Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

APR 0 4 2013

13-ESQ-0009

Mr. E. R. Skinnarland
Nuclear Waste Program
State of Washington
Department of Ecology
3100 Port of Benton Boulevard
Richland, Washington 99354

Dear Mr. Skinnarland:

CLASS 1 MODIFICATIONS TO THE HANFORD FACILITY RESOURCE CONSERVATION AND RECOVERY ACT PERMIT (PERMIT), QUARTER ENDING MARCH 31, 2013

In accordance with Permit Condition I.C.3, enclosed for your notification are the Class 1 modifications for the quarter ending March 31, 2013. Enclosure 1 includes the Class 1 modification information that has been cleared for public release. Enclosure 2 includes the Class 1 modification information that contains Official Use Only information and is not for public distribution.

These modifications update information in Part III of Permit Revision 8C. The modifications pertain to the Liquid Effluent Retention Facility & 200 Area Effluent Treatment Facility, the Integrated Disposal Facility, and the Waste Treatment Plant. The Class 1 modifications are being made to ensure that activities are conducted in compliance with the Permit. A record of these modifications is maintained in the Hanford Facility Operating Record.

Sincerely,

Matt McCormick
Manager

ESQ:ACM

Enclosures

cc: See page 2

Document transmitted contains OUO information.

When separated from Enclosure 2,
handle this document as non-sensitive information.

cc w/encls:
P. G. Harrington, ORP (CD ROM)
Administrative Record, TSD: H-0-1, H-0-8, T-3-4, H6-08 (CD ROM)
Ecology NWP Library (Hardcopy)
Environmental Portal, LMSI, A3-95 (CD ROM)
HF Operating Record (J. K. Perry, MSA, H7-28) (CD ROM)

cc w/o encls:
F. W. Bond, Ecology
D. M. Busche, BNI
A. S. Carlson, Ecology
B. L. Curn, URS
S. L. Dahl, Ecology
L. L. Fritz, MSA
J. A. Hedges, Ecology
D. L. McDonald, Ecology
A. L. Prignano, Ecology
J. R. Seaver, CHPRC

ENCLOSURE 1

CLASS 1 MODIFICATIONS FOR QUARTER ENDING MARCH 31, 2013
Mr. E. R. Skinnarland, Ecology

Consisting of 215 pages,
including this cover page

Hanford Facility RCRA Permit Modification Notification Forms

Part III, Operating Unit 3

Liquid Effluent Retention Facility & 200 Area Effluent Treatment Facility

Index

Page 2 of 6	Hanford Facility RCRA Permit III.3 Conditions
Page 3 of 7	Addendum A, Part A Form
Page 4 of 7	Addendum B, Section B.4.1
Page 5 of 7	Addendum B, Table B.6
Page 6 of 7	Addendum B, Table B.7
Page 7 of 7	Addendum C, Table C.1

Submitted by Co-Operator: [signature] 3-5-13

Date

Reviewed by RL Program Office: [signature] 2.26.13

Date

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part
Liquid Effluent Retention Facility & 200 Area Effluent Treatment Facility	**Part III, Operating Unit 3**

Description of Modification:
Hanford Facility RCRA Permit III.3:

PART III, OPERATING UNIT GROUP 3 PERMIT CONDITIONS
Liquid Effluent Retention Facility & 200 Area Effluent Treatment Facility

Unit Description:

The Liquid Effluent Retention Facility (LERF) and 200 Area Effluent Treatment Facility(200 Area ETF) consists of an aqueous waste treatment system that provides treatment, storage integral to the treatment process, and storage of secondary wastes from the treatment process for a variety of aqueous mixed waste. The 200 Area ETF is located in the 200 East Area. Aqueous wastes managed by the 200 Area ETF include process condensate from the LERF and 200 Area ETF and other aqueous waste generated from onsite remediation and waste management activities.

The LERF consists of three lined surface impoundments, or basins. Aqueous waste from LERF is pumped to the 200 Area ETF for treatment in a series of process units, or systems, that remove or destroy essentially all of the dangerous waste constituents. The treated effluent is discharged to a State-Approved Land Disposal Site (SALDS) north of the 200 West Area, under the authority of a Washington State Waste Discharge Permit (Ecology 2000) and 200 Area ETF Delisting (40 CFR 261, Appendix IX, Table 2). Construction of the LERF began in 1990. Waste management operations began at LERF in April 1994. Construction of the 200 Area ETF began in 1992. Waste management operations began at 200 Area ETF in November of 1995.

This Chapter provides unit-specific Permit conditions applicable to the dangerous waste management units for LERF and 200 Area ETF.

List of Addenda Specific to Operating Unit Group 3

Addendum A	Part A Form, dated ~~June 30, 2012~~March 31, 2013
Addendum B	Waste Analysis Plan, dated ~~March 31, 2012~~March 31, 2013
Addendum C	Process Information, dated ~~December 31, 2011~~March 31, 2013
Chapter 5.0	Groundwater Monitoring (PNNL-11620 & WHC-SD-EN-AP-024), dated June 30, 2008
Addendum E	Security Requirements, dated, June 30, 2011
Addendum F	Preparedness and Prevention, dated June 30, 2011
Addendum G	Personnel Training, dated June 30, 2012
Addendum H	Closure Plan, dated June 30, 2011
Addendum I	Inspection Requirements, dated June 30, 2011
Addendum J	Contingency Plan, dated March 31, 2012

WAC 173-303-830 Modification Class [1] [2]	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1
Enter wording of WAC 173-303-830, Appendix I Modification citation:
Administrative and informational changes.

Modification Approved: [X] Yes [ ] No (state reason for denial)	Reviewed by Ecology:
Reason for denial:	E R Skinnarland (signature) 2/21/13
	E. R. Skinnarland — Date

---

[1] Class 1 modifications requiring prior Agency approval.

[2] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to a Class [1]1, if appropriate.

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part
Liquid Effluent Retention Facility & 200 Area Effluent Treatment Facility	**Part III, Operating Unit 3**

Description of Modification:

Addendum A, Part A Form:

Section XII. Process Codes and Design Capacities								**Section XIII. Other Process Codes**								
Line Number		**A. Process Codes (enter code)**			**B. Process Design Capacity**		**C. Process Total Number of Units**	**Line Number**		**A. Process Codes (enter code)**			**B. Process Design Capacity**		**C. Process Total Number of Units**	**D. Process Description**
					1. Amount	**2. Unit of Measure (enter code)**							**1. Amount**	**2. Unit of Measure (enter code)**		
X	**1**	**S**	**0**	**2**	**1,600**	**G**	**002**	**X**	**1**	**T**	**0**	**4**	**700**	**C**	**001**	**In situ vitrification**
X	**2**	**T**	**0**	**3**	**20**	**E**	**001**									
X	**3**	**T**	**0**	**4**	**700**	**C**	**001**									
	1	S	0	4	88,500,000	L	003		**1**	T	0	4	18,927	V	001	container treatment
	2	T	0	2	88,500,000	V	003		**2**							
	3	S	0	2	~~7,608,654~~ 9,652,810	L	019~~17~~		**3**							
	4	T	0	1	817,646	V	017		**4**							
	5	S	0	1	147,630	L	003		**5**							
	6	T	0	4	18,927	V	001		**6**							
	7								**7**							

WAC 173-303-830 Modification Class [1, 2]	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.2

Enter wording of WAC 173-303-830, Appendix I Modification citation:

Correction of typographical errors. This is to correct a typographical error that occurred when processing an unrelated change in the Part A from Rev. 2 to Rev. 2A. These changes had been made previously and approved in Rev. 2 by Ecology on June 8, 2011 in letter 11-NWP-057, but were dropped in error during the recent Part A permit revision to Rev. 2A approved 8/20/12.

Modification Approved: [X] Yes [ ] No (state reason for denial)

Reason for denial:

Reviewed by Ecology:

E. R. Skinnarland (signature) — Date: 2/21/13

[1] Class 1 modifications requiring prior Agency approval.

[2] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to a Class [1]1, if appropriate.

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part
Liquid Effluent Retention Facility & 200 Area Effluent Treatment Facility	**Part III, Operating Unit 3**

Description of Modification:

Addendum B, Section B.4.1:

B.4.1 Sampling Procedures

With a few exceptions, generators are responsible for the characterization, including sampling and analysis, of an influent aqueous waste. Process condensate is either sampled at the 242-A Evaporator or accumulated in a LERF basin following a 242-A Evaporator campaign and sampled. Other exceptions will be handled on a case-by-case basis and the Hanford Facility Operating Record, LERF and 200 Area ETF File will be maintained at the unit for inspection by Ecology. The following section discusses the sampling locations, methodologies, and frequencies for these aqueous wastes. For samples collected at the LERF and 200 Area ETF, unit-specific sampling protocol is followed. The sample containers, preservation materials, and holding times for each analysis are listed in Section ~~B.10~~B.9.

WAC 173-303-830 Modification Class [1,2]	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.2

Enter wording of WAC 173-303-830, Appendix I Modification citation:

Correction of typographical errors. Correction to appropriate section of permit; there is no Section B.10.

Modification Approved: ☑ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology: E. R. Skinnarland 2/21/13 E. R. Skinnarland Date

[1] Class 1 modifications requiring prior Agency approval.

[2] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to a Class [1]1, if appropriate.

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part
Liquid Effluent Retention Facility & 200 Area Effluent Treatment Facility	**Part III, Operating Unit 3**

Description of Modification:
Addendum B, Table B.6:

Table B.6. Sample and Analysis Criteria for Influent Aqueous Waste and Treated Effluent

Parameter	Analytical Method[1]	Method PQL Sensitivity[2]	Accuracy/ Precision for Method[3] (percent)	Sample container[4]/ Preservative[4]/ Holding time[5]
POLYCHLORINATED BIPHENYLs (PCBs)				
Aroclor-1016	SW-846 8082	0.4	50-110 / 25	Sample container 4 x 1-liter amber glass Preservative 4°C Holding time ~~7 days~~1 year for extraction; ~~40 days~~1 year for analysis after extraction
Aroclor-1221		0.4	50-110 / 25	
Aroclor-1232		0.4	50-110 / 25	
Aroclor-1242		0.4	50-110 / 25	
Aroclor-1248		0.4	50-110 / 25	
Aroclor-1254		0.4	50-110 / 25	
Aroclor-1260		0.4	50-110 / 25	
TOTAL METALS				
Arsenic	EPA-600 200.8	11	70-130 / 20	Sample container 1 x 0.5-liter plastic/glass Preservative 1:1 HNO_3 to pH<2 Holding time 180 days; mercury 28 days

WAC 173-303-830 Modification Class [1 2]	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.2.a

Enter wording of WAC 173-303-830, Appendix I Modification citation:

Changes to analytical quality assurance/control plan to conform with agency guidance or regulations. SW-846 (RCRA solid waste sampling) says there is no hold time for PCBs; 40 CFR 136.3 Table II was changed to say the PCB hold time is 1 year between sampling and extraction and 1 year between extraction and analysis when the extractable analytes of concern fall within a single chemical category. All samples will fall into the single chemical category, as specific classes of organic compounds are considered a single chemical category.

Modification Approved: [X] Yes [ ] No (state reason for denial)

Reason for denial:

Reviewed by Ecology:

E. R. Skinnarland (signature) 2/21/13

E. R. Skinnarland Date

[1] Class 1 modifications requiring prior Agency approval.

[2] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to a Class [1]1, if appropriate.

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part
Liquid Effluent Retention Facility & 200 Area Effluent Treatment Facility	**Part III, Operating Unit 3**

Description of Modification:
Addendum B, Table B.7:

Table B.7. Sample Containers, Preservative Methods, and Holding Times for 200 Area ETF Generated Waste

Parameter	Analytical Method	Method PQL	Accuracy/ Precision for Method (percent)	Sample container[1]/ Preservative[1]/ Holding time[2]
Liquid Matrix				
For methods other than total solids, analyze using the methods and QA/QC in Table B.6. For each method, analyze the target compound list				
Total solids	EPA-600 160.3	ND	ND	Sample container 1 x 500-mL glass or plastic Preservative – 4°C Holding time –7 days
Solid Matrix				
Volatile organic compounds (combined method target compound lists)	SW-846 8260	Refer to Table B.6	Refer to Table B.6	Sample container 1 x 40-mL amber glass with septum Preservative –4°C Holding time –14 days
Semivolatile organic compounds (method target compound list)	SW-846 8270	Refer to Table B.6	Refer to Table B.6	Sample container 1 x 125-mL amber glass Preservative –4°C Holding time –14 days for extraction; 40 days for analysis after extraction
PCBs (method target compound list)	SW-846 8082	Refer to Table B.6	Refer to Table B.6	Sample container Amber glass – 50 g of sample Preservative –4°C Holding time –~~14 days~~1 year for extraction; ~~40 days~~1 year for analysis after extraction

WAC 173-303-830 Modification Class [1 2]	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.2.a

Enter wording of WAC 173-303-830, Appendix I Modification citation:

Changes to analytical quality assurance/control plan to conform with agency guidance or regulations. SW-846 (RCRA solid waste sampling) says there is no hold time for PCBs; 40 CFR 136.3 Table II was changed to say the PCB hold time is 1 year between sampling and extraction and 1 year between extraction and analysis when the extractable analytes of concern fall within a single chemical category. All samples will fall into the single chemical category, as specific classes of organic compounds are considered a single chemical category.

Modification Approved: [X] Yes [ ] No (state reason for denial)

Reason for denial:

Reviewed by Ecology:

E. R. Skinnarland (signature) — Date 2/21/13

[1] Class 1 modifications requiring prior Agency approval.

[2] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to a Class [1]1, if appropriate.

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part
Liquid Effluent Retention Facility & 200 Area Effluent Treatment Facility	**Part III, Operating Unit 3**

Description of Modification:

Addendum C, Table C.1:

Table C.1. Liquid Effluent Retention Facility Containment System

LERF System	Drawing Number	Drawing Title
Bottom Liner	H-2-79590, Sheet 1	Civil Plan, Sections and Details; Cell Basin Bottom Liner
Top Liner	H-2-79591, Sheet 1	Civil Plan, Sections and Details; Cell Basin Bottom Liner
Catch Basin	H-2-79593, Sheet 1, 3-5	Civil Plan, Section and Details; Catch Basin

WAC 173-303-830 Modification Class [1 2]	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1

Enter wording of WAC 173-303-830, Appendix I Modification citation:

Administrative and informational changes. Changes were made in the LERF catch basin secondary containment structures when a pipeline from WTP was connected to each of the LERF basins. Because modifications differed for each basin, sheets 3-5 were added to the original drawing to provide details of each of the three separate catch basins.

There has been no change in actual containment dimensions since the WTP pipelines were connected in 2001. There is no change in secondary containment management practices.

Modification Approved: [X] Yes [ ] No (state reason for denial)

Reason for denial:

Reviewed by Ecology:

E. R. Skinnarland (signature) — Date: 2/21/13

[1] Class 1 modifications requiring prior Agency approval.

[2] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to a Class [1]1, if appropriate.

Remove and Replace the Following Sections:

Remove Part III Permit Conditions, dated June 30, 2012, and replace with Permit Conditions, dated March 31, 2013.

Remove Addendum A, dated June 30, 2012, and replace with Addendum A, dated March 31, 2013.

Remove Addendum B, dated March 31, 2012, and replace with Addendum B, dated March 31, 2013.

Remove Addendum C, dated December 31, 2011, and replace with Addendum C, dated March 31, 2013.

PART III, OPERATING UNIT GROUP 3 PERMIT CONDITIONS

Liquid Effluent Retention Facility & 200 Area Effluent Treatment Facility

Unit Description:

The Liquid Effluent Retention Facility (LERF) and 200 Area Effluent Treatment Facility(200 Area ETF) consists of an aqueous waste treatment system that provides treatment, storage integral to the treatment process, and storage of secondary wastes from the treatment process for a variety of aqueous mixed waste. The 200 Area ETF is located in the 200 East Area. Aqueous wastes managed by the 200 Area ETF include process condensate from the LERF and 200 Area ETF and other aqueous waste generated from onsite remediation and waste management activities.

The LERF consists of three lined surface impoundments, or basins. Aqueous waste from LERF is pumped to the 200 Area ETF for treatment in a series of process units, or systems, that remove or destroy essentially all of the dangerous waste constituents. The treated effluent is discharged to a State-Approved Land Disposal Site (SALDS) north of the 200 West Area, under the authority of a Washington State Waste Discharge Permit (Ecology 2000) and 200 Area ETF Delisting (40 CFR 261, Appendix IX, Table 2). Construction of the LERF began in 1990. Waste management operations began at LERF in April 1994. Construction of the 200 Area ETF began in 1992. Waste management operations began at 200 Area ETF in November of 1995.

This Chapter provides unit-specific Permit conditions applicable to the dangerous waste management units for LERF and 200 Area ETF.

List of Addenda Specific to Operating Unit Group 3

Addendum A	Part A Form, dated March 31, 2013
Addendum B	Waste Analysis Plan, dated March 31, 2013
Addendum C	Process Information, dated March 31, 2013
Chapter 5.0	Groundwater Monitoring (PNNL-11620 & WHC-SD-EN-AP-024), dated June 30, 2008
Addendum E	Security Requirements, dated, June 30, 2011
Addendum F	Preparedness and Prevention, dated June 30, 2011
Addendum G	Personnel Training, dated June 30, 2012
Addendum H	Closure Plan, dated June 30, 2011
Addendum I	Inspection Requirements, dated June 30, 2011
Addendum J	Contingency Plan, dated March 31, 2012

Definitions

State and federal delisting actions: The state delisting action pursuant to WAC 173-303-910(3), August 8, 2005, and the federal delisting action appearing in 40 CFR 261, Appendix IX, Table 2 applicable to the United States, Department of Energy, Richland, Washington.

Acronyms

LERF and 200 Area ETF 200-Area Liquids Processing Facility

III.3.A COMPLIANCE WITH UNIT-SPECIFIC PERMIT CONDITIONS

III.3.A.1 The Permittees will comply with all Permit Conditions in this Chapter and its Addendums and Chapters with respect to dangerous waste management and dangerous waste management units in LERF and 200 Area ETF, in addition to requirements in Permit Part I and Part II.

III.3.B GENERAL WASTE MANAGEMENT

III.3.B.1 The Permittees are authorized to accept dangerous and/or mixed waste for treatment in dangerous waste management units that satisfies the waste acceptance criteria in Permit Addendum B according to the waste acceptance procedures in Permit Addendum B. [WAC 173-303-300]

III.3.B.2 The Permittees are authorized to manage dangerous and/or mixed wastes physically present in the dangerous waste management units in LERF and 200 Area ETF as of the effective date of this Permit according to the requirements of Permit Condition III.15.B.1.

III.3.B.3 The Permittees are authorized to treat and/or store dangerous/mixed waste in the dangerous waste management units in LERF and 200 Area ETF according to the following requirements:

III.3.B.3.a The Permittees are authorized to treat, and store as necessary in support of treatment, dangerous waste in the 200 Area ETF tank systems identified in Permit Addendum C, Section C.2, and Section C.4 according to the Permit Conditions of this Chapter.

III.3.B.3.b The Permittees are authorized to store and treat those dangerous and/or mixed waste identified in Permit Addendum C, Section C.3, in containers according to the requirements of this Chapter. All container management activities pursuant to this Permit Condition will take place within the container storage area or within the 200 Area ETF process area identified in Permit Addendum C, Figure C.3.

III.3.B.3.c Treatment in containers authorized by Permit Condition III.3.B.3.b is limited to decanting of free liquids, and addition of sorbents to free liquids. The Permittees will ensure that sorbents are compatible with wastes and the containers. Sorbents will be compliant with the requirements of WAC 173-303-140(4)(b)(iv), incorporated by reference.

III.3.B.3.d The Permittees are authorized to treat aqueous waste in LERF Basins (Basins 42, 43 and 44) subject to the following requirements:

III.3.B.3.d.1 Following treatment in a LERF basin, aqueous wastes must be treated in 200 Area ETF according to Permit Conditions III.3.B.3.a through c.; [40 CFR 268.4(2)(iii), incorporated by reference by WAC 173-303-140]

III.3.B.3.d.2 The Permittees must ensure that for each basin, either supernatant is removed on a flow-through basis, to meet the requirement of 40 CFR 268.4(a)(2)(ii) incorporated by reference by WAC 173-303-140, or incoming waste is shown to not contain solids by either: (1) sampling results showing the waste does not contain detectable solids, or (2) filtering through a 10 micron filter;[WAC 173-303-815(2)(b)(ii)]

III.3.B.4 The Permittees will maintain the physical structure of the LERF and 200 Area ETF as documented in the applicable sections of Permit Addendum C, Section C.2. [WAC 173-303-630(7), WAC 173-303-640(3), WAC 173-303-640(4)]

III.3.B.5 The Permittees are authorized to use treated effluent for recycle/makeup water purposes at the 200 Area ETF as outlined in Permit Addendum C, Section C.2.5.5, and the letters dated August 19, 2005, EPA Region 10 to Keith A. Klein; and August 8, 2005, Department of Ecology to Keith A. Klein. [WAC 173-303-815 (2)(b)(ii)]

III.3.B.6 The Permittees will maintain and operate systems for the 200 Area ETF documented in Permit Addendum C, Section C.2.5 as necessary for proper operation of the 200 Area ETF, compliance with the conditions of this Permit, and protection of human health and the environment. For purposes of this Permit Condition, the Monitor and Control System documented in Permit Addendum C, Section C.2.5.1, is considered to include all indicators, sensors, transducers, actuators and other control devices connected to but remote from the centralized monitor and control system (MCS) computer.

III.3.B.7 The Permittees must complete the following requirements prior to acceptance for treatment in 200 Area ETF aqueous waste streams with listed waste numbers subject to the requirements of the State and Federal delisting: [WAC 173-303-815(2)(b)(ii)]

III.3.B.7.a The Permittees will prepare a written waste processing strategy according to the requirements of the State and Federal Delisting Actions Conditions (1)(a)(ii) and (1)(b), incorporated by reference, and Permit Addendum B, Section B.2.2.2.

III.3.B.7.b The waste processing strategy required by Permit Condition III.3.B.7.a, must document the proposed processing configuration for the 200 Area ETF, operating conditions for each processing unit, and the expected treated effluent characteristics based on the process model and treatability envelope data required by State and Federal Delisting Conditions (1)(a)(ii) and (1)(b).

III.3.B.7.c The written waste processing strategy required by Permit Condition III.3.B.7.a must demonstrate that the projected treated effluent characteristics satisfy the delisting exclusion limits in State and Federal Delisting Condition (5) of the state and federal delisting actions, and the discharge limits of the State Discharge Permit ST-4500.

III.3.B.7.d The Permittees will place a copy of the written waste processing strategy required by Permit Condition III.3.B.7.a in the Hanford Facility Operating Record, LERF and 200 Area ETF file as part of the documentation of waste streams accepted for management at the 200 Area ETF.

III.3.B.8 Treatment of aqueous waste streams in the 200 Area ETF with listed waste numbers that are subject to the requirements of the state and federal delisting actions must comply with the requirements of State and Federal Delisting Condition (1)(c), incorporated by reference. [WAC 173-303-815 (2)(b)(ii)]

III.3.B.9 The Permittees will manage treated effluent in the final verification tanks according to the requirements of the State and Federal Delisting Conditions (3) and (5), incorporated by reference. [WAC 173-303-815 (2)(b)(ii)]

III.3.B.10 The Permittees will manage treated effluent from the 200 Area ETF according to the requirements of the State Waste Discharge Permit ST 4500 and State and Federal Delisting Condition (7). [WAC 173-303-815(2)(b)(ii)]

III.3.B.11 The Permittees will ensure compliance with treatment standards (40 CFR 268, incorporated by reference by WAC 173-303-140) applicable to treated effluent prior to discharge to the State Authorized Land Disposal Site (SALDS), the delisting criteria at 40 CFR 261, Appendix IX, Table 2, and the corresponding state-approved delisting (dated August 8, 2005, all incorporated by reference). Sampling and analysis necessary for these demonstrations must meet the corresponding requirements in Permit Addendum B. [WAC 173-303-140, WAC 173-303-815 (2)(b)(ii)]

III.3.C WASTE ANALYSIS

III.3.C.1 The Permittees will comply with requirements in Permit Addendum B for sampling and analysis of all dangerous and/or mixed waste required by conditions in this Chapter. [WAC 173-303-300]

III.3.C.2 The Permittees will have an accurate and complete waste profile as described in Permit Addendum B, Section B.2.1.2, for every waste stream accepted for management in LERF and 200 Area ETF dangerous waste management units. [WAC 173-303-380 (1)(a), (b)]

III.3.C.3 The Permittees will place a copy of each waste profile required by Permit Condition III.15.C.2 in the Hanford Facility Operating Record, LERF and 200 Area ETF file required by Permit Condition II.I.2. [WAC 173-303-380 (1)(a), (b)]

III.3.C.4 The Permittees will make a copy of the waste profile required by Permit Condition III.15.C.2 available upon request. [WAC 173-303-380 (1)(a), (b)]

III.3.C.5 Records and results of waste analysis described in this Permit will be maintained in the Hanford Facility Operating Record, LERF and 200 Area ETF file required by Permit Condition II.I.2. [WAC 173-303-380 (1)(a), (b)]

III.3.D RECORDKEEPING AND REPORTING

III.3.D.1 The Permittees will place the following into the Hanford Facility Operating Record, LERF and 200 Area ETF file required by Permit Condition II.I.2:

III.3.D.1.a Records required by WAC 173-303-380 (1)(k), and -(o) incorporated by reference.

III.3.D.1.b Records and results of waste analysis, waste determinations (as required by Subpart CC) and trial tests required by WAC 173-303-300, General waste analysis, and by 40 CFR §264.1034,§264.1063, §264.1083, §265.1034, §265.1063, §265.1084, §268.4(a), and §268.7; [WAC 173-303-310(2)]

III.3.D.1.c An inspection log, summarizing inspections conducted pursuant to Permit Condition III.3.H.1; [WAC 173-303-380(1)(e)]

III.3.D.1.d Records required by the State and Federal Delisting Condition (6), incorporated by reference; [WAC 173-303-815 (2)(b)(ii)]

III.3.E SECURITY

III.3.E.1 The Permittees comply with the Security requirements specific to the LERF and 200 Area ETF in Addendum E and Permit Attachment 3 as required by Permit Condition II.L. [WAC 173-303-310(2)]

III.3.F PREPAREDNESS AND PREVENTION

III.3.F.1 The Permittees will comply with the Preparedness and Prevention requirements specific to LERF and 200 Area ETF in Addendum F. [WAC 173-303-340]

III.3.G CONTINGENCY PLAN

III.3.G.1 The Permittees will comply with Addendum J, Contingency Plan, in addition to the requirements of Permit Condition II.A when applicable. [WAC 173-303-350]

III.3.H INSPECTIONS

III.3.H.1 The Permittees will comply with Addendum I in addition to the requirements of Permit Condition II.X. [WAC 173-303-320]

III.3.I TRAINING PLAN

III.3.I.1 The Permittees will include the training requirements described in Addendum G of this Chapter specific to the dangerous waste management units and waste management activities at LERF and 200 Area ETF into the written training plan required by Permit Condition II.C.

III.3.J GENERAL REQUIREMENTS

III.3.J.1 The Permittees will comply with the requirements of WAC 173-303-395(1), incorporated by reference, for prevention of reaction of ignitable, reactive, or incompatible wastes.

III.3.K CLOSURE

III.3.K.1 The Permittees will close dangerous waste management units in the LERF and 200 Area ETF in accordance with Addendum H, Closure Plan, and Permit Condition II.J. [WAC 173-303-610(3)(a)]

III.3.L POST CLOSURE – RESERVED

III.3.M CRITICAL SYSTEMS – RESERVED

III.3.N RESERVED

III.3.O CONTAINERS

III.3.O.1 Container Storage and Treatment Unit Standards

III.3.O.1.a As part of or in addition to the requirements of Permit Condition III.3.B.2, the Permittees will ensure the integrity of container storage secondary containment and the chemically resistant coating described in Addendum C, Section C.3.4.1 as necessary to ensure any spills or releases to secondary containment do not migrate to the underlying concrete or soils.

III.3.O.1.a.1 Include documentation of any damage and subsequent repairs in the Hanford Facility Operating Record, LERF and 200 Area ETF file required by Permit Condition II.I.2.

III.3.O.2 Container Management Standards

III.3.O.2.a The Permittees will maintain and manage wastes in accordance with the requirements of Addendum C, Section 4.3.2, and Section 4.3.2. [WAC 173-303-630(2)]

III.3.O.2.b The Permittees will label containers in accordance with the requirements of Addendum C, Section C.3.2, and Section C.3.3. [WAC 173-303-630(3)]

III.3.O.2.c The Permittees will comply with the requirements for managing wastes in containers in WAC 173-303-630(5), incorporated by reference.

III.3.O.2.d The Permittees will ensure wastes are compatible with containers and with other wastes stored or treated in containers within the 200 Area ETF according to the requirements of Addendum C, Section C.3.4.3. [WAC 173-303-630(4), WAC 173-303-630(9)]

III.3.O.2.e The Permittees may treat wastes in containers via decanting of free liquids and addition of sorbents. The Permittees may not use addition of sorbents for purposes of changing the treatability group of a waste with respect to the land disposal restriction standards of 40 CFR 268, incorporated by reference by WAC 173-303-140.

III.3.O.2.f The Permittees will remove any accumulated liquids from container storage areas in 200 Area ETF according to the requirements of Addendum C, Section C.3.4.2, to ensure containers are not in contact with free liquids and to prevent overflow of the container storage area secondary containment.

III.3.O.2.g The Permittees will comply with the requirements for air emissions from containers in Addendum C, Section C.6.3.2. [WAC 173-303-692]

III.3.P TANK SYSTEMS

III.3.P.1 Tank System Requirements

III.3.P.1.a The Permittees will develop a schedule for conducting integrity assessments (IA). The schedule will meet the requirements of Addendum C, Section C.4.2, and consideration of the factors in WAC 173-303-640(2)(e) or WAC 173-303-640(3)(b) as applicable:

III.3.P.1.b The Permittees will maintain a copy of the schedule required by Permit Condition III.3.P.1.a, in the Hanford Facility Operating Record, LERF and 200 Area ETF file, and conduct periodic integrity assessments according to the schedule. The Permittees will document results of integrity assessments conducted according to the IA in the Hanford Facility Operating Record, LERF and 200 Area ETF file.

III.3.P.1.c For existing tank systems, if a tank system is found to be leaking, or is unfit for use, the Permittees must follow the requirements of WAC 173-303-640(7), incorporated by reference. [WAC 173-303-640(3)(b)]

III.3.P.2 Tank System Operating Requirements

III.3.P.2.a The Permittees will comply with the requirements of WAC 173-303-640(5)(a), incorporated by reference.

III.3.P.2.b The Permittees will comply with the requirements of Addendum C, Section C.4.5.2. [WAC 173-303-640(5)(b)]

III.3.P.2.c The Permittees will comply with the requirements of Addendum C, Section C.4.6. [WAC 173-303-640(5)(d)]

III.3.P.2.d The Permittees will comply with the requirements of WAC 173-303-640(7), incorporated by reference, in response to spills or leaks from tanks systems at 200 Area ETF. [WAC 173-303-640(5)(c)]

III.3.P.2.e The Permittees will ensure that the Waste Processing Strategy required by Permit Condition III.3.B.7.a, provides for the immediate treatment or blending of waste accepted for management at the 200 Area ETF such that the resulting waste or mixture is no longer reactive or ignitable when further managed in 200 Area ETF tank systems. [WAC 173-303-640(9)]

III.3.P.2.f The Permittees will comply with the requirements of WAC 173-303-640(10), incorporated by reference.

III.3.Q SURFACE IMPOUNDMENTS

III.3.Q.1 The Permittees will maintain the three LERF basins according to the requirements of WAC 173-303-650 (2)(f), incorporated by reference.

III.3.Q.2 The Permittees will operate the LERF basins according to the requirements of Addendum C, Section C.5.3, and Addendum I, Section I.2.2.3.1 to prevent over-topping. [WAC 173-303-650 (2)(c)]

III.3.Q.3 The Permittees will develop and maintain, and operate the LERF basins to ensure that any flow of waste into the impoundment can be immediately shut off in the event of overtopping or liner failure. [WAC 173-303-650 (2)(d)]

III.3.Q.4 The Permittees will comply with the requirements of WAC 173-303-650 (2)(g), incorporated by reference.

III.3.Q.5 The Permittees will comply with the requirements of WAC 173-303-650 (4)(b), incorporated by reference.

III.3.Q.6 The Permittees will comply with the requirements of WAC 173-303-650 (4)(c), incorporated by reference. The certification required by this Permit Condition must be provided to Ecology no later than seven calendar days after the date of the certification. A copy of the certification will be placed in the Hanford Facility Operating Record, LERF and 200 Area ETF file required by Permit Condition II.I.2. [WAC 173-303-650 (4)(c)]

III.3.Q.7 The Permittees will comply with the requirements of WAC 173-303-650(5)(b), incorporated by reference, in response to events in WAC 173-303-650(5)(a), incorporated by reference.

III.3.Q.8 The Permittees will comply with the requirements of WAC 173-303-650(5)(d) for any LERF basin that has been removed from service in accordance with Permit Condition III.3.Q.7 that the Permittees will restore to service. [WAC 173-303-650(5)(d)]

III.3.Q.9 The Permittees will close any LERF basin removed from service in accordance with the requirements of Permit Condition III.3.Q.7 or a basin that cannot be repaired or that the Permittees will not to return to service. [WAC 173-303-650(5)(e)]

III.3.Q.10 The Permittees will comply with the requirements of Addendum C, Section C.5.10 with respect to management of ignitable or reactive wastes in the LERF basins. [WAC 173-303-650(7)]

III.3.Q.11 The Permittees can place incompatible wastes and materials in the same LERF basin only if in compliance with the requirements of WAC 173-303-395(1)(b), (c). [WAC 173-303-650(8)]

III.3.Q.12 The Permittees will use the action leakage rate in Addendum C, Section C.5.8, for operation of LERF basins, and comply with the requirements of WAC 173-303-650(10)(b). [WAC 173-303-650(10)]

III.3.Q.13 The Permittees will comply with the requirements of WAC 173-303-650(11), incorporated by reference.

III.3.Q.14 The Permittees will comply with the requirements of 40 CFR 264, Subpart CC, incorporated by reference by WAC 173-303-692.

III.3.Q.15 Groundwater Monitoring

III.3.Q.15.a The Permittees will comply with the requirements of Chapter 5.0. [WAC 173-303-645]

This page intentionally left blank.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Addendum A
Part A Form

Date Received	Reviewed by: Frederick A. Bond	Date:	0 6 0 1 2 0 1 1
Month Day Year	Approved by: (signature)	Date:	0 6 0 8 2 0 1 1

I. This form is submitted to: (place an "X" in the appropriate box)

☒	**Request modification to a final status permit (commonly called a "Part B" permit)**
☐	**Request a change under interim status**
☐	**Apply for a final status permit. This includes the application for the initial final status permit for a site or for a permit renewal (i.e., a new permit to replace an expiring permit).**
☐	**Establish interim status because of the wastes newly regulated on:** (Date)
	List waste codes:

II. EPA/State ID Number

W	A	7	8	9	0	0	0	8	9	6	7

III. Name of Facility

US Department of Energy – Hanford Facility

IV. Facility Location (Physical address not P.O. Box or Route Number)

A. Street

825 Jadwin

City or Town	State	ZIP Code
Richland	WA	99352

County Code (if known)	County Name
0 0 5	Benton

B. Land Type	C. Geographic Location Latitude (degrees, mins, secs)	Longitude (degrees, mins, secs)	D. Facility Existence Date Month / Day / Year
F	Refer to TOPO Map (Section XV.)		0 3 / 0 2 / 1 9 4 3

V. Facility Mailing Address

Street or P.O. Box

P.O. Box 550

City or Town	State	ZIP Code
Richland	WA	99352

VI. Facility contact (Person to be contacted regarding waste activities at facility)		
Name (last)	**(first)**	
McCormick	Matthew	
Job Title	**Phone Number (area code and number)**	
Manager	(509) 376-7395	
Contact Address		
Street or P.O. Box		
P.O. Box 550		
City or Town	**State**	**ZIP Code**
Richland	WA	99352

VII. Facility Operator Information	
A. Name	**Phone Number**
Department of Energy Owner/Operator CH2M HILL Plateau Remediation Company Co-Operator for LERF & 200 Area ETF*	(509) 376-7395 (509) 376-0556*

Street or P.O. Box		
P.O. Box 550 P.O. Box 1600 *		
City or Town	**State**	**ZIP Code**
Richland	WA	99352

B. Operator Type: F

C. Does the name in VII.A reflect a proposed change in operator? ☐ Yes ☒ No Co-Operator* change

If yes, provide the scheduled date for the change:

Month			Day			Year			
1	0		0	1		2	0	0	8

D. Is the name listed in VII.A. also the owner? If yes, skip to Section VIII.C. ☐ Yes ☒ No

VIII. Facility Owner Information		
A. Name	**Phone Number (area code and number)**	
Matthew S. McCormick, Operator/Facility-Property Owner	(509) 376-7395	
Street or P.O. Box		
P.O. Box 550		
City or Town	**State**	**ZIP Code**
Richland	WA	99352

B. Owner Type: F

C. Does the name in VIII.A reflect a proposed change in owner? ☐ Yes ☒ No

If yes, provide the scheduled date for the change:

Month			Day			Year			

IX. NAICS Codes (5/6 digit codes)

A. First							B. Second						
5	6	2	2	1		Waste Treatment & Disposal	9	2	4	1	1	0	Administration of Air & Water Resource & Solid Waste Management Programs
C. Third							**D. Fourth**						
5	4	1	7	1		Research & Development in the Physical, Engineering, & Life Sciences							

X. Other Environmental Permits (see instructions)

A. Permit Type			B. Permit Number												C. Description
	E		T	S	C	A	0	3	-	1	0	-	2	2	TSCA approval, 40 CFR 761
	E		W	C	M	-1	2	7							40 CFR 761.61(c), TSCA risk-based approval 2003-10-22
	E		N	O	C	-9	3	-	3						WAC 173-400, General Regulations for Air Pollution Sources/WAC 173-460, Controls for New Sources of Toxic Air Pollutants
	E		N	O	C	-9	6	N	W	-1	-	3	0	1	WAC 173-400, General Regulations for Air Pollution Sources/ WAC 173-460, Controls for New Sources of Toxic Air Pollutants
	E		A	I	R	-0	4	-	1	0	1				WAC 246-247, Radiation Protection -- Air Emissions
	U		S	T		4	5	0	0						WAC 173-216, State Waste Discharge Permit Program, Sitewide Permit for miscellaneous streams
	U		S	T		4	5	1	1						WAC 173-216, State Waste Discharge Permit Program, Sitewide Permit for miscellaneous streams

XI. Nature of Business (provide a brief description that includes both dangerous waste and non-dangerous waste areas and activities)

Construction of the Liquid Effluent Retention Facility (LERF) began in 1990. Waste management operations began at LERF in April 1994. Construction of the 200 Area Effluent Treatment Facility (ETF) began in 1992. Waste management operations began at ETF in November of 1995.

The LERF and ETF comprise an aqueous waste treatment system located in the 200 East Area that provides storage and treatment for a variety of aqueous mixed waste. This aqueous waste includes process condensate from the 242-A Evaporator and other aqueous waste generated from onsite remediation and waste management activities.

The LERF consists of three lined surface impoundments, or basins. Aqueous waste from LERF is pumped to the ETF for treatment in a series of process units, or systems, that remove or destroy dangerous waste constituents. The treated effluent is discharged to a State-Approved Land Disposal Site (SALDS) north of the 200 West Area, under the authority of a Washington State Waste Discharge Permit (ST4500) and the Final Delisting (40 CFR 261, Appendix IX, Table 2)

Sludge that accumulates in the bottoms of ETF process tanks is removed periodically and placed into containers. The waste is solidified by decanting the supernate from the container and the remainder of the liquid is allowed to evaporate, or absorbents are added, as necessary, to address the residual liquid. The process design capacity for treatment of waste in containers (T04) is 18,927 liters per day.

EXAMPLE FOR COMPLETING ITEMS XII and XIII (shown in lines numbered X-1, X-2, and X-3 below): A facility has two storage tanks that hold 1200 gallons and 400 gallons respectively. There is also treatment in tanks at 20 gallons/hr. Finally, a one-quarter acre area that is two meters deep will undergo *in situ vitrification.*

Section XII. Process Codes and Design Capacities

Line Number		A. Process Codes (enter code)			B. Process Design Capacity 1. Amount	B. Process Design Capacity 2. Unit of Measure (enter code)	C. Process Total Number of Units
X	1	S	0	2	1,600	G	002
X	2	T	0	3	20	E	001
X	3	T	0	4	700	C	001
	1	S	0	4	88,500,000	L	003
	2	T	0	2	88,500,000	V	003
	3	S	0	2	9,652,810	L	019
	4	T	0	1	817,646	V	017
	5	S	0	1	147,630	L	003
	6	T	0	4	18,927	V	001
	7						
	8						
	9						
1	0						
1	1						
1	2						
1	3						
1	4						
1	5						
1	6						
1	7						
1	8						
1	9						
2	0						
2	1						
2	2						
2	3						
2	4						
2	5						

Section XIII. Other Process Codes

Line Number		A. Process Codes (enter code)			B. Process Design Capacity 1. Amount	B. Process Design Capacity 2. Unit of Measure (enter code)	C. Process Total Number of Units	D. Process Description
X	1	T	0	4	700	C	001	In situ vitrificatio n
X	2							
X	3							
	1	T	0	4	18,927	V	001	container treatment
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
1	0							
1	1							
1	2							
1	3							
1	4							
1	5							
1	6							
1	7							
1	8							
1	9							
2	0							
2	1							
2	2							
2	3							
2	4							
2	5							

XIV. Description of Dangerous Wastes

Example for completing this section: A facility will receive three non-listed wastes, then store and treat them on-site. Two wastes are corrosive only, with the facility receiving and storing the wastes in containers. There will be about 200 pounds per year of each of these two wastes, which will be neutralized in a tank. The other waste is corrosive and ignitable and will be neutralized then blended into hazardous waste fuel. There will be about 100 pounds per year of that waste, which will be received in bulk and put into tanks.

