LIQUID WASTE ENGINEERING
LW ENGINEERING SUPPORT

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Revision 19

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WASTE ACCEPTANCE CRITERIA FOR LIQUID WASTE TRANSFERS TO THE 241-F/H TANK FARMS (U)

September 2004

ADC/RO

Paul B. Rogerson — refer to TRC-HTF-2004-00403 Date: 8/31/04
P. B. Rogerson, Author, Waste Characterization Cognizant Engineering

Alexis O. DeLley Date: 8/31/04
A. O. DeLley, Technical Reviewer, H & F Process Support Engineering

Date: 9/2/04
T. J. Lex, Manager, Liquid Waste Disposition Engineering

Date: 9/7/04
P.K. Hightower, Manager, Environmental Compliance

Date: 9/8/04
W. C. Clark, Manager, H-Tank Farm Liquid Waste Disposition Projects

Date: 9/7/04
S. W. Wilkerson, Manager, F-Tank Farm Liquid Waste Disposition Projects

Implementation:

Effective Date: 1/24/05
W. C. Clark, Manager, H-Tank Farm Liquid Waste Disposition Projects

Effective Date: 1/24/05
S. W. Wilkerson, Manager, F-Tank Farm Liquid Waste Disposition Projects

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Tank Farm Implementation Checklist

	Responsibility		Completed?	
Action	**Generator**	**Receiver**	**Yes**	**No**
HCAN Sample Analysis Complete and Documented	X		✓	
ETP Characterization Deviation Approved	X		✓	
HCAN WCP Revised and Approved	X		✓	
ETP WCP Revised and Approved	X		✓	
FCAN Review WCP for Impacts	X		✓	
DWPF Review WCP for Impacts	X		✓	
SS WAC Rev. 2 Is Approved		X	✓	
~~NOP 221-H-4710~~ MP 9-10-04	~~X~~ MP 9-10-04			

Compensatory Actions If Any Actions Are Checked "No":

Concurrence:

J. W. Ray, Waste Solidification Engineering — Date: 9/10/04

R. S. Peters, Manager, F-Canyon Technical Engineering — Date: 9/9/04

Paul B. Rogerson for S. A. Yano per TIC
S. A. Yano, Manager, H-Canyon Engineering — Date: 9/13/04

A. W. Wiggins, Manager, Effluent Treatment Project Engineering — Date: 9/9/04

T. E. Chandler, Saltstone Engineering — Date: 9/13/04

Receiving Facility Concurrence:

E. J. Freed, Manager, H & F Process Support Engineering — Date: 9-13-04

REVISION HISTORY

rev. 0, 3/94	**initial issue**
rev. 1, 3/95	**total revision** (no change bars used), for example:
pages: all	- re-arranged document and made other editorial changes.
pages: all	- added details for criteria that had been undefined ("TBD").
pages: all	- emphasized acceptability of characterization by "process knowledge" (-vs- "samples").
pages: all	- revised vocabulary and definitions for waste stream categories and levels of characterization, revised list of species to be characterized.
pages: all	- incorporated generator's comments from 1/31/95 draft of rev 1.
pages: 14-17	- since 3/14/95 draft of rev 1: changed minimum pH from 10 to 9.5 (in 11.1.1), added Section 13.3.1 added notes in 0.
rev. 2, 2/98	**total revision(revision bars used)**
	- marked the AB sections
	- added requirement for inputting sampling and transfer data in the Wisdom Work Group
	- added the AB requirements for Radiological Source Terms for influent waste streams
	- added the safe weight ratios for neutron poisons to equivalent U-235
	- change the non-flammability limit to 25% of the CLFL
	- revised the ammonia concentration to 10% of the LFL
	- added temperature criteria for waste receipts
	- added the industrial hygiene section
	- added definition of a trace organic constituent
	- added hydrogen generation limit
	- added Si characterization requirement
	- changed HLW to CST
	- renumbered all footnotes

rev. 3, 12/98	**total revision (no revision bars used)** - updated references - added definition of High-Level Waste - clarified Section 3.2 - updated Acronyms list - added responsibilities for the CSTE WAC Cognizant Engineer, the LWGR, and CSTO - added requirement to issue a WCP for any activity that is not covered in the WCP - added requirement to update the WCP for any activity not covered or characterized prior to transfer - deleted Section 13.7 and incorporated contents in Section 7 - added requirement to prevent Abnormal Emissions due to overheating - added requirement for the receipt of 'organic' and 'non-organic' waste streams - added the Hydrogen generation requirements (HDB-8 and evaporators) and the methodology to use - clarified the ammonia requirements for transfers into organic waste tanks and pump tanks and for transfers into non-organic waste tanks and pump tanks - added requirement for maximum organic content and receipt temperature - clarified the RST for transfers into Type IV tanks and non-Type IV tanks - eliminated section for RST requirements for transfer lines - eliminated requirement for settled solids (assigned as CSTE responsibility) - deleted Attachment 15.1
Rev. 4 4/00	- incorporated editorial comments received after issuance of revision 3 - deleted requirements prior to TSR - incorporated DCF X-DCF-G-00002 addressing the new ammonia limit (section 13.3.3) - added AB requirements for H-Canyon transfers into HPT-6 and waste tank 39H (Section 13.3.1) - added temperature and O/A requirement for H-Canyon transfers into HPT-6 (Section 13.3.4) - clarified supernate is critically safe in the uncontrolled geometry of the waste tanks in Section 13.7
Rev. 5 7/00	**revision bars used** - added a HPT-6 to the list of pump tanks for which the heat generation rate must be evaluated in a case by case basis (Section 13.2). - added a clarification to the Basis to the concentration of ammonia limits for H-Canyon transfers to ensure the AB assumptions are protected (Sections 11.2.1,13.3.3) - added a clarification to the Basis to the organic material content limits for H-Canyon transfers to ensure the AB assumptions are protected (Sections 11.2.1, 13.3.4) - added reference 26
Rev. 6 12/00	**no revision bars used** - added criticality controls in Section 11.6 for acidic solution transfers for evaporator pot cleaning

Rev. 7 2/01	**revision bars used** - specified limit for DBP and revised limit for TBP - added statement which holds CST responsible for requesting guidance from the HLW Environmental Compliance Group to determine if changes require a wastewater permit modification
Rev. 8 2/01	**revision bars used** - hold is removed for transferring cleaning solution to the Tank Farm
Rev. 9 4/01	**revision bars used** - corrected acid molarity in Table 3 to less than or equal to 1.63 - corrected the design volume of the tanker trailer to less than or equal to 4630 on page 31
Rev. 10 4/01	**revision bars used** - section 13.7.1 Table 3 changed to clarify that free acid molarity is specified - total acid limit in Attachment 15.4 is removed
Rev. 11 5/01	**revision bars used** - changed section 2 to DOE Order 435.1-1 - expanded definition of liquid waste to include radioactive liquid chemicals added to a waste tank for use as a special cleaning solution - expanded definition of SW in section 7.1 to include the addition of radioactive liquid chemicals to waste tanks for use as a special cleaning solution - added "Additional Tank 43 Restrictions" to section 13.3.1 for Organic Vapor Control - added " Additional Tank 43 Requirements" to section 13.3.3 for Maximum Ammonia Concentration and Transfer Rate - added section 13.7.2 for Uranium Enrichment in 2H Evaporator System - added section 13.10 for Tanker Trailer Receipt Criteria - added section 13.10.1 for Uranyl Carbonate Receipts - changed PDR to PIR - added sentence in section 13.9 (Industrial Hygiene Safety) to require an MSDS for all new chemicals introduced into the facility
Rev. 12 7/01	**no revision bars used** - changed carbonate concentration from 4.0 +/- 0.5 wt.% to ≥3.0 but ≤ 4.5 wt. % - deleted sentence discussing expected carbonate condition in 43
Rev. 13 2/03	**revisions bars used** - included air emissions evaluation (if needed) requirement for transfers into the Tank Farm in Section 12.5 - revised section 12.6, added poison ratios for multiple poisons present - deleted Sections 9, 13.2, 13.3.3, 13.3.4, 13.7.1, and 13.10.1 - revised to incorporate new 830 Documented Safety Analysis (DSA) and TSR implementation
Rev. 14 6/03	**Revision bars used** - revised section 12.4.2 to reflect revision to Tank 50 JCO (WSRC-TR-2003-00083) - revised section 12.6.1 to reflect revision to Tank 50 JCO (WSRC-TR-2003-00083) - revised reference 24 to reflect revision - added requirement in Section 6 for CSTE to project time-to-LFL for all intended receipt tanks prior to the approval of a Special WCP

Rev. 15 3/04	**Revision bars used** -added requirement to report sample uncertainty for flammability and inhalation dose potential characterization -added section dealing with heat generation rate -replaced requirement for O/A sampling per batch with a semi-annual volatile/semi-volatile organic analysis -deleted requirement for CSTE to review generator's procedures -revised minimum corrosion inhibitor requirements for DWPF recycle waste -deleted section dealing with implementation of DOE Order 435.1-1
Rev. 16 5/04	**Revision bars used** -removed RBOF as a generator -added reportability requirements for transfers into Tank 50 in order to maintain a material balance for Tank 50 and its compliance with Saltstone (Attachments 13.4 and 13.5)
Rev. 17 6/04	**Revision bars used** -changed basis for Saltstone limits for Tank 50 from the proposed limits of a new permit to the limits in the currently approved Saltstone WAC -grammatical changes (as needed – not denoted by revision bars)
Rev. 18 7/04	**Revision bars used** -added U-235, Pu-239 limits for transfers into Tank 50 in order to protect the Tank 50 Valve Box NCSE -clarified the need for a deviation request if a generator does not meet the Saltstone limits directly for transferring to Tank 50 -revised Attachment 13.4 to reflect latest Saltstone WAC requirements (deleted U-232, Am-242m, and Cm-245; added Ra-226, and Th-230)
Rev. 19 9/04	**Revision bars used** -added implementation checklist/effective date signatures -deleted Attachment 13.5 -deleted sentence from Section 2 that said non-compliance with the SB related items would constitute a DSA violation – this will be determined after such an event -changed references to PIR to PR/STAR to reflect change in form used for these situations (revision bars not used for this change) -revised Attachment 13.4 to include minimum periodic characterization requirements for influents into Tank 50; revised Attachment 13.1 to reflect this change -changed Concentration, Storage, and Transfer (CST) to Liquid Waste (LW) – revision bars not used for this change -changed SRTC to SRNL in Section 2 -deleted paragraph from Section 2.3 that was an example of wording for generator's DSA -added clarification to Section 6.2 for better understanding of characterization requirements -removed reference to the Process Interface Description document -removed wording requesting analytical uncertainty within 3 months of rev. 15 approval since all generators have already complied with request -minor editorial changes throughout document

