&ID Plant Wash & Disposal System Underground Transfer Lines* as BNI 2008. • 24590-WTP-M3C-V11T-00002, *Calculation of Terminal Settling Velocity of Solids in LAW Feed* as BNI 2010f. • Added 24590-PTF-M6-FRP-0000301, *P&ID – PTF Waste Feed Receipt Process System FRP-PMP-0001 and FRP-PMP-00002A* as BNI 2011d. • 24590-WTP-ICF-ENG-13-0001, *Incorporate Waste Acceptance Criteria Technical Team Recommendations into ICD-19* as BNI 2014b. • CCN 270769, *Workshop on ICD 19 Issue 19-47 - Waste Treatment Plant (WTP) / Tank Farm Operating Contractor (TOC) Sampling Capability* as BNI 2014c. • CCN 270770, *Workshop on ICD 19 Issue I19-48 - Waste Feed Particle Size and Density* as BNI 2014d. • CCN 229195, *Description of How the Design and Safety Margin Will Be Applied to the Hanford Tank Waste Treatment and Immobilization Plant (WTP) Design With Respect to the Current Particle Size Design Basis* as BNI 2014e. • CCN 265033, *Acceptance of Contract Deliverable 2.11, Proposed Deminimus Organic Concentration in Received Tank Waste* as DOE 2013. • CCN 272195, *Closure of ICD 19 Issue I19-47 (Sampling Issue)* as DOE 2014a. • CCN 272625, *ICD-19 vs. Baseline Disconnect for Particle Size* as DOE 2014b. • RPP-RPT-56000, *External Review of the Remote Sampler Demonstration Platform* as WRPS 2013c. • RPP-RPT-55646, *One System Evaluation of Separable Organics in the Tank Waste* as WRPS 2013d • RPP-RPT-57896, *Estimate of Waste Feed Delivery Non-Newtonian Conditions* as WRPS 2014a. • HNF-IP-1266, *Tank Farms Operations Administrative Controls*, Section 5.8.8 as WRPS 2014d. Deleted the following documents as references and renumbered existing references accordingly: • 24590-WTP-RPT-PE-12-004, *Proposed Deminimus Organic Concentration in Received Tank Waste* as BNI 2012e and BNI 2012g. • CCN 241247, *Submittal of Contract Deliverable 2.11, Proposed Deminimus Organic Concentration in Received Tank Waste* as BNI 2012h. • CCN 241253, *Response to Defense Nuclear Facilities Safety Board (DNFSB) Staff Issue Report Regarding Plugging of Process Lines, Pretreatment Facility, Waste Treatment Plant, Hanford Site* as BNI 2013d. Changed the following documents from a DOE reference to a BNI reference: • 24590-WTP-PL-ENG-12-0007, *One System Plan for Closing Current WTP Feed Acceptance Criteria Issues, Open Items, and Actions* as BNI 2012g from DOE 2012a. • 24590-WTP-RPT-MGT-12-022, *One System Initial Gap Analysis between Waste Treatment Plant Waste Acceptance Criteria and Tank Farm Sampling and Transfer Capability, 2010-2 Implementation Plan Commitment 5.5.3.1* as BNI 2012h from DOE 2012b.

Revision Description

ICD Section	Description
3 (cont.)	Updated the issue date of the following documents and renumbered existing references accordingly: • 24590-PTF-M0C-10-00005, *Time to Pressurize Transfer Pipe Annular Volume* as BNI 2005b from BNI 2003a. • 24590-WTP-CH-MGT-11-008, *One System IPT Charter* as BNI 2013d from WRPS 2013c. • 24590-WTP-PSAR-ESH-01-002-02, *Preliminary Documented Safety Analysis to Support Construction Authorization; PT Facility Specific Information* as BNI 2014a from BNI 2013e. • HNF-4161, *Double-Shell Tank Transfer Piping Subsystem Specification* as WRPS 2013b from WRPS 2011c. • TFC-ENG-STD-26, *Waste Transfer, Dilution, and Flushing Requirements* as WRPS 2014b from WRPS 2012c. • HNF-SD-WM-OCD-015, *Tank Farms Waste Transfer Compatibility Program* as WRPS 2014c from WRPS 2013b.
App A	Removed ICD Issues I19-47 and I19-48.
App B	Closed ICD Issue I19-47 with the following resolution: "Current WAC-DQO parameters have been established and captured in Table 6 and Table 7 as discussed in CCN 270769 (BNI 2014c). Isolok samplers were evaluated as best available to meet requirements per RPP-RPT-56000 (WRPS 2013c). Documented approval by ORP to close I19-47 has been assigned CCN 272195 (DOE 2014a)." Closed ICD Issue I19-48 with the following resolution: "ORP has directed WRPS to incorporate the particle size included in ICD-19 Rev 7 into the planning basis for the Lifecycle Baseline. Documented approval by ORP to close I19-48 has been assigned CCN 272625 (DOE 2014b)."
App C	Closed the following Open Items: #0009, #0015, #0016, #0017, #0018, #0019, #0020, #0021, #0022, #0023, #0025, #0026, #0027, #0028, #0029, #0030, #0031, and #0032. Removed the following items closed in Rev 6 from the Open Items list: #0001, #0002, #0003, #0004, #0005, #0006, #0007, #0008, #0010, #0011, #0012, #0013, and #0014.
App E	Changed the definition of "Maximum Particle Size" from "TBD - Refer to ICD Issue I19-48" to "Largest particle size that can be delivered to WTP."

Contents

Appendices

Tables

Acronyms

ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BOF	balance of facilities
CSER	Preliminary Criticality Safety Evaluation Report for the WTP
CSL	criticality safety limit
DOE	US Department of Energy
DOE-RL	US Department of Energy, Richland Operations Office
DST	double-shell tank
HLW	high-level waste
HTWOS	Hanford Tank Waste Operations Simulator
ICD	interface control document
IHLW	immobilized high-level waste
IMP	interface management plan
IO	interface owner
IWFDP	Integrated Waste Feed Delivery Plan
ISAP	Integrated Sampling and Analysis Plan
LAW	low-activity waste
ORP	US Department of Energy, Office of River Protection
PCB	polychlorinated biphenyl
PDSA	Preliminary Documented Safety Analysis
PMB	Performance Measurement Baseline
PSDD	particle size and density distribution
PT	pretreatment
PTF	Pretreatment Facility
QA/QC	quality assurance/quality control
RDQO	Regulatory Data Quality Objectives
RPP	River Protection Project
TBD	to be determined
TF	tank farms
TFMCS	tank farms monitoring and control system
TOC	Tank Operations Contractor
TOC	total organic carbon
TSAP	tank sampling and analysis plan
ULD	unit liter dose
WAC	waste acceptance criteria
WAC-DQO	Initial Data Quality Objectives for WTP Feed Acceptance Criteria
WTD	waste transfer date
WTP	Hanford Tank Waste Treatment and Immobilization Plant

1 Interface Definition

This interface control document (ICD) describes the required physical and administrative interactions to allow for the transfer of Hanford Tank Farms (TF) tank waste by the Tank Operations Contractor (TOC) to the Hanford Tank Waste Treatment and Immobilization Plant (WTP) Pretreatment Facility (PTF) and, if necessary, from the WTP PTF back to the TF. This document does *not* cover the direct transfer of Hanford tank waste to either the Low-Activity Waste (LAW) or High-Level Waste (HLW) Vitrification Facilities.

1.1 Functional Requirements

Table 1 (on the following page) presents the interface requirements for each responsible organization. Column 1 presents the WTP Contractor interface responsibilities identified in the WTP Contract baseline. Column 2 presents TOC interface responsibilities identified in the TOC baseline. Column 3 summarizes interface actions for the US Department of Energy (DOE) necessary to support this interface.

2 Interface Information

2.1 Physical Interfaces

2.1.1 Physical Description

The transfer line physical interface for waste feed from the Hanford TF to the PTF shall be welded pipe stubs located at the WTP Site boundary (DOE 2003). The interface for the instrumentation signal lines between the WTP Contractor and the TOC shall also be located at the interface as shown on Sheet 1 of the *Interface Control Diagram Transfer Piping Plan* (DOE 2003).

The three feed transfer pipelines consist of 3-inch stainless steel pipes, each inside a 6-inch carbon steel outer pipe (WRPS 2013b, Fluor 2003). The encasement (exterior) pipe is insulated with rigid-polyurethane foam insulation and is protected from corrosion by an epoxy coating and a waterproof, nonmetallic insulation jacket (WRPS 2014b, BNI 2013e).

The ICD 19 Review Team has agreed that the lines will be used as follows (BNI 2012b):

TOC Line #	WTP Line #	Designation	Node # on Interface Control Drawing (BNI 2013g)
SN-637	FRP-PZ-01749-W62F-03	Primary HLW line	Node 2
SN-700	FRP-PZ-01750-W62F-03	Back Up HLW line	Node 1A
SN-701	FRP-PZ-01751-W62F-03	Dedicated LAW line	Node 1B

The TOC has provided three transfer lines, and the WTP contractor will connect to these three lines. With the current jumper design and configuration within the PTF, lines SN-637 and SN-700 are used for transporting HLW feed between the Hanford TF and the PTF. Line SN-701 is used for transporting LAW feed between the Hanford TF and the PTF. Based on the current WTP design depicted on P&IDs 24590-PTF-M6-FRP-00003001 (BNI 2011d) and 24590-PTF-M6-PWD-00057 (BNI 2008), and safety basis requirements identified in Section 5.5.22.1 of the *Preliminary Documented Safety Analysis to Support Construction Authorization; PT Facility Specific Information* (BNI 2014a) and Section 6 of the *Basis of Design* (BNI 2011c), SN-701 must not be used for transporting or receiving HLW feeds in order to avoid getting solids that settle faster than 0.03 ft/min (Footnote #1, Table 7) in the PTF LAW receipt vessels. In the event that the use of a transfer pipe is lost, the jumper configuration within the PTF is capable of being modified to allow the use of SN-700 for transporting HLW **or** LAW feed between the