Line Number			A. Dangerous Waste No. (enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Processes									
									(1) Process Codes (enter)									(2) Process Description [If a code is not entered in D (1)]
X	1		D	0	0	2	400	P	S	0	1	T	0	1				
X	2		D	0	0	1	100	P	S	0	2	T	0	1				
X	3		D	0	0	2												Included with above
		1	D	0	0	1	88,497,000	K	S	0	4	T	0	2				
		2	D	0	0	2		K	S	0	4	T	0	2				
		3	D	0	0	3		K	S	0	4	T	0	2				
		4	D	0	0	4		K	S	0	4	T	0	2				
		5	D	0	0	5		K	S	0	4	T	0	2				
		6	D	0	0	6		K	S	0	4	T	0	2				
		7	D	0	0	7		K	S	0	4	T	0	2				
		8	D	0	0	8		K	S	0	4	T	0	2				
		9	D	0	0	9		K	S	0	4	T	0	2				
		10	D	0	1	0		K	S	0	4	T	0	2				
		11	D	0	1	1		K	S	0	4	T	0	2				
		12	D	0	1	8		K	S	0	4	T	0	2				
		13	D	0	1	9		K	S	0	4	T	0	2				
		14	D	0	2	2		K	S	0	4	T	0	2				
		15	D	0	2	8		K	S	0	4	T	0	2				
		16	D	0	2	9		K	S	0	4	T	0	2				
		17	D	0	3	0		K	S	0	4	T	0	2				
		18	D	0	3	3		K	S	0	4	T	0	2				
		19	D	0	3	4		K	S	0	4	T	0	2				
		20	D	0	3	5		K	S	0	4	T	0	2				
		21	D	0	3	6		K	S	0	4	T	0	2				
		22	D	0	3	8		K	S	0	4	T	0	2				
		23	D	0	3	9		K	S	0	4	T	0	2				
		24	D	0	4	0		K	S	0	4	T	0	2				
		25	D	0	4	1		K	S	0	4	T	0	2				

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Continuation of Section XIV. Description of Dangerous Waste

Line Number	A. Dangerous Waste No. (enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process									
							(1) Process Codes (enter)									(2) Process Description [If a code is not entered in D (1)]
26	D	0	4	3		K	S	0	4	T	0	2				
27	F	0	0	1		K	S	0	4	T	0	2				
28	F	0	0	2		K	S	0	4	T	0	2				
29	F	0	0	3		K	S	0	4	T	0	2				
30	F	0	0	4		K	S	0	4	T	0	2				
31	F	0	0	5		K	S	0	4	T	0	2				
32	F	0	3	9		K	S	0	4	T	0	2				
33	W	T	0	1		K	S	0	4	T	0	2				
34	W	T	0	2		K	S	0	4	T	0	2				
35	U	2	1	0		K	S	0	4	T	0	2				
36	D	0	0	1	298,434,296	K	T	0	1							
37	D	0	0	2		K	T	0	1							
38	D	0	0	3		K	T	0	1							
39	D	0	0	4		K	T	0	1							
40	D	0	0	5		K	T	0	1							
41	D	0	0	6		K	T	0	1							
42	D	0	0	7		K	T	0	1							
43	D	0	0	8		K	T	0	1							
44	D	0	0	9		K	T	0	1							
45	D	0	1	0		K	T	0	1							
46	D	0	1	1		K	T	0	1							
47	D	0	1	8		K	T	0	1							
48	D	0	1	9		K	T	0	1							
49	D	0	2	2		K	T	0	1							
50	D	0	2	8		K	T	0	1							
51	D	0	2	9		K	T	0	1							
52	D	0	3	0		K	T	0	1							
53	D	0	3	3		K	T	0	1							
54	D	0	3	4		K	T	0	1							
55	D	0	3	5		K	T	0	1							
56	D	0	3	6		K	T	0	1							
57	D	0	3	8		K	T	0	1							

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Continuation of Section XIV. Description of Dangerous Waste

Line Number	A. Dangerous Waste No. (enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process									
							(1) Process Codes (enter)									(2) Process Description [If a code is not entered in D (1)]
58	D	0	3	9		K	T	0	1							
59	D	0	4	0		K	T	0	1							
60	D	0	4	1		K	T	0	1							
61	D	0	4	3		K	T	0	1							
62	F	0	0	1		K	T	0	1							
63	F	0	0	2		K	T	0	1							
64	F	0	0	3		K	T	0	1							
65	F	0	0	4		K	T	0	1							
66	F	0	0	5		K	T	0	1							
67	F	0	3	9		K	T	0	1							
68	W	T	0	1		K	T	0	1							
69	W	T	0	2		K	T	0	1							
70	U	2	1	0		K	T	0	1							
71	D	0	0	1	30,433,326	K	S	0	2							
72	D	0	0	2		K	S	0	2							
73	D	0	0	3		K	S	0	2							
74	D	0	0	4		K	S	0	2							
75	D	0	0	5		K	S	0	2							
76	D	0	0	6		K	S	0	2							
77	D	0	0	7		K	S	0	2							
78	D	0	0	8		K	S	0	2							
79	D	0	0	9		K	S	0	2							
80	D	0	1	0		K	S	0	2							
81	D	0	1	1		K	S	0	2							
82	D	0	1	8		K	S	0	2							
83	D	0	1	9		K	S	0	2							
84	D	0	2	2		K	S	0	2							
85	D	0	2	8		K	S	0	2							
86	D	0	2	9		K	S	0	2							
87	D	0	3	0		K	S	0	2							
88	D	0	3	3		K	S	0	2							
89	D	0	3	4		K	S	0	2							

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Continuation of Section XIV. Description of Dangerous Waste

Line Number	A. Dangerous Waste No. (enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process									
							(1) Process Codes (enter)									(2) Process Description [If a code is not entered in D (1)]
90	D	0	3	5		K	S	0	2							
91	D	0	3	6		K	S	0	2							
92	D	0	3	8		K	S	0	2							
93	D	0	3	9		K	S	0	2							
94	D	0	4	0		K	S	0	2							
95	D	0	4	1		K	S	0	2							
96	D	0	4	3		K	S	0	2							
97	F	0	0	1		K	S	0	2							
98	F	0	0	2		K	S	0	2							
99	F	0	0	3		K	S	0	2							
100	F	0	0	4		K	S	0	2							
101	F	0	0	5		K	S	0	2							
102	F	0	3	9		K	S	0	2							
103	W	T	0	1		K	S	0	2							
104	W	T	0	2		K	S	0	2							
105	U	2	1	0		K	S	0	2							
106	D	0	0	1	1,986,735	K	S	0	1							Includes Debris
107	D	0	0	2		K	S	0	1							Includes Debris
108	D	0	0	3		K	S	0	1							Includes Debris
109	D	0	0	4		K	S	0	1							Includes Debris
110	D	0	0	5		K	S	0	1							Includes Debris
111	D	0	0	6		K	S	0	1							Includes Debris
112	D	0	0	7		K	S	0	1							Includes Debris
113	D	0	0	8		K	S	0	1							Includes Debris
114	D	0	0	9		K	S	0	1							Includes Debris
115	D	0	1	0		K	S	0	1							Includes Debris
116	D	0	1	1		K	S	0	1							Includes Debris
117	D	0	1	8		K	S	0	1							Includes Debris
118	D	0	1	9		K	S	0	1							Includes Debris
119	D	0	2	2		K	S	0	1							Includes Debris
120	D	0	2	8		K	S	0	1							Includes Debris
121	D	0	2	9		K	S	0	1							Includes Debris

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Continuation of Section XIV. Description of Dangerous Waste

Line Number	A. Dangerous Waste No. (enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process									
							(1) Process Codes (enter)									(2) Process Description [If a code is not entered in D (1)]
122	D	0	3	0		K	S	0	1							Includes Debris
123	D	0	3	3		K	S	0	1							Includes Debris
124	D	0	3	4		K	S	0	1							Includes Debris
125	D	0	3	5		K	S	0	1							Includes Debris
126	D	0	3	6		K	S	0	1							Includes Debris
127	D	0	3	8		K	S	0	1							Includes Debris
128	D	0	3	9		K	S	0	1							Includes Debris
129	D	0	4	0		K	S	0	1							Includes Debris
130	D	0	4	1		K	S	0	1							Includes Debris
131	D	0	4	3		K	S	0	1							Includes Debris
132	F	0	0	1		K	S	0	1							Includes Debris
133	F	0	0	2		K	S	0	1							Includes Debris
134	F	0	0	3		K	S	0	1							Includes Debris
135	F	0	0	4		K	S	0	1							Includes Debris
136	F	0	0	5		K	S	0	1							Includes Debris
137	F	0	3	9		K	S	0	1							Includes Debris
138	W	T	0	1		K	S	0	1							Includes Debris
139	W	T	0	2		K	S	0	1							Includes Debris
140	U	2	1	0		K	S	0	1							Includes Debris
141	D	0	0	1	81,310	K	T	0	4							Includes Debris
142	D	0	0	2		K	T	0	4							Includes Debris
143	D	0	0	3		K	T	0	4							Includes Debris
144	D	0	0	4		K	T	0	4							Includes Debris
145	D	0	0	5		K	T	0	4							Includes Debris
146	D	0	0	6		K	T	0	4							Includes Debris
147	D	0	0	7		K	T	0	4							Includes Debris
148	D	0	0	8		K	T	0	4							Includes Debris
149	D	0	0	9		K	T	0	4							Includes Debris
150	D	0	1	0		K	T	0	4							Includes Debris
151	D	0	1	1		K	T	0	4							Includes Debris
152	D	0	1	8		K	T	0	4							Includes Debris
153	D	0	1	9		K	T	0	4							Includes Debris

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Continuation of Section XIV. Description of Dangerous Waste

Line Number	A. Dangerous Waste No. (enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process									
							(1) Process Codes (enter)									(2) Process Description [If a code is not entered in D (1)]
154	D	0	2	2		K	T	0	4							Includes Debris
155	D	0	2	8		K	T	0	4							Includes Debris
156	D	0	2	9		K	T	0	4							Includes Debris
157	D	0	3	0		K	T	0	4							Includes Debris
158	D	0	3	3		K	T	0	4							Includes Debris
159	D	0	3	4		K	T	0	4							Includes Debris
160	D	0	3	5		K	T	0	4							Includes Debris
161	D	0	3	6		K	T	0	4							Includes Debris
162	D	0	3	8		K	T	0	4							Includes Debris
163	D	0	3	9		K	T	0	4							Includes Debris
164	D	0	4	0		K	T	0	4							Includes Debris
165	D	0	4	1		K	T	0	4							Includes Debris
166	D	0	4	3		K	T	0	4							Includes Debris
167	F	0	0	1		K	T	0	4							Includes Debris
168	F	0	0	2		K	T	0	4							Includes Debris
169	F	0	0	3		K	T	0	4							Includes Debris
170	F	0	0	4		K	T	0	4							Includes Debris
171	F	0	0	5		K	T	0	4							Includes Debris
172	F	0	3	9		K	T	0	4							Includes Debris
173	W	T	0	1		K	T	0	4							Includes Debris
174	W	T	0	2		K	T	0	4							Includes Debris
175	U	2	1	0		K	T	0	4							Includes Debris
176																
177																
178																
179																
180																
181																
182																
183																
184																

XV. Map

Attach to this application a topographic map of the area extending to at least one (1) mile beyond property boundaries. The map must show the outline of the facility; the location of each of its existing and proposed intake and discharge structures; each of its dangerous waste treatment, storage, recycling, or disposal units; and each well where fluids are injected underground. Include all springs, rivers, and other surface water bodies in this map area, plus drinking water wells listed in public records or otherwise known to the applicant within ¼ mile of the facility property boundary. The instructions provide additional information on meeting these requirements.

Topographic map is located in the Ecology Library

XVI. Facility Drawing

All existing facilities must include a scale drawing of the facility (refer to Instructions for more detail).

XVII. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment, recycling, and disposal areas; and sites of future storage, treatment, recycling, or disposal areas (refer to Instructions for more detail).

XVIII. Certifications

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Operator Name and Official Title (type or print) Matthew S. McCormick, Manager U.S. Department of Energy Richland Operations Office	**Signature** Doug S. Shoop for	**Date Signed** 5/27/11
Co-Operator* Name and Official Title (type or print) John G. Lehew, III President and Chief Executive Officer CH2M HILL Plateau Remediation Company	**Signature** [illegible]	**Date Signed** 5/12/11
Co-Operator – Address and Telephone Number* P.O. Box 1600 Richland, WA 99352 (509) 376-0556		
Facility-Property Owner Name and Official Title (type or print) Matthew S. McCormick, Manager U.S. Department of Energy Richland Operations Office	**Signature** Doug S. Shoop	**Date Signed** 5/27/11

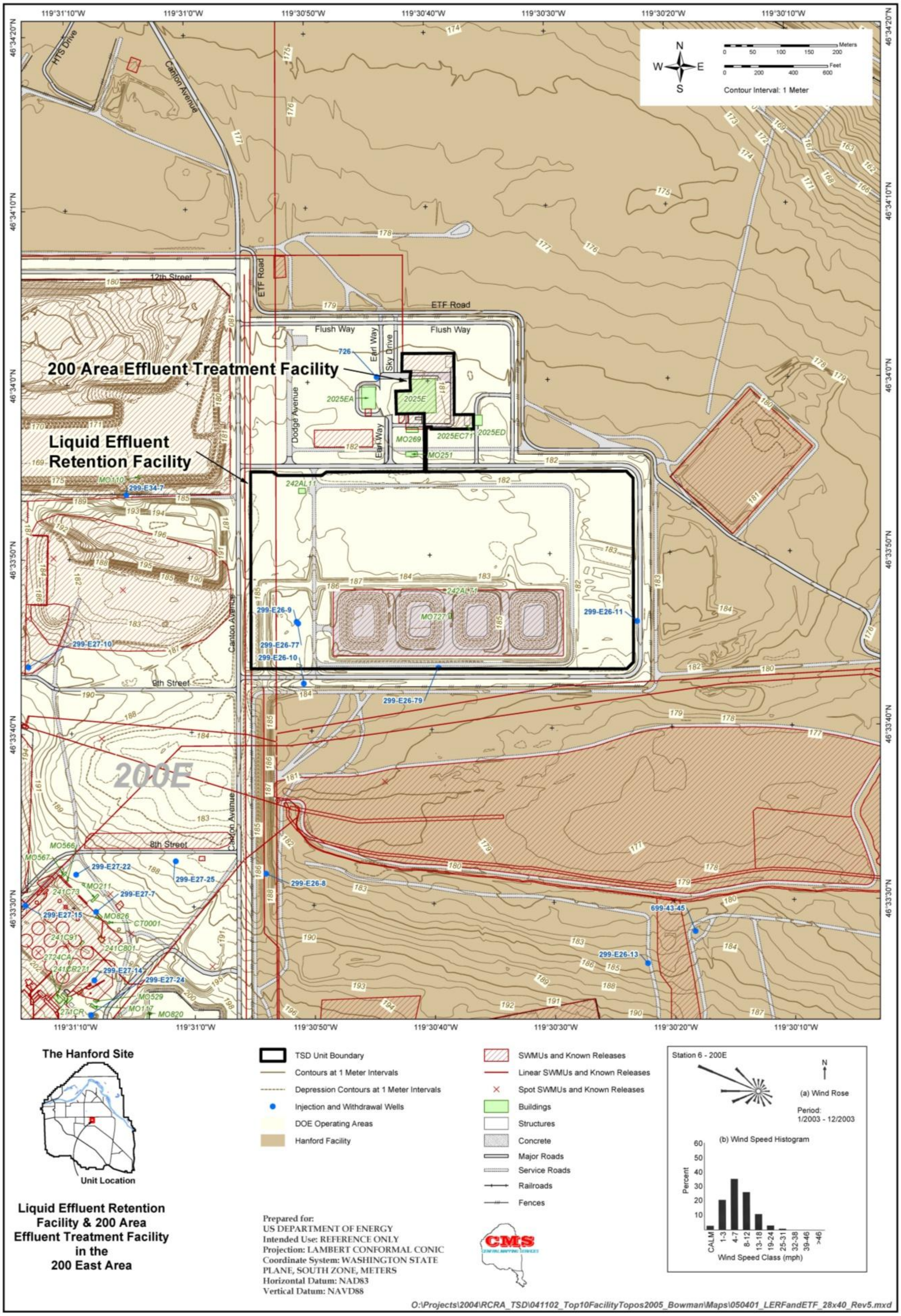
Comments

Liquid Effluent Retention Facility

Typical Basin Photo Taken 1992

200 Area Effluent Treatment Facility

Photo Taken 2005


200 Area Effluent Treatment Facility
Liquid Effluent Retention Facility
ETF Road
Flush Way
Earl Way
Sky Drive
Dodge Avenue
Canton Avenue
12th Street
9th Street
8th Street
HTS Drive
200E
Contour Interval: 1 Meter
The Hanford Site
Unit Location
Liquid Effluent Retention Facility & 200 Area Effluent Treatment Facility in the 200 East Area
TSD Unit Boundary
Contours at 1 Meter Intervals
Depression Contours at 1 Meter Intervals
Injection and Withdrawal Wells
DOE Operating Areas
Hanford Facility
SWMUs and Known Releases
Linear SWMUs and Known Releases
Spot SWMUs and Known Releases
Buildings
Structures
Concrete
Major Roads
Service Roads
Railroads
Fences
Station 6 - 200E
(a) Wind Rose
Period: 1/2003 - 12/2003
(b) Wind Speed Histogram
Percent
Wind Speed Class (mph)
Prepared for:
US DEPARTMENT OF ENERGY
Intended Use: REFERENCE ONLY
Projection: LAMBERT CONFORMAL CONIC
Coordinate System: WASHINGTON STATE PLANE, SOUTH ZONE, METERS
Horizontal Datum: NAD83
Vertical Datum: NAVD88
O:\Projects\2004\RCRA_TSD\041102_Top10FacilityTopos2005_Bowman\Maps\050401_LERFandETF_28x40_Rev5.mxd

Addendum B **Waste Analysis Plan**

B WASTE ANALYSIS PLAN 1

B.1 INTRODUCTION 2
B.1.1 Liquid Effluent Retention Facility and Effluent Treatment Facility Description 3
B.1.2 Sources of Aqueous Waste 4

B.2 INFLUENT WASTE ACCEPTANCE PROCESS 5
B.2.1 Waste Information 5
B.2.2 Waste Management Decision Process 8
B.2.3 Periodic Review Process 13
B.2.4 Record/Information and Decision 13

B.3 SPECIAL MANAGEMENT REQUIREMENTS 15
B.3.1 Land Disposal Restriction Compliance at Liquid Effluent Retention Facility 15

B.4 INFLUENT AQUEOUS WASTE SAMPLING AND ANALYSIS 16
B.4.1 Sampling Procedures 16
B.4.2 Analytical Rationale 17

B.5 TREATED EFFLUENT SAMPLING AND ANALYSIS 18
B.5.1 Rationale for Effluent Analysis Parameter Selection 18
B.5.2 Effluent Sampling Strategy: Methods, Location, Analyses, and Frequency 19

B.6 EFFLUENT TREATMENT FACILITY GENERATED WASTE SAMPLING AND ANALYSIS 19
B.6.1 Secondary Waste Generated from Treatment Processes 20
B.6.2 Operations and Maintenance Waste Generated at the 200 Area Effluent Treatment Facility 23
B.6.3 Other Waste Generated at the 200 Area Effluent Treatment Facility 23

B.7 QUALITY ASSURANCE/QUALITY CONTROL 25
B.7.1 Project Management 25
B.7.2 Data Quality Parameters and Criteria 26
B.7.3 Data Generation and Acquisition 28
B.7.4 Assessment and Oversight 29
B.7.5 Verification and Validation of Analytical Data 29

B.8 REFERENCES 30

B.9 ANALYTICAL METHODS, SAMPLE CONTAINERS, PRESERVATIVE METHODS, AND HOLDING TIMES 31

Figures

Figure B.1. 200 Area Effluent Treatment Facility Floor Plan 7

Tables

Table B.1. General Limits for Liner Compatibility 14
Table B.2. Waste Acceptance Criteria 15
Table B.3. Target Parameters for Influent Aqueous Waste Analyses 18
Table B.4. Rationale for Parameters to be Monitored in Treated Effluent 21
Table B.5. 200 Area Effluent Treatment Facility Generated Waste - Sampling and Analysis 25
Table B.6. Sample and Analysis Criteria for Influent Aqueous Waste and Treated Effluent 31
Table B.7. Sample Containers, Preservative Methods, and Holding Times for 200 Area ETF Generated Waste 35

B WASTE ANALYSIS PLAN

Metric Conversion Chart

Into metric units			Out of metric units		
If you know	Multiply by	To get	If you know	Multiply by	To get
Length			Length		
inches	25.40	millimeters	millimeters	0.0393	inches
inches	2.54	centimeters	centimeters	0.393	inches
feet	0.3048	meters	meters	3.2808	feet
yards	0.914	meters	meters	1.09	yards
miles	1.609	kilometers	kilometers	0.62	miles
Area			Area		
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.092	square meters	square meters	10.7639	square feet
square yards	0.836	square meters	square meters	1.20	square yards
square miles	2.59	square kilometers	square kilometers	0.39	square miles
acres	0.404	hectares	hectares	2.471	acres
Mass (weight)			Mass (weight)		
ounces	28.35	grams	grams	0.0352	ounces
pounds	0.453	kilograms	kilograms	2.2046	pounds
short ton	0.907	metric ton	metric ton	1.10	short ton
Volume			Volume		
fluid ounces	29.57	milliliters	milliliters	0.03	fluid ounces
quarts	0.95	liters	liters	1.057	quarts
gallons	3.79	liters	liters	0.26	gallons
cubic feet	0.03	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.76456	cubic meters	cubic meters	1.308	cubic yards
Temperature			Temperature		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit
Force			Force		
pounds per square inch	6.895	kilopascals	kilopascals	1.4504 x 10^{-4}	pounds per square inch

Source: *Engineering Unit Conversions*, M. R. Lindeburg, P.E., Second Ed., 1990, Professional Publications, Inc., Belmont, California.

B.1 INTRODUCTION

In accordance with the regulations set forth in the Washington State Department of Ecology (Ecology) *Dangerous Waste Regulations*, Washington Administrative Code (WAC) 173-303-300, this waste analysis plan (WAP) has been prepared for operation of the Liquid Effluent Retention Facility (LERF) and the 200 Area Effluent Treatment Facility (200 Area ETF) located in the 200 East Area on the Hanford Site, Richland, Washington.

The purpose of this WAP is to ensure that adequate knowledge as defined in WAC 173-303-040, is obtained for dangerous and/or mixed waste accepted by and managed in LERF and 200 Area ETF. This WAP documents the sampling and analytical methods, and describes the procedures used to obtain this knowledge. This WAP also documents the requirements for generators sending aqueous waste to the LERF or 200 Area ETF for treatment. Throughout this WAP, the term generator includes any Hanford Site source, including treatment, storage, and disposal (TSD) units, whose process produces an aqueous waste.

LERF consists of three surface impoundments which provide treatment and storage. The 200 Area ETF includes a tank system, which provides treatment and storage, and a container management area, which provides container storage and treatment. Additionally, this WAP discusses the sampling and analytical methods for the treated effluent (treated aqueous waste) that is discharged from 200 Area ETF as a non-dangerous, delisted waste to the State Approved Land Disposal Site (SALDS). Specifically, the WAP contains sampling and analysis requirements including quality assurance/quality control requirements, for the following:

- Influent Waste Acceptance Process - determines the acceptability of a particular aqueous waste at the LERF or 200 Area ETF pursuant to applicable Permit conditions, regulatory requirements, and operating capabilities prior to acceptance of the waste at the LERF or 200 Area ETF for treatment or storage. This includes documenting that wastes accepted for treatment at ETF are within the treatability envelope required by the Final Delisting 200 Area ETF, Permit Condition 1.a.i. Refer to Section B.2.
- Special Management Requirements - identifies the special management requirements for aqueous wastes managed in the LERF or 200 Area ETF. Refer to Section B.3.
- Influent Aqueous Waste Sampling and Analysis - describes influent sampling and analyses used to characterize an influent aqueous waste to ensure proper management of the waste and for compliance with the special management requirements. Also includes rationale for analyses. Refer to Section B.4.
- Treated Effluent Sampling and Analysis - describes sampling and analyses of treated effluent (i.e., treated aqueous waste) for compliance with Washington State Waste Discharge Permit, No. ST 4500 (Ecology 2000); and Final Delisting 200 Area ETF [40 CFR 261, Appendix IX, Table 2 and the corresponding State Final Delisting issued pursuant to WAC 173-303-910(3) limits. Also includes rationale for analyses. Refer to Section B.5.
- 200 Area ETF Generated Waste Sampling and Analysis - describes the sampling and analyses used to characterize the secondary waste streams generated from the treatment process and to characterize waste generated from maintenance and operations activities. Also includes rationale for analyses. Characterization and designation of wastes generated from maintenance and operations activities are conducted pursuant to WAC 173-303-170 and are not subject to the permit requirements of WAC 173-303-800. These descriptions are included in this WAP for purposes of completeness, but are not enforceable conditions of this WAP or the permit. Refer to Section B.6.
- Quality Assurance and Quality Control - ensures the accuracy and precision of sampling and analysis activities. Refer to Section B.7.

This WAP meets the specific requirements of the following:

- Land Disposal Restrictions Treatment Exemption for the LERF under 40 CFR 268.4, U.S. Environmental Protection Agency (EPA), December 6, 1994 (EPA 1994)
- Final Delisting 200 Area ETF [40 CFR 261, Appendix IX, Table 2
- Corresponding State Final Delisting issued pursuant to WAC 173-303-910(3)
- Washington State Waste Discharge Permit (No. ST 4500), as amended
- Hanford Facility Dangerous Waste Permit (Permit) WA7890008967, as amended.

The Permit conditions of the Washington State Waste Discharge Permit (No. ST 4500) are included in this WAP for completeness, as well as generator requirements for designation of wastes generated by LERF and 200 Area ETF from operation and maintenance activities. The Washington State Waste Discharge Permit (No. ST 4500) Conditions are not within the scope of RCRA or WAC 173-303 or subject to the permit requirements of WAC 173-303-800. Therefore, revisions of this WAP that are not governed by the requirements of WAC 173-303 will not be considered as a modification subject to review or approval by Ecology. Any other revisions to this WAP will be incorporated through the Permit modification process as necessary to demonstrate compliance with requirements of this Permit, including Permit Conditions I.E.7 and I.E.8.

B.1.1 Liquid Effluent Retention Facility and Effluent Treatment Facility Description

The LERF and 200 Area ETF comprise an aqueous waste treatment system located in the 200 East Area. Both LERF and 200 Area ETF may receive aqueous waste through several inlets. 200 Area ETF can receive aqueous waste through three inlets. First, 200 Area ETF can receive aqueous waste directly from the LERF. Second, aqueous waste can be transferred from the Load-in Station to 200 Area ETF. Third, aqueous waste can be transferred from containers (e.g., carboys, drums) to the 200 Area ETF through either the Secondary Waste Receiving Tanks or the Concentrate Tanks. The Load-in Station is located just east of 200 Area ETF and currently consists of three storage tanks and a pipeline that connects to either LERF or 200 Area ETF through fiberglass pipelines with secondary containment.

The LERF can receive aqueous waste through four inlets. First, aqueous waste can be transferred to LERF through a dedicated pipeline from the 200 West Area. Second, aqueous waste can be transferred through a pipeline that connects LERF with the 242-A Evaporator. Third, aqueous waste also can be transferred to LERF from a pipeline that connects LERF to the Load-in Station at 200 Area ETF. Finally, aqueous waste can be transferred into LERF through a series of sample ports located at each basin.

The LERF consists of three lined surface impoundments with a nominal capacity of 29.5 million liters each. Aqueous waste from LERF is pumped to 200 Area ETF through a double walled fiberglass pipeline. The pipeline is equipped with leak detection located in the annulus between the inner and outer pipes. Each basin is equipped with six available sample risers constructed of 6-inch-perforated pipe. A seventh sample riser in each basin is dedicated to influent waste receipt piping, and an eighth riser in each basin contains liquid level instrumentation. Each riser extends along the sides of each basin from the top to the bottom of the basin. Detailed information on the construction and operation of the LERF is provided in Addendum C, Process Information.

200 Area ETF is designed to treat the contaminants anticipated in process condensate from the 242-A Evaporator and other aqueous wastes from the Hanford Site. Section B.1.2 provides more information on the sources of these wastes.

The capabilities of 200 Area ETF were confirmed through pilot plant testing. A pilot plant was used to test surrogate solutions that contained constituents of concern anticipated in aqueous wastes on the Hanford Site. The pilot plant testing served as the basis for a demonstration of the treatment capabilities of 200 Area ETF in the *200 Area Effluent Treatment Facility Delisting Petition* (DOE/RL-92-72).

200 Area ETF consists of a primary and a secondary treatment train (Figure B.1). The primary treatment train removes or destroys dangerous and mixed waste components from the aqueous waste. In the secondary treatment train, the waste components are concentrated and dried into a powder. This waste is containerized, and transferred to a waste treatment, storage, and/or disposal (TSD) unit.

Each treatment train consists of a series of operations. The primary treatment train includes the following:

- surge tank
- Filtration
- Ultraviolet light oxidation (UV/OX)
- pH adjustment
- Hydrogen peroxide decomposition
- Degasification
- Reverse osmosis (RO)
- Ion exchange
- Final pH adjustment and verification

The secondary treatment train uses the following:

- Secondary waste receiving
- Evaporation (with mechanical vapor recompression)
- Concentrate staging
- Thin film drying
- Container handling
- Supporting systems

A dry powder waste is generated from the secondary treatment train, from the treatment of an aqueous waste. The secondary waste treatment system typically receives and processes by-products generated from the primary treatment train. However, in an alternate operating scenario, some aqueous wastes may be fed to the secondary treatment train before the primary treatment train.

The treated effluent is contained in verification tanks where the effluent is sampled to confirm that the effluent meets the delisting criteria. Under 40 CFR 261, Appendix IX, Table 2, the treated effluent from 200 Area ETF is considered a delisted waste; that is, the treated effluent is no longer a listed dangerous waste subject to the hazardous waste management requirements of RCRA provided that the delisting criteria are satisfied and the treated effluent does not exhibit a dangerous characteristic. The treated effluent is discharged under the Washington State Waste Discharge Permit (No. ST 4500) as a nondangerous, delisted waste to the SALDS, located in the 600 Area, north of the 200 West Area. A portion of the treated wastewater from the Verification Tanks is recycled as service water throughout the facility; for example, it is used to dilute bulk acid and caustic to meet processing needs, thereby reducing the demand for process water.

B.1.2 Sources of Aqueous Waste

200 Area ETF was intended and designed to treat a variety of mixed wastes. However, process condensate from the 242-A Evaporator was the only mixed waste initially identified for storage and treatment in the LERF and 200 Area ETF. As cleanup activities at Hanford progress, many of the aqueous wastes generated from site remediation and waste management activities are sent to the LERF and 200 Area ETF for treatment and storage. A brief discussion of waste streams that may be managed by LERF and 200 Area ETF in the future may be found in the 200 Area ETF Delisting Petition (DOE/RL-92-97). Prior to management of any new waste streams, it may be necessary to modify this WAP through the permit modification process to ensure that adequate knowledge of such new waste streams is available prior to management of them in LERF and 200 Area ETF.

The 242-A process condensate is a dangerous waste because it is derived from a listed, dangerous waste stored in the Double-Shell Tank (DST) System. The DST waste is transferred to the 242-A Evaporator where the waste is concentrated through an evaporation process. The concentrated slurry waste is returned to the DST System, and the evaporated portion of the waste is recondensed, collected, and transferred as process condensate to the LERF.

Other aqueous wastes that are treated and stored at the LERF and 200 Area ETF include, but are not limited to the following Hanford wastes:

- Contaminated groundwater from pump-and-treat remediation activities such as groundwater from the 200-UP-1 Operable Unit;
- Purgewater from groundwater monitoring activities;
- Water from deactivation activities, such as water from the spent fuel storage basins at deactivated reactors (e.g., N Reactor);
- Laboratory aqueous waste from unused samples and sample analyses;
- Leachate from landfills, such as the Environmental Restoration Disposal Facility;
- Any dilute waste, which may be accepted for treatment and within the scope of wastewaters that maybe delisted under terms of the revised delisting (40 CFR 261, Appendix IX, Table 2).

Most of these aqueous wastes are accumulated in batches in a LERF basin for interim storage and treatment through pH and flow equalization before final treatment in 200 Area ETF. However, some aqueous wastes, such as 200-UP-1 Groundwater, maybe treated on a flow through basis in LERF en route to 200 Area ETF for final treatment. The constituents in these aqueous wastes are common to the Hanford Site and were considered in pilot plant testing or in vendor tests, either as a constituent or as a family of constituents. According to the 200 Area ETF Delisting, Permit Condition 1.a.i, all wastes accepted for treatment at 200 Area ETF must be within a specified treatability envelope that ensures that wastes will be within the treatment capability of 200 Area ETF.

B.2 INFLUENT WASTE ACCEPTANCE PROCESS

Throughout the acceptance process, there are specific criteria required for an influent waste (i.e., aqueous waste) to be accepted at the LERF and/or 200 Area ETF. These criteria are identified in the following sections and summarized in Table B.2. The process of accepting a waste into the LERF and 200 Area ETF systems involves a series of steps, as follows.

- Waste information: The generator of an aqueous waste works with LERF and 200 Area ETF personnel to provide characterization data of the waste stream (Section B.2.1).
- Waste management decision process: LERF and 200 Area ETF management decision is based on a case-by-case evaluation of whether an aqueous waste stream is acceptable for treatment or storage at LERF and the 200 Area ETF. The evaluation has two categories:
  - Regulatory acceptability: a review to determine if there are any, regulatory concerns that would prohibit the storage or treatment of an aqueous waste in the LERF or 200 Area ETF; e.g., treatment would meet permit conditions that would comply with applicable regulations.
  - Operational acceptability: an evaluation to determine if there are any operational concerns that would prohibit the storage or treatment of an aqueous waste in the LERF or 200 Area ETF and storage of treatment residuals; e.g., determine treatability and compatibility or safety considerations (Section B.2.2.2).

B.2.1 Waste Information

When an aqueous waste stream is identified for treatment or storage in the LERF or 200 Area ETF, the generator is required to characterize the waste stream according to the requirements in Section B.2.1.1 and document the results of characterization on an aqueous waste profile sheet. This requirement is the first waste acceptance criterion. The LERF and 200 Area ETF personnel work with the generators to ensure that the necessary information is collected for the characterization of a waste stream (i.e., the appropriate analyses or adequate knowledge), and that the information provided on the waste profile sheet is complete. The completed waste profile sheet is maintained in the Hanford Facility Operating Record, LERF and 200 Area ETF File according to Permit Condition II.I.2.

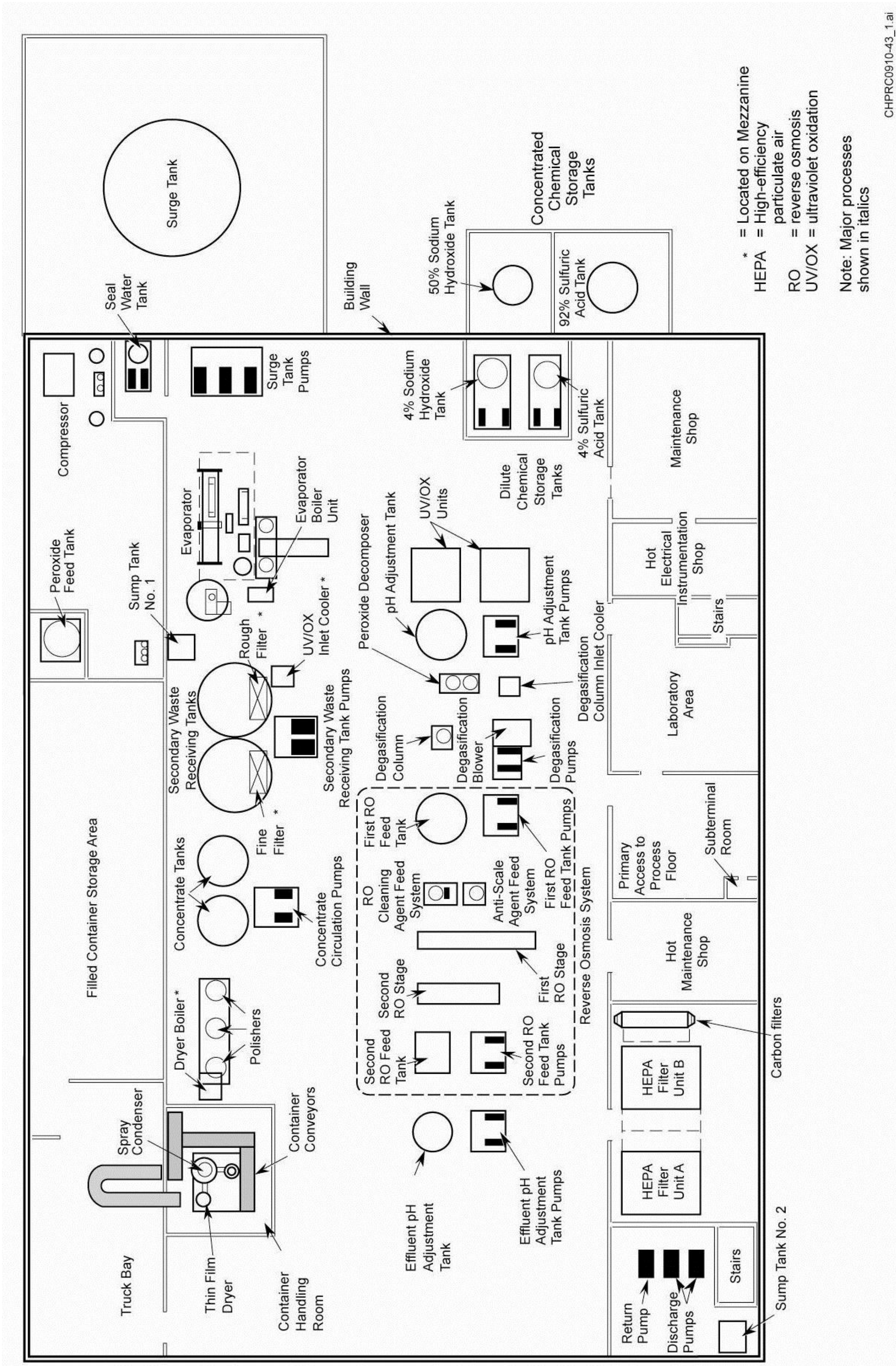
B.2.1.1 Waste Characterization

Because the constituents in the individual aqueous waste streams vary, each waste stream is characterized and evaluated for acceptability on a case-by-case basis. The generator is required to designate an aqueous waste, which generally will be based on analytical data. However, a generator may use knowledge to substantiate the waste designation, or for general characterization information. Examples of acceptable knowledge include the following:

- Documented data or information on processes similar to that which generated the aqueous waste stream
- Information/documentation that the waste stream is from specific, well documented processes, e.g., F-listed wastes
- Information/documentation that sampling/analyzing a waste stream would pose health and safety risks to personnel
- Information/documentation that the waste stream does not lend itself to collecting a laboratory sample for example, wastewater collected (e.g., sump, tank) where the source water characterization is documented. Typically, these circumstances occur at decommissioned buildings or locations, not at operating units.

When a generator performs characterization of a dangerous and/or mixed waste stream based on knowledge, LERF and 200 Area ETF personnel review the knowledge as part of the waste acceptance process to ensure the knowledge satisfies the definition of *knowledge* in WAC 173-303-040. Specifically, LERF and 200 Area ETF personnel review the generator's processes to verify the integrity of the knowledge, and determine whether the knowledge is current and consistent with requirements of this is WAP. LERF and 200 Area ETF management or their designee determines the final decision on the adequacy of the knowledge. The persons reviewing generator process knowledge and those making decisions on the adequacy of knowledge are trained according to the requirements of Addendum G, Personnel Training.

Figure B.1. 200 Area Effluent Treatment Facility Floor Plan



The generator is also responsible for identifying Land Disposal Restrictions (LDRs) treatment standards applicable to the influent aqueous waste as part of the characterization, as required under 40 CFR 268.40 incorporated by reference by WAC 173-303-140. Because the 200 Area ETF main treatment train is a Clean Water Act, equivalent treatment unit [40 CFR 268.37(a)] incorporated by reference by WAC 173-303-140, generators are not required to identify underlying hazardous constituents for characteristic wastes pursuant to 40 CFR 268.9, incorporated by reference by WAC 173-303-140, for wastewaters (i.e., <1 percent total suspended solids and <1 percent total organic carbon). The 200 Area ETF secondary waste (e.g., powder) reflects a change in LDR treatability group (i.e., wastewater to non-wastewater) so there is a new LDR point of generation, at which point any characteristic and associated underlying hazardous constituents must be identified. Therefore, generators of a non-wastewater may be required to identify underlying hazardous constituents for characteristic wastes pursuant to 40 CFR 268.9, incorporated by reference by WAC 173-303-140.

When analyzing an aqueous waste stream for LERF and 200 Area ETF waste acceptance characterization, a generator is required to use the target list of parameters identified in Table B.3, of this WAP. This requirement is in addition to any analysis required for purposes of designation under WAC 173-303-070. These data are used by LERF and 200 Area ETF to verify the treatability of an aqueous waste stream, and to develop a treatment plan for the waste after acceptance. Refer to Table B.6, for the corresponding analytical methods. The generator may use knowledge in lieu of some analyses, as determined by LERF and 200 Area ETF management or their designee, if the knowledge satisfies the definition of *knowledge* in WAC 173-303-040.). For example if a generator provides information that the process generating an aqueous waste does not include or involve organic chemicals, analyses for organic compounds likely would not be required. Additional analyses could be required if historical information and/or knowledge indicate that an aqueous waste contains constituents not included in the target list of parameters.

The characterization and historical information are documented in the waste profile sheet, which is discussed in the following section and is part of the Hanford Facility Operating Record, LERF and 200 Area ETF File according to Permit Condition II.I.

B.2.1.2 Aqueous Waste Profile Sheet

The waste profile sheet documents the characterization of each new aqueous waste stream. The profile includes a detailed description of the source, volume, waste designation and applicable LDR treatment standards, and physical nature (wastewater or non-wastewater) of the aqueous waste. For an aqueous waste to be accepted for treatment or storage in the LERF or 200 Area ETF, each new waste stream generator is required to complete and provide this form to LERF and 200 Area ETF management. Each generator also is required to provide the analytical data and/or knowledge used to designate the aqueous waste stream according to WAC 173-303-070 and to determine the chemical and physical nature of the waste.

The LERF and ETF management determine whether the information on the waste profile sheet is sufficient according to the criteria above. The LERF and 200 Area ETF management use this information to evaluate the acceptability of the aqueous waste stream for storage and treatment in the LERF and 200 Area ETF, and to determine if the secondary waste generated from treatment is acceptable for storage at the 200 Area ETF and has a defined path forward to final disposal.

B.2.2 Waste Management Decision Process

All aqueous waste under consideration for acceptance must be characterized using analytical data and/or knowledge. This information is used to determine the acceptability of an aqueous waste stream. The LERF and 200 Area ETF Facility Manager or their designee is responsible for making the decision to accept or reject an aqueous waste stream. The management decision to accept any aqueous waste stream is based on an evaluation of regulatory acceptability and operational acceptability. Each evaluation uses acceptance criteria, which were developed to ensure that an aqueous waste is managed in a safe, environmentally sound, and in compliance with this Permit. The following sections provide detail on the acceptance evaluation and the acceptance criteria.

An aqueous waste stream could be rejected for one of the following reasons:

- The paperwork and/or laboratory analyses from the generator are insufficient
- Discrepancies with the regulatory and operational acceptance criteria cannot be reconciled, including:
  - An aqueous waste is not allowed under the current Washington State Waste Discharge Permit (No. ST 4500) or 200 Area ETF Delisting, and LERF and 200 Area ETF management elect not to pursue an amendment, or the Permit and Delisting cannot be amended (Section B.2.2.1)
  - An aqueous waste is incompatible with LERF liner materials or with other aqueous waste in LERF and no other management method is available (Section B.2.2.2.2).
- Adequate storage or treatment capacity is not available.

B.2.2.1 Regulatory Acceptability

Each aqueous waste stream is evaluated on a case-by-case basis to determine if there are any regulatory concerns that would preclude the storage or treatment of a waste in the LERF or 200 Area ETF based on the criteria in Sections B2.2.1.1 and B.2.2.1.2. Before an aqueous waste can be stored or treated in either the LERF or 200 Area ETF, the waste designation must be determined. Information on the waste designation of an aqueous waste is documented in the waste profile sheet. This information is used to confirm that treating or storing the aqueous waste in the LERF or 200 Area ETF is allowed under and in compliance with WAC 173-303, Permit (WA7890008967), 200 Area ETF Delisting in 40 CFR 261, Appendix IX, Table 2, the corresponding State-Issued Delisting, and the Washington State Waste Discharge Permit (No. ST 4500) for 200 Area ETF.

B.2.2.1.1 Dangerous Waste Regulations, State and Federal Delisting Actions, and Permits

Before an aqueous waste stream is sent to the LERF or 200 Area ETF, the generator will characterize and designate the stream with the appropriate dangerous/hazardous waste numbers according to WAC 173-303-070. Addendum A, the 200 Area ETF Delisting and the corresponding State-Issued Delisting identify the specific waste numbers for dangerous/mixed waste that can be managed in the LERF and 200 Area ETF. Dangerous waste designated with waste numbers not specified in these documents cannot be treated or stored in the LERF or 200 Area ETF, unless the documents are appropriately modified.

Additionally, aqueous wastes designated with listed waste numbers identified in the 200 Area ETF Delisting and the corresponding State-Issued Delisting will be managed in accordance with the conditions of the delisting, or an amended delisting.

B.2.2.1.2 State Waste Permit Regulations/Permit

Compliance with the Washington State Waste Discharge Permit (No. ST 4500), constitutes another waste acceptance criterion. In accordance with the permit conditions of the Washington State Waste Discharge Permit (No. ST 4500), the constituents of concern in each new aqueous waste stream must be identified. The waste designation and characterization data provided by the generator are used to identify these constituents. The Washington State Waste Discharge Permit (No. ST 4500), defines a constituent of concern in an aqueous waste stream, under the conditions of the Discharge Permit, as any contaminant with a maximum concentration greater than one of the following:

- Any limit in the Washington State Waste Discharge Permit (No. ST 4500)
- Groundwater Quality Criteria (WAC 173-200)
- Final Delisting level (40 CFR 261, Appendix IX, Table 2)
- The corresponding State-Issued Delisting

- Background groundwater concentration as measured at the SALDS disposal site. The practical quantification limit (PQL) is used for the groundwater background concentration for constituents not analyzed or not detected in the SALDs background data.

