WASTE COMPLIANCE PLAN FOR RADIOACTIVE LIQUID WASTE TRANSFERS FROM THE DWPF TO 241-H TANK FARM (U)

CLASSIFICATION: U
Does not contain UCNI

Approvals

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REVISION HISTORY

Revision 0 **April 1999**	- Initial issue of X-SD-G-00005 in response to WAC X-SD-G-00001 Revision 3. This initial issue is to be implemented by the DWPF specifically to support implementation of Technical Safety Requirements (TSR's) in the Tank Farms. Prior versions of this document were under WSRC-RP-95-997.
Revision 1 **May 1999**	**Revision bars used** - Added Tank 21 as a potential receipt tank. - Corrected typographical error in Attachment 8.4. - Deleted Implementation Plan.
Revision 2 **May 2000**	**Revision bars used** - Added Tanks 23 and 24 as potential receipt tanks. - Updated the nitrite and caustic addition quantities and the waste characterization to reflect reduced water volume.
Revision 3 **June 2001**	**Revision bars used** - Minor editorial corrections/changes made throughout. - Revised cover page and 5.1.1 to reflect current organization. - 5.2 – Updated DOE Order consistent with WAC, Rev. 11. - 5.3.5 – Addressed additional criteria specific to Tank 43 per WAC, Rev. 11. - 5.3.5.7 – Deleted statement regarding meeting of ammonium concentration and transfer rate. - 5.3.10 – New section added to address uranium enrichment criteria. - 7.0 – Updated revision numbers for selected references. - 7.0 –Added new reference [24]. - Attachment 8.4 – Revised compliance action for 5.3.5 consistent with changes to that section. - Attachment 8.4 – Added compliance action listing for new section 5.3.10.
Revision 4 **November 2001**	**Revision bars used** - 3.0 – Added definitions for SCHWMR and Equivalent U-235. - 4.2 – Deleted WD-Engineering approval of TF WAC as this is not current practice. - 4.3 – Clarified what documents are co-approved. - 4.3, 5.4.1, & Reference 8 – Updated description/name of Work Group WG08 to reflect current terminology. - 4.4 – Added approval of TF WAC. - 5.2 & 5.3.5.4, & Att. 8.1 – Updated ammonia levels per current estimates. - 5.3.1.6 & Att. 8.4 – Deleted STA as this position no longer exists in the DWPF. - 5.3.3.7 – Deleted first paragraph which was not part of the compliance basis. - 5.3.3.7 – Updated data in last paragraph for next sludge batch. - 5.3.4.6, 5.3.4.7, 5.3.5.6, 5.3.5.7, 5.3.6.6 & Att. 8.4 – Updated calculation information for next sludge batch. - 5.3.6.7 – Included average RST value. - 5.3.7.7 – Updated inhalation dose potential limit per current WAC [11]. - 5.3.8.1.2 & 5.3.8.7 – Clarified information and regulatory references in these sections. - 5.3.9.7 & 3.0 – Updated terminology for "equivalent Pu-239" weight. - 5.3.10 & Att. 8.4 – Updated to reflect current status of the DWPF Sludge Feed WAC. - References 14, 17, 19, & 20 – Updated calculation references for next sludge batch. - Reference 25 – Added new reference. - Att. 8.1 – Updated to include use of alternate antifoam agent. - Minor editorial changes/corrections throughout are not marked.

REVISION HISTORY (continued)

Revision 5 **March 2003**	**Revision bars used** - Revised to be consistent with WAC Revision 13 (including the deletion of the heat generation limit, a new organic vapor limit and toluene limit, new hydrogen generation rate limits, a new inhalation dose potential limit). Other change include: - 5.2 – Re-characterized HEME/HEPA dissolution as Irregular Waste. - 5.3.1 – Revised the frequency for pH sampling. - 5.3.2 – Included discussion for high nitrate conditions. - 5.4.2 – Added new TSR Interface Control section. - References – Updated - Editorial/organizational changes made throughout document.
Revision 6 **December 2003**	**Revision bars used** - Revised the Reference section to update the newest revision for references: 1, 10, 11, 14, 15, 16, 17, 19, 26. - Section 3.0 – added definition for Sludge Batch 3. - Replaced "macrobatch" with "sludge batch" as well as replaced "Sludge batch 2 (Macrobatch 3)" with "Sludge batch 3" throughout the document. - Section 5.3.1.7 – added discussion of the scenario when decontamination waste in the DWTT is transferred to RCT before neutralization.
Revision 7 **April 2004**	**Revision bars used** - 3.0 – Added DWPF-RW-01 and DWPF-RW-02 definitions. - 5.3.1 & 5.3.2 – Revised for the reduction of sodium hydroxide and sodium nitrite addition and for the change in minimum inhibitor schedule for DWPF-RW-01. - Reference section – Added reference 27, 28 and 29. - Insert section 5.4.3, "Analytical Uncertainties" and renumbered the following sections. - Attachment 8.1 – Update the maximum value of Na_2SO_4.
Revision 8 **September 2004**	**Revision bars used** - Replaced CST with LW throughout the document. - Added definitions for streams DWPF-RW-03, DWPF-RW-04, DWPF-IW-01, and DWPF-IW-02 to section 3.0. - 5.1 & 5.2 Revised to include two types of Regular Waste transfers into the RCT: normal and infrequent. - 5.3 & Attachment 8.4 – Revised to add compliance actions for pH and inhibitors criteria for infrequent transfers during RCT processing.
Revision 9 **July 2005**	**Revision bars used** - Referenced the DWPF TSR 5.8.2.25. - Replaced Hasmukh B. Shah with David D. Larsen as LWGR. - Removed Revision number from Reference 26. - Added the DWPF TSR as Reference 30.
Revision 10 **May 2006**	**Revision bars used** - Added Tank Farm LDD flagging
Revision 11 **October 2006**	**Revision bars used** - Revised LDD Flagging for Specific Admin Controls
Revision 12 **February 2007**	**Revision bars used** - Updated for Sludge Batch 4 processing. - Replaced David D. Larsen with representative from the DWPF Chemical Process Group as LWGR. - Removal of toluene and methanol from organic vapor control section. - References – Updated. - Editorial/organizational changes made throughout document.

REVISION HISTORY (continued)

Revision 13 **July 2007**	**Revision bars used** - Updated for "sludge only" and "coupled" processing with ARP/MCU. - Added acceptance criteria for transfers to MCU and Tank 50 (Section 5.4). - Noted Deviation for Tank 50. - References – Updated and added. - Editorial/organizational changes made throughout document.
Revision 14 **April 2008**	**Revision bars used** - Revised Sections 5.4.4.6 and 5.4.11.6 to state that temperature will be monitored during the 512-S to MCU transfer. - Revised Sections 5.4.8 and 5.5.4 to deviate from the TF WAC with steam condensate and other evaluated liquid streams not being filtered prior to transfer to MCU. - Revised Section 5.4.10 to add drain plugs at 512-S. - Updated Attachment 2 phosphate minimum to account for Laboratory use of ReACT.
Revision 15 **October 2008**	**Revision bars used** - Updated for Sludge Batch 5 processing. - Revised references of the Tank 49 sample to Salt Batch qualification samples. - Updated requirements for the 2H Evaporator and added Attachment 8.6 to demonstrate Sludge Batch 4 and 5 compliance. - Added wording to ensure communication between TF and WS Engineering for RCT containing sludge.
Revision 16 **July 2009**	**Revision bars used** - Removed Sludge Batch 4 references. - Added RDCT to Section 3.0. - Added steam generator purge water, process cooling water and chilled water to normal RCT transfer description. - Added MCU process requirement for specific gravity. - Added DWPF laboratory glass shard disposal into the recycle. - Removed deleted references and renumbered remaining references.
Revision 17 **September 2009**	**Revision bars used** - Updated the Inhalation Dose Potential requirements for non-Type IV tanks. - Add ammonia to required laboratory analysis for the RCT for every tenth batch sent to Tank Farm. - Clarified infrequent transfer determination and required laboratory analysis.
Revision 18 **February 2010**	**Revision bars used** - Updated ARP/MCU criticality strategy for N-NCS-H-00192, Rev. 3. - Removed steam condensate additions discussion from WAC. Deviation discussed in Section 5.4.8. - Revised Section 5.4.14 to reflect new Tank 50 hydrogen generation limit and NO_{eff} minimum. - Added downstream requirements for DWPF recycle stream section 5.3.10. - Revised Section 5.5.1.2 to remove water/cold chemical testing technical report discussion.
Revision 19 **June 2010**	**Revision bars used** - Added Sludge Batch 6 information throughout. - Removed Tanks 21, 23, and 24 from acceptable recycle stream tanks. - Added Tank 41 as an option for recycle stream and added streams DWPF-RW-07 and DWPF-RW-08 associated Tank 41 transfers.

REVISION HISTORY (continued)

Revision 20 **May 2011**	**Revision bars used** - Removed Sludge Batch 5 information throughout. - Added Sludge Batch 7a information throughout. - Added Germanium to Attachment 8.2. - Updated Attachment 8.6 for Sludge Batch 6 WAPS data and added Sludge Batch 7 - Added Attachment 8.7—Downstream Facility Acceptance Criteria for ETP. - Added that the RCT will be sampled on a more frequent basis to establish an ammonia concentration baseline.
Revision 21 **June 2011**	**Revision bars used** - Changed DWPF TSR 5.8.2.25 from Administrative Control to a Specific Administrative Control. - The pH minimum limit changed from 9.5 to 12 in Section 5.3.1 and 5.4.1 based on TF WAC, Rev. 30. - Updated Section 5.3.2.6 and 5.5.4 to allow infrequent regular waste transfers to be made without meeting minimum inhibitor providing a corrosion evaluation is performed on receiving tank. - Added new requirements for the Interface Controls.
Revision 22 **September 2011**	**Revision bars used** - Removed Sludge Batch 6 information throughout. - Added Sludge Batch 7b information throughout. - Updated DPB processing limit for MCU and the ETP H-3 and total beta-gamma limit for consistency with the TF WAC. - Updated Attachments 8.6 and 8.7 for Sludge Batch 7a WAPS data and added Sludge Batch 7b.
Revision 23 **April 2012**	**Revision bars used** - Removed Sludge Batch 7a information throughout. - Updated ARP/MCU criticality strategy for Pu concentration increase from 0.1 mg/L to 0.3 mg/L as seen in N-NCS-H-00192, Rev. 5. - Updated Attachment 8.6 for SB7b information for blended data. - Increased the maximum concentration of mercury in Attachment 8.1 to reflect process history.
Revision 24 **September 2012**	**Revision bars used** - Added 25°C temperature to Section 5.3.3 for consistency with hydrogen generation requirement wording in TF WAC. - Revised definitions of Normal Regular Waste and Infrequent Regular Waste transfers. - Revised Attachment 8.7 to remove SB7a data and documented the max allowable sludge slurry to meet the ETP WAC limit for Beta-Gamma. - Added clarifications on amount of sludge solids in Sections 5.3.3, 5.3.4, and 5.3.5. - Revised Temperature Limit wording for MCU Process Requirements in Section 5.4.11.

REVISION HISTORY (continued)

Revision 25 **April 2013**	**Revision bars used** - Updated acronyms and organization names. - Revised Section 5.1.2 (Process Description) to reflect the caustic recycle flowsheet and updated the maximum allowed gallons of sludge slurry from 221 gallons to 650 gallons. Added additional streams to the normal regular waste transfers and the infrequent regular waste transfers for completeness. - Revised Sections 5.3.1 (pH) and 5.3.2 (Minimum Inhibitor) to be consistent with the revised caustic/sodium nitrite requirements and new IPI equipment. - Revised Sections 5.3.3 (Hydrogen Generation) and 5.3.5 (IDP) to include the new gallons of sludge slurry determined in the caustic flowsheet calculations. - Updated Section 5.3.5 (Organic Vapor Control) with the revised organic contribution value. - Added caustic flowsheet calculations to Section 7.0. - Updated compliance actions in Section 8.5 including tracking the gallons of sludge slurry in each RCT transfer and updating WG08 with the data.
Revision 26 **May 2013**	**Revision bars used** - Added Sludge Batch 8 information throughout including incorporating Sludge Batch 8 data/calcs in Sections 5.3.3, 5.3.4, 5.3.5, 5.3.6, 5.3.9, and 5.3.10. - Included four Sludge Batch 8 calculations in Reference section. - Updated Attachments 8.6 and 8.7 for Sludge Batch 8 data.
Revision 27 **December 2013**	**Revision bars used** - Removed Sludge Batch 7b information throughout. - Revised Section 2.0 (Scope) to state that DWPF recycle waste transfers are not allowed to Tanks 43 and 38 (2H Evaporator feed/drop tanks) due to potential sludge solids. - Updated acronyms and organization names. - Revised Section 5.1.2 (Process Description) to delete the caustic recycle flowsheet, address the new sludge allowance strategy for Tank Farm recycle receipt tanks and remove the 650 gallon sludge solids carryover limit. - Clarified parts of Sections 5.3.1 and 5.3.2 related to the elimination of the caustic flowsheet. - Revised Sections 5.3.3 (Hydrogen Generation) and 5.3.5 (IDP for Type IV Waste Tanks) to address the new sludge solids accounting strategy and the blended SB8 composition. - Revised Section 5.3.4 (Organic Vapor Control) to address details on the control of strip effluent transferred to the Tank Farm. - Revised Section 5.3.6 (IDP for non-Type IV Waste Tanks) to include the revised gallons of allowable sludge solids based on the blended SB8 composition. - Revised Section 5.5.2.1 (Interface Controls) to be consistent with DWPF TSR SAC 5.8.2.25. - Updated references in Section 7.0. - Increased the maximum ammonia concentration in Attachment 8.1 to 198 ppm for consistency with Section 5.3.4. - Updated compliance actions in Attachment 8.5 for consistency with the new recycle accounting strategy. - Added new Attachment 8.6 to include sludge volumes from the DWPF Sludge Tracking Log. - Updated Attachments 8.7 and 8.8 with the blended SB8 composition.

REVISION HISTORY (continued)

Revision 28 **February 2014**	**Revision bars used** - Revised Section 5.1.2 (DWPF Process Description) to include new waste streams DWPF-RW-09 and DWPF-RW-10 for DWPF recycle going to Tank 13 (Type II waste tank). - Revised 5.3 subsections to include DWPF recycle going to a Type II tank including revisions to the strip effluent leak calc [6], inhibitor calc [12], HGR calc [43] and the IDP calc [45]. - Revised Section 5.4.5 (MCU Safety Criteria) to update the criteria basis related to the HC 3 status for MCU. - Revised Section 5.1.3 (Characterization) and Section 5.4.8 (MCU – Filtration) to add the 0.5 micron filter size for the 512-S Crossflow filter. - Updated compliance actions in Attachment 8.5 to reflect new waste streams.
Revision 29 **October 2014**	**Revision bars used for non-formatting technical changes only** - Reformatted entire document. - Revised Section 4.0 for D&S-FE to communicate to TF-FE on significant changes made to WG08. - Revised Sections 5.3.3.6 and 5.3.5.6 to state that RCT batch number limit is not applicable when Tank 41 is not undergoing salt dissolution. - Revised Section 5.4.13.1 to be consistent with Tank Farm WAC revision that deleted Attachment 13.1. - Revised Section 5.5.4 to reflect the current version of the SPF WAC. - Added reference 39 and renumbered all references sequentially in Section 7.0.
Revision 30 **May 2015**	**Revision bars used** - Revised Section 1.0 to state that the WCP is applicable to Sludge Batch 8 only processing as well as with the coupled processing of Salt Batches 7 and 8. - Revised Section 3.0 to add PRFT acronym. - Revised Sections 5.3.3, 5.3.5, 5.3.6, and 5.3.9 as well as Attachment 8.5 to establish new compliance bases. - Revised Section 5.3.3 and Attachment 8.5 to denote a Tank 41 recycle accounting exemption. - Revised Attachment 8.1 to address cerium oxide. - Revised Section 5.4.11 of Attachment 8.5 to reflect TF WAC wording. - Removed Attachments 8.6, 8.7, and 8.8. - Removed references 7.17, 7.26, and 7.31 of revision 29 of the WCP, added references 7.17, 7.19, 7.30, 7.41, and 7.42, updated reference 7.25, and sequentially renumbered references.
Revision 31 **June 2015**	**Revision bars used** - Revised Section 5.1.2 to discuss both an MST-Strike and Filter-Only mode of 512-S operation. - Revised Section 5.1.3 to state that the salt batch sample analyzed by SRNL may be treated with MST. - Revised Section 5.3.9.7 to establish that listed numerical results apply to a 512-S flowsheet with and without MST. - Revised Section 5.4.5.4 to state that listed MST parameters will be controlled when 512-S is in the MST-Strike operation mode. - Revised Section 5.4.5.7 to establish the MCU IDP and Hazard Category 3 compliance basis for Salt Batch material that can be processed without MST.