Table 1 Requirements for the Waste Feed Interface

The Waste Treatment Plant Contractor Shall...	The Tank Operations Contractor Shall...	DOE Will...
1 The TOC and WTP Contractor will jointly prepare a detailed procedure for transferring waste feed into the WTP feed receipt system.	1 The TOC and WTP Contractor will jointly prepare a detailed procedure for transferring waste feed into the WTP feed receipt system.	1 No Action.
2 The TOC and WTP Contractor will jointly prepare a detailed procedure for non-routine transfers of feed back to the TF receipt system.	2 The TOC and WTP Contractor will jointly prepare a detailed procedure for non-routine transfers of feed back to the TF receipt system.	2 No Action.
3 Coordinate construction activities in accordance with approved procedures, approved permits, and WAC 173-303 to minimize interference during the installation of pipelines and supporting system.	3 Coordinate construction activities in accordance with approved procedures, approved permits, and WAC 173-303 to minimize interference during the installation of pipelines and supporting systems.	3 No Action.
4 Provide pipelines from the WTP PTF waste feed receipt vessels to the specified interface point that meet the design criteria provided in this ICD. Connect the WTP pipelines to the TOC provided pipelines. Operate and maintain the waste transfer system in accordance with approved procedures, approved permits, and WAC 173-303.	4 Provide pipelines from the TF to the specified interface point that meet the design criteria provided in this ICD. Operate and maintain the waste transfer system in accordance with approved procedures, approved permits, and WAC 173-303.	4 No Action.
5 Provide to the WTP Contractor/TOC interface a permissive/shutdown (interlock) signal for transfer pumps operated by the TOC that will incorporate (at a minimum) the WTP transfer line leak detection system. Monitoring data for the WTP transfer lines and feed tank/feed receipt system will be exchanged. Operate and maintain the instrumentation signal lines and the leak detection system from the interface points to the WTP feed receipt vessels.	5 Provide a WTP Contractor/TOC interface with permissive signal/shutdown (interlock) signal for transfer pumps operated by the WTP Contractor, which will incorporate (at a minimum) the TF transfer line leak detection system. Monitoring data for the TF transfer lines and feed tank/feed receipt system will be exchanged. Operate and maintain the instrumentation signal lines and the leak detection system from the TF to the interface points.	5 No Action.
6 No Action.	6 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 (DOE 2003).	6 No Action.
7 Jointly maintain with the TOC and DOE a waste transfer plan and schedule for multi-year scheduling of waste feed campaign transfers to the WTP. Establish the Waste Transfer Date (WTD) for the first batch of each campaign.	7 Jointly maintain with the WTP Contractor and DOE a waste transfer plan and schedule for multi-year scheduling of waste feed campaign transfers to the WTP.	7 Jointly maintain with the TOC and WTP Contractor a waste transfer plan and schedule for multi-year scheduling of waste feed campaign transfers to the WTP.
8 Provide input to the River Protection Project (RPP) mission 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 Develop RPP mission 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 feed vectors for WTP evaluation. Transmit to the WTP Contractor the selected feed vectors for WTP evaluation.
9 Jointly prepare (with the TOC) a Tank Sampling and Analysis Plan (TSAP) for TOC sampling of each staged waste feed campaign.	9 Jointly prepare (with the WTP Contractor) a Tank Sampling and Analysis Plan (TSAP) for TOC sampling of each staged waste feed campaign. TOC will have the lead in production and development of this plan.	9 No Action.
10 Request waste feed in a manner that will support the requirements of the WTP Contract.	10 Respond to requests for waste feed and schedule delivery in a manner that will support the requirements of the TOC Contract.	10 Confirm volume and date of waste transfer.

Table 1 Requirements for the Waste Feed Interface

The Waste Treatment Plant Contractor Shall...	The Tank Operations Contractor Shall...	DOE Will...
11 Analyze samples or use existing information as provided in the WAC-DQO (BNI 2011a) to ensure compliance with WTP waste acceptance criteria (WAC). Report analysis results to the DOE. Notify the DOE of acceptability of each candidate feed prior to the WTD of such waste from the TF.	11 Provide the laboratory that the WTP Contractor selects to perform Waste Feed Qualification with samples of the staged waste comprising each campaign prior to the projected WTD of such waste to the WTP. The samples must be delivered according to the requirements in the WAC-DQO (BNI 2011a).	11 Authorize waste transfer of accepted feed.
12 For any waste feed campaign not accepted prior to transfer to the WTP, support TOC in the development of an assessment and recommendation of the preferred method(s) to adjust the waste feed for acceptance.	12 For any waste feed campaign not accepted prior to transfer to the WTP, prepare an assessment and recommendation of the preferred method(s) to adjust the waste feed for acceptance. Provide to DOE and the WTP Contractor for review and approval.	12 Provide review and approval of the assessment and recommendation of the preferred method(s) to adjust the waste feed for acceptance. Provide notification to the Department of Ecology.
13 Sample and analyze the transferred waste feed. If, for any reason, the waste feed is determined to be out of compliance, prepare an assessment and recommendation for disposition of the waste. Provide assessment to DOE for review and approval, and, if the recommendation involves transfer of the batch to the TF, obtain TOC review and approval.	13 Support WTP Contractor in the development of the assessment and recommendation. Review and approve assessment if recommendation involves transfer of the batch to the TF.	13 If the received feed is found to be out of compliance, determine jointly with the WTP Contractor the actions necessary to adjust the waste. If the waste cannot be adjusted, provide approval for transfer back to the TF. Provide notification to the Department of Ecology.
14 The WTP Contractor will determine the required waste treatment approach in accordance with the procedure required by Specification 12 and Contract Deliverable C.7-1 (Procedure to Determine the Waste Feed Treatment Approach).	14 No Action.	14 No Action.
15 Have the capability to receive and store 1.5 Mgal of LAW feed. The design shall include the capability to receive without interruption 1.125 Mgal of LAW feed, including transfer line flush water, from the TF while processing from the remaining capacity of 0.375 Mgal of LAW feed.	15 Deliver up to 1.125 Mgal of LAW feed, including transfer line flush water, from the TF to the WTP.	15 No Action
16 Have the capability of receiving without interruption no less than 145,000 gallons of HLW feed per batch, including transfer line flush water, from the TF.	16 Deliver up to 145,000 gallons of HLW feed per batch, including transfer line flush water, from the TF to the WTP.	16 No Action.
17 Document the volume of waste transfer and flush water received, and reconcile differences with the transfer volume recorded by the TOC.	17 Document the volume of waste and flush water transferred, and reconcile differences with the receipt volume recorded by the WTP Contractor.	17 No Action.
18 Document the volume of returned feed delivered and flush water received. Reconcile any differences with the volumes documented by the TOC.	18 Document the volume of returned feed received and flush water delivered, and reconcile any differences with the volumes documented by the WTP Contractor.	18 No Action
19 Provide the capability for non-routine returns of waste feed to the TF followed by the receipt of the transfer line flush water from the TF.	19 Provide the capability for the receipt of non-routine returns of feed from the WTP followed by a flush of the transfer lines from TF to the WTP. The TOC will maintain sufficient capacity to receive back into the Tank Farms HLW or LAW batches that, once received and sampled in WTP, are shown by analysis to be non-compliant with the WAC (BNI 2002d).	19 No Action

Hanford TF and the PTF, although appropriate design changes (including physical connectivity, safety evaluations, and transfer permissive circuitry) would be needed.

See Table 2, Table 3, and Table 4 of this document for the physical characteristics and design parameters of the feed transfer pipelines.

Waste transfer system: The waste transfer system is defined as the transfer pump, piping, jumpers, valving, and instrumentation between the TF source tank and the WTP destination vessel(s), and vice-versa for returns. The transfer system's design temperature is 200°F, and its design and maximum operating pressure is 400 lb/in^2 gauge (psig). All of the waste transfer system hard *piping* has a minimum design pressure of 1000 psig. The limiting components on *system* design pressure are the PUREX connectors used on the jumpers, rated at 400 psig (WRPS 2013b).

Waste transfer system valves: 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. This includes any valves that have a fail-close action.

Transfer pressure limits: The design and maximum operating pressure of the transfer system shall be limited to 400 psig during transfer of fluids between the TF and the WTP, under normal and off-normal conditions (BNI 2006b). Assurance that this limit will not be exceeded is achieved through design (ASME B31.3-1996).

Table 2 Primary (Inner) Pipe

Line Number		Design Pressure (psig) (See Notes 1 & 2)		Design Temperature (°F)	
TF	**WTP**	**TF**	**WTP**	**TF**	**WTP**
SN-637	FRP-PZ-01749-W62F-03	1000	1000	200	200
SN-700	FRP-PZ-01750-W62F-03	1490	1000	200	200
SN-701	FRP-PZ-01751-W62F-03	1490	1000	200	200
Pipe Characteristic		**Tank Farms**		**WTP**	
Pipe Code / Pipe Class (See Note 3)		M-9 (Pipe Code) (Fluor 2003)		W62F (Pipe Class) (BNI 2013c)	
Nominal Pipe Size (Inch)		3			
Pipe Material		ASTM A 312, Grade TP 304L			
Pipe Construction		Seamless			
Pipe Schedule		40S			

Notes:

1 The pipes selected for purchase by the WTP Contractor and TOC are the same. The 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 (BNI 2005b, CH2 2002b). The design pressure of the primary (inner) pipe far exceeds the maximum operating pressure of the transfer system, which is 400 psig.

2 Shop and field testing of the inner and encasement pipe will be performed in accordance with ASME B31.3, Section 345, Testing.

3 M-codes do not reflect current codes and standards and are no longer maintained by the TOC. The above pipe code is provided only for historical information.

Table 3 Encasement Pipe

Line Number		Design/Pneumatic Test Pressure (psig) (See Notes 2 & 3)		Design Temperature (°F)	
TF	**WTP**	**TF**	**WTP**	**TF**	**WTP**
SN-637	FRP-PZ-01749-W62F-03	400/55	50/55[1]	180	200
SN-700	FRP-PZ-01750-W62F-03	400/55	50/55[1]	180	200
SN-701	FRP-PZ-01751-W62F-03	400/55	50/55[1]	180	200
Pipe Characteristic		**Tank Farms**		**WTP**	
Pipe Code / Pipe Class (See Note 4)		M-26a (pipe code) (Fluor 2003)		W62F (Pipe Class) (BNI 2013c)	
Nominal Pipe Size (Inch)		6			
Pipe Material		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 pipes selected for purchase by the WTP Contractor and TOC are the same. The 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 (BNI 2005b, CH2 2002b). The design pressure of the primary (inner) pipe far exceeds the maximum operating pressure of the pipe, which is 400 psig.

3 Shop and field testing of the inner and encasement pipe will be performed in accordance with ASME B31.3, Section 345, Testing.

4 M-codes do not reflect current codes and standards and are no longer maintained by the TOC. The above pipe code is provided only for historical information.

