

**WASTE TREATMENT AND IMMOBILIZATION PLANT
CHAPTER 3A
WASTE ANALYSIS PLAN FOR THE BASELINE CONFIGURATION
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
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CHAPTER 3A
WASTE ANALYSIS PLAN FOR THE BASELINE CONFIGURATION

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1 **3A.1 INTRODUCTION**

2 This Waste Analysis Plan (WAP) for the Baseline Configuration describes the sampling and analysis for
3 dangerous waste constituents for the Hanford Tank Waste Treatment and Immobilization Plant (WTP) to
4 comply with the Washington State Dangerous Waste Regulations contained in Washington
5 Administrative Code (WAC) 173-303, *Dangerous Waste Regulations*. Records specific to the WTP WAP
6 will be managed in the WTP Unit Specific Operating Record that is kept as a part of the Hanford Facility
7 Operating Record WAC-173-303-300(2)(b).

8 The WAP also ensures the waste analysis is comprehensive and reflects the outcome of the *Regulatory*
9 *Data Quality Objectives Optimization Report* (RDQO Optimization Report), 24590-WTP-RPT-MGT-04-
10 001, and sample analysis performed on the tank waste feed stream to be treated by the Tank Operations
11 Contractor and WTP. Sampling and analysis criteria identified in the RDQO Optimization Report related
12 to meeting Resource Conservation and Recovery Act (RCRA) requirements are included as an integral
13 part of this WAP.

14 Regulatory and safety issues are addressed in this WAP and establish bounding conditions for waste to be
15 received and treated at the WTP. These boundary conditions establish limits for waste acceptance.

16 **3A.2 SCOPE**

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

20 The Tank Operations Contractor will characterize the staged Double-Shell Tank (DST) waste feed in
21 conformance with the RDQO Optimization Report. Based on the results, the Tank Operations Contractor
22 will develop a waste profile specific to the staged waste and the planned treatment campaign.

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

29 Simplified process flow figures for WTP processes are included in Chapter 4A of the Dangerous Waste
30 Permit (DWP). The waste will be combined with glass-forming chemicals and melted into a solid glass
31 form in a process known as vitrification.

32 Operation of WTP will generate secondary wastes, in solid and liquid form. These wastes will be
33 designated according to available process knowledge or will be sampled and analyzed as necessary to
34 fully address Treatment, Storage, or Disposal (TSD) unit waste acceptance criteria. Secondary wastes that
35 are not treated by the WTP will be transported to an appropriate TSD unit, subject to that TSD unit's
36 waste acceptance criteria.

37 **3A.3 FACILITY DESCRIPTION**

38 In the baseline WTP operating configuration, the Pretreatment (PT) Facility and the High-Level Waste
39 (HLW) Facility are operational. The PT Facility will both separate and pretreat the Low-Activity Waste
40 (LAW) and HLW and manage recycle waste streams produced from the LAW and HLW waste treatment
41 operation. Within the PT Facility, LAW and HLW (including recycles) will be concentrated by water
42 removal using evaporators; solids will be filtered out of LAW and transferred to the HLW fraction; and
43 soluble, highly radioactive isotopes (primarily cesium) will be removed from LAW by ion exchange units
44 and transferred to the HLW fraction. In some situations, prior to filtration, oxidation and/or precipitation
45 will be used to dissolve solids or remove unwanted components from the LAW for transfer to the HLW
46 fraction. Treated LAW and HLW will be transferred to the respective LAW and HLW Facilities for

1 vitrification. The three production process facilities (i.e., PT, LAW, and HLW) are also supported by the
2 Analytical Laboratory (Lab).

3 Plant equipment will include the following:

- 4 • Pipelines, tanks, and ancillary equipment.
- 5 • Evaporation units.
- 6 • Ultrafiltration units.
- 7 • Ion exchange columns.
- 8 • Chemical addition equipment.
- 9 • LAW and HLW melters.
- 10 • Service and utility units.
- 11 • Container management units.
- 12 • Storage facilities.
- 13 • Offgas treatment systems.

14 **3A.4 GENERAL CONSTITUENT DESCRIPTION**

15 WTP is specifically designed to accept waste from the DST System. The mixed waste to be treated in the
16 Baseline Configuration is an aqueous solution containing dissolved inorganic salts such as sodium,
17 potassium, aluminum, hydroxides, nitrates, and nitrites with some tanks having detectable levels of heavy
18 metals such as lead, chromium, cadmium, mercury. Small quantities of ammonia and organics, such as
19 acetone, butanol, and tri-butyl phosphate, could be present. The physical consistency of the waste in the
20 DST System ranges from aqueous supernate to thick sludge. The higher activity and higher solids portion
21 of the Hanford tank waste is designated as HLW feed. The two different terms describing the tank waste
22 are used because the LAW and HLW fractions of the waste feed are processed differently in the WTP.

23 In the Baseline configuration, characterized LAW and HLW are sent directly from the Hanford Tank
24 Farms to the PT Facility. The mixed waste is pretreated in the PT Facility and sent to either the HLW
25 Vitrification Facility or the LAW Vitrification Facility for processing, depending on the waste
26 characterization. Underground waste transfer lines allow for the transfer of waste from the Hanford Tank
27 Farms to the PT Facility, and to and from the LAW Vitrification Facility, HLW Vitrification Facility.

28 The PT Facility, in the Baseline configuration, uses tank systems, miscellaneous unit systems (defined in
29 Operating Unit Group 10, Section III.10.G of this Permit), and containment buildings to prepare waste
30 feed from the Hanford Tank Farms for vitrification.

31 The LAW Vitrification Facility uses miscellaneous treatment unit sub-systems and equipment (defined in
32 Operating Unit Group 10, Section III.10.H and III.10.I of this Permit), tank systems, and containment
33 buildings to vitrify LAW feed.