Revision 32 **December 2015**	**Revision bars used** - Revised Section 1.0 to make WCP applicable to coupled processing with no specific salt batch called out. - Revised Section 5.3.4 to include analytical uncertainty requirement for organic vapor control from Tank Farm DSA/WAC. - Revised Sections 5.3.5, 5.3.6 and 5.4.5 to include analytical uncertainty requirement for IDP from Tank Farm DSA/WAC. (Section 5.4.5 also included MCU Hazard Category 3 Criteria and Cs-137) - Revised Sections 5.3.8, 5.3.9 and 5.4.6 to include analytical uncertainty requirement for criticality safety from Tank Farm DSA/WAC. - Revised Section 5.3.10 to remove discussion of Attachment 8.8. - Revised Attachment 8.5 to include analytical uncertainty as part of compliance actions for organic vapor control, IDP and criticality safety (Sections 5.3.4, 5.3.5, 5.3.6, 5.3.9, 5.4.5 and 5.4.6)

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Requirement: This document meets the CST requirements for the following:

- **CST Admin Control 5.8.2.13**
- **CST SAC 5.8.2.15**
- **CST SAC 5.8.2.21**
- **CST SAC 5.8.2.25**
- **CST Admin Control 5.8.2.32**
- **CST DSA 3.4.1.5.2, 5.7.1, and 6.5.2**

This document meets the DWPF requirements for the following:

- **DWPF SAC 5.8.2.25**

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1.0 PURPOSE

In accordance with the Defense Waste Processing Facility (DWPF) TSR SAC 5.8.2.25, this Waste Compliance Plan (WCP) for the DWPF Radioactive Waste Transfers to the H Tank Farm (HTF) identifies the Specific Requirements of the Tank Farm (TF) Waste Acceptance Criteria (WAC) [7.1] and the TF DSA [7.2] which are applicable to the DWPF recycle streams, and describes how those requirements will be met. This WCP is applicable for the DWPF recycle streams for Sludge Batch 8 sludge only as well as with the coupled processing with a salt batch through Actinide Removal Process (ARP) in 512-S and Modular Caustic Side Solvent Extraction Unit (MCU).

2.0 SCOPE

This document gives the chemical, physical, and radiological requirements for the DWPF recycle waste transfers to HTF Tank 13 (Type II tank), Tanks 41, 43, and 38 (Type III tanks), and Tank 22 (Type IV tank), via HDB8 and transfers to MCU or Tank 50 from 512-S. Recycle waste transferred to Type IV tanks (Tank 22) is designated as stream DWPF-RW-01, DWPF-RW-03, and DWPF-IW-01, recycle waste transferred to Type III tanks (Tank 41) is designated as stream DWPF-RW-07 and DWPF-RW-08 and recycle waste transferred to Type II tanks (Tank 13) is designated as stream DWPF-RW-09 and DWPF-RW-10 in the TF Emergency Response Database (ERD) [7.3].

NOTE: Recycle waste transfers to Tanks 43 and 38 (2H Evaporator feed/drop tank) are currently not allowed by the TF ERD due to the potential of sludge solids from the DWPF recycle stream going to the 2H Evaporator system. However, DWPF compliance strategies related to Tanks 43 and 38 are still included in this WCP revision since the TF WAC provides requirements for DWPF recycle transfers to Tanks 43 and 38.

The clarified salt solution transferred from 512-S to MCU is designated as stream DWPF-RW-05. The wash water used in 512-S or solution generated during 512-S maintenance conditions is designated as stream DWPF-RW-06 transferred directly to Tank 50. The recycle stream, clarified salt solution stream and wash water/maintenance solution stream characterization and requirements cited in this document apply to the DWPF sludge only or coupled operations.

3.0 TERMS, DEFINITIONS, AND ACRONYMS

ADCT - Acid Drain Catch Tank
ARP - Actinide Removal Process
BUOGCT - Back Up Off Gas Condensate Tank
CDC - Canister Decontamination Cell
CLFL - Composite Lower Flammability Limit
CPC - Chemical Process Cell
CST - Concentration, Storage, and Transfer Department
CSTF - Concentration, Storage and Transfer Facility
Coupled - DWPF operating mode involving feeding and processing of sludge solids and a product stream from the ARP/MCU salt processing facilities.
DOE - Department of Energy
DWPF - Defense Waste Processing Facility
D&S-FE - Defense Waste Processing Facility & Saltstone – Facility Engineering
DWPF-IW-01 - DWPF irregular waste transfers to HTF Tank 22 (Type IV tank)
DWPF-IW-02 - DWPF irregular waste transfers to HTF Tanks 43 and 38 (Type III tanks)
DWPF-RW-01 - DWPF regular waste normal transfers to HTF Tank 22 (Type IV tank)
DWPF-RW-02 - DWPF regular waste normal transfers to HTF Tanks 43 and 38 (Type III tanks)
DWPF-RW-03 - DWPF regular waste infrequent transfers to HTF Tank 22 (Type IV tank)
DWPF-RW-04 - DWPF regular waste infrequent transfers to HTF Tanks 43 and 38 (Type III tanks)
DWPF-RW-05 - DWPF regular waste transfer of clarified salt solution from 512-S to MCU
DWPF-RW-06 - DWPF regular waste transfer of wash water/maintenance solution from 512-S to HTF Tank 50
DWPF-RW-07 - DWPF regular waste normal transfers to HTF Tank 41 (Type III tank)
DWPF-RW-08 - DWPF regular waste infrequent transfers to HTF Tank 41 (Type III tank)
DWPF-RW-09 - DWPF regular waste normal transfers to HTF Tank 13 (Type II tank)
DWPF-RW-10 - DWPF regular waste infrequent transfers to HTF Tank 13 (Type II tank)
DWTT - Decontamination Waste Treatment Tank
ERD - Emergency Response Database
ERT - Effluent Retention Tank
ESP - Extended Sludge Processing
ETP - Effluent Treatment Project
FAWH - Formic Acid Waste Header
FDCT - Floor Drain Catch Tank
GRM - Gas Release Mode
HDB8 - H- Area Diversion Box Number 8
HEME - High Efficiency Mist Eliminator
HEPA - High Efficiency Particulate Air
HGR - Hydrogen Generation Rate
HPT - H-Area Pump Tank
HTF - H-Area Tank Farm
ICD - Interface Control Document
IDP - Inhalation Dose Potential
IPI - Installed Process Instrumentation
ISA - Ionic Strength Adjuster
IW - Irregular Waste
LFL - Lower Flammability Limit
LPPP - Low Point Pump Pit
LW - Liquid Waste
LWF - Liquid Waste Facility
LWGR - Liquid Waste Generator Representative
LWO - Liquid Waste Operations

MC - Melt Cell
MCU - Modular Caustic Side Solvent Extraction Unit
OADCT - Organic Acid Drain Catch Tank
OGCT - Off Gas Condensate Tank
Organics - ‘Organics’, as defined by the WAC, includes any waste component that contributes to a combined CLFL of 5% or greater in the vapor from the stream, under equilibrium conditions. Hydrogen generated from the waste is excluded.
PID - Process Interface Document
PRFT - Precipitate Reactor Feed Tank
PS - Production Support
RCRA - Resource Conservation and Recovery Act
RDCT - Regulated Drain Catch Tank
RCT - Recycle Collection Tank
RWT - Recycle Waste Tank
SAR - Safety Analysis Report
SASs - DWPF Melter Steam Atomized Scrubbers
SB - Safety Basis. Acceptance Criteria designated as “SB” denotes Safety Requirements from the TF WAC as documented in its Authorization Basis (SAR and TSRs)
SB Administrative Control - Acceptance Criteria designated as “SB Administrative Control” are WAC requirements that support the Administrative Control Programs required by the TF TSRs.
SB SAC - Acceptance Criteria designated as “SB SAC” are WAC requirements that support the Specific Administrative Control Programs required by the TF TSRs.
SCHWMR - South Carolina Hazardous Waste Management Regulations
Sludge only - DWPF operating mode involving feeding and processing of sludge solids but not salt feed or other product of salt processing.
SE - Strip Effluent
SME - Slurry Mix Evaporator
SMECT - Slurry Mix Evaporator Condensate Tank
Special Waste - A category of waste, more fully described in the WAC, for streams that can have highly variable compositions.
SS - Safety Significant
STE - Shift Technical Engineer
STEL - Short Term Exposure Limit
TCLP - Toxicity Characteristic Leaching Procedure
TF - Tank Farm
TF-FE - Tank Farm - Facility Engineering
TOC - Total Organic Carbon
TSR - Technical Safety Requirement
Type II Tank - an older-style high level radioactive waste storage tank which has secondary containment.
Type III Tank - a newer-style high-level radioactive waste storage tank which meets current regulatory requirements.
Type IV Tank - an older-style high level radioactive waste storage tank which has no secondary containment.
VCR - Vitrification Control Room
WAC - Waste Acceptance Criteria
WCP - Waste Compliance Plan

4.0 RESPONSIBILITIES

4.1 Tank Farm Facility Engineering (TF-FE) responsibilities, as cited in the WAC [7.1] include, but are not limited to:

- Maintaining the WAC, including revisions, reviews and approvals as needed.
- Co-approve the DWPF Recycle WCP.
- Evaluate the impact of a WAC non-compliance.

4.2 DWPF & Saltstone Facility Engineering (D&S-FE) is responsible to:

- Develop and maintain a Waste Compliance Plan (WCP) document. This WCP describes the DWPF recycle liquid generation, provides a waste characterization, and describes the controls that ensure compliance to the WAC.
- Co-approve the DWPF recycle WCP.
- Inform TF-FE when a proposed change impacts the WCP, prior to transferring of the material.
- Report a WAC non-compliance to TF-FE and assist with the investigation.
- Report any known or suspected deviation from the waste characterization.
- Notify the TF-FE WAC Cognizant Engineer when an activity generating a Special Waste has been terminated.
- Perform monitoring/self-assessment of compliance activities.
- Communicate with TF-FE on WG08 updates regarding significant changes to volume of existing waste streams or any other non-routine updates.

4.3 DWPF Operations and D&S-FE are jointly responsible to:

- Implement the WCP by performing the Compliance Actions.
- Designate a primary contact [Liquid Waste Generator Representative (LWGR) / Waste Acceptance Engineer) for communications regarding WAC/WCP compliance.
- Report any WCP/WAC non-compliance to TF-FE.
- Ensure that proposed activities are consistent with this WCP prior to their approval.
- Provide TF Engineering with the DWPF analytical data in support of this WCP.

4.4 DWPF Operations is responsible to:

- Prepare all waste for transfer to HTF/MCU so that all WCP requirements are met
- Notify the LWGR / Waste Acceptance Engineer of any changes to the Facility or procedures that impact the WCP agreements.

5.0 PROGRAM CRITERA

5.1 General Information

5.1.1 Introduction

This WCP describes the DWPF radioactive waste streams transferred to the HTF and identifies Actions required to ensure compliance to the applicable Specific Criteria identified in the WAC [7.1] and Safety Requirements identified in the CSTF DSA and TSR [7.2, 7.4].

The stream description includes a chemical characterization of principal constituents, and a description of the stream's generation. This information will augment the Compliance Bases for TF-FE assessment of the adequacy of the waste compliance program.

The LWGR / Waste Acceptance Engineer can be contacted through the DWPF Chemical Process Group. The D&S-FE Shift Technical Engineer may also perform duties of the LWGR / Waste Acceptance Engineer in his/her absence.

5.1.2 Process Description

5.1.2.1 DWPF

The primary function of the DWPF is to process high level wastes (in the form of strip effluent (SE) from the MCU, washed MST/sludge slurry (MST-Strike option) or only sludge slurry (Filter-Only option) from the ARP, and prepared sludge from ESP) into a borosilicate glass, canistered waste form which meets the requirements of the Federal Repository.

Recycle liquid is generated in the DWPF Vitrification building and adjoining facilities, and collected in the Recycle Collection Tank (RCT).

The sources of recycle waste, in order of decreasing volume, are currently:

1. Condensate from evaporation of processed waste in the Sludge Receipt and Adjustment Tank (SRAT), and the Slurry Mix Evaporator (SME), collected in the Slurry Mix Evaporator Condensate Tank (SMECT). The SME usually receives water used to decontaminate canisters.

2. Liquid from the melter off-gas condensate system, collected in the Off Gas Condensate Tank (OGCT) or the Back-up Off-Gas Condensate Tank (BUOGCT).

3. Liquid from the Decontamination Waste Treatment Tank (DWTT). This consists of water and chemicals used for equipment decontamination, occasional digestate of spent HEME or HEPA filter media in caustic, and a small amount of water from miscellaneous activities accumulated in the Warm Decontamination Waste Header sumps and the Acid Drain Catch Tank (ADCT).

4. Aqueous waste collected in the Chemical Process Cell (CPC) sumps, Melt Cell (MC) sump, Canister Decontamination Cell (CDC) sump, West Deionizer sump and Inlet Tunnel Collection sump.

5. Occasional flush water [e.g., Formic Acid Waste Header (FAWH)] and process chemicals (i.e., nitric acid, etc.) from cleaning and maintenance activities (OGCT/BUOGCT), or from planned periodic equipment flushing. Also, process water, steam generator purge water, process cooling water and chilled water.

6. Process sample material and flush water from the Analytical Laboratory. Small amounts of laboratory chemicals, crushed glass fine particles and sampled waste material from the Analytical Laboratory drains are also introduced.

7. Dilute contaminated liquid from the Floor Drain Catch Tank (FDCT), Regulated Drain Catch Tank (RDCT) and other sources that will normally be uncontaminated and routed to the Treated Industrial Waste System instead. Additionally, liquid from the Organic Acid Drain Catch Tank (OADCT) and Effluent Retention Tank (ERT).

Recycle liquid is routinely collected and transferred to the RCT. The RCT is purged, and the purge calculations consider catalytic hydrogen generation in the RCT. During the processing of the RCT and prior to transfer to the TF, the required sodium hydroxide and sodium nitrite additions are made, the tank is thoroughly mixed, required samples are collected, and the RCT temperature is checked to ensure that the temperature is below 50 °C. The RCT and its associated purge system are classified as Safety Class (SC) equipment whereas the RCT sampling system is classified as Production Support (PS) equipment.

The RCT will be neutralized and inhibited depending on the recycle waste transferred to Type II, III or IV waste tanks. The RCT processing will be varied between normal and infrequent transfers to the RCT. The normal and infrequent transfers are categorized as following:

a. A transfer to the RCT is designated normal when it includes one or more of the waste transfers listed below:

   - Transfers from the SMECT.
   - Transfers from the OGCT and the BUOGCT which contain only condensate.
   - Transfers from the CPC sumps which contain no leak of acid and no SE.
   - Transfers from the Laboratory drains and Laboratory samples.
   - Transfers from the MC sump.
   - Transfers from the CDC sump.
   - Transfers containing process water, steam generator purge water, process cooling water and chilled water.

b. A transfer to the RCT is designated infrequent when it comes from sources other than the specific ones listed in part a. Infrequent transfers include but are not limited to the following:

- Transfers from the DWTT.
- Transfers from the OGCT and the BUOGCT during non-routine operation, such as flushing residual solids from the tanks with concentrated nitric acid.
- Transfers from the CPC sumps that contain acid and/or a leak of ≤ 20 gallons of SE from MCU.
- Transfers from the OADCT.
- Transfers from the RDCT.
- Transfers from the ERT.
- Transfers from the FDCT.
- Transfers from the flushing of the FAWH.
- Transfers from the West Deionizer sump.
- Transfers from the Inlet Tunnel Collection sump.

In addition to normal and infrequent regular waste streams, another category is irregular waste (IW) streams, where the concentrations of various species vary within some bounds but the same species are present. Dissolution of HEME/HEPA filters in the DWPF results in an irregular waste stream. Attachment 8.3 provides the maximum concentration of digested HEME/HEPA filter species in the RCT.

The table below shows all recycle waste streams from the DWPF categorized by their Waste Type and the Tank Type of their destination tanks.

