WASTE TREATMENT AND IMMOBILIZATION PLANT
APPENDIX 3A
WASTE TREATMENT AND IMMOBILIZATION PLANT WASTE ANALYSIS PLAN

CHANGE CONTROL LOG

Change Control Logs ensure that changes to this unit are performed in a methodical, controlled, coordinated, and transparent manner. Each unit addendum will have its own change control log with a modification history table. The "**Modification Number**" represents Ecology's method for tracking the different versions of the permit. This log will serve as an up to date record of modifications and version history of the unit.

Modification History Table

Modification Date	Modification Number
03/2007	

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APPENDIX 3A
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TABLE OF CONTENTS

TABLES

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ACRONYMS

ALARA	as low as reasonably achievable
~~ASTM~~	~~American Society for Testing and Materials~~
CRV	concentrate receipt vessel
~~BNI~~	~~Bechtel National, Inc.~~
~~CFR~~	~~*Code of Federal Regulations*~~
DOE	~~United States~~US Department of Energy
~~DOE-RL~~	~~United States Department of Energy, Richland Operations Office~~
DST	double-shell tank
~~DWPA~~DWP	*WTP Dangerous Waste Permit ~~Application for the River Protection Project—Waste Treatment and Immobilization Plant~~*
~~RDQO Optimization~~	~~*Regulatory Data Quality Objectives Optimization Report*~~
Ecology	Washington State Department of Ecology
EMF	Effluent Management Facility
EPA	~~United States~~US Environmental Protection Agency
ETF	Effluent Treatment Facility
FRP	waste feed receipt process system
HEME	high-efficiency mist eliminator
HEPA	high-efficiency particulate air (filter)
HLVIT	high-level vitrification
HLW	high-level waste
~~HSSWAC~~	~~*Hanford Site Solid Waste Acceptance Criteria*~~
~~HSLWAC~~	~~*Hanford Site Liquid Waste Acceptance Criteria*~~
ICN	~~i~~Integrated ~~c~~Control ~~n~~Network
ID	identification
IHLW	immobilized high-level waste
ILAW	immobilized low-activity waste
Lab	Analytical Laboratory
LAW	low-activity waste

LDR	Land Disposal Restrictions
LERF	Liquid Effluent Retention Facility
LIMS	laboratory information management system
~~LSM~~	~~locally shielded melter~~
~~MSDS~~	~~material safety data sheet~~
NRC	US Nuclear Regulatory Commission
PCB	~~P~~polychlorinated ~~B~~biphenyl
PDWRS	plant data warehouse and reporting system
PIN	~~p~~Plant ~~i~~Information ~~n~~Network
PPE	personal protective equipment
PT	Pretreatment (Facility)
QA	quality assurance
QAP~~j~~P	*Quality Assurance Project Plan for the Waste Analysis Plan*
QC	quality control
RCRA	Resource Conservation and Recovery Act of 1976
RDQO	regulatory data quality objectives
SBS	submerged bed scrubber
SDS	safety data sheet
SWTD	Solid Waste Tracking Database
TOC	total organic carbon
TRU	transuranic ~~elements~~
TSD	treatment, storage, or disposal ~~(facility)~~
WAC	*Washington Administrative Code*
WAP	~~waste analysis plan~~Waste Treatment Plant Waste Analysis Plan
~~WTIS~~WESP	~~waste tracking and inventory system~~wet electrostatic precipitator
WIPP	Waste Isolation Pilot Plant
WTP	~~River Protection Project –~~Hanford Tank Waste Treatment and Immobilization Plant

1

GLOSSARY

This waste analysis plan ~~(WAP)~~ relies on the definitions of terms as contained in Appendix ~~32~~B of the *Hanford Facility Dangerous Waste Permit* ~~(Ecology 2009~~*Application, General Information Portion* (DOE-RL 2013) and other portions of the *WTP Dangerous Waste Permit* ~~Application for~~ (WA7890008967, herein referred to as the ~~River Protection Project – Waste Treatment and Immobilization Plant (DWPA) (Chapter 1.0),~~DWP) except as supplemented or amended below.

Batch	~~Retrievable waste staged in a single double-shell tank (DST) designated as mixed waste for transfer to the Waste Treatment Plant (WTP) for treatment.~~A portion (finite volume) of a waste campaign with similar physical and chemical properties where the required waste processing parameters do not vary.
Campaign	Volume of waste feed staged by the Tank Operations Contractor, consisting of multiple batches, that is to be treated using a similar processing strategy.
Dangerous Waste	Solid wastes designated in WAC 173-303-070 through 173-303-100 as dangerous, extremely hazardous, or mixed radioactive and dangerous waste. Where information regarding treatment, management, and disposal of the radioactive component of mixed waste has been incorporated it is not incorporated for the purpose of regulating the radiation hazards of such components under this permit (see Condition III.10.A.)
Feed ~~verification~~acceptance	~~The activities the WTP will perform to verify that the staged waste feed meets the WTP acceptance criteria.~~Feed acceptance criteria are the technical and administrative requirements that a waste must meet in order for it to be accepted at a storage, treatment, or disposal facility (DOE M 435.1-1, Nuclear Waste Policy Act [DOE 2004], adapted from DOE 5820.2A, Radioactive Waste Management).
Feed confirmation	The activities the WTP will perform after receiving the waste feed, to confirm that the waste feed received is the same as the waste feed accepted for delivery.
High-Level Waste	High-level waste or HLW means: (1) irradiated reactor fuel; (2) liquid wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuel; or (3) solids into which such liquid wastes have been converted (10 CFR 60.2, *Disposal of High-Level Radioactive Wastes in Geologic Repositories – Definitions*). High-level waste is the highly radioactive waste material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and other highly radioactive material that is determined, consistent with existing law, to require permanent isolation (DOE 2004).
Immobilization	The act or process of reducing the mobility of waste constituents to limit their potential for long-term transport in the biosphere and subsequent exposure to humans, animals, and plants. Vitrification is an example of an immobilization process.
Immobilized Waste	Liquid waste feed that has had its constituents solidified by processing, such as in a vitrification plant.

Incidental Waste	Waste resulting from reprocessing spent nuclear fuel that is determined to be incidental to reprocessing is not high-level waste, and shall be managed under DOE's regulatory authority in accordance with the requirements for transuranic waste or low-activity waste, as appropriate (DOE 2004).
Low-Activity Waste	Low-activity waste is radioactive waste that is not high-level radioactive waste, spent nuclear fuel, transuranic waste, byproduct material (as defined in Section 11e.(2) of 42 USC 2011 et seq., Atomic Energy Act of 1954, or naturally occurring radioactive material (DOE 2004).
Mixed Waste	A dangerous, extremely hazardous, or acutely hazardous waste that contains both a nonradioactive hazardous component and, as defined by 10 CFR 20.1003, source, special nuclear, or byproduct material subject to the Atomic Energy Act of 1954 (42 USC 2011 et seq.). Waste that contains both source, special nuclear, or byproduct material subject to the Atomic Energy Act of 1954 (42 USC 2011 et seq.), and a hazardous component subject to the Resource Conservation and Recovery Act (DOE 2004).
Radioactive Waste	10 CFR 60.2 defines radioactive waste as high-level waste and other radioactive materials other than high-level waste that are received for emplacement in a geologic repository. Within the context of this document, radioactive waste also includes secondary waste streams, any garbage, refuse, sludges, and other discarded material, including solid, liquid, semisolid, or contained gaseous material that must be managed for its radioactive content. [DOE 2004]

1

3A.1 INTRODUCTION

This Waste Analysis Plan (herein referred to as "this WAP") describes the sampling and analysis for dangerous waste constituents for the ~~River Protection Project~~ Hanford Tank Waste Treatment and Immobilization Plant (WTP) to comply with the Washington State Dangerous Waste Regulations contained in ~~Chapter 173-303 of the *Washington Administrative Code* (WAC).~~WAC 173-303, *Dangerous Waste Regulations*. It was prepared in accordance with the requirements of ~~WAC 173-303-110,~~WAC 173-303-110, *Dangerous Waste Regulations* – ~~"~~*Sampling and Testing Methods*~~,"~~ ~~WAC 173-303-300, "~~; WAC 173-303-300, *Dangerous Waste Regulations* – *General Waste Analysis*~~," WAC 173-303-806, "~~; WAC 173-303-806, *Dangerous Waste Regulations* – *Final Facility Permits*~~,"~~; and permit WA7890008967, *Dangerous Waste Portion of the Hanford Facility ~~Dangerous Waste~~ Site-wide Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste* (Hanford Facility RCRA Permit – Dangerous Waste Portion) (Ecology ~~1994).~~ 2007) (herein referred to as the DWP). Some ~~non-dangerous~~ nondangerous constituents are also discussed in this ~~plan~~ WAP, if they support compliance activities or if the discussion provides a more complete description of a particular sampling strategy. ~~The~~In this WAP, the descriptions ~~in this plan~~ of the waste feed stored at the Hanford Site double-shell ~~and~~tank (DST) (which includes waste transferred from the single-shell tank system ~~units (collectively referred to as Hanford tank waste~~unit) and the planned process streams are based on available chemical and physical information and process knowledge.

3A.1.1 Overview

This WAP describes the general requirements for the collection and analysis of waste to be processed by the WTP, and the requirements for characterization of secondary wastes where process knowledge is inadequate to support designation.

The Tank Operations Contractor will characterize the staged DST waste feed in conformance with 24590-WTP-RPT-MGT-04-001, *Regulatory Data Quality Objectives Optimization Report*[1] (herein referred to as "RDQO Optimization Report"). Based on the results, the Tank Operations Contractor will develop a waste profile specific to the staged waste and the planned treatment campaign.

Prior to transferring waste, the WTP will evaluate the waste profile and characterization data for conformance with WTP waste acceptance criteria. The WTP will use this information to ensure the waste feed planned for receipt meets waste acceptance criteria. Analytical results will also be used to determine the appropriate treatment requirements for each campaign. The volume of the waste transferred from the Tank Operations Contractor will also be compared with the volume received at WTP to confirm the waste transfer was completed as planned.

Simplified process flow figures for WTP processes are included in Chapter 4A of the DWP. The waste will be separated into low and high activity fractions, treated, combined with glass-forming chemicals, and melted into a solid glass form in a process known as vitrification.

The vitrified waste will be subject to land disposal restrictions. A site-specific variance under 40 CFR 268.44, *Land Disposal Restrictions – Variance from a Treatment Standard*, that would specify high-level waste vitrification (HLVIT) as the method of treatment for Hanford tank waste processed through the WTP will be submitted (refer to Section 3A.6). The petition would provide the basis to establish the HLVIT treatment standard in lieu of existing concentration-based treatment standards, and would negate

[1] The RDQO Optimization Report, Section 9.6, Quality Assurance, specifies compliance with NQA-1-1989; however, 24590-WTP-QAM-QA-06-001, *Quality Assurance Manual*, updates this requirement and requires compliance with NQA-1-2000, *Quality Assurance Requirements for Nuclear Facility Applications*.

the need for sampling the vitrified waste forms. Therefore, sampling and characterization of vitrified waste is not within the scope of this WAP.

Operation of WTP will generate secondary wastes, in solid and liquid form. These wastes will be designated according to available process knowledge, or will be sampled and analyzed as necessary to fully address treatment, storage, or disposal (TSD) unit waste acceptance criteria. Secondary wastes that are not treated by the WTP will be transported by the Tank Operations Contractor to an appropriate TSD unit, subject to that TSD unit's waste acceptance criteria.

Controlled copies of this WAP will be kept by the WTP Project. The Project Document Control manager, or equivalent title, will be responsible for ensuring that controlled copies of this WAP are kept current when revisions are made to this WAP.

3A.1.2 Background

Reactor fuel reprocessing is the primary source of waste material stored in the Hanford double-shell and single-shell tanks. Minor amounts of other radioactive and mixed waste (~~such as~~e.g., low-~~level~~ activity and transuranic [TRU] waste) are also included in the ~~double-shell tanks~~ DSTs; however, the tank waste is managed as high-level waste (HLW) prior to treatment and vitrification. The waste feed to the WTP will consist of staged transfers of mixed waste from the ~~double-shell tank (~~DST~~)~~ system unit, the TSD unit operated by the Tank Operations Contractor. This waste is composed of sludge, salt cake, and liquids, and is considered mixed waste as defined by WAC 173-303; that is, it contains both radioactive and dangerous waste.

~~HLW is defined by~~In 10 CFR 72.3, *Licensing Requirements for the ~~United States~~ Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste – Definitions*, the US Nuclear Regulatory Commission (NRC) ~~in the *Code of Federal Regulations*, 10 CFR 72.3,~~ defines "high-level radioactive waste" as follows:

> ~~"~~(1) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and (2) other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation.~~"~~

Hanford tank waste is consistent with the HLW definition. The treatment of the Hanford tank waste is required under the Hanford Federal Facility Agreement and Consent Order~~,~~ (Tri-Party Agreement) (Ecology, EPA, and DOE ~~1996~~2011), signed by the Washington State Department of Ecology (Ecology), the ~~United States~~US Environmental Protection Agency (EPA), and the ~~United States~~US Department of Energy (DOE).

In a letter to the DOE Richland ~~DOE~~ Operations Office ~~(DOE-RL) (Paperiello, titled~~ Classification of Hanford Low-Activity Tank Waste Fraction (NRC 1997)~~,~~ the NRC documented an agreement with DOE to classify a portion of the Hanford tank waste as "incidental waste" in accordance with the incidental waste classification criteria specified in an earlier letter from the NRC to DOE (~~Bernero,~~NRC 1993). The lower activity portion of the tank waste, referred to as low-activity waste (LAW) feed, generally refers to the supernatant portion of the tank waste. Following ~~radionuclide removal and vitrification,~~ pretreatment of the tank waste, waste feed received at the LAW Facility will be classified as low-activity waste and supported by a waste incidental to reprocessing determination. The waste will be vitrified in the LAW Facility. The corresponding immobilized low-activity waste (ILAW) will be ~~considered incidental waste, disposed of onsite at Hanford as low-level waste, and will not be subject to the licensing authority of the NRC, consistent with the NRC incidental waste determination. The ILAW will be~~ managed as mixed waste for disposal onsite.

The higher activity and higher solids portion of the Hanford tank waste is designated as HLW feed ~~in the Dangerous Waste Permit Application for the River Protection Project – Waste Treatment and Immobilization Plant (DWPA)~~. The two different terms describing the ~~Hanford~~ tank waste are used because the LAW and HLW fractions of the waste feed are processed differently in the WTP, as described in Section 3A.2 of this WAP.

~~The DST system unit will provide a waste profile and, upon request, a split sample aliquot for each waste feed that is staged for transfer to the WTP. The WTP will perform verification analysis on the aliquot to determine if the waste feed meets WTP acceptance criteria. The WTP will also compare the volume of waste feed transferred from the DST feed staging tank with the volume received into the feed receipt tanks at the WTP, to confirm that the waste feed received corresponds to the waste feed accepted for transfer.~~

~~The WTP will characterize the DST waste feed in conformance with the *Regulatory Data Quality Objectives Optimization Report* (RDQO Optimization) process (24590-WTP-RPT-MGT-04-001). Characterization of the DST waste feed will be completed prior to transfer to the WTP.~~

~~Simplified process flow figures of the operations at the WTP are included in Appendix 4A.~~

~~Controlled copies of this WAP will be kept at the WTP facility. The Project Document Control Manager, or equivalent title, will be responsible for ensuring that controlled copies of the WAP are kept current when revisions to the WAP are made.~~

3A.2 WASTE TREATMENT AND IMMOBILIZATION PLANT UNIT DESCRIPTION

The WTP is a waste treatment unit described under the unit-specific portion of the Hanford Facility RCRA Permit – Dangerous Waste ~~Permit~~ Portion (Ecology ~~1994~~2007). Section XV of the Part A Form presents a plan view of the WTP ~~is located in Chapter 1.0~~. This section briefly describes the WTP processes and activities. More detailed process information is provided in Chapter ~~4.0~~.4 of the DWP. ~~Figure B1-1~~ The WTP has been designed to operate under two operating scenarios. In the baseline configuration, DST waste will first be processed through the WTP Pretreatment (PT) Facility, and then sent on for vitrification at the LAW Facility. Alternately, under a direct feed operating scenario, waste may be sent directly from the Tank Operating Contractor to the LAW facility if the waste meets LAW waste acceptance criteria.