34 The HLW Vitrification Facility uses miscellaneous treatment unit sub-systems and equipment (defined in
35 Operating Unit Group 10, Section III.10.J and III.10.K of this Permit), tank systems, containment
36 buildings, and container storage areas to vitrify HLW feed.

37 A tank system and a container storage area are used at the Lab. Table 3A-1 is the complete list of
38 Dangerous Waste Numbers for WTP that will be managed under the baseline configuration.

Table 3A-1 Summary of Dangerous Waste Numbers for Waste Treatment Plant

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

^aWashington State criteria.

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3A.5 WASTE PRE-ACCEPTANCE AND ACCEPTANCE PROCESSES

This section describes the actions performed before every campaign to determine candidate feed tank waste is acceptable for treatment at WTP.

Step 1: The Tank Operations Contractor submits a waste profile. The content and format of the profile will be established prior to the transfer of waste feed. The following are examples of the information that will be provided in the profile:

- General information (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 (e.g., the proposed volume of each batch transfer and the presence or absence of a separate visible organic layer).
- Relevant process knowledge and historical analytical data (e.g., Total Organic Carbon [TOC]).
- Dangerous waste information (e.g., the designation of dangerous waste numbers) and Land Disposal Restrictions (LDR) information.

Step 2: 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.

Step 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 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).

Step 4: Once the transfer systems are confirmed as operational, the Tank Operations Contractor will transfer the waste feed to the PT Facility through a double-walled pipeline. The Tank Operations Contractor will water flush the pipeline after the transfer is complete.

Step 5: After waste feed is received into WTP, the Tank Operations Contractor and the WTP perform volume transfer and receipt comparison measurements to ensure that the volume of waste feed transferred is the volume of waste feed that was received.

1 The WTP feed acceptance criteria described in this section are consistent with those provided in the
 2 RDQO Optimization Report. The RDQO Optimization Report describes the constituents of regulatory
 3 concern and analytical methods appropriate for the characterization of the waste feed. The RDQO
 4 Optimization Report is designed to address the regulatory needs of the WTP in the Baseline
 5 configuration. The waste acceptance parameters are as follows:

Table 3A-2 Waste Acceptance Parameters

Parameter	Analytical Method ^a	Sample Size (mL) ^b
TOC	9060A	3
Polychlorinated biphenyls (PCBs)	8082A	2
pH	pH meter, 9040C	5
Compatibility	ASTM D5058-90	20
RCRA metals	6010D	3
Mercury (Hg)	7470A or 7471B	1
Selected anions	9056A	20
Ammonia/ammonium	SM 4500-NH ₃ -F or Environmental Protection Agency (EPA) Method 350.1 or Method 350.3	0.5
Semivolatile organics	8270E	3
Volatile organics	8260B	10
Organic acids	9056A	10
Cyanide	9010C / 9014 or 9012B	1
Organochlorine pesticides	8081B	3

^aMethods are from EPA SW-846, as amended, unless otherwise indicated. The specified method revision or newer will be used.

^bSample sizes are subject to change as long as this substitution does not affect the overall quality of the analyses.

7
 8 **Estimated Sample Size**

9 Collection of samples is performed to facilitate contamination control and to minimize sampler exposure.
 10 The RDQO Optimization Report specified a minimum 500 mL of liquid to complete the regulatory
 11 compliance testing for each WTP feed tank, however, it is anticipated that 170 mL of supernatant liquid
 12 per LAW sample shall be sufficient. Per the sampling event requirements described in the RDQO
 13 Optimization Report, the specific sample volume and number of samples to be collected are to be
 14 specified in the Tank Sampling and Analysis Plan (TSAP) for the corresponding staged feed. The sample
 15 material is collected in the field, and then subaliquoted (and centrifuged, if necessary) in the laboratory
 16 under controlled conditions to further reduce exposures. For tank waste samples, typically glass bottles
 17 with Teflon-lined screw caps or polyethylene bottles are used to collect samples. These are then
 18 subsampled and stored in screw cap glass vials (for organic analyses) and in polyethylene vials
 19 (for elemental and radiochemical analyses) during sample preparation and analyses in the laboratory.
 20 Per the guidelines established using the Performance Based Measurement System approach and safe
 21 handling procedures required to limit radiological dose, sample sizes may be reduced from those
 22 recommended in the cited analyses.

1 Total Organic Carbon

2 The waste feed will be analyzed to determine the TOC. The TOC has been chosen for analysis of the
3 waste feed to ensure that the WTP is not required to comply with Subpart BB of WAC 173-303-691. The
4 analytical method is SW-846, *Test Methods for Evaluating Solid Waste, Physical Chemical Compendium*,
5 Method 9060A, using persulfate oxidation. The sample aliquot volume requirements for this analysis are
6 expected to be 3 mL. This method typically measures TOC to levels of about 1 ppm. The criteria for
7 waste acceptance is 10 wt% TOC, or less. Method 9060A will meet the 1 percent detection limit, as given
8 in Table 3A-6. The solids will be analyzed separately for TOC.