Table 1: Designated DWPF Waste stream numbers

Waste Type	To Type IV tank (Tank 22)	To Type III tanks (Tanks 43 & 38)	To Type III tank (Tank 41)	To Type II tank (Tank 13)
Normal Regular Waste	DWPF-RW-01	DWPF-RW-02	DWPF-RW-07	DWPF-RW-09
Infrequent Regular Waste	DWPF-RW-03	DWPF-RW-04	DWPF-RW-08	DWPF-RW-10
Irregular Waste	DWPF-IW-01	DWPF-IW-02		

For normal regular waste transfers, the DWPF will typically analyze the RCT for pH, iron (used for sludge solids determination), TOC, ammonia, nitrite, nitrate and base equivalents every 10^{th} RCT batch. In order to allow for an accurate determination of the sludge content of RCT transfers, each RCT batch will normally be analyzed for iron. If the RCT batch has no iron analysis performed, it will not be possible to further refine the initial assumed sludge volume of 650 gallons.

Additional periodic sampling may be performed on the SMECT and OGCT on a semiannual basis to characterize radionuclides and other species of interest present in these vessels [7.5]. Other analyses are performed as Compliance Actions to meet Acceptance Criteria as described in Section 5.3.

For infrequent regular waste transfers, the DWPF will typically analyze each RCT batch for pH, iron (used for sludge solids determination), nitrite, nitrate and base equivalents to confirm the quantity of inhibitors added to the tank comply with the TF WAC. Similar to normal regular waste transfers, each RCT batch will be analyzed for iron to further refine the initial assumed sludge volume of 650 gallons. The pH analysis is required before the RCT batch is transferred to the TF.

For irregular waste transfers, the DWPF will typically analyze each RCT batch for pH, iron (used for sludge solids determination), TOC, ammonia, nitrite, nitrate and base equivalents to confirm the quantity of inhibitors added to the tank comply with the TF WAC. Similar to normal regular waste transfers, each RCT batch will be analyzed for iron to further refine the initial assumed sludge volume of 650 gallons. The pH analysis is required before the RCT batch is transferred to the TF.

The RCT contents are transferred to the Low Point Pump Pit (LPPP) for eventual transfer to HDB8 pump tank HPT8 or HPT10 for transfer to Tank 13 or Tank 41. The LPPP contents can also be transferred directly to Tank 22.

5.1.2.2 512-S

Transfers to 512-S consist of feed from either 241-96H (MST-Strike option) or Tank 49 (Filter-Only option). MST/sludge solids refers to either MST/sludge solids from 241-96H or potential sludge solids entrainment in the salt solution from Tank 49, depending on whether ARP/MCU is in MST-Strike operations or Filter-Only operations.

The primary function of 512-S is to filter and wash the MST/Sludge slurry from 241-96H, and send the clarified salt solution to MCU and wash water to Tank 50 for disposal at the Saltstone Production Facility. The washed, concentrated MST/sludge solids are transferred to DWPF for processing and eventual disposal in glass. In addition to the 512-S wash water, material that has been used for chemically cleaning the 512-S secondary filter or solution generated during 512-S maintenance conditions may also be transferred to Tank 50.

The table below shows the designations for 512-S streams sent to either MCU or Tank 50.

Table 2: Designated 512-S Waste stream numbers

Waste Type	To MCU	To Tank 50
Normal Regular Waste	DWPF-RW-05	N/A
Infrequent Regular Waste	N/A	DWPF-RW-06
Irregular Waste	N/A	N/A

5.1.3 Characterization

The characterization for recycle liquid is provided in Attachments 8.1, 8.2, and 8.3.

Attachment 8.1 describes the bulk of the recycle stream. This is the anticipated concentration of principal stream components, excluding laboratory chemicals and the products of HEME or HEPA filter dissolution.

Attachment 8.1 provides average and maximum concentrations resulting from normal operation, and anticipated upset conditions. In general, the composition of individual transfers from the DWPF will vary widely within this range because of different batches processed at the DWPF, but the combined composition is expected to be more consistent with the average concentrations over the processing span of the individual sludge batch. During sludge-only or coupled processing, no MST or SE is expected to be in the RCT. The only time SE (containing Isopar L) should be present in the RCT is the result of a spill or maintenance activities. Only a maximum concentration is listed for Isopar L based on an estimated 20 gallon chronic leak of SE [7.6].

Attachment 8.2 describes the principal DWPF laboratory chemicals that will be present. The concentrations given are as in the RCT.

Attachment 8.3 describes the liquid produced from dissolution of HEME or HEPA filters in DWTT caustic solution. The DWPF anticipates to digest approximately nine filters per year and dissolution to take place once or twice a year.

Recycle waste streams from dissolution of HEME/HEPA filters are classified as “irregular waste.” Recycle waste streams from all other sources (including both normal and infrequent transfers) are classified as “regular waste” as defined in the TF WAC [7.1].

The radionuclide content of the DWPF recycle stream sent to the TF is largely a result of entrainment/carryover of feed sludge into the RCT. Historical periodic sample results submitted to the shared electronic WG08 database characterize this aspect.
The characterization for the streams from 512-S to both MCU and Tank 50 is based on the salt batch characteristics. The salt batch tanks are sampled and analyzed by SRNL to the simulated ARP/MCU process. The sample may be treated with MST, filtered through a 0.1 or 0.5 micron filter, and the cesium removed by solvent extraction. The samples also will demonstrate the acceptability of downstream facilities. Attachment 8.4 describes the expected concentrations of principal stream components in the clarified salt solution and wash water streams.

5.2 Prerequisite Programmatic Criteria

A WAC is an ICD written by a waste receiving organization (LW) describing the parameters (e.g., flow, temperature, composition) that must be considered in receiving the waste and defining criteria for acceptance of the waste. The DOE Order on radioactive waste management, DOE Order 435.1-1, requires that waste handling facilities have acceptance criteria.

A WCP is an ICD written by the sending organization (DWPF) describing how the sending organization will control the parameters to ensure compliance with the WAC of the receiving organization. When the liquid waste being sent is known to be outside WAC criteria, a strategy must be developed for safe management and future processing. Upon discovery, the sending organization is to inform the receiving organization of any requirements that have not been satisfied. It will then be determined what actions are to be performed by the sending and/or receiving organizations before the waste can be accepted by the receiving organization. This WCP documents the agreement between the organizations for handling the wastes. Requirements for the WAC and WCP documents for HLW are provided in Reference 7.7.

This document includes the specific requirements from the WAC [7.1] that are applicable to the transfer of the recycle stream from the DWPF to the TF. The specific requirements and the compliance plan methodology for meeting these requirements are cited in Section 5.3.

Up to 500 grams of ground DWPF production glass from the DWPF Analytical Lab may be dispositioned to the TF via the RCT on a monthly basis. The evaluation of this disposition path on the DWPF recycle stream is documented in SRR-WSE-2009-00025 [7.8]. The DWPF Analytical Lab organization will report to D&S-FE the mass of glass sent to the RCT on a monthly basis using OSR Form 46-324.

For Characterization requirements in TF WAC Section 6.3, HEME/HEPA dissolution will be considered as irregular waste (IW). HEME/HEPA dissolution stream contains the same species, and the concentration of this stream can be bounded. The stream has been characterized, and no new species or process chemicals are introduced. Thus, it is acceptable to consider the stream as IW. All other DWPF waste streams will be treated as regular waste (RW), including both normal and infrequent transfers as described in Section 5.1.2.

The volume of each digested HEME/ HEPA batch or the concentration of a detected “indicator” species will be reported for each transfer upon request by TF-FE. Also, the DWPF will notify the TF approximately 2 or 3 weeks in advance of HEME/HEPA dissolution by electronic mail.

The characterization of the decontaminated waste generated as part of an infrequent transfer to the RCT will be provided upon request by TF-FE.

TF WAC Section 11.1.4 for Maximum Concentration of Corrosive Species is satisfied by the characterization information provided in Attachments 8.1, 8.2, and 8.3. The maximum species concentrations are obtained by adding the concentration from the DWPF Laboratory (Attachment 8.2) to the larger of either the maximum concentration in the process chemical stream (Attachment 8.1), or the concentration resulting from dissolution of HEME/HEPA filters (Attachment 8.3).

The maximum chloride concentration for the DWPF recycle stream is 0.029 M. This is the sum of the maximum "lab" contribution ("Chloride" from Attachment 8.2), and the maximum contribution from digestion of HEME/HEPA filters ("Cl" from Attachment 8.3). This meets the criteria that the chloride concentration does not exceed 0.11 M.

The maximum fluoride concentration from the characterization is 0.058 M. This is the sum of the maximum "lab" contribution ("Fluoride" from Attachment 8.2), and the maximum contribution from digestion of HEME/HEPA filters ("F" from Attachment 8.3). This meets the criteria that the fluoride concentration does not exceed 0.086 M.

The maximum nitrate concentration from the characterization is 0.99 M. This is the sum of the maximum "lab" contribution ("Nitrate" from Attachment 8.2), and the maximum concentration of process chemicals ("$NaNO_3$" from Attachment 8.1). This meets the criteria that the nitrate concentration does not exceed 8.5 M.

The maximum sulfate concentration from the characterization is 0.0067 M. This is the sum of the maximum "lab" contribution (0.0032 M, "Sulfate" from Attachment 8.2), and the maximum contribution from process chemicals (0.0035 M, "Na_2SO_4" from Attachment 8.1). This meets the criteria that the sulfate concentration does not exceed 0.18 M.

TF WAC Section 11.3 to Prevent Formation of Shock Sensitive Solids is satisfied by the waste characterization information provided in Attachments 8.1, 8.2, and 8.3 for review by TF-FE. The silver concentration in the recycle stream is dependent on the degree of sludge solids entrainment/carryover into the RCT.

TF WAC Section 11.8 for Requirements to Satisfy Downstream Acceptance Criteria is satisfied by the waste characterization information provided in Attachments 8.1, 8.2, 8.3, 8.4, and 8.7 for review by TF-FE.

No Industrial Hygiene Safety (Section 11.9 of the TF WAC) concerns are introduced with the recycle stream. The characterization provided in Attachments 8.1, 8.2, 8.3, and 8.4 show some compounds already commonplace in the TF such as mercury and caustic that would represent a hazard if the liquid contacted the skin or was ingested. These compounds do not pose any additional industrial hygiene concerns, due to the design and procedural controls in practice. Ammonia vapor can be vented from the tanks. At a maximum concentration of 60 ppm (NH_3) in the recycle liquid at 100°C, the equilibrium vapor concentration could reach 0.238 volume percent [7.9], (68 times the STEL of 35 ppm), if not vented. The odor detection limit for ammonia, 0.043 ppm, is significantly below the STEL, and would provide personnel with an early indication that ammonia vapor levels are rising and that the immediate area should be evacuated.

Other applicable specific criteria cited in the TF WAC [7.1] are addressed in Sections 5.3 and 5.4. Performance of the Compliance Actions of Section 5.3 satisfies all applicable requirements of the TF SB for recycle waste water transfers. Other requirements are not applicable to the DWPF recycle stream. Performance of the Compliance Actions of Section 5.4 satisfies all applicable requirements of the TF SB for clarified salt solution transfers. This WCP is to be implemented by the DWPF specifically to support implementation of the Documented Safety Analysis [7.2] and the Technical Safety Requirements (TSRs) [7.4] in the TF.

5.3 Acceptance Criteria and Compliance Plan for Recycle Waste Water [*A/C* DWPF SAC 5.8.2.25]

The DWPF is responsible for demonstrating that the specific criteria in Sections 5.3.1 through 5.3.10 are met. The actions required to ensure compliance to these specific criteria are summarized in Attachment 8.5. Additional supporting information is provided in the Compliance Bases.

5.3.1 Minimum pH [*A/C* CST Admin Control 5.8.2.13 and CST DSA 6.5.2]

5.3.1.1 Criteria:

The pH is greater than 7 (SB), and greater than 12 (SB Administrative Control).

5.3.1.2 Criteria Type:

SB (pH > 7)
SB Administrative Control (pH > 12)

5.3.1.3 Criteria Applicability: Type II, III and IV Tanks

5.3.1.4 Criteria Basis:

A minimum pH of 12 for influents into waste tanks is specified in the Corrosion Control Program [7.10]. The TF Criticality Safety Basis and the Technical Standards require that the pH be greater than 7 [7.2, 7.4].

The waste tanks and cooling coils are constructed from carbon steel. Solutions with a pH below 7 cause general corrosion of the steel. To prevent general corrosion, solutions transferred to the tanks must have a pH above neutral, and the specification of pH above 12 provides adequate margin to account for errors in neutralization, sampling, and analysis.

5.3.1.5 Computational Technique:

5.3.1.5.1 Direct measurement of pH every 10th batch transferred.

5.3.1.5.2 Verification of the addition of a prescribed quantity of caustic.

5.3.1.6 Compliance Actions:

- RCT processing for normal regular waste and irregular waste transfers: The addition of at least 75 gallons to every RCT batch of DWPF-RW-01, DWPF-RW-07, DWPF-RW-09 and DWPF-IW-01, and 260 gallons to every RCT batch of DWPF-RW-02 and DWPF-IW-02, of nominal 50 weight percent caustic will be verified by all of the following [7.11]:

  a. Caustic flow totalizer of at least 75 or 260 gallons, respectively.
  b. Independent procedural verification by the DWPF Shift Manager, Vitrification Control Room Manager, STE, or equivalent, that a. has been met.
  c. pH measurement will be performed at least every 10^{th} RCT batch and verified to be greater than 12.

- RCT processing for infrequent regular waste transfers:

  The pH of each RCT batch will be measured, and the additional quantity of caustic required to neutralize the tank is determined. The additional caustic will be added along with the normal quantity used for normal transfers to each RCT batch. The required caustic added will be verified by all of the following [7.11]:

  a. Caustic flow totalizer of at least the additional amount plus 75 gallons (for DWPF-RW-03, DWPF-RW-08 and DWPF-RW-10) or 260 gallons (for DWPF-RW-04).
  b. Independent procedural verification by the DWPF Shift Manager, Vitrification Control Room Manager, STE, or equivalent that a. has been met.
  c. pH measurement will be performed on each RCT batch after caustic adjustment to verify that the pH is greater than 12 prior to transfer to the TF.

5.3.1.7 Compliance Basis:

DWPF-RW-01 is the recycle waste of normal transfers to Type IV Waste Tanks, which have stored temperatures less than 40^{o}C. DWPF-RW-02 is the recycle waste of normal transfers to Type III Waste Tanks, which have stored temperatures greater than 40^{o}C.

The technical bases for adding 260 gallons of NaOH in the RCT waste at DWPF was derived from a temperature range at which the dilute waste would be stored. The DWPF recycle waste was initially projected to be stored at a temperature up to 90^{o}C. In recent years, the recycle waste has been sent to Tank 22, a Type IV Tank, where its average temperature stored has been 21 ± 3^{o}C.

Per SRNL recommendation (WSRC-TR-2003-00336 [7.12]), the DWPF recycle stream was highly "over-inhibited" for its supernate composition and its stored temperature. The TF has revised its WAC to allow the DWPF recycle waste to be sent to the TF per the dilute non-DWPF waste inhibitor schedule (Section 11.1.2 of the TF WAC) as long as it meets the 40^{o}C stored temperature limit (DWPF-RW-01) [7.1]. DWPF-RW-02 will be transferred to the TF per the DWPF waste inhibitor schedule (Section 11.1.3 of the TF WAC) [7.1].

For DWPF-RW-01 and DWPF-RW-09 (recycle waste of normal transfers to Type II Waste Tanks), a calculation has been performed to demonstrate that 75 gallons of caustic solution addition to a nominal recycle batch will provide a solution with pH greater than 12.5 [7.13]. In this calculation, influents to the RCT are assumed to be acidic with a pH = 1. Acid equivalents of the influents are used to calculate the volume of 50 wt% NaOH solution required for neutralization (pH = 7) using the maximum processing liquid volume of an RCT batch for conservatism. Base equivalents are then used to calculate the quantity of NaOH solution that is needed to raise the pH from 7 to 12.5. The sum of the two calculated results (i.e., 75 gallons) is the quantity required to appropriately adjust each RCT batch to meet the TF WAC pH limit of 12 [7.13].

At the normal operating conditions of the DWPF, any decontamination waste and other liquid waste are neutralized in the DWTT if the pH is less than 7 before the waste is transferred to the RCT. The nominal caustic addition of 75 gallons NaOH per RCT batch would be free hydroxide and drive the pH to greater than 12.