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1 Introduction To SRS High Level Liquid Waste Management

Liquid high level waste received into the Tank Farm is held in interim storage in 48 underground tanks (where tank 16 has been retired from service and tanks 17 and 20 have been closed) that range in capacity from 0.7 to 1.3 million gallons. Typically, fresh waste is transferred into a receipt tank where the insoluble solids (sludge) are allowed to settle. The supernatant liquid is decanted and then transferred to an evaporator for volume reduction. Evaporator overheads are collected and processed through the F/H Effluent Treatment Project (ETP) and then are discharged to an outfall. The tank farm evaporator bottoms are transferred to a concentrate receipt tank, where the contents are cooled to crystallize the salts. The remaining solution is recycled as evaporator feed and the cycle repeated until as much water as possible has been removed. In this fashion, the overall volume of the waste is reduced by approximately 60-70%. Saltcake and sludge fractions have, for the most part, been segregated. The major radionuclide in salt waste is ^{137}Cs while the actinides and the rest of the fission products accumulate in the sludge. Major chemical components include the NO_3^-, NO_2^- and OH^- salts of Na in the saltcake, and oxides and hydroxides of Fe, Mn, and Al in the sludge.

Eventually, the waste will be removed from the waste tanks and processed into feedstock either for the Defense Waste Processing Facility (DWPF) or for the Saltstone Production Facility (Z Area) or for the Salt Waste Processing Facility (SWPF) for the purpose of tank closure. Several of the waste tanks have been dedicated as processing vessels for use in preparing the waste. Salt that has crystallized in the concentrate receipt tanks will be dissolved and processed as necessary to reduce the concentration of radioactive contaminants before transferring the decontaminated salt solution to Z Area for disposal as saltstone. Sludge in the waste tanks will be slurried and transferred into Tank 40 or Tank 51 for Extended Sludge Processing (ESP). The residual sludge solids will then be washed to reduce the concentration of soluble salts in the sludge slurry. Washing consists of several cycles, each including the steps of wash water addition, sludge suspension/mixing, sludge settling, and decanting the spent wash water. Washed sludge from ESP and radionuclides removed from salt will then be transferred to the DWPF for vitrification (in glass).

Management of the liquid radioactive waste (i.e., interim storage and processing operations) requires:

- safe disposition of waste in the LW tanks;
- safe operation of Tank Farm facilities (e.g., evaporators);
- understanding the impact of new wastes on existing inventories prior to their acceptance;
- compliance with feed requirements for downstream facilities (e.g., DWPF, Saltstone, and ETP)
- certification of solid low level waste (generated as a result of Tank Farm activities) for disposal in the E-area Solid Waste Disposal Facility;
- compliance with environmental permits and regulations;
- compliance with the LWF Safety Basis (SB).

All waste transferred to the Tank Farms for interim storage must be compatible with existing equipment and facilities, and must remain within the LWF SB safety envelope. As the site mission evolves and generators change their processes, waste characteristics are also expected to change. Because of the future potential for waste variability (as opposed to historically steady unchanging processes), more formalized control of waste being transferred into the Tank Farm is needed.

The Waste Acceptance Criteria (WAC) presented in this document provide the controls to satisfy the requirements listed above. To that end, this document includes:

- the criteria and the basis for determining the acceptability of waste to be transferred to the 241-F/H Tank Farms such that (a) interim storage of the waste will be in compliance with applicable safety, environmental, and regulatory requirements and DOE Orders; and (b) the waste composition will meet the downstream facilities' (e.g., DWPF, Saltstone and ETP) feed requirements;
- the methods for reviewing and approving the acceptability of new waste streams, and for accepting waste that deviates from the specific criteria (Section 9);
- identification of WAC sections that are credited in the Tank Farm SB.

This document does not include the requirements for performing inter - tank transfers. Inter tank transfer requirements are identified in other Technical Safety Requirements (TSR) Administrative Control Programs such as the Transfer Control Program.

2 Application of the Waste Acceptance Criteria

This document identifies the requirements and specifications that must be satisfied by the waste generators for direct waste transfers to the Tank Farms. These requirements are applicable to all organizations and facilities that directly transfer waste to the Tank Farm. This includes, but is not limited to, waste generated in the following facilities:

- F-Canyon and Outside Facilities
- H-Canyon and Outside Facilities
- Nuclear Materials Management
- DWPF
- ETP
- Tank Farms
- Tank Farm Maintenance Facility (299-H)
- other facilities:
  - Analytical Laboratories
  - SRNL
  - Remaining on-site facilities
  - Off-site facilities

2.1 Tank Farm WAC

All liquid waste directly transferred into the F/H Tank Farm waste tanks must satisfy the WAC defined in the following sections. This includes radioactive liquid chemicals that are added to a waste tank for use as a special cleaning solution. Waste that is transferred through a different facility for subsequent transfer to the Tank Farms must also satisfy these WAC at the time of discharge to the Tank Farms (i.e., the facility that directly transfers the waste to the Tank Farm is responsible for assuring transfers from other facilities will not prevent them from complying with the WAC).

Waste generators are required to document their Waste Compliance Program (WCP, refer to Section 5), including the waste characterization and controls that ensure the waste satisfies the WAC. Most importantly, the WCP must clearly identify the controls protecting the Tank Farm SB and the program for maintaining the SB controls.

2.2 Tank Farm Technical Safety Requirements

The LWF Safety Basis (the Documented Safety Analysis and Technical Safety Requirements) credits the Waste Acceptance Criteria Program. The Waste Acceptance Criteria Program is credited in the Documented Safety Analysis (DSA) with ensuring that the composition of waste streams received into the facility are within analyzed limits. Waste streams not bounded by the analyzed isotopic and chemical inventory assumptions shall not be accepted unless a USQ evaluation has been performed and approved. Ensuring that the composition is within analyzed limits ensures that the assumptions made in calculating the consequences and deriving the limits in the safety analysis are maintained [6].

Safety Basis (Documented Safety Analysis and Technical Safety Requirements) related requirements are identified by "SB" in the section title.

2.3 Generators Safety Basis

Each generator must recognize the Tank Farm WAC Program in their Safety Basis (SB). A section should be added to demonstrate the importance of the Tank Farm WAC Program. [6]

3 ACRONYMS

Regular, Irregular, Special - the three categories of waste (refer to Section 6.1)

Minimum, Complete - the two levels of characterization (refer to Section 6.2, and Attachment 14.1)

CLFL	- Composite Lower Flammability Limit
CSTF	- Concentration, Storage, and Transfer Facility
DBP	- Dibutylphoshpate
DSA	- Documented Safety Analysis
DWPF	- Defense Waste Processing Facility
EEC, ECC	- Environmental Evaluation Checklist, Environmental Compliance Checklist
ESP	- Extended Sludge Processing
ETP	- Effluent Treatment Project
FOSC	- Facility Operations Safety Committee
H&V	- Heating and Ventilation
ICRP	- International Commission on Radiological Protection
IDP	- Inhalation Dose Potential
IW	- Irregular Waste (refer to Section 6.1)
LEL, LFL	- Lower Explosive Limit, Lower Flammability Limit
LWE	- Liquid Waste Engineering
LWEE	- Liquid Waste Environmental Engineering
LWF	- Liquid Waste Facilities
LWGR	- Liquid Waste Generator Representative (refer to Sections 5.2 and 7)
LWM	- Liquid Waste Management (i.e., LWO, LWE, and LWEE)
LWO	- Liquid Waste Operations

PR/STAR	- Problem Report
PHR	- Process Hazards Review
RCRA	- Resource Conservation and Recovery Act
RCT	- Recycle Collection Tank
RW	- Regular Waste (refer to Section 6.1)
SB	- Safety Basis
SIRIM	- Site Incident Reporting and Issue Management (ref: manual 9B)
SW	- Special Waste (refer to Section 6.1)
SWDF	- Solid Waste Disposal Facility (i.e., the E-Area Vaults)
WAC	- Waste Acceptance Criteria
WCP	- Waste Compliance Program (refer to Section 5)
TBP	- Tributylphosphate
TCLP	- Toxicity Characteristic Leaching Procedure
TSR	- Technical Safety Requirement
USQS	- Unreviewed Safety Question Screening (ref: procedure 1.05 in manual 11Q)

4 Responsibilities

4.1 Liquid Waste Engineering (LWE) WAC Cognizant Engineer is responsible to:

- maintain the WAC, including reviews and revisions as needed;
- co-prepare and co-approve the WAC implementation checklist for each WAC revision
- advise all waste generators on the WAC requirements, including the relation to Technical Safety Requirements (TSR), and other technical bases;
- co-approve the waste generator's Waste Compliance Program document (WCP)
- conduct Technical Reviews *(USQS)* of the waste streams only if they deviate from the WAC;
- assign a waste stream number to all approved waste streams;
- revise the Approved Waste Stream List (i.e., N-ESR-G-00001 – ERD) to include any new waste streams approved for receipt in the Tank Farms;
- document and review the waste generator's self assessment programs for compliance with the WAC and WCP;
- evaluate the impact of a WAC non-compliance, assist the investigation (e.g., PR/STAR, SIRIM) and address the impact to the Tank Farm WAC Criteria Program [1];