9 Polychlorinated Biphenyls

10 Most of the Hanford tank waste contains PCBs at concentrations below 50 ppm. These are regulated
11 under the *Toxic Substances Control Act of 1976* (15 United States Code [USC] 2601 et seq.), and codified
12 in 40 Code of Federal Regulations (CFR) 761.61, Polychlorinated Biphenyls (PCBs) Manufacturing,
13 Processing, Distribution in Commerce, and Use Prohibitions – *PCB remediation waste*, as PCB
14 remediation waste — agreed upon in the *Framework Agreement for Management of Polychlorinated*
15 *Biphenyls (PCBs) in Hanford Tank Waste* (Department of Ecology [Ecology], EPA, and Department of
16 Energy [DOE] 2000). Modification of the basic extraction procedure given in this method is expected to
17 be needed to decrease the sample size and allow the extraction to be performed in a shielded glovebox. It
18 is anticipated that a sample size of 2 mL would be required for liquids. If any single liquid sample
19 contains more than 5 percent solids after centrifuging, the liquid and solid will be analyzed separately.
20 The waste feed sample aliquots will be analyzed to ensure that the waste feed contains less than 50 ppm
21 PCBs. This acceptance criteria of 50 ppm PCBs may change as a result of the risk-based approval of
22 PCBs in the tank waste that is being prepared jointly by Ecology, EPA, and DOE. The sample will be
23 separated into solid and liquid phases and analyzed for PCBs by SW-846 Method 8082A.

24 pH

25 The measurement of pH will ensure that the waste feed is compatible with the WTP materials of
26 construction and treatment processes. Method 9040C of SW-846 will be used to measure pH. The
27 estimated sample size is 5 mL. The decision criteria is greater than pH 12, as presented in Table 3A-6.
28 With a pH above 12, the effect of chloride on uniform corrosion, pitting, or cracking is negligible.

29 Compatibility

30 The waste feed will be evaluated for compatibility with the residual aqueous waste in the LAW
31 Concentrate Receipt Vessel before being accepted into the WTP. These evaluations will focus on the
32 potential for a waste stream to react in an uncontrolled fashion with another waste (40 CFR 264,
33 Appendix V, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal
34 Facilities – *Examples of Potentially Incompatible Waste*). Although problems associated with
35 co-mingling aqueous waste feeds are not expected, this evaluation will ensure the compatibility of two or
36 more aqueous waste feeds from different DST System unit tanks.

37 Waste feed compatibility will be evaluated using ASTM D5058-90, *Standard Test Methods for*
38 *Compatibility of Screening Analysis of Waste*. This evaluation provides three test methods to determine
39 compatibility. Test Method A, using a reduced sample volume, will be applied to the proposed DST
40 System unit waste feed and the WTP feed receipt tank residual waste. This method prescribes the mixing
41 of aliquots of the two waste streams and an evaluation of any temperature change of the mixture. The
42 method also calls for a visual examination to determine whether viscosity has increased. These
43 evaluations will be performed to test for potential incompatibilities that could adversely affect the
44 management of the waste in the WTP. The waste acceptance criteria for compatibility is a temperature
45 change less than ± 20 °C.

1 The recommended sample volume for this test method is 150 to 300 mL. The sample size will be
2 decreased to 10 mL from each waste feed, for a total of 20 mL of the combined waste feeds for waste
3 minimization and will comply with the As Low As Reasonably Achievable philosophy, referred to as
4 “ALARA.”

5 Resource Conservation and Recovery Act Metals

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

- 10 • Antimony.
- 11 • Arsenic.
- 12 • Barium.
- 13 • Beryllium.
- 14 • Cadmium.
- 15 • Chromium.
- 16 • Lead.
- 17 • Mercury.
- 18 • Nickel.
- 19 • Selenium.
- 20 • Silver.
- 21 • Thallium.

22 The recommended sample size for metals (except mercury) is 3 mL and the recommended sample volume
23 for mercury is 1 mL.

24 Anions

25 Waste feed will be evaluated for the following anions using Method 9056A of SW-846:

- 26 • Fluoride.
- 27 • Chloride.
- 28 • Sulfate.
- 29 • Nitrite.
- 30 • Nitrate.
- 31 • Bromide.
- 32 • Phosphate.

33 The recommended sample size for anions analysis is 20 mL.

34 Organic Chemicals

35 The waste feed will be evaluated for organics. Three SW-846 methods will be used. Method 8270E will
36 be used for analysis of semivolatile compounds; Method 8260B will be used for analysis of volatile
37 compounds; and Method 8081B will be used to measure organochlorine pesticides. The recommended
38 sample size for volatile organic compounds is 10 mL, and the recommended sample size for semivolatile
39 organics and pesticides is 3 mL. These analytical methods are “catch-all methods,” meaning the methods
40 are capable of detecting multiple constituents. The requested analysis will include the request for
41 reporting of all quantifiable constituents, with the minimum as specified by the analytical method.

1 Ammonia

2 Waste feed will be evaluated for ammonia using EPA Method 350.3 or Method 350.1 or Standard
3 Method 4500-NH₃-F. It is anticipated that 0.5 mL of liquid will be necessary for the analysis. For these
4 methods, the latest update version will be utilized for testing.

5 Cyanide

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

8 Table 3A-6 provides a summary of the waste analysis parameters, analytical methods, acceptance criteria
9 and a description of action to undertake should a nonconformance occur.

10 Ignitable Waste

11 Four properties of a waste found in WAC 173-303-090(5)(a)(i through iv) are used to determine whether
12 a waste exhibits the characteristic of ignitability.

13 WAC 173-303-090(5)(a)(i) states that waste is ignitable if the sample waste "...is a liquid, other than an
14 aqueous solution containing less than 24 percent alcohol by volume, and has a flash point less than
15 60 degrees C (140 degrees F)... ." Report HNF-SD-WM-SAR-067, *Tank Waste Remediation System
16 Final Safety Analysis Report* (DOE-RL 1999), identifies 241-C-103 as the only tank, at this time, that
17 contains a separate organic solvent phase. The flash point of the separate organic solvent phase on tank
18 241-C-103 was determined to be 118 °C in report PNL-9403, *Waste Tank Organic Safety Project:
19 Analysis of Liquid Samples from Hanford Waste Tank 241-C-103* (PNL 1994). This flash point is well
20 above the regulatory threshold of 60 °C for determining the characteristic of ignitability and represents a
21 worst-case flash point for the liquid portion of the waste feed. Because the liquid portion of the waste feed
22 is aqueous and contains a maximum of 10 wt% TOC, the flash point test will not be performed on the
23 aqueous waste feed.