There are situations during equipment decontamination (i.e., cooling coils, etc.) when the DWTT is almost full and there is no room in the tank for caustic addition. In such instances, or any other abnormal conditions in the DWTT (i.e., sample pump fails), the RCT batch will be analyzed for pH and Nitrate (NO_3^-) concentration after the DWTT contents are transferred to the RCT. Additional caustic required for neutralization in the RCT will be added along with the normal amount of 75 gallons to ensure that liquid recycle waste transferred to HTF has a pH greater than 12.

Between March 26, 1996, and January 31, 2000, the standard quantity of sodium hydroxide inhibitor addition to RCT batches was 240 gallons. Historical analytical results demonstrate that this quantity more than sufficiently inhibited recycle waste batches generated from normal operations. It was demonstrated that even if an operating or equipment failure resulted in caustic not being added to a single RCT batch that was not sampled prior to transfer, caustic remaining in the heels of the RCT and downstream pump tanks would almost certainly neutralize the following RCT batch and maintain the pH >7 [7.14].

After January 31, 2000, routine addition of steam to the SASs was stopped for sludge-only feed operations at the DWPF. This reduced the recycle liquid volume generation rate, and increased the concentration of its chemical constituents. A calculation was performed to demonstrate 260 gallons of caustic solution addition to the more concentrated RCT batches will provide an equivalent degree of excess hydroxide in the adjusted recycle liquid transferred to the TF [7.15].

Since May 2005, the DWPF has normally been operating with steam to one SAS stage to prevent pluggage of the downstream off gas HEME filters. Since the SAS steam will result in a more dilute RCT batch, the 260 gallons (or 75 gallons) of caustic will provide more than enough free OH^- to meet the pH limit of 12.

The TF WAC gives permission for the DWPF recycle waste stream DWPF-RW-01 and DWPF-RW-09 to be sent under inhibitors schedule of the dilute non-DWPF waste. A calculation has been performed using the limits of the dilute non-DWPF waste stream. The calculation shows that the addition of 75 gallons of 50 weight percent NaOH solution will provide enough free hydroxide to keep the pH above 12 [7.13].

Since April 1997, the DWPF has nominally pulled samples every 10^{th} RCT batch transfer for pH, NO_2, NO_3, TOC, Base Equivalents and Fe to satisfy the minimum inhibitors requirement of the TF WAC. The DWPF uses the pH analysis of these samples to satisfy the minimum pH requirement of the WAC also.

DWPF-RW-03 is the recycle waste of infrequent regular waste transfers to Type IV waste tanks, DWPF-RW-04 is the recycle waste of infrequent regular waste transfers to Type III waste tanks, and DWPF-RW-10 is the recycle waste of infrequent regular waste transfers to Type II waste tanks. Per characterization, the only difference between these infrequent streams and the normal streams is the potential of higher concentration of nitrate and nitrite of the infrequent streams. This is a result of the higher concentration of nitric acid or lower pH than normal transfers of the RCT material before processing. In order for the waste to meet TF WAC pH requirements, an additional quantity of caustic to neutralize the extra acid must be added. For infrequent transfers, D&S-FE will calculate the amount of caustic needed to neutralize the extra acid. References 7.13 and 7.15 demonstrate that for each normal RCT processed, the addition of 75 gallons (transfers to Type II and IV tanks) and 260 gallons (transfers to Type III Tanks 43 and 38) of 50 wt% caustic will provide enough hydroxide to keep the pH above 12. Therefore, the addition of the extra amount of caustic plus the normal quantity of 75 gallons (for DWPF-RW-03 and DWPF-RW-10) or 260 gallons (for DWPF-RW-04) will provide sufficient free hydroxide to meet the pH limit of 12. Furthermore, the pH of every infrequent transfer to the RCT will be measured to verify that it meets the SB administrative control pH limit of 12 before the transfer.

DWPF-RW-07 is the recycle waste of normal regular waste transfers to Tank 41, and DWPF-RW-08 is the recycle waste of infrequent regular waste transfers to Tank 41. DWPF recycle transferred to Tank 41 will be used for salt dissolution. The TF corrosion evaluation [7.16] for salt dissolution requires the DWPF recycle streams being transferred to Tank 41 (a Type III tank) to have the inhibitors for a Type IV tank; therefore, an addition of 75 gallons of caustic (the normal addition for a Type IV tank) would be added to DWPF-RW-07 [7.13]. Similar to stream DWPF-RW-03 (infrequent regular waste stream to Type IV tanks), the DWPF-RW-08 waste stream requires the addition of the extra amount of caustic plus the normal 75 gallons to meet the minimum pH.

HEME/HEPA filters dissolution products usually have a pH above 12 (about 5 wt% of caustic solution, a pH > 14) when it is transferred into the RCT. Therefore, with the addition of the normal quantity of caustic, 75 gallons or 260 gallons, the Irregular Waste streams DWPF-IW-01 or DWPF-IW-02 will have sufficient free hydroxide to comply with the pH requirement of the TF WAC.

The DWPF laboratory accuracy for measuring the pH is consistent with the assumptions of the Criteria Basis.

The DWPF Operator executing the transfer will rely on procedural input from the HDB8 Operator regarding the destination of the DWPF transfer.

5.3.2 Minimum Inhibitor Contents [*A/C* CST Admin Control 5.8.2.13]

5.3.2.1 Criteria:

A quantity of hydroxide and nitrite to inhibit waste tank corrosion shall be added to each RCT batch to obtain the average concentration specified in 5.3.2.5, or greater.

5.3.2.2 Criteria Type: SB Administrative Control

5.3.2.3 Criteria Applicability: Type II, III and IV Tanks

5.3.2.4 Criteria Basis:

The Corrosion Control Program [7.10] established waste tank inhibitor levels to minimize or prevent the corrosion of carbon steel waste tank walls and cooling coils. The inhibitor requirements cited in 5.3.2.5 are based on analytical experiments with simulated DWPF recycle waste and its historical data. Nitrite and hydroxide in the DWPF recycle will provide protection against pitting corrosion.

The recycle volume can be as much as 3 Mgal/yr and is collected from various unit operations throughout the DWPF. The waste is collected and transferred to the TF in ~8,000 gal batches. The nitrate concentration in recycle liquid is expected to vary widely. The specified concentrations of inhibitors will provide adequate protection for the composite recycle stream.

5.3.2.5 Computational Technique:

Periodic direct measurement of hydroxide (OH), nitrate (NO_3), and nitrite (NO_2) concentrations confirm that the required average hydroxide and nitrite concentration, as listed below for DWPF-RW-01, DWPF-RW-03, DWPF-RW-07, DWPF-RW-08, DWPF-RW-09, DWPF-RW-10 and DWPF-IW-01, are maintained. For DWPF-RW-02, DWPF-RW-04 and DWPF-IW-02, the DWPF will meet the requirements stated in section 11.1.3 of the TF WAC [7.1].

Nitrate in Recycle Waste	Minimum Inhibitors
For 0.02 M < $[NO_3^-] \leq 1.0$ M:	$[OH^-] \geq 1.0$ M or $[NO_2^-] \geq 1.66 * [NO_3^-]$
For $[NO_3^-] \leq 0.02$ M:	$[OH^-] \geq 1.0$ M or $[NO_2^-] \geq 0.033$ M

Note: All concentrations are in moles/liter, and $[OH^-]$ refers to free hydroxide [7.1]. Certain evolutions may result in $[NO_3^-] \geq 1.0$M. In such instances the DWPF will meet the requirements stated in Section 11.1.2 and 11.1.3 of the TF WAC for concentrated waste.

5.3.2.6 Compliance Actions:

- RCT processing for normal regular waste and irregular waste transfers:

  For DWPF-RW-01, DWPF-RW-09 and DWPF-IW-01, the DWPF will add at least 215 gallons of sodium nitrite solution (nominal 35 to 40 weight percent) to each RCT batch [7.13]. The DWPF will add at least 280 gallons of sodium nitrite solution (nominal 35 to 40 weight percent) to each RCT batch for streams DWPF-RW-02 and DWPF-IW-02 [7.15]. For DWPF-RW-07, the DWPF will add at least 215 gallons of sodium nitrite solution (nominal 35 to 40 weight percent) to each RCT batch per the TF corrosion evaluation [7.16].

  Periodically (normally every 10^{th} batch), the DWPF will analyze the adjusted RCT for nitrate, nitrite, and base equivalents concentrations [7.5], for comparison to the minimum inhibitor criteria.

- RCT processing for infrequent regular waste transfers:

  Infrequent transfers to the RCT may result in nitrate concentrations higher than are normally expected. The above strategy of sodium hydroxide addition and sodium nitrite addition may not apply for those RCT batches (DWPF-RW-03, DWPF-RW-04, DWPF-RW-08 and DWPF-RW-10). In such an event, the DWPF will modify caustic and nitrite additions to meet the inhibitor requirements stated in Section 11.1.2 of the TF WAC for concentrated waste ($[NO_3^-] \geq 1.0$ M). The inhibited contents will be sampled after the adjustment to the RCT to verify that the waste meets the minimum inhibitor criteria of the TF WAC before transfer to the TF.

In the event the RCT may not meet the TF WAC minimum inhibitor requirement, D&S-FE will notify TF-FE and provide an estimate of the nitrite and nitrate concentrations. A corrosion evaluation is required to be performed by TF-FE prior to transferring the infrequent regular waste stream. A sample will be taken prior to transferring and communicated with TF-FE as soon as the results are available.

5.3.2.7 Compliance Basis:

The technical bases for adding 260 gallons of caustic solution (nominal 50 weight percent sodium hydroxide) and 280 gallons of sodium nitrite solution (nominal 35 to 40 weight percent) to each RCT batch at the DWPF was derived from a temperature range at which the dilute waste would be stored. The DWPF recycle waste was initially projected to be stored at a temperature up to 90^{o}C. In recent years, the recycle waste has been sent to Tank 22, a Type IV Tank, where its average temperature stored has been 21 ± 3^{o}C.

Per SRNL recommendation (WSRC-TR-2003-00336 [7.12]), the DWPF recycle stream was highly “over-inhibited” for its supernate composition and its stored temperature. The TF has revised the WAC to allow DWPF-RW-01 to be sent to the TF per dilute non-DWPF waste inhibitor schedule (listed in Section 11.1.2 of TF WAC) as long as Type IV tanks have a 40^{o} C stored temperature limit [7.1]. DWPF-RW-02 will be transferred to the TF per the inhibitor schedule listed in Section 11.1.3 of the TF WAC [7.1].

The standard quantity of sodium hydroxide solution to each RCT batch was 240 gallons between March 26, 1996, and January 31, 2000. The standard quantity of sodium nitrite solution was 150 gallons or less between December 22, 1995, and January 31, 2000. Historical analytical results demonstrated that this quantity of inhibitors added to recycle waste batches resulted in average inhibitor concentrations that exceeded the minimum inhibitor criteria.

A calculation was performed to demonstrate that at the current composition and stored temperature of DWPF-RW-01, DWPF-RW-09 and DWPF-IW-01, the addition of at least 215 gallons of sodium nitrite solution (nominal 35 to 40 weight percent) per RCT batch will provide the excess inhibitor concentration as required in section 5.3.2.5 [7.13]. For DWPF-RW-02 and DWPF-IW-02, the engineering calculation in Reference 7.15 demonstrated that the addition of 280 gallons of the sodium nitrite solution per RCT batch will provide the excess inhibitor concentration as required in Section 11.1.3 of the TF WAC.

A TF corrosion evaluation requires recycle going to Tank 41 for salt dissolution to have the same inhibitors as a Type IV waste tank; therefore, the DWPF will add at least 215 gallons of sodium nitrite solution (nominal 35 to 40 weight percent) per RCT batch for DWPF-RW-07 [7.16]. The DWPF-RW-08 stream will be transferred to the TF per the inhibitor schedule given in Section 11.1.2 of the TF WAC for concentrated waste ($[NO_3^-] \geq 1.0$ M) [7.1].

Therefore, performance of the compliance actions ensures that the minimum inhibitor criteria are met, on an average basis. This will be verified by the periodic RCT analyses, and by waste storage tank analyses specified by the TF Corrosion Control Program [7.10].

For the recycle stream, because of the low concentrations of aluminates and carbonates, base equivalent analysis results are equivalent to free hydroxide analysis results.

5.3.3 Hydrogen Generation Rate [*A/C* CST SAC 5.8.2.15 & 5.8.2.25 and CST DSA 3.4.1.5.2]

5.3.3.1 Criteria:

The bounding hydrogen generation rate (HGR) shall be less than or equal to 1.5E-05 ft^3/hr/gal at 25°C for transfers into non-Type IV waste tanks excluding evaporator feed tanks, less than or equal to 9.6E-06 ft^3/hr/gal at 25°C for transfers into evaporator feed tanks and less than or equal to 3.2 ft^3/hr at 25°C for transfers into Type IV waste tanks. The hydrogen generation limit for transfers into Type IV waste tanks is imposed on the waste tank rather than the influent waste stream.

Generators sending waste to Type IV waste tanks shall provide data on a transfer basis that will allow for the determination of the resulting hydrogen generation in the Type IV receipt tank. Additionally, for generators sending sludge-bearing waste to waste tanks undergoing salt dissolution (i.e., Tank 41), the generator shall address the total addition of sludge.

5.3.3.2 Criteria Type: SB SAC

5.3.3.3 Criteria Applicability: Type II, III and IV Tanks

5.3.3.4 Criteria Basis:

Hydrogen generated from radiolysis is limited to 1.5E-05 ft^3 hydrogen/hr/gallon for transfers into non-Type IV waste tanks excluding evaporator feed tanks to ensure adequate time is provided to TF operations to re-initiate pump tank ventilation. In addition, generators that transfer waste to an evaporator feed tank (i.e., Tank 43) are limited to 9.6E-06 ft^3 hydrogen/hr/gallon in order to comply with the DSA limit for evaporator bottoms [7.2].

For the purpose of hydrogen generation in Type IV waste tanks, it is assumed that there is no mixing available, and therefore the sludge will accumulate and must be tracked. For receipt into salt dissolution tanks such as Tank 41, each salt dissolution has an accompanying gas release mode (GRM) evaluation, and the GRM sets the total amount of sludge that the tank may receive.

5.3.3.5 Computational Technique:

A calculation will be issued for transfers into non-Type IV and evaporator feed tanks utilizing the formulas provided in the TF WAC [7.1]. Conservative nitrite and nitrate concentrations will be employed. Specific sludge batch compositions will be used to calculate the HGR of the specific sludge batch coupled with design basis PRFT material and SE.

5.3.3.6 Compliance Actions:

For each TF sludge batch, D&S-FE will provide an engineering calculation demonstrating that the criteria will be met. This calculation will be submitted to TF-FE for concurrence.

For all recycle transfers sent to the TF, DWPF will communicate with the TF prior to sending the RCT batch to confirm that the RCT batch can be transferred to the respective TF recycle receipt tank per the TF ERD. Each RCT batch will be sampled, and iron analysis will be performed to allow for an accurate determination of the sludge content in each RCT transfer. Prior to receiving the laboratory analysis, an assumed bounding sludge slurry volume of 650 gallons will be assigned to each RCT batch transferred to the TF and recorded in the RCT tracking log [7.17].

Once the iron analysis is reported, D&S-FE will follow the methodology in Reference 7.18 to calculate the volume of Sludge Batch 8 slurry transferred from that RCT batch to the TF recycle receipt tank based on the iron concentration and the transfer volume. The corrected sludge volumes will be formally documented in an E7 Type 1 calculation and will also be included in the RCT tracking log [7.17]. Additionally in the calculation, assuming the default 650 gallon sludge slurry volume, the total number of future RCT batches that can be sent to the TF recycle receipt tank will be calculated to remain within the tank sludge allowance limit of the tank (as determined by TF-FE). This RCT batch number limit will be included in the TF ERD and will remain in place until either DWPF rebaselines the 650 gallon sludge slurry volumes with iron data or the TF rebaselines the sludge allowance limit of the receipt tank. Note: When Tank 41 is the DWPF recycle receipt tank and the tank is undergoing salt dissolution, the RCT batch number limit is not required to be calculated.

5.3.3.7 Compliance Basis:

Reference 7.19 is an HGR calculation that analyzes recycle transfers to the TF that are composed of Sludge Batch 8 with the addition of design basis PRFT material and SE. This calculation demonstrates that up to 1701 gallons and 1088 gallons of coupled Sludge Batch 8 slurry and design basis PRFT material and SE can be transferred to a non-Type IV tank and evaporator feed tank, respectively, and not exceed the non-Type IV tank and evaporator feed tank HGR limits of 1.5E-05 ft^3/hr/gal and 9.6E-06 ft^3/hr/gal at 25°C, respectively.