4.2 Waste Generator and Liquid Waste Generator Representative (LWGR) is responsible to:

- develop, document, co-approve, and implement a Waste Compliance Program (WCP) (refer to Section 5);
- clearly identify items within the WCP that protect LWF SB requirements and the program for maintaining controls for these items (e.g., procedures, procurement specification);
- designate their "Liquid Waste Generator Representative" (LWGR, refer to Section 7), who serves as the primary contact with LW for all communications regarding these responsibilities;
- prepare all waste for transfer to the Tank Farm so that all WAC requirements are met;
- verify that any procedure changes associated with a waste stream do not impact any WAC/WCP agreements;

- input all characterization and transfer information into the Wisdom Workgroup WG08 as agreed to in the WCP and maintain records demonstrating compliance with the WAC and WCP;
- notify the LWE WAC Cognizant Engineer when a special transfer is terminated (e.g., completion of PVV flush);
- include compliance with their WCP as part of a self assessment program;
- finance any additional evaluations or other measures required for the Tank Farm to accept special waste;
- report a WAC non-compliance to LW and assist the investigation (e.g., PR/STAR, SIRIM);
- finance any required studies to develop technical bases for receipt of the waste;
- finance any corrective action resulting from the generator's failure to meet the WAC

4.3 Liquid Waste Operations (LWO) is responsible to:

- co-approve the WAC and each WCP, particularly the operational aspects of all waste transfers;
- notify the LWE WAC Cognizant Engineer of any changes to the facility, processes or procedures that could impact the receipt of a waste stream;
- advise all waste generators of operational requirements for transfers into the Tank Farm and approve the actual waste transfers

4.4 Liquid Waste Environmental Engineering (LWEE) is responsible to:

- advise LWE and all waste generators on the WAC requirements assuring compliance with environmental permits, local , state, and Federal laws and regulations;
- co-approve the WAC and review WCP deviation requests as requested

5 Waste Generator's Compliance Program and LW Approval

Each waste generator shall develop, implement and maintain an approved compliance program, as described in a formal Waste Compliance Program document (WCP). The WAC and WCP combine to bridge the interface between LW and the waste generator, ensuring that waste transferred to the Tank Farms can be safely stored and processed for disposal. At a minimum, the WCP document shall:

- describe the transfer volumes and frequencies to the Tank Farms
- describe the chemicals (and radionuclides if applicable) used in the process generating the waste (i.e., species that could affect the waste composition);
- describe the waste stream in terms of complete characterization (refer to Section 6);
- technically justify any deviations from any WAC requirements;
- describe activities that ensure compliance with the WAC, including any required waste processing (e.g., the generator may need to decant to remove any organic material to meet the 0.5 vol. % organic limit);
- identification of "SB" controlled requirements;
- describe the self assessment program that assures compliance with the WCP;
- describe waste minimization activities (e.g., acid recovery and volume reduction by evaporation, reduced consumption of chemicals); and
- describe any future activities that will validate and/or improve the characterization (e.g., samples).

The WCP document shall be approved by the waste generator, LWE Manager or designee, LWO Facility Manager or designee, and LWEE (when requested).

The WCP may subdivide the major waste streams (listed in Section 6.1) on any appropriate basis provided each waste stream is characterized separately. As described in Section 6.2, "process knowledge" and sample analysis can be combined to characterize a waste stream.

LWE shall review the WCP, particularly the waste characterization versus the specific acceptance criteria described in Section 11.

Any new waste stream requires a preliminary WCP for LW review no later than ***6 weeks*** before the waste is to be transferred to the Tank Farms. Calculations performed to demonstrate compliance with a criteria shall meet the requirements of E7 procedure 2.31. Any waste stream generated from a discussed activity in the approved WCP must be characterized (and the characterization included as an attachment to the WCP). The final WCP (new attachments included) shall be in place before transfer of a new waste stream is allowed.

An evaluation, by LWE, of the flammability impact (predicted time-to-LFL) to the proposed waste receipt tank shall be completed prior to LWE approval of any WCP for a special waste stream.

Basis

The WCP is an agreement between the waste generator and Liquid Waste (LW) that documents the generator's responsibilities to prepare the waste for interim storage and eventual disposal. The WCP formalizes the activities that have previously been conducted as good operating practices, and is part of the Site effort to improve the Conduct of Operations.

6 Waste Stream Categories and Characterization

Waste to be sent to the Tank Farm shall be characterized sufficiently for LWE to demonstrate that the receiving tank will not exceed the characterization used in the LWF Safety Basis [2]. All sample analyses used to demonstrate compliance with the requirements for flammable species and inhalation dose potential must include the analytical uncertainty of those measurements; the only exception is analyses used to demonstrate compliance with inhalation dose potential requirements of currently approved regular waste streams [36].

Note: LWE will evaluate the waste stream characterization to ensure that any impacts on the Tank Farm Safety Basis are recognized, evaluated and approved. For example, the DSA uses certain inhalation dose potential compositions and inventories (e.g., Ci/gal or rem_{inh}/gal).

Basis

Waste transferred to the F/H Tank Farms must not cause the receiving pump tank or waste tank to exceed the bounding composition allowed in the Safety Basis. As the SRS missions change and evolve, the waste transferred to the Tank Farm may be more variable than historically observed. Similarly, the Safety Basis must be updated periodically as changes occur. Relative to the Safety Basis, the impact of each waste stream on the existing waste tank inventory must be known.

LWE's evaluation (refer to Section 5) uses data for several of the radionuclides included in the waste stream characterization (refer to Section 6.2 and Attachment 14.1). For example, the USQ process (a part of the overall Technical Review process) ensures that the inhalation dose potentials used in the Documented Safety Analysis (DSA) are not exceeded.

6.1 Categories

Three categories of waste streams are defined to determine the characterization and reporting requirements. The three categories are:

- **Regular Waste** (RW) has a consistent composition -- both the species present, and their concentrations, are relatively constant (over time).

  Since a given RW stream has little variation in composition, that characterization is sufficient to evaluate the stream's acceptability. However, a full characterization may be required for new waste streams never received in the tank farms. Reporting the volume of each waste stream transferred is sufficient to allow tracking the receipts (and the waste tank inventories) of each species.

  A RW stream will have a consistent composition over time unless the flowsheet is altered by the generator. The volume of such waste streams may be large and transfers to the Tank Farms may be frequent, helping to minimize the variability in composition. For example, "PUREX low heat process waste" is generated continuously by the production process, and will vary as a function of irradiation time and the timing of a transfer relative to other operations that generate low heat waste (e.g., decontamination waste).

- **Irregular Waste** (IW) has a variable composition -- the concentrations of various species vary within some bounds, but the same species are present (over time).

  Since a given IW stream contains the same species and their concentrations can be bounded, that bounded composition is sufficient to evaluate the stream's acceptability. However, to permit tracking the receipts (and the waste tank inventory), the volume and the composition of each batch or the concentration of a selected "indicator" species must be reported for each transfer.

  An IW stream may be generated frequently or intermittently, but it has a potential for large composition variations. The species in a particular IW may be the same as those present in the RW of that process, but the concentrations vary widely (e.g., from batch to batch). No new species/process chemicals are introduced.

- **Special Waste** (SW) has a highly variable composition -- either different species are present, or their concentrations may vary too widely to be bounded satisfactorily. Special waste may also encompass material that is non-routine (or irregular) and not necessarily waste.

  For SW, species present may have significant variation in composition from batch to batch or the waste may contain constituents that are not present in waste normally received in the Tank Farms. As such, characterization of each batch is required to evaluate the stream's acceptability. Also, the composition and volume of each transfer must be reported in more detail to allow tracking the receipts and waste tank inventory. In this context, the term "transfer" may refer to individual waste transfers, or it may apply to all transfers from a special process campaign. The appropriate scope shall be defined by the generator in the WCP.

  These wastes may be generated as part of special activities such as addition of radioactive liquid chemicals to a waste tank or use of a special cleaning solution, or in a process where the presence of species changes from batch to batch, or from one-time activities (e.g., facility decommissioning and closure).

The key to categorizing a given stream as RW, IW, or SW is the variability in species that are present and their concentrations -- neither the volume of waste nor the transfer frequency is

important.

The generator's WCP will define their streams and assign the appropriate category to each.

6.2 Characterization

Attachment 13.1 shows the species to be characterized, and Attachment 13.2 shows the basis for selecting these species; Attachment 13.4 shows the species to be characterized for influents to Tank 50. Characterization shall be based on a combination of (1) process knowledge and (2) analysis of process samples. When sufficient analyses are available for a species, then they should be used for the characterization. When process knowledge is used for some species and analyses are used for others, then the validity of the process knowledge may be corroborated by following a similar reasoning for the "analyzed" species, and comparing that process knowledge to the sample analyses. The characterization should be presented in terms of concentrations in the waste stream to be transferred to the tank farms.

If the waste contains insoluble solids, then the insoluble solids and supernate phases shall be characterized individually because the Tank Farm and DWPF process these phases separately. Table 1 provides the characterization requirements for influent waste streams to the F/H Tank Farms.

Table 1 Characterization Requirements

Type of Waste Compliance Plan	Complete Characterization	Periodic Characterization
Regular WCP	Required	Required Quarterly
Irregular WCP	Required	Frequency Defined in WCP
Special WCP	Required	Frequency Defined in WCP

Table 1 shows the characterization requirements for all approved waste streams to the tank farm. A complete characterization, as shown in Attachment 13.1 and 13.4 (for Tank 50 influents), is required prior to the approval of any and all waste streams. The periodic characterization, or minimum characterization as defined in Attachment 13.1 and 13.4 (for Tank 50 influents), is required quarterly for all regular waste streams; the frequency of the periodic characterization for all irregular and special waste streams is determined by the agreement obtained in the generator's WCP for that waste stream.

As noted in Section 5, the generator's WCP will document the appropriate characterization bases (both complete and periodic), and will be approved by LWE. As discussed in Section 9, the WCP may take exception to a characterization requirement and provide a defensible rationale and/or alternative.