The WTP will commence initial operations by processing waste pretreated by the Tank Operations Contractor under a direct feed option. In this configuration, the LAW Facility and WTP Analytical Laboratory (Lab) will be commissioned to operate while the PT Facility and HLW Facility construction is completed. Direct feed low-activity waste (DFLAW) operations will support processing of Hanford tank waste into glass at the earliest possible date while efforts to complete PT Facility continue. Upon the completion of construction and successful commissioning of the PT and HLW facilities, the WTP will switch to the baseline configuration. The portion of DST waste not subject to direct feed processing (e.g., not pretreated or conditioned before transfer to WTP) will be treated in the baseline configuration with PT, LAW, and HLW facilities. These configurations are independent of one another and will not occur in parallel. Both operating configurations are discussed in this WAP.

Figure 4A-1 of Chapter 4A is a simplified diagram of the treatment ~~components, showing~~ process. It shows the relationship between the following:

- Waste feed
- Pretreatment
- LAW vitrification
- HLW vitrification

Plant equipment will include the following:

- Pipelines, tanks, and ancillary equipment
- Evaporation units
- Ultrafiltration units
- Ion- exchange columns
- Chemical addition equipment
- LAW and HLW melters
- Service and utility units.
- Container management units
- Storage facilities
- ~~Off-gas~~Offgas treatment systems

The pretreatment and vitrification of the waste feed and the management of ~~off-gas~~offgas from these processes are described in the following sections. The applicability of air emissions standards to the WTP is also discussed.

3A.2.1 Pretreatment

As-received waste that already meets the vitrification facility's waste acceptance criteria may be sent directly from the DST unit to the LAW Facility, bypassing the PT Facility. Other waste will require pretreatment before it can be vitrified.

Pretreatment will prepare the DST waste feed for vitrification when the WTP is in the baseline configuration. An overview of the pretreatment processes is provided below and illustrated in ~~Figure B1-1~~
Figure 4A-2 of Chapter 4A. Descriptions of the feed receipt tanks and pretreatment equipment are provided in Chapter 4~~.0~~ of the DWP.

Pretreatment of the waste feed will consist of the following processes:

- Concentration of the waste feed by evaporation.
- Separation of entrained solids by ultrafiltration.
- Separation of strontium and ~~transuranic~~ TRU elements ~~(TRU)~~ by precipitation and ultrafiltration.
- Separation of cesium in ~~an~~ ion exchange unit~~s~~.
- Final concentration by evaporation for the LAW feed.

The following paragraphs provide a description of these processes.

Waste requiring pretreatment will undergo a series of processes to separate the LAW and HLW waste fractions and prepare them for vitrification. After the receipt of the waste feed from the DST system unit, the waste feed evaporator, a forced-circulation vacuum evaporator, will concentrate the waste feed prior to ultrafiltration. Ultrafiltration will remove entrained solids from the concentrated waste feed. The solids will be washed and will either be transferred to the HLW feed or returned to the DST system unit. For certain waste feed, strontium and TRU will be precipitated by adding reagents to the waste feed. The precipitate containing strontium and TRU will be concentrated and washed in the ultrafiltration system before incorporation into the HLW feed.

~~Condensate from the evaporator off-gas streams will be collected and transferred to condensate tanks for discharge to the Liquid Effluent Retention Facility (LERF) or the Effluent Treatment Facility (ETF), or both, for subsequent treatment. Non-condensable gases that are extracted from the evaporator system will be routed to the pretreatment process tank ventilation off-gas treatment system. Refer to Section 2.3.1 for a description of the pretreatment off-gas treatment systems.~~

The liquid separated by ultrafiltration will become the LAW feed. The LAW feed will pass through the cesium ion exchange system to separate cesium from the LAW feed. ~~The cesium will be blended with the HLW feed.~~

The LAW feed leaving the ion exchange units will be concentrated by evaporation in the LAW melter feed evaporator. The operation of the LAW melter feed evaporator will be similar to that of the waste feed evaporator. The pretreated LAW feed will be transferred to the LAW ~~vitrification plant~~Facility for vitrification into the ILAW glass product.

The captured cesium will be eluted from the ion exchange resin and blended with the HLW feed. The HLW feed will then consist of washed solids, strontium and TRU precipitates for certain feed streams, and the cesium ion exchange products. The blended HLW feed will be transferred to the HLW ~~vitrification plant~~Facility for vitrification into the immobilized high-level waste (IHLW) glass product.

Condensate from the evaporator offgas streams will be collected and transferred to condensate tanks for discharge to the Liquid Effluent Retention Facility (LERF) or the Effluent Treatment Facility (ETF), or both, for subsequent treatment. Noncondensable gases extracted from the evaporator system will be routed to the pretreatment process tank ventilation offgas treatment system. Refer to Section 3A.2.4.1 for a description of the pretreatment offgas treatment systems.

Details of the PT Facility are provided in Chapter 4 of the DWP.

3A.2.2 Vitrification Systems

After pretreatment, LAW feed will be transferred to the LAW ~~vitrification plant~~Facility, and HLW feed will be transferred to the HLW ~~vitrification plant~~Facility, for conversion to the immobilized glass product. The vitrification process is the same for the DFLAW configuration, absent the need for treatment at the PT and HLW facilities.

Details of the LAW and HLW facilities and systems are provided in Chapter 4 of the DWP.

3A.2.2.1 Low-Activity Waste Vitrification

The pretreated and concentrated LAW feed exiting the LAW melter feed evaporator or transferred directly from the DST system unit will be combined with necessary glass-forming additives (~~for example, Silica, Alumina, Boric Acid~~e.g., silica, alumina, boric acid, and ~~C~~calcium ~~S~~silicate) and reductants. The slurry of waste feed and glass formers will be transferred to the LAW melter feed tanks in a manner to provide a continuous feed to each of the ~~two~~ LAW melters. The electric-powered, joule-heated LAW melters will operate in parallel. The temperature of the molten glass in the melters will be approximately 950° C to 1,250° C.

In the melter, the feed components will be converted to their respective oxides and dissolved in the melt, destroyed by the high temperatures, or partitioned to the ~~off-gas~~offgas. As these materials are heated, superheated gases will be released into the melter ~~off-gas~~offgas system. Here, most of the solids entrained in the ~~off-gas~~offgas will be captured and returned to the waste feed stream for treatment. The LAW ~~off-gas~~offgas treatment system will treat the volatile constituents that remain in the ~~off-gas~~offgas. LAW ~~off-gas~~offgas treatment is discussed in Section 3A.2.~~3~~4.2.

Molten glass will be discharged from the melters to ~~stainless steel~~metal containers for cooling, solidification, and storage. The process will yield a durable glass containing the ILAW. The glass will be cooled, and the container will be sealed, decontaminated, and temporarily stored before being transferred to an appropriate Hanford Site ~~treatment, storage, or disposal (~~TSD~~)~~ unit.

In the DFLAW configuration, condensate from the submerged bed scrubber (SBS), the wet electrostatic precipitator (WESP) drainage, spent caustic scrubber solution, and system flush water will be collected via the LAW Vitrification Facility Radioactive Liquid Waste Disposal (RLD) System. Contents from the

RLD-VSL-00005 in the LAW and RLD-VSL-00164 in the Lab will be transferred to the Effluent Management Facility (EMF). The EMF will evaporate, or in the case of the spent caustic scrubber solutions sample, these effluents prior to transfer back to LAW or to the LERF/ETF for subsequent treatment. Refer to Section 3A.2.4.3 for a description of the EMF offgas treatment system.

In the baseline configuration, SBS and WESP condensate will be recycled to PT Facility for concentration with treated LAW and eventual incorporation of residual solids in the ILAW. Refer to Section 3A.2.4.2 for a description of the LAW Facility offgas treatment systems.

3A.2.2.2 High-Level Waste Vitrification

The HLW ~~vitrification system~~Facility will receive feed slurry from the HLW pretreatment process. The feed slurry will be combined with necessary glass-forming additives (~~Silica, Boric Acid, Calcium Silicate, Ferric Oxide~~silica, boric acid, calcium silicate, ferric oxide, and ~~Lithium Carbonate~~ lithium carbonate) and reductants, and will then be fed to ~~each of~~ the ~~two~~ HLW melter(s). The temperature of the molten glass in the HLW melter will be approximately 950° C to 1,250° C.

In the melter(s), feed components will be converted to their respective oxides and dissolved in the melt, destroyed by the high temperatures, or partitioned to the ~~off-gas~~offgas. As these materials are heated, superheated gases, including volatile feed components, will be released into the melter ~~off-gas~~offgas system, where most of the solids entrained in the ~~off-gas~~offgas will be captured and returned to the waste feed stream for treatment. The HLW ~~off-gas~~offgas treatment system will treat the volatile constituents that remain in the ~~off-gas~~offgas. The HLW ~~off-gas~~offgas treatment system is discussed in Section 3A.2.~~3.3~~4.4.

Molten glass will be discharged from the HLW melter(s) to ~~stainless steel canisters~~metal containers for cooling, solidification, and storage. The process will yield a durable glass containing IHLW. The glass will be cooled and the ~~canister~~ container sealed, decontaminated, and temporarily stored before being transferred to the Hanford Canister Storage Building unit for storage until final disposal.

~~3A.2.3 Off-Gas Treatment Systems~~

~~The pretreatment plant, the LAW vitrification plant,~~The SBS and WESP condensate from the HLW ~~vitrification plant will each have a dedicated off-gas~~ Facility offgas control equipment will be recycled to the PT Facility for concentration with treated LAW and eventual incorporation of residual solids in the ILAW. Refer to Section 3A.2.4.4 for a description of the HLW Facility offgas treatment system.

3A.2.3 Effluent Management Facility

When the WTP is configured for direct waste feed to the LAW Facility, the EMF will support operations in collecting and processing the radioactive liquid effluents from the LAW Facility and Lab to support a LAW Facility design capacity of 30 metric tons of glass per day and a minimum treatment capacity of 21 metric tons of glass per day. An evaporator is used to concentrate liquid effluents from the LAW RLD System and Lab RLD System. The concentrated stream is recycled back to the LAW Facility or back to the DST System. Prior to return to the DST system, the stream may be adjusted to meet DST WAC. The EMF will have a nominal lifetime of approximately 40 years. It is designed to work in concert with the Lab and LAW Facility. The EMF contains an evaporator system, nine process vessels, and three supporting reagent storage tanks. All waste streams, including mixed waste (hazardous and radioactive), are identified, minimized, and have designated disposal routes. The facility design accommodates disposal routes, size reduction, encapsulation/packaging, accumulation, staging, surveying, and transfer and export of secondary waste streams.

The EMF dilute effluent transfer line will tie into the PT Facility effluent transfer line upstream of the LERF/ETF interface point. Evaporator condensate, along with LAW and Lab RLD liquids that meet the *Liquid Waste Processing Facilities Waste Acceptance Criteria* (herein referred to as "the LERF/ETF

WAC") (CHPRC 2012) will be discharged to the LERF/ETF for subsequent treatment and disposal. The evaporator concentrate (bottoms) will be collected, sampled, chemically adjusted, and batch transferred to the LAW Facility for incorporation into the LAW vitrification process. Excess concentrated effluent or effluent that does not meet the LAW Facility acceptance criteria for incorporation into the vitrification process may be returned to the DST unit. The return line from the EMF to the DST system unit conveys concentrated liquid effluents that meet the DST system unit waste acceptance criteria from the EMF back to the DST system unit for storage.

Details of the EMF are provided in Chapter 4 of the DWP.

3A.2.4 Offgas Treatment Systems

The PT Facility, the LAW Facility, the EMF, and the HLW Facility will each have a dedicated offgas treatment system. These systems are described in the following sections. ~~The off-gas~~The PT, LAW, and HLW facilities' offgas treatment systems are illustrated in ~~Figure B1-1~~ Figure 4A-1 of Chapter 4A. Air emissions are addressed in Section 3A.2.~~3.~~4.5. Details regarding the ~~off-gas~~offgas treatment system components are discussed in Chapter 4~~.0~~ of the DWP.

~~3A.2.3.1~~3A.2.4.1 Pretreatment ~~Plant Off-gas~~Facility Offgas

~~Figure B1-1~~Figure 4A-1 of Chapter 4A illustrates the ~~pretreatment plant off-gas~~PT Facility offgas treatment system. The pretreatment ~~off-gas~~offgas from ~~fluidic devices~~dangerous waste processing equipment will be treated through a high-efficiency mist eliminator (HEME) and high-efficiency particulate air (HEPA) filter, and routed to the ~~pretreatment plant~~ PT Facility stack, where it will be monitored and released to the atmosphere.

The pretreatment ~~off-gas~~offgas from vessels will be treated through the following components operating in series:

- Acid gas scrubber
- HEME
- HEPA filter
- Volatile organic compound oxidizer
- Carbon adsorber

The treated pretreatment ~~off-gas~~offgas from vessels will be monitored and released to the atmosphere through the ~~pretreatment plant~~PT Facility stack.

~~3A.2.3.2~~3A.2.4.2 Low-Activity Waste Vitrification ~~Off-gas~~Offgas

The LAW melter ~~off-gas~~ offgas treatment system will consist of the following components operating in series, as illustrated in ~~Figure B1-1~~Figure 4A-1 of Chapter 4A:

- Film cooler
- ~~Submerged bed scrubber~~
- ~~Wet electrostatic precipitator~~
- SBS
- WESP
- HEPA filter
- ~~Activated carbon adsorber~~
- Thermal catalytic oxidation unit
- Selective catalytic reduction unit
- Caustic scrubber

The treated LAW ~~off-gas~~offgas will be monitored and released to the atmosphere through the LAW Facility stack.

3A.2.4.3 Effluent Management Facility Offgas

The EMF offgas treatment system will consist of HEPA filtration. The treated EMF offgas will be monitored and released to the atmosphere through the EMF stack.

~~3A.2.3.3~~3A.2.4.4 High ~~-~~Level Waste Vitrification ~~Off-gas~~Offgas

The HLW melter ~~off-gas~~offgas treatment system will consist of the following components operating in series, as illustrated in ~~Figure B1-1~~Figure 4A-1 of Chapter 4A:

- Film cooler
- ~~Submerged bed scrubber~~SBS
- ~~Wet electrostatic precipitator~~WESP
- HEME
- HEPA filter
- ~~Activated carbon adsorber~~
- ~~Silver mordenite iodine adsorption unit~~
- Thermal catalytic oxidation unit
- Selective catalytic reduction unit
- Silver mordenite iodine adsorption unit

The treated HLW ~~off-gas~~offgas will be monitored and released to the atmosphere through the HLW Facility stack.

~~3A.2.3.4~~3A.2.4.5 Air Emissions

Emissions from the stacks that vent the WTP processes will be monitored according to the provisions of the ~~WTP and~~ *Hanford ~~Site~~ Air Operating Permit~~,~~ 00-05-006 Renewal 2 - Revision A* (Ecology 2014), *as required by ~~WAC 173-303-395(2).~~*WAC 173-303-395(2), *Dangerous Waste Regulations – Other General Requirements*. Monitoring and sampling to address air emissions concerns under these permits will not be addressed in this application. However, the applicability of the air emissions requirements found in WAC 173-303 will be evaluated in the following sections. Details of the air emissions control systems for the WTP are provided in Chapter 4~~.0~~ of the DWP.

~~3A.2.3.4.1~~3A.2.4.5.1 Air ~~Emissions from~~Emission Standards for Process Vents (Subpart AA)

~~WAC 173-303-690,~~WAC 173-303-690, *Dangerous Waste Regulations – Air Emission Standards for Process Vents*, commonly referred to as "Subpart AA," regulates process vents ~~that are~~ associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air- or steam-stripping operations that manage hazardous wastes with organic concentrations of at least 10 parts per million ~~by weight. WAC 173-303-690 incorporates the provisions of 40 CFR 264.1031 through 40 CFR 264.1036~~ (ppm) by weight. WAC 173-303-690 incorporates the provisions of 40 CFR 264, Subpart AA, *Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities – Air Emission Standards for Process Vents*, by reference. The WTP does not employ any of these listed devices or processes; therefore, the WTP is not subject to regulation under Subpart AA. Refer to 24590-WTP-RPT-ENV-01-001, Rev 0, *RCRA Subpart AA Applicability*, for the regulatory analysis that resulted in this conclusion.