The Permit conditions of the Washington State Waste Discharge Permit (No. ST 4500), also require a demonstration that 200 Area ETF can treat the constituents of concern to below discharge limits.

B.2.2.2 Operational Acceptability

Because the operating configuration or operating parameters at the LERF and 200 Area ETF can be adjusted or modified, most aqueous waste streams generated on the Hanford Site can be effectively treated to below Delisting and Discharge Permit limits. Because of this flexibility, it would be impractical to define numerical acceptance or decision limits. Such limits would constrain the acceptance of appropriate aqueous waste streams for treatment at the LERF and 200 Area ETF. The versatility of the LERF and 200 Area ETF is better explained in the following examples:

- The typical operating configuration of 200 Area ETF is to process an aqueous waste through the UV/OX unit first, followed by the RO unit. However, high concentrations of nitrates may interfere with the performance of the UV/OX. In this case, 200 Area ETF could be configured to process the waste in the RO unit prior to the UV/OX unit.
- For a small volume aqueous waste with high concentrations of some anions and metals, the approach may be to first process the waste stream in the secondary treatment train. This approach would prevent premature fouling or scaling of the RO unit. The liquid portion (i.e., untreated overheads from 200 Area ETF evaporator and thin film dryer) would be sent to the primary treatment train.
- An aqueous waste with high concentrations of chlorides and fluorides may cause corrosion problems when concentrated in the secondary treatment train. One approach is to adjust the corrosion control measures in the secondary treatment train. An alternative may be to blend this aqueous waste in a LERF basin with another aqueous waste, which has sufficient dissolved solids, such that the concentration of the chlorides in the secondary treatment train would not pose a corrosion concern.
- Some metal salts (e.g., barium sulfate) tend to scale the RO membranes. In this situation, descalants used in the treatment process may be increased.
- Any effluent that does not meet these limits in one pass through 200 Area ETF treatment process is recycled to 200 Area ETF for re-processing.

There are some aqueous wastes, whose chemical and physical properties preclude that waste from being treated or stored at the LERF or 200 Area ETF. Accordingly, an aqueous waste is evaluated to determine if it is treatable, if it would impair the efficiency or integrity of the LERF or 200 Area ETF, and if it is compatible with materials in these units. This evaluation also determines if the aqueous waste is compatible with other aqueous wastes managed in the LERF.

The waste acceptance criteria in this category focus on determining treatability of an aqueous waste stream, and on determining any operational concerns that would prohibit the storage or treatment of an aqueous waste stream in the LERF or 200 Area ETF. The chemical and physical properties of an aqueous waste stream are determined as part of the waste characterization, and are documented on the waste profile sheet and compared to the design of the units to determine whether an aqueous waste stream is appropriate for storage and treatment in the LERF and 200 Area ETF. All decisions and supporting rationale and data will be documented in the Hanford Facility Operating Record, LERF and 200 Area ETF File according to Permit Condition II.I.

B.2.2.3 Special Requirements Pertaining to Land Disposal Restrictions

Containers of 200 Area ETF secondary waste are transferred to a storage or final disposal unit, as appropriate (e.g., the Central Waste Complex or to the Environmental Restoration Disposal Facility). 200 Area ETF personnel provide the analytical characterization data and necessary process knowledge for the waste to be managed by the receiving staff, and the appropriate LDR documentation.

The following information on the secondary waste is included on the LDR documentation provided to the receiving unit:

- Dangerous waste numbers (as applicable)
- Determination on whether the waste is restricted from land disposal according to the requirements of 40 CFR 268 incorporated by reference by WAC 173-303-140 (i.e., the LDR status of the waste)

The waste tracking information associated with the transfer of waste

- Waste analysis results.

Generally, the operating parameters or operating configuration at the LERF or 200 Area ETF can be adjusted or modified to accommodate these properties. However, in those cases where a treatment process or operating configuration cannot be modified, the aqueous waste stream will be excluded from treatment or storage at the LERF or 200 Area ETF. Additionally, an aqueous waste stream is evaluated for the potential to deposit solids in a LERF basin (i.e., whether an aqueous waste contains sludge or could precipitate solids). This evaluation will also consider whether the blending or mixing of two or more aqueous waste streams will result in the formation of a precipitate. However, because the waste streams managed in the LERF and 200 Area ETF are generally dilute, the potential for mixing waste streams and forming a precipitate is low; no specific compatibility tests are performed. Filtration at the waste source could be required before acceptance into LERF. Waste streams with the potential to form precipitates in LERF or that cannot be blended with other waste streams to avoid precipitate formation are not accepted for treatment at LERF and 200 Area ETF. The Load-in Facility has the ability to perform filtration on incoming waste streams going to both the LERF and 200 Area ETF Load in. See additional discussions of precipitate formation and compliance with LDR requirements in Section B.3. Similar filtration requirements could apply to aqueous waste fed directly to 200 Area ETF without interim treatment in LERF.

To determine if an aqueous waste meets the criterion of treatability, specific information is required. Treatability of a waste stream is evaluated from characterization data provided by the generator as verified through the waste acceptance process, the 200 Area waste acceptance criteria, and the treatability envelope for the 200 Area ETF as documented in Tables C.1 and C.2 of the November 29, 2001 delisting petition. Generators will also provide characterization data to identify those physical and chemical properties that would interfere with, or foul 200 Area ETF treatment process in consultation with LERF and 200 Area ETF representatives. In some instances, knowledge that meets the definition of *knowledge* in WAC 173-303-040 is used for purposes of identifying a chemical or physical property that would be of concern. For example, the generator could provide knowledge that the stream has two phases (an oily phase and an aqueous phase). In this case, if the generator could not physically separate the two phases, the aqueous waste stream would be rejected because the oily phase could compromise some of the treatment equipment. Typically, analyses for the following parameters are required to evaluate treatability and operational concerns:

- total dissolved solids
- total organic carbon
- total suspended solids
- specific conductivity
- pH
- alkalinity
- ammonia
- barium
- calcium
- chloride
- fluoride
- iron
- magnesium
- nitrate
- nitrite
- phosphate
- potassium
- silicon
- sodium
- sulfate
-

These constituents are identified in Table B.2, which is the list of target analytes used for waste characterization and waste acceptance evaluation.

B.2.2.3.1 Compatibility

Corrosion Control. Because of the materials of construction used in 200 Area ETF, corrosion is generally not a concern with new aqueous waste streams. Additionally, these waste streams are managed in a manner that minimizes corrosion. To ensure that a waste will not compromise the integrity of 200 Area ETF tanks and process equipment, each waste stream is assessed for its corrosion potential as part of the compatibility evaluation. This assessment usually focuses on chloride and fluoride concentrations; however, the chemistry of each new waste also is evaluated for other parameters that could cause corrosion.

Compatibility with Liquid Effluent Retention Facility Liner and Piping. As part of the acceptance process, the criteria of compatibility with the LERF liner materials are evaluated for each aqueous waste stream. This evaluation is performed using knowledge (as defined by WAC 173-303-040) of constituent concentrations in the aqueous waste stream or using constituent concentrations obtained by analyzing the waste stream for the constituents identified in Table B.1 using the analytical methods for these constituents in Section B.9. Then, the constituent concentrations in the waste stream are compared to the decision criteria in Table B.1. If all constituent concentrations are below the decision criteria, then the waste stream is considered compatible with the LERF liner and may be accepted for treatment. Otherwise, the waste stream is considered incompatible with the LERF liner, and it cannot be accepted for treatment in the LERF basins. However, a waste stream may still be acceptable for treatment in ETF if it is fed directly to ETF, bypassing the LERF Basins. Results of this evaluation are documented in the Hanford Facility Operating Record, LERF and 200 Area ETF File according to Permit Condition II.I. The rational for establishing the liner compatibility constituents and decision criteria in Table B.1 is as follows: The high-density polyethylene liners in the LERF basins potentially are vulnerable to the presence of certain constituents that might be present in some aqueous waste. Using EPA SW-846, Method 9090, the liner materials were tested to evaluate compatibility between aqueous waste stored in the LERF and synthetic liner components. Based on the data from the compatibility test and vendor data on the liner materials, several constituents and parameters were identified as potentially harmful (at high concentrations) to the integrity of the liners. From these data and the application of safety factors, concentration limits in Table B.1 were established.

The strategy for protecting the integrity of a LERF liner is to establish upfront that an aqueous waste is compatible before the waste is accepted into LERF. Characterization data on each new aqueous waste stream are compared to the limits outlined in Table B.1 to ensure compatibility with the LERF liner material before acceptance into the LERF.

Before a waste stream is processed at the 242-A Evaporator, the generator reviews DST analytical data and a process condensate profile is developed to ensure the process condensate is compatible with the LERF liner. For flow through aqueous wastes like the 200-UP-1 Groundwater, characterization data will be obtained and reviewed every two years to ensure that liner compatibility is maintained.

In some instances, knowledge may be adequate to determine that an aqueous waste is compatible with the LERF liner. When knowledge is used, it must satisfy the definition of *knowledge* in WAC 173-303-040. In those instances where knowledge is adequate, the waste characterization would likely not require analysis for these parameters and constituents. Storm water is an example where knowledge is adequate to determine that this aqueous waste is compatible with the LERF liner.

Compatibility with Other Waste. Some aqueous wastes, especially small volume streams, are accumulated in the LERF with other aqueous waste. Before acceptance into the LERF, the aqueous waste stream is evaluated for its compatibility with the resident aqueous waste(s). The evaluation focuses on the potential for an aqueous waste to react with another waste (40 CFR 264, Appendix V, *Examples of Potentially Incompatible Wastes*) including formation of any precipitate in the LERF basins. However, the potential for problems associated with commingling aqueous wastes is very low due to the dilute nature of the wastes; this evaluation confirms the compatibility of two or more aqueous wastes from different sources. Compatibility is determined by evaluating parameters such as pH, ammonia, and chloride. No specific analytical test for compatibility is performed.

If it is determined that an aqueous waste stream is incompatible with other aqueous waste streams, alternate management scenarios are available. For example, another LERF basin that contains a compatible aqueous waste(s) might be used, or the aqueous waste stream might be fed directly into 200 Area ETF for treatment. In any case, potentially incompatible waste streams are not mixed, and all aqueous waste is managed in a way that precludes a reaction, degradation of the liner, or interference with 200 Area ETF treatment process.

B.2.3 Periodic Review Process

In accordance with WAC 173-303-300(4)(a), an influent aqueous waste will be periodically reviewed as necessary to ensure that the characterization is accurate and current. At a minimum, an aqueous waste stream will be reviewed in the following situations.

- The LERF and 200 Area ETF management have been notified, or have reason to believe that the process generating the waste has changed.
- The LERF and 200 Area ETF management note an increase or decrease in the concentration of a constituent in an aqueous waste stream, beyond the range of concentrations that was described or predicted in the waste characterization.
- Waste streams will be reviewed every two years

In these situations, LERF and 200 Area ETF management will review the available information. If existing analytical information is not sufficient, the generator may be asked to review and update the current waste characterization, to supply a new WPS, or re-sample and re-analyze the aqueous waste, as necessary. Other situations that might require a re-evaluation of a waste stream are discussed in the following sections.

B.2.4 Record/Information and Decision

The information and data collected throughout the acceptance process, and the evaluation and decision on whether to accept an influent aqueous waste stream for treatment or storage in the LERF or 200 Area ETF are documented as part of Hanford Facility Operating Record, LERF and 200 Area ETF File pursuant to Permit Condition II.I. Specifically, the Hanford Facility Operating Record, LERF and 200 Area ETF File contains the following components on a new influent aqueous waste stream:

- The signed WPS for each aqueous waste stream and analytical data
- Knowledge used to characterize a dangerous/mixed waste (under WAC 173-303), and information supporting the adequacy of the knowledge
- The evaluation on whether an aqueous waste stream meets the waste acceptance criteria, including:
  - The evaluation for regulatory acceptability including appropriate regulatory approvals
  - The evaluation for LERF liner compatibility and for compatibility with other aqueous waste

Table B.1. General Limits for Liner Compatibility

Chemical Family	Constituent(s) or Parameter(s)[1]	Limit (mg/L)[2] (sum of constituent concentrations)
Alcohol/glycol	1-butanol	500,000
Alkanone[3]	acetone,	200,000
Alkenone[4]	none targeted	N/A
Aromatic/cyclic hydrocarbon	acetophenone, benzene, carbozole, chrysene, cresol, di-n-octyl phthalate, diphenylamine, isophorone, pyridine, tetrahydrofuran	2000
Halogenated hydrocarbon	arochlors, carbon tetrachloride, chloroform, hexachlorobenzene, lindane (gamma-BHC), hexachlorocyclopentadiene, methylene chloride, p-chloroaniline, tetrachloroethylene, 2,4,6-trichlorophenol	2000
Aliphatic hydrocarbon	none targeted	N/A
Ether	dichloroisopropyl ether	2000
Other hydrocarbons	acetontrile, carbon disulfide, n-nitrosodimethylamine, tributyl phosphate	2000
Oxidizers	none targeted	NA
Acids, Bases, Salts	ammonia, cyanide, anions, cations	100,000
pH	pH	0.5 < pH < 13.0

[1]Analytical methods for the parameters and constituents are provided in Section B.9

[2]Analytical data are evaluated using the following 'sum of the fraction' technique. The individual constituent concentration is evaluated against the compatibility limit for its chemical family. The sum of the evaluations must be less than 1. pH is not part of this evaluation.

$$\sum_{n=1}^{i}\left(\frac{Conc_n}{LIMIT_n}\right) \leq 1$$

[3]Ketone containing saturated alkyl group(s)

[4]Ketone containing unsaturated alkyl group(s)

Where 'i' is the number of organic constituents detected

mg/L = milligrams per liter

NA = not applicable

Table B.2. Waste Acceptance Criteria

General criteria category	Criteria description
1. Characterization	A. Each generator must provide an aqueous waste profile.
	B. Each generator must designate the aqueous waste stream.
	C. Each generator must provide analytical data and/or knowledge.
2. Regulatory acceptability	A. The LERF and 200 Area ETF can store and treat influent aqueous wastes with waste numbers identified in Addendum A for the LERF and 200 Area ETF, and the 200 Area ETF Delisting, 40 CFR 261, Appendix IX, Table 2.
	B. The aqueous waste must comply with conditions of the Discharge Permit.
3. Operational acceptability	A. Determine whether an aqueous waste stream is treatable, considering: 1. Whether the removal and destruction efficiencies on the constituents of concern will be adequate to meet the Discharge Permit and Delisting levels 2. Other treatability concerns; analyses for this evaluation may include: total dissolved solids, iron total organic carbon, magnesium total suspended solids, nitrate specific conductivity, nitrite alkalinity, phosphate ammonia, potassium barium, silicon calcium, sodium chloride, sulfate fluoride, pH
	B. Determine whether an aqueous waste stream is compatible, considering: 1. Whether an aqueous waste stream presents corrosion concerns with respect to ETF; analysis may include chloride and fluoride 2. Whether an aqueous waste stream is compatible with LERF liner materials, compare characterization data to the liner compatibility limits (Table B.1). 3. Whether an aqueous waste stream is compatible with other aqueous waste(s), 40 CFR 264, Appendix V, comparison will be used.

B.3 SPECIAL MANAGEMENT REQUIREMENTS

Special management requirements for aqueous wastes that are managed in the LERF or 200 Area ETF are discussed in the following section.

B.3.1 Land Disposal Restriction Compliance at Liquid Effluent Retention Facility

Because LERF provides treatment through flow and pH equalization, a surface impoundment treatment exemption from the land disposal restrictions was granted in accordance with 40 CFR 268.4, and WAC 173-303-040. This treatment exemption is subject to several conditions, including a requirement that the WAP address the sampling and analysis of the treatment 'residue' [40 CFR 268.4(a)(2)(i) and WAC 173-303-300(5)(h)(i) and (ii)] to ensure the 'residue' meets applicable treatment standards. Though the term 'residue' is not specifically defined, this condition further requires that sampling must be designed to represent the "sludge and the supernatant" indicating that a residue may have a sludge (solid) and supernatant (liquid) component.

Solid residue is not anticipated to accumulate in a LERF basin for the following reasons:

- Aqueous waste streams containing sludge would not be accepted into LERF under the acceptance criteria of treatability (Section B.2.2.2.1)
- No solid residue was reported from process condensate discharged to LERF in 1995

- The LERF basins are covered and all incoming air first passes through a breather filter
- No precipitating or flocculating chemicals are used in flow and pH equalization.
- Multiple waste streams managed in a single LERF basin are evaluated for the formation of precipitates. Wastes that would form precipitates are not accepted for treatment at LERF.

Therefore, the residue component subject to this condition is the supernatant (liquid component). Additionally, an aqueous waste stream is evaluated for the potential to deposit solids in a LERF basin (i.e., an aqueous waste that contains suspended solids). If necessary, filtration at the waste source could be required before acceptance into LERF. Therefore, the residue component in LERF subject to this condition is the supernatant (liquid component). The contingency for removal of solids will be addressed during closure in Addendum H, Closure Plan.

The conditions of the treatment exemption also require that treatment residues (i.e., aqueous wastes), which do not meet the LDR treatment standards "must be removed at least annually" [40 CFR 268.4(a)(2)(ii) incorporated by reference by WAC 173-303-140]. To address the conditions of this exemption, an influent aqueous waste is sampled and analyzed and the LDR status of the aqueous waste is established as part of the acceptance process. The LERF basins are then managed such that any aqueous waste(s), which exceeds an LDR standard is removed annually from a LERF basin, except for a heel of approximately 1 meter. A heel is required to stabilize the LERF liner. The volume of the heel is approximately 1.9 million liters.

B.4 INFLUENT AQUEOUS WASTE SAMPLING AND ANALYSIS

The following sections provide a summary of the sampling procedures, frequencies, and analytical parameters for characterization of influent aqueous waste (Section B.2) and in support of the special management requirements for aqueous waste in the LERF (Section B.3).

B.4.1 Sampling Procedures

With a few exceptions, generators are responsible for the characterization, including sampling and analysis, of an influent aqueous waste. Process condensate is either sampled at the 242-A Evaporator or accumulated in a LERF basin following a 242-A Evaporator campaign and sampled. Other exceptions will be handled on a case-by-case basis and the Hanford Facility Operating Record, LERF and 200 Area ETF File will be maintained at the unit for inspection by Ecology. The following section discusses the sampling locations, methodologies, and frequencies for these aqueous wastes. For samples collected at the LERF and 200 Area ETF, unit-specific sampling protocol is followed. The sample containers, preservation materials, and holding times for each analysis are listed in Section B.9.

B.4.1.1 Batch Samples

In those cases where an aqueous waste is sampled in a LERF basin, samples are collected from four of the six available sample risers located in each basin, i.e., four separate samples. When LERF levels are low, fewer than four samples can be taken if the sampling approach is still representative. Though there are eight sample risers at each basin, one is dedicated to liquid level instrumentation and another is dedicated as an influent port. Operating experience indicates that four samples adequately capture the spatial variability of an aqueous waste stream in the LERF basin. Specifically, sections of stainless steel (or other compatible material) tubing are inserted into the sample riser to an appropriate depth. Using a portable pump, the sample line is flushed with the aqueous waste and the sample collected. The grab sample containers typically are filled for volatile organic compounds (VOC) analysis first, followed by the remainder of the containers for the other parameters.

Several sample ports are also located at 200 Area ETF, including a valve on the recirculation line at 200 Area ETF surge tank, and a sample valve on a tank discharge pump line at 200 Area ETF Load-in Station. All samples are obtained at the LERF or 200 Area ETF are collected in a manner consistent with SW-846 procedures (EPA as amended).

B.4.2 Analytical Rationale

As stated previously, each generator is responsible for designating and characterizing an aqueous waste stream. Accordingly, each generator samples and analyzes an influent waste stream using the target list of parameters (Table B.3) for the waste acceptance process. At the discretion of the LERF and ETF management, a generator may provide knowledge in lieu of some analyses as discussed in Section B.2.1.1. The LERF and ETF personnel will work with the generator to determine which parameters are appropriate for the characterization.

The analytical methods for these parameters are provided in Section B.9. All methods are EPA methods satisfying the requirements of WAC 173-303-110(3). Additional analyses may be required if historical information and knowledge indicate that an influent aqueous waste contains constituents not included in the target list of parameters. For example, if knowledge indicates that an aqueous waste contains a parameter that is regulated by the Groundwater Quality Criteria (WAC 173-200), that parameter(s) would be added to the suite of analyses required for that aqueous waste stream.

The analytical data for the parameters presented in Table B.3, including VOC, SVOC, metals, anions, and general chemistry parameters are used to define the physical and chemical properties of the aqueous waste for the following:

- Set operating conditions in the LERF and ETF (e.g., to determine operating configuration , refer to Section B.2.2.2)
- Identify concentrations of some constituents which may also interfere with, or foul ETF treatment process (e.g., fouling of the RO membranes, refer to Section B.2.2.2)
- Evaluate LERF liner and piping material compatibility
- Determine treatability to evaluate if applicable constituents in the treated effluent will meet Discharge Permit and Delisting limits
- Estimate concentrations of some constituents in the waste generated in the secondary treatment train (i.e., dry powder waste).

Table B.3. Target Parameters for Influent Aqueous Waste Analyses

VOLATILE ORGANIC COMPOUNDS		SEMIVOLATILE ORGANIC COMPOUNDS
Acetone		Acetophenone
Acetonitrile		Cresol (o, p, m)
Benzene		Dichloroisopropyl ether (bis(2-chloropropyl)ether)
1-Butanol		Di-n-octyl phthalate
Carbon disulfide		Diphenylamine
Carbon tetrachloride		Hexachlorobenzene
Chloroform		Hexachlorocyclopentadiene
Methylenechloride		Iosophorone
Tetrachloroethylene		Lindane (gamma-BHC)
Tetrahydrofuran		N-nitrosodimethylamine
		Pyridine
		Tributyl phosphate
		2,4,6-Trichlorophenol
TOTAL METALS		**ANIONS**
Arsenic	Magnesium	Chloride
Barium	Mercury	Fluoride
Beryllium	Nickel	Nitrate
Cadmium	Potassium	Nitrite
Calcium	Selenium	Phosphate
Chromium	Silicon	Sulfate
Copper	Silver	**GENERAL CHEMISTRY PARAMETERS**
Iron	Sodium	Ammonia
Lead	Vanadium	Cyanide
	Zinc	pH
		Total suspended solids
		Total dissolved solids
		Total organic carbon
		Specific conductivity

B.5 TREATED EFFLUENT SAMPLING AND ANALYSIS

The treated aqueous waste, or effluent, from 200 Area ETF is collected in three 2,940,000-liter verification tanks before discharge to the SALDS. To determine whether the Discharge Permit early warning values, enforcement limits, and the Delisting criteria are met, the effluent routinely is sampled at the verification tanks. The sampling and analyses performed are described in the following sections.

B.5.1 Rationale for Effluent Analysis Parameter Selection

The parameters measured in the treated effluent are required by the following regulatory documents:

- Delisting criteria from the 200 Area ETF Delisting (40 CFR 261, Appendix IX, Table 2)
- Corresponding State Final Delisting issued pursuant to WAC 173-303-910(3)
- Effluent limits from the Washington State Waste Discharge Permit (No. ST 4500)
- Early warning values from the Washington State Waste Discharge Permit (No. ST 4500)

The 200 Area ETF Delisting provides two testing regimes for the treated effluent. Initial verification testing is performed when a new influent waste stream is processed through the 200 Area ETF. For each 200 Area ETF influent waste stream, the first generated verification tank must be sampled and analyzed for all delisting constituents and conductivity. Subsequent verification sampling and analysis of all delisting parameters is performed on every 15th tank of that 200 Area ETF influent waste stream. If the concentration of any analyte is found to exceed a Washington State Waste Discharge Permit (No. ST 4500), enforcement limit or a Delisting criterion, the contents of the verification tank are reprocessed and/or re-analyzed. The next verification tank generated is also sampled for all delisting constituents. If the concentration of any analyte exceeds an early warning value, an early warning value report is prepared and submitted to Ecology.

B.5.2 Effluent Sampling Strategy: Methods, Location, Analyses, and Frequency

Effluent sampling methods and locations, the analyses performed, and frequency of sampling are discussed in the following sections.

B.5.2.1 Effluent Sampling Method and Location

Samples of treated effluent are collected and analyzed to verify the treatment process using 200 Area ETF specific sampling protocol. These verification samples are collected at a sampling port on the verification tank recirculation line. Section B.9 presents the sample containers, preservatives, and holding times for each parameter monitored in the effluent.

B.5.2.2 Analyses of Effluent

The parameters required by the current Washington State Waste Discharge Permit (No. ST 4500), and Final Delisting 200 Area ETF, conditions are presented in Table B.4. The analytical methods and PQLs associated with each parameter are provided in Section B.9. The methods and PQLs are equivalent to those used in the analysis of influent aqueous waste.

B.5.2.3 Frequency of Sampling

Treated effluent is tested for all parameters listed in Table B.4 on a frequency satisfying the permit conditions of the Washington State Waste Discharge Permit (No. ST 4500), and the 200 Area ETF Delisting. This effluent must meet the Washington State Waste Discharge Permit (No. ST 4500), and 200 Area ETF Delisting limits associated with these parameters. Grab samples are collected from each verification tank.

During operation of 200 Area ETF, if one or more of the constituents exceeds a Delisting criterion, the Delisting conditions require:

- The characterization data and processing strategy of the influent waste stream be reviewed and changed accordingly to ensure the contents of subsequent tanks do not exceed the Delisting criteria
- The contents of the verification tank are recycled for additional treatment. The contents that are recycled are resampled after treatment to ensure no constituents exceed a Delisting criteria
- The contents of the following verification tank are sampled for compliance with the Delisting criteria.
- Treated effluent that does not meet Washington State Waste Discharge Permit (No. ST 4500) is not discharged to the SALDS until the tank has been retreated and/or reanalyzed.

B.6 EFFLUENT TREATMENT FACILITY GENERATED WASTE SAMPLING AND ANALYSIS

The wastes discussed in this section include the wastes generated at 200 Area ETF and are managed in the container storage areas of 200 Area ETF. This section describes the characterization of the following secondary waste streams generated within 200 Area ETF:

- Secondary waste generated from the treatment process, including the following waste forms:
  - dry powder waste
  - concentrate tanks slurry
  - sludge removed from process tanks
- Waste generated by operations and maintenance activities

- Miscellaneous waste generated within 200 Area ETF.

For each waste stream described, a characterization methodology and rationale are provided, and sampling requirements are addressed.

B.6.1 Secondary Waste Generated from Treatment Processes

The following terms used in this Section, including powder, dry powder, waste powder, and dry waste powder, are equivalent to the term 'dry powder waste'.

A dry powder waste is generated from the secondary treatment train, from the treatment of an aqueous waste. Waste is received in the secondary treatment train in waste receiving tanks where it is fed into an evaporator. Concentrate waste from the evaporator is then fed to a concentrate tank. From these tanks, the waste is fed to a thin film dryer and dried into a powder, and collected into containers. The containers are filled via a remotely controlled system. The condensed overheads from the evaporator and thin film dryer are returned to the surge tank to be fed to the primary treatment train.

Occasionally, salts from the treatment process (e.g., calcium sulfate and magnesium hydroxide) accumulate in process tanks as sludge. Because processing these salts could cause fouling in the thin film dryer, and to allow uninterrupted operation of the treatment process, the sludge is removed and placed in containers. The sludge is dewatered and the supernate is pumped back to 200 Area ETF for treatment.

The secondary treatment system typically receives and processes the following by-products generated from the primary treatment train:

- Concentrate from the first RO stage
- Backwash from the rough and fine filters
- Regeneration waste from the ion exchange system
- Spillage or overflow collected in the process sumps.

In an alternate operating scenario, some aqueous wastes may be fed to the secondary treatment train before the primary treatment train.

B.6.1.1 Special Requirements Pertaining to Land Disposal Restrictions

Containers of 200 Area ETF secondary waste are transferred to a storage or final disposal unit, as appropriate (e.g., the Central Waste Complex or to the Environmental Restoration Disposal Facility). 200 Area ETF personnel provide the analytical characterization data and necessary knowledge for the waste to be managed by the receiving staff, and for the appropriate LDR documentation.

The following information on the secondary waste is included on the LDR documentation provided to the receiving unit:

- Dangerous waste numbers (as applicable)

- Determination on whether the waste is restricted from land disposal according to the requirements of 40 CFR 268 incorporated by reference by WAC 173-303-140 (i.e., the LDR status of the waste)

The waste tracking information associated with the transfer of waste

- Waste analysis results.

B.6.1.2 Sampling Methods

The dry powder waste and containerized sludge are sampled from containers using the principles presented in SW-846 (EPA as amended) and ASTM Methods (American Society for Testing Materials), as referenced in WAC 173-303-110(2). The sample container requirements, sample preservation requirements, and maximum holding times for each of the parameters analyzed in either matrix are presented in Section B.9.

Concentrate tank waste samples are collected from recirculation lines, which provide mixing in the tank during pH adjustment and prevent caking. The protocol for concentrate tank sampling prescribes opening a sample port in the recirculation line to collect samples directly into sample containers. The sample port line is flushed before collecting a grab sample. The VOC sampling typically is performed first for grab samples. Each VOC sample container will be filled such that cavitation at the sample valve is minimized and the container has no headspace. The remainder of the containers for the other parameters will be filled next.

Table B.4. Rationale for Parameters to be Monitored in Treated Effluent

Parameter	(Cas No.)	200 Area ETF Delisting[1]	Discharge Permit[2]	
			Enforcement Limit	Early Warning Value
VOLATILE ORGANIC COMPOUNDS				
Acetone	(67-64-1)	X		
Acetonitrile	(75-05-8)	X		
Benzene	(71-43-2)	X		X
1-Butanol	(71-36-3)	X		
Carbon disulfide	(75-15-0)	X		
Carbon tetrachloride	(56-23-5)	X	X	
Chloroform	(67-66-3)			X
Methylene Chloride	(75-09-2)		M	
Tetrachloroethylene	(127-18-4)		X	
Tetrahydrofuran	(109-99-9)	X		X
SEMIVOLATILE ORGANIC COMPOUNDS				
Acetophenone	(98-86-2)		X	
Carbazole	(86-74-8)	X		
p-Chloroaniline	(106-47-8)	X		
Chrysene	(218-01-9)	X		
Cresol (total)	(1319-77-3)	X		
Dichloroisopropyl ether (bis(2-chloroisopropyl)ether)	(108-60-1)	X		
Di-n-octyl phthalate	(117-84-0)	X		
Diphenylamine	(122-39-4)	X		
Hexachlorobenzene	(118-74-1)	X		
Hexachlorocyclopentadiene	(77-47-4)	X		
Isophorone	(78-59-1)	X		
Lindane (gamma-BHC)	(58-89-9)	X		
N-nitrosodimethylamine	(62-75-9)	X	X	
Pyridine	(110-86-1)	X		
Tributyl phosphate	(126-73-8)	X		
2,4,6-Trichlorophenol	(88-06-2)	X		
PCBs				
Aroclor 1016	(12674-11-2)	X		
Aroclor 1221	(11104-28-2)	X		
Aroclor 1232	(11141-16-5)	X		
Aroclor 1242	(53469-21-9)	X		
Aroclor 1248	(12672-29-6)	X		
Aroclor 1254	(11097-69-1)	X		
Aroclor 1260	(11096-82-5)	X		
TOTAL METALS3				
Arsenic	(7440-38-2)	X	X	
Barium	(7440-39-3)	X		
Beryllium	(7740-41-7)	X	X	

Table B.4. Rationale for Parameters to be Monitored in Treated Effluent

Parameter	(Cas No.)	200 Area ETF Delisting[1]	Discharge Permit[2] Enforcement Limit	Discharge Permit[2] Early Warning Value
Cadmium	(7440-43-9)	X		X
Chromium	(7440-47-3)	X	X	
Copper	(7440-50-8)			X
Lead	(7439-92-1)	X		X
Mercury	(7439-97-6)	X		X
Nickel	(7440-02-0)	X		
Selenium	(7782-49-2)	X		
Silver	(7440-22-4)	X		
Vanadium	(7440-62-2)	X		
Zinc	(7440-66-6)	X		
ANIONS				
Chloride	(16887-00-6)		X	
Fluoride	(16984-48-8)	X		
Nitrate (as N)	(14797-55-8)		X	
Nitrite (as N)	(1479765-0)		X	
Sulfate	(14808-79-8)		X	
OTHER ANALYSES				
Ammonia	(7664-41-7)	X	X	
Cyanide	(57-12-5)	X		
Total dissolved solids				X
Total organic carbon			X	
Total suspended solids			X	
Specific conductivity			M	

[1]Parameters required by the current conditions of the 200 Area ETF Delisting, 40 CFR 261, Appendix IX, Table 2,70 FR 44496 (EPA 2005)
[2]Parameters required by the current conditions of the State Waste Discharge Permit, No. ST 4500
[3]Metals reported as total concentrations
X = Rationale for measuring this parameter in treated effluent
M = Monitor only; no limit defined
PCBs = polychlorinated biphenyls

B.6.1.3 Sampling Frequency

When designation or identification of applicable LDR treatment standards of the 200 Area ETF secondary waste cannot be based on influent characterization data or knowledge as described in Section B.6.1.1, 200 Area ETF secondary waste is sampled on a batch basis. A batch is defined as any volume of aqueous waste that is being treated under consistent and constant process conditions.

When personnel exposures are of concern, one representative sample will be collected from the concentrate tank, if waste from the concentrate tank. The sample will be analyzed for the appropriate parameters identified in Table B.5 based on the needs identified from evaluating influent waste analysis data. If sampling of the concentrate tank is not technically practicable for purposes of designating the powder, direct sampling of the dry powder will be used to make determinations on the dry powder. The dry powder or concentrate tanks will be resampled in the following situations:

- Change in influent characterization
- Change in process chemistry, as indicated by in-line monitoring of conductivity and pH

- The LERF and 200 Area ETF management have been notified, or have reason to believe that the process generating the waste has changed (for example, a source change such as a change in the well-head for groundwater that significantly changes the aqueous waste characterization).
- The LERF and 200 Area ETF management note an increase or decrease in the concentration of a constituent in an aqueous waste stream, beyond the range of concentrations that was described or predicted in the waste characterization.

B.6.2 Operations and Maintenance Waste Generated at the 200 Area Effluent Treatment Facility

Operation and maintenance of process and ancillary equipment generates additional routine waste. These waste materials are segregated to ensure proper handling and disposition, and to minimize the commingling of potentially dangerous waste with nondangerous waste. The following waste streams are anticipated to be generated during routine operation and maintenance of 200 Area ETF. This waste might or might not be dangerous waste, depending on the nature of the material and its exposure to a dangerous waste.

- Spent lubricating oils and paint waste from pumps, the dryer rotor, compressors, blowers, and general maintenance activities
- Spent filter media and process filters
- Spent ion exchange resin
- HEPA filters
- UV light tubes
- RO membranes
- Equipment that cannot be returned to service
- Other miscellaneous waste that might contact a dangerous waste (e.g., plastic sheeting, glass, rags, paper, waste solvent, or aerosol cans).

These waste streams are stored at 200 Area ETF before being transferred for final treatment, storage, or disposal as appropriate. This waste is characterized and designated using knowledge (from previously determined influent aqueous waste composition information); analytical data; and material safety data sheets (MSDS) of the chemical products present in the waste or used (the data sheets are maintained at 200 Area ETF). Sampling of these waste streams is not anticipated; however, if an unidentified or unlabeled waste is discovered, that waste is sampled. This 'unknown' waste is sampled and analyzed for the parameters in Table B.5 as appropriate, and will be designated according to Washington state regulatory requirements. The specific analytical methods for these analyses are provided in Section B.9.

B.6.3 Other Waste Generated at the 200 Area Effluent Treatment Facility

There are two other potential sources of waste at 200 Area ETF: spills and/or overflows, and discarded chemical products. Spills may be subject to the requirements of Permit Condition II.E. Spilled material that potentially might be dangerous waste generally is either containerized or routed to 200 Area ETF sumps where the material is transferred either to the surge tank for treatment or to the secondary treatment train. In most cases, knowledge and the use of MSDSs are sufficient to designate the waste material. If the source of the spilled material is unknown and the material cannot be routed to 200 Area ETF sumps, a sample of the waste is collected and analyzed according to Table B.5, as necessary, for appropriate characterization of the waste. Unknown wastes will be designated according to Washington State regulatory requirements at WAC 173-303-070. The specific analytical methods for these analyses are provided in Section B.9.

A discarded chemical product waste stream could be generated if process chemicals, cleaning agents, or maintenance products become contaminated or are otherwise rendered unusable. In all cases, these materials are appropriately containerized and designated. Sampling is performed, as appropriate, for waste designation.

Table B.5. 200 Area Effluent Treatment Facility Generated Waste - Sampling and Analysis

Parameter[1]	Rationale
• Total solids or percent water[2]	• Calculate dry weight concentrations
• Volatile organic compounds[3]	• LDR - verify treatment standards
• Semivolatile organic compounds[3]	• LDR - verify treatment standards
• Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver)	• Waste designation • LDR - verify treatment standards
• Cation and anions of concern	• Address receiving TSD unit waste acceptance requirements
• pH	• Waste designation

1 For influent and concentrate tank samples, the total sample (solid plus liquid) is analyzed and the analytical result is expressed on a dry weight basis. The result for toxicity characteristic metal and organic is divided by a factor of 20 and compared to the toxicity characteristic (TC) constituent limits [WAC 173-303-090(8)]. If the TC limit is met or exceeded, the waste is designated accordingly. All measured parameters are compared against the corresponding treatment standards.

2 Total solids or percent water are not determined for unknown waste and dry powder waste samples and are analyzed in maintenance waste and sludge samples, as appropriate (i.e., percent water might not be required for such routine maintenance waste as aerosol cans, fluorescent tubes, waste oils, batteries, etc., or sludge that has dried).

3 VOC and/or SVOC analysis of secondary waste is required unless influent characterization data and knowledge indicate that the constituent will not be in the final secondary waste at or above the LDR.

LDR = land disposal restrictions

TSD = treatment, storage, and/or disposal

B.7 QUALITY ASSURANCE/QUALITY CONTROL

The following quality assurance/quality control (QA/QC) plan for LERF and 200 Area ETF is provided as required by WAC 173-303-810(6) and follows the guidelines of EPA QA/G-5.

B.7.1 Project Management

The following sections address project administrative functions and approaches.

B.7.1.1 Project Organization

Overall management of the LERF/200 Area ETF is performed by the Facility Manager, who is responsible for safe operation of the facility, including implementation of this QA/QC plan and compliance with applicable permits and regulations. The Facility Manager also provides retention of project records in accordance with this plan. Assisting the Facility Manager is an Environmental Compliance Officer (ECO) that monitors compliance, reviews new requirements and regulations, and interfaces with EPA and Ecology. Also assisting the Facility Manager is a QA representative who is responsible for implementing the QA program at the facility.

Reporting to the Facility Manager are several support groups. The Operations group consists of trained personnel who operate the plant, including operators performing sampling activities such as collection, packaging, and transportation of samples to the laboratory. The Maintenance group is responsible for performing calibrations and preventative maintenance on facility equipment, including pH, conductivity, and flow meters required by environmental permits. The Engineering group monitors the process with online instruments and sampling for process control. The Engineering group also performs waste acceptance, and environmental compliance activities, including scheduling sampling, generating data forms, and reviewing data.

B.7.1.2 Special Training

Individuals involved in sampling, analysis, and data review will be trained and qualified to implement safely the activities addressed in this WAP and QA/QC plan. Training will conform to the training requirements specified in WAC 173-303-330 and the LERF/200 Area ETF Dangerous Waste Training Plan (Addendum F). Training records will be maintained in accordance with Section B.7.1.3 of this WAP.

B.7.1.3 Documentation and Records

Sample records are documented as part of the Hanford Facility Operating Record, LERF and 200 Area ETF File pursuant to Permit Condition II.I. These documents and records include the following:

- Training
- Chains of Custody for all regulatory sampling performed by LERF and 200 Area ETF
- Data Summary Reports
- QA/QC reports
- Assessment reports
- Instrument inspection, maintenance, and calibration logs

B.7.2 Data Quality Parameters and Criteria

Data quality parameters are listed by EPA QA/G-5S, *Guidance for Choosing a Sampling Design for Environmental Data Collection* as:

- Purpose of Data Collection (e.g. determining if a parameter exceeds a threshold level)
- Spatial and Temporal Boundaries of Study
- Preliminary Estimation of Sample Support (volume that each sample represents)
- Statistical Parameter of Interest (e.g. mean, percentile, percentage), and
- Limits on Decision Error/Precision (e.g. false acceptance error, false rejection error)

The parameters for the first four bullets (limits, sample points, frequency of samples, etc.) are already established in the permits, delisting petition, and this WAP. The focus of this QA/QC plan is on limits on decision error/precision.

The data quality parameters were chosen to ensure Limits on Decision Error/Precision are appropriate for purposes of using the data to demonstrate compliance with permits, delisting exclusion limits, and this WAP. The principal quality parameters are precision, accuracy, representativeness, comparability, and completeness. Secondary data parameters of importance include sensitivity and detection levels. The data quality parameters and the data acceptance criteria are discussed below.

B.7.2.1 Precision

Precision is a measure of agreement among replicate measurements of the same property, under prescribed similar conditions. Precision is expressed in terms of the relative percent difference (RPD) for duplicate measurements. QA/QC sample types that test precision include field and laboratory duplicates and spike duplicates. The RPDs for laboratory duplicates and/or matrix spike duplicates will be routinely calculated.

$$\text{RPD} = (100)\,\textit{absolute value of}\left(\frac{\text{sample result} - \text{duplicate sample result}}{\text{average of sample result} + \text{duplicate sample result}}\right)$$

Matrix spike duplicates are replicates of matrix spike samples that are analyzed with every analytical batch that contains an ETF treated effluent sample. The precision of the analytical methods are estimated from the results of the matrix spike (MS) and the matrix spike duplicate (MSD) for selected analytes. Matrix spike analyses cannot be performed for certain analytical methods, including conductivity, pH, and total dissolved solids. Duplicate analyses are used to determine the RPD for these methods. The precision acceptance criteria are specified in Table B.6.

B.7.2.2 Accuracy

Accuracy assesses the closeness of the measured value to an accepted reference value. Accuracy of analytical results is typically assessed using matrix spikes. A matrix spike is the addition of a known amount of the analyte to the sample matrix being analyzed. Accuracy is expressed as a percent recovery of the spiked samples.

$$\text{Percent Recovery} = 100 \left(\frac{\text{matrix spike sample result} - \text{sample result}}{\text{spiked amount}}\right)$$

Matrix spike analyses cannot be performed on certain analytical methods, including conductivity, pH, and total dissolved solids. The percent recovery for the laboratory control standard samples demonstrates that these methods are working properly and gives an estimate of the method's accuracy. The percent recovery will be routinely calculated.

Accuracy criteria are established to provide confidence that the result is below the action level. Therefore the closer the result is to the action level the higher the degree of accuracy needed. The upper and lower accuracy acceptance criteria are specified in Table B.6. The criteria are reasonable values based on previous analysis of constituents in the delisting exclusion, or similar constituents.

B.7.2.3 Representativeness

Representativeness expresses the degree to which data accurately and precisely represent selected characteristics of a parameter at a sampling point or process condition. Because of the matrix being analyzed, dilute aqueous solution, it is not expected that representativeness will be of concern, except when there are potential for changes to process conditions such as the facility influent concentrations or waste processing strategy. Sampling due to these changes in process conditions is addressed in Section B.6.1.3 of this WAP.

The representativeness of a sample may be compromised by the presence of contaminants introduced in the field or the laboratory. To determine if contamination may be present, a blank sample of reagent water is analyzed. A method blank is performed by the laboratory on every batch of 20 samples being analyzed at the same time. The presence of a constituent in the sample and the blank sample indicates contamination has occurred.

B.7.2.4 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system, expressed as a percentage of the number of valid measurements that were planned to be collected. Lack of completeness is sometimes caused by loss of a sample, loss of data, or inability to collect the planned number of samples. Incompleteness also occurs when data are discarded because they are of unknown or unacceptable quality. Since most regulatory sampling events performed by LERF/200 Area ETF involve a single sample, all analysis must be complete and valid.

B.7.2.5 Comparability

Comparability is the confidence with which one data set can be compared to another. Comparability is achieved by using sampling and analytical techniques, which provide for measurements that are consistent and representative of the media and conditions measured. In laboratory analysis, the term comparability focuses on method type, holding times, stability issues, and aspects of overall analytical quantitation.