Changes in a waste stream's characterization are to be approved by revising the WCP.

The quarterly requirement to characterize RW streams may be relaxed if the generators' procedures analyze for major constituents (e.g., isotopes for criticality and inhalation dose, or constituents near downstream facility limits, etc.) in waste streams prior to transfer to LWF.

Additional characterization may be required in order to meet the requirements of section 11.8 of the WAC. Characterization needed to satisfy downstream facility requirements will be required prior

to the approval of the generator's WCP.

Characterization information should be provided within four weeks prior to the planned transfer to the Tank Farm. Transfer information should be provided within two weeks of the transfer or as agreed upon in the WCP.

6.3 Basis

A wide variety of liquid waste is received into the LWF, and based on the definitions in Section 6.1, these wastes are assigned to a category (i.e., RW, IW, or SW).

RW is typically generated by a facility's ongoing/routine operations. **IW** may be generated in a facility as a result of activities used to improve production (e.g., flushing of process vessels). The use of nitric and oxalic acid solutions for cleaning and decontamination is also considered as generation of IW, since the salts of these acids are present in normal waste. Another example of **IW** is dissolution of HEME/HEPA material in the DWPF. Other waste streams may be categorized as **SW** due to their potential for a wide variety of chemical constituents and concentrations. Examples of SW would include the following:

- Acceptance of outside waste streams for processing at the ETP, or the use of special flushing/cleaning agents in all facilities will likely introduce species that are not present in RW streams.
- Miscellaneous streams from the F/H-Canyons could include product solutions, which would require detailed characterization and evaluation before transfer to the Tank Farm.
- The use of different chemicals for experiments or analytical methods within the site laboratory facilities could generate waste in which the species inventory will vary significantly from batch to batch, depending on programs being performed at the time. Note that a lab waste stream could well be considered RW, depending on the consistency in its operations and waste composition (over time).
- Decontamination, decommissioning, and closure of site facilities could generate waste solutions drastically different than routine high level waste. Each batch of these wastes will require evaluation of impact to the Tank Farm, and are categorized as SW.

Characterization of influent waste streams into the Tank Farms must be tracked throughout the LWF. The inclusion of specific species in the characterization is based on requirements discussed in Section 11 (refer to Attachments 13.1 and 13.2). Species that can cause upsets with respect to these requirements must be identified so that a strategy for handling these species can be developed.

7 Liquid Waste Generator Representative (LWGR)

Each organization that transfers waste to the F/H Tank Farms will designate a LWGR (or a lead LWGR and appropriate alternate(s)). The LWGR will be the LWE's point of contact for communications with the generator. Specific duties of the LWGR are listed in Section 5.2.

To provide accurate information on waste transfers, the LWGR must be knowledgeable of all processes and activities in the generator's facility that can affect the quantity and composition of waste. The LWGR must be aware of day-to-day operations or activities that could affect the status of a waste stream. For example, a chemical addition or non-standard operation that results in waste which exceeds the approved characterization requires the waste stream to be characterized before the waste is transferred to the Tank Farm. Note that the generator's WCP can define (and characterize) a given waste stream to allow a range of activities if the composition doesn't vary too widely.

8 Documenting Waste Transfers To The Tank Farms – SB Administrative Control

The waste generators will input characterization and transfer information into the Wisdom Work Group (i.e., WG08, Hlw-wrt) to provide easy tracking. In addition, the generators shall perform an independent verification of data.

When transferring waste to the Tank Farms, generators shall comply with the criteria in Section 5.7.1 of the CSTF DSA (refer to Section 12.10 of this document) [3].

Basis

The Tank Farms SB has an administrative requirement to have a WAC Program to safely receive waste [1,3]. To meet the future processing requirements the characterization and transfer information must be provided in the Wisdom Work Group.

9 Deviations From the WAC Requirements

Programmatic controls shall ensure that waste streams to be received into the LWF (or transferred through the LWF from an outside sender) is within the analyzed isotopic and chemical inventory requirements of the LWF WAC and is performed in accordance with the applicable LWF-approved Waste Compliance Plan (or other approved engineering document). If the material does not meet the WAC requirements, an USQ review (or equivalent) shall be performed and approved by LWF prior to transferring the material [3].

A waste generator may take exception to anything in this WAC (i.e., any deviation can be proposed), and such deviations will be documented in the generator's WCP. In this context, the terms "deviation", "exception", and "exemption" have the same meaning. If the WCP takes exception to a characterization requirement, it shall provide a defensible rationale and/or alternative. As discussed in Section 5, LW's approval of the WCP will thus include any requested deviations. For example, a waste generator might request:

- to deviate from a characterization requirement. For example, an online process density measurement could be substituted for the periodic specific gravity sample analysis, or a facility having highly consistent ratios of NO_3^-, NO_2^-, and OH^- could explain why the periodic sample analysis for these anions is unnecessary.
- to transfer a particular solution that is outside one or more of the specific WAC requirements in Section 11. Depending on the circumstance, a deviation may be possible, particularly for a limited volume of the waste. For example, the existing contents of a waste receipt tank may be "credited" for "blending" the composition of a proposed waste. LW and the waste generator will jointly determine if any additional controls are needed to ensure that the waste can be safely received, managed and eventually processed by DWPF, Saltstone, or ETP. For example, additional mitigating measures or studies may be necessary to receive the waste.

When deviating from the WAC, generators must submit a written request, which must be approved by the Engineering and Operating Manager after a USQ has been performed against the proposed activity and approved by the FOSC. When generators deviate from their Waste Compliance Plan (WCP), a written evaluation must be performed on the proposed activity which must be approved by Engineering and Operations Manager. FOSC approval is not required for WCP deviations that do not impact the WAC. Also, whether a WCP contains a deviation must be clearly identified and summarized in the Introduction and Conclusion. Generators must provide a basis/justification for why a deviation (regardless of whether it is a WAC or WCP deviation) is acceptable in their WCP.

Note that a WAC deviation may also trigger other administrative systems (e.g., Safety Basis change, procedure changes, set point changes).

Basis

Many of the requirements in this WAC are compiled from historical requirements, which already have established administrative systems for approving deviations. The activities that result in the generation of a different waste composition, and the act of receiving that waste into the Tank Farms, fall within the scope of a "Proposed Activity" [2,3], thus, "Technical Review" procedures [2,3] are the most appropriate means of evaluating and approving the transfer of a waste stream with a different composition.

10 Recovery From A Non-Compliance

Immediately, the LWGR is required to inform LWE and Tank Farm Operations verbally and in writing of any requirements which have not been satisfied (e.g., due to a process upset, an inadvertent transfer). In conjunction with LWO and LWEE, LWE will determine the actions to be performed by the Generator before waste can be (or can continue to be) accepted in the LWF.

Note: the PR/STAR, and/or SIRIM procedures will be invoked as appropriate.

Basis

For waste that does not comply with the specific requirements of the WAC, a strategy must be developed for safe management and future processing. The purpose of the criteria is to ensure that all waste received conforms to requirements for interim storage and eventual disposal.

11 Specific Criteria for High Level Liquid Waste Receipts

This WAC identifies chemical and radionuclide requirements and specifications that must be satisfied by the waste generators for waste transfers to the F/H Tank Farms.

Specific requirements detailed below govern the presence and allowable concentrations of several species. They incorporate many safety and regulatory considerations for the safe management and processing of waste within the Tank Farms (e.g. corrosion prevention [4]). Safety Basis (Documented Safety Analysis and Technical Safety Requirements) related requirements are identified by "SB" in the section title. LWE's review of a generator's WCP will evaluate the appropriate implementation of SB identified items. Specifications also result from feed requirements of the downstream processes (e.g., DWPF/Saltstone [5,6], and ETP [7]). Some of the species appear in more than one requirement; however, the most conservative limit is documented below.

11.1 Requirements for Corrosion Prevention

The Tank Farm waste tanks and cooling coils within the tanks are constructed of carbon steel, and are susceptible to nitrate induced stress corrosion cracking, general corrosion and pitting corrosion. To prevent unacceptable rates of corrosion, waste solutions transferred to the Tank Farms must satisfy the following specifications:

11.1.1 Minimum pH of Waste –SB Administrative Control

pH > 9.5

Basis

This is a TSR Administrative Control which requires limits on pH [1, 4]. A minimum pH of 9.5 for influents into the waste tanks was established in the Corrosion Control Program [4]. This requirement also protects the Tank Farm Criticality Safety Basis [8].

Solutions with a pH below 7 cause general corrosion of carbon steel. To prevent general corrosion, solutions transferred to the tanks must have a pH above neutral, and the specification of pH above 9.5 is judged to provide adequate margin to account for error in sampling and analysis. The waste tank corrosion chemistry sampling program corrects for inhibitor depletion (e.g., hydroxide depletion by CO_2 absorption), and also confirms the generator's pH controls and inhibitor additions.

11.1.2 Minimum Inhibitor Contents For all Waste Generators, including DWPF Recycle when Stored Below 40°C – SB Administrative Control

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

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

Basis

The Corrosion Control Program requires limits on OH^-, NO_2^-, and NO_3^- to ensure that the tank chemistry is controlled to minimize corrosion of tank walls, cooling coils and transfer lines [1, 4]:

- The specification for free hydroxide concentration through the entire range of nitrate composition ensures that the alkalinity of the waste is sufficiently high to prevent general corrosion.
- The combination of nitrite and hydroxide as inhibitors provides protection against nitrate induced stress corrosion cracking, which can occur for nitrate concentrations above 1M. The nitrate ion is, by far, the predominant aggressive species. The cracking aggressiveness of solutions increases as the nitrate concentration increases, requiring more corrosion inhibitor be present.
- The concentrations of nitrite and hydroxide provide protection against pitting corrosion, which is the main corrosion mechanism for solutions with nitrate concentrations below 1M in carbon steel tanks. The limits are based on either nitrite or hydroxide acting alone to prevent pitting. No pitting has been observed for a free hydroxide concentration above 1M. Because no data have been developed at lower hydroxide concentrations, the value of 1M is used. For nitrite inhibition, the minimum concentration was developed from the amount of nitrite needed at a minimum hydroxide concentration. The nitrite concentration specified in the limit was determined for a waste temperature of 40°C. Waste temperature in uncooled tanks in which dilute waste is stored has been observed to only reach about 30-32°C during

the summer months.