24 The WAC 173-303-090(5)(a)(ii) property of ignitability pertains to material that is not a liquid. Portions
25 of the Hanford tank waste are in a solid (crust and salt cake) and semi-solid (sludge) form. Process
26 knowledge indicates that this property of ignitability does not apply to the tank waste. Throughout the
27 history of the Tank Farms — according to memorandum 82331-90-313, *Double-Shell Tank Waste
28 Designation* (Westinghouse 1990) — there has been no evidence of the solid or semisolid portions of the
29 tank waste "...causing fire through friction, absorption of moisture or spontaneous chemical changes and,
30 when ignited, burns so vigorously and persistently that it creates a hazard" [WAC 173-303-090(5)(a)(ii)].

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

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

45 49 CFR 173.128, Shippers – General Requirements for Shipments and Packagings – *Class 5, Division 5.2
46 – Definitions and types*, defines organic peroxides and is not applicable to the waste feed.

1 The dangerous waste number D001 for ignitability will be removed from the waste feed after it is
2 received into the PT Facility, based upon the previous discussions of process knowledge.

3 Reactive Waste

4 WAC 173-303-090(7)(a)(i through viii) lists eight properties of a waste that would cause it to be
5 designated as a reactive waste.

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

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

16 Hydrogen, ammonia, oxides of nitrogen, and methane are generated in the Hanford waste tanks. These
17 gases are generated primarily from the radiolytic decomposition of the waste and are not a result of
18 mixing with water — according to report HNF-SF-1193, Rev 1, *Flammable Gas Project Topical Report*
19 (PNNL 1996). Nevertheless, flammable gases produced by the waste's radiolytic decomposition and, to a
20 lesser degree, thermolytic decomposition, will be managed at the WTP through ventilation of the vessels
21 that contain the waste feed.

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

31 Thirteen tanks have been investigated by the Pacific Northwest National Laboratory under CH2M Hill
32 Hanford Group, Inc. (Project Number 41503) for their potential to generate these gases at a pH between 2
33 and 12.5. This report researched the analytical data for the concentrations of cyanide and sulfide in the
34 supernatant and solids in the tanks, using the best basis inventory on the Tank Waste Information
35 Network System database current to November 2000 (Lockheed Martin 1999). Analytical data for
36 cyanide was available, but no data was available for sulfide because there is no history of sulfide addition
37 to the Tank Farms. Consequently, the author used total sulfur and sulfate concentration values for the
38 evaluation. Standard chemistry principles were used to calculate the potential generation of hydrogen
39 cyanide and hydrogen sulfide in acidic conditions. This investigation determined that hydrogen cyanide
40 and hydrogen sulfide would not be generated at the respective benchmark levels of 250 and 500 mg/kg of
41 waste for these tanks. Thus the waste feed contained in tanks scheduled for the first 10 years of WTP
42 operation is not considered to be sulfide- or cyanide-bearing waste.

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

7 **3A.5.1 Generated Wastes**

8 In addition to the vitrified glass product the WTP facilities' vitrification processes will generate a variety
9 of solid, liquid, and gaseous waste streams. Some of these waste streams include waste derived from the
10 incoming feed from the DST System unit. Other wastes include spent materials used in processing the
11 waste feed, such as rinsate and scrubber solutions that come into contact with the waste feed or its
12 derivatives, and contaminated equipment. General facility operations and maintenance activities will also
13 generate dangerous waste.

14 This section describes the secondary waste streams generated by the WTP, including characterization of
15 secondary waste, the associated sampling and analysis activities, and the ultimate TSD of regulated waste.
16 Air emissions subject to regulation, commonly referred to as Subparts AA, BB, and CC, are discussed in
17 Section 3A.6. Other regulated air emissions are addressed under the *Clean Air Act of 1990* (42 USC 7401
18 et seq.) and the *Washington State Clean Air Act of 1967* (Revised Code of Washington [RCW] 70.94
19 et seq.) permits and are not included in the following discussions.

20 Secondary waste streams that will be transferred back to the DST System unit will be designated with
21 waste numbers based upon process knowledge or by characterization where process knowledge is
22 inadequate. Waste transferred to the DST System unit will meet the DST waste acceptance criteria.

23 Secondary waste streams are divided into solid waste streams (discussed in Section 3A.5.2) and liquid
24 waste streams (discussed in Section 3A.5.4). Dangerous waste streams generated within the WTP will
25 meet the waste acceptance criteria or protocols established by the receiving TSD facilities' permits and
26 operating authority. This document does not outline the details of sampling and analyzing each waste
27 stream because each TSD receiving waste may update its waste acceptance criteria and thus alter the
28 required waste analyses.

29 Also, disposable sampling equipment will eliminate the need for equipment decontamination after use,
30 and is the preferred sampling option. If the use of disposable equipment is not practical, the sampling
31 equipment will be decontaminated before and following each sample event.

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

- 34 • Waste streams can be designated using process knowledge. Acceptable process knowledge
35 includes:
 - 36 • Historical analytical data.
 - 37 • Mass balance from a controlled process with a specified output for a specified input.
 - 38 • Safety Data Sheets (SDS).
 - 39 • Analytical data on the waste from a similar process.
 - 40 • For mixed waste, process knowledge could include information from surrogate material
41 (that is, a non-radioactive waste generated from an analogous activity or process).
- 42 • The listed waste numbers F001 through F005 will follow the secondary waste if the secondary
43 waste is derived from the waste feed. F039 waste was never placed in the DST System unit and
44 will not be designated to secondary waste. If the DST System unit receives F039 waste in the
45 future, F039 will then be designated to secondary waste that contacts the DST waste feed.