B.7.2.6 Sensitivity and Detection Levels

Sensitivity is the measure of the concentration at which an analytical method can positively identify and report analytical results. Sensitivity represents the maximum value for a detection level that will reasonably assure the results are below the established limits. The analytical method selected by LERF/200 Area ETF should have a detection level for each constituent that is below the sensitivity. The preferred detection level is the practical quantitation limit (PQL), which is lowest concentration that can be reliably measured during routine laboratory conditions. If the method PQL cannot meet the sensitivity for some constituents, the minimum concentration or attribute that can be measured by a method (method detection limit) or by an instrument (instrument detection limit) may be used. The sensitivity levels, specified in Table B.6, are derived from the delisting limits, water discharge limits, and uncertainty values, which are based on the required precision and accuracy for each constituent.

B.7.3 Data Generation and Acquisition

The following section addresses QA requirements for data generation and acquisition.

B.7.3.1 Sampling Method

LERF/200 Area ETF samples required by the permits and delisting are collected as grab samples. Sampling for the purpose of waste designation of secondary waste is performed using grab, composite, thief, scoop, or composite liquid waste sampler (COLIWASA). The selection of the sample collection device depends on the type of sample, the sample container, the sampling location, and the nature and distribution of the waste components. In general, the methodologies used for specific materials correspond to those referenced to WAC 173-303-110(2). The selection and use of the sampling device is supervised or performed by a person thoroughly familiar with the sampling requirements.

The following protocol applies to all sampling methods:

- All containers will be filled within as short a time period as reasonably achievable.
- Volatile Organic Analysis (VOA) sample containers will be filled first, and prior to any subdividing of a composited sample.
- VOA samples consisting of a set of two or more sample containers will be filled sequentially. The sample containers are considered equivalent and given identical sampling times.
- All VOA sample containers must have no headspace and be free of trapped air bubbles.
- Grab sample protocol includes:
- Sample lines should be as short as reasonably achievable and free of traps and pockets in which solids might settle.
- The sample line should be flushed before sampling with a minimum volume equivalent to three times the sample line volume.
- Contamination to the sample from contact with the internal and external surfaces of the tap should be minimized.

Thief and COLIWASA samplers are used to sample liquid waste containers such as drums. Scoop samplers are used to sample powder waste generated in the thin-film dryer. Sample requirements for these samples include:

- Thief or COLIWASA sampler, the sampler should be lowered into the liquid slowly so the level of the liquid inside and outside the sampler tube remain about the same.
- When lifting the thief or COLIWASA sampler from the solution, the outside should be wiped down, or the excess water allowed to drip off, before filling the sample container.

B.7.3.2 Sample Handling, Custody, and Shipping

The proper handling of sample bottles after sampling is important to ensure the samples are free of contamination and to demonstrate the samples have not been tampered with.

B.7.3.2.1 Chain-of-Custody

Evidence of collection, shipment, receipt at the laboratory, and laboratory custody until disposal will be documented using a chain-of-custody form. The chain-of-custody form will, as a minimum identify sample identification number, sampling date and time, sampling location, sample bottle type and number, analyses to be performed, and preservation method.

The operations person who signs as the collector on the chain of custody is the first custodian of the samples. A custodian must maintain continuous custody of sample containers at all times from the time the sample is taken until delivery to the laboratory or until delivery to a common carrier for shipment to an off-site location. Custody is maintained by any of the following:

- The custodian has the samples in view, or has placed the samples in locked storage, or keeps the samples within a secured area (e.g., controlled by authorized personnel only), or has applied a tamper-indicating device, such as evidence tape, to the sample containers or shipping containers.
- The custodian has taken physical possession of the samples or the shipping containers sealed with an intact tamper-indicating device, such as evidence tape.

B.7.3.2.2 Sample Preservation, Containers, and Holding Time

Table B.6 lists the sample container, preservation method, and holding time requirements for different types of analyses. These parameters are based on the requirements of 40 CFR 136, Table II.

B.7.3.3 Instrument Calibration and Preventive Maintenance

LERF/200 Area ETF uses instruments to monitor operations and meet regulatory requirements. This includes continuous pH and conductivity monitors required by facility permits and delisting. All instruments are calibrated according to frequencies and tolerances established by the LERF/200 Area ETF engineering group. Calibrations and other maintenance actions are scheduled and tracked by LERF/200 Area ETF maintenance group using a preventive maintenance database. Measuring and test equipment used for instrument calibration is controlled, calibrated at specified intervals, and maintained to establish accuracy limits.

B.7.4 Assessment and Oversight

Quality programs can only be effective if meaningful assessments are performed to monitor and respond to issues associated with program performance. Routine assessment of data is performed as part of the validation process discussed in Section B.7.5.1.

B.7.4.1 Assessments and Response

Management assessments are conducted by first line management and subject matter experts, focusing on procedural adequacy, compliance, and overall effectiveness of the program. Management assessments of the sample program typically include the LERF and 200 Area ETF QA representative. Each management assessment has a performance objective or lines of inquiry. Examples may include personnel training, proper performance of sample custody, or completeness of sampling records.

B.7.4.2 Reports to Management

Results of performance assessments, including any issues identified, are provided to the LERF and 200 Area ETF Facility Manager in a written report. The Facility Manager is responsible to correct all findings from the report.

B.7.5 Verification and Validation of Analytical Data

The data verification and validation processes will ensure that the data resulting from the selected analytical method are consistent with requirements specified in this QA/QC plan.

B.7.5.1 Data Verification

The primary data reporting will be by electronic data systems. Data verification will be performed on laboratory data packages that support environmental compliance to ensure that their content is complete and in order. A review of the data package will be performed to ensure that:

- The data package contains the required technical information

- Deficiencies are identified and documented
- Identified deficiencies are corrected by the laboratory and the appropriate revisions are made
- Deficient pages are replaced with the laboratory corrections
- A copy of the completed verification report is placed in the data file

B.7.5.2 Data Validation

Data validation ensures that the data resulting from analytical measurements meet the quality requirements specified in the QA/QC plan. Data validation will be performed on data packages that support environmental compliance.

The following are included in data validation:

- Chain-of-Custody – Verify the COC shows unbroken custody from sampling through receipt at the laboratory.
- Request analysis – Review the sample results to verify the requested analysis was performed. If an alternate method was used, verify permit-required detection limits were met.
- Holding times – Review the sample results to verify the analyses were performed within required holing times and where applicable, extraction times.
- Blank – Review the results of trip, field, and equipment blank samples to verify the sample results are not compromised by contamination.
- Laboratory QC – Verify the laboratory QC was completed and there are no outstanding problems

B.8 REFERENCES

DOE/RL-92-72, *200 Area Effluent Treatment Facility Delisting Petition*, Revision 1, 1993, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Ecology, 1996b, *The Washington State Department of Ecology (Ecology) Regulatory Interpretation of the Liquid Effluent Retention Facility (LERF) Land Disposal Restriction Exemption*, letter from Washington State Department of Ecology to T. Teynor, U.S. Department of Energy and A. DiLiberto, Westinghouse Hanford Company, September 9, 1996.

Ecology, 2000, *Washington State Waste Discharge Permit* (No. ST 4500), as amended, for 200 Area Effluent Treatment Facility, Hanford Facility, Washington State Department of Ecology, Olympia, Washington, August 1, 2000.

EPA, 1983, *Methods for Chemical Analysis of Water Wastes*, EPA-600/4-79/020, (as amended), National Exposure Research Laboratory, Cincinnati, Ohio

EPA, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods, SW-846* (Third Edition, as amended), U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

EPA, 1994, *Liquid Effluent Retention Facility (LERF) Land Disposal Restrictions Treatment Exemption-Regulatory Interpretation EPA/Ecology ID No: WA7890008967*, letter from U.S. Environmental Protection Agency, Region 10 to J. Hennig, U.S. Department of Energy, December 6, 1994.

EPA, 2005, 200 Area ETF Delisting [Exclusion], issued to U.S. Department of Energy, 40 CFR 261, Appendix IX, Table 2 (70 FR 44496, August 3, 2005), U.S. Environmental Protection Agency, Washington, D.C.

B.9 ANALYTICAL METHODS, SAMPLE CONTAINERS, PRESERVATIVE METHODS, AND HOLDING TIMES

Table B.6. Sample and Analysis Criteria for Influent Aqueous Waste and Treated Effluent

Parameter	Analytical Method[1]	Method PQL Sensitivity[2]	Accuracy/ Precision for Method[3] (percent)	Sample container[4]/ Preservative[4]/ Holding time[5]
VOLATILE ORGANIC COMPOUNDS				
Acetone	SW-846 8260	40	60-120 / 20	Sample container 3 x 40-mL amber glass with septum Preservative HCl to pH<2; 4°C Holding time 14 days
Acetonitrile		820	60-120 / 20	
Benzene		5	60-120 / 20	
1-Butanol		1600	60-120 / 20	
Carbon Disulfide		1500	60-120 / 20	
Carbon tetrachloride		5	60-120 / 20	
Chloroform		5	50-130 / 20	
Methylene chloride		5	50-150 / 20	
Tetrachloroethylene		5	65-140 / 20	
Tetrahydrofuran		100	60-120 / 20	
SEMIVOLATILE ORGANIC COMPOUNDS				
Acetophenone	SW-846 8270	10	70-110 / 25	Sample container 4 x 1-liter amber glass Preservative 4°C Holding time 7 days for extraction; 40 days for analysis after extraction
Carbazole		110	50-120 / 25	
p-Chloroaniline		76	50-120 / 25	
Chrysene		350	50-120 / 25	
Cresol (o, p, m)		760	50-120 / 25	
Di-n-octyl phthalate		300	50-120 / 25	
Diphenylamine		350	50-120 / 25	
Hexachlorobenzene		2	50-120 / 25	
Hexachlorocyclopentadiene		110	50-120 / 25	
Isophorone		2600	50-120 / 25	
Lindane (gamma-BHC)		1.9	50-120 / 25	
N-nitrosodimethylamine		12	50-120 / 25	
Pyridine		15	50-120 / 25	
Tributyl phosphate		76	50-120 / 25	
2.4.6-Trichlorophenol		230	50-120 / 25	

Table B.6. Sample and Analysis Criteria for Influent Aqueous Waste and Treated Effluent

Parameter	Analytical Method[1]	Method PQL Sensitivity[2]	Accuracy/ Precision for Method[3] (percent)	Sample container[4]/ Preservative[4]/ Holding time[5]
POLYCHLORINATED BIPHENYLs (PCBs)				
Aroclor-1016	SW-846 8082	0.4	50-110 / 25	Sample container 4 x 1-liter amber glass Preservative 4°C Holding time 1 year for extraction; 1 year for analysis after extraction
Aroclor-1221		0.4	50-110 / 25	
Aroclor-1232		0.4	50-110 / 25	
Aroclor-1242		0.4	50-110 / 25	
Aroclor-1248		0.4	50-110 / 25	
Aroclor-1254		0.4	50-110 / 25	
Aroclor-1260		0.4	50-110 / 25	
TOTAL METALS				
Arsenic	EPA-600 200.8	11	70-130 / 20	Sample container 1 x 0.5-liter plastic/glass Preservative 1:1 HNO_3 to pH<2 Holding time 180 days; mercury 28 days
Cadmium		5	70-130 / 20	
Chromium		20	70-130 / 20	
Copper		70	70-130 / 20	
Lead		10	70-130 / 20	
Mercury		2	70-130 / 20	
Selenium		20	70-130 / 20	
Barium	SW-846 6010/ EPA-600 200.7	1200	75 - 125 / 20	
Beryllium		34	75 - 125 / 20	
Calcium		200	75 - 125 / 20	
Iron		100	75 - 125 / 20	
Magnesium		400	75 - 125 / 20	
Nickel		340	75 - 125 / 20	
Potassium		10,000	75 - 125 / 20	
Silicon		580	75 - 125 / 20	
Silver		83	75 - 125 / 20	
Sodium		2500	75 - 125 / 20	
Vanadium		120	75 - 125 / 20	
Zinc		5100	75 - 125 / 20	

Table B.6. Sample and Analysis Criteria for Influent Aqueous Waste and Treated Effluent

Parameter	Analytical Method[1]	Method PQL Sensitivity[2]	Accuracy/ Precision for Method[3] (percent)	Sample container[4]/ Preservative[4]/ Holding time[5]
GENERAL CHEMISTRY				
Chloride	EPA-600 300.0	1000	70-130 / 20	Sample container 1 x 60-mL plastic/glass Preservative 4°C Holding time 28 days; nitrate and nitrite 48 hours
Fluoride		880	70-130 / 20	
Formate		1250	70-130	
Nitrate (as N)		100	70-130 / 20	
Nitrite (as N)		100	70-130 / 20	
Phosphate		1500	70-130 / 20	
Sulfate		10,000	70-130 / 20	
Ammonia (as N)	EPA-600, 300.7	40	70-130 / 20	Sample container 1 x 50-mL glass or plastic Preservative H_2SO_4 to pH<2; 4°C Holding time 28 days
Cyanide	EPA-600 335.2/335.3	350	70-130 / 20	Sample container 1 x 250-mL glass or plastic Preservative NaOH to pH>12; 4°C Holding time 14 days
Alkalinity	EPA-600 310.1/310.2	ND	ND	Sample container 1 x 50-mL glass or plastic Preservative 4°C Holding time 14 days
Total dissolved solids	EPA-600 160.1	ND	ND	Sample container 1 x 500-mL glass or plastic Preservative 4°C Holding time 7 days
Total suspended solids	EPA-600 160.2	ND	ND	Sample container 1 x 1-L glass or plastic Preservative 4°C Holding time 7 days

Table B.6. Sample and Analysis Criteria for Influent Aqueous Waste and Treated Effluent

Parameter	Analytical Method[1]	Method PQL Sensitivity[2]	Accuracy/ Precision for Method[3] (percent)	Sample container[4]/ Preservative[4]/ Holding time[5]
Specific conductivity	EPA-600 120.1 (in lab)	ND	ND	<u>Sample container</u> 1 x 50-mL glass or plastic <u>Preservative</u> 4°C <u>Holding time</u> 28 days
pH[7]	EPA-600 150.1	ND	ND	<u>Sample container</u> 1 x 60-mL glass or plastic <u>Preservative</u> None <u>Holding time</u> Analyze immediately
Total organic carbon	SW-846 9060	ND	ND	<u>Sample container</u> 1 x 250-mL amber glass <u>Preservative</u> H_2SO_4 to pH<2; 4°C <u>Holding time</u> 28 days

[1]SW-846 or EPA-600 methods are presented unless otherwise noted. Other methods might be substituted if the applicable PQL can be met.
[2]ST-4500 required method PQL or Delisting Exclusion condition 2 report sensitivity/detection level, whichever is lower. Units are parts per billion unless otherwise noted.
[3]Accuracy/precision used to confirm or re-establish MDL
[4]Sample bottle, volumes, and preservatives could be adjusted, as applicable, for safety reasons
[5]Holding time = time between sampling and analysis
[7]pH monitored in influent aqueous waste only

L = liter
mL = milliliter
NA = not applicable
ND = not determined
MDL = method detection level
PQL = practical quantitation limit
RL = reporting limit

Table B.7. Sample Containers, Preservative Methods, and Holding Times for 200 Area ETF Generated Waste

Parameter	Analytical Method	Method PQL	Accuracy/ Precision for Method (percent)	Sample container[1]/ Preservative[1]/ Holding time[2]
Liquid Matrix				
For methods other than total solids, analyze using the methods and QA/QC in Table B.6. For each method, analyze the target compound list				
Total solids	EPA-600 160.3	ND	ND	Sample container 1 x 500-mL glass or plastic Preservative – 4°C Holding time –7 days
Solid Matrix				
Volatile organic compounds (combined method target compound lists)	SW-846 8260	Refer to Table B.6	Refer to Table B.6	Sample container 1 x 40-mL amber glass with septum Preservative –4°C Holding time –14 days
Semivolatile organic compounds (method target compound list)	SW-846 8270	Refer to Table B.6	Refer to Table B.6	Sample container 1 x 125-mL amber glass Preservative –4°C Holding time –14 days for extraction; 40 days for analysis after extraction
PCBs (method target compound list)	SW-846 8082	Refer to Table B.6	Refer to Table B.6	Sample container Amber glass – 50 g of sample Preservative –4°C Holding time –1 year for extraction; 1 year for analysis after extraction
RCRA Metals (method target compound list)	EPA-600 200.8	Refer to Table B.6	Refer to Table B.6	Sample container glass or plastic – 10 g of sample Preservative –none, mercury 4°C Holding time –180 days; mercury 28 days
Total Metals (method target compound list)	SW-846 6010	Refer to Table B.6	Refer to Table B.6	
Anions (method target compound list)	EPA-600 300.0	Refer to Table B.6	Refer to Table B.6	Sample container glass or plastic –25 g of sample Preservative –none Holding time –6 months for extraction; 28 days for analysis after extraction, nitrate and nitrite 48 hours for analysis after extraction
Ammonia	EPA-600 300.7	Refer to Table B.6	Refer to Table B.6	Sample container glass or plastic – 25 g of sample Preservative –none Holding time –6 months for extraction; 28 days for analysis after extraction
pH	SW-846 9045	ND	ND	Sample container glass or plastic – 50 g of sample Preservative –none Holding time –none

Table B.7. Sample Containers, Preservative Methods, and Holding Times for 200 Area ETF Generated Waste

Parameter	Analytical Method	Method PQL	Accuracy/ Precision for Method (percent)	Sample container[1]/ Preservative[1]/ Holding time[2]
Toxicity Characteristic Leaching Procedure[3]	SW-846 1311	NA	NA	Sample container Refer to specific method being performed after TCLP – 125 g of sample Preservative –None (after TCLP, preserve extract per method being performed) Holding time –Metals: 180 days for TCLP extraction, mercury 28 days for TCLP extraction SVOA: 14 days for TCLP extraction (after TCLP, refer to specific methods for time for analysis after extraction)

[1] Sample bottle, volumes, and preservatives could be adjusted, as applicable, for safety reasons
[2] Holding time equals time between sampling and analysis
[3] Extraction procedure, as applicable; extract analyzed by referenced methods [WAC 173-303-110(3)(c)]

g = grams
NA = not applicable
PQL = practical quantitation limit
mL = milliliter
ND = not determined
TCLP = toxicity characteristic leaching procedure

Addendum C **Process Information**

C. PROCESS INFORMATION C.1
C.1 LIQUID EFFLUENT RETENTION FACILITY PROCESS DESCRIPTION C.1
C.2 EFFLUENT TREATMENT FACILITY PROCESS DESCRIPTION C.2
C.2.1 Load-In Station C.2
C.2.2 Effluent Treatment Facility Operating Configuration C.3
C.2.3 Primary Treatment Train C.3
C.2.4 Secondary Treatment Train C.5
C.2.5 Other Effluent Treatment Facility Systems C.7
C.3 CONTAINERS C.9
C.3.1 Description of Containers C.9
C.3.2 Container Management Practices C.10
C.3.3 Container Labeling C.10
C.3.4 Containment Requirements for Managing Containers C.10
C.4 TANK SYSTEMS C.12
C.4.1 Design Requirements C.12
C.4.2 Additional Requirements for New Tanks C.16
C.4.3 Secondary Containment and Release Detection for Tank Systems C.17
C.4.4 Tank Management Practices C.21
C.4.5 Labels or Signs C.23
C.4.6 Air Emissions C.24
C.4.7 Management of Ignitable or Reactive Wastes in Tanks Systems C.24
C.4.8 Management of Incompatible Wastes in Tanks Systems C.24
C.5 SURFACE IMPOUNDMENTS C.24
C.5.1 List of Dangerous Waste C.24
C.5.2 Construction, Operation, and Maintenance of Liner System C.25
C.5.3 Prevention of Overtopping C.32
C.5.4 Structural Integrity of Dikes C.32
C.5.5 Piping Systems C.34
C.5.6 Double Liner and Leak Detection, Collection, and Removal System C.35
C.5.7 Construction Quality Assurance C.36
C.5.8 Proposed Action Leakage Rate and Response Action Plan C.36
C.5.9 Dike Structural Integrity Engineering Certification C.36
C.5.10 Management of Ignitable, Reactive, or Incompatible Wastes C.37
C.6 AIR EMISSIONS CONTROL C.37
C.6.1 Applicability of Subpart AA Standards C.37
C.6.2 Process Vents - Demonstrating Compliance C.37
C.6.3 Applicability of Subpart CC Standards C.38
C.7 ENGINEERING DRAWINGS C.39
C.7.1 Liquid Effluent Retention Facility C.39
C.7.2 200 Area Effluent Treatment Facility C.40

Figures

Figure C.1. Liquid Effluent Retention Facility Layout C.47
Figure C.2. Plan View of the 200 Area Effluent Treatment Facility C.48
Figure C.3. 200 Area Effluent Treatment Facility Layout C.49
Figure C.4. 200 Area Effluent Treatment Facility C.50
Figure C.5. Example - 200 Area Effluent Treatment Facility Configuration 1 .... C.51
Figure C.6. Example - 200 Area Effluent Treatment Facility Configuration 2 .... C.52
Figure C.7. Surge Tank C.53
Figure C.8. Ultraviolet Light/Oxidation Unit C.54
Figure C.9. Reverse Osmosis Unit C.55
Figure C.10. Ion Exchange Unit C.56
Figure C.11. Verification Tanks C.57
Figure C.12. Effluent Treatment Facility Evaporator C.58
Figure C.13. Thin Film Dryer C.59
Figure C.14. Container Handling System C.60
Figure C.15. Effluent Treatment Facility Sump Tanks C.61
Figure C.16. Liner Anchor Wall and Cover Tension System C.62
Figure C.17. Liner System Schematic C.63
Figure C.18. Detail of Leachate Collection Sump C.64

Tables

Table C.1. Liquid Effluent Retention Facility Containment System C.40
Table C.2. Liquid Effluent Retention Facility Piping and Instrumentation C.40
Table C.3. Effluent Treatment Facility and Load-In Station Secondary Containment Systems C.40
Table C.4. Major Process Units and Tanks at the Effluent Treatment Facility and Load-In Station C.41
Table C.5. 200 Area Effluent Treatment Facility Tank Systems Information C.42
Table C.6. 200 Area Effluent Treatment Facility Additional Tank System Information C.43
Table C.7. Ancillary Equipment and Material Data C.44
Table C.8. Concrete and Masonary Coatings C.45
Table C.9. Geomembrane Material Specifications C.45
Table C.10. Drainage Gravel Specifications C.46

C. PROCESS INFORMATION

This addendum provides a detailed discussion of the LERF and 200 Area ETF processes and equipment. The LERF and 200 Area ETF comprise an aqueous waste treatment system located in the 200 East Area that provides storage and treatment for a variety of aqueous mixed waste. This aqueous waste includes process condensate from the 242-A Evaporator and other aqueous waste generated from onsite remediation and waste management activities.

The LERF consists of three lined surface impoundments, or basins. Aqueous waste from LERF is pumped to the200 Area ETF for treatment in a series of process units, or systems, that remove or destroy essentially all of the dangerous waste constituents. The treated effluent is discharged to a State-Approved Land Disposal Site (SALDS) north of the 200 West Area, under the authority of a Washington State Waste Discharge Permit (Ecology 2000) and the Final Delisting (40 CFR 261, Appendix IX, Table 2).

C.1 LIQUID EFFLUENT RETENTION FACILITY PROCESS DESCRIPTION

Each of the three LERF basins has an operating capacity of 29.5-million liters. The LERF receives aqueous waste through several inlets including the following:

- A pipeline that connects LERF with the 242-A Evaporator
- A pipeline from the 200 West Area
- A pipeline that connects LERF to the Load-In Station at the 200 Area ETF
- A series of sample ports located at each basin.

Figure C.1 presents a general layout of LERF and associated pipelines. Aqueous waste from LERF is pumped to the 200 Area ETF through one of two double-walled fiberglass transfer pipelines. Effluent from the 200 Area ETF also can be transferred back to the LERF through one of these transfer pipelines. These pipelines are equipped with leak detection located in the annulus between the inner and outer pipes. In the event that these leak detectors are not in service, the pipelines are visually inspected during transfers for leakage by opening the secondary containment drain lines located at the 200 Area ETF end of the transfer pipelines.

Each basin is equipped with six available sample risers constructed of 6-inch perforated pipe. A seventh sample riser in each basin is dedicated to influent aqueous waste receipt piping (except for aqueous waste received from the 242-A Evaporator), and an eighth riser in each basin contains liquid level instrumentation. Each riser extends along the sides of each basin from the top to the bottom of the basin and allows samples to be collected from any depth. Personnel access to these sample ports is from the perimeter area of the basins.

A catch basin is provided at the northwest corner of each LERF basin for aboveground piping and manifolds for transfer pumps. Aqueous waste from the 242-A Evaporator is transferred through piping which ties into piping at the catch basins. Under routine operations, a submersible pump is used to transfer aqueous waste from a LERF basin to the 200 Area ETF for processing or for basin-to-basin transfers. This pump is connected to a fixed manifold on one of four available risers.

Each basin consists of a multilayer liner system supported by a concrete anchor wall around the basin perimeter and a soil-bentonite clay underlayment. The multilayer liner system consists of a primary liner in contact with the aqueous waste, a layer of bentonite carpet, a geonet, a geotextile, a gravel layer, and a secondary liner that rests on the bentonite underlayment. Any aqueous waste leakage through the primary liner flows through the geonet and gravel to a leachate collection system. The leachate flows to a sump at the northwest corner of each basin, where the leachate is pumped up the side slope and back into the basin above the primary liner. Each liner is constructed of high-density polyethylene. A floating cover made of very low-density polyethylene is stretched over each basin above the primary liner. These covers serve to keep unwanted material from entering the basins, and to minimize evaporation of the liquid contents.

C.2 EFFLUENT TREATMENT FACILITY PROCESS DESCRIPTION

The 200 Area ETF is designed as a flexible treatment system that provides treatment for contaminants anticipated in process condensate and other onsite aqueous waste. The design influent flow rate into the 200 Area ETF is approximately 570 liters per minute, with planned outages for activities such as maintenance on the 200 Area ETF systems. Maintenance outages typically are scheduled between treating a batch of aqueous waste, referred to as treatment campaigns. The effluent flow (or volume) is equivalent to the influent flow (or volume).

The 200 Area ETF generally receives aqueous waste directly from the LERF. However, aqueous waste also can be transferred from tanker trucks at the Load-In Station to the 200 Area ETF and from containers (e.g., carboys, drums) directly to ETF. Aqueous waste is treated and stored in the 200 Area ETF process areas in a series of tank systems, referred to as process units. Within the ETF, waste also is managed in containers through treatment and/or storage. Figure C.2 provides the relative locations of the process and container storage areas within the ETF.

The process units are grouped in either the primary or the secondary treatment train. The primary treatment train provides for the removal or destruction of contaminants. Typically, the secondary treatment train processes the waste by-products from the primary treatment train by reducing the volume of waste. In the secondary treatment train, contaminants are concentrated and dried to a powder. The liquid fraction is routed to the primary treatment train. Figure C.3 provides an overview of the layout of the ETF, 2025E Building). Figure C.4 presents the 200 Area ETF floor plan, the relative locations of the individual process units and associated tanks within the ETF, and the location of the Load-In Station.

The dry powder waste and maintenance and operations waste are containerized and stored or treated in the container storage areas or in collection or treatment areas within the Process Area. Secondary containment is provided for all containers and tank systems (including ancillary equipment) housed within the ETF. The trenches and floor of the 200 Area ETF comprise the secondary containment system. The floor includes approximately a 15.2-centimeter rise (berm) along the containing walls of the process and container storage areas. Any spilled or leaked material from within the process area or container storage area is collected into trenches that feed into either sump tank 1 or sump tank 2. From these sump tanks, the spilled or leaked material (i.e., waste) is fed to either the surge tank and processed in the primary treatment train or the secondary waste receiving tanks and processed in the secondary treatment train. All tank systems outside of the 200 Area ETF are provided with a secondary containment system.

In the following sections, several figures are provided that present general illustrations of the treatment units and the relation to the process.

C.2.1 Load-In Station

The 200 Area ETF receives aqueous waste from LERF or the Load-In Station. The 200 Area ETF Load-In Station, located due east of the surge tank and outside of the perimeter fence (Figure C.4), was designed and constructed to provide the capability to unload, store, and transfer aqueous waste to the LERF or 200 Area ETF from tanker trucks and other containers (such as drums). The Load-In Station consists of two truck bays equipped with load-in tanks, transfer pumps, filtration system, level instrumentation for tanker trucks, leak detection capabilities for the containment basin and transfer line, and an underground transfer line that connects to lines in the surge tank berm, allowing transfers to either the 200 Area ETF surge tank or LERF. The Load-In Station is covered with a steel building for weather protection. Tanker trucks and other containers are used to unload aqueous waste at the Load-In Station. To perform unloading, the tanker truck is positioned on a truck pad, a 'load-in' transfer line is connected to the truck, and the tanker contents are pumped into one of the Load-In Station tanks, the surge tank, or directly to the LERF. For container unloading, the container is placed on the truck pad and the container contents are pumped into one of the Load-In Station tanks, the surge tank, or directly to the LERF.

During unloading operations, solids may be removed from the waste by pumping the contents of the tanker truck or container through a filtration system. If solids removal is not needed, the filtration system is not used and the solution is transferred directly to the Load-In Station tanks, surge tank, or to LERF.

Any leaks at the Load-In Station drain to the sump. A leak detector in the sump alarms locally and in the 200 Area ETF control room. Alternatively, leaks can be visually detected.

C.2.2 Effluent Treatment Facility Operating Configuration

Because the operating configuration of the 200 Area ETF can be adjusted or modified, most aqueous waste streams can be effectively treated to below Delisting and Discharge Permit limits. The operating configuration of the 200 Area ETF depends on the unique chemistry of an aqueous waste stream(s). Before an aqueous waste stream is accepted for treatment, the waste is characterized and evaluated. Information from the characterization is used to adjust the treatment process or change the configuration of the 200 Area ETF process units, as necessary, to optimize the treatment process for a particular aqueous waste stream.

Typically, an aqueous waste is processed first in the primary treatment train, where the 200 Area ETF is configured to process an aqueous waste through the UV/OX unit first, followed by the RO unit. However, under an alternate configuration, an aqueous waste could be processed in the RO unit first. For example, high concentrations of nitrates in an aqueous waste might interfere with the performance of the UV/OX. In this case, the 200 Area ETF could be configured to process the waste in the RO unit before the UV/OX unit.

The flexibility of the 200 Area ETF also allows some aqueous waste to be processed in the secondary treatment train first. For example, for small volume aqueous waste with high concentrations of some anions and metals, the approach could be to first process the waste stream in the secondary treatment train. This approach would prevent premature fouling or scaling of the RO unit. The liquid portion (i.e., untreated overheads from the 200 Area ETF evaporator and thin film dryer) would be sent to the primary treatment train.

Figure C.5 and Figure C.6 provide example process flow diagrams for two different operating configurations.

C.2.3 Primary Treatment Train

The primary treatment train consists of the following processes:

- Influent Receipt/Surge tank - inlet, surge capacity
- Filtration - for suspended solids removal
- UV/OX - organic destruction
- pH adjustment - waste neutralization
- Hydrogen peroxide decomposition - removal of excess hydrogen peroxide
- Degasification - removal of carbon dioxide
- RO - removal of dissolved solids
- IX - removal of dissolved solids
- Verification - holding tanks during verification

Influent Receipt/Surge Tank. Depending on the configuration of the ETF, the surge tank is one inlet used to feed an aqueous waste into the 200 Area ETF for treatment. In Configuration 1 (Figure C.5), the surge tank is the first component downstream of the LERF. The surge tank provides a storage/surge volume for chemical pretreatment and controls feed flow rates from the LERF to the 200 Area ETF. However, in Configuration 2 (Figure C.6), aqueous waste from LERF is fed directly into the treatment units. In this configuration, the surge tank receives aqueous waste, which has been processed in the RO units, and provides the feed stream to the remaining downstream process units. In yet another configuration, some small volume aqueous waste could be received into the secondary treatment train first for processing. In this case, the aqueous waste would be received directly into the secondary waste receiving tanks. Finally, the surge tank also receives waste extracted from various systems within the primary and secondary treatment train while in operation.

The surge tank is located outside the 200 Area ETF on the south side. In the surge tank (Figure C.7), the pH of an aqueous waste is adjusted using the metered addition of sulfuric acid and sodium hydroxide, as necessary, to prepare the waste for treatment in downstream processes. In addition, hydrogen peroxide or biocides could be added to control biological growth in the surge tank. A pump recirculates the contents in the surge tank, mixing the chemical reagents with the waste to a uniform pH.

Filtration. Two primary filter systems remove suspended particles in an aqueous waste: a rough filter removes the larger particulates, while a fine filter removes the smaller particulates. The location of these filters depends on the configuration of the primary treatment train. However, the filters normally are located upstream of the RO units.

The solids accumulating on these filter elements are backwashed to the secondary waste receiving tanks with pulses of compressed air and water, forcing water back through the filter. The backwash operation is initiated either automatically by a rise in differential pressure across the filter or manually by an operator. The filters are cleaned chemically when the backwashing process does not facilitate acceptable filter performance.

Auxiliary fine and rough filters (e.g., disposable filters) have been installed to provide additional filtration capabilities. Depending on the configuration of the ETF, the auxiliary filters are operated either in series with the primary filters to provide additional filtration or in parallel, instead of the primary fine and rough filters, to allow cleaning/maintenance of the primary fine and rough filters while the primary treatment train is in operation.

Ultraviolet Light/Oxidation. Organic compounds contained in an aqueous waste stream are destroyed in the UV/OX system (Figure C.8). Hydrogen peroxide is mixed with the waste. The UV/OX system uses the photochemical reaction of UV light on hydrogen peroxide to form hydroxyl radicals and other reactive species that oxidize the organic compounds. The final products of the complete reaction are carbon dioxide, water, and inorganic ions.

Organic destruction is accomplished in two UV/OX units operating in parallel. During the UV/OX process, the aqueous waste passes through reaction chambers where hydrogen peroxide is added. While in the UV/OX system, the temperature of an aqueous waste is monitored. Heat exchangers are used to reduce the temperature of the waste should the temperature of the waste approach the upper limits for the UV/OX or RO systems.

pH Adjustment. The pH of a waste stream is monitored and controlled at different points throughout the treatment process. Within the primary treatment train, the pH of a waste can be adjusted with sulfuric acid or sodium hydroxide to optimize operation of downstream treatment processes or adjusted before final discharge. For example, the pH of an aqueous waste would be adjusted in the pH adjustment tank after the UV/OX process and before the RO process. In this example, pH is adjusted to cause certain chemical species such as ammonia to form ammonium sulfate, thereby increasing the rejection rate of the RO.

Hydrogen Peroxide Decomposition. Typically, hydrogen peroxide added into the UV/OX system is not consumed completely by the system. Because hydrogen peroxide is a strong oxidizer, the residual hydrogen peroxide from the UV/OX system is removed to protect the downstream equipment. The hydrogen peroxide decomposer uses a catalyst to break down the hydrogen peroxide that is not consumed completely in the process of organic destruction. The aqueous waste is sent through a column that breaks down the hydrogen peroxide into water and oxygen. The gas generated by the decomposition of the hydrogen peroxide is vented to the vessel off gas system.

Degasification. The degasification column is used to purge dissolved carbon dioxide from the aqueous waste to reduce the carbonate loading to downstream dissolved solids removal processes within the 200 Area ETF primary treatment train. The purged carbon dioxide is vented to the vessel off gas system.

Reverse Osmosis. The RO system (Figure C.9) uses pressure to force clean water molecules through semi-permeable membranes while keeping the larger molecule contaminants, such as dissolved solids, and large molecular weight organic materials, in the membrane. The RO process uses a staged configuration to maximize water recovery. The process produces two separate streams, including a clean 'permeate' and a concentrate (or retentate), which are concentrated as much as possible to minimize the amount of secondary waste produced.

The RO process is divided into first and second stages. Aqueous waste is fed to the first RO stage from the RO feed tank. The secondary waste receiving tanks of the secondary treatment train receive the retentate removed from the first RO stage, while the second RO stage receives the permeate (i.e., 'treated' aqueous waste from the first RO stage). In the second RO stage, the retentate is sent to the first stage RO feed tank while the permeate is sent to the IX system or to the surge tank, depending on the configuration of the ETF.

Two support systems facilitate this process. An anti-scale system injects scale inhibitors as needed into the feed waste to prevent scale from forming on the membrane surface. A clean-in-place system using cleaning agents, such as descalants and surfactants, cleans the membrane pores of surface and subsurface deposits that have fouled the membranes.

Ion Exchange. Because the RO process removes most of the dissolved solids in an aqueous waste, the IX process (Figure C.10) acts as a polishing unit. The IX system consists of three columns containing beds of cation and/or anion resins. This system is designed to allow for regeneration of resins and maintenance of one column while the other two are in operation. Though the two columns generally are operated in series, the two columns also can be operated in parallel or individually.

Typically, the two columns in operation are arranged in a primary/secondary (lead/lag) configuration, and the third (regenerated) column is maintained in standby. When dissolved solids breakthrough the first IX column and are detected by a conductivity sensor, this column is removed from service for regeneration, and the second column replaces the first column and the third column is placed into service. The column normally is regenerated using sulfuric acid and sodium hydroxide. The resulting regeneration waste is collected in the secondary waste receiving tanks.

Spent resins are transferred into a disposal container should regeneration of the IX resins become inefficient Free water is removed from the container and returned to the surge tank. Dewatered resins are transferred to a final storage/disposal point.

Verification. The three verification tanks (Figure C.11) are used to hold the treated effluent while a determination is made that the effluent meets discharge limits. The effluent can be returned to the primary treatment train for additional treatment, or to the LERF, should a treated effluent not meet Discharge Permit or Final Delisting requirements.

The three verification tanks alternate between three operating modes: receiving treated effluent, holding treated effluent during laboratory analysis and verification, or discharging verified effluent. Treated effluent may also be returned to the 200 Area ETF to provide 'clean' service water for operational and maintenance functions, e.g., for boiler water and for backwashing the filters. This recycling keeps the quantity of fresh water used to a minimum.

C.2.4 Secondary Treatment Train

The secondary treatment system typically receives and processes the following by-products generated from the primary treatment train: concentrate from the first RO stage, filter backwash, regeneration waste from the ion exchange system, and spillage or overflow received into the process sumps. Depending on the operating configuration, however, some aqueous waste could be processed in the secondary treatment train before the primary treatment train (refer to Figure C.5 and Figure C.6 for example operating configurations).

The secondary treatment train provides the following processes:

- Secondary waste receiving - tank receiving and chemical addition
- Evaporation - concentrates secondary waste streams
- Concentrate staging - concentrate receipt, pH adjustment, and chemical addition
- Thin film drying - dewatering of secondary waste streams
- Container handling - packaging of dewatered secondary waste

Secondary Waste Receiving. Waste to be processed in the secondary treatment train is received into two secondary waste receiving tanks, where the pH can be adjusted with sulfuric acid or sodium hydroxide for optimum evaporator performance. Chemicals, such as reducing agents, may be added to waste in the secondary waste receiving tanks to reduce the toxicity or mobility of constituents in the powder.

Evaporation. The 200 Area ETF evaporator is fed alternately by the two secondary waste receiving tanks. One tank serves as a waste receiver while the other tank is operated as the feed tank. The 200 Area ETF evaporator vessel (also referred to as the vapor body) is the principal component of the evaporation process (Figure C.12).

Feed from the secondary waste receiving tanks is pumped through a heater to the recirculation loop of the 200 Area ETF evaporator. In this loop, concentrated waste is recirculated from the 200 Area ETF evaporator, to a heater, and back into the evaporator where vaporization occurs. As water leaves the evaporator system in the vapor phase, the concentration of the waste in the evaporator increases. When the concentration of the waste reaches the appropriate density, a portion of the concentrate is pumped to one of the concentrate tanks.

The vapor that is released from the 200 Area ETF evaporator is routed to the entrainment separator, where water droplets and/or particulates are separated from the vapor. The 'cleaned' vapor is routed to the vapor compressor and converted to steam. The steam from the vapor compressor is sent to the heater (reboiler) and used to heat the recirculating concentrate in the 200 Area ETF evaporator. From the heater, the steam is condensed and fed to the distillate flash tank, where the saturated condensate received from the heater drops to atmospheric pressure and cools to the normal boiling point through partial flashing (rapid vaporization caused by a pressure reduction). The resulting distillate is routed to the surge tank. The non-condensable vapors, such as air, are vented through a vent gas cooler to the vessel off gas system.

Concentrate Staging. The concentrate tanks make up the head end of the thin film drying process. From the 200 Area ETF evaporator, concentrate is pumped into two concentrate tanks, and pH adjusted chemicals, such as reducing agents, may be added to reduce the toxicity or mobility of constituents when converted to powder. Waste is transferred from the concentrate tanks to the thin film dryer for conversion to a powder. The concentrate tanks function alternately between concentrate receiver and feed tank for the thin film dryer. However, one tank may serve as both concentrate receiver and feed tank.

Because low solubility solids (i.e., calcium and magnesium sulfate) tend to settle in the concentrate tanks, these solids must be removed to prevent fouling and to protect the thin film dryer, and to maintain concentrate tank capacity.

Thin Film Drying. From the concentrate tanks, feed is pumped to the thin film dryer (Figure C.13) that is heated by steam. As the concentrated waste flows down the length of the dryer, the waste is dried. The dried film, or powder, is scraped off the dryer cylinder by blades attached to a rotating shaft. The powder is funneled through a cone-shaped powder hopper at the bottom of the dryer and into the Container Handling System.

Overhead vapor released by the drying of the concentrate is condensed in the distillate condenser. Excess heat is removed from the distillate by a water-cooled heat exchanger. Part of the distillate is circulated back to the condenser spray nozzles. The remaining distillate is pumped to the surge tank. Any noncondensible vapors and particulates from the spray condenser are exhausted to the vessel off gas system.

Container Handling. Before an empty container is moved into the Container Handling System (Figure C.14), the lid is removed and the container is placed on a conveyor. The containers are moved into the container filling area after passing through an air lock. The empty container is located under the thin film dryer, and raised into position. The container is sealed to the thin film dryer and a rotary valve begins the transfer of powder to the empty container. Air displaced from the container is vented to the distillate condenser attached to the 200 Area ETF evaporator that exhausts to the vessel off gas system.

The container is filled to a predetermined level, then lowered from the thin film dryer and moved along a conveyor. The filled container is manually recapped, and moved along the conveyor to the airlock. At the airlock, the container is moved onto the conveyor by remote control. The airlock is opened, the smear sample (surface wipe) is taken, and the contamination level counted. A 'C' ring is installed to secure the container lid. If the container has contaminated material on the outside, the container is wiped down and retested. Filled containers that pass the smear test are labeled, placed on pallets, and moved by forklift to the filled container storage area. Section C.3 provides a more detailed discussion of container handling.

C.2.5 Other Effluent Treatment Facility Systems

The 200 Area ETF is provided with support systems that facilitate treatment in the primary and secondary treatment trains and that provide for worker safety and environmental protection. An overview of the following systems is provided:

- Monitor and control system
- Vessel off gas system
- Sump collection system
- Chemical injection feed system
- Verification tank recycle system
- Utilities

C.2.5.1 Monitor and Control System

The operation of the 200 Area ETF is monitored and controlled by a centralized computer system (i.e., monitor and control system or MCS). The MCS continuously monitors data from various field indicators, such as pH, flow, tank level, temperature, pressure, conductivity, alarm status, and valve switch positions. Data gathered by the MCS enable operations and engineering personnel to document and adjust the operation of the ETF.

C.2.5.2 Vessel Off gas System

Ventilation for various tanks and vessels is provided through the vessel off gas system. The system includes a moisture separator, duct heater, pre-filter, high-efficiency particulate air filters, carbon absorber (when required to reduce organic emissions), exhaust fans, and ductwork. Gasses ventilated from the tanks and vessels enter the exhaust system through the connected ductwork. The vessel off gas system draws vapors and gasses off the following tanks and treatment systems:

- Surge tank
- Vent gas cooler (off the ETF evaporator/distillate flash tank)
- pH adjustment tank
- Concentrate tanks
- Degasification system
- First and second RO stages
- Dry powder hopper
- Effluent pH adjustment tank
- Drum capping station
- Secondary waste receiving tanks
- Distillate condenser (off the thin film dryer)
- Sump tanks 1 and 2

The vessel off gas system maintains a negative pressure with respect to the atmosphere, which produces a slight vacuum within tanks, vessels, and ancillary equipment for the containment of gas vapor. This system also provides for the collection, monitoring, and treatment of confined airborne in-vessel contaminants to preclude over-pressurization. The high-efficiency particulate air filters remove particulates and condensate from the air stream before these are discharged to the heating, ventilation, and air conditioning system.