The waste tank corrosion chemistry sampling program corrects for inhibitor depletion (e.g., hydroxide depletion by CO_2 absorption), and also confirms the generator's pH controls and inhibitor additions.

DWPF recycle waste may use the limits given above as long as the receipt tank's supernate temperature is not greater than 40°C. These limits may also be used for a receipt tank that will have a resulting nitrate concentration greater than 1 M [37].

11.1.3 Minimum Inhibitor Contents For Waste Generated by DWPF when Stored at Temperatures in Excess of 40°C – SB Administrative Control

For $[NO_3^-] \geq 1.0$ M:		follow Section 11.1.2
For $0.1\ M \leq [NO_3^-] < 1.0$ M:		$[OH^-] \geq 1.0$ M
For $0.01\ M \leq [NO_3^-] < 0.1$ M:		$[OH^-] \geq 0.5$ M
	and	$[NO_2^-] \geq 3.17 * [NO_3^-] - 0.0192$
For $[NO_3^-] < 0.01$ M:		$[OH^-] \geq 0.5$ M
	and	$[NO_2^-] \geq 0.0013$

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

Basis

The Corrosion Control Program requires limits on OH^-, NO_2^-, and NO_3^- to ensure that the tank chemistry is controlled to minimize corrosion of tank walls and transfer lines [1, 4]. This requirement is based on analytical experiments with simulated DWPF recycle waste [9,10,11] as well as an evaluation of the temperature dependence of inhibitor limits [37]. 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 Tank Farm (e.g., Tank 43) in ~8,000 gal batches. The nitrate concentration is expected to vary widely, up to a concentration of 1M. The specified concentrations of inhibitors will provide adequate protection for the composite recycle stream. The waste tank corrosion chemistry sampling program corrects for inhibitor depletion (e.g., hydroxide depletion by CO_2 absorption), and also confirms the generator's pH controls and inhibitor additions.

11.1.4 Maximum Concentrations of Corrosive Species – SB Administrative Control

The waste's 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.

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 [4]. The maximum chloride and sulfate concentrations reflect the maximum concentrations found in the Tank Farm [12]. The Tank Farm's satisfactory operating history demonstrates that the inhibitor levels specified in Section 11.1.2 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. Fluoride is used in the Separations processes to promote dissolution. The specification is based on corrosion tests for dilute waste solutions (i.e., nitrate concentration < 1.0 M) inhibited with nitrite. The maximum fluoride concentration tested was 0.086 M, and the inhibitor levels specified in Section 11.1.2 for [NO_3^-] less than 1 M were found to prevent corrosion [13].

The maximum nitrate concentration is a Corrosion Control Program limit [4]. This limit prevents addition of waste outside of the range of nitrate concentration for which corrosion inhibitor requirements have been developed.

11.2 Requirements To Prevent Accumulation of Flammable Species

All sample results reported to demonstrate compliance with the requirements to prevent accumulation of flammable species (either organic content or hydrogen generation rate) must include the analytical uncertainty, and the uncertainty must be used in any subsequent calculations based on those results [36]. If evaporation and decantation is credited for organic vapor control rather than sample analyses, sample uncertainty is not required for any organic analysis.

11.2.1 Organic Vapor Control – SB

Prior to waste streams entering the LWF, the waste stream shall be evaluated and shown to have less than, or equal to, a 5 % organic contribution to the hydrogen LFL at 100°C [3]. This includes volatile organics as well as ammonia. Although the Tank Farm DSA calculates LFL values at 100°C in the pump tank (so reliance on temperature controls is not needed), generators are still required to transfer waste at no greater than 70°C. Meeting the WAC requirement will require WAC restrictions on generators with the nature and extent of the restriction varying by waste stream. For example, requiring that non-Process Vessel Ventilation (PVV) transfers from the Canyons undergo decanting and evaporation may be sufficient to ensure the 5 % limit is met for a given stream [3,14]. Also, no new sources of flammable material may be added to the waste stream after it has been evaporated and decanted. Waste shall only be excluded from these decanting and evaporation requirements if prior process knowledge has shown it to contain only trace organics (< 5 % hydrogen LFL) without evaporation or an evaluation is performed to ensure the 5% limit is not exceeded. A semi-annual sample for volatile/semi-volatile organics will provide analytical assurance that the organic content of the waste stream will contribute less than 5% hydrogen LFL. Other senders (e.g., Defense Waste Processing Facility (DWPF)) may require limits on the waste stream constituents (e.g., toluene, ammonia).

Canyon PVV flushes may exceed the 5 % limit and be transferred into the Tank Farm if they are evaluated and shown to have:

- Less than, or equal to, a 20 % organic contribution to the hydrogen LFL in receipt pump tank (at 100°C), and [3]
- Less than, or equal to, a 5 % organic contribution to the hydrogen LFL in locations downstream of the receipt pump tank (at 100°C) [3].

The evaluation of effects downstream of the receipt pump tank may take credit for actual facility conditions in showing the organic contribution to the hydrogen LFL is less than, or equal to, 5 %. The required purge flow of receipt pump tanks for transfers exceeding a 5 % organic contribution (up to a 20 % organic contribution) is adjusted to account for the

additional contribution of the organics. To transition the flow requirement back to the non-PVV flow requirement, sufficient pump tank flushes shall be performed to reduce the organic contribution to the hydrogen LFL to less than or equal to 5 % (at 100°C) [3]. The number of flushes required shall be determined on a case by case basis by an engineering evaluation of the organic concentrations required to meet the 5 % limit.

Basis

"Organics" as used in the DSA is defined as flammable vapors other than hydrogen contributing to the LFL, including both organic vapors and other flammable vapors. Because of this WAC requirement, the flammability contribution of organics in LWF locations can be considered bounded by 5 % of the hydrogen LFL without reliance on any temperature controls. The energy contribution of organics to an explosion is accounted for by adding an extra 0.96 vol. % H_2 to the calculated H_2 volume.

Volatile species, both organic (e.g., butanol) and inorganic (e.g., ammonia), can be "driven" from solution by the presence of dissolved salts at high pH. Most of the waste already in the Tank Farms contains higher salt concentrations than the fresh waste streams, so mixing the solutions can force the volatile species into the waste tank vapor space. A limit is required to ensure that the pump tank and waste tank vapor space does not exceed 5% of the hydrogen LFL (except for PVV flushes) under liquid-vapor equilibrium conditions. This excludes the hydrogen generation.

For example, consider a waste stream that has a particular temperature and salt content. The stream's allowable butanol content is limited such that its equilibrium vapor is <5% of the hydrogen LFL. When the waste goes to a pump tank, normal H&V system operation will ensure that the pump tank's actual vapor has a much lower %LFL. Furthermore, consider that the waste then goes to a Tank Farm receipt tank which has a temperature (and/or salt content) that is higher than the fresh waste and an organic content that is lower than the fresh waste. In this case, the organic content of the fresh waste will be diluted (tending to reduce the receipt tank's resulting vapor %LFL), but the temperature and salt effects will tend to increase the vapor %LFL. The receipt tank's actual vapor % LFL will depend on which effect dominates, along with the effect of the tank's H&V flow.

<u>Restrictions for DWPF Transfers</u>

The concentration of toluene and ammonia in DWPF's RCT waste stream must be limited to the following in order to restrict the organic contribution to the hydrogen LFL to ≤ 5% at 100°C in the pump tank: [14]

Toluene: ≤ 7.0 grams/5,000 gallons of DWPF recycle
Ammonia: ≤ 60 mg/L in waste tank

Basis

LWF credits the ammonia in waste tanks being lower due to evaporative losses. 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 waste tank. The ammonia must be re-evaluated prior to sending subsequent sludge batches.

Only occasionally, a few grams of methanol are included in a DWPF recycle batch. Even the maximum amount of methanol that is transferred from DWPF does not contribute to increasing

the hydrogen LFL in waste tanks [14]. Thus, the impact of methanol in waste tanks is negligible and, therefore, ignored.

11.2.2 Hydrogen Generation rate – SB Administrative Control

The Liquid Waste Generators (LWG) must ensure that the hydrogen generation from radiolysis for **influent sludge slurry waste streams** is below 1.5E-5 ft^3 of hydrogen/hr/gallon [3]. The bounding hydrogen generation rate for intended transfers into Type IV waste tanks (i. e. DWPF recycle) shall be less than or equal to 2.6E-6 ft^3/hr/gal [3]. The hydrogen generation limit for transfers into Type IV waste tanks is imposed on the **waste tank**, rather than the influent waste stream. In addition, generators must ensure that they meet the hydrogen generation rate limit for transfers into evaporator feed tanks of 9.6E-6 ft^3/hr/gal [3].

The hydrogen generation rate shall be calculated using the following formulas: [15]

For alpha particles:

$$R_{\alpha} = 134.7 - 82.3 * \left[NO_{eff}^{-}\right]^{1/3} - 13.6 * \left[NO_{eff}^{-}\right]^{2/3} + 11.8 * \left[NO_{eff}^{-}\right]$$

where $\left[NO_{eff}^{-}\right] = \left[NO_3^{-}\right] + 0.5 * \left[NO_2^{-}\right]$

For beta/gamma:

$$R_{\beta/\gamma} = 48.36 - 52.78 * \left[NO_{eff}^{-}\right]^{1/3} + 14.1 * \left[NO_{eff}^{-}\right]^{2/3} + 0.572 * \left[NO_{eff}^{-}\right]$$

where R is expressed as ft^3 $H_2/10^6$ Btu. The hydrogen generation rate should be expressed as ft^3 H_2/hr/gal. Significant hydrogen generated from any other mechanism (e.g., chemical) shall be accounted for.