As the bounding 1088 gallon value corresponding to the evaporator feed tank HGR limit is greater than the corrected transferred Sludge Batch 8 slurry volumes indicated in the RCT tracking log [7.17], no DWPF procedural limits are required for Sludge Batch 8 based on the significant margin present.

Reference 7.20 documents the DWPF strategy to account for sludge slurry in each recycle transfer to a TF Type IV tank. Compliance with the total allowance sludge value for a TF Type IV tank ensures that the total bounding HGR of 3.2 ft^3/hr at 25°C is protected.

The average of the corrected sludge slurry volumes transferred to the TF from December 31, 2013 to November 10, 2015 per the RCT tracking log [7.17] is 45 gallons, and thus the assumed sludge slurry volume of 650 gallons in an RCT batch transfer bounds this average volume.

5.3.4 Organic Vapor Control [*A/C* CST SAC 5.8.2.15]

5.3.4.1 Criteria:

The concentration of ammonia in the DWPF RCT waste stream that is transferred to an HDB8 receipt pump tank (e.g., HPT-8, HPT-10) shall be limited to the following to restrict the organic contribution to the hydrogen LFL to 5% at 100°C [7.1]:

Ammonia: ≤ 60 mg/L in waste tank

The amount of SE in the DWPF RCT waste stream that is transferred to a waste tank shall be limited to the following to restrict the organic contribution to the hydrogen LFL to 5% at 100°C [7.1]:

Strip Effluent: ≤ 20 gallons per RCT batch of DWPF recycle [7.6]

All sample results (e.g., ammonia) reported to demonstrate compliance with the requirements to prevent accumulation of flammable species (organic content) must include the analytical uncertainty, and the uncertainty must be used in any subsequent calculations based on those results [7.1].

5.3.4.2 Criteria Type: SB SAC

5.3.4.3 Criteria Applicability: Type II, III and IV Tanks

5.3.4.4 Criteria Basis:

The concentration of ammonia in a waste tank must be limited in order to restrict the organic contribution to the hydrogen LFL to ≤ 5%. Reference 7.9 indicates that the DWPF has the potential to generate ammonia levels of a maximum of 198 mg/L in the DWPF recycle stream. The actual measured levels of ammonia reaching the TF are well below 60 mg/L. Since the ammonia solubility is low in a highly ionic and caustic environment, it is credited that most of the ammonia will dissipate before it reaches the HDB8. Based on the nature of the DWPF operations in the RCT and in the LPPP-Recycle Pump Tank (RPT) coupled with the high vapor pressure of ammonia, large reductions in the ammonia content of the DWPF recycle are expected. This expectation has been substantiated by the absence of ammonia in the Tank 43H vapor and liquid samples and in the 2H Evaporator overheads [7.9].

Reference 7.6 provides the basis for chronic contamination of the DWPF recycle stream with 20 gallons of SE per RCT batch and assesses its impact on the flammability of Tanks 13, 21, 22, 41, 38, 41, the 2H evaporator pot and HTF pump tanks. This analysis is predicated on a minimum level of 7,500 gallons in the RCT prior to transfer to the TF. This minimum level requirement is implemented in procedure SW4-15.17-4.31 [7.21].

5.3.4.5 Computational Technique:

An Engineering Evaluation performed by TF-FE [7.9] demonstrates that the DWPF waste stream has less than or equal to a 5% organic contribution to the hydrogen LFL at 100°C. Ammonia levels of ≤ 198 mg/L in the DWPF recycle stream have been considered and deemed acceptable for an HDB8 receipt pump tank [7.9].

The ammonia concentration must be re-evaluated prior to processing a new sludge batch, to making an addition (e.g., excess plutonium or neptunium from the canyons) to a qualified sludge batch, or to making a change to the DWPF flow sheet (e.g., ARP operations).

Disposal of diminutive amounts of legacy chemicals (e.g., < 10 grams of toluene, etc.) from the DWPF Laboratory via the RCT will have a negligible impact on organic contribution to LFL.

5.3.4.6 Compliance Actions:

Before processing each DWPF sludge batch, D&S-FE will verify the requirement of ammonia levels of ≤ 198 mg/L [7.9].

Ammonia production at DWPF is driven by the use of formic acid in the SRAT. Ammonium ion production was determined to be directly proportional to the formic acid addition in the SRAT [7.22]. The ammonium in the SRAT will end up in the SMECT before being transferred to the RCT. The ratio of the concentration of ammonium ion in the SMECT to aqueous NH_3 in the RCT is 5.91 [7.22]. While this ratio was determined for Sludge Batch 2, D&S-FE has observed the ratio to hold true for the subsequent sludge batches. Reference 7.23 demonstrates the ammonia concentration based on a maximum formic acid of 400 gallons addition will be 313 ppm or mg/L in the SMECT (and 53 mg/L in the RCT applying the 5.91 ratio) for bounding sludge analyzed in the DWPF DSA [7.24]. Formic acid additions for Sludge Batch 8 have averaged less than 300 gallons and all ammonia concentrations measured in the RCT during Sludge Batch 8 coupled processing have been well below the 198 mg/L value [7.25]. Specifically, the average of ammonia concentrations in the RCT from June 2013 (the beginning of Sludge Batch 8) through November 2015 is approximately 10 mg/L [7.25]. Analytical uncertainty will be included in the ammonia measurements included in the shared electronic workgroup files [7.25].

D&S-FE and the DWPF Operations will also implement and exercise any additional controls needed to protect the bases of these limits. For Sludge Batch 8 processing (sludge only or coupled processing), the following procedural controls are in place:

- The RCT temperature upon transfer shall be less than or equal to 50^{o}C [7.26].

- The RCT will be sampled periodically for ammonia [7.5, 7.11].

- Following full transition to a new sludge batch as determined by D&S-FE, the RCT will be sampled on a more frequent basis to establish a baseline ammonia concentration.

D&S-FE and DWPF Operations monitor for leaks and spills of SE. Transfer of SE in the recycle stream is controlled by procedure to be $\leq$ 20 gallons at 87 mg/L Isopar L [7.11].

5.3.4.7 Compliance Basis:

References 7.6 and 7.9 provides the basis that the DWPF recycle waste stream has less than or equal to a 5% organic contribution to the hydrogen LFL at 100°C.

5.3.5 Receipt Inhalation Dose Potential (IDP) Criteria for Type IV Waste Tanks [*A/C* CST SAC 5.8.2.15]

5.3.5.1 Criteria:

The total Inhalation Dose Potential (IDP) must be less than or equal to 1.0E+07 rem_{inh}/gallon. This limit is imposed on the waste tank rather than the influent waste stream.

Generators sending waste to Type IV waste tanks shall provide data on a transfer basis that will allow for the determination of the resulting IDP in the Type IV receipt tank.

All sample results reported to demonstrate compliance with the requirements for inhalation dose potential must include the analytical uncertainty, and the uncertainty must be used in any subsequent calculations based on those results [7.1].

5.3.5.2 Criteria Type: SB SAC

5.3.5.3 Criteria Applicability: Type IV Tanks

5.3.5.4 Criteria Basis:

The TF DSA assumes that the Type IV tanks have a radiological content of 1.0E+07 rem_{inh} /gallon or less. Therefore, the average inhalation dose for the Type IV tanks shall not exceed those criteria. Since the TF DSA assumes that the entire tank volume will have up to 1.0E+07rem_{inh} /gallon, individual transfers exceeding the criteria are not necessarily inconsistent with the DSA assumption. Recycle liquid generated from processing of future sludge batches may not be suitable for transfer to Type IV tanks without additional controls.

For the purpose of IDP in Type IV waste tanks, it is assumed that there is no mixing available, and therefore the sludge will accumulate and must be tracked.

5.3.5.5 Computational Technique: Not Applicable

5.3.5.6 Compliance Actions:

For all recycle transfers sent to the TF, DWPF will communicate with the TF prior to sending the RCT batch to confirm that the RCT batch can be transferred to the respective TF recycle receipt tank per the TF ERD. Each RCT batch will be sampled and iron analysis will be performed to allow for an accurate determination of the sludge content in each RCT transfer. Prior to receiving the laboratory analysis, an assumed bounding sludge slurry volume of 650 gallons will be assigned to each RCT batch transferred to the TF and recorded in the RCT tracking log [7.17].

Once the iron analysis is reported, D&S-FE will follow the methodology in Reference 7.18 to calculate the volume of Sludge Batch 8 slurry transferred from that RCT batch to the TF recycle receipt tank based on the iron concentration and the transfer volume. The corrected sludge volumes will be formally documented in an E7 Type 1 calculation and will also be included in the RCT tracking log [7.17]. Analytical uncertainty in the Fe sample results will be accounted for in the recycle rebaseline calculation. Additionally in the calculation, assuming the default 650 gallon sludge slurry volume, the total number of future RCT batches that can be sent to the TF recycle receipt tank will be calculated to remain within the tank sludge allowance limit of the tank (as determined by TF-FE). This RCT batch number limit will be included in the TF ERD and will remain in place until either DWPF rebaselines the 650 gallon sludge volumes with iron data or the TF rebaselines the sludge allowance limit of the receipt tank.

5.3.5.7 Compliance Basis:

Reference 7.20 documents the DWPF strategy to account for sludge slurry in each recycle transfer to the TF. Compliance with the total allowance sludge value for a Type IV waste tank ensures that the total bounding IDP rate of 1.0E+07 rem_{inh}/gallon is protected.

The average of the corrected sludge slurry volumes transferred to the TF from December 31, 2013 to November 10, 2015 per the RCT tracking log [7.17] is 45 gallons, and thus the assumed sludge slurry volume of 650 gallons in an RCT batch transfer bounds this average volume.

5.3.6 Receipt IDP Criteria for non-Type IV Waste Tanks [*A/C* CST SAC 5.8.2.15, 5.8.2.21, & 5.8.2.25]

5.3.6.1 Criteria:

The waste stream composition (solids and liquid) IDP concentration for the influent waste stream must be less than 1.5E+09 rem_{inh}/gallon and less than 2.0E+08 rem_{inh}/gallon to be designated as a low-rem transfer.

Low-rem transfers that exceed 3.5E+07 rem_{inh}/gallon require, within 30 days, a sufficient flush to reduce the residual waste in the core pipe to less than or equal to 3.5E+07 rem_{inh}/gallon. In addition, any waste stream that has an IDP greater than 9.8E+07 rem_{inh}/gallon is considered a sludge-slurry transfer and requires a special flushing procedure to be transferred to the TF.

Material transferred into the 2H evaporator feed tanks shall not cause the evaporator bottom IDP to exceed 3.3E+07 rem_{inh}/gallon.

All sample results reported to demonstrate compliance with the requirements for inhalation dose potential must include the analytical uncertainty, and the uncertainty must be used in any subsequent calculations based on those results [7.1].

5.3.6.2 Criteria Type: SB SAC

5.3.6.3 Criteria Applicability: Type II and III Tanks

5.3.6.4 Criteria Basis:

These requirements are mitigative measures to ensure that the consequences of explosion events are bounded by the TF DSA accident analysis [7.1].

The TF DSA assumes a maximum source term of 1.5E+09 rem_{inh}/gallon for non-Type IV Tanks. Exceeding the maximum criteria could exceed the bounding consequence of the TF DSA [7.2].

5.3.6.5 Computational Technique:

A calculation will be issued for transfers into non-Type IV tanks and evaporator feed tanks using the ICRP database for dose conversion factors as was used in developing the TF DSA. The calculation will also address the low-rem criteria as well as specific criteria requiring special flushes.

5.3.6.6 Compliance Action:

For each sludge batch, D&S-FE will provide an engineering calculation demonstrating that the criteria will be met. This calculation will be submitted to TF-FE for concurrence.

5.3.6.7 Compliance Basis:

Reference 7.19 is an IDP calculation that analyzes DWPF recycle transfers to the TF that are composed of Sludge Batch 8 with the addition of design basis PRFT material and SE. Analytical uncertainty in the sample results for Sludge Batch 8 is accounted for in Reference 7.19. This calculation demonstrates that up to 1089 gallons of sludge slurry can be transferred to an evaporator feed tank and not exceed the evaporator feed tank IDP limit of 3.3E+07 rem_{inh}/gal. By meeting the evaporator feed tank limit, DWPF recycle transfers during Sludge Batch 8 processing will also meet the non-Type IV tank IDP limit. The calculation also shows that recycle transfers from DWPF to TF are low-rem transfers.

As the 1089 gallon value corresponding to the evaporator feed tank IDP limit is greater than the corrected transferred Sludge Batch 8 slurry volumes indicated in the RCT tracking log [7.17], no DWPF procedural limits are required for Sludge Batch 8 based on the significant IDP margin present.

Reference 7.20 documents the DWPF strategy to account for sludge slurry in each recycle transfer to a TF Type IV tank. Compliance with the total allowance sludge value for a Type IV tank ensures that the total bounding IDP of 1.5E+09 rem_{inh}/gal is protected.

The average of the corrected sludge slurry volumes transferred to the TF from December 31, 2013 to November 10, 2015 per the RCT tracking log [7.17] is 45 gallons, and thus the assumed sludge slurry volume of 650 gallons in an RCT batch transfer bounds this average volume.

5.3.7 Requirements for Regulatory Compliance

5.3.7.1 Criteria:

5.3.7.1.1 No RCRA hazardous "listed" waste will be received in the TF.

5.3.7.1.2 The LWF tanks are part of the site wide Part 70 Air Quality Permit. Air emissions from the DWPF recycle waste streams into the LWF TF system must be in compliance with the Permit.

5.3.7.1.3 Except as noted in the SRS Approved Site Treatment Plan, hazardous characteristics and constituents in the waste received in the TF must be below the respective RCRA/SCHWMR regulatory limits. Hazardous waste numbers for characteristics and constituents that are permitted to be present in the DWPF recycle waste stream above their respective regulatory limit are identified below:

Characteristic/Constituent	Hazardous Waste Number
Corrosives	D002
Ba	D005
Cr	D007
Pb	D008
Hg	D009
Ag	D011
Benzene	D018

5.3.7.2 Criteria Type: Not applicable

5.3.7.3 Criteria Applicability: Type II, III and IV Tanks

5.3.7.4 Criteria Basis:

These criteria are required to meet TF environmental regulatory compliance requirements as described in the WAC [7.1].

5.3.7.5 Computational Technique:

Verify from the waste characterization and process knowledge that the criteria are met.

5.3.7.6 Compliance Actions: No actions are required.

5.3.7.7 Compliance Basis:

No "listed" hazardous wastes are added to the DWPF recycle stream.

Comparison of RCRA/SCHWMR 261.24 regulatory limits with the DWPF recycle waste stream characterization verifies that none of the hazardous constituents that have not been exempted exceed their respective regulatory limit.

5.3.8 Requirements for Criticality Safety [*A/C* CST SAC 5.8.2.15 and CST DSA 6.5.2]

5.3.8.1 Criteria:

Waste received in the TF shall be inherently safe with respect to criticality for any concentration and mass in the uncontrolled geometry of the waste tanks. The WAC [7.1] provides the required weight ratio of a single neutron poison to equivalent Pu-239 to ensure the waste received into the TF is inherently safe.

All sample results reported to demonstrate compliance with the requirements for criticality safety must include the analytical uncertainty, and the uncertainty must be used in any subsequent calculations based on those results [7.1].

5.3.8.2 Criteria Type: SB SAC

5.3.8.3 Criteria Applicability: Type II, III and IV Tanks

5.3.8.4 Criteria Basis:

The controls specified in the WAC [7.1] ensure criticality is not credible in the TF.

5.3.8.5 Computational Technique: Not Applicable

5.3.8.6 Compliance Actions: No actions are required.

5.3.8.7 Compliance Basis:

As specified in the DWPF WAC for sludge solids [7.27], the sludge to be transferred to the DWPF shall have a weight ratio of iron to equivalent Pu-239 greater than or equal to the safe weight ratio of 160:1. This limit is to meet the DWPF TSR SAC 5.8.2.11. Satisfying this limit on incoming sludge to the DWPF, along with the DWPF criticality safety bases documented in Reference 7.28, ensures that the DWPF recycle stream meets the TF criteria as well. Analytical uncertainty is required in the criticality sections of the DWPF WAC [7.27].