Table 4 Encasement Pipe Insulation

Insulation Thickness (Inches)		
Tank Farms		**WTP**
SN-700 / SN-701	1.5 ± 0.5 (CH2. 2003a)	Minimum 1.5 (BNI 2010a)
SN-637	2.5 ± 0.5 (CH2. 2003b)	

In order to avoid temperature monitoring requirements for buried piping, TOC has a requirement for a minimum of 3 feet of cover soil over the waste feed lines in Section 5.8.8 of the *Tank Farms Operations Administrative Controls*, HNF-IP-1266 (WRPS 2014d). This requirement also applies to the buried piping in the transfer system installed by the WTP Contractor. TOC also has a requirement for freeze protection on waste transfer-associated structures (e.g., valve pits) that are physically connected to a waste transfer pump not under administrative lock (WRPS 2014d). Therefore, air temperature monitoring in waste transfer-associated structures is required during active waste transfers.

2.1.2 Interface Controls and Monitoring

As discussed in Section 2.4, the TOC and WTP Contractor will prepare a detailed procedure for transferring waste feed into the WTP feed receipt system. In addition, the TOC and WTP Contractor will prepare a detailed procedure for non-routine transfers of feed back to the TF receipt system (Section 2.7). These detailed transfer procedures 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 be via hard wired connection to the interface termination box(es). The interface termination box(es) will be NEMA 4 (DOE 2003) and will be provided by the TOC at the interface point (BNI 2013g). The TOC will operate and maintain the interface termination box(es). The removal of the interlock signal from the WTP or from the TF will initiate a transfer shutdown process. Typical TF inputs to the interlock signal may include: leak detection, tank level, valve alignment, and tank ventilation signals. Typical WTP inputs to the interlock signal may include: leak detection, vessel level, valve alignment, transfer timers (BNI 2014a), 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 Tank Farms Monitoring and Control System (TFMCS). Details 2 and 3 of DOE 2003, Sheet 1, have been revised to reflect the updated configuration.

2.1.3 Interface Maintenance and Operation

The WTP Contractor shall operate and maintain the waste transfer lines, instrumentation signal lines, and leak detection system from the WTP Site boundary (interface nodes 1A, 1B, and 2 [BNI 2013g]) to the WTP feed receipt vessels. The TOC shall operate and maintain the waste transfer lines, instrumentation signal lines, and leak detection system from the TF to the WTP Site boundary (interface nodes 1A, 1B, and 2 [BNI 2013g]). Responsibilities for waste transfers shall be defined in the waste feed transfer and waste return procedures referred to in Rows 1 and 2 of Table 1 and described in Section 2.4 and 2.7 respectively.

2.2 Administrative Interfaces

2.2.1 Mission Planning Integration

The River Protection Project System Plan (DOE 2011) is the primary mission-planning document developed and issued by the TOC. The System Plan provides a modeling estimate of the River Protection Project (RPP) mission operations based on a set of processing and operating assumptions approved by the DOE, Office of River Protection (ORP). The Hanford Tank Waste Operations Simulator (HTWOS) is a computer based model of tank waste retrieval, processing, and disposition used to develop the System Plan that results in a feed vector describing the content and scheduling of feed batches planned for delivery to the PTF.

To ensure integration of the operations of the TOC and the WTP Contractor, the *One System IPT Charter* (BNI 2013d) will facilitate the establishment of feed vectors and waste campaigns to be transferred to the PTF based on contract specifications and mission priorities. This will include the identification of an alternate tank or tanks for the initial Hot Commissioning feed as a result of the decision to remove 241-AY-102 from service and to retrieve waste from 241-AY-102 to another DST. The WTP Contractor will evaluate the One System selected feed vectors in accordance with WTP Contract Section C, Standard 2 (b)(3). Comments, if any, will be resolved through the One System organization. The comment resolution process will include DOE oversight on any characteristics that can improve the ability to process the projected waste feed compositions.

2.2.2 Interface Schedule

NOTE: The current WTP baseline for FY-2014 is reflected herein. The WTP Contractor has been directed to re-baseline and re-plan. All milestones will be updated accordingly when the re-baselining efforts are completed.

The DOE-approved baseline schedules for the TOC and the WTP Contractor contain the interface milestones and integrated schedule for this interface control document. 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.

Interface milestones between the TOC and the WTP Contractor have been established. Efforts are underway or planned to evaluate the efficacy of providing waste feed directly to the LAW and HLW Facilities. Outcomes from these evaluations and studies for providing waste feed directly to the LAW and HLW Facilities, including DOE direction and approved performance measurement baseline milestones, will be provided in a new ICD describing specific operating scenarios and the physical and administrative requirements. This effort is outside the scope of ICD-19.

2.2.2.1 Milestone 19 A - Construct Waste Feed Transfer Lines

This milestone represents the planned date that the transfer lines will be installed, capped, and acceptance tested to the connection point.

Contractor	Act ID	Title	Early Date
WTP	4BBZZ0020G	BOF - Construct LAW Waste Feed Transfer Line (ICD19A)	TBD[1]
WTP	4BBZZ0025G	BOF - Construct HLW Waste Feed Transfer Line (ICD20A)	TBD[1]
TOC	Activity completed and no longer carried in TOC baseline	Construct Waste Feed Transfer Line (LAW)	Complete
TOC	Activity completed and no longer carried in TOC baseline	Construct Waste Feed Transfer Line (HLW)	Complete

Notes:

1 This scope currently resides in WTP Contractor's undistributed budget pending Project re-baseline.

2.2.2.2 Milestone 19 B - Initial Transfer of 1st LAW Waste Feed

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

Contractor	Act ID	Title	Early Date
WTP	5HPC4CD19B	PT - Initiate Transfer of 1st LAW Waste Feed	TBD [1, 2]
TOC	JAM-426200	LAW – Batch #1	TBD[2]

Notes:

1 This scope currently resides in WTP Contractor's undistributed budget pending project re-baseline

2 Baseline dates will be aligned within two years of transfer date.

2.2.2.3 Milestone 19 C - Initial Transfer of 1st HLW Waste Feed

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

Contractor	Act ID	Title	Early Date
WTP	5HPC4CD20B	PT - Initiate Transfer of 1st HLW Waste Feed	TBD [1, 2]
TOC	JAM-429200	HLW – Batch #1	TBD[2]

Notes:

1 This scope currently resides in WTP Contractor's undistributed budget pending project re-baseline

2 Baseline dates will be aligned within two years of transfer date.

2.2.2.4 Waste Feed Transfer Scheduling

The WTP Contractor, the TOC, and the DOE shall jointly maintain a waste transfer plan and schedule for multi-year scheduling of waste feed campaigns[1] and batch[2] transfers to the PTF. This plan and schedule will provide enough detail to implement the long-term planning provided by the *River Protection Project System Plan* (DOE 2011), its successor, or other guidance. The transfer plan and schedule shall identify waste 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.

[1] A campaign is defined as all of the batches of LAW or HLW feed delivered to the PTF from a single source DST.

[2] A batch is defined as a discrete volume of certified LAW or HLW waste feed from a single source DST transferred from TF to the PTF as a constituent of a campaign.

2.2.3 Hot Commissioning

The current TOC baseline waste feed delivery plans are based on the *River Protection Project System Plan*, ORP-11242 (DOE 2011), and the Integrated Waste Feed Delivery Plan (IWFDP) (WRPS 2012a). The WTP Contract (BNI 2000) provides requirements for accomplishing hot commissioning. The WTP Contractor and TOC coordinate through the One System interface to ensure that waste feeds to WTP support efficient product delivery and hot commissioning.

Hot commissioning will include a series of integrated tests of waste delivery and receipt systems including transfer of water from the TF to the WTP prior to initiating the first waste transfer. Details for these tests will be developed as part of the hot commissioning test program development prior to hot commissioning.

2.2.4 Hot Operations

The current TOC baseline waste feed delivery plans for hot operations are based on the *River Protection Project System Plan*, ORP-11242 (DOE 2011), and the *Integrated Waste Feed Delivery Plan* (IWFDP) (WRPS 2012a).

2.2.4.1 LAW Hot Operations

The PTF shall have the capability to receive and store 1,500,000 gallons (5,680 m^3) of LAW feed (BNI 2000). The design shall include the capability to receive without interruption 1,125,000 gallons (4260 m^3) of LAW feed while processing from the remaining capacity of 375,000 gallons (1420 m^3) of LAW feed (BNI 2000). This volume includes the volume used for pre- and post-transfer flushing. The TOC plans to transfer LAW feed batches to fill the WTP feed receipt vessels in optimum practical quantities to meet the amount of waste feed requested by the WTP Contractor.

Any LAW feed remaining in the TF staging tank that could not be transferred due to space limitations in the WTP feed receipt system may be transferred as soon as the WTP Contractor concurs that space is available. This additional transfer may occur later than 30 calendar days after the initial waste transfer date but soon enough so as not to affect continuous WTP operations. If the remaining volume in the TF staging tank is to be transferred as part of the same campaign, then no additions to the staging tank can be made until the entire campaign has been transferred.

2.2.4.2 HLW Hot Operations

The PTF will be capable of receiving without interruption no less than 145,000 gallons (548.89 m^3) of HLW feed per batch (BNI 2000). The volume includes the volume used for pre- and post-transfer flushing. This receipt capability is provided in the PTF using a single vessel.

The WTP Contractor will determine the size of each batch of the staged feed to be transferred. The HLW feed batch size will be limited such that, after receipt in the PTF and after blending with pre-existing vessel contents, the resulting insoluble solids concentration in the PTF receipt vessel will not exceed a linear range of 107 grams of unwashed solids/liter at 0.1M sodium up to 144 grams of unwashed solids/liter at 7M sodium (BNI 2000).

The volume of each batch will depend on the following to ensure the above limits are met:

- Unwashed solids and sodium concentration of the material in the TF staging tank
- PTF vessel heel volume
- Unwashed solids and sodium concentration in the PTF vessel heel
- Volume of pre-dilution fluid added to the PTF vessel

The unwashed solids and sodium concentration of the material in the TF staging tank will be determined once per campaign as part of waste acceptance. It is expected that there will be multiple batch transfers for each HLW campaign.

2.3 Waste Sampling, Analysis, and Acceptance

The TOC will provide a sample of staged waste comprising each campaign to the WTP Contractor at least 180 calendar days[3] prior to the agreed-upon WTD. The following sections describe TOC waste sampling, analysis of tank waste samples, and acceptance of waste feed by the WTP Contractor.