Basis

Hydrogen generated from radiolysis is limited to 1.5E-5 ft^3 hydrogen/hr/gallon (or 2.6E-6 ft^3 hydrogen/hr/gallon for transfers into Type IV waste tanks) to ensure adequate time is provided to tank farm operations to re-initiate pump tank ventilation [3]. In addition, generators who transfer waste to an evaporator feed tank (i.e., Tanks 43 and 26) are limited to 9.6E-6 ft^3 hydrogen/hr/gallon in order to comply with the DSA limit for evaporator bottoms [3]. This will ensure that limit is met.

In the absence of purge ventilation, leakage, or other mitigating factors, hydrogen and organic vapor may accumulate in the vapor space of F- and H-Area Tank Farm waste tanks and pump tanks. To prevent the composite gas/vapor from reaching 100% hydrogen LFL (which is 4% of the vapor space volume for the case of hydrogen, alone), administrative controls must be used to monitor the potential hydrogen and organic vapor buildup [3]

Using empirical data relating the volumetric rate of hydrogen generated to the nitrate and nitrite concentration and decay heat present, estimates can be made of the time required to reach LFL (TLFL) due to hydrogen accumulation for each waste tank and pump tank in F- and H-Area Tank Farms [3].

11.3 Prevent Formation of Shock Sensitive Compounds

No waste containing silver shall be transferred into the Tank Farm.

Note: this specification does not prohibit silver present as a fission product, or a minimal quantity of silver present as a result of laboratory and/or analytical methods, or if the quantity received is evaluated to have no impact on the tank farm.

Basis

This requirement is based on administrative controls [16] resulting from previous transfers of silver-laden flush water from the F/H-Canyons. In 1970, popping noises were heard when dried waste deposits in the Tank 21 feed-jet enclosure and the 242-H Evaporator cell were disturbed by personnel and/or equipment. Investigation of the incident revealed that silver was present in the waste feeding the evaporator, and likely formed silver nitride, a shock sensitive compound [17,18]. The silver was present due to flushes of the silver coated Berl saddles used in the canyons to remove radioiodine. After an administrative control prohibiting such flushes was implemented in the Canyons, no similar incidents have been observed.

11.4 Requirements for Radionuclide Content for Waste Receipts

All sample results reported to demonstrate compliance with the requirements for inhalation dose potential must include the analytical uncertainty, with the exception of approved regular waste streams, and the uncertainty must be used in any subsequent calculations based on those results [36].

11.4.1 Receipt Inhalation Dose Potential Criteria for Slurried Type IV Waste Tanks- SB Administrative

Transfers into slurried Type IV tanks may not cause the tank waste limit for the material at risk of 1.0E+07 rem_{inh}/gallon for any slurried Type IV waste tank to be exceeded [3]. This limit is imposed on the waste tank not on the influent waste stream; however, the generator must still provide the IDP of the influent waste. In addition, generators shall use ICRP Publication 68/72 for dose conversion factors as was used in developing the Tank Farm DSA.

Basis

The 1.0E+07 rem_{inh}/gallon requirement is from the CSTF Documented Safety Analysis and Technical Safety Requirements. Type IV waste tanks are assumed to contain material at risk which has a slurry dose potential bounded by 1.0E+07 rem_{inh}/gallon at the normal operating capacity [3].

11.4.2 Receipt Inhalation Dose Potential Criteria for non-Type IV Waste Tanks – SB Administrative

The waste stream composite (solids and liquids) dose potential concentration must be less than 1.5E+09 rem_{inh}/gallon to be received in the Tank Farm [3]. This limit is imposed on the influent waste stream. Generators shall use ICRP Publication 68/72 for dose conversion factors as was used in developing the Tank Farm DSA. In addition, waste transfers may be categorized as "High-Rem" or "Low-Rem" transfers. High-Rem waste transfers have an inhalation dose potential of greater than 2.0E+08 rem/gallon, while Low-Rem transfers have an inhalation dose potential of less than, or equal to, 2.0E+08 rem/gal [3]. It is assumed in the DSA that all Canyon transfers are Low-Rem, and thus, must remain as such. Low-Rem transfers that exceed 9.8E+07 rem/gal (bounding supernate) require flushing to reduce amounts in pump tanks to less than residual quantities [3]. Any transfer which has an IDP above 9.8E+07 rem/gallon shall be

considered a sludge-slurry transfer and shall be labeled as such in the generators' WCP. Sludge-slurry transfers require special flushing procedures in order to be transferred to the Tank Farm. In addition, all generators must identify in their WCP's whether a given waste stream is considered to be a High-Rem or Low-Rem transfer. In order to make a High-Rem transfer, generators must submit a special WCP.

Material transferred into the 2H and 2F evaporator feed tanks (i.e., Tanks 43H and 26F) shall not cause the evaporator bottom IDP of 3.3E+07 rem/gallon to be exceeded [3].

Material transferred into Tank 50 (Saltstone feed) shall not have an inhalation dose potential greater than 2.8 E+05 rem/gal [19].

Basis

These requirements are mitigative measures to ensure that the consequences of explosion events are bounded by the current DSA accident analysis and to ensure no additional safety basis controls are necessary [3, 19].

Accident analyses of liquid waste with a dose potential concentration above this concentration (1.5E+09 rem_{inh}/gallon) have not been performed; therefore, acceptance of a liquid waste above the dose potential concentration limit would require a USQ to be completed and could require an SB change.

11.5 Requirements for Regulatory Compliance (RCRA, TCLP)

A wastewater permit modification may be necessary for process changes within the scope of this WAC. The LW Waste Characterization Group is responsible for requesting guidance from the Environmental Compliance Group to determine if proposed changes require a wastewater permit modification.

No RCRA hazardous "listed" waste will be received in the Tank Farm.

Except for the following, waste received in the Tank Farms must be below the RCRA TCLP toxic "characteristic" concentration limits [20]. The "Mixed Waste Site Treatment Plan" [21] lists the species that are allowed to exceed the TCLP criteria:

Characteristic	TCLP Code [20]
Corrosivity	D002
Ba	D005
Cr	D007
Pb	D008
Hg	D009
Ag	D011 (except refer to Section 11.3 limitation)
Benzene	D018

Transfers into the Tank Farm will also be evaluated for the emissions of radiological and non-radiological air pollutants to South Carolina Department of Health and Environmental Control (SCDHEC) regulations. Upon request, the LWGR agrees to assist the LWEE in resolving any characterization of waste issues to permit the timely evaluation of any air emissions impacts.

Basis

The LWF Tank Farms are permitted by SCDHEC for operation as an Industrial Wastewater

Treatment Facility [22]. Waste stream composition must be controlled to ensure that the Wastewater and all other applicable Tank Farm permits are met. Similarly, waste composition must be controlled to ensure that permits of downstream processing facilities and site-level permits are not affected, including the generation of secondary waste from activities within the Tank Farm.

A prohibition on RCRA "listed" wastes (ref: 40 CFR 261) is imposed to ensure that any waste received into the Tank Farms can be processed by DWPF, Saltstone and the ETP; and that solid wastes generated from LWF operations can be properly disposed of in the SWDF. All waste will eventually be processed through these facilities, and the respective regulatory permits require final waste forms be non-hazardous (e.g., high-level waste glass, saltstone, and ETP's treated effluent). The EPA and SCDHEC regulations specify that anything "derived from" (e.g., mixed with) a "listed" hazardous waste are also considered "listed" hazardous wastes (unless the difficult process of "de-listing" is accomplished). Thus "listed" wastes are excluded from the Tank Farms to prevent creating hazardous products in DWPF, Saltstone, and ETP. There are some exemptions whereby the use of chemicals on the RCRA lists does not cause the waste to be "listed". If the waste generator uses such chemicals, then the WCP must include the WSRC Environmental Protection Department's written concurrence that the specific use does not cause the waste to be "listed". For example, if particular chemical were used in the production process, then that waste would be "listed". However, if that same chemical is used in a laboratory analysis and the lab waste meets certain other requirements, then the lab waste stream would not be "listed".

The LWF tanks are part of the site wide Part 70 Air Quality Permit application currently with SCDHEC for review and issuance of a comprehensive Air Quality permit. Air emissions from the introduction of any new waste stream into the LWF Tank Farm system must be in compliance with the application.

The "Mixed Waste Site Treatment Plan" [21] lists the RCRA constituents that are currently found in the Tank Farms at concentrations greater than the TCLP limits. New constituents could be added to the plan (and then to the "acceptable" list in this WAC) if the new constituents are shown to be compatible with the treatment plan and applicable permits.

11.6 Requirements for Criticality Safety - SB

Waste received in the Tank Farm shall be inherently safe with respect to criticality for any concentration and mass in the uncontrolled geometry of the waste tanks. Table 2 provides the required weight ratio of a single neutron poison to equivalent U-235 and Pu-239 to ensure the waste is inherently safe. To determine the equivalent U-235 for sludge slurries (applicable for all poisons), use the appropriate equivalency factor (EF) from Table 2 (i. e. Equivalent U-235 = U-235 + EF (Pu-239+Pu-241)) [23,24]. Waste transfers that contain U-233 should be considered Pu-239.

If multiple neutron poisons are present in the waste stream, additional safe weight ratios for multiple neutron poisons can be evaluated for use. Alternatively, equations 1- 4 show the single and multiple weight ratios for neutron poisons to U-235 and Pu-239 for mixed fissile waste streams. Equations 1-4 do not use equivalency factors of any kind (i.e., single fissile isotopes are used). Equations 1-4 only apply to Canyon transfers and shall not be applied to poison DWPF waste streams.