~~3A.2.3.4.2~~3A.2.4.5.2 Air Emission Standards for Equipment Leaks (Subpart BB)

~~WAC 173-303-691~~WAC 173-303-691, *Dangerous Waste Regulations – Air Emission Standards for Equipment Leaks*, applies to facilities that treat, store, or dispose of hazardous waste, and regulates air emissions from equipment that contains or contacts hazardous wastes with organic concentrations of at least 10 percent by weight~~. WAC 173-303-691 incorporates 40 CFR 264.1051 through 1065 (Subpart BB)~~ (wt%). WAC 173-303-691 incorporates 40 CFR 264, Subpart BB, *Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities – Air Emission Standards for Equipment Leaks*, by reference. This provision does not apply to the WTP, because the WTP will not accept wastes with organic concentrations at or above 10 ~~percent by weight~~wt%. (refer to Section 3A.~~.~~3.~~.~~2). Compliance with this provision will be documented through analysis, as described in Section 3A.3.~~4.1~~2.

~~3A.2.3.4.3~~3A.2.4.5.3 Air Emission Standards for Tanks, Impoundments, and Containers (Subpart CC)

The regulations specified under ~~WAC 173-303-692 and 40 CFR Part 264 Subpart CC~~WAC 173-303-692, *Dangerous Waste Regulations – Air Emission Standards for Tanks, Surface Impoundments, and Containers*, and 40 CFR 264, Subpart CC, *Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities – Air Emission Standards for Tanks, Surface Impoundments, and Containers*, incorporated by reference, do not apply to the WTP mixed waste tank systems and containers. These tanks and containers are excluded under WAC 173-303-692(1)(b)(vi) because they qualify as waste management units ~~that are ""~~"…used solely for the management of radioactive dangerous waste in accordance with all applicable regulations under the authority of the Atomic Energy Act and the Nuclear Waste Policy Act~~" and are excluded under WAC 173-303-692(1)(b)(vi)~~." Containers or tanks bearing non-radioactive, dangerous waste~~, such as~~ (e.g., maintenance and laboratory waste~~,~~) that are not excluded under WAC 173-303-692(1)(b)(ii) or 40 CFR 264.1082(c), will comply with the container and tank standards specified under 40 CFR Part 264 Subpart CC.

3A.3 WASTE ACCEPTANCE ~~[C 1, C 2]~~

The waste feed to be transferred from the DST system unit to the WTP will undergo several stages of review before acceptance. The ~~DST system unit~~Tank Operations Contractor will provide the WTP with a waste profile for the feed ~~batch~~ campaign staged for transfer to the WTP~~. If requested, (the DST system unit will also provide an aliquot of the split~~ sample ~~of the~~ will be drawn from a location identified in Figure 4A-1 of Chapter 4A as S1). A waste campaign is a volume of waste feed ~~for waste verification analysis performed~~ staged by the ~~WTP. Verification analytical~~Tank Operations Contractor, consisting of multiple batches, that is to be treated using a similar processing strategy. Analytical data on the waste feed provided by the ~~DST system unit~~ Tank Operations Contractor will be

~~accepted~~ used by the WTP for waste acceptance purposes. During sampling and analysis for ~~verification~~waste acceptance, the waste feed will remain within the control and responsibility of the ~~DST system unit~~Tank Operations Contractor.

After WTP personnel determine that the ~~verification analysis~~analytical results ~~meet~~ indicate the waste acceptance criteria~~,~~ are met, DOE will be notified and the ~~DST system unit~~Tank Operations Contractor will be authorized in writing to transfer the waste feed through double-walled pipes to LAW Concentrate Receipts Vessels (CRV) or PT Facility feed receipt tanks (Waste Feed Receipt Process System, FRP) located inside the WTP. The transfer will be assisted by flush water to clear the transfer lines after a waste transfer. After transfer, the WTP will compare the volume of waste feed and flush water transferred from the DST feed staging tank with the volume received ~~into the~~by WTP ~~feed receipt tanks. This will~~. The waste transfer is via a closed system with no additions (with the exception of flush water), so volume will be used confirm that the waste feed received corresponds to the waste feed ~~that was~~ accepted for transfer.

The steps involved in evaluating and accepting the waste feed into the WTP are summarized ~~in Table B1-1, and are described~~ in the following sections. Also discussed in the following sections is the rationale for the removal of dangerous waste numbers D001 (ignitable) and D003 (reactive) from the waste feed, and the selection of analytical laboratories.

Dangerous waste will be managed in a way that will preclude adverse reaction or interference with the WTP treatment process.

3A.3.1 Waste Feed Acceptance Process ~~Designation~~

~~Waste numbers described in the *Double-Shell Tank System Unit Permit, Operating Group 12, Addendum B, Waste Analysis Plan* (DOE-RL 2009) are applicable to the waste feed. A list of these dangerous waste numbers is shown in Table B1-2. Table B1-2 includes multi-source leachate (F039) as a waste derived from non-specific source wastes F001 through F005. Waste feed received from the DST system unit is not expected to exhibit the characteristics of ignitability (D001) or reactivity (D003), based on process knowledge. Section 3.6 describes the process knowledge that will be used to demonstrate that the waste feed is not ignitable or reactive.~~

~~3A.3.2 Waste Feed Acceptance Process [C-3a]~~

For each waste feed ~~batch~~campaign, the waste acceptance process is summarized in Table 3A-1, and is discussed in the remainder of this section.

~~3A.3.2.1~~3A.3.1.1 Waste Feed Profile ~~[C-2a(3)]~~

The ~~DST system unit~~Tank Operations Contractor will complete a profile of the waste feed ~~batch~~ campaign before making a transfer of ~~that~~ a batch to the WTP~~.~~ (a batch is a portion of a waste campaign with similar physical and chemical properties where the required waste processing parameters do not vary). The content and format of the profile will be established prior to the transfer of waste feed. ~~An example~~ The following are examples of the information that will be provided in the profile ~~is~~:

- General information~~, such as~~ (e.g., the identification of the source DST tank from which the transfer will be made and the date of the proposed transfer).
- Physical properties of the waste feed~~, such as~~ (e.g., the proposed volume of ~~the~~each batch transfer and the presence or absence of a separate visible organic layer).
- Historical analytical data~~, such as~~ (e.g., total organic carbon ([TOC]).
- Dangerous waste information~~, such as~~ (e.g., the designation of dangerous waste numbers).
- Land ~~d~~Disposal ~~r~~Restriction (LDR) information.

~~3A.3.2.2 Waste Feed Verification~~

~~At the request of the WTP, the DST system unit will supply a split sample aliquot of the staged waste feed for verification analysis. The aliquot will be analyzed by the WTP for the waste acceptance criteria parameters. The verification process is discussed in Section 3.3, and the waste acceptance criteria for verification are discussed in Section 3.4. If the waste acceptance criteria information is provided by the DST system unit for the staged waste feed, then the WTP will not need to repeat analyses for the provided information.~~

As waste stream disposition requirements are identified, individual waste profiles will be developed in a joint effort between the WTP, Tank Operations Contractor, and the DOE.

~~3A.3.2.3~~3A.3.1.2 Preshipment Review

~~Verification analytical~~Analytical information will be obtained for each waste feed ~~batch whether~~campaign as provided by the ~~DST system unit or determined by the WTP through analysis of the DST split sample aliquot~~Tank Operations Contractor. The purpose of the preshipment review is to evaluate the ~~verification~~ analytical results to ensure compatibility and acceptability of the waste feed before it enters the WTP. If the ~~verification~~ analytical results ~~are within~~indicate the waste meets waste acceptance criteria ~~limits~~, then the waste will be accepted for treatment. If the ~~verification~~ analytical results are outside of the waste acceptance criteria, then the ~~DST system unit~~Tank Operations Contractor will be notified that the waste feed does not conform. Actions in response to non-conformance are addressed in Section 3A.3.~~2.4~~1.3.

The WTP will perform the preshipment review to ensure the waste acceptance criteria are met, and that sufficient storage capacity exists for the waste feed and subsequent post-transfer flush water. Following successful completion of the preshipment review~~,~~ including the resolution of any non-conformance, a representative of the WTP will notify ~~DST system unit~~DOE and Tank Operations Contractor personnel in writing that the WTP is ready for a waste feed transfer. The position title of the WTP representative will be provided prior to the commencement of WTP operations. The two parties will agree on the waste feed transfer date, as well as any other pertinent information.

~~3A.3.2.4~~3A.3.1.3 ~~Non-Conformance~~Nonconformance Action ~~[C-3b, C-3c]~~

Confirmatory action~~, such as~~ (e.g., re-analysis and data review~~,~~) will be performed for each ~~verification~~ analytical result that does not initially meet the acceptance criteria presented in Table 2. Re-analysis of a sample that fails an acceptance ~~criteria~~criterion will consist of two repeat analyses for the failed criteria. If both of the repeat analyses pass, then the sample will be considered to meet that acceptance criteria. If one or both of the repeat analyses fail, the waste will be considered non-conforming. If the waste feed is determined to be non-conforming, then the ~~waste is returned to tank farms. The~~ WTP, the ~~DST system unit~~Tank Operations Contractor, or both, will determine and execute corrective actions necessary to be able to transfer ~~back to WTP to~~and process the waste feed. Such actions may include:

- Waste feed adjustment (blending) to meet the WAC requirements
- Change acceptance criteria requirements if there is no impact to the WTP design, safety basis, or permit requirements (on a case-by-case basis)

If no feasible alternative is found and the feed cannot be accepted, the following actions will be implemented:

- Transfer to an alternative treatment
- Continued waste storage until an alternative is identified

The non-conformance decisions, corrective actions ~~and,~~ supporting data, ~~along with~~and the names and titles of the individuals making these decisions~~,~~ will be documented and retained as a quality assurance (QA) record, according to procedures described in ~~the~~ Appendix 3B, *Quality Assurance Project Plan for*

the Waste Analysis Plan (~~QAPjP), Appendix 3B.~~24590-WTP-RPT-ENV-01-002) (herein referred to as the "QAPP").

~~3A.3.2.5~~3A.3.1.4 Waste Feed Transfer

Waste feed transfer will be coordinated between the DST system unit and the WTP. Prior to waste feed transfer, the WTP will ensure that waste feed transfer systems are operational. These systems include~~,~~ (but are not limited to) to the following:

- Pipeline interstitial leak detection.
- ~~Feed receipt~~CRV or FRP tank level measurement equipment.
- ~~Feed receipt~~CRV or FRP tank ventilation.

Once the transfer systems are confirmed as operational, the ~~DST system unit~~Tank Operations Contractor will transfer the waste feed to the ~~WTP feed receipt tanks~~ LAW CRV or PT Facility FRP vessels through a double-walled pipeline. The ~~DST system unit~~ Tank Operations Contractor will water flush the pipeline after the transfer is complete.

~~3A.3.2.6~~3A.3.1.5 Waste Feed Confirmation ~~[C 2a, C2a(1)]~~

The purpose of confirmation is to ensure that the waste feed received into the WTP is the same waste feed that was accepted for transfer. The method used for confirmation will be a comparison of the volume removed from the DST system unit feed staging tank with the volume received into the ~~WTP feed receipt tanks. The tank~~ LAW CRV or PT Facility FRP vessels. The vessel volume measurement systems for the DST system unit and the WTP are discussed in the following sections. Because the waste transfer is via a closed system with no additions (with the exception of flush water), volume will be used confirm that the waste feed received corresponds to the waste feed accepted for transfer.

~~3A.3.2.6.1~~3A.3.1.5.1 Confirmation Frequency ~~[C 2d]~~, Measurement Locations, and Measurement Methods

Volume measurements will be made from the DST system unit feed staging vessel/tank and the ~~WTP feed receipt tanks~~ LAW CRV or PT Facility FRP vessels for each waste feed transfer. ~~The locations of the waste feed confirmation measurements are identified on Figure B1-1 as S1 for the DST system feed staging tank, and S2 for the WTP waste feed receipt tanks.~~

The method for volume measurement at both the DST system unit feed staging vessel/tank ~~and~~, the ~~WTP feed receipt tanks~~ CRV or FRP vessels will be tank level measurements taken before and after waste feed transfer. The volume is then calculated from the tank level differences, taking into account the volume of the line flush water.

~~3A.3.2.6.2~~3A.3.1.5.2 Confirmation Volume Reconciliation

The WTP and ~~the DST system unit~~ Tank Operations Contractor will reconcile any differences between the measured waste volume transferred out of the DST staging tank and the measured volume received in the ~~WTP waste feed receipt~~ FRP system, including top-off transfers.

~~3A.3.3 Waste Feed Verification Process~~

~~The purpose of verification is to determine whether the DST waste feed staged for transfer can be properly managed in the WTP. Appropriate and reliable analytical information to make this determination will be obtained through the activities discussed in the following sections.~~

~~3A.3.3.1 Verification Sampling and Frequency [C 2c, C 2d]~~

~~At the request of the WTP, the DST system unit will provide one split sample aliquot for each batch of waste feed prior to transfer to the WTP. The sampling location for the waste feed verification is identified on Figure B1-1 as sample point S1.~~

Verification analyses, which are the waste acceptance criteria, are listed in Table B1-3, and discussed in Section 3.4. Methods for selecting a laboratory and establishing laboratory quality assurance (QA) and quality control (QC) procedures are addressed in Section 3.5. Detailed QC information is provided in the QAPjP.

3A.3.3.2 Verification Sampling Methods [C-2c]

The verification split sample aliquot of the DST waste feed staged for transfer to the WTP will be collected as described in Section 9.2 of the *Regulatory Data Quality Objectives Optimization Report (RDQO Optimization) (24590-WTP-RPT-MGT-04-001).*

3A.3.3.3 Sample Preservation, Storage and Holding Times

Sample preservation, storage, and holding times for the sample collected from the DST staging tank for verification analysis are described in Section 9.7 of the *RDQO Optimization (24590-WTP-RPT-MGT-04-001).*

3A.3.3.4 Sampling Quality Assurance and Quality Control [C-2a(2)(b)]

Quality assurance and quality control for verification sampling activities performed by the DST system unit are addressed in Sections 9.6 of the *RDQO Optimization (24590-WTP-RPT-MGT-04-001).* Analytical laboratory quality assurance and quality control are discussed in Section 3.5.2.1 of this WAP.

3A.3.3.5 Selection of Verification Analytes [C-2a]

The selected analytes for waste feed verification are:

- Total organic carbon (TOC)
- Polychlorinated biphenyls (PCBs)
- pH
- Compatibility

The analytical methods and waste acceptance criteria for each of these analytes are listed in Table B1-3 and discussed in Section 3.4.

The list of analytes for waste feed verification is described in the *RDQO Optimization (24590-WTP-RPT-MGT-04-001)* and will be re-evaluated as a result of the environmental risk assessment, currently under development and scheduled to be finalized during cold commissioning LAW and HLW demo tests. The RDQO Optimization process is subject to periodic evaluation and may periodically affect the list of analytes.

3A.3.3.6 Selection of Verification Analytical Methods [C-2a(2)]

Table B1-3 presents the currently selected SW-846 (EPA 1997a) preparation and analytical methods that will be applied to the waste feed to verify that it is acceptable for treatment by the WTP. Any applicable analytical method provided in WAC 173-303-110 may be used for analysis. If an analytical method used for regulatory purposes other than the methods provided in WAC 173-303-110 is proposed, approval of the method will be requested from Ecology, according to WAC 173-303-910(2). The proposed analytical method will not be used for regulatory purposes until Ecology authorizes the method. If modifications to a procedure are needed, they will be requested in accordance with WAC 173-303-110(4). Specific technical guidance for modification of SW-846 (EPA 1997a) methods will be obtained from *Guidance on Testing Requirements* (NRC, EPA 1997), *Preparation of Radioactive Mixed Waste Samples* (ASTM 1990), *Methods of Chemical Analysis* (PNL 1993), as well as recent publications (for example, Mong and others, 1997). The SW-846 (EPA 1997a) "method hotline" indicates that sample size is not a method modification, unless detection limits are not sufficient for making decisions.