- 1 • Secondary wastes not derived from the waste feed (e.g., Lab and maintenance waste) will be
- 2 characterized and designated with the appropriate EPA hazardous waste numbers and
- 3 Washington State dangerous waste numbers and managed accordingly.
- 4 • If analyses are required for determining waste numbers for a secondary waste, laboratory
- 5 procedures will be prepared using applicable SW-846 methods. Analytical procedures will be
- 6 revised, as appropriate, if SW-846 methods are revised.
- 7 • Documentation of the process knowledge or analytical data used to designate the waste numbers
- 8 will be maintained in the WTP operating record. Documentation is discussed in Section 3A.7 of
- 9 this report.

10 **3A.5.2 Secondary Solid Waste Streams**

11 Solid waste will be generated from WTP operations and includes a wide variety of wastes – such as waste
 12 derived from routine maintenance activities, nonroutine maintenance activities, and daily operating
 13 activities. The following sections describe the various mixed and variable solid waste types to be
 14 generated. Refer to the WAP glossary for additional details on the specific waste types.

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

22

Table 3A-3 Secondary Solid Mixed Waste Streams

Waste Stream	Characterization	Disposal
Out-of-service melters	Designated by process knowledge or by characterization where process knowledge is inadequate.	Disposal of out-of-service melters is currently under development.
HLW glass residue		Determined case-by-case.
Melter components		These wastes will be packaged and transferred to the appropriate Hanford TSD unit.
Offgas treatment system components: <ul style="list-style-type: none"> • High-Efficiency Mist Eliminators (HEMEs). • High Efficiency Particulate Air (HEPA) filters. • Silver mordenite canisters. 		
Spent carbon and catalyst from offgas treatment		
Spent ion exchange resins		
Spent ultrafilters		
Out-of-service equipment		
Entrained solids		

1 Out-of-Service Melters

2 It is anticipated that melters will require replacement at some point, due to the harsh conditions of the
3 vitrification process. Residual molten glass is vitrified. The melter will be allowed to cool and then will
4 be disconnected.

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

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

22 High-Level Waste Glass Residue

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

28 Ancillary Equipment

29 Melters will be fitted with various ancillary equipment (e.g., bubbler assemblies, heating elements, and
30 thermocouples) that will require periodic replacement. The ancillary equipment will be removed,
31 designated by process knowledge as mixed waste, and packaged and transferred to an appropriate TSD
32 unit. It is anticipated that LAW melter components will be contact-handled, mixed LAW. This secondary
33 waste stream will be packaged for transportation and treated for disposal at a commercial vendor to meet
34 the LDR.

35 Ancillary equipment (e.g., pumps, valves, piping, motors, and electrical equipment) no longer fit for use,
36 will be removed from service and designated as out-of-service equipment. Out-of-service equipment that
37 has been in contact with the waste feed will be sampled or designated by process knowledge, packaged,
38 and transferred to an appropriate TSD unit.

39 Offgas Treatment System Components

40 HEMEs, HEPA filters, and silver mordenite canisters will be components of the offgas treatment system
41 incorporated to remove contaminants from the offgas streams prior to discharge. These components will
42 periodically be replaced to maintain treatment efficiency. They will be designated by process knowledge
43 or by characterization where process knowledge is inadequate, packaged, and transferred to an
44 appropriate TSD unit.

1 Spent Ion Exchange Resins

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

6 Spent Ultrafilters

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

9 Entrained Solids

10 Entrained solids will be generated by pretreating the LAW feed via ultrafiltration. The separated solids
 11 will be washed and again concentrated via ultrafiltration. The entrained solids will either be incorporated
 12 into the IHLW or the Immobilized Low-Activity Waste (ILAW) or returned to the DST System unit in
 13 the form of a slurry via pipeline.

14 Spent Carbon and Catalyst from Offgas Treatment

15 Spent carbon and catalyst from offgas treatment will periodically be replaced to maintain treatment
 16 efficiency. These materials will be designated by process knowledge or characterization where process
 17 knowledge is inadequate and managed as mixed waste. They will be removed from their respective
 18 equipment, packaged, and transferred to an appropriate TSD unit.

19 **3A.5.3 Variable Solid Waste Streams**

20 The waste streams listed in Table 3A-4 can be radioactive waste, dangerous waste, or mixed waste,
 21 depending on the source of the waste and whether it had contact with the waste feed. The EPA hazardous
 22 waste numbers and Washington State dangerous waste numbers will be assigned to these waste streams,
 23 based on the designation of the waste by process knowledge or by characterization where process
 24 knowledge is inadequate. In addition to the waste streams listed in Table 3A-4, raw process materials and
 25 chemicals will be brought onto the WTP site. Some of these substances may subsequently become waste
 26 and will require characterization for proper waste management. The SDS is useful when characterizing
 27 and designating material waste codes and waste streams. Vendors will be required to provide SDS for
 28 substances that will be brought onto the WTP site, and an SDS file will be maintained by the WTP.
 29 Examples of these types of substances are process and laboratory chemicals, lubricants (e.g., oils and
 30 greases), and maintenance products (e.g., paints, solvents, and adhesives).