Table 2 Safe Weight Ratios for Neutron Poisons to Equivalent U-235 and Pu-239

Single Neutron Poison	Required Weight Ratio to Equivalent U-235	Required Weight Ratio to Equivalent Pu-239	Equivalency Factor Pu-239 to U-235	Reference
Fe	72	160	2.25	[23]
Mn	14	29	2.07	[23]
U-238	103	-	1.6 [24]	[25]

Single and Multiple Safe Weight Ratios for Neutron Poisons to Equivalent U-235

For Fe Addition:
Equation 1: [Fe: U-235] = (-5.8* [Mn: U-235]) + 70 – [known Fe: U-235] [23]

For Mn Addition:
Equation 2: [Mn: U-235] = (-0.17* [Fe: U-235]) + 12 – [known Mn: U-235] [23]

Single and Multiple Safe Weight Ratios for Neutron Poisons to Equivalent Pu-239

For Fe Addition:
Equation 3: [Fe: Pu-239] = (-5.7* [Mn: Pu-239]) + 160 – [known Fe: Pu-239] [23]

For Mn Addition:
Equation 4: [Mn: Pu-239] = (-0.17* [Fe: Pu-239]) + 28 – [known Mn: Pu-239] [23]

Notes

1. Under certain circumstances when a waste stream can be demonstrated to only contain <15 g of fissile material a deviation to adding neutron poisons may be possible [26].
2. An equivalency factor of 2.25, 2.07, or 1.6 should be applied to (Pu-239 + Pu-241) to determine the equivalent U-235 mass when poisoning with Fe, Mn, and U-238, respectively [23,24]. Equivalency factors shall not be used in Equations 1-4.
3. The generator's WCP document shall demonstrate that criticality is not a concern. If the fresh waste is a slurry, then the settled sludge phase (i.e., the concentrated insoluble phase) must also be demonstrated to be safe.
4. LWE will evaluate the waste stream characterization for downstream processing impacts (e.g., aluminum dissolution in ESP, concentrated supernate and salt cake produced by evaporation).
5. The solubility of fissile material and neutron poisons is low in supernate due to the alkaline chemistry maintained in the waste tanks. The fissionable material along with the chemical compounds tends to settle to the bottom of the waste tank to form a sludge layer. Therefore, supernate is critically safe in the uncontrolled geometry of the waste tanks. Therefore for supernate, there is no requirement to report the weight ratios of neutron poisons to equivalent U-235.
6. H-Canyon shall limit their transfers to contain less than a fissile mass unit (U-235 eq. ≤ 624 grams, Pu-239 eq. ≤ 390 grams) per batch or less [27]. F-Canyon shall limit their transfers to contain less than a 450 grams equivalent Pu-239 per batch or less [28]. A special WCP must be submitted and approved to transfer more than a fissile mass unit per batch.

In addition, transfers into Tank 50 must contain no more than 16.5 mg/L U-235 (25 mg/L of total Uranium at an enrichment of 66%) and 1.68 mg/L Pu-239 [40]. These restrictions on Tank 50 are to protect the Tank 50 Valve Box NCSE (Reference 40).

Basis (Reference 3).

The waste tank sludge inventory at SRS has a low fissile material concentration, low areal density of fissile material, and an abundance of neutron absorbing diluents in the sludge matrix. Each of these three properties contributes to demonstrating that sludge is inherently safe. The fissile

material is distributed in a large volume, over a large surface and co-exists with other waste materials that are effective neutron absorbers. To describe the criticality safety margin associated with the SRS sludge inventory, the use of safety parameters is required. Because sludge is a variable mixture of insoluble solids with varying elemental compositions, calculating safe fissile material concentrations for specific sludges is tedious. Because of the low fissile material concentrations, the neutron absorber to fissile material ratios are high resulting in sludge being an inherently safe mixture. The criticality safety margin demonstrated in the waste tank's low areal densities is supplemented by an abundance of neutron absorbers. Three consistently abundant neutron-absorbing elements, for which safe weight ratios to (Pu-239 + Pu-241) and U-235 have been calculated, are iron, chromium, and manganese. In addition to the iron, chromium, and manganese, safe ratios of (Pu-239 + Pu-241) and U-238 have been determined if the U-235 content of the uranium is at or below that found in 0.96 wt. % uranium. This latter safety parameter is very useful in describing criticality safety in waste tanks that received large amounts of depleted uranium, like that found in PUREX waste. Demonstrating criticality safety based solely on the presence of one or two sludge diluents, while neglecting the presence of other neutron absorbing diluents indicates a large margin of safety. This margin of safety is demonstrated independently of the physical distribution of the fissile material in the waste tanks.

LWE's evaluation (refer to Section 5) will utilize data for several of the species included in the waste stream characterization (refer to Section 6.2 and Attachment 14.1).

11.6.1 Uranium Enrichment in 2H Evaporator System (includes Tanks 38 and 43)

LWF shall isolate Tank 43H (feed tank) and Tank 38H (drop tank) from all tank transfers within the Tank Farm. Acceptable external transfers that may proceed directly into Tank 43 or Tank 38 are:

- batches from DWPF recycle ≤ 0.7 % U-235 (must re-evaluate enrichment upon changing sludge batches) [29,34]
- H-Canyon GPE transfers < 15 g U-235 per transfer [29,34]
- H-Canyon GPE transfers shall not exceed 120 g per calendar month [29,34]

Basis

Currently, the GPE sends ~ 8 batches of waste per month. The GPE transfers will be limited to < 15 grams of equivalent U-235 per batch, to ensure that Tank 43 meets its target enrichment of 0.7% U-235. This enrichment value of 0.7% coincides with the amount of enriched uranium which is sent to Liquid Waste from DWPF and is limited to ensure that the U-235 enrichment of 1.1% is not exceeded in the evaporator [29]. The large volumes of DWPF transfers with enrichments < 0.7% will be the driving force that maintains the low enrichment in Tank 43 [29]. After changing sludge batches, DWPF must confirm to LWF that a U-235 enrichment of 0.7% is not exceeded. DWPF will satisfy this requirement by requiring that the sludge fed from the Tank Farm to DWPF have an enrichment of < 0.7%.

11.7 Requirements to Protect Heat Generation Rate – SB

The Tank Farm DSA requires that the waste tanks in the facility contain waste with a heat generation rate less than 8.0E+05 BTU/hr, and the pump tanks in the facility contain waste with less than 2.1E+04 BTU/hr. This requirement has been determined to be bounding for all incoming waste streams, so no additional controls are necessary.

Basis

The bases for the heat generation rates listed in the DSA and historical information shows that these limits are bounding and need no further controls [35].

11.8 Requirements to Satisfy Downstream Facility Acceptance Criteria

Waste received in the Tank Farm shall be characterized sufficiently for LWE to demonstrate that the Tank Farm's ability to meet various acceptance criteria imposed by the downstream processing and disposal facilities will not be impaired.

For waste being transferred to Tank 50, all radiological and chemical constituents listed in Attachment 13.4 must be described in the characterization. Only waste from ETP, rainwater from sumps, and Low Level Waste from H-Canyon may be transferred into Tank 50. Sample results or process knowledge may be used to determine the concentration of these constituents contained in a waste stream, but a value for all of the constituents must be given. This information is used to demonstrate continual compliance with the Saltstone requirements. Additional sample analyses may be required by the Tank Farm if such samples are deemed necessary to ensure the accuracy of the Tank 50 Material Balance. In addition, the waste generator must ensure that no waste that is hazardous or that will produce solid saltstone classified as TRU or HLW waste is transferred to Tank 50.

Note: The complete characterization required by Sections 6.1 and 6.2 and Attachment 13.1 meets the WAC requirement to protect downstream facilities, except when the receipt tank is Tank 50; in this case, additional analysis must be done as described in Attachment 13.4.

Note: LWE will evaluate the waste stream characterization to ensure that any impacts on downstream facilities are recognized, evaluated and approved.

Basis

All waste sent to the Tank Farms eventually goes to "downstream" treatment and disposal facilities. Waste, which is sent to the Tank Farms, must be compatible with various acceptance criteria imposed by those facilities. Each individual transfer or waste stream sent to the Tank Farm does not need to meet each of the downstream acceptance criteria (except for influents to Tank 50 – see paragraph below), but a given stream must not prevent the Tank Farm from meeting those criteria:

- DWPF, Saltstone [5,39], and ETP's requirements (e.g., H-3) [7],
- SWDF's Waste Acceptance Criteria (e.g., solid low level waste characterization, B-25 tornado accident) [30],
- Tank Farm Evaporators (e.g., evaporator IDH 3.3E+07 rem/gallon for 2H and 2F),
- Tank Farm Waste Tanks and pump tanks heat generation,
- Single Contained transfer lines (< 0.05 Ci/gal), and
- Tank Farm Vamp detection during "High-Rem" transfers (e.g., IDP limits, area radiation monitors spill detection (i.e., 1 Ci/gal Cs-137))

A material balance is being kept for constituents going into Tank 50. The constituents needed to maintain this material balance are given in Attachment 13.4. All influent streams into Tank 50 must either meet the Saltstone limits [39] directly, or a deviation request must be made. The approval of the deviation request by Saltstone shall be required prior to the approval of the waste

generator's WCP to Tank 50.

11.9 Industrial Hygiene Safety

Personnel protection issues shall be discussed in the WCP. Additional Health and Safety Information shall be provided for all new chemicals contained in radioactive solutions which are introduced into the facility. In the DSA, the Chemical Inventory Program provides control over NEW chemicals entering the facility. MSDSs are governed at a site level program.

Basis

Liquid waste received into the tank farm could expose Tank Farm personnel to chemical hazards at concentrations above the Occupation Safety and Health Administration (OSHA) limits. Chemical constituents that present a hazard should be identified, and the OSHA permissible exposure limits stated.

Consideration on the chemical constituent behavior under the Tank Farm conditions should be addressed. For example, ammonium has a low vapor pressure in acidic solutions; however, under the alkaline tank farm conditions the ammonium is converted to ammonia and is evolved into the vapor space of waste tanks and pump tanks. Venting ammonia could expose personnel to concentrations above OSHA limits, depending on the individual facilities ventilation system and atmospheric conditions.

11.10 Tanker Trailer Waste Receipt Criteria

The following requirements must be met for tanker trailer waste receipts into the Tank Farm.