~~3A.3.4~~3A.3.2 Waste Acceptance Criteria

The following sections discuss the specific waste acceptance criteria that will be used for ~~verification of~~ the DST waste feed. ~~If the waste acceptance criteria information is provided by the DST system unit for the staged waste feed, then the WTP will not repeat analyses for the provided information.~~ Waste feed received into the WTP that meets the waste acceptance criteria will be treated by the WTP. The WTP feed acceptance criteria described in this section are consistent with those provided in the RDQO Optimization Report (24590-WTP-RPT-MGT-04-001). The RDQO Optimization Report describes the constituents of regulatory concern and analytical methods appropriate for the characterization of the waste feed. The RDQO Optimization Report is designed to address the regulatory needs of the WTP. The waste acceptance parameters are as follows:

- Total organic carbon
- Polychlorinated biphenyls (PCB)
- pH
- Compatibility
- Selected metals
- Selected organic compounds
- Selected anions
- Ammonia
- Cyanide

Collection of samples is performed to facilitate contamination control and to minimize sampler exposure. The RDQO Optimization Report specified a minimum 350 g of sludge solids (if present in the tank) and 500 mL of liquid to complete the regulatory compliance testing for each WTP feed tank, however, it is anticipated that 300 mL slurry containing at least 30 g of solids per HLW sample, and 170 mL of supernatant liquid per LAW sample shall be sufficient (CCN 233666, Sample Volume Required for Analyses of Feed Samples - WAC DQO). Per the sampling event requirements described in the RDQO Optimization Report, the specific sample volume and number of samples to be collected are to be specified in the Tank Sampling and Analysis Plan (TSAP) for the corresponding staged feed. The sample material is collected in the field, and then subaliquoted (and centrifuged, if necessary) in the laboratory under controlled conditions to further reduce exposures. For tank waste samples, typically glass bottles with Teflon lined screw caps or polyethylene bottles are used to collect samples. These are then subsampled and stored in screw cap glass vials (for organic analyses) and in polyethylene vials (for elemental and radiochemical analyses) during sample preparation and analyses in the laboratory. Per the guidelines established using the Performance Based Measurement System[2] approach and safe handling procedures required to limit radiological dose, sample sizes may be reduced from those recommended in the cited analyses.

The following analytes shall be sampled and analyzed in waste feed samples to provide data to assess waste feed compliance with waste acceptance criteria. Table 3A-3 provides a summary of the waste analysis parameters, analytical methods, acceptance criteria and a description of action to undertake should a nonconformance occur.

[2] In the Federal Register, EPA defines the *Performance Based Measurement System* as "a set of processes wherein the data quality needs, mandates or limitations of a program or project are specified, and serve as criteria for selecting appropriate methods to meet those needs in a cost-effective manner." (FRL-5903-2, Federal Register Vol. 62, No. 193).

~~3A.3.4.1~~3A.3.2.1 Total Organic Carbon ~~[C 2a(1), C 2a(2)]~~

The waste feed will be analyzed to determine the TOC. The TOC has been chosen for analysis of the waste feed to ensure that the WTP is not required to comply with Subpart BB ~~found in WAC 173-303-691. Proportionate liquid and solid aliquots of the split sample will be taken for this analysis.~~ of WAC 173-303-691. The analytical method is SW-846 ~~Method 9060 (EPA 1997a)~~, *Test Methods for Evaluating Solid Waste, Physical Chemical Methods* (EPA 2014), Method 9060A or ~~EPA~~ Method 415.2 (EPA ~~1997b~~1997), using persulfate oxidation. The sample aliquot volume requirements for this analysis are expected to be ~~less than 1 milliliter~~3 mL for liquid, and ~~0.1 gram~~2 g or less for solids. This method typically measures TOC to levels of about 1 ~~part per million~~ppm. The criteria for waste acceptance ~~level for this verification process~~ is 10 ~~percent~~wt% TOC. ~~In order to preserve the liquid sample in accordance with Method 9060 (EPA 1997a), the liquid sample will be diluted from 1 part per hundred to 1 part per thousand in water, with enough Sulfuric Acid added to maintain the pH at less than 2 pH units. The dilution will be performed because of the high alkalinity and the need to acidify for preservation. Even with the dilution, Method 9060 (EPA 1997a~~, or less. Method 9060 (EPA 2014) will meet the 1~~ percent~~% detection limit, as given in Table3A-2. The solids will be analyzed separately for TOC~~, and will not be acidified or diluted~~.

~~3A.3.4.2~~3A.3.2.2 Polychlorinated Biphenyls ~~[C 2a(1), C 2a(2)]~~

~~Portions~~ Most of the Hanford tank waste ~~may contain PCBs~~ contains polychlorinated biphenyls (PCB) at concentrations below 50 ~~parts per million~~ppm. These are regulated under the Toxic Substances Control Act ~~(TSCA~~ of 1976~~),~~ (15 USC 2601 et seq.), and codified in ~~40 CFR 761.61~~40 CFR 761.61, *Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions – PCB Remediation Waste*, as PCB remediation waste ~~(Fitzsimmons—~~agreed upon in the *Framework Agreement for Management of Polychlorinated Biphenyls (PCBs) in Hanford Tank Waste* (Ecology, EPA, and ~~others,~~DOE 2000). The waste feed ~~verification~~ sample aliquots will be analyzed to ensure that the waste feed contains less than 50 ~~parts per million~~ppm PCBs. This acceptance criteria of 50 ~~parts per million~~ppm PCBs may change as a result of the risk-based approval of PCBs in the ~~Hanford~~ tank waste that is being prepared jointly by ~~DOE,~~ Ecology, EPA, and ~~EPA~~DOE.

The sample will be separated into solid and liquid phases and analyzed for PCBs by SW-846 Method ~~8082~~8082A (EPA ~~1997a~~2014). Modification of the basic extraction procedure given in this method is expected to be needed to decrease the sample size and allow the extraction to be performed in a shielded glovebox. It is anticipated that a sample size of ~~0.5 to 1 gram~~2 g would be required for solids, and ~~10 to 20 milliliters~~2 mL for liquids. If any single liquid sample contains more than 5 ~~percent~~% solids after centrifuging, the liquid and solid will be analyzed separately. Refer to Table 3A-2 for the acceptance criteria.

~~3A.3.4.3~~3A.3.2.3 ~~Waste Feed~~ pH ~~[C 2a(1), C 2a(2)]~~

The measurement of pH will ensure that ~~a batch of~~the waste feed is compatible with the WTP materials of construction and treatment processes. Method 9040C of SW-846 ~~Method 9040~~ (EPA ~~1997a~~2014) will be used to measure pH. The estimated sample size is 5 ~~milliliters~~mL. The decision criteria is greater than pH 7, as presented in Table 3A-2.

~~3A.3.4.4~~3A.3.2.4 ~~Waste Feed~~ Compatibility ~~[C 2a(1), C 2a(2)]~~

The waste feed will be evaluated for compatibility with the residual aqueous waste in the ~~WTP feed receipt tanks~~LAW CRV or PT Facility FRP vessels, before being accepted into the WTP. These evaluations will focus on the potential for a waste stream to react in an uncontrolled fashion with another waste ~~(40 CFR 264,~~(40 CFR 264, Appendix V, ~~"~~*Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities –* Examples of Potentially Incompatible Wastes~~"~~). Although problems associated with co-mingling aqueous waste feeds are not expected, this evaluation will ensure the compatibility of two or more aqueous waste feeds from different DST system unit tanks.

Waste feed compatibility will be evaluated using ~~the American Society for Testing and Materials Method (~~ASTM~~)~~ D5058-90, *Standard Test Methods for Compatibility of Screening Analysis of Waste* ~~(ASTM 2001)~~. This evaluation provides three test methods to determine compatibility. Test method A, using a reduced sample volume, will be applied to the proposed DST system unit waste feed and the WTP feed receipt tank residual waste. This method prescribes the mixing of aliquots of the two waste streams and an evaluation of any temperature change of the mixture.

The method also calls for a visual examination to determine whether viscosity has increased. These evaluations will be performed to test for potential incompatibilities that could adversely affect the management of the waste in the WTP.

The recommended sample volume for this test method is 150 to 300 ~~milliliters~~ mL. The sample size will be decreased to 10 ~~milliliters~~ mL from each waste feed ~~source,~~type (supernate and sludge, if present), for a total of 20 ~~milliliters~~ mL of the combined waste feeds for waste minimization, and will comply with the as low as reasonably achievable ~~(ALARA)~~ philosophy~~.~~, referred to as "ALARA."

3A.3.2.5 Metals

The waste feed will be evaluated for toxicity characteristic metals, underlying hazardous constituent metals and metals of interest for potential future delisting of IHLW. Waste feed metals will be determined using Methods 7470A or 7471B of SW-846 (EPA 2014) for mercury and Method 6010D of SW-846 (EPA 2014) for metals other than mercury. The waste feed metals are the following:

- Antimony
- Arsenic
- Barium
- Beryllium
- Cadmium
- Chromium
- Copper
- Lead
- Mercury
- Nickel
- Selenium
- Silver
- Thallium
- Vanadium
- Zinc

The recommended sample size for metals (except mercury) is 3 mL and the recommended sample volume for mercury is 1 mL (or 2 g and 1 g of solids for metals and mercury analysis, respectively).

3A.3.2.6 Organic Chemicals

The waste feed will be evaluated for organics. Three SW-846 (EPA 2014) methods will be used. Method 8270D will be used for analysis of semivolatile compounds; Method 8260B will be used for analysis of volatile compounds; and Method 8081B will be used to measure organochlorine pesticides. The recommended sample size for volatile organic compounds is 10 mL, and the recommended sample size for semivolatile organics and pesticides is 3 mL. These analytical methods are "catch-all methods," meaning the methods are capable of detecting multiple constituents as available in the analytical library.

The requested analysis will include the request for reporting of all quantifiable constituents, with the minimum as specified by the analytical method.

3A.3.2.7 Anions

Waste feed will be evaluated for the following anions using Method 9056A of SW-846 (EPA 2014):

- Fluoride
- Chloride
- Nitrite
- Bromide
- Nitrate
- Phosphate
- Sulfate

The recommended sample size for anions analysis is 20 mL of liquid and 20 g of solid.

~~3A.3.5 Analytical Laboratory~~

~~The following sections discuss the WTP's onsite analytical laboratory and the quality assurance and quality control that will be implemented for analytical activities and for sampling performed by the WTP. Also discussed is the selection of other analytical laboratories.~~

~~3A.3.5.1 Waste Treatment Plant Analytical Laboratory~~

~~The WTP will establish and operate an onsite analytical laboratory. A laboratory quality assurance (QA) program meeting the requirements of SW-846, Chapter 1, Section 4.4 (EPA 1997a) will be prepared before initiation of laboratory operations.~~

~~3A.3.5.2 Establishing Quality Assurance and Quality Control Procedures [C 2a(2)(b)]~~

~~The following sections discuss the quality assurance (QA) and quality control (QC) for the analytical laboratory and for sampling operations.~~

~~3A.3.5.2.1 Laboratory QA and QC~~

~~The WTP laboratory will conduct its operation in a way that ensures that reliable information is provided on request. The policies and procedures described in the QAPjP will be implemented to ensure reliable data.~~

~~Laboratory equipment and instrumentation will meet the requirements and specifications of the test methods and other procedures described in the QAPjP.~~

~~The QAPjP will describe or refer to laboratory activities that may affect data quality. Any deviation from an established procedure during a data collection activity will be documented. QC procedures will be available for the indicated activities as described in the QAPjP.~~

~~The QAPjP describes how the following elements of the QC program will be implemented:~~

- ~~Sample control~~
- ~~Analyses~~
- ~~Measures of precision, accuracy, and representativeness~~
- ~~Deviation~~
- ~~Corrective action~~
- ~~Data reduction and validation~~

- ~~Reporting~~
- ~~Generation, control, and disposal of records~~

~~The QA organization will conduct reviews consisting of internal and external assessments to assure that QA/QC procedures are in use and that laboratory staff conform to these procedures. QA reviews will be conducted as deemed appropriate and necessary. Non-conformances will be documented.~~

~~3A.3.5.2.2 Waste Treatment Plant Sampling QA and QC~~

~~Sampling procedures, equipment, and sample preservation and handling requirements are discussed in the QAPjP. Policies and procedures commensurate with the complexity and importance of data will be developed and implemented.~~

~~Equipment, instrumentation, and supplies at the sampling site will be identified in written procedures that will be developed to accomplish the activities planned. The procedures will typically include the following information:~~

- ~~Sampling equipment~~
- ~~Sample management~~
- ~~Reagent and standard preparation~~
- ~~Decontamination equipment~~
- ~~Sample collection~~
- ~~Field measurements~~
- ~~Equipment calibration and maintenance~~

~~3A.3.5.3 Selecting Other Analytical Laboratories~~

~~The WTP may~~

3A.3.2.8 Ammonia

Waste feed (supernate) will be evaluated for ammonia using EPA Method 350.3 (EPA 1989) or Standard Method 4500-NH_3-F (APHA 1992). It is anticipated that 0.5 mL of liquid will be necessary for the analysis. Solids are not analyzed for ammonia.

3A.3.2.9 Cyanide

Waste feed will be evaluated for cyanide using Methods 9012B or 9010C / 9014 of SW-846 (EPA 2014). The recommended sample size for cyanide analysis is 1 mL of liquid and 0.2 g of solid.

3A.3.3 Analytical Services

The WTP will contract with other ~~Hanford Site~~ laboratories to provide analytical services, as necessary, based on a review of the ability of each laboratory to provide acceptable data for the types of waste handled by the WTP. The review will include an onsite surveillance of the laboratory facilities, and a review of its documentation. Evaluation of candidate laboratories will be based on the following criteria:

- Licenses or permits issued by the applicable government authority, allowing the laboratory to handle waste samples that contain chemical and radiological components.
- Laboratory accreditation.
- Analytical capacity, including number and type of analytical instruments, sample preparation facilities, and sufficient uncommitted capacity, or a commitment to procure sufficient capacity to handle the sample load.
- Adequate number of qualified technical staff.
- Demonstrated history of performing acceptable analyses.

- Adequate sample tracking system (refer to Section ~~7~~3A.8.2~~, *Sample Tracking*~~).
- A demonstrated QA program ~~that meets the requirements of SW-846, Chapter 1, Section 4.4 (EPA 1997a).~~and participation in performance evaluation.

~~3A.3.6~~3A.3.4 Waste Feed Designation

Waste numbers described in the ~~*Double-Shell Tank*~~*DST System* ~~*Unit*~~*/ 204-AR Waste Unloading Station – Dangerous Waste Permit*~~, Operating Group 12, Addendum B, Waste Analysis Plan~~ *Application, Part A Form* (Ecology 2009) are applicable to the waste feed. These dangerous waste numbers are listed in Table 3A-2.~~.~~

The waste feed will carry the numbers for ignitable (D001) and reactive (D003) waste. However, based on past process knowledge,~~—~~which includes the age, temperature, history, and chemical composition of the waste feed stored in the DST system unit~~,~~—it is not expected to exhibit the characteristics of ignitability or reactivity found in ~~WAC 173-303-090~~WAC 173-303-090, *Dangerous Waste Regulations – Dangerous Waste Characteristics*. After the waste feed has been received into the ~~WTP~~PT Facility, this process knowledge will be used to remove the dangerous waste number for ignitability and reactivity.

When the WTP is configured for DFLAW operations, the Tank Operations Contractor will ensure that LAW feed does not carry waste codes D001 and D003 when transferred to the LAW Facility. As previously discussed, if the waste is pretreated or conditioned to meet LAW Facility acceptance criteria before transfer to WTP, which will include not having the D001 and D003 codes, the waste may be transferred directly to the LAW Facility under the DFLAW configuration. The following discussions only apply to waste feed to be transferred to the PT Facility in the baseline configuration.

Precautions taken to prevent accidental ignition or reaction of ignitable or reactive waste will be in accordance with WAC 173-303-395(1) (a) through (d), and will be documented in the WTP operating record in accordance with WAC 173-303-395(1)(c), as discussed in the QAP~~j~~P. Tank inspection is addressed in ~~Appendix 6A~~Chapter 6 of the DWP.

~~3A.3.6.1~~3A.3.4.1 Ignitable Waste

Four properties of a waste found in WAC 173-303-090(5)(a)(i through iv) are used to determine whether a waste exhibits the characteristic of ignitability. These four properties are listed in Table 3A-4, and are discussed below.