31

Table 3A-4 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 or by characterization where process knowledge is inadequate 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 (PPE)		
Maintenance waste		

32

33 Subcontractors to the WTP will be required to have an SDS for the substances that they bring onto the
 34 WTP site.

1 Laboratory Waste

2 Non-wastewater laboratory waste derived from the waste feed will be designated as mixed waste by
3 process knowledge or by characterization where process knowledge is inadequate, packaged, and
4 transferred to an appropriate TSD unit. Other non-wastewater laboratory wastes (e.g., off-specification
5 laboratory chemicals and spent or unused simulant) will be designated by process knowledge or by
6 characterization where process knowledge is inadequate and managed accordingly. These wastes will be
7 packaged and disposed of at an appropriate TSD unit.

8 Personal Protective Equipment

9 Personnel performing certain tasks such as facility maintenance, treatment process operations, and waste
10 packaging activities, may wear PPE. Used PPE may be returned to the vendor for cleaning and
11 refurbishment. Used PPE that cannot be recycled to the vendor and has had contact with waste feed or
12 other sources of radiological contamination will be designated as radioactive or mixed waste by process
13 knowledge or by characterization where process knowledge is inadequate, packaged, and transferred to an
14 appropriate TSD unit. The PPE nonradioactive waste designated as dangerous waste by process
15 knowledge or by characterization where process knowledge is inadequate, and will be packaged and
16 disposed of at an appropriate TSD unit.

17 Maintenance Waste

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

25 **3A.5.4 Liquid Waste Streams**

26 The dangerous and mixed liquid waste streams generated at the WTP that cannot be incorporated back
27 into the treatment process (recycled) will be managed in accordance with the Liquid Effluent Retention
28 Facility/Effluent Treatment Facility (LERF/ETF) waste acceptance criteria (WRPS 2018). The
29 LERF/ETF will receive hazardous aqueous waste generated at WTP. The waste will meet the acceptance
30 criteria as outlined in the LERF/ETF waste acceptance criteria. The LERF and ETF allow process
31 knowledge to be used in lieu of some analyses in instances where process knowledge is adequate, and a
32 LERF or ETF representative will work with a WTP representative to identify the waste acceptance
33 criteria and analyses appropriate for liquid waste characterization.

34 Aqueous waste streams listed in Table 3A-5 will be collected in an effluent collection tank. Samples will
35 be taken from the effluent collection tank, in accordance with a sampling procedure which is included in
36 the Operating Record.

Table 3A-5 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 mixed tank are grab sampled by autosampler or manually.	Sampling will be performed under the following circumstances: <ul style="list-style-type: none"> • Before initial discharge. • At major process change or upset. • At request for resampling by the receiving facility.
LAW melter feed evaporator condensate			
PT, HLW, and LAW offgas condensate			
LAW and HLW melter offgas scrubber blowdown			
Laboratory wastewater			
Plant wastewater containing waste feed			

1
2 A discussion of each aqueous waste stream is presented below.

3 **Aqueous Waste from Processes**

4 Table 3A-5 lists the aqueous waste streams that will be generated by the WTP from processing the DST
5 waste feed. The analytical laboratory will also generate aqueous waste. These waste streams will contain
6 both radioactive and dangerous waste components and will be similar to the process condensate stream
7 described in DOE/RL-90-42, *242-A Evaporator Dangerous Waste Permit Application* (DOE-RL 1997).

8 **Plant Wastewater**

9 Wastewater will be generated primarily from decontamination and wash-down activities in the WTP. The
10 wastewater will be designated as mixed waste by process knowledge or by characterization where process
11 knowledge is inadequate, since it will contain dilute waste feed constituents.

12 **3A.5.5 Land Disposal Restrictions Evaluation for Immobilized Waste**

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

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

19 “(a) A prohibited waste identified in the table “Treatment Standards for Hazardous Wastes” may
20 be land disposed only if it meets the requirements found in the table. For each waste, the table
21 identifies one of three types of treatment standard requirements:

- 22 (1) All hazardous constituents in the waste or in the treatment residue must be at or below the
23 values found in the table for that waste (“total waste standards”); or
- 24 (2) The hazardous constituents in the extract of the waste or in the extract of the treatment residue
25 must be at or below the values found in the table (“waste extract standards”); or
- 26 (3) The waste must be treated using the technology specified in the table (“technology standard”),
27 which are described in detail in §268.42, Table 1 – Technology Codes and Description of
28 Technology-Based Standards.”

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

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

13	D002	Corrosivity (pH)
14	D004	Arsenic
15	D005	Barium
16	D006	Cadmium
17	D007	Chromium (total)
18	D008	Lead
19	D009	Mercury
20	D010	Selenium
21	D011	Silver

22 Similar to the treatment of the Savannah River Site tank waste, the treatment of the Hanford tank waste
 23 will require many years of WTP operation. Rather than repeated sampling and analysis of the waste to
 24 demonstrate LDR using the total waste standard or the waste extract standard, it would be appropriate to
 25 treat the Hanford tank waste to a specific treatment standard (e.g., the HLVIT technology-based standard
 26 described above for the Savannah River Site tank waste). WTP has submitted a petition for a site-specific
 27 variance as directed under 40 CFR 268.44(h) that would specify HLVIT as the method of treatment for
 28 Hanford tank waste processed through the WTP for all applicable waste codes.

29 **3A.5.6 Waste Feed Rejection Policy**

30 Confirmatory action (e.g., re-analysis and data review) will be performed for each analytical result that
 31 does not initially meet the acceptance criteria presented in Table 3A-6. Re-analysis of a sample that fails
 32 an acceptance criterion will consist of two repeat analyses for the failed criteria. If both of the repeat
 33 analyses pass, then the sample will be considered to meet that acceptance criteria. If one or both of the
 34 repeat analyses fail, the waste will be considered nonconforming. If the waste feed is determined to be
 35 nonconforming, then the WTP, the Tank Operations Contractor, or both, will determine and execute
 36 corrective actions necessary to be able to transfer and process the waste feed. Such actions may include:

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

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

- 42 • Continued waste storage until an alternative is identified.