5.3.9 Requirements for Equivalent Uranium Enrichment in 2H Evaporator

5.3.9.1 Criteria:

Only the DWPF recycle batches that contain ≤ 5.5 wt. % ^{235}U equivalent enrichment with a ratio of plutonium to total fissionable material that do not exceed 2 wt. % are acceptable for transfer directly into Tank 22, Tank 43 or Tank 38.

All sample results reported to demonstrate compliance with the requirements for criticality safety must include the analytical uncertainty, and the uncertainty must be used in any subsequent calculations based on those results [7.1].

5.3.9.2 Criteria Type: SB SAC

5.3.9.3 Criteria Applicability: Tanks 22, 43 and 38

5.3.9.4 Criteria Basis:

The controls specified in the TF WAC [7.1] ensure that the ^{235}U equivalent enrichment of 5.5 wt. % is not exceeded in the 2H evaporator. The ratio of plutonium to total fissionable material not exceeding 2 wt. % is required in the 2H evaporator NCSE [7.29].

5.3.9.5 Computational Technique:

From the characterization of the sludge and salt batch qualification samples, a calculation / evaluation will be issued that analyzes the fissionable isotopes contained in DWPF recycle material composed of Sludge Batch 8 coupled with a respective salt batch.

5.3.9.6 Compliance Actions:

For each sludge and salt batch, an engineering calculation / evaluation will be performed demonstrating that the criteria will be met.

5.3.9.7 Compliance Basis:

Reference 7.30 is an enrichment calculation that analyzes the fissionable isotopes contained in DWPF recycle transfers to the TF that are composed of Sludge Batch 8 coupled with Salt Batches 7 and 8 with and without MST. This calculation demonstrates that the ^{235}U equivalent enrichment and ratio of plutonium to total fissionable material of recycle transfers to the TF that are composed of Sludge Batch 8 coupled with Salt Batches 7 and 8 with and without MST are 1.545 wt. % and 0.380 wt. %, respectively, which are less than the respective TF WAC limits of 5.5 wt. % and 2 wt. % [7.1]. Analytical uncertainty in the sample results for Sludge Batch 8 / Salt Batches 7 and 8 is accounted for in Reference 7.30.

For future sludge and/or salt batches, an evaluation will be completed using the respective sludge and salt batch qualification reports to ensure that the enrichment criteria are met. Analytical uncertainty will be included with the characterization data.

5.3.10 Requirements to Satisfy Downstream Facility Acceptance Criteria [*A/C* CST SAC 5.8.2.15]

5.3.10.1 Criteria:

Waste received in the TF shall be characterized sufficiently for TF-FE to demonstrate that the ability of the TF to meet various acceptance criteria imposed by the downstream processing and disposal facilities will not be impaired. For DWPF recycle waste being transferred to the TF, the material must be free of the chemical Petro AG [7.1].

For waste streams that will be transferred into the TF evaporator system, tritium, ammonia, mercury, and beta-gamma will be compared to the Effluent Treatment Project (ETP) WAC [7.31].

5.3.10.2 Criteria Type: Not Applicable.

5.3.10.3 Criteria Applicability: Type II, III and IV Tanks

5.3.10.4 Criteria Basis:

DWPF recycle material is used in Salt Batch macrobatch recipes. MCU processing will experience undesirable effects from the anti-cake agent, Petro AG.

DWPF recycle material is fed to the evaporator systems. A comparison to the ETP WAC limits ensures no detrimental impacts to ETP.

5.3.10.5 Computational Technique: No analyses are required.

5.3.10.6 Compliance Actions:

No actions are required for Petro AG. The material specification for DWPF recycle specifies sodium nitrite that does not contain Petro AG.

No additional actions, beyond the sampling outlined in Section 5.3.4 are required. Historically, evaporator-processed DWPF recycle has not exceeded the ETP WAC limits [7.32]. DWPF recycle is required to be less than or equal to 198 mg/L ammonia to satisfy the TF WAC requirement for organic vapors (see Section 5.3.4). Evaporator overheads for mercury have not exceeded WAC requirements historically [7.25, 7.32]. Even though mercury concentrations are higher in Sludge Batch 8 versus Sludge Batch 7b, the mercury ETP limit is expected to be met during Sludge Batch 8 processing due to evaporator processing.

5.3.10.7 Compliance Basis:

Verify from the characterization of the sodium nitrite introduced in the DWPF recycle does not contain Petro AG.

DWPF recycle historically has not caused any detrimental downstream impacts for ETP related to tritium and beta-gamma ETP WAC limits [7.32].

DWPF will meet the TF WAC criteria for ammonia for organic vapors. The majority of the mercury in DWPF recycle is removed in the TF evaporator system and not transferred to ETP.

5.4 Acceptance Criteria and Compliance Plan for Clarified Salt Solution Transfers to MCU or Wash Water Transfers to Tank 50 [*A/C* DWPF SAC 5.8.2.25]

The DWPF is responsible for demonstrating that the specific criteria in Sections 5.4.1 through 5.4.14 are met. The actions required to ensure compliance to these specific criteria are summarized in Attachment 8.5. Additional supporting information is provided in the Compliance Bases provided.

5.4.1 Minimum pH [*A/C* CST Admin Control 5.8.2.13 and CST DSA 6.5.2]

5.4.1.1 Criteria:

The pH is greater than 7 (SB), and greater than 12 (SB Administrative Control).

5.4.1.2 Criteria Type:

SB (pH > 7)
SB Administrative Control (pH > 12)

5.4.1.3 Criteria Applicability: Transfers to MCU or Tank 50

5.4.1.4 Criteria Basis:

A minimum pH of 12 for influents into waste tanks is specified in the Corrosion Control Program [7.10]. The TF Criticality Safety Basis and the Technical Standards require that the pH be greater than 7 [7.2].

Transfers of clarified salt solution from 512-S to MCU will result in treated waste that will eventually be transferred to Tank 50. These transfers must meet Tank 50 requirements for Corrosion Prevention.

5.4.1.5 Computational Technique:

Verify from the waste characterization and process knowledge that the criteria are met.

5.4.1.6 Compliance Actions: No actions are required.

5.4.1.7 Compliance Basis:

The MCU facility requires no corrosion compulsory actions as the equipment is stainless steel. The decontaminated salt solution will be sent to Tank 50. Feed to MCU will need to comply with corrosion prevention requirements for Tank 50 and applicable downstream facilities. The characterization of the salt batch qualification sample(s) following simulated process with process knowledge will ensure the minimum pH constraint is met.

5.4.2 Minimum Inhibitor Contents [*A/C* CST Admin Control 5.8.2.13]

5.4.2.1 Criteria:

For 5.5M < $[NO_3^-] \leq 8.5$ M:	$[OH^-] \geq 0.6$ M and $[OH^-] + [NO_2^-] \geq 1.1$ M
For 2.75 M < $[NO3^-] \leq 5.5$ M:	$[OH^-] \geq 0.3$ M and $[OH^-] + [NO_2^-] \geq 1.1$ M
For 1.0 M < $[NO_3^-] \leq 2.75$ M:	$[OH^-] \geq 0.1 * [NO_3^-]$ and $[OH^-] + [NO_2^-] \geq 0.4 * [NO_3^-]$
For 0.02 M < $[NO_3^-] \leq 1.0$ M:	$[OH^-] \geq 1.0$ M or $[NO_2^-] \geq 1.66 * [NO_3^-]$
For $[NO_3^-] \leq 0.02$ M:	$[OH^-] \geq 1.0$ M or $[NO_2^-] \geq 0.033$ M

Note: All concentrations are in moles/liter, and $[OH^-]$ refers to free hydroxide.

5.4.2.2 Criteria Type: SB Administrative Control

5.4.2.3 Criteria Applicability: Transfers to MCU or Tank 50

5.4.2.4 Criteria Basis:

The Corrosion Control Program [7.10] established waste tank inhibitor levels to minimize or prevent the corrosion of carbon steel waste tank walls and cooling coils. Nitrite and hydroxide in the CSS will provide protection against pitting corrosion.

5.4.2.5 Computational Technique:

Verify from the waste characterization and process knowledge that the criteria are met.

5.4.2.6 Compliance Actions: No actions are required.

5.4.2.7 Compliance Basis:

The MCU facility requires no corrosion compulsory actions as the equipment is stainless steel. The clarified salt solution will be sent to Tank 50. Feed to MCU will need to comply with corrosion prevention requirements for Tank 50 and applicable downstream facilities. The characterization of the salt batch qualification sample(s) following simulated process with process knowledge will ensure the minimum inhibitor contents constraint is met.

5.4.3 Maximum Concentrations of Corrosive Species [*A/C* CST Admin Control 5.8.2.13]

5.4.3.1 Criteria:

The waste supernate phase is limited to (these concentrations may occur simultaneously):

- $[Cl^-] \leq 0.11$ M;
- $[F^-] \leq 0.086$ M (the concentration of uncomplexed fluoride);
- $[NO_3^-] \leq 8.5$ M; and
- $[SO_4^=] \leq 0.18$ M.

5.4.3.2 Criteria Type: SB Administrative Control

5.4.3.3 Criteria Applicability: Transfers to MCU or Tank 50

5.4.3.4 Criteria Basis:

The Corrosion Control Program requires limits on $SO_4^=$, Cl^-, and NO_3^- to ensure that the tank chemistry is controlled to minimize corrosion of tank walls and transfer lines. The satisfactory operating history of the TF demonstrates that the inhibitor levels are sufficient to prevent corrosion of the waste tanks at these chloride and sulfate concentrations. The limits refer to the soluble phase composition. The maximum uncomplexed fluoride concentration is specified to prevent corrosion of the carbon steel waste tanks and cooling coils.

5.4.3.5 Computational Technique:

Verify from the waste characterization and process knowledge that the criteria are met.

5.4.3.6 Compliance Actions: No actions are required.

5.4.3.7 Compliance Basis:

The MCU facility requires no corrosion compulsorily actions as the equipment is stainless steel. The clarified salt solution will be sent to Tank 50. Feed to MCU will need to comply with corrosion prevention requirements for Tank 50 and applicable downstream facilities. The characterization of the salt batch qualification sample(s) following simulated process with process knowledge will ensure the minimum inhibitor contents constraint is met.

5.4.4 MCU Hydrogen Generation Rate [*A/C* CST SAC 5.8.2.15 & 5.8.2.25 and CST DSA 3.4.1.5.2]

5.4.4.1 Criteria: Transfers into MCU from 512-S are to be ≤ 50°C

5.4.4.2 Criteria Type: SB SAC

5.4.4.3 Criteria Applicability: Transfers to MCU

5.4.4.4 Criteria Basis:

A high temperature input of 50°C was the basis for the HGR evaluations for streams within MCU.

5.4.4.5 Computational Technique: No computation is required.

5.4.4.6 Compliance Actions:

Waste shall be verified to be less than or equal to 50°C prior to and during the transfer from 512-S to MCU. While this temperature limit protects the HGR TF SAC, there is a more restrictive temperature range (20°C to 29°C) given in Section 5.4.11 (MCU Process Requirements—Temperature Limit) [7.33]. No significant temperature change in the feed material is expected between the initiation and termination of the 512-S to MCU transfer.

5.4.4.7 Compliance Basis:

Direct temperature measurement of the waste stream prior to and during the transfer from 512-S to MCU will ensure that this requirement is met.

5.4.5 Inhalation Dose Potential, Hazard Category 3 Criteria, and Cs-137 for MCU [*A/C* CST SAC 5.8.2.15]

5.4.5.1 Criteria:

Material transferred into the MCU facility shall be less than or equal to 1.69E+05 rem/gallon. Material transferred from 512-S to MCU shall maintain a sum of ratios less than 1 to protect the HC 3 status of MCU. 1.1 Ci/gallon is the maximum allowable Cs-137 concentration for transfer into MCU.

All sample results reported to demonstrate compliance with the requirements for inhalation dose potential/hazard categorization/Cs-137 must include the analytical uncertainty, and the uncertainty must be used in any subsequent calculations based on those results [7.1].

5.4.5.2 Criteria Type: SB SAC

5.4.5.3 Criteria Applicability: Transfers to MCU

5.4.5.4 Criteria Basis:

By controlling the parameters of temperature, ionic strength or sodium concentration as well as MST concentration, MST strike time, and agitation in 241-96H (under MST-Strike operation), MCU is protected as a Hazard Category 3 facility. In addition to the listed parameters, the filtering function performed in 512-S, along with a feed limit for Cs-137 concentration, also protect the Hazard Category 3 classification of the MCU [7.1].

The sum of ratios is less than 1.0 when compared to HC 2 thresholds.

1.1 Ci/gallon is the maximum Cs-137 activity.

5.4.5.5 Computational Technique:

From the characterization of the salt batch qualification sample, an evaluation will be issued that analyzes the radionuclides contained in the salt batch.

5.4.5.6 Compliance Actions:

For each salt batch, an engineering evaluation will be performed demonstrating that the criteria will be met.

5.4.5.7 Compliance Basis

If the qualification of the salt batch that is to be processed through ARP/MCU establishes that the salt batch material can be processed without MST, then the MCU IDP and Hazard Category 3 Criteria will be met based on SRNL analysis of the salt batch qualification sample(s). If, however, the qualification of the salt batch that is to be processed through ARP/MCU establishes that the salt batch material can only be processed with MST, then process demonstrations will be performed on the salt batch qualification sample(s) and will be treated with MST in accordance with the ARP Flowsheet and filtered with a media that has an equivalent effective pore size or larger than that used in 512-S. A sample of the treated, filtered sample will validate the performance of the ARP process and the ability to meet the IDP and HC-3 criteria. This basis is also sufficient to ensure that all wash water transfers to Tank 50 are less than the maximum Tank 50 IDP of 2.09E+05 rem/gallon. The Cs-137 concentration will also be evaluated to ensure that the 1.1 Ci/gal limit is met. Analytical uncertainty will be included with the characterization data supporting the inhalation dose potential/hazard categorization/Cs-137 evaluations.

5.4.6 MCU Fissile Material Management [*A/C*CST SAC 5.8.2.15 and DSA 6.5.2]

5.4.6.1 Criteria:

Each salt batch qualification sample will be analyzed to determine the concentration of soluble uranium, concentration of soluble plutonium, and the uranium enrichment level and shall be less than or equal to 50 mg/L, 0.3 mg/L, and 3 wt%, respectively.

All sample results reported to demonstrate compliance with the requirements for criticality safety must include the analytical uncertainty, and the uncertainty must be used in any subsequent calculations based on those results [7.1].

5.4.6.2 Criteria Type: SB SAC

5.4.6.3 Criteria Applicability: Transfers to MCU

5.4.6.4 Criteria Basis:

Criticality safety is controlled in ARP and MCU by ensuring that the concentration of soluble uranium is less than or equal to 50 mg/L, concentration of soluble plutonium is less than or equal to 0.3 mg/L, and the uranium enrichment level be less than or equal to 3 wt% for each salt batch.

5.4.6.5 Computational Technique:

From the characterization of the salt batch qualification sample, an evaluation will be issued that analyzes the fissionable isotopes contained in the salt batch.

5.4.6.6 Compliance Actions: For each salt batch, an engineering evaluation will be performed demonstrating that the criteria will be met.

5.4.6.7 Compliance Basis:

An evaluation will be completed using the respective salt batch qualification report to ensure that the enrichment criteria are met. Analytical uncertainty will be included with the characterization data.

5.4.7 MCU Process Requirements - Potassium Molarity

5.4.7.1 Criteria:

Potassium molarity shall be less than or equal to 0.05 M.

5.4.7.2 Criteria Type: Process

5.4.7.3 Criteria Applicability: Transfers to MCU

5.4.7.4 Criteria Basis:

The potassium ion has the potential to cause tertiary phase formation in the MCU process and must be excluded to prevent process upsets.

5.4.7.5 Computational Technique:

The characterization of the salt batch qualification sample(s) following simulated process with process knowledge.

5.4.7.6 Compliance Actions: No actions are required.

5.4.7.7 Compliance Basis:

Verify from the waste characterization and process knowledge that the criteria are met.

5.4.8 MCU Process Requirements - Filtration

5.4.8.1 Criteria:

Direct feed to MCU shall be processed through a 0.1 or 0.5 micron filter to remove solids [7.1].

5.4.8.2 Criteria Type: Process

5.4.8.3 Criteria Applicability: Transfers to MCU

5.4.8.4 Criteria Basis:

The equipment used in the extraction, scrub, and stripping banks at MCU is not designed to process significant quantities of insoluble solids. Filtration is required to ensure that only clarified solution is transferred to MCU.