~~WAC 173-303-090(5)(a)(i) states, in part: "It~~ WAC 173-303-090(5)(a)(i) states that waste is ignitable if the sample waste "…is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume, and has a flash point less than 60~~°~~ degrees C (140~~°~~ degrees F~~)." The~~)…." Report HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report* (DOE-RL 1999), identifies 241-C-103 as the only tank, at this time, that contains a separate organic solvent phase. The flash point of the separate organic solvent phase on ~~Tank~~tank 241-C-103 was determined to be 118 ºC ~~(Pool and Bean,~~in report PNL-9403, *Waste Tank Organic Safety Project: Analysis of Liquid Samples from Hanford Waste Tank 241-C-103* (PNL 1994). This flash point is well above the regulatory threshold of 60 ºC for determining the characteristic of ignitability and represents a worst~~-~~case flash point for the liquid portion of the waste feed. ~~Since~~ Because the liquid portion of the waste feed is aqueous and contains a maximum of 10 ~~percent total organic carbon~~wt% TOC, the flash point test will not be performed on the aqueous waste feed.

The WAC 173-303-090(5)(a)(ii) property of ignitability pertains to material that is not a liquid. Portions of the Hanford tank waste are in a solid (crust and salt cake) and semi-solid (sludge) form. Process knowledge indicates that this property of ignitability does not apply to the tank waste. Throughout the history of the ~~tank farms (Blankenship,~~Tank Farms—according to memorandum 82331-90-313, *Double-Shell Tank Waste Designation* (Westinghouse 1990~~),~~)—there has been no evidence of the solid or semi-solid portions of the tank waste ~~"~~"…causing fire through friction, absorption of moisture or spontaneous

chemical changes, and, when ignited, burns so vigorously and persistently that it creates a hazard" (WAC 173-303-090(5)(a)(ii)).

WAC 173-303-090(5)(a)(iii) pertains to compressed gas. This definition does not apply since because the Hanford tank farm waste is not a compressed gas.

WAC 173-303-090(5)(a)(iv) states: "It that waste is an oxidizer, if it is defined as such in 49 CFR 173.127 and 173.128"."…yields oxygen readily to stimulate the combustion of organic matter." According to 49 CFR 173.12749 CFR 173.127, *Shippers – General Requirements for Shipments and Packagings – Class 5, Division 5.1 – Definition and Assignment of Packing Groups*, an oxidizer is defined as "…a material that may, generally by yielding oxygen, cause or enhance the combustion of other materials." Nitrate and nitrite salts are present in the waste feed (Blankenship,Westinghouse 1990) and can yield oxygen. However, the report HNF-4240, *Organic Solvent Topical Report* (HNF-4240) CH2M Hill 2000), determined that the nitrate and nitrite in the DST waste will not cause or enhance the combustion of other materials. Thus, the DST waste does not meet the definition of an oxidizer. The *Organic Solvent Topical* Report (HNF-4240) was independently reviewed and accepted by the Chemical Reactions Subpanel of the Tanks Advisory Panel, the Defense Nuclear Facilities Safety Board staff, and the Oregon Office of Energy (DOE-ORP 2000). —which is documented in memorandum 00-SHD-066, *Closure of the Organic Solvent Safety Issue and Removal of the Organic Solvent Tanks from the Watchlist* (DOE-ORP 2000).

49 CFR 173.12849 CFR 173.128, *Shippers – General Requirements for Shipments and Packagings – Class 5, Division 5.2 – Definitions and Types*, defines organic peroxides and is not applicable to the waste feed.

The dangerous waste number D001 for ignitability will be removed from the waste feed after it is received into the WTPPT Facility, based upon the previous discussions of process knowledge. Waste feed accepted in the DFLAW operations configuration will not carry the D001 code. The Tank Operations Contractor will ensure that treated LAW feed does not carry waste code D001 (ignitability) when transferred to the LAW Facility

3A.3.6.23A.3.4.2 Reactive Waste

WAC 173-303-090(7)(a)(i through viii) lists eight properties of a waste that would cause it to be designated as a reactive waste. The eight properties are listed in Table 3A-5 and are discussed in the following paragraphs.

WAC 173-303-090(7)(a)(i) describes a waste that is unstable and will undergo violent change. The Hanford tank waste has not exhibited a violent change during the history of the tank farmsTank Farms. Differential thermal analysis or differential scanning calorimeter analysis has been performed on the tank waste. These tests have shown that the waste does not react under thermal stress (Blankenship,Westinghouse 1990).

WAC 173-303-090(7)(a)(ii), (iii), and (iv) involves waste that, when mixed with water, produces hazardous reactions, or generates toxic gases, vapors, or fumes. Since Because the Hanford tank waste is already a water solution, it does not meet the following definitions that:. (ii) "It reacts violently with water," (iii) "It forms potentially explosive mixtures with water," or (iv) "When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment."

Hydrogen, Aammonia, oxides of Nnitrogen, and Mmethane are generated in the Hanford waste tanks. These gases are generated primarily from the radiolytic decomposition of the waste and are not a result of mixing with water (Johnson, —according to report HNF-SF-1193, Rev 1, *Flammable Gas Project Topical Report* (PNNL 1996). Nevertheless, flammable gases produced by the waste's radiolytic decomposition

of the waste,and, to a lesser degree, thermolytic decomposition, will be managed at the WTP through ventilation of the vessels that contain the waste feed.

WAC 173-303-090(7)(a)(v) concerns the generation of toxic gases, vapors, or fumes when a Ccyanide- or Ssulfide-bearing waste is exposed to pH conditions between 2 and 12.5, in a quantity sufficient to present a danger to human health or the environment. Hydrogen Ccyanide and Hhydrogen Ssulfide are the gases that would be generated from Ccyanide- or Ssulfide-bearing waste when exposed to acidic conditions. In 1985, the EPA published guidance for determining regulated thresholds for these gases as 250 milligrams per kilogram mg/kg of waste for Hhydrogen Ccyanide and 500 milligrams per kilogrammg/kg of waste for Hhydrogen Ssulfide. Although these numerical thresholds were rescinded by the EPA via memorandum *Withdrawal of Cyanide and Sulfide Reactivity Guidance* (EPA 1998), they are still useful as benchmarks for determining the characteristic of reactivity and are still accepted by Ecology.

Thirteen tanks have been investigated by the Pacific Northwest National Laboratory under CH2M Hill Hanford Group, Inc.,. (Project Number 41503,) for their potential to generate these gases at a pH between 2 and 12.5. Included in these thirteen tanks are the tanks scheduled for vitrification during the first ten 10 years of WTP operation. This report researched the analytical data for the concentrations of Ccyanide and Ssulfide in the supernatant and solids in the tanks, using the best basis inventory on the Tank Waste Information Network System database current to November 2000 (LMHCLockheed Martin 1999). Analytical data for Ccyanide was available, but no data was available for Ssulfide since because there is no history of Ssulfide addition to the tTank fFarms. Consequently, the author used total Ssulfur and Ssulfate concentration values for the evaluation. Standard chemistry principles were used to calculate the potential generation of Hhydrogen Ccyanide and Hhydrogen Ssulfide in acidic conditions. This investigation determined that Hhydrogen Ccyanide and Hhydrogen Ssulfide would not be generated at the respective benchmark levels of 250 and 500 milligrams per kilogrammg/kg of waste for these tanks. Thus the waste feed contained in tanks scheduled for the first ten 10 years of WTP operation is not considered to be Ssulfide- or Ccyanide-bearing waste.

WAC 173-303-090(7)(a)(vi), (vii), and (viii) is concerned with waste that will detonate or explode. Process knowledge and history indicate that the Hanford tank waste does not detonate or explode. As mentioned previously, differential thermal analysis or differential scanning calorimeter analysis has been performed on the tank waste, showing that it does not react under thermal stress (Blankenship,Westinghouse 1990). Finally, the tank farm waste is not regulated as an explosive in 49 CFR 173.50.49 CFR 173.50, *Shippers – General Requirements for Shipments and Packagings – Class 1 – Definitions.*

The WTP will remove the dangerous waste number D003 for reactivity will be removed from the waste feed based after it is received into the PT Facility, upon the above previous discussions of process knowledge. Waste feed accepted in the DFLAW operations configuration will not carry the D003 code. The Tank Operations Contractor will ensure that treated LAW feed does not carry waste code D003 (reactivity) when transferred to the LAW Facility.

3A.4 WASTE FEED CHARACTERIZATION [C-1, C-2]

This section describes the general characterization of waste to support assessment of applicable waste acceptance criteria. Prior to the transfer of DST waste feed, the WTPTank Operations Contractor will characterize the waste feed in conformance with the RDQO Optimization Report (24590-WTP-RPT-MGT-04-001). After the the set of analytes are determined and methods are developed and approved by Ecology, the waste feed will be analyzed and the results used to characterize the waste. The data quality objective process is an ongoing activity and may periodically affect the set of analytes and analytical methods. To date, the RDQO Optimization Report has been the basis for the selection of the of the waste acceptance criteria presented in Section 3A.3.2. The subsections below identify corresponding sections of the RDQO Optimization Report.

3A.4.1 Sampling Methods and Sampling Frequency ~~[C 2c, C 2d]~~

The samples collected for characterization of the ~~DST~~ waste feed staged for transfer to the WTP will be collected as described in Section 9~~.2~~ of the RDQO Optimization Report (24590-WTP-RPT-MGT-04-001). ~~One~~A minimum of one sample will be collected from the ~~DST~~ waste feed tank for characterization of the waste stored in that tank.

3A.4.2 Sample Preservation, Storage, and Holding Times

Sample preservation, storage, and holding times for the samples collect to support characterization of the DST waste feed are discussed in Section 9~~.7~~ of the RDQO Optimization Report (24590-WTP-RPT-MGT-04-001).

3A.4.3 Selection of Analytes ~~[C 2a(1)]~~

The analytes for characterization of the ~~DST~~ waste feed have been determined as a result of the RDQO Optimization Report (24590-WTP-RPT-MGT-04-001~~) process and~~). The analyte list will be ~~re-evaluated as a result of~~finalized after completing the environmental risk assessment, currently under development. These activities are scheduled to be completed prior to the commencement of cold operations, and will be used to ~~establish a~~verify the set of analytes described in Section 3A.4 as appropriate ~~to perform~~for characterization of the ~~DST~~ waste feed.

3A.4.4 Selection of Analytical Methods ~~[C 2a(2)(a)]~~

~~Identification of~~The analytical methods that will be used to obtain the necessary data for characterizing the DST waste feed ~~is~~ are addressed in Section 9.8~~.3~~ of the RDQO Optimization Report (24590-WTP-RPT-MGT-04-001). ~~Modified SW-846 (EPA 1997a) methods, except for sample size or as otherwise identified in the RDQO Optimization (24590-WTP-RPT-MGT-04-001), will not be used for characterization until they are authorized by Ecology.~~

3A.4.5 Quality Assurance and Quality Control ~~[C 2a(2)(b)]~~

~~Quality assurance~~The QA and quality control (QC) for ~~DST~~ waste feed characterization are addressed in Sections 9.6 and 9.8~~.5~~ of the RDQO Optimization Report[3] (24590-WTP-RPT-MGT-04-001~~) report.~~). Additional QA and QC requirements for sampling and analysis in support of the characterization of the waste feed and the characterization of secondary waste streams are provided in Appendix 3B of this permit

3A.5 SECONDARY WASTE STREAMS

In addition to the vitrified glass product, the PT Facility's pretreatment processes and the Lab, EMF, LAW and HLW~~-~~ facilities' vitrification processes will generate a variety of solid, liquid, and gaseous waste streams. Some of these waste streams include waste derived from the incoming feed from the DST system unit. Other wastes include spent materials used in processing the waste feed, such as rinsate and scrubber solutions that come into contact with the waste feed or its derivatives, and contaminated equipment. General facility operations and maintenance activities will also generate dangerous waste.

~~Waste streams regulated under WAC 173-303 (because of dangerous waste concerns) include the ILAW and IHLW, as well as miscellaneous secondary solid and liquid waste streams. Air emissions subject to regulation, commonly referred to as Subparts AA, BB, and CC, are discussed in Section 2.3.4. Other regulated air emissions are addressed under the permit applications to be developed under the Clean Air~~

[3] The RDQO Optimization Report, Section 9.6 "Quality Assurance" specifies compliance with NQA-1-1989, however, the WTP *Quality Assurance Manual* (24590-WTP-QAM-QA-06-001) updates this requirement and requires compliance with NQA-1-2000 (ASME 2000).

~~Act of 1990 (CAA 1990) and the Washington Clean Air Act of 1967 (WCAA 1967), and are not included in the following discussions.~~

~~Section 5.1 describes the land disposal restriction (LDR) evaluation for the immobilized waste streams.~~ ~~Section 5.2~~ This section describes the secondary waste streams generated by the WTP, including characterization of secondary waste, the associated sampling and analysis activities, and the ultimate treatment, storage, or disposal of regulated waste~~TSD of regulated waste~~. Air emissions subject to regulation, commonly referred to as Subparts AA, BB, and CC, are discussed in Section 3A.2.4.5.1. Other regulated air emissions are addressed under the *Clean Air Act of 1990* (42 USC 7401 et seq.) and the *Washington State Clean Air Act of 1967* (RCW 70.94 et seq.) permits and are not included in the following discussions.

~~3A.5.1 Land Disposal Restrictions Evaluation for Immobilized Waste~~

~~This section describes the approach for addressing the LDR program requirements applicable to the land disposal of ILAW and IHLW.~~

~~5.1.1 Land Disposal Restrictions Treatment Standards~~

~~Land disposal restrictions are codified in WAC 173-303-140, which incorporates 40 CFR Part 268 by reference. 40 CFR 268.40 identifies the treatment standards for the land disposal of a dangerous waste. It states:~~

> ~~"(a) A waste identified in the table "Treatment Standards for Hazardous Wastes" may be land disposed only if it meets the requirements found in the table. For each waste, the table identifies one of three types of treatment standard requirements:~~
>
> ~~(1) All hazardous constituents in the waste or in the treatment residue must be at or below the values found in the table for that waste ("total waste standards"); or~~
>
> ~~(2) The hazardous constituents in the extract of the waste or in the extract of the treatment residue must be at or below the values found in the table ("waste extract standards"); or~~
>
> ~~(3) The waste must be treated using the technology specified in the table ("technology standard"), which are described in detail in § 268.42, Table 1 – Technology Codes and Description of Technology-Based Standards."~~

~~The "total waste standards" and "waste extract standards" require repeated sampling and analysis of the waste to demonstrate that the dangerous constituents in the waste are at or below the values found in the table. These standards are appropriate for a limited dangerous waste stream, but are not a good choice for a mixed waste stream of extended duration because of repeated human exposure during sampling and analysis.~~

~~*Table 1 – Technology Codes and Description of Technology-Based Standards* (40 CFR 268.42) includes the technology standard HLVIT. At the request of DOE, the HLVIT treatment technology was promulgated by the EPA to treat the tank wastes at the Savannah River Site. According to the *Treatment Standards for Hazardous Wastes* table (40 CFR 268.40), HLVIT is the technology for the treatment of the following dangerous waste numbers from radioactive high-level wastes generated during the reprocessing of fuel rods:~~

- ~~D002 Corrosivity (pH)~~
- ~~D004 Arsenic~~
- ~~D005 Barium~~
- ~~D006 Cadmium~~
- ~~D007 Chromium (total)~~
- ~~D008 Lead~~

D009 Mercury
D010 Selenium
D011 Silver

3A.5.1.1 Treatment Standard for the Hanford Tank Waste

Similar to the treatment of the Savannah River Site tank waste, the treatment of the Hanford tank waste will require many years of WTP operation. Rather than repeated sampling and analysis of the waste to demonstrate LDR using the total waste standard or the waste extract standard, it would be appropriate to treat the Hanford tank waste to a specific treatment standard, such as the HLVIT treatment standard described above for the Savannah River Site tank waste. Consequently, the WTP will submit a land disposal restriction treatability variance petition to the EPA and Ecology to establish a new treatment standard that will be specific to the Hanford tank waste. The new treatment standard would specify vitrification as the land disposal treatment standard for Hanford double-shell and single-shell tank waste for the characteristic and listed waste numbers applicable to the Hanford tank waste.

As required by 40 CFR 268.44, *Variance from a treatment standard*, the petition will be submitted in accordance with the procedures specified in 40 CFR 260.20. The negotiated petition would be published in the Federal Register for public comment. After successful resolution of public comments, the EPA would promulgate a final rule establishing the treatment standard. The Hanford tank waste would then meet LDR through treatment by the promulgated treatment standard.