C.2.5.3 Sump Collection System

Sump tanks 1 and 2 compose the sump collection system that provides containment of waste streams and liquid overflow associated with the 200 Area ETF processes. The process area floor is sloped to two separate trenches that each drain to a sump tank located under the floor of the 200 Area ETF (Figure C.15). One trench runs the length of the primary treatment train and drains to Sump Tank 2, located underneath the verification tank pump floor. The second trench collects spillage primarily from the secondary treatment train and flows to Sump Tank 1, located near the 200 Area ETF evaporator. Sump tanks 1 and 2 are located below floor level (Figure C.15). An eductor in these tanks prevents sludge from accumulating.

C.2.5.4 Chemical Injection Feed System

At several points within the primary and secondary treatment trains, sulfuric acid and sodium hydroxide (or dilute solutions of these reagents) are metered into specific process units to adjust the pH. For example, a dilute solution of 4 percent sulfuric acid and 4 percent sodium hydroxide could be added to the secondary waste receiving tanks to optimize the evaporation process.

C.2.5.5 Verification Tank Recycle System

To reduce the amount of water added to the process, verification tank water (i.e., verified effluent) is recycled throughout the 200 Area ETF process. Tanks and ancillary equipment that use verification tank water include:

- 4 percent H_2SO4 solution tank and ancillary equipment
- 4 percent NaOH solution tank and ancillary equipment
- Clean-in-place tank and ancillary equipment
- IX columns (during resin regeneration)
- 200 Area ETF evaporator boiler and ancillary equipment
- Thin film dryer boiler and ancillary equipment
- Seal water system.In addition, verification tank water is used extensively during maintenance activities. For example, it may be used to flush piping systems or to confirm the integrity of piping, a process tank or tank truck.

C.2.5.6 Utilities

The 200 Area ETF maintains the following utility supply systems required for the operation of the ETF:

- Cooling water system - removes heat from process water via heat exchangers and a cooling tower
- Compressed air system - provides air to process equipment and instrumentation
- Seal water system - provides cool, clean, pressurized water to process equipment for pump seal cooling and pump seal lubrication, and provides protection against failure and fluid leakage
- Demineralized water system - removes solids from raw water system to produce high quality, low ion-content, water for steam boilers, and for the hydrogen peroxide feed system.
- Heating, ventilation, and air conditioning system - provides continuous heating, cooling, and air humidity control throughout the ETF.

The following utilities support 200 Area ETF activities:

- Electrical power
- Sanitary water
- Communication systems
- Raw water

C.3 CONTAINERS

This section provides specific information on container storage and treatment operations at the 200 Area ETF, including descriptions of containers, labeling, and secondary containment structures.

A list of dangerous and/or mixed waste managed in containers at the 200 Area ETF is presented in Addendum A. The types of dangerous and/or mixed waste managed in containers in the 200 Area ETF could include:

- Secondary waste powder generated from the treatment process
- Aqueous waste received from other Hanford site sources awaiting treatment
- Miscellaneous waste generated by operations and maintenance activities.

The secondary treatment train processes the waste by-products from the primary treatment train, which are concentrated and dried into a powder. Containers are filled with dry powder waste from the thin film dryer via a remotely controlled system. Containers of aqueous waste received from other Hanford site sources are stored at 200 Area ETF until their contents can be transferred to the process for treatment. The waste is usually transferred to the secondary waste receiving or concentration tanks. Miscellaneous waste generated from maintenance and operations activities are stored at the ETF. The waste could include process waste, such as used filter elements; spent RO membranes; damaged equipment, and decontamination and maintenance waste, such as contaminated rags, gloves, and other personal protective equipment. Containers of miscellaneous waste which have free liquids generally are packaged with absorbents.

Several container collection areas could be located within the 200 Area ETF process and container handling areas. These collection areas are used only to accumulate waste in containers. Once a container is filled, the container is transferred to a container storage area (Figure C.3 and Figure C.4), to another TSD unit, or to a less-than-90-day storage pad. Containers stored in the additional storage area (Figure C.4) are elevated or otherwise protected from contact with accumulated liquids. The container storage area within 200 Area ETF is a 22.9 x 8.5-meter room located adjacent to the 200 Area ETF process areas. The containers within the container storage area are clearly labeled, and access to these containers is limited by barriers and by administrative controls. The 200 Area ETF floor provides secondary containment, and the 200 Area ETF roof and walls protects all containers from exposure to the elements.

Waste also could be placed in containers for treatment as indicated in Addendum A. For example, sludge that accumulates in the bottoms of the process tanks is removed periodically and placed into containers. In this example, the waste is solidified by decanting the supernate from the container and the remainder of the waste is allowed to evaporate, or absorbents are added, as necessary, to address remaining liquids. Following treatment, this waste either is stored at the 200 Area ETF or transferred to another TSD unit.

C.3.1 Description of Containers

The containers used to collect and store dry powder waste are 208-liter steel containers. Most of the aqueous waste received at 200 Area ETF, and maintenance and operation waste generated, are stored in 208-liter steel or plastic containers; however, in a few cases, the size of the container could vary to accommodate the size of a particular waste. For example, some process waste, such as spent filters, might not fit into a 208-liter container. In the case of spent resin from the IX columns, the resin is dewatered, and could be packaged in a special disposal container. In these few cases, specially sized containers could be required. In all cases, however, only approved containers are used and are compatible with the associated waste. Typically, 208-liter containers are used for treatment.

Current operating practices indicate the use of new 208-liter containers that have either a polyethylene liner or a protective coating. Any reused or reconditioned container is inspected for container integrity before use. Overpack containers are available for use with damaged containers. Overpack containers typically are unlined steel or polyethylene.

Per Addendum A, a maximum of 147,630 liters of dangerous and/or mixed waste could be stored in containers in the 200 Area ETF.

C.3.2 Container Management Practices

Before use, each container is checked for signs of damage such as dents, distortion, corrosion, or scratched coating. For dry powder loading, empty containers on pallets are raised by a forklift and manually placed on the conveyor that transports the containers to the automatic filling station in the container handling room (Figure C.14). The container lids are removed and replaced manually following the filling sequence. After filling, containers exit the container handling room via the filled drum conveyor. Locking rings are installed, the container label is affixed, and the container is moved by dolly or forklift to the container storage area.

Before receipt at 200 Area ETF, each container from other Hanford site sources is inspected for leaks, signs of damage, and a loose lid. The identification number on each container is checked to ensure the proper container is received. The containers are typically placed on pallets and moved by dolly or forklift to the container storage area. These containers are later moved to the process area and the contents transferred to the process for treatment.

Containers used for storing maintenance and operations secondary waste are labeled before being placed in the container storage area or in a collection area. Lids are secured on these containers when not being filled. When the containers in a collection area are full, the containers are transferred by dolly or forklift to the container storage area or to an appropriate TSD unit. Containers used for treating waste also are labeled. The lids on these containers are removed as required to allow for treatment. During treatment, access to these containers is controlled through physical barriers and/or administrative controls.

The filled containers in the container storage area are inventoried, checked for proper labeling, and placed on pallets or in a separate containment device as necessary. Each pallet is moved by forklift. Within the container storage area, palletized containers are stacked no more than three pallets high and in rows no more than two containers wide. Unobstructed aisles with a minimum of 76-centimeter aisle space separate rows.

C.3.3 Container Labeling

Labels are affixed on containers used to store dry powder when the containers leave the container handling room. Labels are affixed on other waste containers before use. Every container is labeled with the date that the container was filled. Appropriate major risk labels, such as "corrosive", "toxic", or "F-listed", also are added. Each container also has a label with an identification number for tracking purposes.

C.3.4 Containment Requirements for Managing Containers

Secondary containment is provided in the container management areas within the ETF. The secondary containment provided for tank systems also serves the container management areas. This section describes the design and operation of the secondary containment structure for these areas.

C.3.4.1 Secondary Containment System Design

For the container management areas, the reinforced concrete floor and a 15.2-centimeter rise (berm) along the walls of the container storage area of the 200 Area ETF provides secondary containment. The engineering assessment required for tanks (Mausshardt 1995) also describes the design and construction of the secondary containment provided for the 200 Area ETF container management areas. All systems were designed to national codes and standards (e.g., American Society for Testing Materials, American Concrete Institute standards).

The floor is composed of cast-in-place, pre-formed concrete slabs, and has a minimum thickness of 15.2 centimeters. All slab joints and floor and wall joints have water stops installed at the mid-depth of the slab. In addition, filler was applied to each joint. The floor and berms are coated with a chemically resistant; high-solids epoxy coating system consisting of primer and top coating. This coating material is compatible with the waste managed in containers and is an integral part of the secondary containment system for containers.

The floor is sloped to drain any solution in the container storage area to floor drains along the west wall. Each floor drain consists of a grating over a 20.3-centimeter diameter drain port connected to a 4-inch polyvinyl chloride transfer pipe. The pipe passes under this wall and connects to a trench running along the east wall of the adjacent process area. This trench drains solution to sump tank 1.

The container storage area is separated from the process area by a common wall and a door for access to the two areas (Figure C.3). These two areas also share a common floor and trenches that, with the 15.2-centimeter rise of the containing walls, form the secondary containment system for the process area and the container storage area.

C.3.4.2 Structural Integrity of Base

Engineering calculations were performed showing the floor of the container storage area is capable of supporting the weight of containers. These calculations were reviewed and certified by a professional engineer (Mausshardt 1995). The concrete was inspected for damage during construction. Cracks were identified and repaired to the satisfaction of the professional engineer. Documentation of these certifications is included in the engineering assessment (Mausshardt 1995).

C.3.4.3 Containment System Capacity

The container storage area is primarily used to store dry powder, aqueous waste awaiting treatment, and maintenance and operation waste. Where appropriate, absorbents are added to fix any trace liquids present. Large volumes of liquid are not stored in the container storage area. However, liquids might be present in those containers that are in the treatment process. The maximum volume of waste that can be stored in containers in the container storage area is 147,630 liters.

Because they are interconnected by floor drains, both the process area and the container storage area are considered in the containment system capacity. The volume available for secondary containment in the process area is approximately 68,000 liters, as discussed in the engineering assessment (Mausshardt 1995). Using the dimensions of the container storage area (22.9 by 8.5 by 0.15 meters), and assuming that 50 percent of the floor area is occupied by containers, the volume of the container storage area is 14,900 liters. The combined volume of both the container storage and process areas available for secondary containment, therefore, is 82,900 liters. This volume is greater than 10 percent of the maximum total volume of containers allowed for storage in the ETF, as discussed previously.

C.3.4.4 Control of Run-on

The container management areas are located within the ETF, which serves to prevent run-on of precipitation.

C.3.4.5 Removal of Liquids from Containment Systems

The container storage area is equipped with drains that route solution to a trench in the process area, which drains to sump tank 1. The sump tanks are equipped with alarms that notify operating personnel that a leak is occurring. The sump tanks also are equipped with pumps to transfer waste to the surge tank or the secondary treatment train.

C.3.4.6 Prevention of Ignitable, Reactive, and Incompatible Wastes in Containers

Individual waste types (i.e., ignitable, corrosive, and reactive) are stored in separate containers. A waste that could be incompatible with other wastes is separated and protected from the incompatible waste. Incompatible wastes are evaluated using the methodology documented in 40 CFR 264, Appendix V. For example, acidic and caustic wastes are stored in separate containers. Free liquids are absorbed in miscellaneous waste containers that hold incompatible waste. Additionally, ETF-specific packaging requirements for these types of waste provide extra containment with each individual container. For example, each item of acidic waste is individually bagged and sealed within a lined container.

C.4 TANK SYSTEMS

This section provides specific information on tank systems and process units. This section also includes a discussion on the types of waste to be managed in the tanks, tank design information, integrity assessments, and additional information on the 200 Area ETF tanks that treat and store dangerous and/or mixed waste. The 200 Area ETF dangerous waste tanks are identified in Section 4C.4.1.1, and the relative locations of the tanks and process units in the 200 Area ETF are presented in Figure C.3.

C.4.1 Design Requirements

The following sections provide an overview of the design specifications for the tanks within the ETF. A separate discussion on the design of the process units also is provided. In accordance with the new tank system requirements of WAC 173-303-640(3), the following tank components and specifications were assessed:

- Dimensions, capacities, wall thicknesses, and pipe connections
- Materials of construction and linings and compatibility of materials with the waste being processed
- Materials of construction of foundations and structural supports
- Review of design codes and standards used in construction
- Review of structural design calculations, including seismic design basis
- Waste characteristics and the effects of waste on corrosion

This assessment was documented in the *Final RCRA Information Needs Report* (Mausshardt 1995; the engineering assessment performed for the 200 Area ETF tank systems by an independent professional engineer. A similar assessment of design requirements was performed for Load-in tanks 59A-TK-109 and -117 and is documented in *200 Area Effluent BAT/AKART Implementation, ETF Truck Load-in Facility, Project W-291H Integrity Assessment Report* (KEH 1994). An assessment was also performed when Load-in tank 59A-TK-1 was placed into service for receipt of dangerous and mixed wastes. The assessment is documented in *200 Area ETF Purgewater Unloading Facility Tank System Integrity Assessment* (HNF 2009a).

The specifications for the preparation, design, and construction of the tank systems at the 200 Area ETF are documented in the *Design Construction Specification, Project C-018H, 242-A Evaporator/PUREX Plant Process Condensate Treatment Facility* (WHC 1992a). The preparation, design, and construction of Load-in tanks 59A-TK-109 and -117 are provided in the construction specifications in *Project W-291, 200 Area Effluent BAT/AKART Implementation ETF Truck Load-in Facility* (KEH 1994). The preparation, design and construction of Load-in 59A-TK-1 are documented in *Purgewater Unloading Facility Project Documentation* (HNF 2009b).

Most of the tanks in the 200 Area ETF are constructed of stainless steel. According to the design of the ETF, it was determined stainless steel would provide adequate corrosion protection for these tanks. Exceptions include Load-in tank 59A-TK-1, which is constructed of fiberglass-reinforced plastic and the verification tanks, which are constructed of carbon steel with an epoxy coating.The 200 Area ETF evaporator/vapor body (and the internal surfaces of the thin film dryer) is constructed of a corrosion resistant alloy, known as alloy 625, to address the specific corrosion concerns in the secondary treatment train. Finally, the hydrogen peroxide decomposer vessels are constructed of carbon steel and coated with a vinyl ester lining.

The shell thicknesses of the tanks identified in Table C.5 represent a nominal thickness of a new tank when placed into operation. The tank capacities identified in this table represent the maximum volumes. Nominal tank volumes discussed below represent the maximum volume in a tank unit during normal operations.

C.4.1.1 Codes and Standards for Tank System Construction

Specific standards for the manufacture of tanks and process systems installed in the 200 Area ETF are briefly discussed in the following sections. In addition to these codes and industrial standards, a seismic analysis for each tank and process system is required [WAC 173-303-806(4)(a)(xi)]. The seismic analysis was performed in accordance with UCRL-15910 *Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards*, Section 4 (UCRL 1987). The results of the seismic analyses are summarized in the engineering assessment of the 200 Area ETF tank systems (Mausshardt 1995).

Storage and Treatment Tanks. The following tanks store and/or treat dangerous waste at the ETF.

Tank name	Tank number
Surge tank	2025E-60A-TK-1
pH adjustment tank	2025E-60C-TK-1
Effluent pH adjustment tank	2025E-60C-TK-2
First RO feed tank	2025E-60F-TK-1
Second RO feed tank	2025E-60F-TK-2
Verification tanks (three)	2025E-60H-TK-1A/1B/1C
Secondary waste receiving tanks (two)	2025E-60I-TK-1A/1B
Evaporator (vapor body)	2025E-601-EV-1
Concentrate tanks (two)	2025E-60J-TK-1A/1B
Sump tanks (two)	2025E-20B-TK-1/2
Distillate flash tank	2025E-60I-TK-2
Load-in tanks	2025ED-59A-TK-1/109/117

The relative location of these tanks is presented in Figure C.3. These tanks are maintained at or near atmospheric pressure. The codes and standards applicable to the design, construction, and testing of the above tanks and ancillary piping systems are as follows:

ASME - B31.3 Chemical Plant and Petroleum Refinery Piping (ASME 1990)

ASME Sect. VIII, Division I Pressure Vessels (ASME 1992a)

AWS - D1.1 Structural Welding Code - Steel (AWS 1992)

ANSI - B16.5 Pipe Flanges and Flanged Fittings (ANSI 1992)

ASME Sect. IX Welding and Brazing Qualifications (ASME 1992b)

API 620 Design and Construction of Large Welded Low Pressure Storage Tanks (API 1990)

AWWA - D100 Welded Steel Tanks for Water Storage (AWWA 1989)

AWWA - D103 Factory-Coated Bolted Steel Tanks for Water Storage (AWWA 1987)

AWWA - D120 Thermosetting Fiberglass-Reinforced Plastic Tanks (AWWA 1984)

ASTM-D3299 Filament Wound Glass-Fiber-Reinforced Thermoset Resin Corrosion Resistant Tanks.

The application of these standards to the construction of 200 Area ETF tanks and independent verification of completed systems ensured that the tank and tank supports had sufficient structural strength and that seams and connections were adequate to ensure tank integrity. In addition, each tank met strict quality assurance requirements. Each tank constructed offsite was tested for integrity and leak tightness before shipment to the Hanford Facility. Following installation, the systems were inspected for damage to ensure against leakage and to verify proper operation. If a tank was damaged during shipment or installation, leak tightness testing was repeated onsite.

C.4.1.2 Design Information for Tanks Located Outside of Effluent Treatment Facility

The load-in tanks, surge tank, and verification tanks are located outside the ETF. These tanks are located within concrete structures that provide secondary containment.

Load-In Tanks and Ancillary Equipment. The load-in tanks 59A-TK-109 and -117are heated and constructed of stainless steel, and have a nominal capacity of 31,000 liters. Load-in tank 59A-TK-1 is heated and constructed of fiberglass reinforced plastic and has a nominal capacity of 24,200 liters. Load-in tanks 59A-TK-109 and -117 are located outside of the metal building while Load-in tank 59A-TK-1 is located inside the building. Ancillary equipment includes transfer pumps, filtration systems, a double encased, fiberglass transfer pipeline, level instruments for tanker trucks, and leak detection equipment. From the Load-In Station, aqueous waste can be routed to the surge tank or to the LERF through a double-encased line. The load-in tanks, sump, pumps, and truck pad are all provided with secondary containment.

Surge Tank and Ancillary Equipment. The surge tank is constructed of stainless steel and has a nominal capacity of 379,000 liters. Ancillary equipment to the surge tank includes two underground double encased (i.e., pipe-within-a-pipe) transfer lines connecting to LERF and three pumps for transferring aqueous waste to the primary treatment train. The surge tank is located at the south end of the ETF. The surge tank is insulated and the contents heated to prevent freezing. Eductors in the tank provide mixing.

Verification Tanks and Ancillary Equipment. The verification tanks are located north of the ETF. The verification tanks have a nominal capacity of 2,740,000 liters each. For support, the tanks have a center post with a webbing of beams that extend from the center post to the sides of the tank. The roof is constructed of epoxy covered carbon steel that is attached to the cross beams of the webbing. The tank floor also is constructed of epoxy covered carbon steel and is sloped. Eductors are installed in each tank to provide mixing.

Ancillary equipment includes a return pump that provides circulation of treated effluent through the eductors. The return pump also recycles effluent back to the 200 Area ETF for retreatment and can provide service water for 200 Area ETF functions. Two transfer pumps are used to discharge treated effluent to SALDS or back to the LERF.

C.4.1.3 Design Information for Tanks Located Inside the Effluent Treatment Facility Building

Most of the 200 Area ETF tanks and ancillary equipment that store or treat dangerous and/or mixed waste are located within the ETF. The structure serves as secondary containment for the tank systems.

pH Adjustment Tank and Ancillary Equipment. The pH adjustment tank has a nominal capacity of 13,200 liters. Ancillary equipment for this tank includes overflow lines to a sump tank and pumps to transfer waste to other units in the main treatment train.

Effluent pH Adjustment Tank and Ancillary Equipment. The effluent pH adjustment tank has a nominal capacity of 11,100 liters. Ancillary equipment includes overflow lines to a sump tank and pumps to transfer waste to the verification tanks.

First and Second Reverse Osmosis Feed Tanks and Ancillary Equipment. The first RO feed tank is a vertical, stainless steel tank with a round bottom and has a nominal capacity of 16,100 liters. Conversely, the second RO feed tank is a rectangular vessel with the bottom of the tank sloping sharply to a single outlet in the bottom center. The second RO feed tank has a nominal capacity of 7,600 liters. Each RO tank has a pump to transfer waste to the RO arrays. Overflow lines are routed to a sump tank.

Secondary Waste Receiving Tanks and Ancillary Equipment. Two nominal 69,000-liter secondary waste receiving tanks collect waste from the units in the main treatment train, such as concentrate solution (retentate) from the RO units and regeneration solution from the IX columns. These are vertical, cylindrical tanks with a semi-elliptical bottom and a flat top. Ancillary equipment includes overflow lines to a sump tank and pumps to transfer aqueous waste to the 200 Area ETF evaporator.**Effluent Treatment Facility Evaporator and Ancillary Equipment.** The 200 Area ETF evaporator, the principal component of the evaporation process, is a cylindrical pressure vessel with a conical bottom. Aqueous waste is fed into the lower portion of the vessel. The top of the vessel is domed and the vapor outlet is configured to prevent carryover of liquid during the foaming or bumping (violent boiling) at the liquid surface. The 200 Area ETF evaporator has a nominal operating capacity of approximately 16,000 liters.

The 200 Area ETF evaporator includes the following ancillary equipment:

- Preheater
- Recirculation pump
- Waste heater with steam level control tank
- Concentrate transfer pump
- Entrainment separator
- Vapor compressor with silencers
- Silencer drain pump.

Distillate Flash Tank and Ancillary Equipment. The distillate flash tank is a horizontal tank that has a nominal operating capacity of 730 liters. Ancillary equipment includes a pump to transfer the distillate to the surge tank for reprocessing.

Concentrate Tanks and Ancillary Equipment. Each of the two concentrate tanks has an approximate nominal capacity of 22,700 liters. Ancillary equipment includes overflow lines to a sump tank and pumps for recirculation and transfer.

Sump Tanks. Sump tanks 1 and 2 are located below floor level. Both sump tanks are double-walled, rectangular tanks, placed inside concrete vaults. Both tanks have a working volume of 4,000 liters each. The sump tanks are located in pits below grade to allow gravity drain of solutions to the tanks. Each sump tank has two vertical pumps for transfer of waste to the secondary waste receiving tanks or to the surge tank for reprocessing.

C.4.1.4 Design Information for Effluent Treatment Facility Process Units

As with the 200 Area ETF tanks, process units that treat and/or store dangerous and/or mixed waste are maintained at or near atmospheric pressure. These units were constructed to meet a series of design standards, as discussed in the following sections. Table C.6 presents the materials of construction and the ancillary equipment associated with these process units. All piping systems are designed to withstand the effects of internal pressure, weight, thermal expansion and contraction, and any pulsating flow. The design and integrity of these units are presented in the engineering assessment (Mausshardt 1995).

Filters. The load-in fine and rough filter vessels (including the influent and auxiliary filters) are designed to comply with the ASME Section VIII, Division I, Pressure Vessels (ASME 1992a). The application of these standards to the construction of the 200 Area ETF filter system and independent inspection ensure that the filter and filter supports have sufficient structural strength and that the seams and connections are adequate to ensure the integrity of the filter vessels.

Ultraviolet Oxidation System. The UV/OX reaction chamber is designed to comply with manufacturers standards.

Degasification System. The codes and standards applicable to the design, fabrication, and testing of the degasification column are identified as follows:

- ASME - B31.3, Chemical Plant and Petroleum Refinery Piping (ASME 1990)
- AWS - D1.1, Structural Welding Code - Steel (AWS 1992)
- ANSI - B16.5, Pipe Flanges and Flanged Fittings (ANSI 1992)

Reverse Osmosis System. The pressure vessels in the RO unit are designed to comply with ASME Section VIII, Division I, Pressure Vessels (ASME 1992a), and applicable codes and standards.

Ion Exchange (Polishers). The IX columns are designed in accordance with ASME Section VIII, Division I, Pressure Vessels (ASME 1992a), and applicable codes and standards. Polisher piping is fabricated of type 304 stainless steel or polyvinyl chloride (PVC) and meets the requirements of ASME B31.3, Chemical Plant and Petroleum Refinery Piping (ASME 1990).

Effluent Treatment Facility Evaporator. The 200 Area ETF evaporator is designed to meet the requirements of ASME Section VIII, Division I, Pressure Vessels (ASME 1992a), and applicable codes and standards. The 200 Area ETF evaporator piping meets the requirements of ASME B31.3, Chemical Plant and Petroleum Refinery Piping (ASME 1990).

Thin Film Dryer System. The thin film dryer is designed to meet the requirements of ASME Section VIII, Division I, Pressure Vessels (ASME 1992a), and applicable codes and standards. The piping meets the requirements of ASME - B31.3, Chemical Plant and Petroleum Refinery Piping (ASME 1990).

C.4.1.5 Integrity Assessments.

The integrity assessment for 200 Area ETF (Mausshardt 1995) attests to the adequacy of design and integrity of the tanks and ancillary equipment to ensure that the tanks and ancillary equipment will not collapse, rupture, or fail over the intended life considering intended uses. For the load-in tanks, a similar integrity assessment was performed (KEH 1995 and HNF 2009a). Specifically, the assessment documents the following considerations:

- Adequacy of the standards used during design and construction of the facility
- Characteristics of the solution in each tank
- Adequacy of the materials of construction to provide corrosion protection from the solution in each tank
- Results of the leak tests and visual inspections

The results of these assessments demonstrate that tanks and ancillary equipment have sufficient structural integrity and are acceptable for storing and treating dangerous and/or mixed waste. The assessments also state that the tanks and building were designed and constructed to withstand a design-basis earthquake. Independent, qualified registered professional engineers certified these tank assessments.

The scope of the 200 Area ETF tank integrity assessment was based on characterization data from process condensate. To assess the effect that other aqueous waste might have on the integrity of the 200 Area ETF tanks, the chemistry of an aqueous waste will be evaluated for its potential to corrode a tank (e.g., chloride concentrations will be evaluated). The tank integrity assessment for the load-in tanks was based on characterization data from several aqueous waste streams. The chemistry of an aqueous waste stream not considered in the load-in tank integrity assessment also will be evaluated for the potential to corrode a load-in tank.

Consistent with the recommendations of the integrity assessment, a corrosion inspection program was developed. Periodic integrity assessments are scheduled for those tanks predicted to have the highest potential for corrosion. These inspections are scheduled annually or longer, based on age of the tank system, materials of construction, characteristics of the waste, operating experience, and recommendations of the initial integrity assessment. These ‘indicator tanks’ include the concentrate tanks, secondary waste receiving tanks, and verification tanks. One of each of these tanks will be inspected yearly to determine if corrosion or coating failure has occurred. Should significant corrosion or coating failure be found, an additional tank of the same type would be inspected during the same year. In the case of the verification tanks, if corrosion or coating failure is found in the second tank, the third tank also will be inspected. If significant corrosion were observed in all three sets of tanks, the balance of the 200 Area ETF tanks would be considered for inspection. For tanks predicted to have lower potential for corrosion, inspections also are performed nonroutinely as part of the corrective maintenance program.

C.4.2 Additional Requirements for New Tanks

Procedures for proper installation of tanks, tank supports, piping, concrete, etc., are included in *Construction Specification, Project C-018H, 242-A Evaporator/PUREX Plant Process Condensate Treatment Facility* (WHC 1992a). For the load-in tanks, procedures are included in the construction specifications in *Project W-291, 200 Area Effluent BAT/AKART Implementation ETF Truck Load-in Facility* (KEH 1994) and Purgewater Unloading Facility Project Documentation (HNF 2009b). Following installation, an independent, qualified, registered professional engineer inspected the tanks and secondary containment. Deficiencies identified included damage to the surge tank, damage to the verification tank liners, and 200 Area ETF secondary containment concrete surface cracking. All deficiencies were repaired to the satisfaction of the engineer. The tanks and ancillary equipment were leak tested as part of acceptance of the system from the construction contractor. Information on the inspections and leak tests are included in the engineering assessment (Mausshardt 1995). No deficiencies were identified during installation of the load-in tanks and ancillary equipment.

C.4.3 Secondary Containment and Release Detection for Tank Systems

This section describes the design and operation of secondary containment and leak detection systems at the ETF.

C.4.3.1 Secondary Containment Requirements for All Tank Systems

The specifications for the preparation, design, and construction of the secondary containment systems at the 200 Area ETF are documented (WHC 1992a). The preparation, design, and construction of the secondary containment for the load-in tanks are provided in the construction specifications (KEH 1994 and HNF 2009b). All systems were designed to national codes and standards. Constructing the 200 Area ETF per these specifications ensured that foundations are capable of supporting tank and secondary containment systems and that uneven settling and failures from pressure gradients should not occur.

C.4.3.1.1 Common Elements

The following text describes elements of secondary containment that are common to all 200 Area ETF tank systems. Details on the secondary containment for specific tanks, including leak detection systems and liquids removal, are provided in Section 4C.4.4.1.2.

Foundation and Construction. For the tanks within the ETF, except for the sump tanks, secondary containment is provided by a coated concrete floor and a 15.2-centimeter rise (berm) along the containing walls. The double-wall construction of the sump tanks provides secondary containment. Additionally, trenches are provided in the floor that also provides containment and drainage of any liquid to a sump pit. For tanks outside the ETF, secondary containment also is provided with coated concrete floors in a containment pit (load-in tanks) or surrounded by concrete dikes (the surge and verification tanks).

The transfer piping that carries aqueous waste into the 200 Area ETF is pipe-within-a-pipe construction, and is buried approximately 1.2 meters below ground surface. The pipes between the verification tanks and the verification tank pumps within the 200 Area ETF are located in a concrete pipe trench.

For this discussion, there are five discrete secondary containment systems associated with the following tanks and ancillary equipment that treat or store dangerous waste:

- Load-in tanks
- Surge tank
- Process area (including sump tanks)
- Verification tanks
- Transfer piping and pipe trenches

All of the secondary containment systems are designed with reinforcing steel and base and berm thickness to minimize failure caused by pressure gradients, physical contact with the waste, and climatic conditions. Classical theories of structural analysis, soil mechanics, and concrete and structural steel design were used in the design calculations for the foundations and structures. These calculations are maintained at the ETF. In each of the analyses, the major design criteria from the following documents were included:

V-C018HC1-001	Design Construction Specification, Project C-018H, 242A Evaporator/PUREX Plant Process Condensate Treatment Facility (WHC 1992a)
DOE Order 6430.1A	General Design Criteria
SDC-4.1	Standard Architectural-Civil Design Criteria, Design Loads for Facilities (DOE-RL 1988)
UCRL-15910	Design and Evaluation Guidelines for Department of Energy Facilities Subjected to

	Natural Phenomena Hazards (UCRL 1987)
UBC-91	Uniform Building Code, 1991 Edition (ICBO 1991)
UBC-97	Uniform Building Code, 1997 Edition (ICC 1997, for Load-in tank 59A-TK-1)

The design and structural analysis calculations substantiate the structural designs in the referenced drawings. The conclusions drawn from these calculations indicate that the designs are sound and that the specified structural design criteria were met. This conclusion is verified in the independent design review that was part of the engineering assessment (Mausshardt 1995, KEH 1994, and HNF 2009a).

Containment Materials. The concrete floor consists of cast-in-place and preformed concrete slabs. All slab joints and floor and wall joints have water stops installed at the mid-depth of the slab. In addition, filler was applied to each joint.

Except for the sump tank vaults, all of the concrete surfaces in the secondary containment system, including berms, trenches, and pits, are coated with a chemical-resistant, high-solids, epoxy coating that consists of a primer and a top coating. This coating material is compatible with the waste being treated, and with the sulfuric acid, sodium hydroxide, and hydrogen peroxide additives to the process. The coating protects the concrete from contact with any chemical materials that might be harmful to concrete and prevents the concrete from being in contact with waste material. Table C.8 summarizes the specific types of primer and top coats specified for the concrete and masonry surfaces in the ETF. The epoxy coating is considered integral to the secondary containment system for the tanks and ancillary equipment.

The concrete containment systems are maintained such that any cracks, gaps, holes, and other imperfections are repaired in a timely manner. Thus, the concrete containment systems do not allow spilled liquid to reach soil or groundwater. There are a number of personnel doorways and vehicle access points into the 200 Area ETF process areas. Releases of any spilled or leaked material to the environment from these access points are prevented by 15.2-centimeter concrete curbs, sloped areas of the floor (e.g., truck ramp), or trenches.

Containment Capacity and Maintenance. Each of these containment areas is designed to contain more than 100 percent of the volume of the largest tank in each respective system. Secondary containment systems for the surge tank, and the verification tanks, which are outside the ETF, also are large enough to include the additional volume from a 100-year, 24-hour storm event; i.e., 5.3 centimeters of precipitation.

Sprinkler System. The sprinkler system within the 200 Area ETF supplies firewater protection to the process area and the container storage area. This system is connected to a site wide water supply system and has the capacity to supply sufficient water to suppress a fire at the ETF. However, in the event of failure, the sprinkler system can be hooked up to another water source (e.g., tanker truck).

C.4.3.1.2 Specific Containment Systems

The following discussion presents a description of the individual containment systems associated with specific tank systems.

Load-In Tank Secondary Containment. The load-in tanks 59A-TK-109 and -117 are mounted on a 46-centimeter-thick reinforced concrete slab (Drawing H-2-817970). Secondary containment is provided by a pit with 30.5-centimeter-thick walls and a floor constructed of reinforced concrete. The load-in tank pit is sloped to drain solution to a sump. The depth of the pit varies with the slope of the floor, with an average thickness of about 1.1 meters. The volume of the secondary containment is about 79,000 liters, which is capable of containing the volume of at least one load-in tank (i.e., 34,200 liters). Leaks are detected by a leak detector that alarms locally, in the 200 Area ETF control room, and by visual inspection of the secondary containment.

Adjacent to the pit is a 25.4-centimeter-thick reinforced concrete pad that serves as secondary containment for the load-in tanker trucks, containers, transfer pumps, and filter system that serve as the first tanker truck unloading bay. The pad is inside the metal Load-in building and is 15.2 centimeters below grade with north and south walls gently sloped to allow truck access. The pad has a 3-inch drain pipe to route waste solution to the adjacent load-in tank pit. The pad does not have protective coating because it would experience excessive wear from the vehicle traffic.

Load-in tank 59A-TK-1 is located on a 25.4-centimeter-thick reinforced concrete slab (Drawing H-2-817970) inside the metal Load-in building. The tank has a flat bottom which sits on a concrete slab in the secondary containment. Secondary containment for the tank, filter system, and truck unloading piping is provided by an epoxy coated catch basin with a capacity of about 3,500 liters. The catch basin is sloped to route solution from the catch basin through a 15.2-centimeter-wide by 14.3-centimeter-deep trench to the adjacent truck unloading pad. This pad drains to the Load-in tank pit discussed above. The volume of the combined secondary containment of these two systems is greater than 82,000 liters, which is capable of holding the volume of tank 59A-TK-1 (i.e., 26,000 liters).

Adjacent to tank 59A-TK-1 catch basin is a 25.4-centimeter-thick reinforced concrete pad that serves as the second tanker truck unloading bay. The pad is inside the metal Load-in building and has a 2.4-meter by 4.0-meter shallow, sloping pit to catch leaks during tanker truck unloading. The pit has a maximum depth of 6.0 centimeters and a 15.2-centimeter-wide by 6.0-centimeter-deep trench to route leaks to the adjacent tank 59A-TK-1 catch basin. The pad does not have protective coating because it would experience excessive wear from the vehicle traffic.

Surge Tank Secondary Containment. The surge tank is mounted on a reinforced concrete ringwall. Inside the ringwall, the flat-bottomed tank is supported by a bed of compacted sand and gravel with a high-density polyethylene liner bonded to the ringwall. The liner prevents galvanic corrosion between the soil and the tank. The secondary containment is reinforced concrete with a 15.2-centimeter thick floor and a 20.3-centimeter thick dike. The secondary containment area shares part of the southern wall of the main process area. The dike extends up 2.9 meters to provide a containment volume of 740,000 liters for the 452,000-liter surge tank.

The floor of the secondary containment slopes to a sump in the northwest corner of the containment area. Leaks into the secondary containment are detected by level instrumentation in the sump, which alarms in the 200 Area ETF control room, and/or by routine visual inspections. A sump pump is used to transfer solution in the secondary containment to a sump tank.

Process Area Secondary Containment. The process area contains the tanks and ancillary equipment of the primary and secondary treatment trains, and has a jointed, reinforced concrete slab floor. The concrete floor of the process area provides the secondary containment. This floor is a minimum of 15.2 centimeters thick. With doorsills 15.2 centimeter high, the process area has a containment volume of over 200,000 liters. The largest tanks in the process area are the secondary waste receiving tanks, which each have a maximum capacity of 73,800 liters.

The floor of the process area is sloped to drain liquids to two trenches that drain to a sump. Each trench is approximately 38.1 centimeters wide with a sloped trough varying from 39.4 to 76.2 centimeters deep. Leaks into the secondary containment are detected by routine visual inspections of the floor area near the tanks, ancillary equipment, and in the trenches.

A small dam was placed in the trench that comes from the thin film dryer room to contain minor liquid spills originating in the dryer room to minimize the spread of contamination into the process area. The dryer room is inspected for leaks in accordance with the inspection schedule in Addendum I. Operators clean up these minor spills by removing the liquid waste and decontaminating the spill area.

A small dam was also placed in the trench adjacent to the chemical feed skid when the chemical berm area was expanded to accommodate acid and caustic pumps, which were moved indoors from the top of the surge tank to resolve a safety concern. This dam was designed to contain minor spills originating in the chemical berm area and prevent them from entering the process sump.

The northwest corner of the process area consists of a pump pit containing the pumps and piping for transferring treated effluent from the verification tanks to SALDS. The pit is built 1.37 meters below the process area floor level and is sloped to drain to a trench built along its north wall that routes liquid to sump tank 1. Leaks into the secondary containment of the pump pit are detected by routine visual inspections.

Sump Tanks. The sump tanks support the secondary containment system, and collect waste from several sources, including:

- Process area drain trenches
- Tank overflows and drains
- Container washing water
- Resin dewatering solution
- Steam boiler blow down
- Sampler system drains.

These double-contained tanks are located within unlined, concrete vaults. The sump tank levels are monitored by remote level indicators or through visual inspections from the sump covers. These indicators are connected to high- and low-level alarms that are monitored in the control room. When a high-level alarm is activated, a pump is activated and the sump tank contents usually are routed to the secondary treatment train for processing. The contents also could be routed to the surge tank for treatment in the primary treatment train. In the event of an abnormally high inflow rate, a second sump pump is initiated automatically.

Verification Tank Secondary Containment. The three verification tanks are each mounted on ringwalls with high-density polyethylene liners similar to the surge tank. The secondary containment for the three tanks is reinforced concrete with a 15.2-centimeter thick floor and a 20.3-centimeter thick dike. The dike extends up 2.6 meters to provide a containment of 110 percent of the capacity of a single tank (Table C.5).

The floor of the secondary containment slopes to a sump along the southern wall of the dike. Leaks into the secondary containment are detected by level instrumentation in the sump that alarms in the control room and/or by routine visual inspections. A sump pump is used to transfer solution in the secondary containment to a sump tank.

C.4.3.2 Additional Requirements for Specific Types of Systems

This section addresses additional requirements in WAC 173-303-640 for double-walled tanks like the sump tanks and secondary containment for ancillary equipment and piping associated with the tank systems.

C.4.3.2.1 Double-Walled Tanks

The sump tanks are the only tanks in the 200 Area ETF classified as 'double-walled' tanks. These tanks are located in unlined concrete vaults and support the secondary containment system for the process area. The sump tanks are equipped with a leak detector between the walls of the tanks that provide continuous monitoring for leaks. The leak detector provides immediate notification through an alarm in the control room. The inner tanks are contained completely within the outer shells. The tanks are contained completely within the concrete structure of the 200 Area ETF so corrosion protection from external galvanic corrosion is not necessary.

C.4.3.2.2 Ancillary Equipment

The secondary containment provided for the tanks and process systems also serves as secondary containment for the ancillary equipment associated with these systems.

Ancillary Equipment. Section D.4.3.1.2 describes the secondary containment systems that also serve most of the ancillary equipment within the 200 Area ETF. Between the 200 Area ETF and the verification tanks, a pipeline trench provides secondary containment for four pipelines connecting the transfer pumps (i.e., discharge and return pumps) in the 200 Area ETF with the verification tanks (Figure C.2). This concrete trench crosses under the road and extends from the verification tank pumps to the verification tanks. Treated effluent flows through these pipelines from the verification tank pumps to the verification tanks. The return pump is used to return effluent to the 200 Area ETF for use as service water or for reprocessing.

For all of the ancillary equipment housed within the ETF, the concrete floor, trenches, and berms form the secondary containment system. For the ancillary equipment of the surge tank and the verification tanks, secondary containment is provided by the concrete floors and dikes associated with these tanks. The concrete floor and pit provide secondary containment for the ancillary equipment of the load-in tanks.

Transfer Piping and Pipe Trenches. The two buried transfer lines between LERF and the surge tank have secondary containment in a pipe-within-a-pipe arrangement. The 4-inch transfer line has an 8-inch outer pipe, while the 3-inch transfer, line has a 6-inch outer pipe. The pipes are fiberglass and are sloped towards the surge tank. The outer piping ends with a drain valve in the surge tank secondary containment.

These pipelines are equipped with leak detection located in the annulus between the inner and outer pipes; the leak detection equipment can continuously 'inspect' the pipelines during aqueous waste transfers. The alarms on the leak detection system are monitored in the control room. A low-volume air purge of the annulus is provided to prevent condensation buildup and minimize false alarms by the leak detection system. In the event that these leak detectors are not in service, the pipelines are inspected during transfers by opening a drain valve to check for solution in the annular space between the inner and outer pipe.

The 3-inch transfer line between the load-in tanks and the surge tank has a 6-inch outer pipe in a pipe-within-a-pipe arrangement. The piping is made of fiberglass-reinforced plastic and slopes towards the load-in tank secondary containment pit. The drain valve and leak detection system for the load-in tank pipelines are operated similarly to the leak detection system for the LERF to 200 Area ETF pipelines.

As previously indicated, a reinforced concrete pipe trench provides secondary containment for piping under the roadway between the 200 Area ETF and the verification tanks. Three 15.2 centimeter thick reinforced concrete partitions divide the trench into four portions and support metal gratings over the trench. Each portion of the trench is 1.2 meters wide, 0.76 meter deep, and slopes To route any solution present to 4-inch drain lines through the north wall of the ETF building. These drain lines route solution to sump tank 2 in ETF. The floor of the pipe trench is 30.5 centimeters thick and the sides are 15.2 centimeters thick. The concrete trenches are coated with water sealant and covered with metal gratings at ground level to allow vehicle traffic on the roadway.

C.4.4 Tank Management Practices

When an aqueous waste stream is identified for treatment or storage at 200 Area ETF, the generating unit is required to characterize the waste. Based on characterization data, the waste stream is evaluated to determine if the stream is acceptable for treatment or storage. Specific tank management practices are discussed in the following sections.

C.4.4.1 Rupture, Leakage, Corrosion Prevention

Most aqueous waste streams can be managed such that corrosion would not be a concern. For example, an aqueous waste stream with high concentrations of chloride might cause corrosion problems when concentrated in the secondary treatment train. One approach is to adjust the corrosion control measures in the secondary treatment train. An alternative might be to blend this aqueous waste in a LERF basin with another aqueous waste that has sufficient dissolved solids, such that the concentration of the chlorides in the secondary treatment train would not pose a corrosion concern.

Additionally, the materials of construction used in the tanks systems (Table C.5) make it unlikely that an aqueous waste would corrode a tank. For more information on corrosion prevention, refer to Addendum B, Waste Analysis Plan.

If operating experience suggests that most aqueous waste streams can be managed such that corrosion would not be a concern, operating practices and integrity assessment schedules and requirements will be reviewed and modified as appropriate.

When a leak in a tank system is discovered, the leak is immediately contained or stopped by isolating the leaking component. Following containment, the requirements of WAC 173-303-640(7), incorporated by reference, are followed. These requirements include repair or closure of the tank/tank system component, and certification of any major repairs.