1 The nonconformance decisions, corrective actions, supporting data, and the names and titles of the
2 individuals making these decisions will be documented and retained as a Quality Assurance (QA) record,
3 according to procedures described in Chapter 3B, “Quality Assurance Project Plan for the Waste Analysis
4 Plan” (herein referred to as the QAPjP).

5 **3A.5.7 Discrepancy Policy**

6 If discrepancies, such as improper container labeling, improper packaging, nonconformance issues, or
7 manifest inconsistencies, are discovered during the container receipt inspection, discrepant containers or
8 shipments will not be accepted into WTP until the discrepancies have been resolved using one or more of
9 the following alternatives:

- 10 • Incorrect or incomplete entries on the Uniform Hazardous Waste Manifest or on-site shipping
11 paperwork can be corrected upon receipt at WTP with concurrence from the generator.
12 Corrections are made by drawing a single line through the incorrect manifest entry. Corrected
13 entries are initialed and dated by the individual making the correction.
- 14 • The waste package(s) can be held at WTP and segregated from other stored waste, in which case,
15 the generator must provide written instructions for correcting the discrepancies.
- 16 • The waste package may be returned to the generator for a detailed chemical, physical, and/or
17 biological analysis of waste.

18 If the waste container or shipment is damaged to such an extent, or the waste is in such a condition as to
19 present a hazard to the public health or the environment in the process of further transportation, then
20 actions must be taken in accordance with Chapter 7, Building Emergency Plan.

21 A generator may be contacted to provide additional information or requested to provide corrective
22 actions. If conformance issues are unable to be resolved, waste will not be accepted into the WTP. The
23 verification rate for that waste stream will be increased to 100 percent, and the generator’s other waste
24 streams will be evaluated to determine whether all waste streams or a subset of waste streams might be
25 subject to the same type of conformance issue. Also, the physical screening frequency for each waste
26 stream that might be subject to the same type of verification failure will be adjusted to 100 percent.

27 **3A.5.8 Sampling Strategies and Frequency**

28 The samples collected for characterization of the waste feed, by the Tank Operations Contractor, for
29 transfer to the WTP will be collected as described in the RDQO Optimization Report. A minimum of one
30 sample will be collected from the waste feed tank for characterization of the waste stored in that tank.

31 Samples will be accompanied by a chain-of-custody at all times, ensuring accountability of the sample
32 and associated records. At a minimum, the following information must be identified on a completed
33 chain-of-custody record:

- 34 • Collector(s) names.
- 35 • Project designation.
- 36 • Unique sample numbers.
- 37 • Date, time, and location (or traceable reference thereto) of sample collection.
- 38 • Chain of possession information (i.e. signatures/printed names of all individuals involved in the
39 transfer of sample custody and sample locations, dates of receipt and relinquishment).
- 40 • Additional information regarding the sample and specific analytical instructions may also be
41 identified.

42 Sample preservation, storage, and holding times for the samples collected to support characterization of
43 the DST waste feed are discussed in the RDQO Optimization Report.

1 **3A.5.9 Analytical Parameters and Test Methods**

2 The analytical methods that will be used to obtain the necessary data for characterizing the DST waste
3 feed are addressed in the RDQO Optimization Report.

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

- 8 • Licenses or permits issued by the applicable government authority, allowing the laboratory to
9 handle waste samples that contain chemical and radiological components.
- 10 • Laboratory accreditation.
- 11 • Analytical capacity, including number and type of analytical instruments, sample preparation
12 facilities, and sufficient uncommitted capacity, or a commitment to procure sufficient capacity to
13 handle the sample load.
- 14 • Adequate number of qualified technical staff.
- 15 • Demonstrated history of performing acceptable analyses.
- 16 • Adequate sample tracking system.
- 17 • A demonstrated QA program and participation in performance evaluation.

18 **3A.5.10 Quality Assurance/Quality Control and Data Reporting**

19 The QA and Quality Control (QC) for waste feed characterization are addressed in the RDQO
20 Optimization Report. Additional QA and QC requirements for sampling and analysis in support of the
21 characterization of the waste feed and the characterization of secondary waste streams are provided in
22 Chapter 3B of this permit.

23 **3A.6 AIR EMISSIONS**

24 Emissions from the stacks that vent the WTP processes will be monitored according to the provisions of
25 the *Hanford Air Operating Permit*, as required by WAC 173-303-395(2), Dangerous Waste Regulations –
26 *Other general requirements*. Monitoring and sampling to address air emissions concerns under these
27 permits will not be addressed in this application. However, the applicability of the air emissions
28 requirements found in WAC 173-303 will be evaluated in the following sections. Details of the air
29 emissions control systems for the WTP are provided in Chapter 4 of the DWP.