2.3.1 Tank Waste Sampling

The TOC baseline sampling plans and capabilities are not currently compatible with the WTP Contractor sample and analysis requirements as described in the following documents:

- *Integrated Sampling and Analysis Plan* (ISAP), 24590-LAB-PL-OP-12-0001 (BNI 2013f)
- *Initial Data Quality Objectives for WTP Feed Acceptance Criteria* (WAC-DQO), 24590-WTP-RPT-MGT-11-014 (BNI 2011a)
- *Regulatory Data Quality Objectives Optimization Report* (RDQO), 24590-WTP-RPT-MGT-04-001 (BNI 2004)

Reconciliation of issues and incompatibilities are being addressed in the following ongoing tasks:

- Development of the waste feed qualification program as described in *Waste Feed Qualification Program Plan*, 24590-WTP-PL-OP-12-0004 (BNI 2013a).
- Follow-up on closure of open items associated with waste acceptance criteria data quality objectives as described in *One System Plan for Closing Current WTP Feed Acceptance Criteria Issues, Open Items, and Actions*, RPP-PLAN-53354 and 24590-WTP-PL-ENG-12-0007 (BNI 2012g).
- Requirement updates due to the revision of the *Preliminary Criticality Safety Evaluation Report for the WTP* (CSER), 24590-WTP-CSER-ENS-08-0001 (BNI 2009a).

Staged LAW feed campaign samples are planned to be collected using the existing TOC grab sampling process (BNI 2011a). The TOC has embarked on a program to evaluate the capability of a HLW mixing / sampling concept as the initial phase of developing and demonstrating a system to support sampling staged HLW feed campaigns. The details of that program are documented in RPP-PLAN-52623, *One System Waste Feed Delivery Mixing and Sampling Program System Performance Test* (WRPS 2012b), and the Waste Feed Delivery system itself is described in RPP-40149, *Integrated Waste Feed Delivery Plan* (WRPS 2012a). In this sampling concept, samples are taken from the TF transfer pump outlet while the tank is being mixed by two submerged and rotating mixer pumps before the first HLW feed batch is delivered to the PTF. The samples are transported to the 222-S Laboratory.

2.3.1.1 Tank Waste Sampling and Analysis Plan

A Tank Sampling and Analysis Plan (TSAP) shall be prepared for TOC sampling of each staged waste campaign. This includes both HLW and LAW feeds. This plan shall be prepared jointly by the TOC and the WTP Contractor, with the TOC having the lead. The TOC procedure, *Preparation of Tank Sampling and Analysis Plans*, TFC-ENG-CHEM-D-23 (WRPS 2011a) and the WAC-DQO (BNI 2011a) will be

[3] The 180 calendar days is provided for initial scheduling purposes. The lead time for obtaining samples will be determined during the joint waste feed transfer scheduling discussed in Section 2.2.2.4.

used to develop the plan. The plan shall provide information on sampling requirements, sample collection, testing, and analytical requirements. This includes chain-of-custody, sample handling in the field and the laboratory, packaging, transport, and QA/QC requirements consistent with the WAC-DQO. This effort will also involve the TOC, the WTP Contractor, the 222-S Laboratory, and a waste feed qualification laboratory. A waste feed qualification laboratory shall be designated by the WTP Contractor for analyzing the waste samples provided by the TOC. Although the selection of the laboratory is outside the scope if this ICD, the selection will potentially determine sample transport and chain of custody requirements that will have to be integrated into this ICD.

2.3.2 Tank Waste Sample Analyses

Once the staged waste campaign sample has been provided by the TOC to the WTP Contractor, the waste feed qualification laboratory performs analyses to determine waste feed acceptance. The waste feed qualification laboratory will perform other activities not associated with waste feed acceptance that are outside the scope of this ICD as follows:

- Perform testing required by Contract Specification 12 (BNI 2000).
- Perform feed qualification activities identified in the Waste Feed Qualification Program Plan (BNI 2013a), such as demonstrating key WTP unit operations at a laboratory scale.

These other activities establish processing conditions and parameters needed to treat the staged waste campaign and provide additional information needed for waste form compliance reporting. All waste feed qualification activities are described in the *Waste Feed Qualification Program Plan* (BNI 2013a).

The sample volume, number of samples, required analyses, and quality of data required for waste acceptance criteria are described in the *Initial Data Quality Objectives for WTP Feed Acceptance Criteria*, 24590-WTP-RPT-MGT-11-014 (BNI 2011a). This includes the environmental regulatory requirements identified in the *Regulatory Data Quality Objectives Optimization Report*, 24590-WTP-RPT-MGT-04-001 (BNI 2004).

The procedures and requirements for performing WAC analyses and other tests using the waste feed samples are to be established following the completion of the waste feed qualification program development (BNI 2013a) and the optimization of the *Initial Data Quality Objectives for WTP Feed Acceptance Criteria* (BNI 2011a) which is referred to as the WAC-DQO.

The WTP Contractor may also sample and analyze the feed batch from a PTF receipt vessel to verify compliance. Analysis results will be reported to the DOE.

2.4 Waste Transfer Procedure

2.4.1 Transfer Procedure Requirements

The TOC and WTP Contractor will prepare a detailed procedure for transferring waste feed into the WTP feed receipt system. Appendix D provides draft transfer procedure concepts whose elements should be incorporated in the operating procedures when developed. The draft transfer procedure concepts in Appendix D do not drive requirements on the transfer process, but they are used to help identify and understand interfaces between the TOC and WTP Contractor for planning purposes.

2.4.2 Pipeline Flushing Requirements

As quickly as possible (less than 4 hours) following the transfer of feed to the WTP feed receipt system, the TOC will begin flushing the transfer pipeline with a volume of water that, combined with any pre-transfer flush, is not more than three times the transfer pipeline capacity (WRPS 2014b) for a total flush volume of not more than 7500 gallons (28.39 m^3). Flush volume will be adjusted to accommodate unplanned interruptions in transfers. The water velocity shall be between 6 and 10 feet/sec, not to exceed the system design pressure (WRPS 2011c). When the transfer pipeline flush water is combined with the feed, the composition of the feed batch will remain compliant with the limits established in Table 7. The TOC can demonstrate this compliance using mathematical calculations and the feed certification sample results. The TOC shall communicate the flush volume to be transferred before and following the waste transfer to the PTF to allow the WTP Contractor to calculate final waste characteristics.

2.4.3 Transfer Coordination

Prior to acceptance of staged waste, the WTP Contractor will participate in the development of the TSAP for each staged campaign for mutual agreement on sample collection, handling, and analytical requirements as described in Section 2.3.1.1. After acceptance of staged waste campaigns based on waste sampling, but before each waste transfer from the TF to the PTF, 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 waste 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 as part of the WTP Batch and Campaign methodology per the process defined in the *Batch Processing Methodology for the WTP Pretreatment Facility* (BNI 2012e). Implementing protocols will be developed at a later date. The coordination process and documentation will be prepared jointly by the WTP Contractor and TOC during the development of the detailed procedure for transferring waste feed into the WTP feed receipt system.

A conceptual transfer sequence with key information exchanges is included in Appendix D. Note that the draft transfer procedure concepts in Appendix D do not drive requirements on the transfer process but they are used to help identify and understand interfaces between the TOC and WTP Contractor for planning purposes.

2.5 Waste Feed Transfer Limitations and Requirements

2.5.1 Waste Feed Transfer Physical Limits

Table 5 Waste Feed Transfer Physical Limits

Transfer Property	Delivery Parameter
System design pressure	400 lb/in^2 (Section 2.1.1)
System design temperature	200 °F (Section 2.1.1)

2.5.2 Waste Feed Transfer Flow Requirements

Waste feed will be delivered at a minimum transfer velocity of 6 feet/sec, equivalent to a volumetric flow rate of 140 gpm in the nominal 3-inch, Schedule 40 waste transfer pipe (CH2 2002a).

For the TOC, lower transfer velocities are allowable if calculations have been performed to establish the critical deposition velocity of the waste and show that a lower transfer velocity exceeds the critical deposition velocity (WRPS 2014b).

The maximum transfer velocity of waste feed is not specified, but it will not exceed the maximum flush velocity of 10 feet/sec (Section 2.7.2).

2.6 Waste Feed Acceptance

Table 6 and Table 7 summarize the constituents and parameters, as listed in the WAC-DQO, (BNI 2011a) to be determined in support of waste feed acceptance. The initial data collection requirements for waste feed acceptance are documented in the WAC-DQO. The WAC-DQO document was jointly developed by the WTP Contractor and the TOC.

Table 6 provides a listing of constituent source documents that apply to the LAW and HLW waste feeds. The listed constituents are described in detail in the *RDQO Report* (BNI 2004), in the *IHLW Waste Form Compliance Plan for the Hanford Tank Waste Treatment and Immobilization Plant* (BNI 2009c), and in WTP Contract Specifications 7 and 8 (BNI 2000). The Table 6 document constituents, in conjunction with the parameters in Table 7, constitute the entirety of the waste feed acceptance parameters. The data for the constituents in Table 6 documents are required for reporting and/or processability purposes including compliance assessment. Therefore, the values for the constituents in Table 6 documents are not used for waste feed acceptance and are not considered waste acceptance criteria (WAC) as used in this ICD. However, the determination and reporting of the values for the constituents in Table 6 documents will follow the same QA/QC process as the determination of the parameters in Table 7 as described in the WAC-DQO.

Table 6 Waste Feed Acceptance Constituents for Reporting Purposes

Constituents	Notes	Reference
Constituents in the *IHLW Waste Form Compliance Plan for the Hanford Tank Waste Treatment and Immobilization Plant*	N/A	BNI 2009c
Constituents in the *Regulatory Data Quality Optimization Report* (RDQO)	N/A	BNI 2004
Specification 7 list of constituents and concentrations	1 and 2	BNI 2000
Specification 8 list of constituents and concentrations	2 and 3	BNI 2000

Notes:

1. Tables TS-7.1 and TS-7.2 (in the WTP Contract [BNI 2000]) list chemical and radionuclide components which, in conjunction with the parameters in Table 7 of this ICD, constitute the entirety of the LAW feed acceptance parameters.
2. Includes, by reference, any feed specifications imposed by the TOC in the operations specification document (CH2 2000) except for free hydroxide.
3. Tables TS-8.1, TS-8.2, TS-8.3, and TS-8.4 (in the WTP Contract [BNI 2000]) list chemical and radionuclide components which, in conjunction with the parameters in Table 7 of this ICD, constitute the entirety of the HLW feed acceptance parameters. Note that Specification 8 states that components in Table TS-8.4 are not to be used for feed certification.