3A.5.2 Secondary Waste Streams

The WTP's primary mission is to vitrify the Hanford tank waste. This process will also generate a variety of secondary waste streams that must be properly managed. The management of secondary waste streams that will be regulated as dangerous waste is discussed in this section.

Secondary waste streams that will be transferred back to the DST system unit will be designated with waste numbers based upon process knowledge. Waste transferred to the DST system unit will meet the DST waste acceptance criteria.

Secondary waste streams are divided into solid waste streams (discussed in Section 3A.5.2.1) and liquid waste streams (discussed in Section 3A.5.2.2). Dangerous waste streams generated within the WTP will meet the waste acceptance criteria or protocols established by the receiving TSD facilities' permits and operating authority. This document does not outline the details of sampling and analyzing each waste stream because each TSD receiving waste may update its waste acceptance criteria and thus alter the required waste analyses.

The following general information related to waste classification applies to solid and liquid secondary waste streams:

- Normally, waste streams will be designated using process knowledge. Acceptable process knowledge includes:
  - Historical analytical data
  - Mass balance from a controlled process with a specified output for a specified input
  - Material sSafety data sheets (SDS)
  - Analytical data on the waste from a similar process
  - For mixed waste, process knowledge could include information from surrogate material. (that is, a non-radioactive waste generated from an analogous activity or process)
- The listed waste numbers F001 through F005 will follow the secondary waste if the secondary waste is derived from the waste feed. F039 waste was never placed in the DST system unit, and will not be applied designated to secondary waste. If the DST system unit receives F039 waste in

the future, ~~then~~ F039 will then be ~~applied~~designated to secondary waste that contacts the DST waste feed.

- Secondary wastes ~~that are~~ not derived from the waste feed~~, such as laboratory~~ (e.g., Lab and maintenance waste~~,~~) will be characterized and designated with the appropriate EPA hazardous waste numbers and Washington State dangerous waste numbers, and managed accordingly.
- If analyses are required for determining waste numbers for a secondary waste, laboratory procedures will be prepared using applicable SW-846 ~~(EPA 1997a)~~ methods~~.~~ (EPA 2014). Analytical procedures will be revised, as appropriate, if SW-846 ~~(EPA 1997a)~~ methods are revised.
- Documentation of the process knowledge or analytical data used to designate the waste numbers will be maintained in the WTP operating record. Documentation is discussed in Section ~~6~~3A.7 of this report, and waste tracking is presented in Section ~~7~~3A.8.
- Characteristic of ignitability (D001) and reactivity (D003) waste numbers, if applicable, can be removed after testing or the application of process knowledge, as appropriate.

~~3A.5.3~~3A.5.1 Secondary Solid Waste Streams

~~Solid waste streams that are designated as dangerous or mixed waste will be transferred to Hanford Site TSDs in accordance with the current *Hanford Site Solid Waste Acceptance Criteria* (HSSWAC) (HNF 2001). The WTP will meet the unit specific waste acceptance criteria for the receiving Hanford Site or other appropriate TSD. Solid wastes that are stored at the WTP will meet the acceptance criteria of the specific WTP storage area.~~Solid waste will be generated from WTP operations and includes a wide variety of wastes—such as waste derived from routine maintenance activities, nonroutine maintenance activities, and daily operating activities. The following sections describe the various mixed and variable solid waste types to be generated. Refer to the WAP glossary for additional details on the specific waste types.

~~3A.5.3.1~~3A.5.1.1 Solid Waste Designated as Mixed Waste

Solid waste streams that will come into contact with the waste feed during any stage of the treatment processes will be designated as mixed waste by process knowledge. These secondary waste streams are listed in Table ~~Table B1-6~~Table 3A-6. EPA hazardous waste numbers and Washington State dangerous waste numbers will be assigned to these mixed waste streams, based on the characterization of the waste feed. Each waste stream discussed below will meet the waste acceptance criteria of the receiving facility. A discussion of each of these mixed waste streams is provided.

Out-of-Service Melters

It is anticipated that melters will require replacement at some point, due to the harsh conditions of the vitrification process. When the end of a melter's operational life is reached, residual molten glass will be removed as immobilized product, as much as is practical. The melter will be allowed to cool and then will be disconnected.

~~The locally shielded melter (LSM) will be a disposal container or overpack, defined as a Resource Conservation and Recovery Act (RCRA 1976) miscellaneous unit, containing the LAW melter. The LSM, including residual glass, will be the final disposal container. After disconnection, the openings will be closed to provide complete containment. The LAW LSM will be transported to a permitted Hanford TSD. Refer to Chapter 4.0 for a more complete description of the LSM.~~

~~A HLW melter that is removed from service and that meets the HSSWAC will be placed into an overpack that will serve as its disposal container. The HLW disposal container is not a LSM. The overpacked HLW melter will be transported to a permitted Hanford Site TSD for disposal.~~

~~An out-of-service HLW melter may not meet the HSSWAC, depending on its radionuclide content. If this should occur, the overpacked HLW melter will be stored at the WTP or another permitted facility until facility closure, at which time it will be dismantled, packaged, and transported to a permitted Hanford Site TSD for disposal.~~

~~The details for the disposal of the LAW LSM and overpacked HLW melters are currently under development.~~

The LAW melters will be provided to the disposal facilities in a shielded and seal-welded melter package. The melters may require a LDR treatability variance to allow land disposal at the Hanford Site. The Tank Operations Contractor, with the Plateau Remediation Contractor, has been tasked with developing a disposal path for the WTP LAW melters. A determination has yet to be made if the LAW melter will require additional treatment at the disposal facility. Due to the extreme weight of a spent or failed LAW melter, treatment (if needed) would have to be completed at or near the disposal site. If treatment will occur at the disposal facility, the appropriate permit modifications will be required to include this activity.

Current data indicate that the concentration of TRU constituents will cause some HLW melters to be designated as a TRU waste. The LDR treatment standards for the HLW melter are met by the macroencapsulation of the melter in an 8-inch thick welded carbon steel shielded overpack. The Tank Operations Contractor, with the Plateau Remediation Contractor, has been tasked with developing a disposal path for the WTP HLW melters. The HLW melters may require an LDR treatability variance to allow land disposal at the Waste Isolation Pilot Plant (WIPP) or another offsite facility. If future waste characterization data validates that some HLW melters will be TRU waste, permitting and approval for long-term storage of this TRU waste at the Central Waste Complex will then be needed. Facilities to grout, size reduce, and package the melters to meet the WIPP waste acceptance criteria or a yet to be established HLW disposal facility do not exist.

High-Level Waste Glass Residue

The disposal path for HLW glass residue that may be removed from an out-of-service HLW melter will be determined case-by-case. Final disposal will be based on the radionuclide content and dangerous characteristics of the glass residue. It is anticipated that this secondary waste will be classified as remote-handled, mixed low-activity waste. These wastes will be packaged for transportation in shielded transportation casks and treated for disposal at a commercial vendor to meet the LDR.

Melter Components

Melters will be fitted with various ancillary equipment (~~such as~~e.g., bubbler assemblies, heating elements, and thermocouples) that ~~may~~will require periodic replacement. The ancillary equipment will be removed, designated by process knowledge as mixed waste, and packaged and transferred to an appropriate TSD unit. It is anticipated that LAW melter components will be contact-handled, mixed low-activity waste; the HLW melter components will be remote-handled, mixed low-activity waste. Both these secondary waste streams will be packaged for transportation and treated for disposal at a commercial vendor to meet the LDR.

~~Off-gas~~Offgas Treatment System Components

HEMEs, HEPA filters, and silver mordenite canisters will be components of the ~~off-gas~~offgas treatment system incorporated to remove contaminants from the ~~off-gas~~offgas streams prior to discharge. These components will periodically be replaced to maintain treatment efficiency. They will be designated by process knowledge, packaged, and transferred to an appropriate TSD unit.

Spent Carbon and Catalyst from ~~Off-gas~~Offgas Treatment

Spent carbon and catalyst from ~~off-gas~~offgas treatment will periodically be replaced to maintain treatment efficiency. These materials will be designated by process knowledge and managed as mixed waste. They will be removed from their respective equipment, packaged, and transferred to an appropriate TSD unit.

Spent Ion Exchange Resins

Ion exchange resins used for cesium removal will periodically be replaced to maintain treatment efficiency. These resins will be designated by process knowledge and managed as mixed waste. They will be eluted, removed from their respective columns, dried and packaged in high-integrity containers, and finally transferred to an appropriate TSD unit.

Spent Ultrafilters

Ultrafilters may be periodically replaced to maintain treatment efficiency. They will be designated as mixed waste by process knowledge, packaged, and transferred to an appropriate TSD unit.

Out-of-Service Equipment

Ancillary equipment~~, such as~~ (e.g., pumps, valves, piping, motors, and electrical equipment ~~that is~~) no longer fit for use, will be removed from service and designated as out-of-service equipment. Out-of-service equipment that contacted the waste feed ~~or secondary waste liquid streams~~ will be designated by process knowledge, packaged, and transferred to an appropriate TSD unit.

Entrained Solids

Entrained solids will be generated by pretreating the LAW feed ~~using~~ via ultrafiltration. The separated solids will be washed and again concentrated ~~using~~ via ultrafiltration. The entrained solids will either be incorporated into the ~~HLW feed~~IHLW or the ILAW or returned to the DST system unit in the form of a slurry via pipeline.

~~3A.5.3.2~~3A.5.1.2 Variable Solid Waste Streams

The waste streams listed in Table 3A-7 can be radioactive waste, dangerous waste, or mixed waste, depending on the source of the waste and whether it had contact with the waste feed. The EPA hazardous waste numbers and Washington State dangerous waste numbers will be assigned to these waste streams, based on the designation of the waste by process knowledge. In addition to the waste streams listed in Table 3A-7, raw process materials and chemicals will be brought onto the WTP site. Some of these substances may subsequently become waste and will require characterization for proper waste management. ~~The material safety data sheet (MSDS)~~ The SDS provides the information necessary to properly characterize and designate a substance when it becomes a waste. Vendors will be required to provide ~~MSDS~~ SDS for substances that will be brought onto the WTP site, and ~~a MSDS~~ an SDS file will be maintained by the WTP. Examples of these types of substances are process and laboratory chemicals, lubricants ~~such as~~(e.g., oils and greases), and maintenance products~~, such as~~ (e.g., paints, solvents, and adhesives).

Subcontractors to the WTP will be required to have an ~~MSDS~~SDS for the substances that they bring onto the WTP site. Subcontractors will also be required to remove the residuals of any substance that they bring onto the WTP site, including wastes generated ~~such as~~(e.g., wipes, paintbrushes, and personal protective equipment~~.~~ [PPE]). Subcontractors may make arrangements with another waste management organization to manage the generated wastes.

Laboratory Waste

~~Liquid laboratory waste collected in the hot cell drain and lab area sink drain collection vessels will be transferred to the pretreatment facility for recycle.~~ Non-wastewater laboratory waste derived from the waste feed will be designated as mixed waste by process knowledge, packaged, and transferred to an

appropriate TSD unit. Other non-wastewater laboratory wastes~~, such as~~ (e.g., off-specification laboratory chemicals~~,~~ and spent or unused simulant) will be designated by process knowledge and managed accordingly. These wastes will be packaged and ~~treated as necessary and~~ disposed of at an appropriate TSD unit.

Personal Protective Equipment

Personnel performing certain tasks such as facility maintenance, treatment process operations, and waste packaging activities, may wear PPE~~personal protective equipment~~. Used ~~personal protective equipment~~ PPE may be returned to the vendor for cleaning and refurbishment. Used ~~personal protective equipment~~PPE that cannot be recycled to the vendor and has had contact with waste feed or other sources of radiological contamination will be designated as radioactive or mixed waste by process knowledge, packaged, and transferred to an appropriate TSD~~. Personal protective equipment waste that is not radioactive but is~~ unit. The PPE nonradioactive waste designated as dangerous waste by process knowledge will be packaged ~~as necessary~~ and disposed of at an appropriate TSD unit.

Maintenance Waste

Maintenance wastes ~~such as~~(e.g., paints, lubricants, cleaning solvents, adhesives, and off-specification chemicals) will be generated at the WTP. Maintenance ~~wastes derived from the~~ waste that comes in direct contact with waste feed will be designated as mixed waste. Waste contaminated by indirect contact will be designated based on process knowledge~~, packaged~~ as radioactive waste or mixed waste as appropriate, and transferred to an appropriate TSD unit. Those not derived from the waste feed and designated as dangerous waste by process knowledge will be packaged as ~~necessary~~ and disposed of at an appropriate TSD unit.

~~3A.5.4~~3A.5.2 Liquid Waste Streams ~~[C 2c]~~

The dangerous and mixed liquid waste streams generated at the WTP that cannot be incorporated back into the treatment process (recycled) will be managed in accordance with the ~~*Hanford Site Liquid Waste Acceptance Criteria* (HSLWAC) (WMFS 1998~~LERF/ETF WAC (CHPRC 2012). The LERF or the ETF, or both, will receive hazardous aqueous waste generated at WTP. The waste will meet the acceptance criteria as outlined in the ~~HSLWAC~~LERF/ETF WAC. The LERF and ETF allow process knowledge to be used in lieu of some analyses in instances where process knowledge is adequate, and a LERF or ETF representative will work with a WTP representative to identify the waste acceptance criteria and analyses appropriate for liquid waste characterization.

~~The liquid~~Aqueous waste streams listed in Table 3A-8 ~~Table B1-8~~will be collected in an effluent collection tank. Should sampling be required, the sample will be drawn from a location identified in ~~Figure B1-1~~Figure 4A-1 of Chapter 4A as S~~3~~2. Samples will be taken from the effluent collection tank by a computer-controlled auto-sampling system~~. Auto-sampling~~ at the PT Facility or manually sampled. Autosampling of waste streams is described in Section 7.2.1 of the ~~American Society for Testing and Materials (~~ASTM~~) Designation~~ D6232-98, *Standard Guide for Selection of Sampling Equipment for Waste and Contaminated Media Data Collection Activities* ~~(ASTM 1998)~~. The effluent collection tank will be stirred during sample collection to provide representative samples.

When the WTP is configured for the DFLAW configuration, samples of condensate and liquid effluent may be taken from the appropriate EMF vessel or the effluent transfer pipeline after additions for corrosion control, and analyzed to verify the effluent meets the LERF/ETF WAC. Additional sampling and analysis of EMF effluent will be performed in the event of a process upset, change in effluent source, compliance purposes, data loss, or as agreed to by WTP and LERF or ETF.

Disposable sampling equipment will eliminate the need for equipment decontamination after use. If the use of disposable equipment is not practical, the sampling equipment will be decontaminated before and following each sample event.

A discussion of each aqueous waste stream is presented below.

Aqueous Waste from Processes

Table 3A-8l ists the aqueous waste streams that will be generated by the WTP from processing the DST waste feed. The analytical laboratory will also generate aqueous waste. These waste streams will contain both radioactive and dangerous waste components and will be similar to the process condensate stream described in the ~~*Hanford Facility*~~ DOE/RL-90-42, *242-A Evaporator* *Dangerous Waste Permit Application*~~, 242-A Evaporator (DOE-RL 2005). These~~ (DOE-RL 1997). When WTP is configured for waste feed to the PT Facility, these aqueous waste streams will be piped to the effluent collection tank prior to transfer to the LERF~~/~~ or ETF by underground pipeline for treatment.

Plant Wastewater

Wastewater will be generated primarily from decontamination and wash-down activities in the WTP. The wastewater will be designated as mixed waste by process knowledge, since it will contain dilute waste feed constituents. ~~Wastewater~~When WTP is configured for waste feed to the PT Facility, wastewater will also be piped to the effluent collection tank prior to transfer to the LERF~~/~~ or ETF by underground pipeline for treatment.

EMF Effluents

Evaporator condensate from the EMF is transferred to the LERF or ETF by underground pipeline for treatment. Evaporator concentrate is typically recycled back to the LAW Facility or a pretreat/conditioning facility operated by the Tank Farms Contractor for eventual incorporation into ILAW, but can be returned to the DST system unit for storage in the unlikely event that the waste cannot be recycled. An alternate contingency, the effluent can be transferred by tanker truck to the appropriate disposal facility.