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

- 1 • *Air Emission Standards for Equipment Leaks* (Subpart BB)
- 2 WAC 173-303-691, Dangerous Waste Regulations – *Air emission standards for equipment leaks*,
- 3 applies to facilities that treat, store, or dispose of hazardous waste, and regulates air emissions
- 4 from equipment that contains or contacts hazardous wastes with organic concentrations of at least
- 5 10 percent by weight (wt%). WAC 173-303-691 incorporates 40 CFR 264, Subpart BB,
- 6 Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal
- 7 Facilities – *Air Emission Standards for Equipment Leaks*, by reference. This provision does not
- 8 apply to the WTP, because the WTP will not accept wastes with organic concentrations at or
- 9 above 10 wt%. (refer to Section 3A.5). Compliance with this provision will be documented
- 10 through analysis, as described in Section 3A.5.
- 11 • *Air Emission Standards for Tanks, Impoundments, and Containers* (Subpart CC)
- 12 The regulations specified under WAC 173-303-692, Dangerous Waste Regulations – *Air emission*
- 13 *standards for tanks, surface impoundments, and containers*, and 40 CFR 264, Subpart CC,
- 14 Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal
- 15 Facilities – *Air Emission Standards for Tanks, Surface Impoundments, and Containers*,
- 16 incorporated by reference, do not apply to the WTP mixed waste tank systems and containers.
- 17 These tanks and containers are excluded under WAC 173-303-692(1)(b)(vi) because they qualify
- 18 as waste management units “...used solely for the management of radioactive mixed waste in
- 19 accordance with all applicable regulations under the authority of the Atomic Energy Act and the
- 20 Nuclear Waste Policy Act.” Containers or tanks bearing nonradioactive, dangerous waste
- 21 (e.g., maintenance and laboratory waste) that are not excluded under WAC 173-303-692(1)(b)(ii)
- 22 or 40 CFR 264.1082(c) will comply with the container and tank standards specified under
- 23 40 CFR 264, Subpart CC.

24 **3A.7 RECORDKEEPING**

25 Records generated for environmental compliance will be legible, identifiable, and retrievable, and will be

26 protected against damage, deterioration, or loss. Requirements and responsibilities for record

27 transmission, distribution, retention, maintenance, and disposal will be established and documented. The

28 requirements contained in WAC 173-303-380(a, b, and c), Dangerous Waste Regulations – *Facility*

29 *recordkeeping*, are addressed in this WAP and will be managed through the waste tracking system

30 record-keeping policies. Additional requirements listed under WAC 173-303-380 are addressed in the

31 QAPjP. Records generated to support activities described in this WAP will be considered QA records.

32 These may be in electronic or hard copy format, and will be managed according to the requirements

33 outlined in the QAPjP.

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

- 35 • Sample information provided by the Tank Operations Contractor, including constituents of
- 36 concern from sampling activities, laboratory analysis results, waste certifications, and shipping
- 37 and transfer papers.
- 38 • Documentation used for any discrepancy resolution and nonconformance action.
- 39 • Confirmation volume measurement data, including any discrepancy resolution.
- 40 • Documentation used for LDR evaluation.
- 41 • Sampling and analytical data developed for meeting the waste acceptance criteria of receiving
- 42 facilities.
- 43 • Calibration data from analytical equipment.
- 44 • Shipment and waste transfer documentation, including waste profile sheets and LDR information
- 45 forms.

Table 3A-6 Waste Feed Analysis, Waste Acceptance Criteria, and Nonconformance Actions

Parameter	Analytical Method ^{a, b}	Target Minimum Reportable Quantity	Acceptance Criteria	Nonconformance Actions
TOC using persulfate oxidation method	9060A	1 wt%	TOC < 10 wt%	Reject waste feed
PCBs	8082A	0.025-0.05 mg/L (supernate) 0.1-0.25 mg/kg (sludge)	PCBs < 50 ppm	Reject waste feed
pH	pH meter, 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 >12	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
RCRA Metals: Sb, As, Ba, Be, Cd, Cr, Pb, Ni, Se, Ag, Tl ^d	6010D	0.05-015 mg/L (supernate) 15.0-100 mg/kg (sludge)	per Permit Condition Table III.10.H.D	Determination of toxicity characteristic metals, underlying hazardous constituents
Hg	7470A or 7471B	0.025-1.0 mg/L (supernate) 0.10-3.5 mg/kg (sludge)	Hg < 1.4E-05 mol/mol sodium	Determination of toxicity characteristic metals
Inorganic Anions – Ratio to Sodium ^c	9056A	150-500 mg/L (supernate) 2.50-50.0 mg/kg (sludge)	Cl < 3.7E-2 mol/mol sodium F < 9.1E-2 mol/mol sodium SO4 < 7.0E-2 mol/mol sodium	Corrective actions to eliminate incompatible conditions
Ammonia / ammonium	SM 4500-NH ₃ -F or EPA Method 350.1 or Method 350.3	0.08-15.0 mg/L (supernate only)	Ammonia/Ammonium < 0.04 M	Corrective actions to eliminate incompatible conditions

Table 3A-6 Waste Feed Analysis, Waste Acceptance Criteria, and Nonconformance Actions

Parameter	Analytical Method^{a, b}	Target Minimum Reportable Quantity	Acceptance Criteria	Nonconformance Actions
Semivolatile organics	8270E	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	8260B	0.10-1.0 mg/L (supernate) 0.25-1.0 mg/kg (sludge)	Not applicable	Potential risk driver during facility performance demonstration
Organic acids	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
Cyanide	9012B or 9010C/9014	2.50-10 mg/L (supernate) 0.50-3.50 mg/kg (sludge)	Not applicable	Potential risk driver during facility performance demonstration
Organochlorine pesticides	8081B	0.025-0.07 mg/L (supernate) 0.01-0.07 mg/kg (sludge)	Not applicable	Potential risk driver during facility performance demonstration

^a Methods are from EPA SW-846, as amended, unless otherwise indicated. The specified method revision or newer will be used.

^b Since many types and sizes of glassware and supplies are commercially available, and since it is possible to prepare reagents and standards in many different ways, the apparatus, reagents, and volumes included in these methods may be replaced by any similar type as long as this substitution does not affect the overall quality of the analysis.

^c Nitrate, Nitrite, Bromide, and Phosphate Acceptance Criteria limits will be added when the WAP is updated for Baseline operations.

^d The acceptance criteria for RCRA metals refers to the limiting feed rate of RCRA metals into the melter, as determined by the Environmental Performance Demonstration Test. This acceptance criterion does not apply to the acceptance of DST waste into the LAW Facility.