C.4.4.2 Overfilling Prevention

Operating practices and administrative controls used at the 200 Area ETF to prevent overfilling a tank are discussed in the following paragraphs. The 200 Area ETF process is controlled by the MCS. The MCS monitors liquid levels in the 200 Area ETF tanks and has alarms that annunciate on high-liquid level to notify operators that actions must be taken to prevent overfilling of these vessels. As an additional precaution to prevent spills, many tanks are equipped with overflow lines that route solutions to sump tanks 1 and 2. These tanks include the pH adjustment tank; RO feed tanks, effluent pH adjustment tank, secondary waste receiving tanks, and concentrate tanks.

The following section discusses feed systems, safety cutoff devices, bypass systems, and pressure controls for specific tanks and process systems.

Tanks. All tanks are equipped with liquid level sensors that give a reading of the tank liquid volume. All of the tanks are equipped further with liquid level alarms that are actuated if the liquid volume is near the tank overflow capacity. In the actuation of the surge tank alarm, a liquid level switch trips, sending a signal to the valve actuator on the tank influent lines, and causing the influent valves to close.

The operating mode for each verification tank, i.e., receiving, holding, or discharging, can be designated through the MCS; modes also switch automatically. When the high-level set point on the receiving verification tank is reached, the flow to this tank is diverted and another tank becomes the receiver. The full tank is switched into verification mode. The third tank is reserved for discharge mode.

The liquid levels in the pH adjustment, first and second RO feed, and effluent pH adjustment tanks are maintained within predetermined operating ranges. Should any of these tanks overflow, the excess waste is piped along with any leakage from the feed pumps to a sump tank.

When waste in a secondary waste-receiving tank reaches the high-level set point, the influent flow of waste is redirected to the second tank. In a similar fashion, the concentrate tanks switch receipt modes when the high-level set point of one tank is reached. **Filter Systems.** All filters at 200 Area ETF (i.e., the Load-In Station, rough, fine, and auxiliary filter systems) are in leak-tight steel casings. For the rough and fine filters, a high differential pressure, which could damage the filter element, activates a valve that shuts off liquid flow to protect the filter element from possible damage. To prevent a high-pressure situation, the filters are cleaned routinely with pulses of compressed air that force water back through the filter. Cleaning is terminated automatically by shutting off the compressed air supply if high pressure develops. The differential pressure across the auxiliary filters also is monitored. A high differential pressure in these filters would result in a system shutdown to allow the filters to be changed out.

The Load-In Station filtration system has pressure gauges for monitoring the differential pressure across each filter. A high differential pressure would result in discontinuing filter operation until the filter is replaced.

Ultraviolet Light/Oxidation System and Decomposers. A rupture disk on the inlet piping to each of the UV/OX reaction vessels relieves to the pH adjustment tank in the event of excessive pressure developing in the piping system. Should the rupture disk fail, the aqueous waste would trip the moisture sensor, shut down the UV lamps, and close the surge tank feed valve. Also provided is a level sensor to protect UV lamps against the risk of exposure to air. Should those sensors be actuated, the UV lamps would be shut down immediately.

The piping and valving for the hydrogen peroxide decomposers are configured to split the waste flow: half flows to one decomposer and half flows to the other decomposer. Alternatively, the total flow of waste can be treated in one decomposer or both decomposers can be bypassed. A safety relief valve on each decomposer vessel can relieve excess system pressure to a sump tank.

Degasification System. The degasification column is typically supplied aqueous waste feed by the pH adjustment tank feed pump. This pump transfers waste solution through the hydrogen peroxide decomposer, the fine filter, and the degasification column to the first RO feed tank.

The degasification column is designed for operation at a partial vacuum. A pressure sensor in the outlet of the column detects the column pressure. The vacuum in the degasification column is maintained by a blower connected to the vessel off gas system. The column is protected from extremely low pressure developed by the column blower by the use of an intake vent that is maintained in the open position during operation. The column liquid level is regulated by a flow control system with a high- and low-level alarm. Plate-type heat exchanger cools the waste solution fed to the degasification column.

Reverse Osmosis System. The flow through the first and second RO stages is controlled to maintain constant liquid levels in the first and second stage RO feed tanks.

Polisher. Typically, two of the three columns are in operation (lead/lag) and the third (regenerated) column is in standby. When the capacity of the resin in the first column is exceeded, as detected by an increase in the conductivity of the column effluent, the third column, containing freshly regenerated IX resin, is brought online. The first column is taken offline, and the waste is rerouted to the second column, and to the third. Liquid level instrumentation and automatically operated valves are provided in the IX system to prevent overfilling.

Effluent Treatment Facility Evaporator. Liquid level instrumentation in the secondary waste receiving tanks is designed to preclude a tank overflow. A liquid level switch actuated by a high-tank liquid level causes the valves to reposition, closing off flow to the secondary waste receiving tanks. Secondary containment for these tanks routes liquids to a sump tank.

Valves in the 200 Area ETF evaporator feed line can be positioned to bypass the secondary waste around the 200 Area ETF evaporator and to transfer the secondary waste to the concentrate tanks.

Thin Film Dryer. The two concentrate tanks alternately feed the thin film dryer. Typically, one tank serves as a concentrate waste receiver while the other tank serves as the dryer feed tank. One tank may serve as both concentrate waste receiver and dryer feed tank. Liquid level instrumentation prevents tank overflow by diverting the concentrate flow from the full concentrate tank to the other concentrate tank. Secondary containment for these tanks routes liquids to a sump tank.

An alternate route is provided from the concentrate receiver tank to the secondary waste receiving tanks. Dilute concentrate in the concentrate receiver tank can be reprocessed through the 200 Area ETF evaporator by transferring the concentrate back to a secondary waste-receiving tank.

C.4.5 Labels or Signs

Each tank or process unit in the 200 Area ETF is identified by a nameplate attached in a readily visible location. Included on the nameplate are the equipment number and the equipment title. Those tanks that store or treat dangerous waste at the 200 Area ETF (Section 4C.4.1.1) are identified with a label, which reads *PROCESS WATER/WASTE*. The labels are legible at a distance of at least fifty feet or as appropriate for legibility within the ETF. Additionally, these tanks bear a legend that identifies the waste in a manner, which adequately warns employees, emergency personnel, and the public of the major risk(s) associated with the waste being stored or treated in the tank system(s).

Caution plates are used to show possible hazards and warn that precautions are necessary. Caution signs have a yellow background and black panel with yellow letters and bear the word *CAUTION*. Danger signs show immediate danger and signify that special precautions are necessary. These signs are red, black, and white and bear the word *DANGER*.

Tanks and vessels containing corrosive chemicals are posted with black and white signs bearing the word *CORROSIVE*. *DANGER - UNAUTHORIZED PERSONNEL KEEP OUT* signs are posted on all exterior doors of the ETF, and on each interior door leading into the process area. Tank ancillary piping is also labeled *PROCESS WATER* or *PROCESS LIQUID* to alert personnel which pipes in the process area contains dangerous and/or mixed waste.

All tank systems holding dangerous waste are marked with labels or signs to identify the waste contained in the tanks. The labels or signs are legible at a distance of at least 50-feet and bear a legend that identifies the waste in a manner that adequately warns employees, emergency response personnel, and the public, of the major risk(s) associated with the waste being stored or treated in the tank system(s).

C.4.6 Air Emissions

Tank systems that contain extremely hazardous waste that is acutely toxic by inhalation must be designed to prevent the escape of such vapors. To date, no extremely hazardous waste has been managed in 200 Area ETF tanks and is not anticipated. However, the 200 Area ETF tanks have forced ventilation that draws air from the tank vapor spaces to prevent exposure of operating personnel to any toxic vapors that might be present. The vapor passes through a charcoal filter and two sets of high-efficiency particulate air filters before discharge to the environment. The Load-in tanks and verification tanks are vented to the atmosphere.

C.4.7 Management of Ignitable or Reactive Wastes in Tanks Systems

Although the 200 Area ETF is permitted to accept waste that is designated ignitable or reactive, such waste would be treated or blended immediately after placement in the tank system so that the resulting waste mixture is no longer ignitable or reactive. Aqueous waste received does not meet the definition of a combustible or flammable liquid given in National Fire Protection Association (NFPA) code number 30 (NFPA 1996). The buffer zone requirements in NFPA-30, which require tanks containing combustible or flammable solutions be a safe distance from each other and from public way, are not applicable.

C.4.8 Management of Incompatible Wastes in Tanks Systems

The 200 Area ETF manages dilute solutions that can be mixed without compatibility issues. The 200 Area ETF is equipped with several systems that can adjust the pH of the waste for treatment activities. Sulfuric acid and sodium hydroxide are added to the process through the MCS for pH adjustment to ensure there will be no large pH fluctuations and adverse reactions in the tank systems.

C.5 SURFACE IMPOUNDMENTS

This section provides specific information on surface impoundment operations at the LERF, including descriptions of the liners and secondary containment structures, as required by WAC 173-303-650 and WAC 173-303-806(4)(d).

The LERF consists of three lined surface impoundments (basins) with a design operating capacity of 29.5 million liters each. The maximum capacity of each basin is 34 million liters. The dimensions of each basin at the anchor wall are approximately 103 meters by 85 meters. The typical top dimensions of the wetted area are approximately 89 meters by 71 meters, while the bottom dimensions are approximately 57 by 38 meters. Total depth from the top of the dike to the bottom of the basin is approximately 7 meters. The typical finished basin bottoms lie at about 4 meters below the initial grade and 175 meters above sea level. The dikes separating the basins have a typical height of 3 meters and typical top width of 11.6 meters around the perimeter of the impoundments.

C.5.1 List of Dangerous Waste

A list of dangerous and/or mixed aqueous waste that can be stored in LERF is presented in Addendum A. Addendum B, Waste Analysis Plan also provides a discussion of the types of waste that are managed in the LERF.

C.5.2 Construction, Operation, and Maintenance of Liner System

General information concerning the liner system is presented in the following sections. Information regarding loads on the liner, liner coverage, UV light exposure prevention, and location relative to the water table are discussed.

C.5.2.1 Liner Construction Materials

The LERF employs a double-composite liner system with a leachate detection, collection, and removal system between the primary and secondary liners. Each basin is constructed with an upper or primary liner consisting of a high-density polyethylene geomembrane laid over a bentonite carpet liner. The lower or secondary liner in each basin is a composite of a geomembrane laid over a layer of soil/bentonite admixture with a hydraulic conductivity less than 10^{-7} centimeters per second. The synthetic liners extend up the dike wall to a concrete anchor wall that surrounds the basin at the top of the dike. A batten system bolts the layers in place to the anchor wall (Figure C.16).

Figure C.17 is a schematic cross-section of the liner system. The liner components, listed from the top to the bottom of the liner system, are the following:

- Primary 1.5-millimeter high-density polyethylene geomembrane
- Bentonite carpet liner
- Geotextile
- Drainage gravel (bottom) and geonet (sides)
- Geotextile
- Secondary 1.5-millimeter high-density polyethylene geomembrane
- Soil/bentonite admixture (91 centimeters on the bottom, 107 centimeters on the sides)
- Geotextile

The primary geomembrane, made of 1.5-millimeter high-density polyethylene, forms the basin surface that holds the aqueous waste. The secondary geomembrane, also 1.5-millimeter high-density polyethylene, forms a barrier surface for leachate that might penetrate the primary liner. The high-density polyethylene chemically is resistant to constituents in the aqueous waste and has a relatively high strength compared to other lining materials. The high-density polyethylene resin specified for the LERF contains carbon black, antioxidants, and heat stabilizers to enhance its resistance to the degrading effects of UV light. The approach to ensuring the compatibility of aqueous waste streams with the LERF liner materials and piping is discussed in Addendum B, Waste Analysis Plan.

Three geotextile layers are used in the LERF liner system. The layers are thin, nonwoven polypropylene fabric that chemically is resistant, highly permeable, and resistant to microbiological growth. The first two layers prevent fine soil particles from infiltrating and clogging the drainage layer. The second geotextile also provides limited protection for the secondary geomembrane from the drainage rock. The third geotextile layer prevents the mixing of the soil/bentonite admixture with the much more porous and granular foundation material.

A 30.5-centimeters-thick gravel drainage layer on the bottom of the basins between the primary and secondary liners provides a flow path for liquid to the leachate detection, collection, and removal system. A geonet (or drainage net) is located immediately above the secondary geomembrane on the basin sidewalls. The geonet functions as a preferential flow path for liquid between the liners, carrying liquid down to the gravel drainage layer and subsequently to the leachate sump. The geonet is a mesh made of high-density polyethylene, with approximately 13-millimeter openings.

The soil/bentonite layer is 91 centimeters thick on the bottom of the basins and 107 centimeters thick on the basin sidewalls; its permeability is less than 10^{-7} centimeters per second. This composite liner design, consisting of a geomembrane laid over essentially impermeable soil/bentonite, is considered best available technology for solid waste landfills and surface impoundments. The combination of synthetic and clay liners is reported in the literature to provide the maximum protection from waste migration (Forseth and Kmet 1983).

A number of laboratory tests were conducted to measure the engineering properties of the soil/bentonite admixture, in addition to extensive field tests performed on three test fills constructed near the LERF site. For establishing an optimum ratio of bentonite to soil for the soil/bentonite admixture, mixtures of various ratios were tested to determine permeability and shear strength. A mixture of 12 percent bentonite was selected for the soil/bentonite liner and tests described in the following paragraphs demonstrated that the admixture meets the desired permeability of less than 10-7 centimeters per second. Detailed discussion of test procedures and results is provided in Report of Geotechnical Investigation, 242-A Evaporation and PUREX Interim Storage Basins (Chen-Northern 1990).

Direct shear tests were performed according to ASTM D3080 test procedures (ASTM 1990) on soil/bentonite samples of various ratios. Based on these results, the conservative minimum Mohr-Coulomb shear strength value of 30 degrees was estimated for a soil/bentonite admixture containing 12 percent bentonite.

The high degree of compaction of the soil/bentonite layer [92 percent per ASTM D1557 (ASTM 1991)] was expected to maximize the bonding forces between the clay particles, thereby minimizing moisture transport through the liner. With respect to particle movement ('piping'), estimated fluid velocities in this low-permeability material are too low to move the soil particles. Therefore, piping is not considered a problem.

For the soil/bentonite layer, three test fills were constructed to demonstrate that materials, methods, and procedures used would produce a soil/bentonite liner that meets the EPA permeability requirement of less than 10^{-7} centimeters per second. All test fills met the EPA requirements. A thorough discussion of construction procedures, testing, and results is provided in *Report of Permeability Testing, Soil-bentonite Test Fill* (Chen-Northern 1991a).

The aqueous waste stored in the LERF is typically a dilute mixture of organic and inorganic constituents. Though isolated instances of soil liner incompatibility have been documented in the literature (Forseth and Kmet 1983), these instances have occurred with concentrated solutions that were incompatible with the geomembrane liners in which the solutions were contained. Considering the dilute nature of the aqueous waste that is and will be stored in LERF and the moderate pH, and test results demonstrating the compatibility of the high-density polyethylene liners with the aqueous waste [9090 Test Results (WHC 1991)], gross failure of the soil/bentonite layer is not probable.

Each basin also is equipped with a floating very low-density polyethylene cover. The cover is anchored and tensioned at the concrete wall at the top of the dikes, using a patented mechanical tensioning system. Figure C.16 depict the tension mechanism and the anchor wall at the perimeter of each basin. Additional information on the cover system is provided in Section C.5.2.5.

C.5.2.1.1 Material Specifications

Material specifications for the liner system and leachate collection system, including liners, drainage gravel, and drainage net are discussed in the following sections. Material specifications are documented in the *Final Specifications 242-A Evaporator and PUREX Interim Retention Basins* (KEH 1990a) and *Construction Specifications for 242-A Evaporator and PUREX Interim Retention Basins* (KEH 1990b).

Geomembrane Liners. The high-density polyethylene resin for geomembranes for the LERF meets the material specifications listed in Table C.9. Key physical properties include thickness (1.5 millimeters [60 mil]) and impermeability (hydrostatic resistance of over 360,000 kilogram per square meter). Physical properties meet National Sanitation Foundation Standard 54 (NSF 1985). Testing to determine if the liner material is compatible with typical dilute waste solutions was performed and documented in *9090 Test Results* (WHC 1991).

Soil/Bentonite Liner. The soil/bentonite admixture consists of 11.5 to 14.5 percent bentonite mixed into well-graded silty sand with a maximum particle size of 4.75 millimeters (No. 4 sieve). Test fills were performed to confirm the soil/bentonite admixture applied at LERF has hydraulic conductivity less than 10^{-7} centimeters per second, as required by WAC 173-303-650(2)(j) for new surface impoundments.

Bentonite Carpet Liner. The bentonite carpet liner consists of bentonite (90 percent sodium montmorillonite clay) in a primary backing of woven polypropylene with nylon filler fiber, and a cover fabric of open weave spunlace polyester. The montmorillonite is anticipated to retard migration of solution through the liner, exhibiting a favorable cation exchange for adsorption of some constituents (such as ammonium). Based on composition of the bentonite carpet and of the type of aqueous waste stored at LERF, no chemical attack, dissolution, or degradation of the bentonite carpet liner is anticipated.

Geotextile. The nonwoven geotextile layers consist of long-chain polypropylene polymers containing stabilizers and inhibitors to make the filaments resistant to deterioration from UV light and heat exposure. The geotextile layers consist of continuous geotextile sheets held together by needle punching. Edges of the fabric are sealed or otherwise finished to prevent outer material from pulling away from the fabric or raveling.

Drainage Gravel. The drainage layer consists of thoroughly washed and screened, naturally occurring rock meeting the size specifications for Grading Number 5 in Washington State Department of Transportation construction specifications (WSDOT 1988). The specifications for the drainage layer are given in Table C.10. Hydraulic conductivity tests (Chen-Northern 1992a, 1992b, 1992c) showed the drainage rock used at LERF met the sieve requirements and had a hydraulic conductivity of at least 1 centimeter per second, which exceeded the minimum of at least 0.1 centimeters per second required by WAC 173-303-650(2)(j) for new surface impoundments.

Geonet. The geonet is fabricated from two sets of parallel high-density polyethylene strands, spaced 1.3 centimeters center-to-center maximum to form a mesh with minimum two strands per 2.54 centimeter in each direction. The geonet is located between the liners on the sloping sidewalls to provide a preferential flow path for leachate to the drainage gravel and subsequently to the leachate sump.

Leachate Collection Sump. Materials used to line the 3.0-meter by 1.8-meter by 0.30-meter-deep leachate sump, at the bottom of each basin in the northwest corner, include [from top to bottom (Figure C.18)]:

- 25 millimeter high-density polyethylene flat stock (supporting the leachate riser pipe)
- Geotextile
- 1.5-millimeter high-density polyethylene rub sheet
- Secondary composite liner:
  - 1.5-millimeter high-density polyethylene geomembrane
  - 91 centimeters of soil/bentonite admixture
  - Geotextile

Specifications for these materials are identical to those discussed previously.

Leachate System Risers. Risers for the leachate system consist of 10-inch and 4-inch pipes from the leachate collection sump to the catch basin northwest of each basin (Figure C.18). The risers lay below the primary liner in a gravel-filled trench that also extends from the sump to the concrete catch basin (Figure C.19).

The risers are high-density polyethylene pipes fabricated to meet the requirements in ASTM D1248 (ASTM 1989). The 10-inch riser is perforated every 20.3 centimeters with 1.3-centimeter holes around the diameter. Level sensors and leachate pump are inserted in the 10-inch riser to monitor and remove leachate from the sump. To prevent clogging of the pump and piping with fine particulate, the end of the riser is encased in a gravel-filled box constructed of high-density polyethylene geonet and wrapped in geotextile. The 4-inch riser is perforated every 10.2 centimeters with 0.64-centimeter holes around the diameter. A level detector is inserted in the 4-inch riser.

Leachate Pump. A deep-well submersible pump, designed to deliver approximately 110 liters per minute, is installed in the 10-inch leachate riser in each basin. Wetted parts of the leachate pump are made of 316L stainless steel, providing both corrosion resistance and durability.

C.5.2.1.2 Loads on Liner System

The LERF liner system is subjected to the following types of stresses.

Stresses from Installation or Construction Operations. Contractors were required to submit construction quality control plans that included procedures, techniques, tools, and equipment used for the construction and care of liner and leachate system. Methods for installation of all components were screened to ensure that the stresses on the liner system were kept to a minimum.

Calculations were performed to estimate the risk of damage to the secondary high-density polyethylene liner during construction (*Calculations for LERF Part B Permit Application* [HNF 1997]). The greatest risk expected was from spreading the gravel layer over the geotextile layer and secondary geomembrane. The results of the calculations show that the strength of the geotextile was sufficiently high to withstand the stress of a small gravel spreader driving on a minimum of 15 centimeters of gravel over the geotextile and geomembrane. The likelihood of damage to the geomembrane lying under the geotextile was considered low.

To avoid driving heavy machinery directly on the secondary liner, a 28-meter conveyer was used to deliver the drainage gravel into the basins. The gravel was spread and consolidated by hand tools and a bulldozer. The bulldozer traveled on a minimum thickness of 30.5 centimeters of gravel. Where the conveyer assembly was placed on top of the liner, cribbing was placed to distribute the conveyer weight. No heavy equipment was allowed for use directly in contact with the geomembranes.

Additional calculations were performed to estimate the ability of the leachate riser pipe to withstand the static and dynamic loading imposed by lightweight construction equipment riding on the gravel layer (HNF 1997). Those calculations demonstrated that the pipe could buckle under the dynamic loading of small construction equipment; therefore, the pipe was avoided by equipment during spreading of the drainage gravel.

Installation of synthetic lining materials proceeded only when winds were less than 24 kilometers per hour, and not during precipitation. The minimum ambient air temperature for unfolding or unrolling the high-density polyethylene sheets was -10 C, and a minimum temperature of 0 C was required for seaming the high-density polyethylene sheets. Between shifts, geomembranes and geotextile were anchored with sandbags to prevent lifting by wind. Calculations were performed to determine the appropriate spacing of sandbags on the geomembrane to resist lifting caused by 130 kilometer per hour winds (HNF 1997). All of the synthetic components contain UV light inhibitors and no impairment of performance is anticipated from the short-term UV light exposure during construction. Section C.5.2.4 provides further detail on exposure prevention.

During the laying of the soil/bentonite layer and the overlying geomembrane, moisture content of the admixture was monitored and adjusted to ensure optimum compaction and to avoid development of cracks.

C.5.2.1.3 Static and Dynamic Loads and Stresses from the Maximum Quantity of Waste

When a LERF basin is full, liquid depth is approximately 6.4 meters. Static load on the primary liner is roughly 6,400 kilograms per square meter. Load on the secondary liner is slightly higher because of the weight of the gravel drainage layer. Assuming a density of 805 kilograms per square meter for the drainage gravel [conservative estimate based on specific gravity of 2.65 (Ambrose 1988)], the secondary high-density polyethylene liner carries approximately 7,200 kilograms per square meter when a basin is full.

Side slope liner stresses were calculated for each of the layers in the basin sidewalls and for the pipe trench on the northwest corner of each basin (HNF 1997). Results of these calculations indicate factors of safety against shear were 1.5 or greater for the primary geomembrane, geotextile, geonet, and secondary geomembrane.

Because the LERF is not located in an area of seismic concern, as identified in Appendix VI of 40 CFR 264 and WAC 173-303-282(6)(a)(I), discussion and calculation of potential seismic events are not required.

C.5.2.1.4 Stresses Resulting from Settlement, Subsidence, or Uplift

Uplift stresses from natural sources are expected to have negligible impact on the liner. Groundwater lies approximately 62 meters below the LERF, average annual precipitation is only 16 centimeters, and the average unsaturated permeability of the soils near the basin bottoms is high, ranging from about 5.5×10^4 centimeters per second to about 1 centimeter per second (Chen-Northern 1991b). Therefore, no hydrostatic uplift forces are expected to develop in the soil underneath the basins. In addition, the soil under the basins consists primarily of gravel and sand, and contains few or no organic constituents. Therefore, uplift caused by gas production from organic degradation is not anticipated.

Based on the design of the soil-bentonite liner, no structural uplift stresses are present within the lining system (Chen-Northern 1991b).

Regional subsidence is not anticipated because neither petroleum nor extractable economic minerals are present in the strata underlying the LERF basins, nor is karst (erosive limestone) topography present.

Dike soils and soil/bentonite layers were compacted thoroughly and proof-rolled during construction. Calculation of settlement potential showed that combined settlement for the foundation and soil/bentonite layer is expected to be about 2.7 centimeters. Settlement impact on the liner and basin stability is expected to be minimal (Chen-Northern 1991b).

C.5.2.1.5 Internal and External Pressure Gradients

Pressure gradients across the liner system from groundwater are anticipated to be negligible. The LERF is about 62 meters above the seasonal high water table, which prevents buildup of water pressure below the liner. The native gravel foundation materials of the LERF are relatively permeable and free draining. The 2 percent slope of the secondary liner prevents the pooling of liquids on top of the secondary liner. Finally, the fill rate of the basins is slow enough (average 190 liters per minute) that the load of the liquid waste on the primary liner is gradually and evenly distributed.

To prevent the buildup of gas between the liners, each basin is equipped with 21 vents in the primary geomembrane located above the maximum water level that allow the reduction of any excess gas pressure. Gas passing through these vents exit through a single pipe that penetrates the anchor wall into a carbon adsorption filter. This filter extracts nearly all of the organic compounds, ensuring that emissions to the air from the basins are not toxic.

C.5.2.2 Liner System Location Relative to High-Water Table

The lowest point of each LERF basin is the northwest corner of the sump, where the typical subgrade elevation is 175 meters above mean sea level. Based on data collected from the groundwater monitoring wells at the LERF site, the seasonal high-water table is located approximately 62 meters or more below the lowest point of the basins. This substantial thickness of unsaturated strata beneath the LERF provides ample protection to the liner from hydrostatic pressure because of groundwater intrusion into the soil/bentonite layer. Further discussion of the unsaturated zone and site hydrogeology is provided in Addendum D, Groundwater Monitoring Plan.

C.5.2.3 Liner System Foundation

Foundation materials are primarily gravels and cobbles with some sand and silt. The native soils onsite are derived from unconsolidated Holocene sediments. These sediments are fluvial and glaciofluvial sands and gravels deposited during the most recent glacial and postglacial event. Grain-size distributions and shape analyses of the sediments indicate that deposition occurred in a high-energy environment (Chen-Northern 1990).

Analysis of five soil borings from the LERF site was conducted to characterize the natural foundation materials and to determine the suitability of onsite soils for construction of the impoundment dikes and determine optimal design factors. Well-graded gravel containing varying amounts of silt, sand, and cobbles comprises the layer in which the basins were excavated. This gravel layer extends to depths of 10 to 11 meters below land surface (Chen-Northern 1990). The basins are constructed directly on the subgrade. Excavated soils were screened to remove oversize cobbles (greater than 15 centimeters in the largest dimension) and used to construct the dikes.

Settlement potential of the foundation material and soil/bentonite layer was found to be low. The foundation is comprised of undisturbed native soils. The bottom of the basin excavation lies within the well-graded gravel layer, and is dense to very dense. Below the gravel is a layer of dense to very dense poorly graded and well-graded sand. Settlement was calculated for the gravel foundation soils and for the soil/bentonite layer, under the condition of hydrostatic loading from 6.4 meters of fluid depth. The combined settlement for the soils and the soil/bentonite layer is estimated to be about 2.7 centimeters. This amount of settlement is expected to have minimal impact on overall liner or basin stability (Chen-Northern 1991b). Settlement calculations are provided in *Calculations for Liquid Effluent Retention Facility Part B Permit Application* (HNF 1997).

The load bearing capacity of the foundation material, based on the soil analysis discussed previously, is estimated at about 48,800 kilograms per square meter [maximum advisable presumptive bearing capacity (Hough 1969)]. Anticipated static and dynamic loading from a full basin is estimated to be less than 9,000 kilograms per square meter (Section C.5.2.1.3), which provides an ample factor of safety.

When the basins are empty, excess hydrostatic pressure in the foundation materials under the liner system theoretically could result in uplift and damage. However, because the native soil forming the foundations is unsaturated and relatively permeable, and because the water table is located at a considerable depth beneath the basins, any infiltration of surface water at the edge of the basin is expected to travel predominantly downward and away from the basins, rather than collecting under the excavation itself. No gas is expected in the foundation because gas-generating organic materials are not present.

Subsidence of undisturbed foundation materials is generally the result of fluid extraction (water or petroleum), mining, or karst topography. Neither petroleum, mineral resources, nor karst are believed to be present in the sediments overlying the Columbia River basalts. Potential groundwater resources do exist below the LERF. Even if these sediments were to consolidate from fluid withdrawal, their depth most likely would produce a broad, gently sloping area of subsidence that would not cause significant strains in the LERF liner system. Consequently, the potential for subsidence related failures are expected to be negligible.

Borings at the LERF site, and extensive additional borings in the 200 East Area, have not identified any significant quantities of soluble materials in the foundation soil or underlying sediments (Last et al. 1989). Consequently, the potential for sinkholes is considered negligible.

C.5.2.4 Liner System Exposure Prevention

Both primary and secondary geomembranes and the floating cover are stabilized with carbon black to prevent degradation from UV light. Furthermore, none of the liner layers experience long-term exposure to the elements. During construction, thin polyethylene sheeting was used to maintain optimum moisture content and provide protection from the wind for the soil/bentonite layer until the secondary geomembrane was laid in place. The secondary geomembrane was covered by the geonet and geotextile as soon as quality control testing was complete. Once the geotextile layer was completed, drainage material immediately was placed over the geotextile. The final (upper) geotextile layer was placed over the drainage gravel and immediately covered by the bentonite carpet liner. This was covered immediately, in turn, by the primary high-density polyethylene liner.

Both high-density polyethylene liners, geotextile layers, and geonet are anchored permanently to a concrete wall at the top of the basin berm. During construction, liners were held in place with many sandbags on both the basin bottoms and side slopes to prevent wind from lifting and damaging the materials. Calculations were performed to determine the amount of fluid needed in a basin to prevent wind lift damage to the primary geomembrane. Approximately 15 to 20 centimeters of solution are kept in each basin to minimize the potential for uplifting the primary liner (HNF 1997).

The entire lining system is covered by a very low-density polyethylene floating cover that is bolted to the concrete anchor wall. The floating cover prevents evaporation and intrusion from dust, precipitation, vegetation, animals, and birds. A patented tensioning system is employed to prevent wind from lifting the cover and automatically accommodate changes in liquid level in the basins. The cover tension mechanism consists of a cable running from the flexible geosynthetic cover over a pulley on the tension tower (located on the concrete anchor wall) to a dead man anchor. These anchors (blocks) simply hang from the cables on the exterior side of the tension towers. The anchor wall also provides for solid attachment of the liner layers and the cover, using a 6.4-millimeter batten and neoprene gasket to bolt the layers to the concrete wall, effectively sealing the basin from the intrusion of light, precipitation, and airborne dust (Figure C.16).

The floating cover, made of very low-density polyethylene with UV light inhibitors, is not anticipated to experience unacceptable degradation during the service life of the LERF. The very low-density polyethylene material contains carbon black for UV light protection, anti-oxidants to prevent heat degradation, and seaming enhancers to improve its ability to be welded. A typical manufacturer's limited warranty for weathering of very low-density polyethylene products is 20 years (Poly America, undated). This provides a margin of safety for the anticipated medium-term use of the LERF for aqueous waste storage.

The upper 3.4 to 4.6 meters of the sidewall liner also could experience stresses in response to temperature changes. Accommodation of thermal influences for the LERF geosynthetic layers is affected by inclusion of sufficient slack as the liners were installed. Calculations demonstrate that approximately 67 centimeters of slack is required in the long basin bottom dimension, 46 centimeters across the basin, and 34 centimeters from the bottom of the basin to the top of the basin wall (HNF 1997).

Thermal stresses also are experienced by the floating cover. As with the geomembranes, sufficient slack was included in the design to accommodate thermal contraction and expansion.

C.5.2.4.1 Liner Repairs During Operations

Should repair of a basin liner be required while the basin is in operation, the basin contents will be transferred to the 200 Area ETF or another available basin. After the liner around the leaking section is cleaned, repairs to the geomembrane will be made by the application of a piece of high-density polyethylene sheeting, sufficient in size to extend approximately 8 to 15 centimeters beyond the damaged area, or as recommended by the vendor. A round or oval patch will be installed using the same type of equipment and criteria used for the initial field installations.

C.5.2.4.2 Control of Air Emissions

The floating covers limit evaporation of aqueous waste and releases of volatile organic compounds into the atmosphere. To accommodate volumetric changes in the air between the fluid in the basin and the cover, and to avoid problems related to 'sealing' the basins too tightly, each basin is equipped with a carbon filter breather vent system. Any air escaping from the basins must pass through this vent, consisting of a pipe that penetrates the anchor wall and extends into a carbon adsorption filter unit.

C.5.2.5 Liner Coverage

The liner system covers the entire ground surface that underlies the retention basins. The primary liner extends up the side slopes to a concrete anchor wall at the top of the dike encircling the entire basin (Figure C.16).

C.5.3 Prevention of Overtopping

Overtopping prevention is accomplished through administrative controls and liquid-level instrumentation installed in each basin. The instrumentation includes local liquid-level indication as well as remote indication at the ETF. Before an aqueous waste is transferred into a basin, administrative controls are implemented to ensure overtopping will not occur during the transfer. The volume of feed to be transferred is compared to the available volume in the receiving basin. The transfer is not initiated unless there is sufficient volume available in the receiving basin or a cut-off level is established. The transfer into the basin would be stopped when this cut-off level is reached.

In the event of a 100-year, 24-hour storm event, precipitation would accumulate on the basin covers. Through the self-tensioning design of the basin covers and maintenance of adequate freeboard, all accumulated precipitation would be contained on the covers and none would flow over the dikes or anchor walls. The 100-year, 24-hour storm is expected to deliver 5.3 centimeters of rain or approximately 61 centimeters of snow. Cover specifications include the requirement that the covers be able to withstand the load from this amount of precipitation. Because the cover floats on the surface of the fluid in the basin, the fluid itself provides the primary support for the weight of the accumulated precipitation. Through the cover self-tensioning mechanism, there is ample 'give' to accommodate the overlying load without overstressing the anchor and attachment points.

Rainwater and snow evaporate readily from the cover, particularly in the arid Hanford Facility climate, where evaporation rates exceed precipitation rates for most months of the year. The black color of the cover further enhances evaporation. Thus, the floating cover prevents the intrusion of precipitation into the basin and provides for evaporation of accumulated rain or snow.

C.5.3.1 Freeboard

Under current operating conditions, 0.61 meter of freeboard is maintained at each LERF basin, which corresponds to an operating level of 6.8 meters, or 29.5 million liters.

C.5.3.2 Immediate Flow Shutoff

The mechanism for transferring aqueous waste is either through pump transfers with on/off switches or through gravity transfers with isolation valves. These methods provide positive ability to shut off transfers immediately in the event of overtopping. Overtopping a basin during a transfer is very unlikely because the low flow rate into the basin provides long response times. At a flow rate of 284 liters per minute, approximately 11 days would be required to fill a LERF basin from the 6.8-meter operating level (i.e., 0.61 meter of freeboard) to maximum capacity of 34 million liters (i.e., the 7.4-meter level).

C.5.3.3 Outflow Destination

Aqueous waste in the LERF is transferred routinely to 200 Area ETF for treatment. However, should it be necessary to immediately empty a basin, the aqueous waste either would be transferred to the 200 Area ETF for treatment or transferred to another basin (or basins), whichever is faster. If necessary a temporary pumping system may be installed to increase the transfer rate.

C.5.4 Structural Integrity of Dikes

The structural integrity of the dikes was certified attesting to the structural integrity of the dikes, signed by a qualified, registered professional engineer.

C.5.4.1 Dike Design, Construction, and Maintenance

The dikes of the LERF are constructed of onsite native soils, generally consisting of cobbles and gravels. Well-graded mixtures were specified, with cobbles up to 15 centimeters in the largest dimension, but not constituting more than 20 percent of the volume of the fill. The dikes are designed with a 3:1 (3 units horizontal to 1 unit vertical) slope on the basin side, and 2.25:1 on the exterior side. The dikes are approximately 8.2 meters high from the bottom of the basin, and 3 meters above grade.

Calculations were performed to verify the structural integrity of the dikes (HNF 1997). The calculations demonstrate that the structural strength of the dikes is such that, without dependence on any lining system, the sides of the basins can withstand the pressure exerted by the maximum allowable quantity of fluid in the impoundment. The dikes have a factor of safety greater than 2.5 against failure by sliding.

C.5.4.2 Dike Stability and Protection

In the following paragraphs, various aspects of stability for the LERF dikes and the concrete anchor wall are presented, including slope failure, hydrostatic pressure, and protection from the environment.

Failure in Dike/Impoundment Cut Slopes. A slope stability analysis was performed to determine the factor of safety against slope failure. The computer program 'PCSTABL5' from Purdue University, using the modified Janbu Method, was employed to evaluate slope stability under both static and seismic loading cases. One hundred surfaces per run were generated and analyzed. The assumptions used were as follows (Chen-Northern 1991b):

- Weight of gravel: 2,160 kilograms per cubic meter
- Maximum dry density of gravel: 2,315 kilograms per cubic meter
- Mohr-Coulomb shear strength angle for gravel: minimum 33 degrees
- Weight of soil/bentonite: 1,600 kilograms per cubic meter
- Mohr-Coulomb shear strength angle for soil/bentonite: minimum 30 degrees
- Slope: 3 horizontal: 1 vertical
- No fluid in impoundment (worst case for stability)
- Soils at in-place moisture (not saturated conditions)

Results of the static stability analysis showed that the dike slopes were stable with a minimum factor of safety of 1.77 (Chen-Northern 1991b).

The standard horizontal acceleration required in the *Hanford Plant Standards*, "Standard Architectural-Civil Design Criteria, Design Loads for Facilities" (DOE-RL 1988), for structures on the Hanford Site is 0.12 g. Adequate factors of safety for cut slopes in units of this type generally are considered 1.5 for static conditions and 1.1 for dynamic stability (Golder 1989). Results of the stability analysis showed that the LERF basin slopes were stable under horizontal accelerations of 0.10 and 0.15 g, with minimum factors of safety of 1.32 and 1.17, respectively (Chen-Northern 1991b). Printouts from the PCSTABL5 program are provided in *Calculations for Liquid Effluent Retention Facility Part B Permit Application* (HNF 1997).

Hydrostatic Pressure. Failure of the dikes due to buildup of hydrostatic pressure, caused by failure of the leachate system or liners, is very unlikely. The liner system is constructed with two essentially impermeable layers consisting of a synthetic layer overlying a soil layer with low-hydraulic conductivity. It would require a catastrophic failure of both liners to cause hydrostatic pressures that could endanger dike integrity. Routine inspections of the leachate detection system, indicating quantities of leachate removed from the basins, provide an early warning of leakage or operational problems that could lead to excessive hydrostatic pressure. A significant precipitation event (e.g., a 100-year, 24-hour storm) will not create a hydrostatic problem because the interior sidewalls of the basins are covered completely by the liners. The covers can accommodate this volume of precipitation without overtopping the dike (Section C.5.3), and the coarse nature of the dike and foundation materials on the exterior walls provides for rapid drainage of precipitation away from the basins.

Protection from Root Systems. Risk to structural integrity of the dikes because of penetrating root systems is minimal. Excavation and construction removed all vegetation on and around the impoundments, and native plants (such as sagebrush) grow very slowly. The large grain size of the cobbles and gravel used as dike construction material do not provide an advantageous germination medium for native plants. Should plants with extending roots become apparent on the dike walls, the plants will be controlled with appropriate herbicide application.

Protection from Burrowing Mammals. The cobble size materials that make up the dike construction material and the exposed nature of the dike sidewalls do not offer an advantageous habitat for burrowing mammals. Lack of vegetation on the LERF site discourages foraging. The risk to structural integrity of the dikes from burrowing mammals is therefore minimal. Periodic visual inspections of the dikes provide observations of any animals present. Should burrowing mammals be noted onsite, appropriate pest control methods such as trapping or application of rodenticides will be employed.

Protective Cover. Approximately 7.6 centimeters of crushed gravel serve as the cover of the exterior dike walls. This coarse material is inherently resistant to the effect of wind because of its large grain size. Total annual precipitation is low (16 centimeters) and a significant storm event (e.g., a 100-year, 24-hour storm) could result in about 5.3 centimeters of precipitation in a 24-hour period. The absorbent capacity of the soil exceeds this precipitation rate; therefore, the impact of wind and precipitation run-on to the exterior dike walls will be minimal.

C.5.5 Piping Systems

Aqueous waste from the 242-A Evaporator is transferred to the LERF using a pump located in the 242-A Evaporator and approximately 1,500 meters of pipe, consisting of a 3-inch carrier pipe within a 6-inch outer containment pipeline. Flow through the pump is controlled through a valve at flow rates from 150 to 300 liters per minute. The pipeline exits the 242-A Evaporator below grade and remains below grade at a minimum 1.2 meter depth for freeze protection, until the pipeline emerges at the LERF catch basin, at the corner of each basin. All piping at the catch basin that is less than 1.2 meters below grade is wrapped with electric heat tracing tape and insulated for protection from freezing.

The transfer line from the 242-A Evaporator is centrifugally cast, fiberglass-reinforced epoxy thermoset resin pressure pipe fabricated to meet the requirements of ASME D2997 (ASME 1984). The 3-inch carrier piping is centered and supported within 6-inch containment piping. Pipe supports are fabricated of the same material as the pipe, and meet the strength requirements of ANSI B31.3 (ANSI 1987) for dead weight, thermal, and seismic loads.A catch basin is provided at the northwest corner of each basin where piping extends from the basin to allow for basin-to-basin and basin-to-200 Area ETF liquid transfers. Drawing H-2-88766, Sheets 1 through 4, provide schematic diagrams of the piping system at LERF. Drawing H-2-79604 provides details of the piping from the 242-A Evaporator to LERF.

C.5.5.1 Secondary Containment System for Piping

The 6-inch containment piping encases the 3-inch carrier pipe from the 242-A Evaporator to the LERF. All of the piping and fittings that are not directly over a catch basin or a basin liner are of this pipe-within-a-pipe construction. A catch basin is provided at the northwest corner of each basin where the inlet pipes, leachate risers, and transfer pipe risers emerge from the basin. The catch basin consists of a 20-centimeter-thick concrete pad at the top of the dike. The perimeter of the catch basin has a 20-centimeter-high curb, and the concrete is coated with a chemical resistant epoxy sealant. The concrete pad is sloped so that any leaks or spills from the piping or pipe connections will drain into the basin. The catch basin provides an access point for inspecting, servicing, and operating various systems such as transfer valving, leachate level instrumentation and leachate pump. Drawing H-2-79593 provides a schematic diagram of the catch basins.

C.5.5.2 Leak Detection System

Single-point electronic leak detection elements are installed along the transfer line at 305-meter intervals. The leak detection elements are located in the bottom of specially designed test risers. Each sensor element employs a conductivity sensor, which is connected to a cable leading back to the 242-A Evaporator control room. If a leak develops in the carrier pipe, fluid will travel down the exterior surface of the carrier pipe or the interior of the containment pipe. As moisture contacts a sensor unit, a general alarm sounds in the 242-A Evaporator and 200 Area ETF control rooms and the zone of the Sensor unit causing the general alarm can be determined using the 242-A Evaporator leak detection monitoring panel. Upon verification of a leak, the pump located in the 242-A Evaporator is shut down, stopping the flow of aqueous waste through the transfer line. A low-volume air purge of the annulus between the carrier pipe and the containment pipe is provided to prevent condensation buildup and minimize false alarms by the leak detection elements.

The catch basins have conductivity leak detectors that alarm in the 242-A Evaporator and 200 Area ETF control rooms. Leaks into the catch basins drain back to the basin through a 5.1-centimeter drain on the floor of the catch basin.

C.5.5.3 Certification

Although an integrity assessment is not required for piping associated with surface impoundments, an assessment of the transfer liner was performed, including a hydrostatic leak/pressure test at 10.5 kilograms per square centimeter gauge. A statement by an independent, qualified, registered professional engineer attesting to the integrity of the piping system is included in *Integrity Assessment Report for the 242-A Evaporator/LERF Waste Transfer Piping, Project W105* (WHC 1993), along with the results of the leak/pressure test.