3A.5.3 Treatment, Storage, or Disposal Unit Waste Acceptance Criteria

Solid waste streams designated as dangerous or mixed waste will be transferred to Hanford Site TSD units in accordance with the current *Hanford Site Solid Waste Acceptance Criteria* (CHPRC 2011). The WTP will meet the unit-specific waste acceptance criteria for the receiving TSD unit. Solid wastes stored at the WTP will meet the acceptance criteria of the specific WTP storage area.

3A.6 LAND DISPOSAL RESTRICTIONS EVALUATION FOR IMMOBILIZED WASTE

This section describes the approach for addressing the LDR program requirements applicable to the land disposal of ILAW and IHLW.

The LDRs are codified in WAC 173-303-140, *Dangerous Waste Regulations – Land Disposal Restrictions*, which incorporates 40 CFR 268, *Land Disposal Restrictions*, by reference. In 40 CFR 268.40, *Land Disposal Restrictions – Applicability of Treatment Standards*, the treatment standards for land disposal of a dangerous waste are identified as follows:

A prohibited waste identified in the table "Treatment Standards for Hazardous Wastes" may be land disposed only if it meets the requirements found in the table. For each waste, the table identifies one of three types of treatment standard requirements:

(1) All hazardous constituents in the waste or in the treatment residue must be at or below the values found in the table for that waste ("total waste standards"); or

(2) The hazardous constituents in the extract of the waste or in the extract of the treatment residue must be at or below the values found in the table ("waste extract standards"); or

(3) The waste must be treated using the technology specified in the table ("technology standard"), which are described in detail in § 268.42, Table 1 – Technology Codes and Description of Technology-Based Standards.

The total waste standards and waste extract standards require repeated sampling and analysis of the waste to demonstrate that the dangerous constituents in the waste are at or below the values found in the table. These standards are appropriate for a limited dangerous waste stream, but are not a good choice for a mixed waste stream of extended duration because of repeated human exposure during sampling and analysis.

Table 1 in 40 CFR 268.42, *Land Disposal Restrictions – Treatment Standards Expressed as Specified Technologies*, includes the technology-based standard "HLVIT" (high-level vitrification). At the request of DOE, the HLVIT treatment technology was promulgated by the EPA to treat the tank waste at the Savannah River Site (refer to *Land Disposal Restrictions for Third Third Scheduled Wastes; Rule* [EPA 1990]). According to the table in 40 CFR 268.40 regarding treatment standards for hazardous wastes, HLVIT is the technology for the treatment of the following dangerous waste numbers from radioactive high-level wastes generated during the reprocessing of fuel rods:

D002 Corrosivity (pH)
D004 Arsenic
D005 Barium
D006 Cadmium
D007 Chromium (total)
D008 Lead
D009 Mercury
D010 Selenium
D011 Silver

Similar to the treatment of the Savannah River Site tank waste, the treatment of the Hanford tank waste will require many years of WTP operation. Rather than repeated sampling and analysis of the waste to demonstrate LDR using the total waste standard or the waste extract standard, it would be appropriate to treat the Hanford tank waste to a specific treatment standard (e.g., the HLVIT technology-based standard described above for the Savannah River Site tank waste). Consequently, the WTP is preparing a petition to the EPA and Ecology to establish a new treatment standard that will be specific to the Hanford tank waste. The new treatment standard would specify vitrification as the land disposal treatment standard for tank waste for the characteristic and listed waste numbers applicable to the Hanford tank waste.

As required by 40 CFR 268.44, the petition will be submitted in accordance with the procedures specified in 40 CFR 260.20, *Hazardous Waste Management System – General*. Report RPT-W375LV-EN00002, *Approach to Immobilized Hanford Tank Waste Land Disposal Restrictions Compliance*, describes the petition process. The negotiated petition will be published in the Federal Register for public comment. After successful resolution of public comments, the EPA would promulgate a final rule establishing the treatment standard. The Hanford tank waste would then meet LDR through treatment by the promulgated treatment standard.

3A.63A.7 WASTE TRANSFER DOCUMENTATION SYSTEM [C-3]

The WTP is part of the Hanford Site facility because it will operate under the same EPA identification (ID) number as the other Hanford Site facilities. The WTP will prepare transportation documentation for the transfer of dangerous or mixed waste to a Hanford TSD unit according to the requirements of Condition II.NQ of the Hanford Facility RCRA Permit – Dangerous Waste Permit Portion (Ecology 19942007). Condition II.N.2.d Q.1 exempts waste that will be transported by rail or pipeline unless required by unit-specific conditions. This exemption will apply to waste feed that is transferred to and

from the WTP by underground pipeline, and to effluent transferred to the LERF, ~~/~~ETF, a LAW pretreat/conditioning facility operated by the Tank Farms Contractor, or Tank Farms via underground pipeline.

Waste transfer documentation and supporting process knowledge will be considered QA records and managed in accordance with the requirements for document control, as outlined in the QAP~~j~~P. This documentation will specify the identity of the receiver and confirm that the receiver accepted the waste. WTP ~~staff~~ personnel and the waste receiver's acceptance personnel will date and sign the waste transfer papers. Electronic waste transfer documentation may be used, as appropriate.

Solid and liquid waste transfers and LDR notifications are discussed in the following sections.

~~3A.6.1~~3A.7.1 Solid Waste Transfer

The WTP, as a waste generator, will provide documentation with each ~~shipment~~container transferred to the Tank Operations Contractor to support waste designation and waste shipping of regulated solid waste to a Hanford Site TSD unit in accordance with the current ~~HSSWAC (HNF-2001)~~*Hanford Site Solid Waste Acceptance Criteria* (CHPRC 2011). Regulated solid waste transferred from the WTP to the Tank Operations Contractor for treatment and final disposal at a Hanford Site TSD unit will meet the unit-specific waste acceptance criteria for the receiving TSD unit. Regulated waste shipped to an offsite TSD unit will be accompanied by a manifest, according to ~~WAC 173-303-180.~~WAC 173-303-180, *Dangerous Waste Regulations – Manifest*.

~~3A.6.2~~3A.7.2 Liquid Waste Transfer

Aqueous waste transfers from the WTP to the ~~200 Area~~ LERF~~/~~ or ETF will comply with the current ~~HSLWAC (WMFS 1998).~~ LERF/ETF WAC (CHPRC 2012). The WTP will perform online monitoring of the effluent flow rate, effluent radiation, pH, and conductivity, and the data will be transmitted to the LERF Instrument Building. The real-time data will be transmitted over a dedicated line. Stop-transfer control and leak detection circuits will be integrated with the effluent transfer system.

Aqueous waste transfers from the WTP to the Tank Farms will meet the Tank Farms' waste acceptance criteria (under development).

A waste profile sheet will accompany aqueous waste transfers. As waste stream disposition requirements are identified, individual waste profiles will be developed in a joint effort between the WTP, Tank Operations Contractor, and the DOE.

~~3A.6.3~~3A.7.3 Land Disposal Restrictions Notification and Certification

The WTP will provide LDR notification and certification of WTP ~~-~~shipped waste that contains LDR constituents above the treatment standards listed in 40 CFR 268.40. The information will be included with transfer documents to the receiving TSD facility for solid waste and liquid waste transfers. The receiving TSD will generate a new LDR notification and certification subsequent to any additional treatment performed, prior to final disposal.

~~3A.7~~3A.8 TRACKING SYSTEM ~~[C-4]~~

The ~~p~~Plant ~~i~~Information ~~n~~Network (PIN) will be a manufacturing execution system ~~is~~ designed to collect and maintain information~~. The PIN enables~~ enabling the optimization of the WTP activities ~~operational and support activities. In addition, it provides data on the glass~~ from order launch to finished product~~, secondary wastes, and monitoring activities~~. The PIN consists of software applications designed to meet specific requirements and functions. ~~An overview of the network software systems is provided in Figure B1-2.~~

The PIN will consist of the following systems:

- ~~Computerized~~ Maintenance ~~Management System (CMMS).~~management system

- Plant ~~D~~data ~~W~~warehouse and ~~R~~reporting ~~S~~system (PDWRS).
- Laboratory ~~I~~information ~~M~~management ~~S~~system (LIMS~~LIJ~~).~~Waste tracking and inventory system (to be developed).~~
- Solid Waste Tracking Database (SWTD)

The PIN will interface with the ~~i~~Integrated ~~c~~Control ~~n~~Network (ICN). The ICN will consist of the process control system, mechanical handling control system, and the auto-sampling control system.

These systems will be discussed in the following sections as they relate to waste tracking.

~~3A.7.1~~3A.8.1 Inventory and Batch Tracking

The ~~waste tracking~~PDWRS and ~~inventory system serves~~LIMS serve as the main repository for the relevant information pertinent to a given waste batch. Data is collected for each sequence or step throughout the processing history of a given batch of waste, from receipt of raw feed to disposition of the finished products, including secondary waste. At the end of a batch cycle, the data applicable to that particular batch will be catalogued to facilitate historical recording and reporting.

The ~~waste tracking~~PDWRS and ~~inventory system~~LIMS will also record the inventory of glass product containers, including the data generated for each container of vitrified waste~~,~~ and ~~including~~ the final QA checks. Each glass product container will bear a unique ~~identification~~ID number to facilitate tracking.

~~3A.7.2~~3A.8.2 Sample Tracking

Sampling activities will be started, monitored, and controlled ~~through~~ by the ~~plant~~ ICN, with key sequence durations and operations logged~~.~~ into the PDWRS and LIMS directly from the ICN. Sampling operations will be requested by plant operators or laboratory personnel using the ICN. These requests will be time and date stamped, as will the actual sampling operation and the associated sample handling and laboratory activities. Sample requests and operations will be channeled through the ICN, which will operate in a supervisory capacity and will communicate the necessary information to the PDWRS and LIMS.

The LIMS will be an integral feature of the PIN. Workstations will be located within the laboratory and the plant control rooms. The LIMS will record the required ~~quality control~~QC checks to ~~assure~~ensure correct sample preparation and selection of analyses ~~will be recorded in the LIMS.~~, and controlled checking and approval of results.

Sample containers received in the laboratory preparation area will be identified by their ~~identification (~~ID~~)~~ label. The ID label ~~correlates the sample container with~~ provides details of the sample source and, therefore, ~~identifies~~specifies the required preparation and analysis techniques. The ID will be registered at the locations where manual intervention is required~~, such as~~ (e.g., manual samplers). The results of calibration checks on equipment and analyzers will be recorded.

Analytical results will be compiled by the LIMS and held, pending checking and approval by laboratory staff, before being formally recorded within the ~~waste tracking~~ PDWRS and ~~inventory system. Process control sample results~~ LIMS. Results that affect the progression of the main plant process will be communicated to appropriate plant personnel where required. WTP samples that come under the exclusion provided in WAC 173-303-071(3)(l), *Dangerous Waste Regulations – Excluded Categories of Waste*, may not be tracked.

Samples transferred to an analytical laboratory external to the WTP will be tracked in ~~the~~ a LIMS. The LIMS will be capable of accurately tracking samples through the laboratory, and accurately recording analytical results and ~~quality control~~QC data. Section 3A.3~~.5~~.3 discusses the evaluation of external analytical laboratories.

~~3A.7.3~~3A.8.3 Secondary Waste Stream Tracking

Secondary waste streams will be tracked separate from the primary waste/product streams within the ~~waste tracking and inventory system~~ WTP. Secondary waste, once generated, will be placed in containers with unique ID numbers and tracked in the Solid Waste Tracking Database (SWTD) in a manner similar to that of primary waste streams. ~~Secondary waste streams will be managed by using assigned, unique ID numbers.~~ Corresponding histories and data collection triggers will gather process and ~~status information~~ characterization data during the ~~processing~~generation and packaging of secondary waste in order to ~~satisfy tracking of waste~~ support designation, treatment, and disposal ~~records.~~ of the waste. The SWTD will provide cradle-to-grave tracking and record of all secondary waste generated at the WTP. Shipments of overpacks will be labeled and tracked as part of the inventory control function of the ~~waste tracking and inventory system~~ SWTD.

Maintenance, decommissioning, or disposal activities may generate consumables, including such items as equipment, hardware, ~~personal protective equipment~~PPE, and materials used in the normal operation of the facility. Consumables ~~that are~~ designated as dangerous ~~waste~~ will be tracked by the ~~waste tracking and inventory~~ maintenance management system, with appropriate fields denoting the hazardous classification of the disposed parts and materials, and cross-linked to disposal records. Waste being accumulated in satellite accumulation areas under the provisions of ~~WAC 173-303-200 will also be tracked~~ WAC 173-303-200, *Dangerous Waste Regulations – Accumulating Dangerous Waste On-Site*, may not be tracked until it has been accepted into a permitted portion of the WTP.

~~3A.8~~3A.9 RECORDKEEPING

Records generated for environmental compliance will be legible, identifiable, and retrievable, and will be protected against damage, deterioration, or loss. Requirements and responsibilities for record transmission, distribution, retention, maintenance, and disposal will be established and documented. The requirements contained in WAC 173-303-380(a~~), (~~, b~~)~~, and ~~(~~c~~) of WAC 173-303-380 "~~), *Dangerous Waste Regulations –* Facility Recordkeeping~~",~~ are addressed in this WAP and will be managed through the waste tracking system record~~-~~keeping policies. Additional requirements listed under ~~WAC 173-303-380~~ WAC 173-303-380 are addressed in the QAP~~j~~P. Records generated to support activities described in ~~the~~ this WAP will be considered QA records. These may be in electronic or hard copy format, and will be managed according to the requirements outlined in the QAP~~j~~P.

The following documents that support this WAP are considered QA records:

- Sample information provided by the ~~DST system unit~~ Tank Operations Contractor, including constituents of concern from sampling activities, laboratory analysis results, waste certifications, and~~s~~ shipping and transfer papers.
- ~~Verification analytical data.~~
- Documentation used for any discrepancy resolution and non~~-~~conformance action.
- Confirmation volume measurement data, including any discrepancy resolution.
- Documentation used for LDR evaluation.
- Sampling and analytical data developed for meeting the waste acceptance criteria of receiving facilities.
- Calibration data from analytical equipment.
- Shipment and waste transfer documentation, including waste profile sheets~~,~~ and LDR information forms.

~~3A.9~~3A.10 REFERENCES

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2 **Table 3A-1 Summary of the Waste Feed Acceptance Process**

3A.3.1.1	The Tank Operations Contractor submits a waste profile.
3A.3.1.2	Qualified WTP personnel perform a preshipment review by examining the waste profile and the analytical results to ensure compatibility and acceptability of the waste feed. If the review finds that the waste feed is acceptable, the WTP notifies the Tank Operations Contractor that the waste feed can be transferred. If the review finds that the waste feed is not acceptable, nonconformance actions are initiated.
3A.3.1.3	Non-conformance actions include a second review of the data and information and may include a second analysis of the split sample aliquot. If the waste feed continues to be outside of the waste acceptance criteria, adjustments (blending) may be used to change the waste composition such that acceptance criteria are met. Alternately, a change to the waste acceptance criteria may be made on a case-by-case basis (as long as there are no design or safety basis impacts and permit compliance is maintained). Otherwise, the waste will be refused for transfer (transferred to an alternative treatment or stored until other alternatives are identified).
3A.3.1.4	Acceptable waste feed is transferred from the DST system unit [a] to the WTP.
3A.3.1.5	After waste feed is received into WTP, the Tank Operations Contractor and the WTP perform confirmation volume measurements to ensure that the waste feed transferred is the waste feed that was accepted for transfer.

[a] In this context, DST unit means either pretreated or conditioned waste sent directly to the LAW Facility for treatment, or waste sent to the PT Facility.