Table 7 provides a listing of the waste feed acceptance criteria, organized by those criteria that apply to LAW feed only, to HLW feed only, and to both feeds.

The decision to accept the waste feed shall be based upon sample data obtained for comparison to the WAC after ensuring that data were obtained in accordance with WAC-DQO and RDQO requirements. This includes sample re-analyses, analyses of additional samples, or both. Data from bench-scale testing of unit operations for each new waste campaign will also be used to specify the volume of feed to be transferred. Since qualification data establish acceptable range for parameters in WTP identified campaigns, the feed receipt volume in WTP receipt vessels shall be based on the waste feed qualification data (BNI 2013a) to ensure campaign-specific waste processing strategy.

If the waste (prior to transfer to WTP) does not meet the WAC, alternative actions as described in the WAC-DQO shall be taken. The alternative actions may include:

- Waste feed adjustment to meet the WAC requirements
- Change acceptance criteria requirements if there is no impact to the WTP design, safety basis, or permit requirements (on a case-by-case basis)
- Transfer to an alternative treatment
- Continued waste storage

All of the above alternative actions except for "Change acceptance criteria..." and "Continued waste storage" will require re-staging and re-sampling of the waste feed.

If the waste composition and properties do not comply with the WAC specified in Table 7 of this ICD, then the DOE Contracting Officer is to be notified and the TOC and WTP Contractor are to prepare an assessment and recommend the preferred method(s), if possible and practical, to correct any waste composition or property deficiencies for DOE review and approval. This may require an adjustment to the WTD.

At least 15 calendar days[4] prior to the WTD, the WTP Contractor will provide the DOE with a written recommendation to accept or refuse the staged waste feed campaign by the TOC.

2.6.1 Criticality Specification

Preliminary criticality safety limits (CSL) developed for the WTP are contained in the *Preliminary Criticality Safety Evaluation Report for the WTP*, 24590-WTP-CSER-ENS-08-0001 (CSER) (BNI 2009a). The CSER document provides specific operational limits. These preliminary limits may apply to the WAC when operations commences and are included in Table 7. However, since the CSER establishes the CSL values, when a revision of the CSER occurs, the most current CSER should be reviewed for the current acceptance criteria for criticality safety.

2.6.2 Erosivity Specification

The Action Plan for Resolution of Erosion and Corrosion Design Issues (BNI 2012d) states that a method for determining waste erosivity will be developed and qualified by the WTP Contractor to support waste feed acceptance. The intent of this task is to determine a standard method of determining the erosivity of waste feed and then to trend how the feed erosivity varies compared to that of a benchmark using the WTP design basis erosion allowance. These data will be used to make informed decisions regarding feed batch receipt related to the waste erosivity throughout the mission.

2.7 Non-Routine Transfer of Waste from WTP Contractor to TOC

The TOC and the WTP Contractor will prepare a detailed procedure for non-routine transfers of HLW or LAW feed back to the TF receipt system. Production of this non-routine transfer procedure is identified and tracked by WTP Contractor Schedule ID 5HPC1TA095. The "Scope and Entry Conditions" sections of the procedure will provide guidance for when the procedure is to be implemented. For mission planning purposes, the TOC will maintain sufficient space to receive back HLW or LAW feed batches for at least 4 days after delivery of the batch to allow sufficient time for the WTP Contractor to determine whether a delivered batch is WAC-compliant.

2.7.1 WTP Contractor to TOC Waste Return Acceptance Criteria

Specification 9, Liquids or Slurries Transferred to DOE Tanks by Pipeline (BNI 2000), and the *Tank Farms Waste Transfer Compatibility Program* (WRPS 2014c) define the transfer requirements that will be applied to waste returns. If, after sampling and analysis, the WTP Contractor determines that the waste (either HLW or LAW) transferred to the PTF is out of compliance, the WTP Contractor and the DOE will determine and take actions necessary to adjust the waste or the WTP Contractor will seek DOE approval for transferring the waste back to the TF.

2.7.2 Pipeline Flushing Requirements

As quickly as possible (less than 4 hours) following waste feed returns to the TF, the TOC will begin flushing the transfer pipeline with a volume of water that, combined with any pre-transfer flush, is not more than three times the transfer pipeline capacity (WRPS 2014b) for a total flush volume of not more than 7500 gallons (28.39 m^3). The water velocity shall be between 6 and 10 feet/sec, not to exceed the system design pressure (WRPS 2011c).

[4] The 15 calendar days is provided for initial scheduling purposes.

2.7.3 WTP to TOC Waste Return Transfer Coordination

Prior to the return of waste from the PTF to the TF, the TOC will transmit a waste profile sheet detailing transfer specific parameters for WTP Contractor acceptance or comment. The profile sheet shall document the characterization data in accordance with Specification 9 of the WTP Contract (BNI 2000). The agreement between the WTP Contractor and TOC to accept these parameters are a prerequisite for initiating the waste return transfer operation. The contents of this profile sheet will be developed by the TOC and coordinated with the WTP Contractor. Implementing protocols will be developed at a later date.

A conceptual waste return transfer sequence with key information exchanges is included in Appendix D. The coordination process and documentation will be prepared jointly by the WTP Contractor and TOC during the development of the detailed procedure for a waste return transfer from the WTP feed receipt system to TF.

Table 7 Waste Feed Acceptance Criteria

Applies to:	Property	Limit	Notes	Reference
LAW Feed	Solids concentration	≤ 3.8 wt%	1, 7, & 15	BNI 2000, Spec 7
	Slurry viscosity	≤ 21 cP	8	BNI 2012f
	Slurry bulk density	< 1.46 kg/L	16	N/A
	Hydrogen generation rate	≤ 3.7E-07 gmole H_2 / L / Hr @120° F	N/A	BNI 2010c
	WTP feed receipt temperature	< 120 °F	N/A	BNI 2012a
HLW Feed	Solids concentration	≤ 200 g/liter	7	BNI 2000, Specification 8 BNI 2010d
	Slurry rheology (at 25 °C) – Consistency – Yield stress	 < 10 cP < 1.0 Pa	8, 20	 BNI 2003a BNI 2003a
	Slurry bulk density	< 1.5 kg/L	16	N/A
	Critical velocity	≤ 4 ft/s	2 & 18	N/A
	Maximum particle size	310 µm	N/A	BNI 2013h
	Hydrogen generation rate	≤ 2.1E-06 gmole H_2 / L / Hr @150° F	N/A	BNI 2010c
	WTP feed receipt temperature	< 150 °F	N/A	BNI 2011b
HLW and LAW Feed	Ammonia NH_3	< 0.04M	N/A	BNI 2006a
	Separable organics	No visual immiscible layer	3	DOE 2013
	Total organic carbon (*TOC*)	< 10 wt%	N/A	Ecology 2012
	PCBs	< 50 ppm	N/A	Ecology 2012
	Slurry pH	≥ 12	9	BNI 2009b
	Waste feed compatibility	< ± 20 °C	10	Ecology 2012
	Liquid fraction unit liter dose	< 1500 Sv/L at 10M Na	N/A	BNI 2009d
	Solid fraction unit liter dose	< 2.9E+05 Sv/L	4 & 5	BNI 2009d
	Pu to metals loading ratio	< 6.20 g/kg	6, 12 & 13	BNI 2009a, CSL 8.1 & 8.4
	U fissile to U total	< 8.4 g/kg	12 & 13	BNI 2009a, CSL 8.2
	Pu concentration of liquids	< 0.013 g/liter	13	BNI 2009a, CSL 8.3
	Total radioactivity in material fed to WTP per year from external sources	≤ 1.1 E8 Ci/yr	11	Health 2006
	Sodium molarity (liquid fraction)	≤ 10 M	15	BNI 2000, Specification 7
	Median particle size	≤ 11 µm	14 & 19	BNI 2005a
	Arithmetic average particle hardness	≤ 4.4 mohs	14 & 19	BNI 2005a

Notes:

1 After the LAW campaign is fully prepared, the LAW staged feed tank undergoes a prescribed hold time that will be determined by TOC in-process control plans, for review by the WTP Contractor, to allow solids that settle faster than 0.03 feet/minute to settle below the transfer location (BNI 2000, BNI2010d, WRPS 2012a) in the tank. The critical velocity for LAW is not measured.

2 Value is based on a 3 in. Schedule 40 pipe. The velocity of 4 ft/sec is intended to avoid physical plugging of the waste transfer line and avoid beds of solids forming along the bottom of the transfer pipe (CH2 2002a) and the WTP HLW feed specifications are currently based on a critical velocity of 4 ft/sec (BNI 2011c).

3 The proposed deminimus concentration level for separable organics that could be sent to the WTP without adversely affecting the WTP has been approved by the DOE (DOE 2013).

4 The solids fraction feed unit dose is based on wet centrifuged solids.

5 The value for solids fraction feed unit dose is 2.9E05 Sv/L which is derived from HNF-IP-1266, *Tank Farms Operations Administrative Controls* (WRPS 2014d) as the bounding offsite ULD for solids. The WTP Contractor has converted this to 270 Sv/g for use in WTP calculations. The conversion of this is as follows: (2.9E05 Sv/L) / (0.66 * 1.63 * 1 g/cc * 1000 cc/L) = 270 Sv/g; where 0.66 is the fraction of solids and 1.63 is the specific gravity.

6 Sample analysis for solids shall credit Fe and Ni as the absorber metals and simulate the effects of wash/leach (CSL 8.1) Sample analyses for permeate Fe, Ni, Mn, and Cd are credited as absorber metals and simulate any subsequent processing, including wash/leach, Sr/TRU precipitation, and Cs ion exchange (CSL 8.4)

7 Solids to be measured after holding the bulk sample at 25°C for 8 hours. Definition of solids provided in Appendix E.

8 Analysis made on bulk sample after holding the bulk sample at 25°C for 8 hours. Measured at 25°C. LAW feed value is for a Newtonian fluid. HLW feed values are based on a Bingham plastic fluid.

9 Limit from Ecology 2012 is >7. Limit of >12 is more restrictive.

10 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.

11 Limit value is a per year or accumulation value and is not directly applicable to individual staged feed campaigns.

12 Limit applies to both the liquid and solid fraction separately.

13 Criticality safety limits under review (BNI 2012c).

14 The *Preliminary Documented Safety Analysis to Support Construction Authorization*; *PTF Specific Information* (PDSA) (BNI 2014a) states that each batch of waste received from TF shall be sampled to measure median particle hardness, concentration, and particle size distribution prior to acceptance, and the values will be bounded by the values in *WTP Waste Particle Size and Hardness Characterization* (BNI 2005a). BNI 2005a is the cited source for the median particle size and arithmetic average particle hardness values in this table. The solids concentration limit from BNI 2005a is 27.3 wt%; it is not included in this table because it is bounded by the ≤ 200 g/L value from BNI 2000.