C.5.6 Double Liner and Leak Detection, Collection, and Removal System

The double-liner system for LERF is discussed in Section C.5.2. The leachate detection, collection, and removal system (Figure C.18 and Figure C.19) was designed and constructed to remove leachate that might permeate the primary liner. System components for each basin include:

- 30.5-centimeter layer of drainage gravel below the primary liner at the bottom of the basin
- Geonet below the primary liner on the sidewalls to direct leachate to the gravel layer
- 3.0-meter by 1.8-meter by 0.30-meter-deep leachate collection sump consisting of a 25 millimeter high-density polyethylene flat stock, geotextile to trap large particles in the leachate, and 1.5-millimeter high-density polyethylene rub sheet set on the secondary liner
- 10-inch and 4-inch perforated leachate high-density polyethylene riser pipes from the leachate collection sump to the catch basin northwest of the basin
- Leachate collection sump level instrumentation installed in the 4-inch riser
- Level sensors, submersible leachate pump, and 1.5-inch fiberglass-reinforced epoxy thermoset resin pressure piping installed in the 10-inch riser
- Piping at the catch basin to route the leachate through 1.5-inch high-density polyethylene pipe back to the basins

The bottom of the basins has a two percent slope to allow gravity flow of leachate to the leachate collection sump. This exceeds the minimum of 1 percent slope required by WAC 173-303-650(j) for new surface impoundments. Material specifications for the leachate collection system are given in Section C.5.2.1.1.

Calculations demonstrate that fluid from a small hole (2 millimeter) (EPA 1989, p. 122) at the furthest end of the basin, under a low head situation, would travel to the sump in less than 24 hours (HNF 1997).

Additional calculations indicate the capacity of the pump to remove leachate is sufficient to allow time to readily identify a leak and activate emergency procedures (HNF 1997).

Automated controls maintain the fluid level in each leachate sump below 33 centimeters to prevent significant liquid backup into the drainage layer. The leachate pump is activated when the liquid level in the sump reaches about 28 centimeters, and is shut off when the sump liquid level reaches about 18 centimeters. This operation prevents the leachate pump from cycling with no fluid, which could damage the pump. Liquid level control is accomplished with conductivity probes that trigger relays selected specifically for application to submersible pumps and leachate fluids. A flow meter/totalizer on the leachate return pipe measures fluid volumes pumped and pumping rate from the leachate collection sumps, and indicates volume and flow rate on local readouts. Other instrumentation provided is real-time continuous level monitoring with readout at the catch basin and the 242-A Evaporator control room. A sampling port is provided in the leachate piping system at the catch basin. Leak detection is provided through inspections of the leachate flow totalizer readings. For more information on inspections, refer to Addendum I.

The stainless steel leachate pump is designed to deliver 110 liters per minute. The leachate pump returns draw liquid from the sump via 1.5-inch pipe and discharges into the basin through 1.5-inch high-density polyethylene pipe.

C.5.7 Construction Quality Assurance

The construction quality assurance plan and complete report of construction quality assurance inspection and testing results are provided in *242-A Evaporator Interim Retention Basin Construction Quality Assurance Plan* (KEH 1991). A general description of construction quality assurance procedures is outlined in the following paragraphs.

For excavation of the basins and construction of the dikes, regular inspections were conducted to ensure compliance with procedures and drawings, and compaction tests were performed on the dike soils.

For the soil/bentonite layer, test fills were first conducted in accordance with EPA guidance to demonstrate compaction procedures and to confirm compaction and permeability requirements can be met. The ratio of bentonite to soil and moisture content was monitored; lifts did not exceed 15 centimeters before compaction, and specific compaction procedures were followed. Laboratory and field tests of soil properties were performed for each lift and for the completed test fill. The same suite of tests was conducted for each lift during the laying of the soil/bentonite admixture in the basins.

Geotextiles and geomembranes were laid in accordance with detailed procedures and quality assurance programs provided by the manufacturers and installers. These included destructive and nondestructive tests on the geomembrane seams, and documentation of field test results and repairs.

C.5.8 Proposed Action Leakage Rate and Response Action Plan

An action leakage rate limit is established where action must be taken due to excessive leakage from the primary liner. The action leak rate is based on the maximum design flow rate the leak detection system can remove without the fluid head on the bottom liner exceeding 30 centimeters. The limiting factor in the leachate removal rate is the hydraulic conductivity of the drainage gravel. An action leakage rate (also called the rapid or large leak rate) of 20,000 liters per hectare per day was calculated for each basin (WHC 1992b).

When it is determined that the action leakage rate has been exceeded, the response action plan will follow the actions in WAC 173-303-650(11)(b) and (c), which includes notification of Ecology in writing within 7 days, assessing possible causes of the leak, and determining whether waste receipt should be curtailed and/or the basin emptied.

C.5.9 Dike Structural Integrity Engineering Certification

The structural integrity of the dikes was certified attesting to the structural integrity of the dikes, signed by a qualified, registered professional engineer.

C.5.10 Management of Ignitable, Reactive, or Incompatible Wastes

Although ignitable or reactive aqueous waste might be received in small quantities at LERF, such aqueous waste is mixed with dilute solutions in the basins, removing the ignitable or reactive characteristics. For compatibility requirements with the LERF liner, refer to Addendum B, Waste Analysis Plan.

C.6 AIR EMISSIONS CONTROL

This section addresses the 200 Area ETF requirements of Air Emission Standards for Process Vents, under 40 CFR 264, Subpart AA (WAC 173-303-690 incorporated by reference) and Subpart CC. The requirements of 40 CFR 264, Subpart BB (WAC 173-303-691) is not applicable because aqueous waste with 10 percent or greater organic concentration would not be acceptable for processing at the ETF.

C.6.1 Applicability of Subpart AA Standards

The 200 Area ETF evaporator and thin film dryer perform operations that specifically require evaluation for applicability of WAC 173-303-690. Aqueous waste in these units routinely contains greater than 10 parts per million concentrations of organic compounds and are, therefore, subject to air emission requirements under WAC 173-303-690. Organic emissions from all affected process vents on the Hanford Facility must be less than 1.4 kilograms per hour and 2.8 mega grams per year, or control devices must be installed to reduce organic emissions by 95 percent.

The vessel off gas system provides a process vent system. This system provides a slight vacuum on the 200 Area ETF process vessels and tanks (refer to Section C.2.5.2). Two vessel vent header pipes combine and enter the vessel off gas system filter unit consisting of a demister, electric heater, prefilter, high-efficiency particulate air filters, activated carbon absorber, and two exhaust fans (one fan in service while the other is backup). The vessel off gas system filter unit is located in the high-efficiency particulate air filter room west of the process area. The vessel off gas system exhaust discharges into the larger building ventilation system, with the exhaust fans and stack located outside and immediately west of the ETF. The exhaust stack discharge point is 15.5 meters above ground level.

The annual average flow rate for the 200 Area ETF stack (which is the combined vessel off gas and building exhaust flow rates) is 1600 cubic meters per minute with a total annual flow of approximately 8.4 E+08 cubic meters. During waste processing, the airflow through just the vessel off gas system is about 23 standard cubic meters per minute.

Organic emissions occur during waste processing, which occurs less than 310 days each year (i.e., 85 percent operating efficiency). This operating efficiency represents the maximum annual operating time for the ETF, as shutdowns are required during the year for planned maintenance outages and for reconfiguring the 200 Area ETF to accommodate different aqueous waste.

C.6.2 Process Vents - Demonstrating Compliance

This section outlines how the 200 Area ETF complies with the requirements and includes a discussion of the basis for meeting the organic emissions limits, calculations demonstrating compliance, and conditions for reevaluation.

C.6.2.1 Basis for Meeting Limits/Reductions

The 242-A Evaporator and the 200 Area ETF are currently the only operating TSD units that contribute to the Hanford Facility volatile organic emissions under 40 CFR 264, Subpart AA. The combined release rate is currently well below the threshold of 1.4 kilograms per hour or 2,800 kilograms per year of volatile organic compounds. As a result, the 200 Area ETF meets these standards without the use of air pollution control devices.

The amount of organic emissions could change as waste streams are changed, or TSD units are brought online or are deactivated. The organic air emissions summation will be re-evaluated periodically as condition warrants. Operations of the TSD units operating under 40 CFR 264, Subpart AA, will be controlled to maintain Hanford Facility emissions below the threshold limits or pollution control device(s) will be added, as necessary, to achieve the reduction standards specified under 40 CFR 264, Subpart AA.

C.6.2.2 Demonstrating Compliance

Calculations to determine organic emissions are performed using the following assumptions:

- Maximum flow rate from LERF to 200 Area ETF is 568 liters per minute.
- Emissions of organics from tanks and vessels upstream of the UV/OX process are determined from flow and transfer rates given in *Clean Air Act Requirements, WAC 173-400, As-built Documentation, Project C-018H, 242-A Evaporator/PUREX Plant Process Condensate Treatment Facility* (Adtechs 1995).
- UV/OX reaction rate constants and residence times are used to determine the amount of organics, which are destroyed in the UV/OX process. These constants are given in *200 Area Effluent Treatment Facility Delisting Petition* (DOE/RL 1992).
- All organic compounds that are not destroyed in the UV/OX process are assumed to be emitted from the tanks and vessels into the vessel off gas system.
- No credit for removal of organic compounds in the vessel off gas system carbon absorber unit is taken. The activated carbon absorbers are used if required to reduce organic emissions.

The calculation to determine organic emissions consists of the following steps:

1. Determine the quantity of organics emitted from the tanks or vessels upstream of the UV/OX process, using transfer rate values
2. Determine the concentration of organics in the waste after the UV/OX process using UV/OX reaction rates and residence times. If the 200 Area ETF is configured such that the UV/OX process is not used, a residence time of zero is used in the calculations (i.e., none of the organics are destroyed)
3. Assuming all the remaining organics are emitted, determine the rate which the organics are emitted using the feed flow rate and the concentrations of organics after the UV/OX process
4. The amount of organics emitted from the vessel off gas system is the sum of the amount calculated in steps 1 and 3.

The organic emission rates and quantity of organics emitted during processing are determined using these calculations and are included in the Hanford Facility Operating Record, LERF and 200 Area ETF file.

C.6.2.3 Reevaluating Compliance with Subpart AA Standards

Calculations to determine compliance with Subpart AA will be reviewed when any of the following conditions occur at the 200 Area ETF:

- Changes in the maximum feed rate to the 200 Area ETF (i.e., greater than the 568 liters per minute flow rate)
- Changes in the configuration or operation of the 200 Area ETF that would modify the assumptions given in Section C.6.2.2 (e.g., taking credit for the carbon absorbers as a control device)
- Annual operating time exceeds 310 days.

C.6.3 Applicability of Subpart CC Standards

The air emission standards of 40 CFR 264, Subpart CC apply to tank, surface impoundment, and container storage units that manage wastes with average volatile organic concentrations equal to or exceeding 500 parts per million by weight, based on the hazardous waste composition at the point of origination (61 FR 59972). However, TSD units that are used solely for management of mixed waste are exempt. Mixed waste is managed at the LERF and 200 Area ETF and dangerous waste could be treated and stored at these TSD units.

TSD owner/operators are not required to determine the concentration of volatile organic compounds in a hazardous waste if the wastes are placed in waste management units that employ air emission controls that comply with the Subpart CC standards. Therefore, the approach to Subpart CC compliance at the LERF and 200 Area ETF is to demonstrate that the LERF and 200 Area ETF meet the Subpart CC control standards (40 CFR 264.1084 – 40 CFR 264.1086).

C.6.3.1 Demonstrating Compliance with Subpart CC for Tanks

Since the 200 Area ETF tanks already have process vents regulated under 40 CFR 264, Subpart AA (WAC 173-303-690), they are exempt from Subpart CC [40 CFR 264.1080(b)(8)].

C.6.3.2 Demonstrating Compliance with Subpart CC for Containers

Container Level 1 and Level 2 standards are met at the 200 Area ETF by managing all dangerous and/or mixed wastes in U.S. Department of Transportation containers [40 CFR 264.1086(f)]. Level 1 containers are those that store more than 0.1 cubic meters and less than or equal to 0.46 cubic meters. Level 2 containers are used to store more than 0.46 cubic meters of waste, which are in 'light material service'. Light material service is defined where a waste in the container has one or more organic constituents with a vapor pressure greater than 0.3 kilopascals at 20 C, and the total concentration of such constituents is greater than or equal to 20 percent by weight.

The monitoring requirements for Level 1 and Level 2 containers include a visual inspection when the container is received at the 200 Area ETF and when the waste is initially placed in the container. Additionally, at least once every 12 months when stored onsite for 1 year or more, these containers must be inspected.

If compliant containers are not used at the 200 Area ETF, alternate container management practices are used that comply with the Level 1 standards. Specifically, the Level 1 standards allow for a "container equipped with a cover and closure devices that form a continuous barrier over the container openings such that when the cover and closure devices are secured in the closed position there are no visible holes, gaps, or other open spaces into the interior of the container. The cover may be a separate cover installed on the container...or may be an integral part of the container structural design…" [40 CFR 264.1086(c)(1)(ii)]. An organic-vapor-suppressing barrier, such as foam, may also be used [40 CFR 264.1086(c)(1)(iii)]. Section C.3 provides detail on container management practices at the 200 Area ETF.

Container Level 3 standards apply when a container is used for the "treatment of a hazardous waste by a waste stabilization process" [40 CFR 264.1086(2)]. Because treatment in containers using the stabilization process is not provided at the 200 Area ETF, these standards do not apply.

C.6.3.3 Demonstrating Compliance with Subpart CC for Surface Impoundments

The Subpart CC emission standards are met at LERF using a floating membrane cover that is constructed of very-low-density polyethylene that forms a continuous barrier over the entire surface area [40 CFR 264.1085(c)]. This membrane has both organic permeability properties equivalent to a high-density polyethylene cover and chemical/physical properties that maintain the material integrity for the intended service life of the material. The additional requirements for the floating cover at the LERF have been met (Section C.5.2.4).

C.7 ENGINEERING DRAWINGS

C.7.1 Liquid Effluent Retention Facility

Drawings of the containment systems at the LERF are summarized in Table C.1. Because the failure of these containment systems at LERF could lead to the release of dangerous waste into the environment, modifications that affect these containment systems will be submitted to the Washington State Department of Ecology, as a Class 1, 2, or 3 Permit modification, as required by WAC 173-303-830.

Table C.1. Liquid Effluent Retention Facility Containment System

LERF System	Drawing Number	Drawing Title
Bottom Liner	H-2-79590, Sheet 1	Civil Plan, Sections and Details; Cell Basin Bottom Liner
Top Liner	H-2-79591, Sheet 1	Civil Plan, Sections and Details; Cell Basin Bottom Liner
Catch Basin	H-2-79593, Sheet 1, 3-5	Civil Plan, Section and Details; Catch Basin

The drawings identified in Table C.2 illustrate the piping and instrumentation configuration within LERF, and of the transfer piping systems between the LERF and the 242-A Evaporator. These drawings are provided for general information and to demonstrate the adequacy of the design of the LERF as a surface impoundment.

Table C.2. Liquid Effluent Retention Facility Piping and Instrumentation

LERF System	Drawing Number	Drawing Title
Transfer Piping to 242-A Evaporator	H-2-79604, Sheet 1	Piping Plot and Key Plans; 242-A Evaporator Condensate Stream
LERF Piping and Instrumentation	H-2-88766, Sheet 1	P&ID; LERF Basin and ETF Influent
	H-2-88766, Sheet 2	P&ID; LERF Basin and ETF Influent
	H-2-88766, Sheet 3	P&ID; LERF Basin and ETF Influent
	H-2-88766, Sheet 4	P&ID; LERF Basin and ETF Influent
Legend	H-2-89351, Sheet 1	Piping & Instrumentation Diagram - Legend

C.7.2 200 Area Effluent Treatment Facility

Drawings of the secondary containment systems for the 200 Area ETF containers, and tanks and process units, and for the Load-In Tanks are summarized in Table C.3. Because the failure of the secondary containment systems could lead to the release of dangerous waste into the environment, modifications, which affect the secondary containment systems, will be submitted to the Washington State Department of Ecology, as a Class 1, 2, or 3 Permit modification, as required by WAC 173-303-830.

Table C.3. Effluent Treatment Facility and Load-In Station Secondary Containment Systems

200 Area ETF Process Unit	Drawing Number	Drawing Title
Surge Tank, Process/ Container Storage Areas and Trenches - Foundation and Containment	H-2-89063, Sheet 1	Architectural/structural – Foundation and Grade Beam Plan
Sump Tank Containment	H-2-89065, Sheet 1	Architectural/structural – Foundation, Sections and Detail
Verification Tank Foundation and Containment	H-2-89068, Sheet 1	Architectural/structural – Verification Tank Foundation
Load-In Facility Foundation and Containment	H-2-817970, Sheet 1	Structural – ETF Truck Load-in Facility Plans and Sections
Load-In Facility Foundation and Containment	H-2-817970, Sheet 2	Structural – ETF Truck Load-in Facility Sections and Details

The drawings identified in Table C.4 provide an illustration of the piping and instrumentation configuration for the major process units and tanks at the ETF, and the Load-In Tanks. Drawings of the transfer piping systems between the LERF and200 Area ETF, and between the Load-In Station and the 200 Area ETF also are presented in this table. These drawings are provided for general information and to demonstrate the adequacy of the design of the tank systems.

Table C.4. Major Process Units and Tanks at the Effluent Treatment Facility and Load-In Station

200 Area ETF Process Unit	Drawing Number	Drawing Title
Load-In Facility	H-2-817974, Sheet 1	P&ID – ETF Truck Load-In Facility
Load-In Facility	H-2-817974, Sheet 2	P&ID – ETF Truck Load-In Facility
Surge Tank	H-2-89337, Sheet 1	P&ID – Surge Tank System
UV/Oxidation	H-2-88976, Sheet 1	P&ID – UV Oxidizer Part 1
UV/Oxidation	H-2-89342, Sheet 1	P&ID – UV Oxidizer Part 2
Reverse Osmosis	H-2-88980, Sheet 1	P&ID – 1st RO Stage
Reverse Osmosis	H-2-88982, Sheet 1	P&ID – 2nd RO Stage
IX/Polishers	H-2-88983, Sheet 1	P&ID – Polisher
Verification Tanks	H-2-88985, Sheet 1	P&ID – Verification Tank System
ETF Evaporator	H-2-89335, Sheet 1	P&ID – Evaporator
Thin Film Dryer	H-2-88989, Sheet 1	P&ID – Thin Film Dryer
Transfer Piping from LERF to ETF	H-2-88768, Sheet 1	Piping Plan/Profile 4"– 60M-002-M17 and 3"-60M-001-M17
Transfer Piping from Load-In Facility to ETF	H-2-817969, Sheet 1	Civil – ETF Truck Load-In Facility Site Plan

Table C.5. 200 Area Effluent Treatment Facility Tank Systems Information

Tank Description	Material of Construction	Maximum Tank Capacity[1] liters	Inner diameter meters	Height meters	Shell Thickness [2] centimeters	Corrosion Protection [3]
Load-in tanks 59A-TK-109/-117 (2)	304 SS	34,200	3.6	4.7	0.64	Type 304 SS
Load-in tank 59A-TK-1	FRP	26,000	3.0	3.8	0.48 (dome) 0.63 (walls & bottom)	FRP
Surge tank	304 SS	452,000	7.9	9.2	0.48	Type 304 SS
pH adjustment tank	304 SS	16,700	3.0	2.5	0.64	Type 304 SS
First RO feed tank	304 SS	20,600	3.0	3.2	0.64	Type 304 SS
Second RO feed tank	304 SS	9,000	Nonround tank 3.0 m x 1.5 m	1.5	0.48 w/rib stiffeners	Type 304 SS
Effluent pH adjustment tank	304 SS	14,400	2.4	3.6	0.64	Type 304 SS
Verification tanks (3)	Carbon steel with epoxy lining	2,940,000	18.3	11.4	0.79	epoxy coating
Secondary waste receiving tanks (2)	304 SS	73,800	4.3	5.7	0.64	Type 304 SS
Concentrate tanks (2)	316L SS	24,200	3.0	3.8	0.64	Type 316 SS
ETF evaporator (Vapor Body)	Alloy 625	20,000	2.4	6.8	variable	Alloy 625
Distillate flash tank	304 SS	910	Horizontal tank 0.76	Length 2.2	0.7	304 SS
Sump tank 1	304 SS	4,400	1.5 x 1.5	3.4	0.48	304 SS
Sump tank 2	304 SS	4,400	1.5 x 1.5	3.4	0.48	304 SS

[1] The maximum operating volume of the tanks is identified.
[2] The nominal thickness of ETF tanks is represented.
[3] Type 304 SS, 304L, 316 SS and alloy 625 provide corrosion protection.
304 SS = stainless steel type 304 or 304L.
316L SS = stainless steel type 316L
FRP = Fiberglass-reinforced plastic.

Table C.6. 200 Area Effluent Treatment Facility Additional Tank System Information

Tank Description	Liner Materials	Pressure Controls	Foundation Materials	Structural Support	Seams	Connections
Load-in tanks 59A-TK-109/-117 (2)	None	vent to atmosphere	concrete slab	SS skirt bolted to concrete	welded	flanged
Load-in tank 59A-TK-1	None	vent to atmosphere	concrete slab	bolted to concrete	none	flanged
Surge tank	None	vacuum breaker valve/vent to VOG	reinforced concrete ring plus concrete slab	structural steel on concrete base	welded	flanged
pH adjustment tank	None	vent to VOG	concrete slab	carbon steel skirt	welded	flanged
First RO feed tank	None	vent to VOG	concrete slab	carbon steel skirt	welded	flanged
Second RO feed tank	None	vent to VOG	concrete slab	carbon steel frame	welded	flanged
Effluent pH adjustment tank	None	vent to VOG	concrete slab	carbon steel skirt	welded	flanged
Verification tanks (3)	Epoxy	filtered vent to atmosphere	reinforced concrete ring plus concrete slab	structural steel on concrete base	welded	flanged
Secondary waste receiving tanks (2)	None	vent to VOG	concrete slab	carbon steel skirt	welded	flanged
Concentrate tanks (2)	None	vent to VOG	concrete slab	carbon steel skirt	welded	flanged
ETF evaporator (vapor body)	None	pressure indicator/pressur e relief valve vapor vent to DFT/VOG	concrete slab	carbon steel frame	welded	flanged
Distillate flash tank	None	Pressure relief valve/vent to vent gas cooler/VOG	concrete slab	carbon steel I-beam and cradle	welded	flanged
Sump tank 1	None	vent to VOG	concrete containment	reinforced concrete containment basin	welded	flanged
Sump tank 2	None	vent to VOG	concrete containment	reinforced concrete containment basin	welded	flanged

DFT = distillate flash tank
VOG = vessel off gas system

1 **Table C.7. Ancillary Equipment and Material Data**

System	Ancillary Equipment	Number	Material
Load-in tanks	Load-in/transfer pumps (2)	2025ED-P-103A/-103B	316 SS
		2025ED-P-001A/-001B	Cast iron
	Load-in filters (6)	59A-FL-001/-002/-003/-004/-005/-006	304 SS
Surge tank	Surge tank pumps (3)	2025E-60A-P-1A/-1B/-1C	304 SS
Rough filter	Rough filter	2025E-60B-FL-1	304 SS
UV/OX	UV oxidation inlet cooler	2025E-60B-E-1	316 SS
	UV oxidizers (4)	2025E-60D-UV-1A/-1B/-2A/-2B	316 SS
pH adjustment	pH adjustment pumps (2)	2025E-60C-P-1A/-1B	304 SS
Peroxide decomposer	H2O2 decomposers (2)	2025E-60D-CO-1A/-1B	CS with epoxy coating
Fine filter	Fine filter	2025E-60B-FL-2	304 SS
Degasification	Degasification column inlet cooler	2025E-60E-E-1	316 SS
	Degasification column	2025E-60E-CO-1	FRP
	Degasification pumps (2)	2025E-60E-P-1A/-1B	316 SS
RO	Feed/booster pumps (6)	2025E-60F-P-1A/-1B/-2A/-2B/-3A/-3B	304 SS
	Reverse osmosis arrays (21)	2025E-60F-RO-01 through -21	Membranes: polyamide Outer piping: 304 SS
IX/Polishers	Polishers (3)	2025E-60G-IX-1A/-1B-1C	CS with epoxy coating
	Resins strainers (3)	2025E-60G-S-1A/-1B/-1C	304 SS
Effluent pH adjustment	Recirculation/transfer pumps (2)	2025E-60C-P-2A/-2B	304 SS/PVC
Verification tanks	Return pump	2025E-60H-P-1	304 SS
	Transfer pumps (2)	2025E-60H-P-2A/-2B	
Secondary waste receiving tanks	Secondary waste feed pumps (2)	2025E-60I-P-1A/-1B	304 SS
ETF evaporator system	Feed/distillate heat exchanger	2025E-60I-E-02	Tubes: 316 SS Shell: 304 SS
	Heater (reboiler)	2025E-60I-E-01	Tubes: alloy 625 Shell: 304 SS
	Recirculation pump	2025E-60I-P-02	316 SS
	Concentrate transfer pump	2025E-60I-P-04	316 SS
	Entrainment separator	2025E-60I-DE-01	Top section: 316 SS Bottom section: alloy 625
	Vapor compressor (incl. silencers)	2025E-60I-C-01	304 SS
	Silencer drain pump	2025E-60I-P-06	316 SS
	Level control tank	2025E-60I-TK-5	304 SS
	Distillate flash tank pump	2025E-60I-P-03	316 SS
Concentrate tanks	Concentrate circulation pumps (2)	2025E-60J-P-1A/-1B	316 SS
Thin film dryer	Concentrate feed pump	2025E-60J-P-2	316 SS
	Thin film dryer	2025E-60J-D-1	Interior surfaces: alloy 625 Rotor and blades: 316 SS
	Powder hopper	2025E-60J-H-1	316 SS
	Spray condenser	2025E-60J-DE-01	316 SS
	Distillate condenser	2025E-60J-CND-01	Tubes: 304 SS Shell: CS
	Dryer distillate pump	2025E-60J-P-3	316 SS
Resin dewatering	Dewatering pump	2025E-80E-P-1	

Table C.8. Concrete and Masonary Coatings

Location	Product Name	Applied Film Thickness, Estimated
ETF Process and Container Storage Areas		
Floor: Topcoat	Steelcote Floor-Nu Finish[1]	2 coats at 10-12 mils
Floor: Primer	Steelcote Monomid Hi-Build[1]	2.0 mils
Walls to 7 feet, Doors & Jambs	Chemproof PermaCoat 4000 Vertical[2]	2 coats at 12-16 mils
Load-in Station Tank Pit		
Floor and Walls	Ameron Amercoat 351[3]	2 coats at 8.0-12 mils
Surge Tank and Verification Tank Berms		
Floors (and Walls at Surge Tank): Topcoat	KCC Corrosion Control Elasti-Liner I[4]	80 mils
Floors (and Walls at Surge Tank): Primer	KCC Corrosion Control Techni-Plus E3[4]	5.0-7.0 mils

[1]Floor-Nu Finish and Monomid Hi-Build are trademarks of Steelcote Manufacturing, Incorporated
[2]PermaCoat is a trademark of Chemproof Polymers, Incorporated
[3]Amercoat is a trademark of Ameron International, Incorporated
[4]Elasti-Liner and Techni-Plus are trademarks of KCC Corrosion Control, Incorporated

Table C.9. Geomembrane Material Specifications

Property	Value
Specific gravity	0.932 to 0.950
Melt flow index	1.0 g/10 min., maximum
Thickness (thickness of flow marks shall not exceed 200% of the nominal liner thickness)	60 mil 310% (1.5 mm 3 10%)
Carbon black content	1.8 to 3%, bottom liner 2 to 3% top liner
Tensile properties (each direction)	
Tensile strength at yield	21.5 kgf/cm width, minimum
Tensile strength at break	32.2 kgf/cm width, minimum
Elongation at yield	10%, minimum
Elongation at break	500%, minimum
Tear resistance	13.6 kgf, minimum
Puncture resistance	31.3 kgf, minimum
Low temperature/brittleness	-400 C, maximum
Dimensional (%change each direction)	32%, maximum
Environmental stress crack	750 h, minimum
Water absorption	0.1 maximum and weight change
Hydrostatic resistance	316,000 kgf/m^2
Oxidation induction time (200 C/l atm. $O_{2)}$	90 minutes

Reference: Construction Specifications (KEH 1990b). Format uses NSF 54 table for high-density polyethylene as a guide (NSF 1985). However, RCRA values for dimensional stability and environmental stress crack have been added.

%	=	percent	max	=	maximum
g	=	gram	kgf	=	kilograms force
min	=	minute	m	=	meters
h	=	hour	mm	=	millimeters

Table C.10. Drainage Gravel Specifications

Property	Value
Sieve size	
25 millimeters	100 wt% passing
19 millimeters	80 – 100 wt% passing
9.5 millimeters	10 – 40 wt% passing
4.75 millimeters	0 – 4 wt% passing
Permeability	0.1 cm/sec, minimum

Reference: Sieve size is from WSDOT M41-10-88, Section 9.03.1(3)C for Grading No. 5 (WSDOT 1988).
Permeability requirement is from WAC 173-303-650(2)(j) for new surface impoundments.

1 **Figure C.1. Liquid Effluent Retention Facility Layout**

2

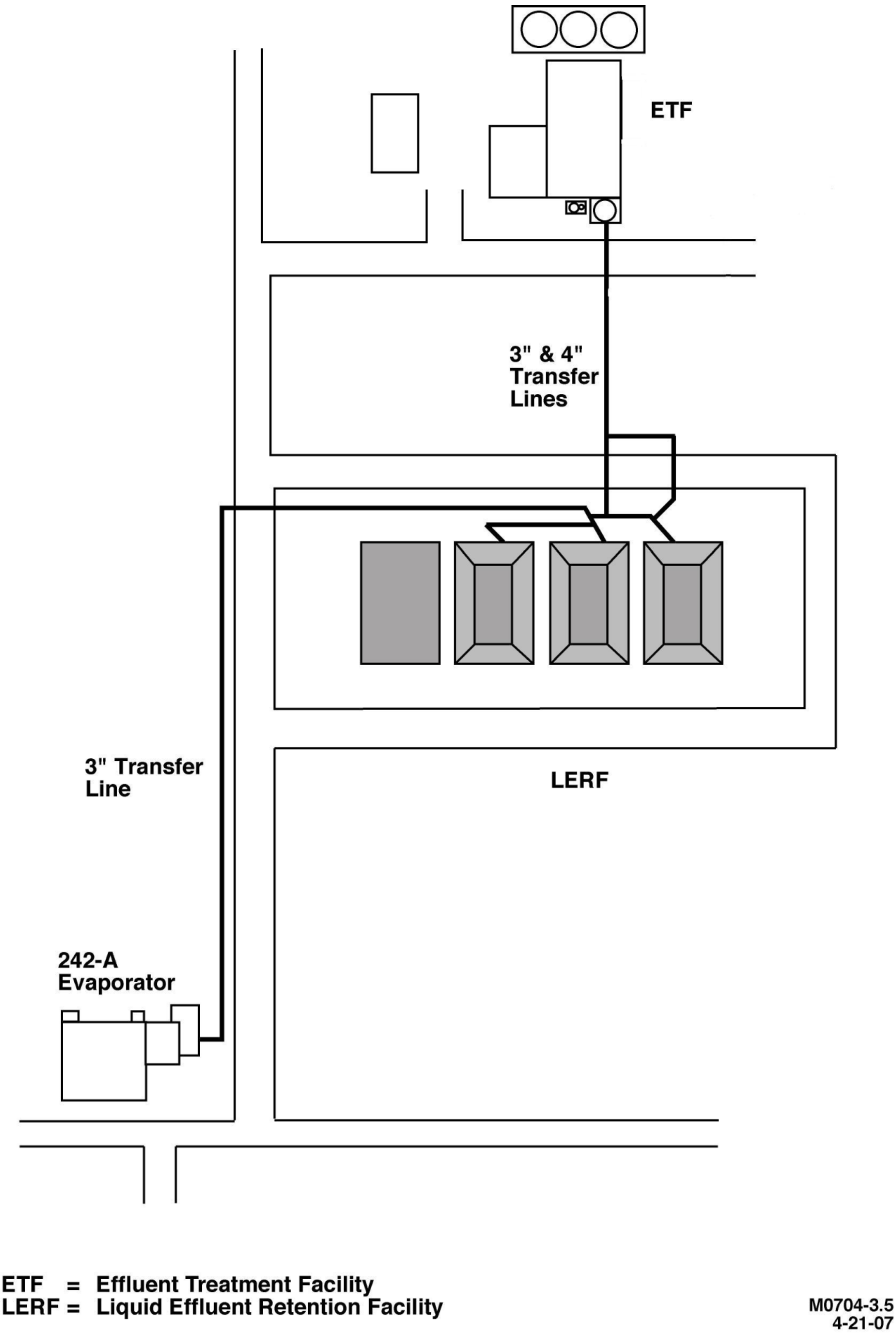


Figure C.2. Plan View of the 200 Area Effluent Treatment Facility

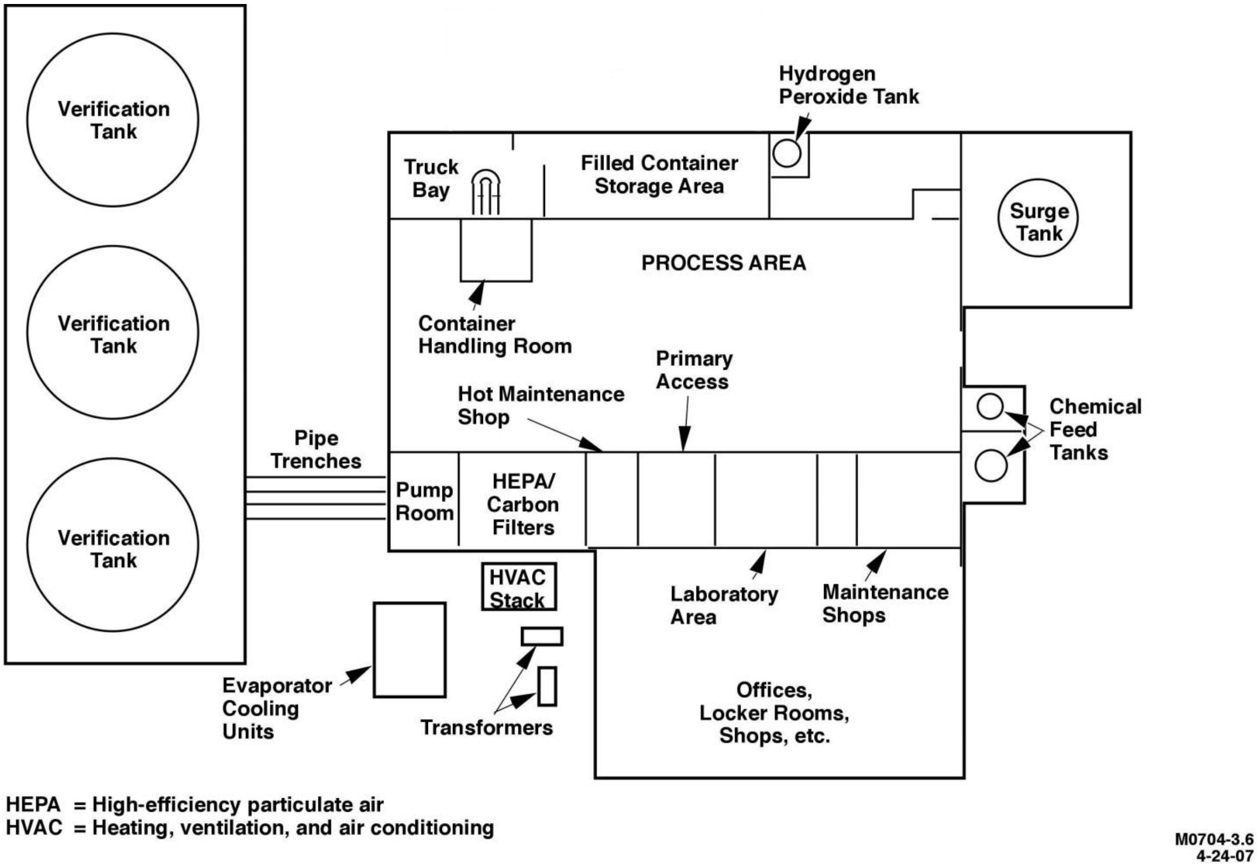
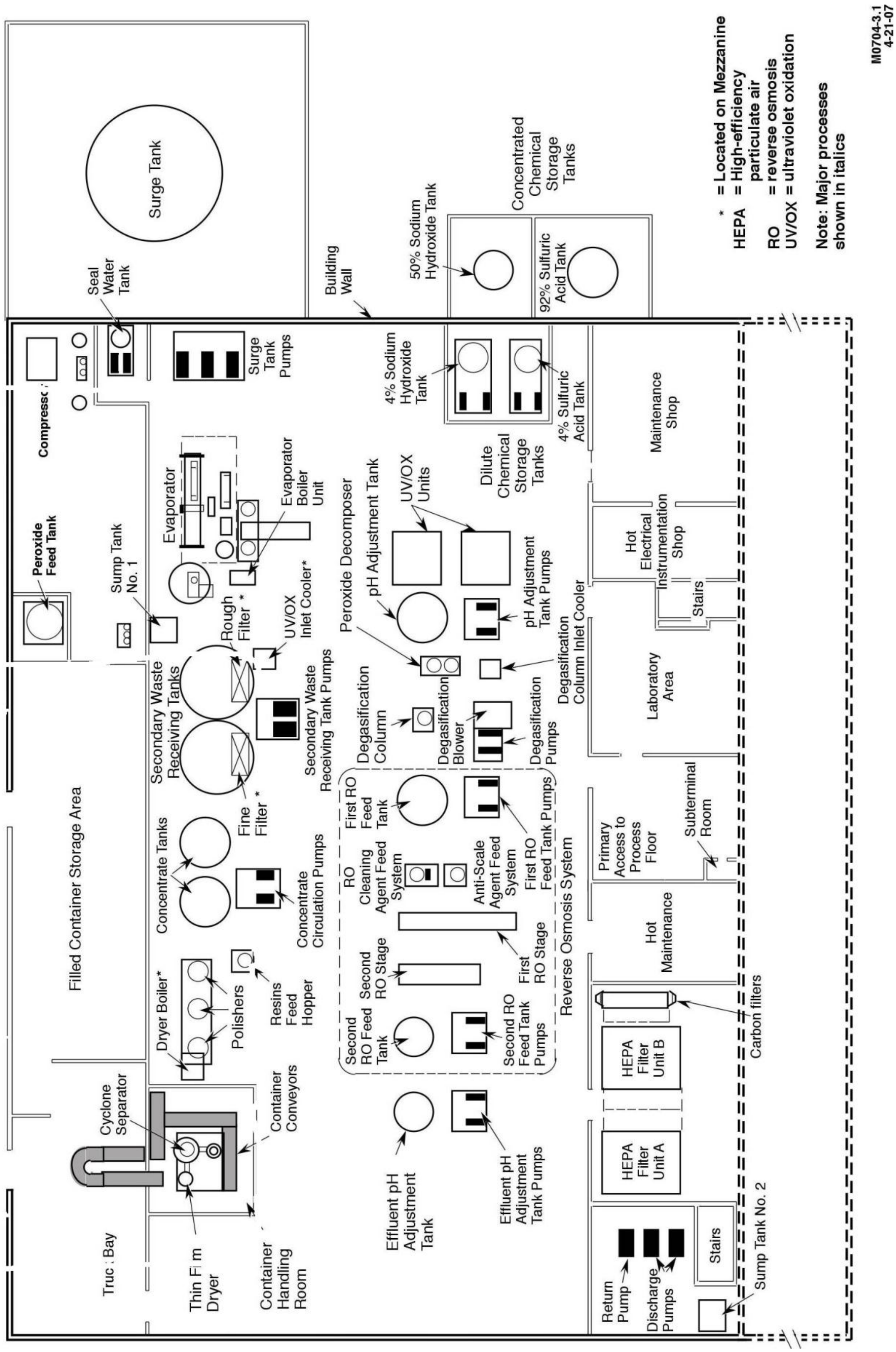
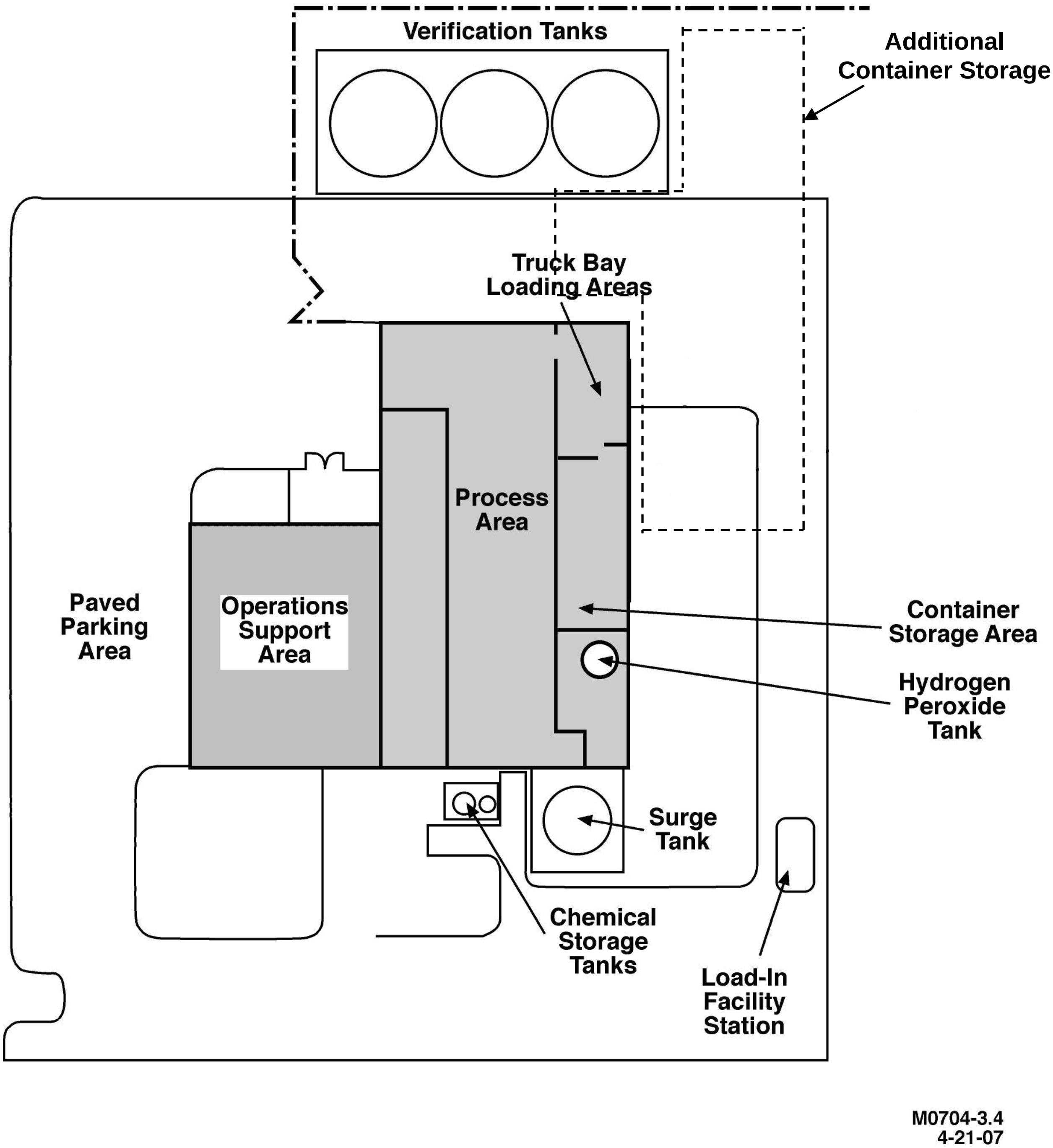