1. identification number of each tanker
2. volume of material in each tanker
3. any material heel shall be evaluated for potential impacts to subsequent deliveries
4. comply with requirements of 5Q1.1 for radiation and contamination control
5. completion of Transfer Report Form (if needed) as agreed to in the WCP
6. inhalation dose potential must be provided to LWF (in WCP) for review

11.11 Transfer Requirements of Radioactive Waste into the Tank Farm – SB

The following interface control requirements require TSR/OSR controls within the appropriate waste sender's Safety Basis to protect the safety analysis assumptions [3].

1. Notification shall be provided to the LWF Shift Manager prior to intended transfer.
2. The ability to secure the prime mover of a transfer shall be required.
3. When transferring material to the LWF with an inhalation dose potential greater than 2.0E+08 rem/gal, leak detection with control room alarm shall be operable within the LDBs (leak detection box) associated with the transfer path.
4. Transfer into the LWF shall be secured as a result of a tornado warning, tornado watch, or high wind warning for the LWF as issued by the SRS Operations Center. Transfers into the LWF shall also be secured following a seismic event.

5. For evolutions not intended for the LWF, double isolation shall be required. Where double valve isolation is not possible, notification shall be given to the LWF Shift Manager of the potential for an unintended waste transfer prior to the intended transfer.
6. Notification shall be given to the LWF Shift Manager prior to performing excavations potentially affecting LWF transfer lines.

12 Records

Records and documentation generated as a result of the WAC and WCP will be maintained by LWE (e.g., procedure WM-QI-1171 "Records Management" in manual SW6) and by the individual Waste Generators (per their Division's Record Retention Schedule "RIDS").

Documentation of characterization and analytical information, and a monthly summary of all waste transfer volumes, is to be provided under written correspondence to LWE. Refer to Sections 6.2.

13 Attachments

Attachment
13.1
Species To Be Included In Waste Characterization

(Refer to Section 6.2)

Minimum Characterization* consists of:

Anion	Miscellaneous	Radionuclide
NO_3^-	pH	total-α
NO_2^-	Specific Gravity	total-β/γ
free OH^-		**gamma PHA for:**
		^{60}Co
		^{106}Ru
		^{125}Sb
		^{137}Cs
		^{154}Eu

Complete Characterization** consists of the Minimum Characterization plus:

Anion	Cation	Organic & Miscellaneous	Radionuclide
AlO_2^-	Ag	Total Organic Carbon	^{3}H
$CO_3^=$	Al	any known volatiles >20 mg/L	^{14}C
$C_2O_4^=$	As	Total Insoluble Solids	^{59}Ni
Cl^-	B	Total Dissolved Solids	^{63}Ni
F^-	Ba	any known chelating agents	^{79}Se
PO_4^{-3}	Cd	any known chemicals >0.1 M	$^{89,90}Sr$
$SO_4^=$	Cr	Volatile/semi-volatile organics	^{94}Nb
	Cu	**facilities using TBP:**	^{99}Tc
	Fe	n-butanol	^{126}Sn
	Hg		^{129}I
	K^+		^{134}Cs
	Mn		^{144}Ce
	Na^+		^{147}Pm
	NH_4^+		U isotopics & total
	Pb		Pu isotopics & total
	Se		^{237}Np
	Si		Am isotopics & total
	Ti		Cm isotopics & total
			any known isotope >1 Ci%

Note: **If the waste contains insoluble solids, then the sludge and supernate phases are to be characterized individually.**

*** The Minimum Characterization of Tank 50 influents is found in Attachment 13.4.**
**** The Complete Characterization of Tank 50 influents is found in Attachment 13.4.**

Attachment
13.2
Basis For Including Particular Species In The Waste Characterization

(Refer to Sections 6.2, and 11 and table on following page)

	species to be characterized "Minimum"	"Complete"	# of refs	prevent corrosion 12.1	flammable/ explosive 12.2/12.3	radionuclide content 12.4	regulatory compliance 12.5	criticality controls 12.6	Safety Basis 12	ETF acceptance 12.7	DWPF Design Bases 12.7	Saltstone WAC 12.7	SWDF WAC 12.7	other CbI needs ----
Anions	NO2	NO2	5	x					x	x	x	x		
	NO3	NO3	5	x					x	x	x	x		
	free OH	free OH	4	x					x		x	x		
		AlO2	2							x		x		
		CO3	3							x	x	x		
		C2O4	2							x		x		
		Cl	5	x					x	x	x	x		
		Si	1											x
		F	4	x						x	x	x		
		PO4	3							x	x	x		
		SO4	5	x					x	x	x	x		
Cation		Ag	5		x		x			x		x	x	
		Al	1								x			
		As	4				x			x		x	x	
		B	2							x	x			
		Ba	4				x			x		x	x	
		Cd	4				x			x		x	x	
		Cr	7				x	x	x	x	x	x	x	
		Cu	2							x	x			
		Fe	3					x	x		x			
		Hg	5				x			x	x	x	x	
		K	2							x	x			
		Mn	4					x	x	x	x			
		Na	2							x				x
		NH4	3		x				x	x				
		Pb	4				x			x		x	x	
		Se	4				x			x		x	x	
		Ti	1								x			
Organics & Misc	volatile/semi-volatile organics		2		x				x					
	pH		4	x					x	x		x		
	specific gravity		1											x
	total organic carbon		2							x				x
	known volit organics >20 mg/L		6		x				x	x	x	x	x	
	total insoluble solids		1									x		
	total dissolved solids		1											x
	known chelating agents		2									x	x	
	known chemicals >0.1M		1									x		
	TBP users: n-butanol		4		x				x	x		x		
Radionuclides	total-ß/γ	total-ß/γ	3			x				x		x		
	total-α	total-α	3			x				x		x		
	Co-60	Co-60	4							x	x	x	x	
	Ru-106	Ru-106	4						x	x	x	x		
	Sb-125	Sb-125	2							x		x		
	Cs-137	Cs-137	6			x			x	x	x	x	x	
	Eu-154	Eu-154	3							x	x	x		
		H-3	4			x				x		x	x	
		C-14	3							x		x	x	
		Ni-59	3							x		x	x	
		Ni-63	2							x		x		
		Se-79	3							x		x	x	
		Sr-89/90	5						x	x	x	x	x	
		Nb-94	2							x		x		
		Tc-99	3							x		x	x	
		Sn-126	3							x		x	x	
		I-129	3							x		x	x	
		Cs-134	3							x	x		x	
		Ce-144	1								x			
		Pm-147	1								x			
	U isotopics & total		5			x		x	x		x		x	
	Pu isotopics & total		7			x		x	x	x	x	x	x	
		Np-237	4			x				x		x	x	
	Am isotopics & total		4			x		x	x				x	
	Cm isotopics & total		4			x		x			x		x	
	other known isotopes >1 Ci %		3			x						x	x	

Attachment
13.3
Example Documentation of Waste Transfer Summary
(Refer to Section 8)

MM/DD/YY

doc#-XYZ-yy-nnnn

To: LW engineering

cc: LW operations

From: Waste Generator XYZ

XYZ Facility Waste Transfers To LW Tank Farms: mm/dd/yy - mm/dd/yy

This summary of waste transfers is provided in accordance with Section 8 of the Tank Farm Waste Acceptance Criteria and the XYZ facility Waste Compliance Program (ref its doc-#):

	Date	Volume, gal	species, average concentration, units		
transfers of Regular Wastes (RW):					
stream XYZ-RW-1		_____	refer to WCP for stream 1		
stream XYZ-RW-2c		_____	refer to WCP for stream 2, rev-c		
stream XYZ-RW-3a		_____	refer to WCP for stream 3, rev-a		
transfers of Irregular Wastes (IW):					
stream XYZ-IW-1		_____	___	___	___
			___	___	___
stream XYZ-IW-4		_____	___	___	___
			___	___	___
			___	___	___
			___	___	___
stream XYZ-IW-6a		_____	___	___	___
			___	___	___
			___	___	___
transfers of Special Wastes (SW):					
stream XYZ-SW-2	_____	_____	___	___	___
stream XYZ-SW-5	_____	_____	___	___	___
			___	___	___
			___	___	___
	_____	_____	___	___	___
			___	___	___
			___	___	___

Attachment
13.4
Tank 50 Reportability Requirements

Minimum Characterization for Tank 50 Influents			
Anions	**Radionuclides**		**Miscellaneous**
Nitrite	Sr-90*	Total alpha	pH
Nitrate	U-235*	Total beta/gamma	Specific Gravity
Hydroxide	Pu-239*		
*If the criticality and Saltstone WAC limits can be bounded by the total alpha and total beta/gamma result, these constituents do not have to be analyzed.			

Complete Characterization for Tank 50 Influents			
Radionuclides		**Chemicals**	
H-3	Ra-226	Ammonium	Copper
C-14	Th-230	Carbonate	Iron
Al-26	Th-232	Chloride	Lithium
Ni-59	U-233	Fluoride	Manganese
Ni-63	U-234	Hydroxide	Molybdenum
Co-60	U-235	Nitrate	Nickel
Se-79	U-236	Nitrite	Potassium
Sr-90	U-238	Oxalate	Silicon
Nb-94	Np-237	Phosphate	Sodium
Tc-99	Pu-238	Sulfate	Strontium
Ru-106	Pu-239	Arsenic	Zinc
Sb-125	Pu-240	Barium	Total Insoluble Solids
Sn-126	Pu-241	Cadmium	Butanol & Isobutanol
I-129	Pu-242	Chromium	Isopropanol
Cs-134	Am-241	Lead	Methanol
Cs-135	Am-243	Mercury	Phenol
Cs-137	Cm-242	Selenium	Tetraphenylborate
Ce-144	Cm-244	Silver	Toluene
Pm-147	Total Transuranic Alpha Emitters	Aluminum	Tributylphosphate
Sm-151	Total Beta-Gamma	Boron	EDTA
Eu-154		Calcium	Total Organic Carbon
Eu-155		Cobalt	

14. References

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