15 LAW feed solids concentration of ≤ 3.8 wt% is based on 5 M sodium. If sodium concentration is between 5 and 10 M, then maximum LAW feed solids concentration must be reduced accordingly (BNI 2005a, BNI 2009e).

16 Values are legacy values which originated from CH2 2002a, have been integrated into the WTP Project design, and are now considered WTP waste acceptance criteria.

17 Deleted.

18 Critical velocity is a bulk slurry parameter. It should not be used to project the behavior of subsets of particles with specific size and density values.

19 Particle hardness and arithmetic average particle size are values not expected to be measured directly, are under investigation, and will likely be replaced. See discussion in Section 2.6.2.

20 If the 1.0 Pa yield stress limit is implemented with the current PTF design, a significant portion of the staged HLW feed may require dilution. If the proposed standard high solids vessels are approved as part of PTF optimization, the need for dilution may be largely obviated.

2.8 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 listed in Table 8 will be provided to the affected parties by the responsible Interface Owner.

Table 8 Interface Configuration Management Items

WTP Documents	Interfacing Organization Documents
24590-WTP-RPT-MGT-04-001, Rev 0, *Regulatory Data Quality Objectives Optimization Report* (BNI 2004)	HNF-40122, Rev. 0, *WTP Material at Risk Evaluation of Important Uncertainties and Resulting WTP Design Conservatisms* (BNI 2009d)
24590-WTP-RPT-MGT-11-014, Rev 0, *Initial Data Quality Objectives for WTP Feed Acceptance Criteria* (BNI 2011a)	HNF-4161, Rev 6, *Double Shell Tank Transfer Piping Subsystem Specification* (WRPS 2013b).
24590-WTP-3YD-50-00002, Rev 1, *WTP Integrated Processing Strategy Description* (BNI 2009b)	HNF-4162, Rev 5, *Double Shell Tank Transfer Pump Subsystem Specification* (WRPS 2011b)
24590-PTF-M4C-V11T-00015, *Evaluation of 150 Degree Fahrenheit Temperature Limit* (BNI 2011b)	HNF-4163, Rev 6, *Double Shell Tank Diluent and Flush Subsystem Specification* (WRPS 2011c)
24590-WTP-RPT-M-05-001, Rev 0, *WTP Waste Particle Size and Hardness Characterization* (BNI 2005a)	ORP-11242, Rev 6, *River Protection Project System Plan* (DOE 2011)
24590-WTP-CSER-ENS-08-0001, *Preliminary Criticality Safety Evaluation Report for the WTP* (BNI 2009a)	RPP-5346, Rev 2, *Waste Feed Delivery Transfer System Analysis* (CH2 2002a)
24590-WTP-M4C-V11T-00011, Rev. C, *Revised Calculation of Hydrogen Generation Rates and Times to Lower Flammability Limit for WTP* (BNI 2010c)	RPP-40149-VOL1 Rev 2, RPP 40149-VOL2 Rev. 2, and RPP 40149-VOL3 Rev. 2, *Integrated Waste Feed Delivery Plan*, Volumes 1, 2, & 3 (WRPS 2012a).
24590-PTF-M3C-FRP-00002, Rev B, *Pressure Drop from W-211/WTP Interface to FRP Vessels* (BNI 2006b)	TFC-ENG-STD-26, Rev B, *Waste Transfer, Dilution, and Flushing Requirements.* (WRPS 2014b).
24590-WTP-PSAR-ESH-01-002-02, Rev 5a, *Preliminary Documented Safety Analysis to Support Construction Authorization; PT Facility Specific Information* (BNI 2014a)	HNF-SD-WM-OCD-015, Rev 34, *Tank Farms Waste Transfer Compatibility Program* (WRPS 2014c)
24590-WTP-PL-OP-12-0004, Rev. 0, *Waste Feed Qualification Program Plan* (BNI 2013a)	
WTP Drawings	**Interfacing Organization Drawings**
24590-WTP-B2-C12T-00001, Rev 2, *Interface Control Drawing* (BNI 2013g)	H-14-104365, Rev 2, *Interface Control Diagram - Transfer Piping Plan 2*, sheet 1 through 4 (DOE 2003)

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, Maryland.

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BNI. 2002a. *Guidelines for Performing Chemical, Physical, and Rheological Properties Measurements*, 24590-WTP-GPG-RTD-001, Rev 0, dated 20 May 2002. Bechtel National, Inc., Richland, Washington.

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BNI. 2003a. *Rheology of "As-Received" HLW Feed*, CCN 074567, dated 15 December 2003. Bechtel National, Inc., Richland, Washington.

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BNI. 2009a. *Preliminary Criticality Safety Evaluation Report for the WTP*, 24590-WTP-CSER-ENS-08-0001, Rev 0b, dated 28 August 2009. Bechtel National, Inc., Richland, Washington.

BNI. 2009b. *WTP Integrated Processing Strategy Description*, 24590-WTP-3YD-50-00002, Rev 1, dated 19 June 2009. Bechtel National, Inc., Richland, Washington.

BNI. 2009c. *IHLW Waste Form Compliance Plan for the Hanford Tank Waste Treatment and Immobilization Plant*, 24590-HLW-PL-RT-07-0001, Rev. 3, dated 23 June 2009. Bechtel National, Inc., Richland, Washington.

BNI. 2009d. *WTP Material at Risk Evaluation of Important Uncertainties and Resulting WTP Design Conservatisms*, CCN 201898 (HNF-40122, Rev. 0), dated 15 July 2009. Joint Task Team document between Bechtel National, Inc., Richland, Washington; CH2M HILL Hanford Group, Inc., Richland, Washington; and US Department of Energy, Office of River Protection, Richland, Washington.

BNI. 2009e. *Contract Clarification on Use of Waste Feed Specifications*, CCN 194412, dated 06 February 2009. Bechtel National, Inc., Richland, Washington.

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

BNI. 2010b. *Response to ORP comments on interface control document -19 (ICD-19) proposed technical and risk evaluation, and waste feed*, CCN 175241, dated 09 November 2010. Bechtel National Inc., Richland, Washington.

BNI. 2010c. *Revised Calculation of Hydrogen Generation Rates and Times to Lower Flammability Limit for WTP*, 24590-WTP-M4C-V11T-00011, Rev. C, dated 07 May 2010. Bechtel National Inc., Richland, Washington.

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BNI. 2011a. *Initial Data Quality Objectives for WTP Feed Acceptance Criteria,* 24590-WTP-RPT-MGT-11-014, Rev 0, dated 19 May 2011. Bechtel National, Inc., Richland, Washington.

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BNI. 2013a. *Waste Feed Qualification Program Plan,* 24590-WTP-PL-OP-12-0004, Rev 0, dated 07 January 2013. Bechtel National, Inc., Richland, Washington.

BNI. 2013b. *Clarification of Feed Specification and Design Criteria Related to Particle Size, Particle Hardness and Particle Density for the WTP*, CCN 229185, dated 14 February 2013. Bechtel National Inc., Richland, Washington.

BNI. 2013c. 24590-WTP-3PB-P000-TW62F, *River Protection Project - Waste Treatment Plant Piping Material Classification for Pipe Class W62F*, Rev 11, dated 11 April 2013. Bechtel National, Inc., Richland, Washington.

BNI. 2013d. *One System IPT Charter*, 24590-WTP-CH-MGT-11-008, Rev. 4 (RPP-51471), dated 05 December 2013. Bechtel National, Inc., Richland, Washington.

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CH2. 2002a. *Waste Feed Delivery Transfer System Analysis*, RPP-5346, Rev 2. CH2M HILL Hanford Group, Inc., Richland, Washington.

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DOE. 2014a. *Closure of ICD 19 Issue I19-47 (Sampling Issue)*, CCN 272195, dated 21 August 2014. US Department of Energy, Office of River Protection, Richland, Washington.

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Appendix A - Open ICD 19 Issues and Actions

Issue / Action #	Tracking #	Issue / Action	Baseline (In-Out-N/A)		Page(s)
			WTP	TOC[1]	
None					

Notes:
[1] TOC Baseline referenced here is the lifecycle Performance Measurement Baseline (PMB) which includes both WRPS and DOE-ORP 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
I19-47	24590 WTP-ATS-MGT-11-0559 TOC WBS 5.03.01.07.03 (WFD Tank Mixing and Sampling)	Reconcile WTP/TOC Sampling Plan Incompatibilities	21 August 2014	Current WAC-DQO parameters have been established and captured in Table 6 and Table 7 as discussed in CCN 270769 (BNI 2014c). Isolok samplers were evaluated as best available to meet requirements per RPP-RPT-56000 (WRPS 2013c). Documented approval by ORP to close I19-47 has been assigned CCN 272195 (DOE 2014a).
I19-48	DOE-ORP ESTARS Number: ORP-WSC-2014-0040	There is an incompatibility between the maximum waste feed particle size-density combination described in the WTP BOD and the TOC lifecycle (PMB) to provide waste feed within that constraint (BNI 2012h).	18 September 2014	ORP has directed WRPS to incorporate the particle size included in ICD-19 Rev 7 into the planning basis for the Lifecycle Baseline. Documented approval by ORP to close I19-48 has been assigned CCN 272625 (DOE 2014b).

Appendix C - ICD 19 Open Items List

NOTE: 24590-WTP-PL-MG-01-001, Interface Management Plan (IMP) defines ICD Issues as: 1) An incompatibility between Contractor's technical, regulatory or nuclear safety baselines or contract across a WTP Interface, or 2) An incomplete interface. ICD Actions are defined as discreet activities engaged to resolve ICD Issues. There are items that do not fit the description of ICD Issues or ICD Actions found in the IMP that still require tracking. This does not mean these items are unimportant. The following list is a way of tracking these items to resolution. Depending on events related to these items, some of these items may be elevated to become ICD Issues or ICD Actions and others may be closed and removed from this list in future revisions to ICD 19. When an item on this list is closed, the resolution will be recorded in the Status column and it will appear in the next revision of ICD 19 with the resolution. In the following revision, the item will be removed from the list, since it will have become part of the historical record.