5.4.8.5 Computational Technique: No computation is required.

5.4.8.6 Compliance Actions:

All salt solution transfers to MCU will be made from the Late Wash Hold Tank and be filtered through the Crossflow filter at 512-S [7.34].

WAC Deviation:
Drains located in 512-S are piped to the LWHT. These drains have been plugged to comply with the Foreign Material Exclusion criteria (Section 5.4.10). If liquid collects at a plugged drain, D&S-FE will evaluate the contents of the liquid prior to disposition of the material. If the liquid is free of contaminants that could adversely affect the CSSX Chemistry per the evaluation, the liquid will be drained to the LWHT. TF-FE concurrence with the evaluation of the sump and drain contents is required prior to draining into the LWHT.

Water additions to the LWHT pose the potential to reduce the concentration of chemical constituents (specifically: sodium, hydroxide, and NO_{eff}) in the feed going to MCU below the limits specified in the TF WAC [7.1]. In the event that the feed from the LWHT exceeds the specific gravity requirement (Section 5.4.12), then DWPF Engineering will evaluate batch remediation (i.e., addition of process chemicals such as 50 wt. % NaOH [7.35]) or alternate disposal paths (e.g., Tank 50 [7.36]). TF-FE concurrence with this evaluation is required prior to the disposition of this waste.

Justification:
The liquid drained to the LWHT collected by the plugged drains will be evaluated to verify the liquid contents are free of solids or other contaminants. Therefore, the Foreign Material criteria (Section 5.4.10) will be met.

5.4.8.7 Compliance Basis:

The Crossflow filter at 512-S has a nominal pore size of 0.1 or 0.5 micron [7.1].

5.4.9 MCU Process Requirements - Maximum Lipophilic Anions

5.4.9.1 Criteria:

Analysis of lipophilic anions, specifically tributylphosphate (TBP), dibutylphosphate (DBP), trimethylamine (TMA), formate and 1-butanol, are required. Evaluations if the MCU transfer is acceptable are necessary for concentrations above 30 mM TBP, 2 mM DBP, 10 mM TMA, 100 mM formate or 10 mM 1-butanol.

5.4.9.2 Criteria Type: Process

5.4.9.3 Criteria Applicability: Transfers to MCU

5.4.9.4 Criteria Basis:

Concentrations less than 30 mM TBP, 2 mM DBP, 10 mM TMA, 100 mM formate and 10 mM 1-butanol ensure proper MCU facility operations.

5.4.9.5 Computational Technique:

The characterization of the salt batch qualification sample(s) following simulated process with process knowledge.

5.4.9.6 Compliance Actions: No actions are required.

5.4.9.7 Compliance Basis:

Verify from the waste characterization and process knowledge that the criteria are met.

5.4.10 MCU Process Requirements - Foreign Material Exclusion

5.4.10.1 Criteria:

The sending facility (512-S) shall be in compliance with the Foreign Material Exclusion Program.

5.4.10.2 Criteria Type: Process

5.4.10.3 Criteria Applicability: Transfers to MCU

5.4.10.4 Criteria Basis:

Maintenance operations upstream and at MCU have the potential to introduce chemicals and other foreign materials that are known to disrupt the MCU process. A foreign material exclusion (FME) program has been developed to control these activities and prevent the inclusion of such compounds into streams transferred to MCU.

5.4.10.5 Computational Technique: No computation is required.

5.4.10.6 Compliance Actions:

512-S shall be compliant with the FME program [7.37]. 512-S has installed plugs to drains that are piped to the LWHT [7.38]; therefore, eliminating solids entering MCU from the drains located in 512-S and reducing the likelihood of solids build up on the MCU contactors. D&S-FE evaluated the potential for liquid collection at these drain plugs to be unlikely. However, if liquid does collect, D&S-FE will evaluate the contents of the liquid. If the liquid is free of contaminants that could adversely affect the CSSX Chemistry per the evaluation, the liquid will be drained to the LWHT using the TF WAC deviation in Section 5.4.8.6.

A drain is also located in the Backpulse Room at 512-S. This drain has not been plugged due to the minimal risk of foreign and unfiltered material draining to the LWHT because the Backpulse Room is a locked and secured High Radiation Area and the drain system is monitored by a conductivity probe. In the case of a conductivity probe alarm, the source of the leak will be determined and included in the evaluation as discussed in Section 5.4.8.6.

5.4.10.7 Compliance Basis:

The use of the FME program for maintenance activities at 512-S will prevent foreign material from being transferred to MCU.

5.4.11 MCU Process Requirements - Temperature Limit

5.4.11.1 Criteria: Transfers into MCU from 512-S are to be between 20°C and 29°C.

5.4.11.2 Criteria Type: Process

5.4.11.3 Criteria Applicability: Transfers to MCU

5.4.11.4 Criteria Basis:

To minimize the potential for sodium aluminosilicate solids precipitation in MCU, the temperature of the clarified salt solution must be controlled.

5.4.11.5 Computational Technique: No computation is required.

5.4.11.6 Compliance Actions:

Waste shall be verified to be between 20°C and 29°C prior to and during the transfer from 512-S to MCU [7.33]. No significant temperature change in the feed material is expected between the initiation and termination of the transfer.

5.4.11.7 Compliance Basis:

Direct temperature measurement of the waste stream prior to and during the transfer from 512-S to MCU will ensure that this requirement is met.

5.4.12 MCU Process Requirements - Specific Gravity

5.4.12.1 Criteria: Transfers into MCU from 512-S shall have a specific gravity between 1.16 and 1.3.

5.4.12.2 Criteria Type: Process

5.4.12.3 Criteria Applicability: Transfers to MCU

5.4.12.4 Criteria Basis:

A specific gravity range of 1.16 to 1.3 corresponds to a sodium molarity range of 3 to 7 molar, which is required for efficient MCU contactor operations as well as meeting downstream facility requirements [7.1].

5.4.12.5 Computational Technique: No computation is required.

5.4.12.6 Compliance Actions:

Waste shall be verified to be between 1.16 and 1.3 specific gravity prior to transfer from 512-S to MCU [7.33]. No significant specific gravity change in the feed material is expected between the initiation and termination of the transfer.

5.4.12.7 Compliance Basis:

Direct specific gravity measurement of the waste stream prior to the transfer from 512-S to MCU will ensure that this requirement is met.

5.4.13 Requirements to Satisfy Downstream Facility Acceptance Criteria [*A/C* CST SAC 5.8.2.15]

5.4.13.1 Criteria:

Waste received in the TF shall be characterized sufficiently for TF-FE to demonstrate that the ability of the TF to meet various acceptance criteria imposed by the downstream processing and disposal facilities will not be impaired. For waste being transferred to Tank 50, the Saltstone WAC describes the WAC required for the transfer of low-level aqueous waste from Tank 50 to the Saltstone facility [7.1].

5.4.13.2 Criteria Type: SB SAC

5.4.13.3 Criteria Applicability: Transfers to MCU or Tank 50

5.4.13.4 Criteria Basis:

Transfers from 512-S to MCU will eventually be sent to Tank 50 for disposal in Saltstone. Solids Wash Water and Filter Wash Water transfers to Tank 50 will be processed in Saltstone.

5.4.13.5 Computational Technique:

The characterization of the salt batch qualification sample(s) following simulated process with process knowledge.

5.4.13.6 Compliance Actions: No actions are required.

5.4.13.7 Compliance Basis:

Verify from the waste characterization and process knowledge that the criteria are met. For wash water and filter wash water transfers to Tank 50, some chemical species (e.g., Na^+ molarity) and some radionuclide concentrations (e.g., Cs-137) may not meet the Saltstone limits. A deviation will be required if compliance cannot be demonstrated for these species.

5.4.14 Hydrogen Generation Rate in Tank 50 [*A/C* CST SAC 5.8.2.15 and 5.8.2.25 and CST DSA 3.4.1.5.2]

5.4.14.1 Criteria:

The hydrogen generation limit for transfer into Tank 50 is limited to 2.90E-08 ft^3/hr-gal (with a NO_{eff} of 1.70 minimum at 43ºC).

5.4.14.2 Criteria Type: SB SAC

5.4.14.3 Criteria Applicability: Transfers to Tank 50

5.4.14.4 Criteria Basis:

The potential exists for flammable gases to accumulate in the vapor space and present an explosive hazard. Control of the HGR for influents into Tank 50 helps to limit the concentration of flammable gases.

5.4.14.5 Computational Technique:

The characterization of the salt batch qualification sample(s) following simulated process with process knowledge.

5.4.14.6 Compliance Actions: No actions are required.

5.4.14.7 Compliance Basis:

Verify from the waste characterization and process knowledge that the criteria are met.

5.5 Administrative Controls [*A/C* DWPF SAC 5.8.2.25]

5.5.1 Documentation and Reporting [*A/C* CST Admin Control 5.8.2.32]

5.5.1.1 Recycle Waste Transfers

D&S-FE and DWPF Operations will report approved analytical results to TF-FE as they become available. This will normally be through the shared Workgroup electronic files [7.25].

As specified in the WAC [7.1], the DWPF has designated a Liquid Waste Generator Representative as the primary contact for interface issues.

Prior to transfer, DWPF Operations will report to TF Operations the volume of liquid and other key batch data, as required by the operating procedure. D&S-FE will notify TF-FE if the recycle contains sludge solids.

Operating procedures will record pertinent DWPF historical operating data, as described in Section 6.0.

5.5.1.2 Clarified Salt Solution and Wash Water Transfers

TF-FE and D&S-FE shall jointly prepare a salt batch acceptance technical report. The report shall include the acceptance sample analytical results and a comparison of the results to the TF WAC values. Any deviations from a WAC value shall be addressed in the report.

5.5.2 TSR Interface Controls [*A/C* CST SAC 5.8.2.15 and CST DSA 5.7.1]

The following interface controls require TSR controls within the DWPF Safety Basis to protect the TF safety analysis assumptions [7.1, 7.2]. There are three additional interface controls included in the CSTF DSA and TF WAC that were determined not to apply to DWPF. The justification is documented in Section 11.7.2.2 of the DWPF Final Safety Analysis Report FSAR [7.24]. Unless noted the following requirements are a part of the DWPF SAC 5.8.2.25.

Notification shall be provided to the CSTF Shift Manager/First Line Manager/Control Room Manager prior to intended transfers to the CSTF. This requirement is not a SAC.

The equipment needed to stop transfers and liquid additions to the CSFT shall be available to respond to indications of a primary containment waste release.

Transfers into the CSTF shall be secured as a result of a tornado warning, tornado watch, or high wind warning for the CSTF as issued by the SRS Operations Center.

Transfers into the CSTF shall be secured following a seismic event.

Transfers into the CSTF shall be secured following notification of a CSTF wildland fire event.

Transfers into the CSTF shall be secured following notification of a CSTF control room abandonment event.

5.5.3 Analytical Uncertainties

All sample analyses used to demonstrate compliance with the following Tank Farm waste acceptance criteria will account for the analytical uncertainties of those measurements (2 Sigma): organic flammable species, IDP, criticality safety, MCU Hazard Categorization and MCU Cs-137 [7.1]. Shared Workgroup electronic files will include analytical uncertainty for ammonia (organic vapor control) and iron (IDP) [7.25].

5.5.4 Deviations

Deviations may be experienced during infrequent regular transfers to the TF. As described in 5.3.2.6, the RCT may be out of corrosion compliance as in Section 11.1.2 of the TF WAC. D&S-FE will provide TF-FE information needed for an evaluation to be completed on the receiving tank prior to the transfer beginning. D&S-FE will provide sample results to TF-FE when available.

Deviations may be experienced during transfer of solids wash water and filter wash water from 512-S to Tank 50. As described in 5.4.13, wash water and filter wash water transfers to Tank 50 may be outside the 2.5-7 M sodium concentration range, $NO_{effective}$ concentration limit of 1.70 M, and above the curie limit of 0.015 Ci/gal [7.1, 7.39]. Prior to the transfer to Tank 50, D&S-FE will perform an evaluation. 512-S wash water and filter wash water, chemical cleaning, and transfers to Tank 50 have been deemed acceptable for the Saltstone Disposal Facility [7.36].

5.5.5 Self Assessment

Self assessment includes some of the specific actions and administrative controls already described, such as monitoring and reporting analytical results (D&S-FE and the DWPF Operations), and verifying compliance to the WCP (D&S-FE) including tracking sludge volumes.

D&S-FE will track the volume of recycle waste generated and compare it to operating rates. This will serve as a tool to detect increases in wastewater generation that may be correctable.

D&S-FE will formally and informally monitor plant operations to assure that good operating practices are employed with respect to avoiding unnecessary recycle waste generation. D&S-FE will also formally and informally interact with plant operations to assure that any waste generation activities beyond the scope described in this WCP are recognized, planned for, and reported to the LW receiver representative.

Revisions of the WCP, including the Characterization, will be initiated by D&S-FE as needed.

6.0 RECORDS

Operating Records including those pertaining to the generation of the recycle stream, are saved in completed operating procedures and are retained per Manual 1B MRP 3.31 (Records Management) and Manual 1Q 17-1 (Records Management).

Other significant information related to characterization of the recycle stream will be documented as correspondence.

7.0 REFERENCES

7.1. X-SD-G-00001, "Waste Acceptance Criteria for Liquid Waste Transfers to the Tank Farms (U)."
7.2. WSRC-SA-2002-00007, "CST Facilities DSA."
7.3. N-ESR-G-00001, "High Level Waste Emergency Response Data and Waste Tank Data."
7.4. S-TSR-G-00001, "Concentration, Storage, and Transfer Facilities Technical Safety Requirements."
7.5. X-SCH-S-00001, "DWPF Analytical Sample Schedule (U) (RADOPS)."
7.6. X-CLC-H-00641, "Impact of a Chronic Strip Effluent Leak at DWPF on Tank Farm Flammability."
7.7. Liquid Waste Organization Administrative Procedures Manual S4, "Waste Acceptance Criteria, Waste Compliance Plan, and Special Waste Compliance Plan," Procedure ENG.08.
7.8. SRR-WSE-2009-00025, "Disposal of Ground Glass Shards to the Recycle Collection Tank (RCT)."
7.9. WSRC-TR-2002-00094, "Resolution of the Organic PISA."
7.10. WSRC-TR-2002-00327, "CSTF Corrosion Control Program."
7.11. SW4-15.17, "Radioactive Waste System Operating Manual (U)," Section 2.4.
7.12. WSRC-TR-2003-00336, "Inhibitor Limits For Recycle Waste Generated by the DWPF (U)."
7.13. X-CLC-S-00136, "RCT Inhibitor Requirements."
7.14. X-CLC-S-00070, "Potential for Acidic Pump Tank 10 (U)."
7.15. X-CLC-S-00094, "RCT Inhibitor Requirements for SAS Steam Elimination."
7.16. X-ESR-H-00238, "Corrosion Control Analysis for Tank 41 and 23 during Bulk Salt Removal from Tank 41."
7.17. \\wg08\HLW-WRT\DWPF\RCT Tracking Log.xlsm
7.18. X-ESR-S-00162, "Estimating the Quantity of Sludge Transferred from the RCT to the H-Tank Farm."
7.19. X-CLC-S-00335, "Determination of Maximum Acceptable Volume of Sludge Slurry in a DWPF Recycle Transfer Composed of Sludge Batch 8 Coupled with Design Basis PRFT material & Strip Effluent to the HTF."
7.20. X-ESR-H-00541, "DWPF Recycle Accounting and 2H Feed Strategy."
7.21. SW4-15.17, "Radioactive Waste System Operating Manual (U)," Section 4.31.
7.22. WSRC-TR-2001-00558, Rev. 0, "Ammonia Emission Projection for DWPF Recycle During Macrobatch 3 Campaign."
7.23. X-CLC-S-00283, "Flammability of Recycle Waste from Sludge Batch 8 and Salt Batches 5 and 6."
7.24. WSRC-SA-6, "Final Safety Analysis Report Savannah River Site DWPF."
7.25. \\wg08\HLW-WRT\DWPF\RCT Sample Results.xlsx
7.26. SW4-15.17, "Radioactive Waste System Operating Manual (U)," Section 4.1.
7.27. X-SD-G-00008, "Waste Acceptance Criteria for Sludge, ARP, and MCU Process Transfers to 512-S and DWPF (U)."
7.28. N-NCS-S-00009, "Nuclear Criticality Safety Evaluation: Sludge Processing in DWPF (U)."
7.29. N-NCS-H-00180, "Nuclear Criticality Safety Evaluation: Operation of the 2H Evaporator System (U)."
7.30. X-CLC-S-00337, "HTF Enrichment WAC Compliance of DWPF Recycle Material Composed of Sludge Batch 8 Coupled with Salt Batches 7 & 8 with and without MST."
7.31. X-SD-H-00009, "F/H Effluent Treatment Project Waste Acceptance Criteria (U)."
7.32. SRR-WSE-2011-00106, "DWPF Recycle Effect on ETP Waste Acceptance Criteria for the DWPF Waste Compliance Plan."
7.33. SW4-15.116, "512-S Process System Operating Manual (U)," Section 4.2.
7.34. SW4-15.116, "512-S Process Operating Manual (U)," Section 2.3.
7.35. LWO-WSE-2009-00015, "Engineering Position: Acceptability of 512-S Batches with Caustic Additions to MCU."
7.36. LWO-RIP-2009-00016, "Savannah River Site Z-Area Saltstone Disposal Facility Waste Streams."
7.37. S4 Manual, Procedure ENG.31, "Liquid Waste Operations Foreign Material Exclusion Measures for Protection of MCU."
7.38. DWPF-TMC-08-006, "512-S Drains."
7.39. WSRC-NB-90-177, "Hasmukh B. Shah's SRS Laboratory Notebook."
7.40. X-SD-Z-00001, "Waste Acceptance Criteria for Aqueous Waste Sent to the Z-Area Saltstone Production Facility (U).201D
7.41. LWO-PIT-2006-00054, "Evaluation of Disposition of Cerium (IV) Oxide Paste to SRS Tank Farms."
7.42. SW4-15.209-2.32, "Polishing Analytical / Sampling Cell Windows Using Cerium Oxide Paste."
7.43. SRNL-STI-2011-00389, Rev. 0, "Evaluation of the Impact of the Defense Waste Processing Facility (DWPF) Laboratory Germanium Oxide Use on Recycle Transfers to the H-Tank Farm."