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Table 3A-2 Waste Feed Analysis, Waste Acceptance Criteria, and Nonconformance Actions

Parameter	Analytical Method [a, b]	Target Minimum Reportable Quantity [c]	Acceptance Criteria	Nonconformance Actions
TOC using persulfate oxidation method	Method 9060A or Method 415.2 (EPA 1997)	1 wt%	TOC < 10 wt%	Reject waste feed
PCBs	Method 8082A	0.025-0.05 mg/L (supernate) 0.1-0.25 mg/kg (sludge)	PCBs < 50 ppm [d]	Reject waste feed
pH	pH meter, Method 9040C	Not established; per the method, bracket the expected pH of the sample by three pH units or more apart during calibration	Acceptable pH range >7	Corrective actions to correct pH
Compatibility	ASTM D5058-90	Temperature Change = 1 °C	Acceptable temperature change < ± 20 °C No viscosity change adversely affecting waste processing	Corrective actions to eliminate incompatible conditions
Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, Ag, Tl, V, Zn	Method 6010D	0.05-015 mg/L (supernate) 15.0-100 mg/kg (sludge)	Not applicable	Determination of toxicity characteristic metals, underlying hazardous constituents, and potential glass formation interferences
Hg	Method 7470A or 7471B	0.025-1.0 mg/L (supernate) 0.10-3.5 mg/kg (sludge)	Not applicable	Determination of toxicity characteristic metals
Semivolatile organics	Method 8270D	0.25-5.00 mg/L (supernate) 1.50-5.00 mg/kg (sludge)	Not applicable	Potential risk driver during facility performance demonstration
Volatile organics	Method 8260B	0.10-1.0 mg/L (supernate) 0.25-1.0 mg/kg (sludge)	Not applicable	Potential risk driver during facility

Table 3A-2 Waste Feed Analysis, Waste Acceptance Criteria, and Nonconformance Actions

Parameter	Analytical Method [a, b]	Target Minimum Reportable Quantity [c]	Acceptance Criteria	Nonconformance Actions
				performance demonstration
Organochlorine pesticides	Method 8081B	0.025-0.07 mg/L (supernate) 0.01-0.07 mg/kg (sludge)	Not applicable	Potential risk driver during facility performance demonstration
Anions	Method 9056A	150-500 mg/L (supernate) 2.50-50.0 mg/kg (sludge)	Not applicable	Potential risk driver during facility performance demonstration
Organic acids	Method 9056A	4000 mg/L (supernate) 2000 mg/kg (sludge)	Not applicable	Organic acids are not expected to affect the ability of the WTP to comply with risk assessment or air permitting limits
Ammonia / ammonium	SM 4500-NH_3-F (APHA 1992) or EPA Method 350.3 (EPA 1989)	0.08-15.0 mg/L (supernate only)	Not applicable	Potential risk driver during facility performance demonstration
Cyanide	Method 9010C / 9014 or 9012B	2.50-10 mg/L (supernate) 0.50-3.50 mg/kg (sludge)	Not applicable	Potential risk driver during facility performance demonstration

[a] Collection of samples is in accordance with ALARA requirements for contamination control and to minimize sampler exposure. The RDQO Optimization Report (24590-WTP-RPT-MGT-04-001) specified a minimum 350 g of sludge solids (if present in the tank) and 500 mL of liquid to complete the regulatory compliance testing for each WTP feed tank, however, it is anticipated that 300 mL slurry containing at least 30 g of solids per high-level waste sample, and 170 mL of supernatant liquid per low-activity waste sample shall be sufficient. Per the sampling event requirements described in the RDQO Optimization Report, the specific sample volume and number of samples to be collected are to be specified in the Tank Sampling and Analysis Plan (TSAP) for the corresponding staged feed. The sample material is collected in the field, and then sub-aliquoted (and centrifuged, if necessary) in the laboratory under controlled conditions to further reduce exposures. Per the Performance Based Measurement System approach and safe handling

Table 3A-2 Waste Feed Analysis, Waste Acceptance Criteria, and Nonconformance Actions

Parameter	Analytical Method [a, b]	Target Minimum Reportable Quantity [c]	Acceptance Criteria	Nonconformance Actions

procedures required to limit radiological dose, sample sizes may be reduced from those recommended in the cited analyses.

[b] SW-846 Method (EPA 2014), unless specified otherwise.

[c] Typical range shown, consult RDQO Optimization Report, Table 9.3, for specific constituent requirements.

[d] Parts per million – milligrams per liter or milligrams per kilogram (approximate).

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Table ~~B1-2~~3A-3 Summary of Dangerous Waste Numbers for WTP

Characteristic Waste Numbers				Listed Waste Numbers		
~~D001~~ D001[a]	D002	~~D003~~ D003[a]	D004	F001	F002	F003
D005	D006	D007	D008	F004	F005	F039 ~~[a]~~[b]
D009	D010	D011	D018			
D019	D022	D028	D029			
D030	D033	D034	D035			
D036	D038	D039	D040			
D041	D043	~~WT01~~[~~b~~]WT01[c]	W~~T02~~[~~b~~]WT02[c]			
~~WP01~~[~~b~~]WP01[c]	~~WP02~~[~~b~~]WP02[c]					

[a] ~~Multi-source~~ When WTP is configured for DFLAW, D001 and D003 wastes are not permitted.
[~~a~~]~~b~~ Multisource leachate (F039) is included as a waste derived from non-specific source wastes F001 through F005.
[~~b~~]c Washington State criteria.

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Table ~~B1-4~~3A-4 Properties for the Determination of Ignitable Waste

Regulatory Citation	Ignitable (D001) Waste Property
~~WAC 173-303-090 (5)(a)(i)~~ WAC 173-303-090(5)(a)(i)	It is a liquid, other than an aqueous solution containing less than 24 % alcohol by volume, and has a flash point less than 60 °C (140 °F~~),)~~ as determined by a Pensky-~~Martin Closed Cup Tester~~Martens closed-cup tester, using the test method specified in ASTM D93, Standard ~~D 93-79 or D 93-80~~, *Test Methods for Flash Point by Pensky-Martens Closed Cup Tester*; or a Setaflash ~~Closed Cup Tester~~closed-cup tester, using the test method in ASTM- D3278, Standard ~~D 3278-78~~ *Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus*.
~~WAC 173-303-090 (5)(a)(ii)~~WAC 173-303-090(5)(a)(ii)	It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical changes, and when ignited, it burns so vigorously and persistently that it creates a hazard.
~~WAC 173-303-090 (5)(a)(iii)~~WAC 173-303-090(5)(a)(iii)	It is an ignitable compressed gas that is defined in ~~49 CFR 173.115~~49 CFR 173.115, *Shippers – General Requirements for Shipments and Packagings – Class 2, Divisions 2.1, 2.2, and 2.3 – Definitions*, and is determined to be flammable by the test methods described in that regulation.
~~WAC 173-303-090 (5)(a)(iv)~~WAC 173-303-090(5)(a)(iv)	~~It is an oxidizer, if it is defined as such in 49 CFR 173.127 and 173.128.~~It is an oxidizer if defined as such in 49 CFR 173.127 or 49 CFR 173.128.

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Table ~~B1-5~~3A-5 Properties for the Determination of Reactive Waste

Regulatory Citation	Reactive (D003) Waste Property
WAC 173-303-090 (7)(a)(i)	It is normally unstable and readily undergoes violent change without detonating.
WAC 173-303-090 (7)(a)(ii)	It reacts violently to water.
WAC 173-303-090 (7)(a)(iii)	It forms potentially explosive mixtures with water.
WAC 173-303-090 (7)(a)(iv)	When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.
WAC 173-303-090 (7)(a)(v)	It is a cyanide- or sulfide-bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.
WAC 173-303-090 (7)(a)(vi)	It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
WAC 173-303-090 (7)(a)(vii)	It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
WAC 173-303-090 (7)(a)(viii)	It is a forbidden explosive, as defined in ~~49 CFR 173.54,~~ 49 CFR 173.54, *Shippers – General Requirements for Shipments and Packagings – Forbidden Explosives*; or a Class 1 explosive, ~~(~~Division 1.1, Division 1.2, Division 1.3, and Division 1.5~~)~~, as defined in 49 CFR 173.50.

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Table ~~B1-6~~3A-6 Secondary Solid Mixed Waste Streams

Waste Stream	Characterization	Disposal
Out-of-service melters	Designated by process knowledge.	Disposal of out-of-service melters is currently under development.[a]
HLW glass residue		Determined case-by-case.
Melter components		These wastes will be packaged and transferred to the appropriate Hanford TSD unit.
Off-gas treatment system components: • High-efficiency mist eliminators • HEPA filters • Silver mordenite canisters		
Spent carbon and catalyst from off-gas treatment		
Spent ion exchange resins		
Spent ultrafilters		
Out-of-service equipment		
Entrained solids		[b]Entrained solids may be returned to the DST system unit via pipeline as a slurry or added to the low-activity or high-level waste feed for vitrification.

~~a Disposal of out-of-service melters is currently under development.~~

~~b Entrained solids will be added to the HLW feed for vitrification.~~

Table ~~B1-7~~3A-7 Variable Solid Waste Streams

Waste Stream	Characterization	Disposal
Non-wastewater laboratory waste	Each generation event of these wastes will be individually designated by process knowledge and will comply with the receiving TSD waste acceptance criteria	The wastes will be packaged and transferred for disposal to an appropriate TSD unit.
Personal protective equipment		
Maintenance waste		

Table ~~B1-8~~3A-8 Liquid Mixed Waste Streams

Waste Stream	Characterization and Disposal	Sampling Point	Sampling Frequency
Waste feed evaporator condensate	The waste streams, not subject to recycling, will collect in a mixer tank, be designated as mixed waste by process knowledge and analysis, as necessary, and will be transferred to the LERF or ETF. (or tanker truck, as a contingency), or DST system unit.	The streams collected in a ~~mixer~~ mixed tank are grab sampled by autosampler or manually.	Sampling will be performed under the following circumstances: • ~~b~~Before initial discharge • ~~a~~At major process change or upset • ~~at~~ At request for re-sampling by the ~~ETF~~receiving facility
~~LAW~~Low-activity waste melter feed evaporator condensate			
Pretreatment, LAW, and HLW off-gas condensate			
LAW and HLW melter off-gas scrubber blowdown			
Cesium process condensate			
~~Cesium~~Technetium and cCesium ion exchange rinse water			
Laboratory wastewater			
Plant wastewater containing waste feed			
EMF evaporator bottoms			
EMF effluent		The streams collected in a tank are grab sampled manually or sampled in-line (confirmatory sample during transfers).	

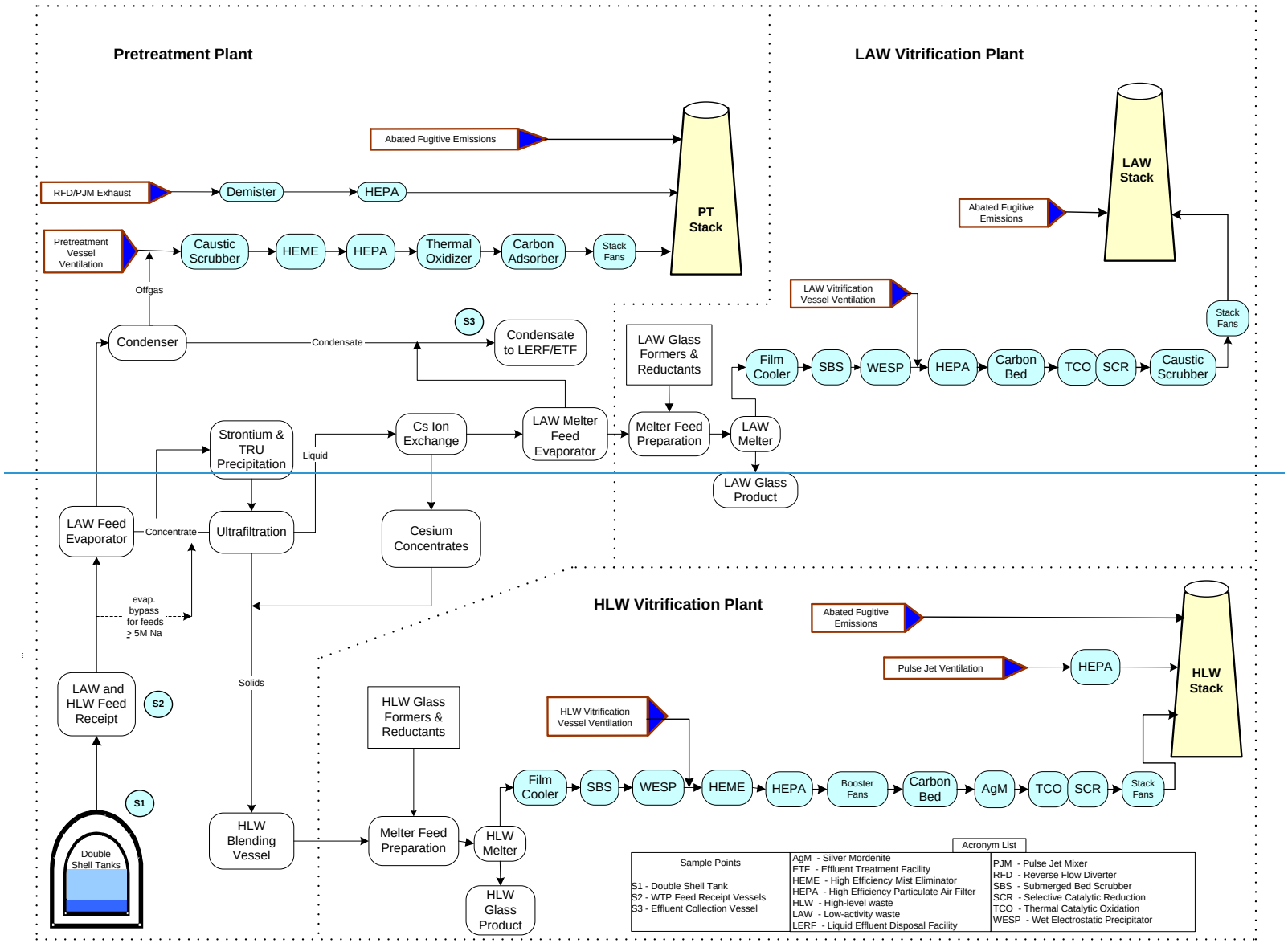

Figure B1-1 Simplified Flow Diagram and Sampling Locations

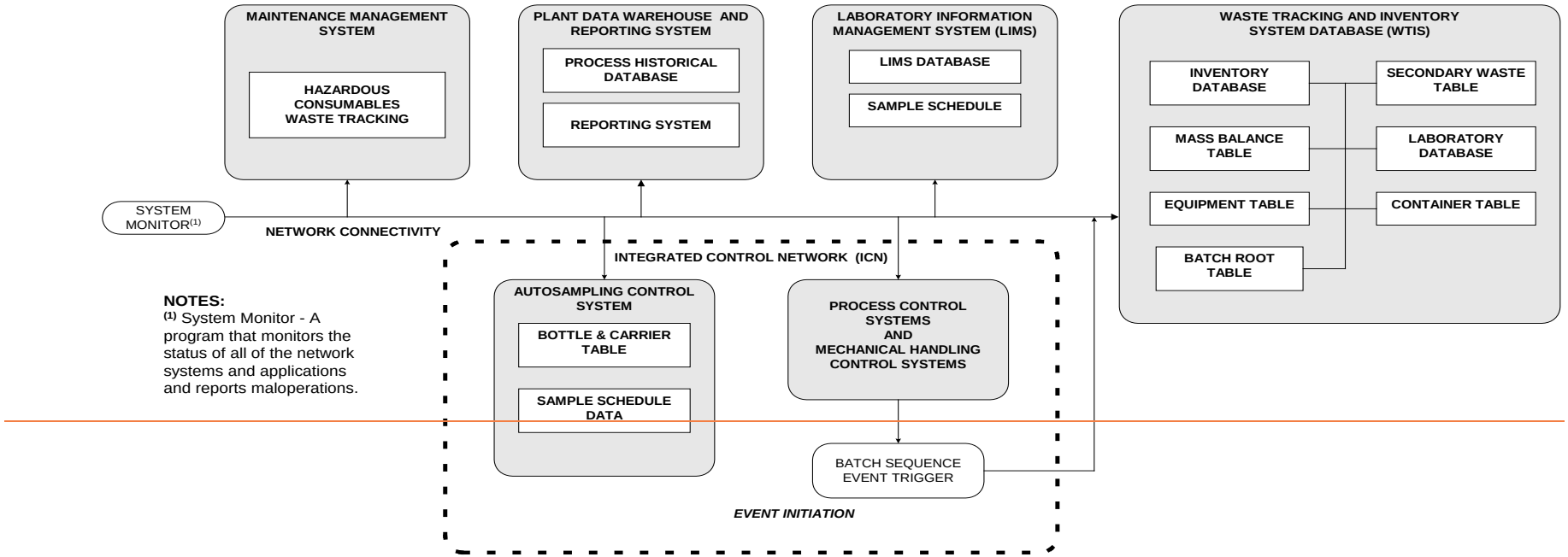

Figure B1-2 Plant Information Network Data Relationships