Item #	Description	Source	Status
0009	Determine if the limits of cohesiveness and agglomeration need to be incorporated into ICD 19, Table 7 (Waste Acceptance Criteria).	Don Alexander	CLOSED. No additional WAC is currently needed in Table 7. Agglomeration will not occur during transfer from TF to WTP since moderate shear forces readily reduce the size of agglomerate particles per RPP-9805 (DOE 2002). 24590-WTP-PIER-MGT-13-0687-D has been raised to document the effect of agglomerating waste on the design of the Waste Delivery System and the WTP.

Item #	Description	Source	Status
0015	Particle hardness and arithmetic average particle size are values not expected to be measured directly, are under investigation, and will likely be replaced.	Mike Thien	CLOSED. As a result of a revised approach for evaluating the WTP erosion design basis documented in new Section 2.6.2 per 24590-WTP-ICF-ENG-13-0001 (BNI 2014b), the two WAC parameters will likely be replaced (see Note 19 in Table 7).

Item #	Description	Source	Status
0016	Full-scale integrated tests are planned to evaluate mixing effectiveness in a number of WTP vessels. The results of these tests may lead to new or modified WAC associated with particle size and density.	Eric Slaathaug	CLOSED. New WAC of 310 micron maximum particle size was specified in Table 7 per 24590-WTP-ICF-ENG-13-0001 (BNI 2014b). This value, in conjunction with the ≤4 ft/sec critical velocity, will limit the particle size/density combination of waste feed to below the values planned to be used in full-scale mixing tests.
0017	Erosion/corrosion tests and evaluations are planned (BNI 2012d) and the results may lead to new or modified WAC associated with particle or slurry physical characteristics.	Eric Slaathaug	CLOSED. No additional WAC is currently needed in Table 7. The revised approach for protecting the WTP erosion/corrosion design basis is documented in new Section 2.6.2 per 24590-WTP-ICF-ENG-13-0001 (BNI 2014b).

Item #	Description	Source	Status
0018	Incorporate required updates to the ICD 19 Waste Acceptance Criteria that result from the ongoing revision of the Preliminary CSER (BNI 2009a).	Eric Slaathaug / Steve Blush	CLOSED. Revisions to the preliminary CSER (BNI 2009a) (listed in Table 8) will be evaluated for impact to the WAC prior to ICD 19 incorporation in the same manner as any other source document that determines new or revised WAC. Current criticality sampling requirements have been established and captured in Table 7.

Item #	Description	Source	Status
0019	The proposed deminimus organic concentration in tank waste received at WTP is stated as, "No visual immiscible layer is the deminimus concentration level that could be sent to the WTP without adversely affecting the WTP." (BNI 2012e) The sampling protocol needed to ensure this limit is met has not been determined. TOC is investigating the maximum concentration of separable organics that can be sent to WTP.	TOC	CLOSED. Transfer of a visible separate organic phase to WTP was evaluated as being very unlikely per RPP-RPT-55646 (WRPS 2013d). WAC criterion for separable organics (i.e., no visual immiscible layer) has been approved by ORP (DOE 2013) and captured in Table 7.

Item #	Description	Source	Status
0020	A waste tank temperature monitoring strategy is to be developed. This strategy must include the criteria, instrument inputs, and any necessary algorithms that will be used for determination of the temperature that will either allow or prohibit tank transfer when the final value is compared to the WTP WAC.	Jim Kelly (TOC)	CLOSED. Development of a temperature monitoring strategy does not need to be captured in this ICD since it only involves the TOC. The temperature requirements (i.e., <120°F for LAW feed receipt and <150°F for HLW feed receipt in WTP) have been established and captured in Table 7.

Item #	Description	Source	Status
0021	Table 7 includes a critical velocity value as well as a maximum particle size as WAC parameters for HLW feed (note an ICD Issue related to the maximum particle size is I19-48). Revision 5 of ICD-19 stated that the TOC would measure critical velocity. However, the TOC cannot measure critical velocity as it is defined in this revision of the ICD. (See Appendix E for definitions.) Therefore, the details on who/how/where will determine the critical velocity value that needs to be established. The One System Technical team will work in conjunction with the TOC, the DOE, and the WTP Contractor Design Authority to establish the processes and procedures to determine critical velocity.	Eric Slaathaug	CLOSED. TOC can measure critical velocity as defined in Appendix E per 24590-WTP-ICF-ENG-13-0001 (BNI 2014b): "Critical velocity is the minimum flow velocity demarcating flows in which any solids form a stationary bed at the bottom of the pipe (i.e., particles drop out of the continuous phase and become stationary on the pipe surface) from fully suspended flows" per CCN 270770 (BNI 2014d).

Item #	Description	Source	Status
0022	The WTP *Basis of Design* (BNI 2011c) will need to be updated to include the settling rate restriction for LAW feed and acknowledge that critical velocity will not be a Waste Acceptance Criterion for LAW feed.	Eric Slaathaug	CLOSED. The settling rate restriction for LAW feed of 0.03 ft/min is documented in the WTP *Basis of Design* (BNI 2011c). For a critical velocity of 4 ft/sec (without the 30% margin from the WTP design guide), a 310 micron particle size requires a particle density of 2.94 g/mL in a 1.1 g/mL and 2 cP liquid per CCN 229195, Attachment 1, Page 2, Evaluation 5 (BNI 2014e). For a 0.03 ft/min settling rate, a 2900 kg/m^3 (2.9 g/mL) particle density requires a particle size of 20 to 25 microns in a 1.2 kg/L and 2.94 cP liquid per 24590-WTP-M3C-V11T-00002, Section 8 (BNI 2010f). Therefore, the specified critical velocity and maximum particle size are bounding for the settling rate restriction.

Item #	Description	Source	Status
0023	Update values for Transfer System Design Pressure and Transfer System Maximum Allowable Operating Pressure based on the outcome of efforts to upgrade the pressure rating of the Transfer System jumper PUREX connectors (WRPS WBS 5.01.04.01.07.19, Strategy to Qualify Transfer Line Pressure Rating).	Stuart Arm	CLOSED. Current design pressure and maximum operating pressure requirements of the transfer system (i.e., 400 psig) have been established and captured in Section 2.1.1. Values will be updated after the pressure rating of PUREX connectors and associated piping components is upgraded. The schedule activity for the testing is 3EP10PGT20 (PT – Upgrade Pressure Rating of PUREX Connectors to 600 psi).

Item #	Description	Source	Status
0024	The revised waste feed flow rates need to be evaluated to determine the impacts to the WTP baseline.	Stuart Arm	CLOSED. Retaining the ≤4 ft/sec critical velocity in Table 7 eliminates the concern of this open item. Transfer velocity of 6 ft/sec proposed by TOC is below the WTP design limit of 10 ft/sec. If waste has been demonstrated to have a critical velocity of less than 4 ft/sec, transfers can occur at velocities up to 10 ft/sec (BNI 2014e).
0025	The TOC Waste Feed Delivery (WFD) Design needs to be completed.	Jim Kelly (TOC)	CLOSED. Completion of the WFD design does not need to be captured in this ICD since it only involves TOC. WFD design requirements have been established and captured in Section 2.5.

Item #	Description	Source	Status
0026	Table 6, Note 1 currently states, "For ^{137}Cs, the liquid portion of the feed is limited to a maximum of 1.2 Ci/L for all but the AZ-101/AZ-102 liquid which is limited to 3.0 Ci/L." If the content of AZ-101/AZ-102 at the time the specification was established has been changed or relocated, the Specification 7 Contract limit may have to be re-evaluated accordingly.	Paul Certa	CLOSED. Changes to the Specification 7 Contract limit can be recommended after down-blending of AZ-101/AZ-102 is completed, if necessary. WFD WAC requirements have been established and captured in Table 6 and Table 7.

Item #	Description	Source	Status
0027	A waste feed qualification laboratory shall be designated by the WTP Contractor for analyzing the waste samples provided by the TOC. Although the selection of the laboratory is outside the scope if this ICD, the selection will potentially determine sample transport and chain of custody requirements that will have to be integrated into this ICD.	Stuart Arm	CLOSED. Selected WTP Contractor waste feed qualification laboratory sample transport and chain of custody requirements will be established once a laboratory has been selected.

Item #	Description	Source	Status
0028	TOC requires that flushing shall be conducted as quickly as possible following a waste transfer (less than 4 hours) (WRPS 2014b). A WTP technical basis for the maximum time between completion of a waste transfer and the initiation of a waste feed line flush needs to be determined.	Mark Medsker	CLOSED. Established TOC procedures will meet WTP flushing requirements as determined by HPAV.

Item #	Description	Source	Status
0029	The development of the profile sheets will need to ensure that the Tank Farm WAC for the non-routine return of HLW or LAW feed is no more restrictive than the bounds of the WTP WAC in Table 7. This open item is raised because the current *Tank Farms Waste Transfer Compatibility Program* (WRPS 2014c), Section 3.1.5.2 indicates that "*Waste transfers into the DST system from non-Tank Farm facilities or interfacing facilities, other than the 242-A Evaporator, must comply with the limits provided in Table 3-2 and Table 3-3 or a criticality safety evaluation must be completed documenting that the waste may be received and stored safely in the DST system.*" The limits in Table 3-2 and Table 3-3 are, in some cases, more restrictive than the WAC criteria in Table 7.	Eric Slaathaug	CLOSED. The proposed revision to tank farms criticality evaluation, RPP-7475, Rev. 5, *Criticality Safety Evaluation Report for Hanford Tank Farms Facilities*, does not allow transfers arriving from non-tank farm facilities, such as WTP. Since such waste transfers from WTP will be fissile material operations, a new criticality safety evaluation must be completed to cover that scope. This evaluation would be subject to the Unreviewed Safety Question process and would be coordinated with the ICD teams to ensure consistency and compliance with any WTP WAC.

Item #	Description	Source	Status
0030	The processes and procedures to determine the maximum particle size will need to be established by the TOC.	Bob Voke (WTP) Mike Thien (TOC)	CLOSED. The TOC strategy (process, procedures, or a combination of both) for meeting the 310 micron limit in Table 7 will be controlled by the resolution to ICD Issue I19-48.