8.0 ATTACHMENTS

ATTACHMENT 8.1: PROCESS CHEMICALS IN THE RECYCLE COLLECTION TANK

Compound	Average ppm	Max. ppm (M)
CsOH	2	4
"Dow Corning 544"	15	30
or "Antifoam 747"	30	60
KOH	155	2000
NH_3	< 100	198
$Na_2B_4O_7$	64	300
NaCOOH	360	1300
$Na_2C_2O_4$	2200	60,000
NaCl	3	34 (0.0006M)
NaF	7	71 (0.0018M)
$NaNO_2$	11,000	37,000
$NaNO_3$	4500	78,000 (0.95 M)
NaOH	43,000	100,000
Na_2SO_4	34	470 (0.0035M) (1)
Ag_2O (s)	<1	13
Al_2O_3 (s)	104	12,500
B_2O_3 (s)	155	3600
$BaSO_4$ (s)	<1	20
CaO (s)	1	24
$CaCO_3$ (s)	30	3800
CaC_2O_4 (s)	<1	16
CaF_2 (s)	<1	19
$Ca_3(PO_4)_2$ (s)	23	2900
$CaSO_4$ (s)	<1	44
Cr_2O_3 (s)	2	250
Cs_2O (s)	< 1	<1
CuO (s)	<1	40
Fe_20_3 (s)	300	38,000
FeO (s)	30	3800
Hg, all forms	100	1100
K_2O (s)	<1	40
Li_2O (s)	66	1500
MgO (s)	16	2000
MnO_2 (s)	60	4300
Na_2O (s)	150	5500
NiO (s)	3	350
PbO (s)	< 1	<1

ATTACHMENT 8.1: PROCESS CHEMICALS IN THE RECYCLE COLLECTION TANK (continued)

Compound	Average ppm	Max. ppm
$PbSO_4$ (s)	1	150
PdO (s)	<1	1
PuO_2 (s)	< 1	16
RhO_2 (s)	<1	1
RuO_2 (s)	<1	2
SiO_2 (s)	900	21,000
$SrCO_3$ (s)	<1	1
SrO (s)	< 1	<1
TcO_2 (s)	<1	4
ThO_2 (s)	<1	50
TiO_2 (s)	<1	36
U_3O_8 (s)	34	4300
$Y_2(CO_3)_3$ (s)	<1	1
Y_2O_3 (s)	< 1	<1
ZnO (s)	1	70
"BULAB 6057"	3	330
"BULAB 9066"	21	2100
"BULAB 9077"	32	3200
"Mobil SHC 630" Lube Oil	<42	1100
Isopar L	<1	<1
CeO_2	-	240 mg/L (2)

Note: (1) Calculated from sulfate concentration of Tank 40 sludge [7.39] for maximum carry-over. All sulfate is accounted as in sodium sulfate.

(2) The maximum volume of cerium oxide that can be added to an RCT batch is 10 lbs [7.40, 7.41], which would result in a maximum cerium oxide concentration of 240 mg/L in an RCT batch of 5000 gallons.

ATTACHMENT 8.2: LABORATORY CHEMICALS IN THE RECYCLE COLLECTION TANK

Cations	Ave. ppm	Max. ppm	Anions	Ave. ppm	Max. ppm (M)	Other Chemicals	Ave. ppm	Max. ppm
Aluminum	0.005	0.17	Acetate	0.40	14	Alconox (detergent)	0.043	1.5
Ammonium	0.36	13	Borate	5.3	190	1-Amino-2-naphthol-4-sulfonic acid	0.043	1.5
Barium	0.29	10	Carbonate	5.3	190			
Calcium	0.31	11	Chloride	26	900 (0.026M)	Ascorbic acid	0.043	1.5
Cesium	0.065	2.3	2,3-Diamino-Propionate	0.033	1.1	Attapulgite clay	1E-03	0.003
Chromium	0.005	0.17				Dimethyl phthalate	0.043	1.5
Copper	0.17	5.9	Formate	4.6	160	Ethylene diammonium sulfate	-	0.06
Iron	0.21	7.3	Fluoride	26	880 (0.048M)			
Lead	1E-03	0.03	Hydroxylamine	0.026	0.91	Glycerine	5.5	200
Lithium	0.088	3.1	Hypochlorite	0.033	1.1	Hydrogen peroxide	1.5	51
Magnesium	0.22	7.9	Iodide	0.071	2.5	Sodium peroxide	4.3	150
Manganese	0.009	0.31	Metabisulfite	3.3	117	Germanium [7.42]	0.73	1.84
Mercury	1E-03	0.03	Metavanadate	0.038	1.3			
Neodymium	1E-03	0.03	Molybate, Mo_7O_{24}	0.038	1.3			
Nickel	0.005	0.17						
Potassium	6.5	230	Molybdate, MnO_4	1.4E-03	0.05			
Silver	0.076	2.6	Nitrate	62	2200 (0.037 M)			
Sodium	48	1700	Nitrite	2.9	104			
Tetrabutyl-ammonium	2.2	81	Oxalate	2.9	102			
Tin	2.9	110	Perchlorate	0.40	14			
Titanium (in solution)	0.28	0.35	Persulfate	6.5	230			
Titanium (as dioxide)	0.050	1.8	Phosphate	114	2200			
Vanadium	1E-03	0.03	Phthalate	0.71	25			
Zinc	1E-03	0.03	Pyrosulfate(K salt)	-	0.05			
Zirconium	1E-03	0.03	Silicate	1.6	56			
			Sulfate	8.6	300 (0.0032M)			
			Sulfite	0.31	11			
			Thiocyanate	0.033	1.2			

ATTACHMENT 8.3: MAXIMUM CONCENTRATION OF DIGESTED HEME/HEPA FILTERS CHEMICALS IN THE RECYCLE COLLECTION TANK

Compound	Species Concentration (at maximum digestate concentration), ppm (M)
Al_2O_3 (s)	1500 – 2600
B_2O_3(s)	1800 – 4100
BaO (s)	80 – 1300
CuO (s)	400 – 2100
Fe_2O_3 (s)	0 – 110
K_2O (s)	340 -1120
Li_2O (s)	15
MgO (s)	0 – 1120
Na_2O (s)	3700 – 6900
ZnO (s)	0 – 1700
Cl	100 (0.0029M)
F	180 (0.0099 M)
SO_4^{2-}	75 (0.0008 M)
SiO_3^{2-}	27,000 – 30,000
NaOH	50,000
Max. insoluble	16,000

ATTACHMENT 8.4: NOMINAL CHEMICAL AND RADIONUCLIDE CONCENTRATIONS OF CLARIFIED SALT SOLUTION AND WASH WATER AT 512-S

	Clarified Salt Solution	Wash Water
Chemical (ppm)		
KNO_3	534	199
NaOH	53487	20227
$NaNO_3$	151472	56364
$NaNO_2$	35931	13409
NaHgOOH	2.28	0.85
CH_3OH	0.42	0.16
$(CH_3)_2CHOH$	0.31	0.12
$Na_2C_2O_4$	1268	477
Radionuclide (µCi/gal)		
Sr-90	1.67E+02	3.79E+03
Cs-137	3.49E+05	1.14E+05
U-232	2.53E-06	8.86E-06
U-233	1.82E-03	6.38E-03
U-234	2.57E-04	9.00E-04
U-235	7.03E-06	2.47E-05
U-236	2.65E-05	9.29E-05
U-238	8.23E-05	2.88E-04
Pu-238	2.34E+00	4.90E+01
Pu-239	6.09E-02	1.27E+00
Pu-240	2.51E-02	5.25E-01
Pu-241	5.47E-01	1.14E+01
Pu-242	1.67E-05	3.48E-04

Note: Data taken from Appendix F of ARP Material Balance, X-CLC-S-00113, Rev. 0. This characterization represents a nominal composition. Sample analysis from salt batch qualification will be used for comparison against limits and an evaluation report will document acceptability for each salt batch processed in Tank 49.

ATTACHMENT 8.5: DWPF COMPLIANCE ACTIONS

SPECIFIC CRITERIA	COMPLIANCE ACTIONS
5.3.1 pH > 7 (SB), pH > 12 (SB Administrative Control)	For normal regular waste and irregular waste transfers, the pH will be periodically verified to meet the criteria, at least every 10th RCT batch transferred. Addition of at least 75 gallons (for DWPF-RW-01, DWPF-RW-07, DWPF-RW-09, and DWPF-IW-01) or 260 gallons (for DWPF-RW-02 and DWPF-IW-02) of nominal 50 wt % sodium hydroxide solution to each RCT batch will be verified by all of the following: a. Caustic flow totalizer of at least 75 or 260 gallons, respectively. b. Independent procedural verification by the Shift Manager, VCR Manager, STE, or equivalent, that a. is met. 2. For infrequent regular waste transfers (DWPF-RW-03, DWPF-RW-04, DWPF-RW-08, and DWPF-RW-10), recycle solutions with unusually high acid concentrations may require a different adjustment strategy than specified in Number 1 above. The DWPF will modify the caustic addition to meet the pH and inhibitor requirements of the TF WAC. The RCT contents will be sampled and analyzed for pH after the adjustment to verify that the pH is > 12 before the transfer.
5.3.2 Nitrate Concentrations meet the requirements of 5.3.2.5 (SB Administrative Control)	1. For normal regular waste and irregular waste transfers, the DWPF will add at least 215 gallons to each RCT batch (for DWPF-RW-01, DWPF-RW-07, DWPF-RW-09, and DWPF-IW-01), or at least 280 gallons to each RCT batch (for DWPF-RW-02 and DWPF-IW-02) of sodium nitrite solution (nominal 35 to 40 weight percent). 2. The DWPF will periodically (normally every 10th batch), analyze the adjusted RCT for nitrate, nitrite, and base equivalents concentrations, for comparison to the criteria. 3. For infrequent regular waste transfers (DWPF-RW-03, DWPF-RW-04, DWPF-RW-08, and DWPF-RW-10), recycle solutions with unusually high nitrate concentrations may require a different adjustment strategy than specified in 1 & 2 above. The DWPF will modify the caustic and nitrite additions and sample and analyze each RCT batch in those cases to verify that the inhibitors meet the requirements of the TF WAC Section 11.1.2 prior to transfer to the TF.
5.3.3 Hydrogen Generation Rate (SB SAC)	For each sludge batch, D&S-FE will develop a calculation demonstrating that the HGR criteria will be met for non-Type IV tanks, and evaporator feed tanks. Additionally, for recycle transfers sent to the TF, DWPF will communicate with the TF prior to sending the RCT batch to confirm that the RCT batch can be transferred to the respective TF recycle receipt tank per the TF ERD. Each RCT batch will be sampled, and iron analysis will be performed to allow for an accurate determination of the sludge content in each RCT transfer. Prior to receiving the laboratory analysis, an assumed bounding sludge volume of 650 gallons will be assigned to each RCT batch transferred to the TF and will be included in the RCT tracking log. The total number of future RCT batches that can be sent to the TF recycle receipt tank will be calculated to stay within the sludge allowance limit of the receipt tank (as determined by TF-FE). Note: When Tank 41 is the DWPF recycle receipt tank and the tank is undergoing salt dissolution, the RCT batch number limit is not required to be calculated.

ATTACHMENT 8.5: DWPF COMPLIANCE ACTIONS (continued)

SPECIFIC CRITERIA	COMPLIANCE ACTIONS
5.3.4 Organic Vapor Control (SB SAC)	Before processing of each sludge batch, D&S-FE will verify the requirement of ammonia levels of ≤ 198 mg/L ammonia. The RCT will be sampled periodically for ammonia. Analytical uncertainty will be included. The RCT temperature upon transfer shall be ≤ 50°C. Transfer of strip effluent in the recycle stream is controlled by procedure to be ≤ 20 gallons at 87 mg/L Isopar L per RCT batch.
5.3.5 Receipt IDP Criteria for Type IV Waste Tanks (SB SAC)	For recycle transfers sent to the TF, DWPF will communicate with the TF prior to sending the RCT batch to confirm that the RCT batch can be transferred to the respective TF recycle receipt tank per the TF ERD. Each RCT batch will be sampled, and iron analysis will be performed to allow for an accurate determination of the sludge content in each RCT transfer. Prior to receiving the laboratory analysis, an assumed bounding sludge volume of 650 gallons will be assigned to each RCT batch transferred to the TF and will be included in the RCT tracking log. The total number of future RCT batches that can be sent to the TF recycle receipt tank will be calculated to stay within the sludge allowance limit of the receipt tank (as determined by TF-FE). Analytical uncertainty will be included.
5.3.6 Receipt IDP Criteria for non-Type IV Waste Tanks (SB SAC)	For each sludge batch, D&S-FE will develop a calculation demonstrating that IDP criteria will be met for evaporator feed tanks and Type III tanks. Additionally, the calculation will show that recycle transfers from DWPF to TF are low-rem transfers. Analytical uncertainty will be included.
5.3.9 U Enrichment in 2H Evaporator	For each sludge and salt batch, D&S-FE will provide a calculation or evaluation demonstrating that these criteria will be met. Analytical uncertainty will be included.
5.4.4 MCU Hydrogen Generation Rate	Waste shall be verified to be less than or equal to 50°C prior to and during the transfer from 512-S to MCU.
5.4.5 MCU IDP, Haz Cat 3 & Cs-137	For each salt batch, an engineering evaluation will be performed demonstrating that the inhalation dose potential/hazard categorization/Cs-137 criteria will be met. Analytical uncertainty will be included.
5.4.6 MCU Fissile Material Mgmt.	For each salt batch, an engineering evaluation will be performed demonstrating that the MCU criticality safety criteria will be met. Analytical uncertainty will be included.
5.4.8 MCU Process Requirements (PRs) - Filtration	For all transfers to MCU from 512-S, the material must be filtered through a media with a nominal pore size of 0.1 or 0.5 micron. As detailed in the WAC Deviation in Section 5.4.8.6, evaluated liquid streams may bypass the filter.
5.4.10 MCU PRs - Foreign Material Exclusion	All sending facilities (512-S) must comply with the FME Program prior to transfer to MCU. 512-S has installed plugs to drains that are piped to the LWHT to ensure no contaminants enter the process. The Backpulse Room, which did not require a plug in the drain, is a locked High Radiation Area.
5.4.11 MCU PRs-Temp Limits	All transfers to MCU must be verified to be between 20°C and 29°C.
5.4.12 MCU PRs-Specific Gravity	All transfers to MCU must be verified to be between a specific gravity of 1.16 to 1.3.