Item #	Description	Source	Status
0031	The rheology limits for HLW feed were produced in conjunction with TOC personnel and were based on the limited rheology information available at the time (BNI 2003a). TOC has newer rheology information (e.g., WRPS 2012c and PNNL 2011) which indicates that a significant portion of the staged HLW feed is expected to have greater than 1.0 Pa yield stress. In response, the TOC is to evaluate the validity of the expected rheology from the new references and to document the capability/impact of meeting the HLW rheology limits in Table 7. Based on the results of the TOC evaluation, a new ICD issue may need to be generated for the WTP Contractor to evaluate the capability and impacts of increasing the allowable rheology of the delivered HLW feed above that currently in	Bob Voke (WTP) Mike Thien (TOC)	CLOSED. RPP-RPT-57896, *Estimate of Waste Feed Delivery Non-Newtonian Conditions* (WRPS 2014a), evaluates the validity of the expected rheology and documents the capability/impact of meeting the HLW rheology limits. If the 1.0 Pa yield stress limit is implemented with the current PTF design, a significant portion of the staged HLW feed may require dilution. If the proposed standard high solids vessels are approved as part of PTF optimization, the need for dilution may be largely obviated.

Item #	Description	Source	Status
0032	Once the erosivity methodology is documented and accepted by the ORP, the *WTP Preliminary Documented Safety Analysis to Support Construction Authorization; PTF Specific Information* (PDSA) (BNI 2014a) will be updated and the parameters in Table 7 of ICD-19 will be revised to reflect the change in the PDSA requirements as required.	Bob Voke (WTP) Mike Thien (TOC)	CLOSED. The PTF PDSA will be added to Table 8. Revisions to this document will be evaluated for impact prior to ICD 19 incorporation in the same manner as any other source document that determines a new or revised design basis. The revised approach for protecting the WTP erosion/corrosion design basis is documented in new Section 2.6.2 per 24590-WTP-ICF-ENG-13-0001 (BNI 2014b).

Appendix D - Draft Transfer Procedure Concepts

Appendix D
Draft Transfer Procedure Concepts

Table D-1 Draft Transfer Procedure Concepts - Transfer from TF to WTP

	Responsibility	Action	Why Needed
1	WTP Contractor	WTP Contractor requests transfer of WAC compliant waste feed	WTP Contractor communicates need to receive next batch of waste including: • waste campaign number • scheduled transfer start time • transfer volume • intended transfer path
2	TOC	Acknowledge request for transfer of qualified waste	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: • tank space available • no transfer line leak detection alarms • Waste feed qualification acceptance
4	TOC	TOC internal prerequisites and entry conditions met	TOC internal system and administrative requirements met, including: • pre-transfer mixing complete • heated flush water staged (LAW feed).
5	WTP Contractor	WTP Contractor aligns to receive transfer	Align system to receive waste and clear transfer and to clear permissives and interlocks.
6	TOC	TOC aligns for transfer to WTP	Align system to send transfer waste 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 TF transfer pump. Requires: • no leak detection alarms on transfer line • system lineup to a receipt vessel • PTF operator hand switch set
9	TOC	Notify WTP Contractor and initiate warm-up flush (LAW Feed)	Pre-heat line for transfer
10	TOC	Notify WTP Contractor and initiate waste transfer	Transfer Waste
11	WTP Contractor	Monitor vessel levels and other process indicators	Monitor during transfer to identify upset conditions

Table D-1 Draft Transfer Procedure Concepts - Transfer from TF to WTP

	Responsibility	Action	Why Needed
12	TOC	Monitor vessel levels and other process indicators	Monitor during transfer to identify upset conditions
13	WTP Contractor	Align transfer path to additional receipt vessels (LAW Feed) if needed	LAW Feed transfers may exceed the capacity of a single vessel
14	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.
15	TOC	Terminate waste transfer upon reaching target volume	Terminate once agreed volume of waste is transferred.
16	TOC	Initiate post-transfer flush	Flush line to clear solids
17	WTP Contractor	Align flush through required flow paths	Flush water through lines and dead legs filled by the waste transfer
18	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.
19	TOC	Terminate flush	Minimize water sent to WTP
20	WTP Contractor	Remove transfer permissive via hand switch	Remove transfer permissive from TF to WTP to prevent inadvertent transfers.
21	WTP Contractor	Secure lineup for waste receipt	Align for next operational activity
22	TOC	Secure lineup for waste transfer	Align for next operational activity
23	WTP Contractor	Transmit amount of material received as indicated by WTP instrumentation	Volumetric balance for transfer

Table D-2 Draft Transfer Procedure Concepts - Transfer from WTP to TF

	Responsibility	Action	Why Needed
1	WTP Contractor	WTP Contractor requests transfer of WAC compliant waste feed to the TF.	WTP Contractor communicates need to return a batch of waste including: • waste campaign number • scheduled transfer start time • transfer volume • intended transfer path • waste characterization
2	TOC	Acknowledge request for transfer of qualified waste	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: • no transfer line leak detection alarms • DOE authorization for return of waste
4	TOC	TOC internal prerequisites and entry conditions met	TOC internal system and administrative requirements met including: • Transfer path established • Tank space available • waste acceptance criteria met.
5	WTP Contractor	WTP Contractor to develop procedure for non-routine return of waste feed to TF	Establish actions for implementing non-routine transfer of waste feed to TF
6	TOC	TOC to develop procedure for non-routine acceptance of waste return from WTP	Establish actions for implementing non-routine receipt of waste return from WTP
7	WTP Contractor	WTP Contractor aligns to return transfer waste	Align system to transfer waste to TF and to clear permissives and interlocks.
8	TOC	TOC aligns for receipt from WTP	Align system to receive waste from WTP
9	TOC	Clear (or verify) applicable leak detectors in transfer path enabled and not in alarm	Ensure no inadvertent environmental discharges
10	WTP Contractor	Initiate waste transfer	Transfer waste.
11	WTP Contractor	Monitor vessel levels and other process indicators	Monitor during transfer to identify upset conditions
12	TOC	Monitor vessel levels and other process indicators	Monitor during transfer to identify upset conditions

Table D-2 Draft Transfer Procedure Concepts - Transfer from WTP to TF

	Responsibility	Action	Why Needed
13	TOC	Direct WTP Contractor to terminate transfer upon detection of upset conditions; e.g., leak detection, tank level, etc.	Notify WTP Contractor to secure transfer pump
14	WTP Contractor	Terminate waste transfer upon reaching target volume	Terminate once agreed volume of waste is transferred.
15	TOC	Initiate post-transfer flush	Flush line to clear solids
16	TOC	Terminate flush	Minimize water sent to TF
17	WTP Contractor	Secure lineup for waste receipt	Align for next operational activity
18	TOC	Secure lineup for waste transfer	Align for next operational activity
19	WTP Contractor	Transmit amount of material received as indicated by WTP instrumentation	Volumetric balance for transfer
20	TOC	Determine amount of material received based on tank level	Volumetric balance for transfer

Appendix E - Definition of Terms

Appendix E
Definition of Terms

This appendix was developed as a reference to standardize definition of terms between the TOC, the WTP Contractor, and the DOE regarding terms used for the LAW and HLW waste feeds. Of particular importance is the WTP Contractor's definition of the terms which are used to determine the acceptance criteria values in Table 7.

General Definitions

- **Batch**
  A discrete volume of certified LAW or HLW waste feed from a single source DST transferred from TF to the PTF as a constituent of a campaign.

- **Campaign**
  All of the batches of LAW or HLW feed delivered to the PTF from a single source DST.

- **Flush water**
  Strained raw water that may be heated to 180°F without addition of sodium hydroxide or sodium nitrite.

- **Separable Organics**
  Separable organics are organic compounds (carbon based molecules) that are present in the HLW or LAW waste streams transferred to the WTP and are present in concentrations beyond their saturation point for a particular batch inventory. The saturation point for a particular HLW or LAW waste is determined by blending the two wastes together at a minimum 8 wt% solids concentration and 10 molar sodium concentration then holding at 25 °C for 8 hours. If the organic species separates as a solid or liquid under these conditions, the organic is deemed "separable."

- **Solids**
  Solids in WTP 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 LAW feed and grams of solids per liter of HLW slurry feed.

- **Waste Feed Acceptance Criteria**
  Quantified limitations on waste feed parameters established to protect the WTP design or safety basis.

- **Waste Feed Transfer Physical Limits**
  Those physical limitations imposed upon the transfer of waste feed to ensure the physical integrity of the transfer system and process stability.

- **WTP Contractor**

  The WTP Contract (BNI 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 later by DOE. The term "WTP Contractor" used within this ICD applies to the "Contractor" as defined in the WTP Contract (BNI 2000).

- **WTP Operations Contractor**

  The WTP Contract (BNI 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 later by DOE. The term "WTP Operations Contractor" used within this ICD applies to the "Operations Contractor" as defined in the WTP Contract (BNI 2000).

LAW Feed Waste Acceptance Criteria (Table 7) Definitions

- **Feed Receipt Temperature**

  Monitored in the TF staging 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 (gmole H_2/hr) and the volume tested (L). The hydrogen generation rate (gmole H_2/hr) is to be determined by sample and analysis testing.

- **Slurry Bulk Density**

  Density of the entire slurry. Results are to be determined after holding the sample at 25°C for 8 hours.

- **Slurry Viscosity**

  Viscosity of the entire slurry. Results are to be determined after holding the sample at 25°C for 8 hours.

- **Solids Concentration**

  See general definition section for definition of 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.

HLW Feed Waste Acceptance Criteria (Table 7) Definitions

- **Critical Velocity**

  Critical velocity is the minimum flow velocity demarcating flows in which any solids form a stationary bed at the bottom of the pipe (i.e., particles drop out of the continuous phase and become stationary on the pipe surface) from fully suspended flows. See design guide 24590-WTP-GPG-M-0058 (BNI 2010e) for definitions of the physical properties to be used by the WTP Contractor for predicting the critical velocity of a given slurry line.

- **Feed Receipt Temperature**

  Monitored in the staging 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 (gmole H_2/hr) and the volume tested (L). The hydrogen generation rate (gmole H_2/hr) is to be determined by sample and analysis testing.

- **Maximum Particle Size**

  Largest particle size that can be delivered to WTP.

- **Slurry Bulk Density**

  Density of the entire slurry. Results are to be determined after holding the sample at 25°C for 8 hours.

- **Slurry Rheology**

  Rheology of the entire slurry. The results are to be determined after holding the sample at 25°C for 8 hours, and the values in Table 7 are based upon a Bingham plastic fit.

- **Solids Concentration**

  See general definition section for definition of solids. Results are expressed in grams of dry solids per liter slurry feed and the mass of solids is to be determined after holding the sample at 25°C for 8 hours.

- **Unwashed Solids**

  Solids in HLW feed prior to any treatment or washing. The unwashed solids content is measured in centrifuged samples after removing the separated liquid.