Figure C.3. 200 Area Effluent Treatment Facility Layout



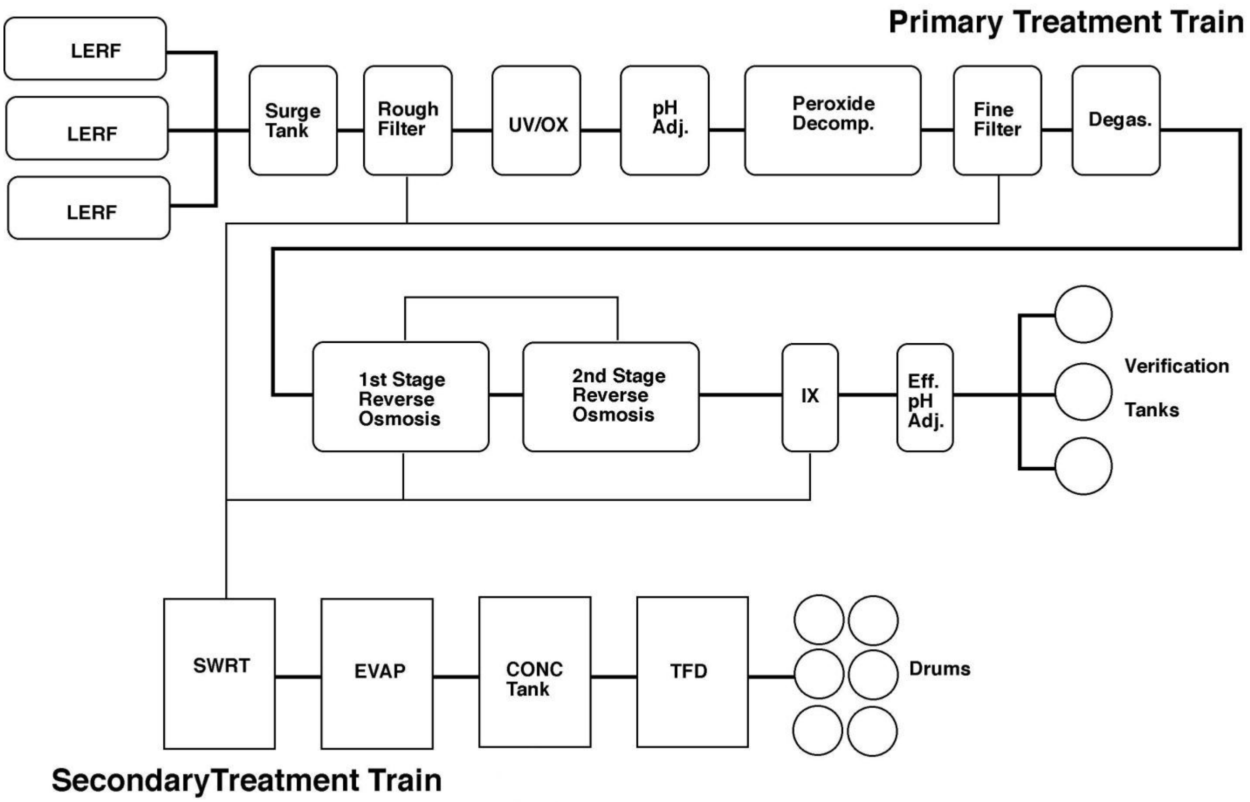
1 **Figure C.4. 200 Area Effluent Treatment Facility**



2

3

Figure C.5. Example - 200 Area Effluent Treatment Facility Configuration 1



CONC Tank = Concentrate tank
Degas. = Degasification column
Eff. pH Adj. = Effluent pH adjustment tank
EVAP = Evaporator
IX = Ion Exchange
LERF = Liquid Effluent Retention Facility
pH Adj. = pH adjustment tank
SWRT = Secondary waste receiving tank
TFD = Thin film dryer
UV/OX = Ultraviolet Oxidation

M0704-3.8
4-21-07

Figure C.6. Example - 200 Area Effluent Treatment Facility Configuration 2

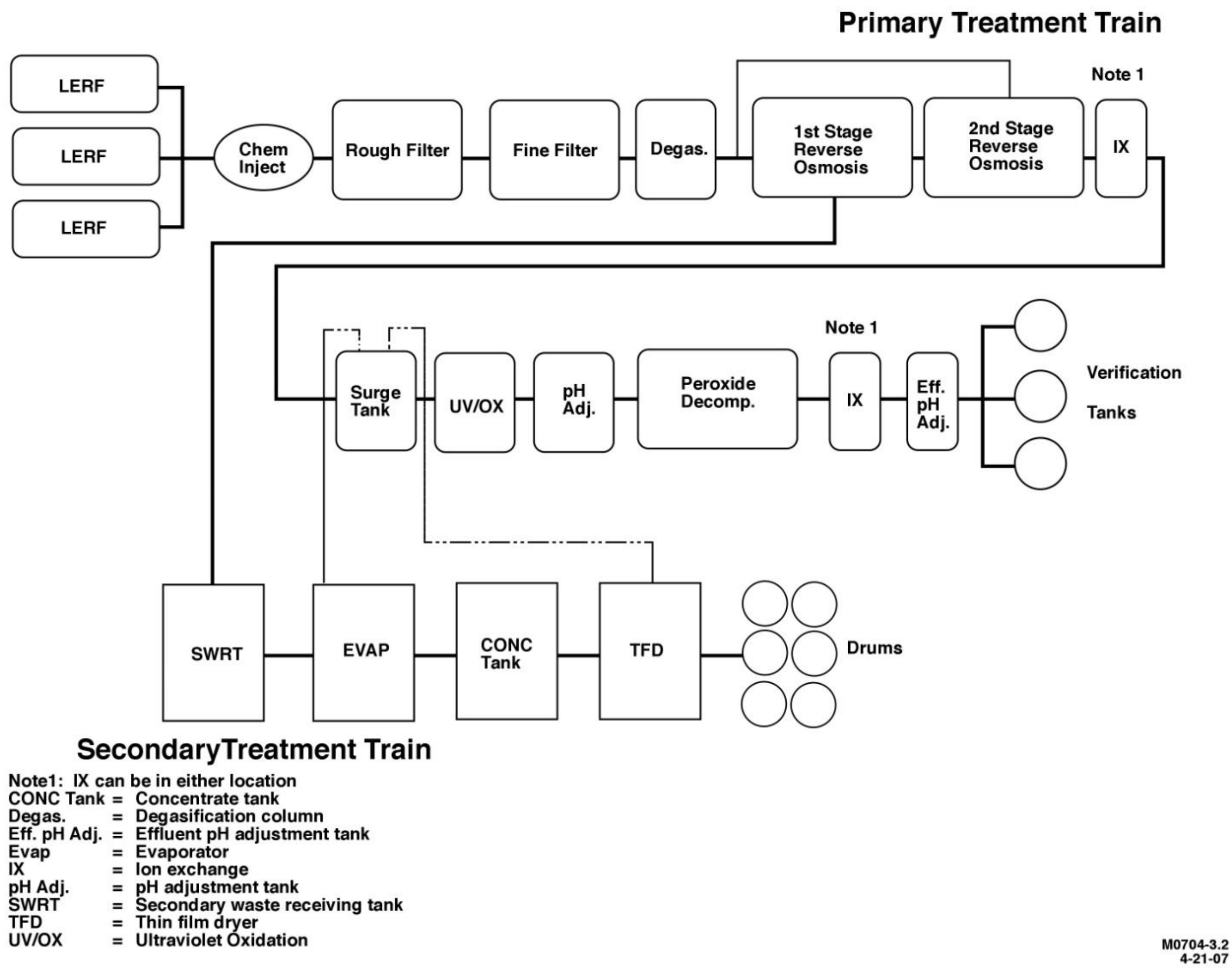


Figure C.7. Surge Tank

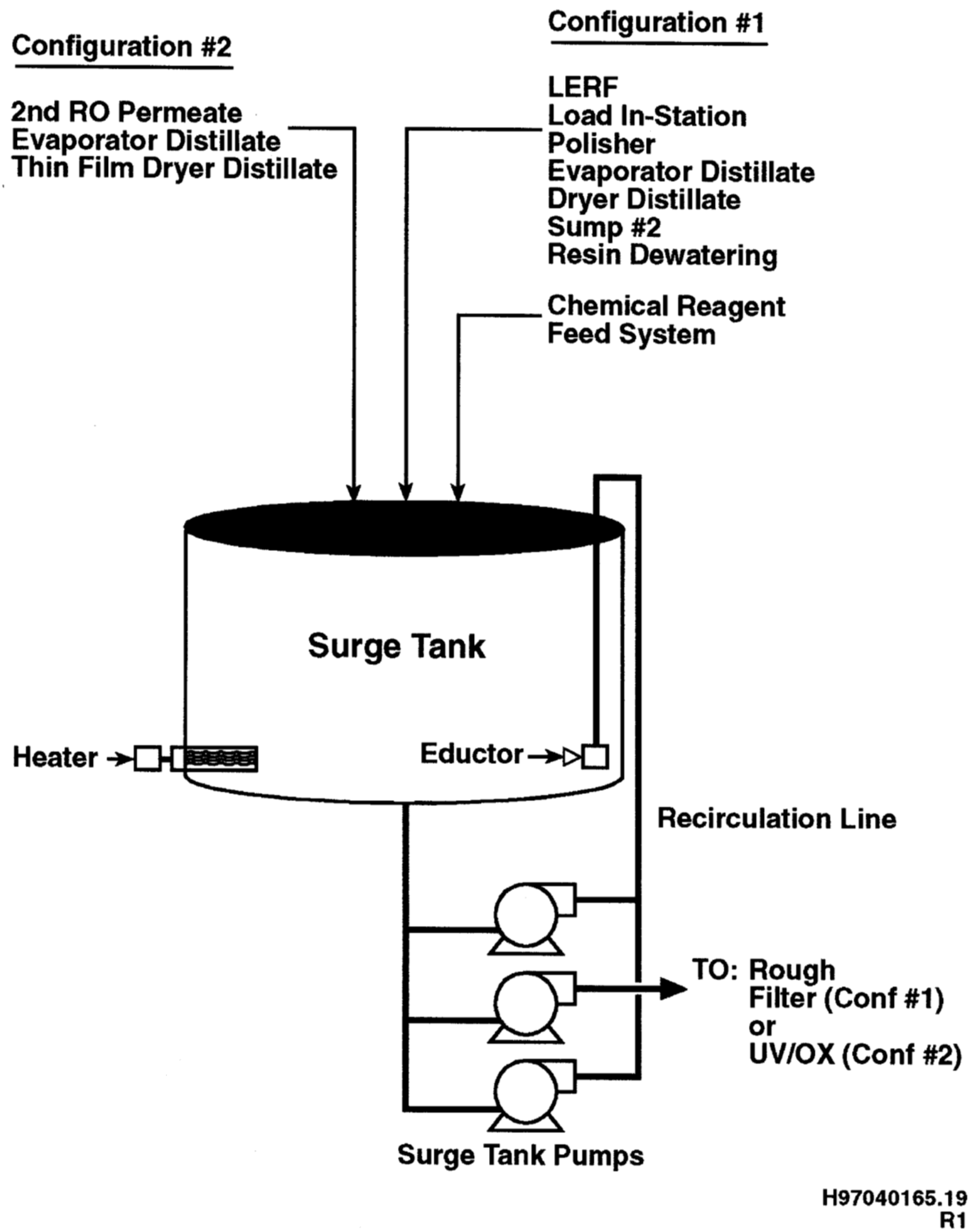


Figure C.8. Ultraviolet Light/Oxidation Unit

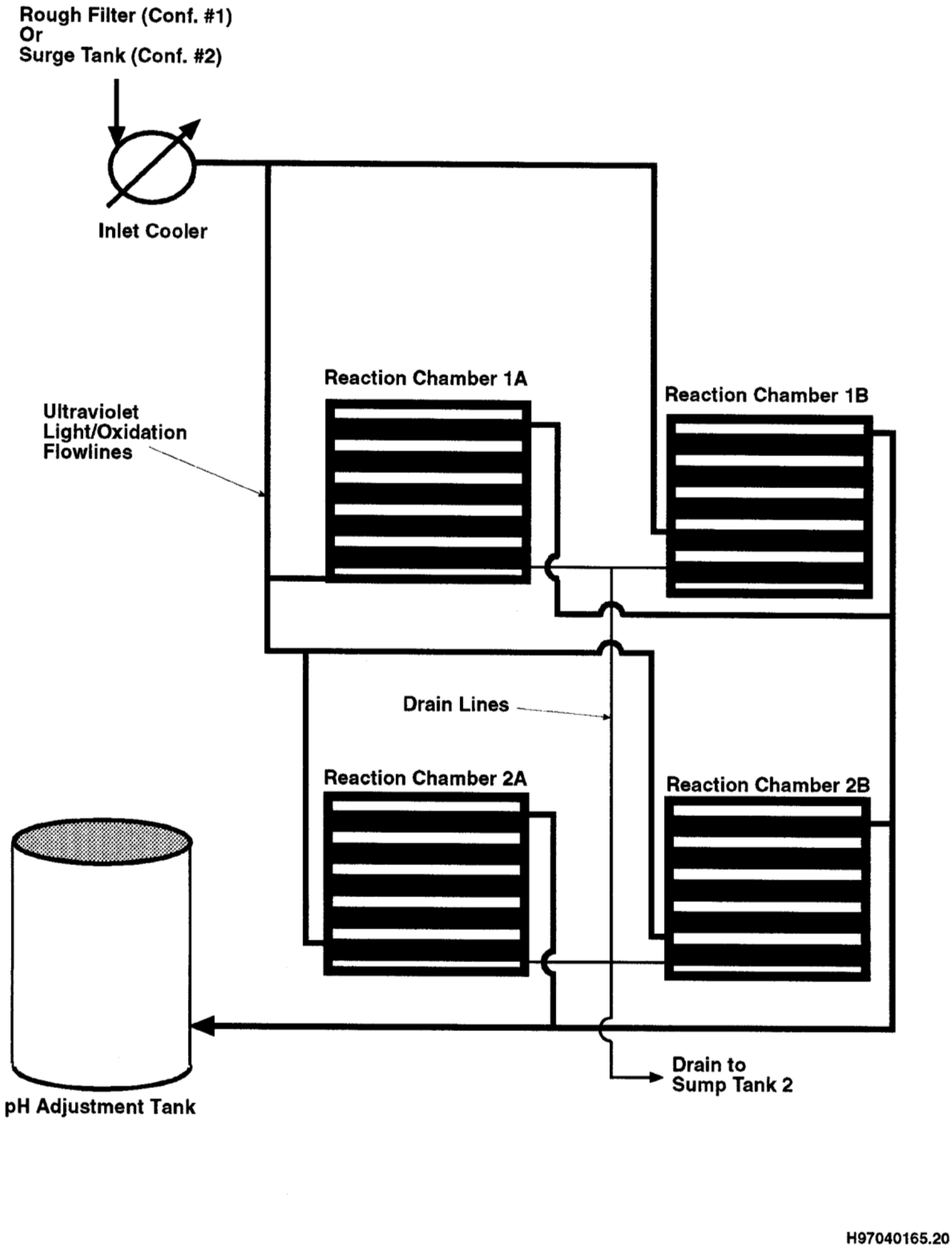


Figure C.9. Reverse Osmosis Unit

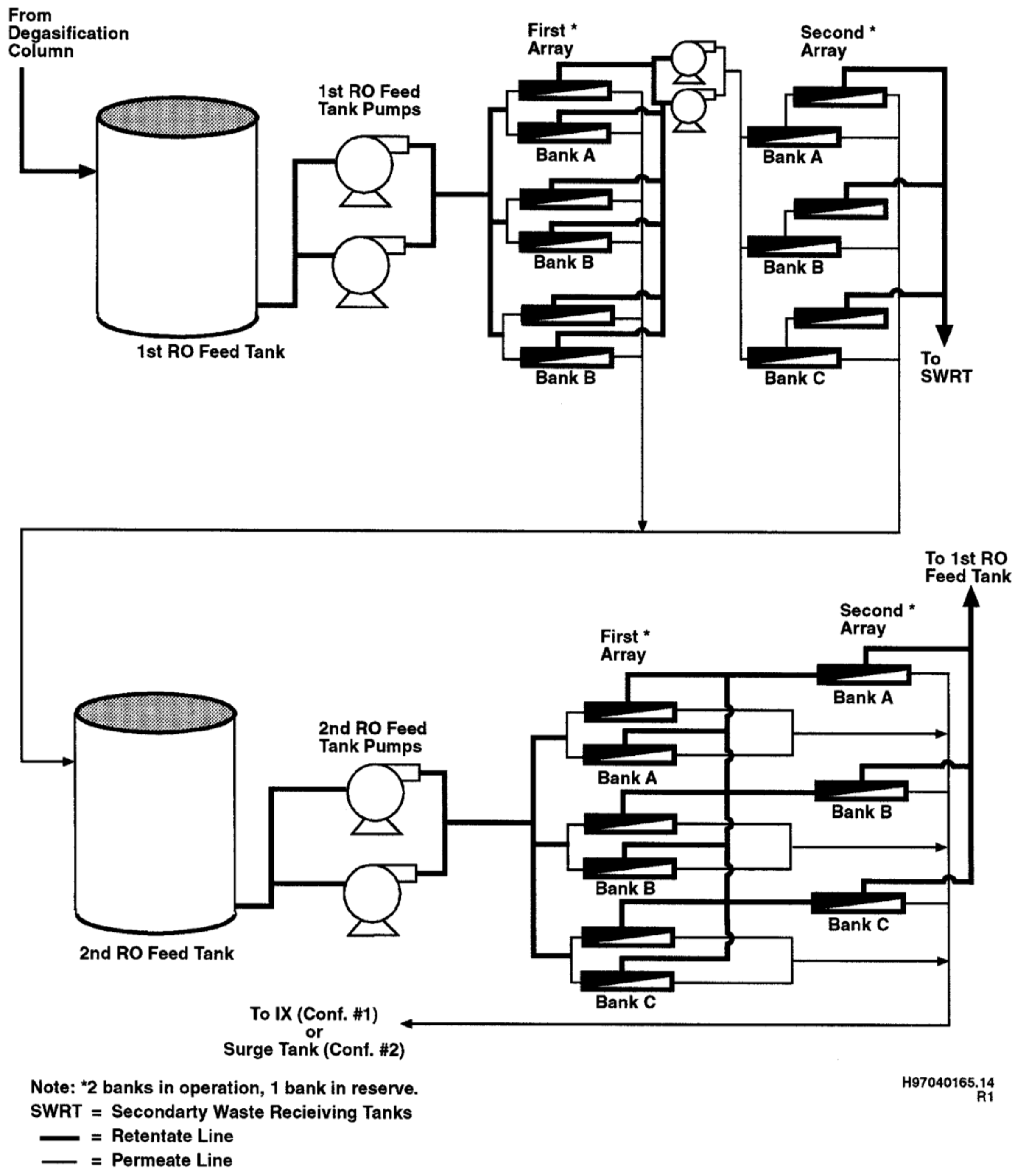


Figure C.10. Ion Exchange Unit

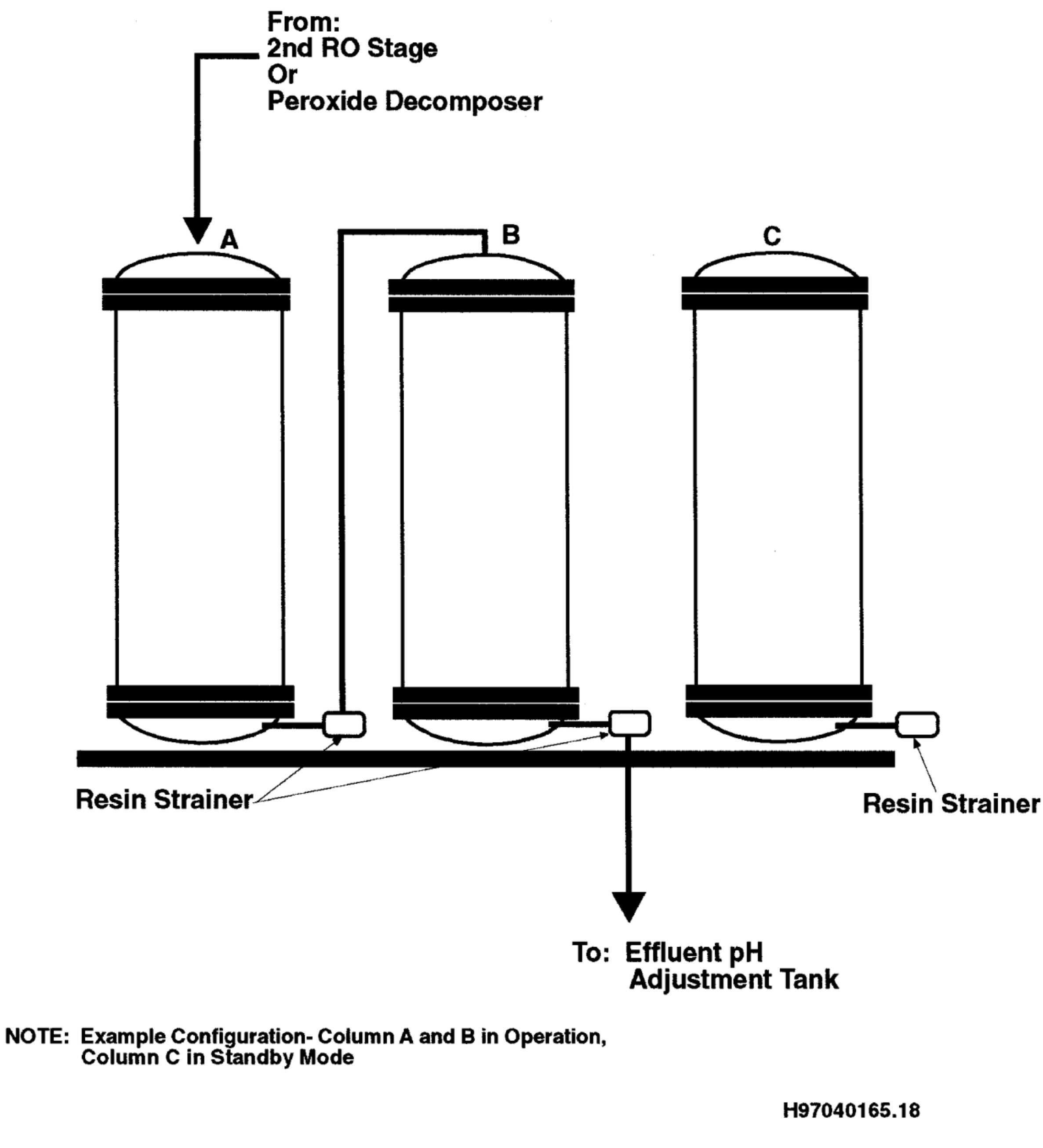
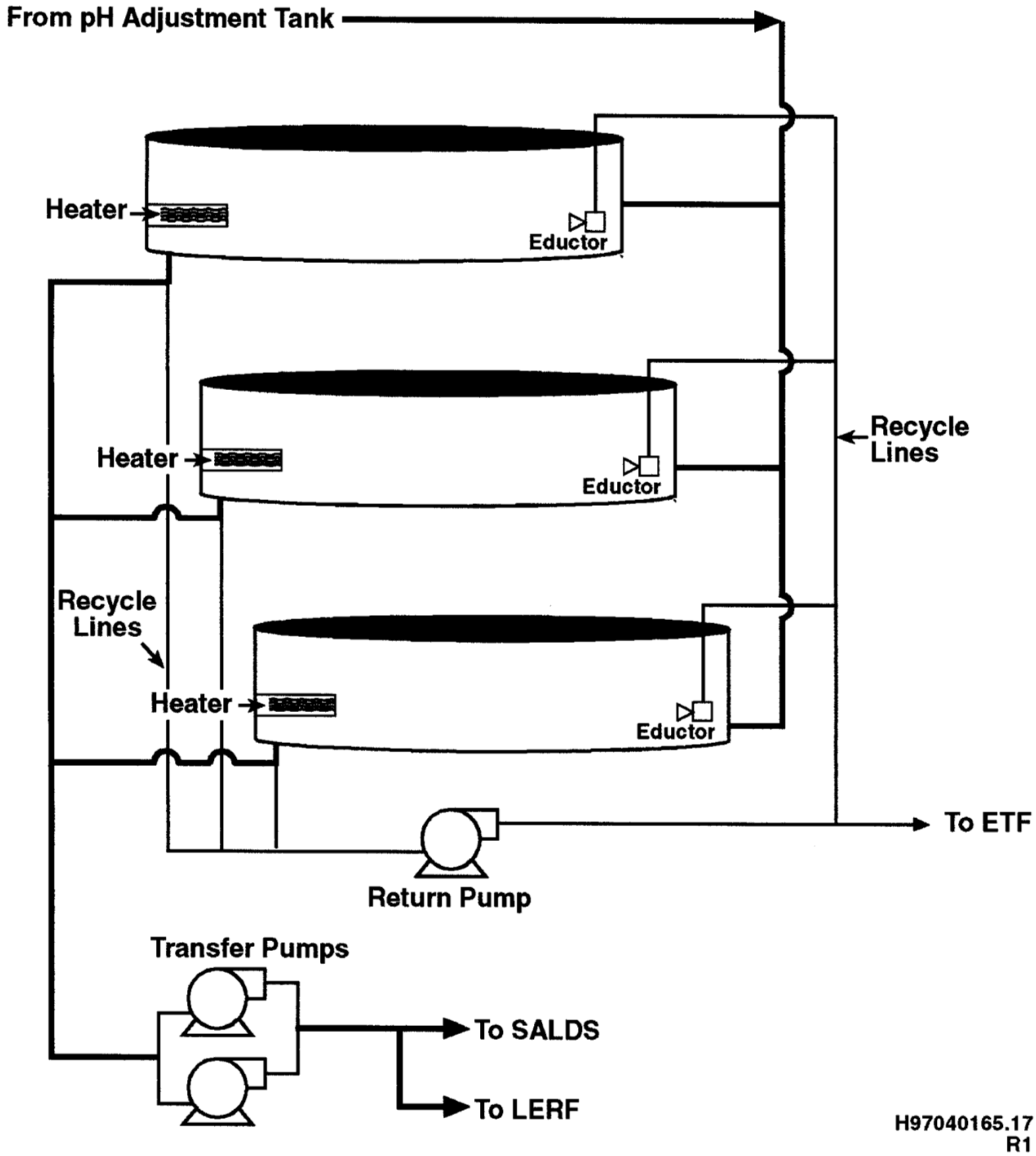


Figure C.11. Verification Tanks



1 **Figure C.12. Effluent Treatment Facility Evaporator**

2

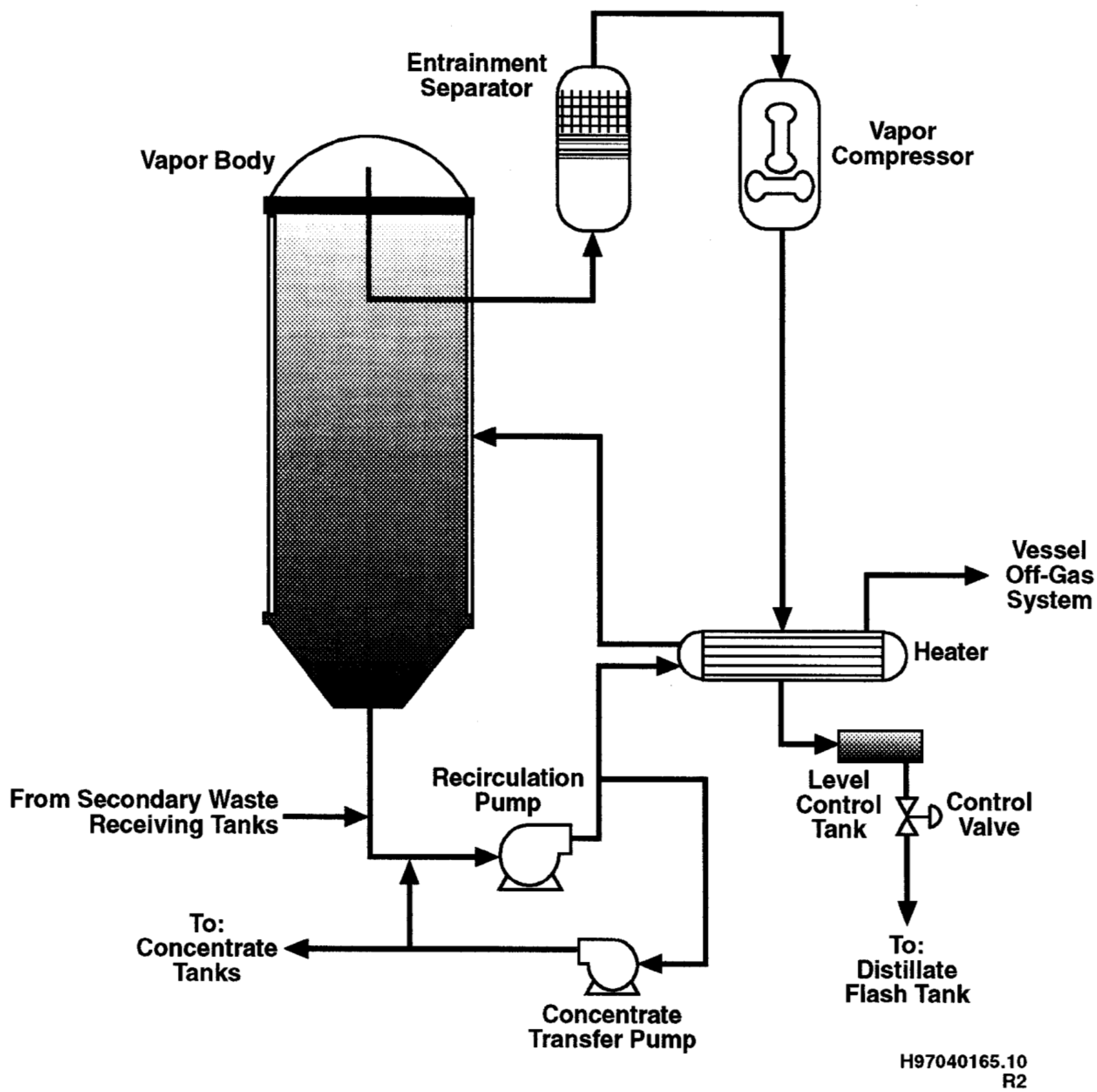
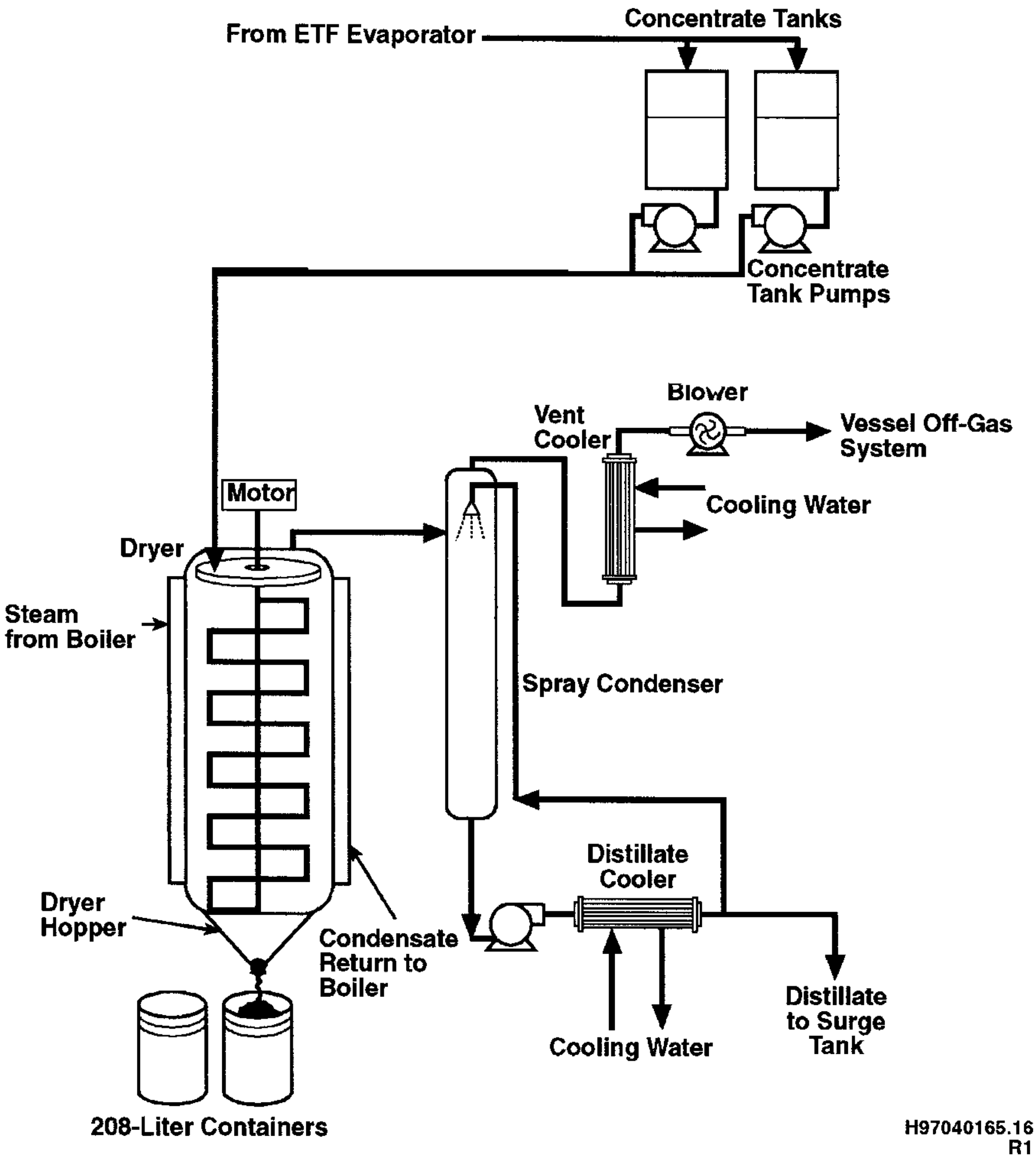


Figure C.13. Thin Film Dryer



1 **Figure C.14. Container Handling System**

2

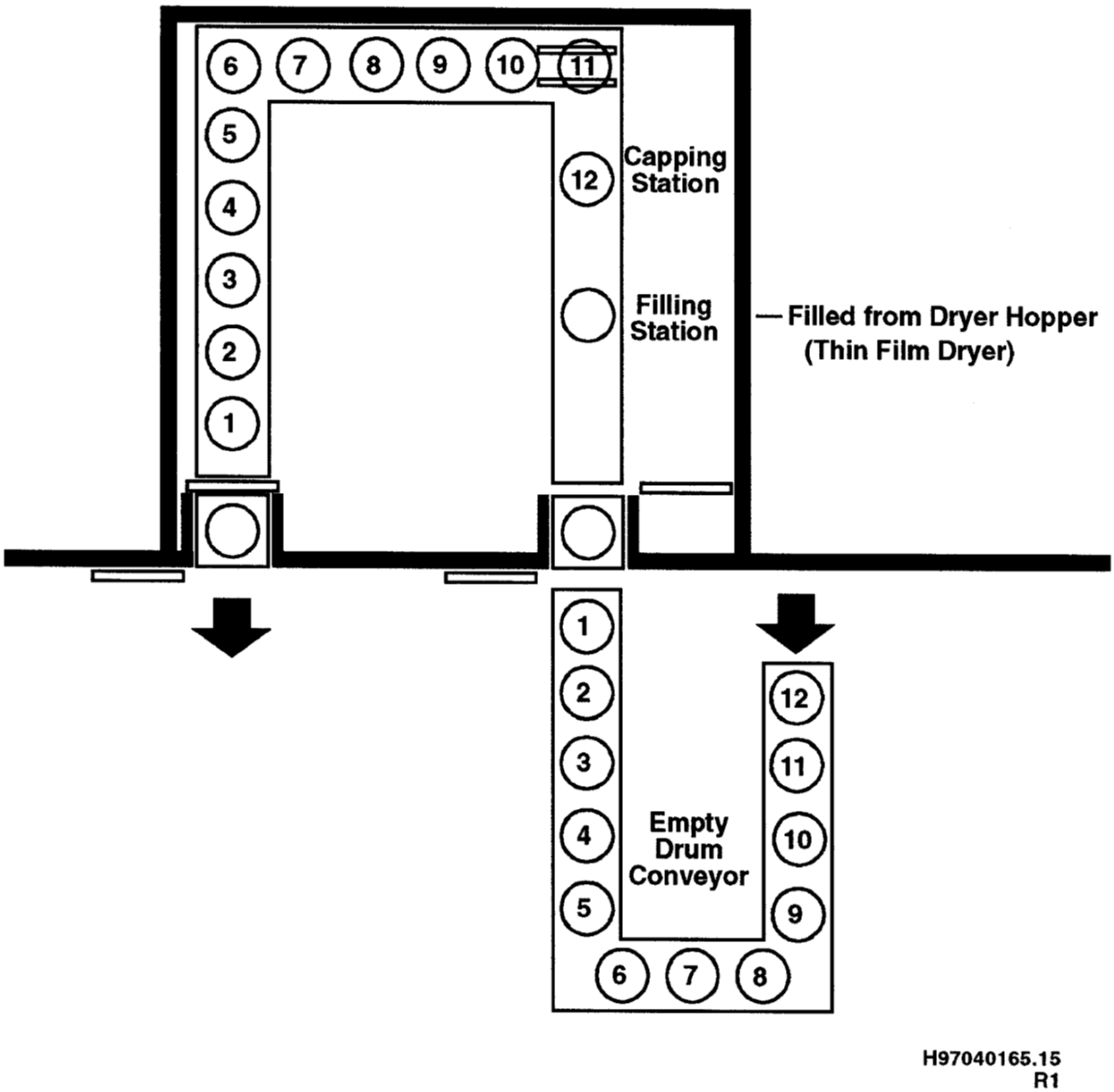


Figure C.15. Effluent Treatment Facility Sump Tanks

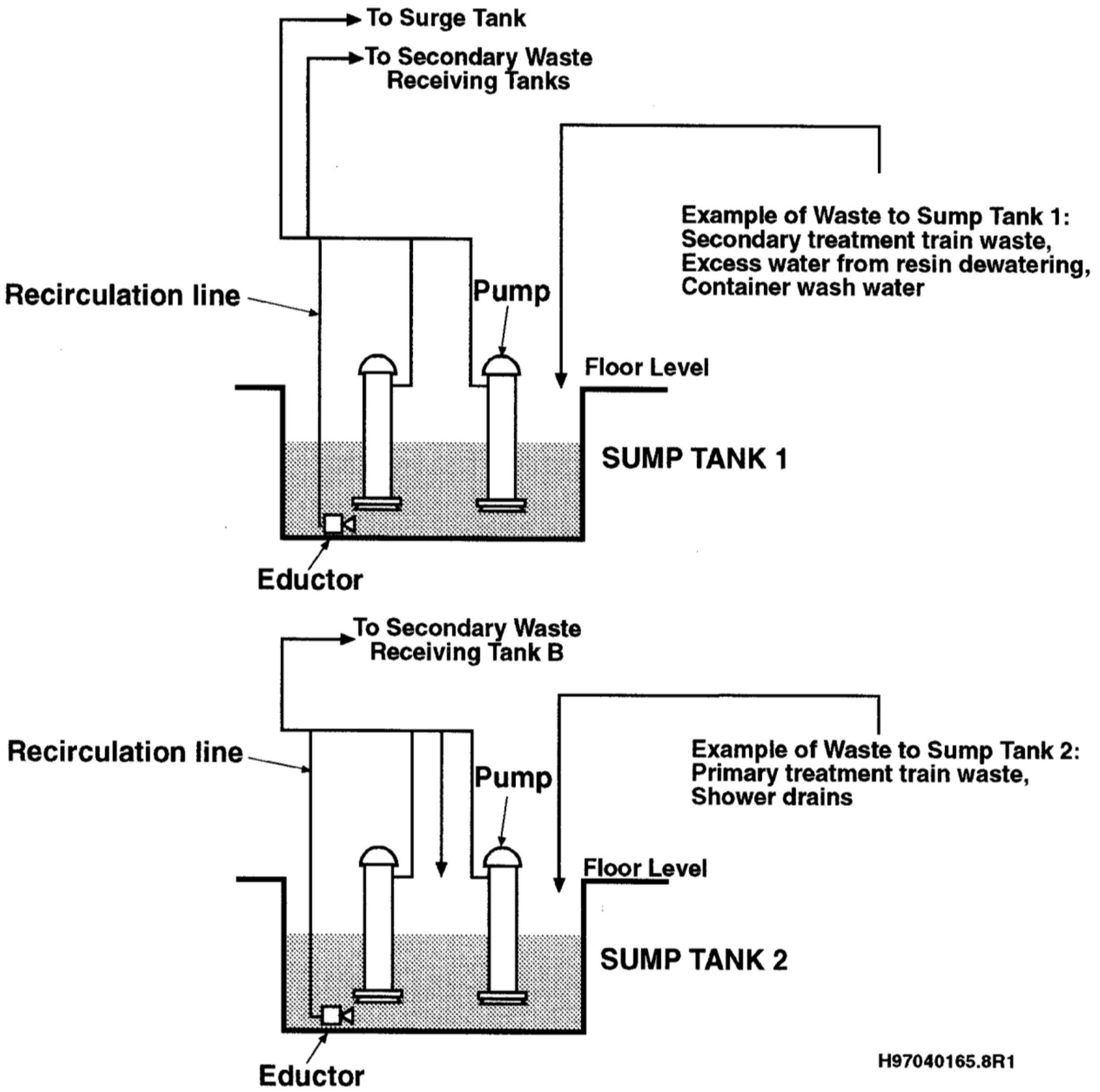


Figure C.16. Liner Anchor Wall and Cover Tension System

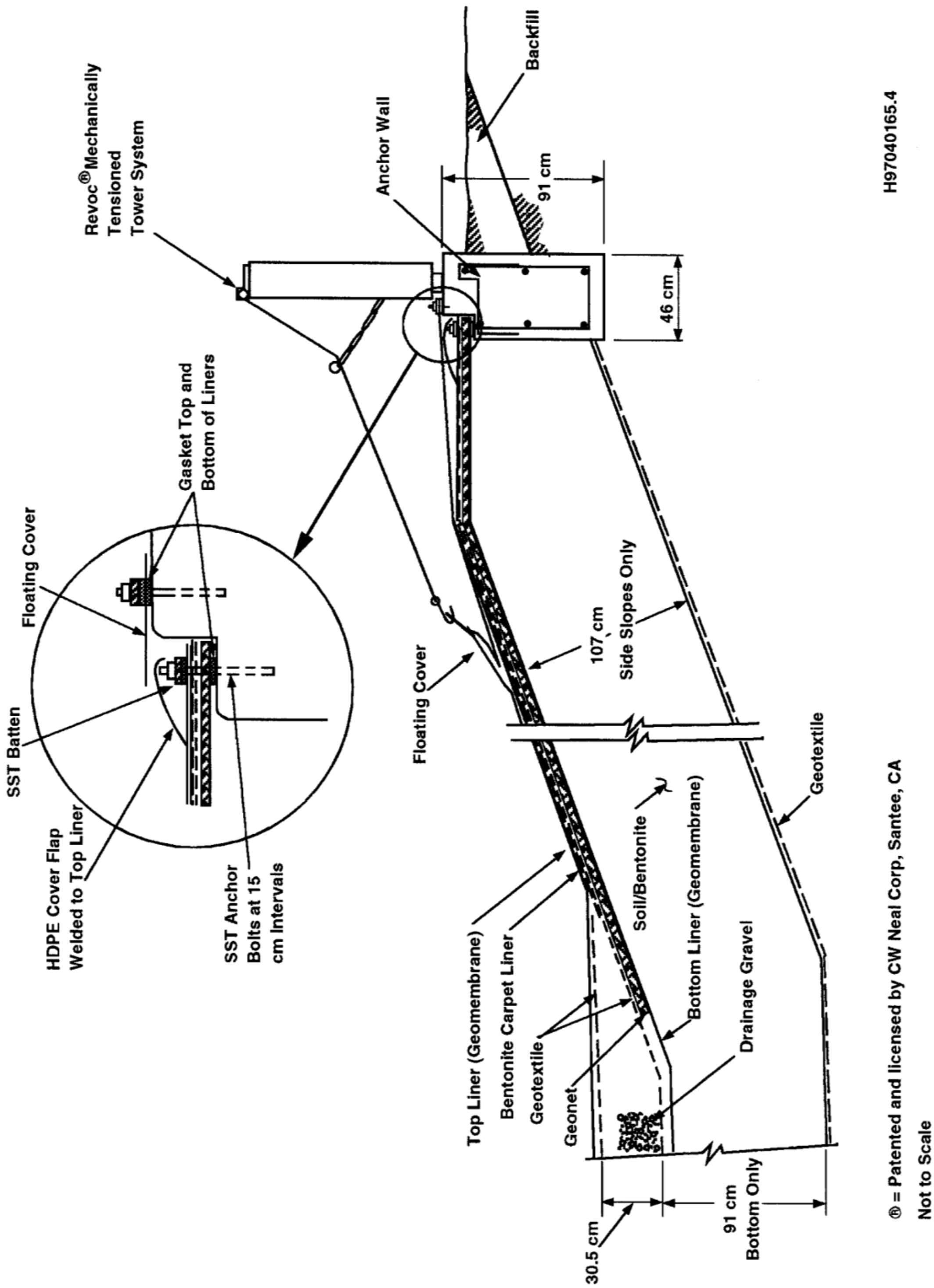


Figure C.17. Liner System Schematic

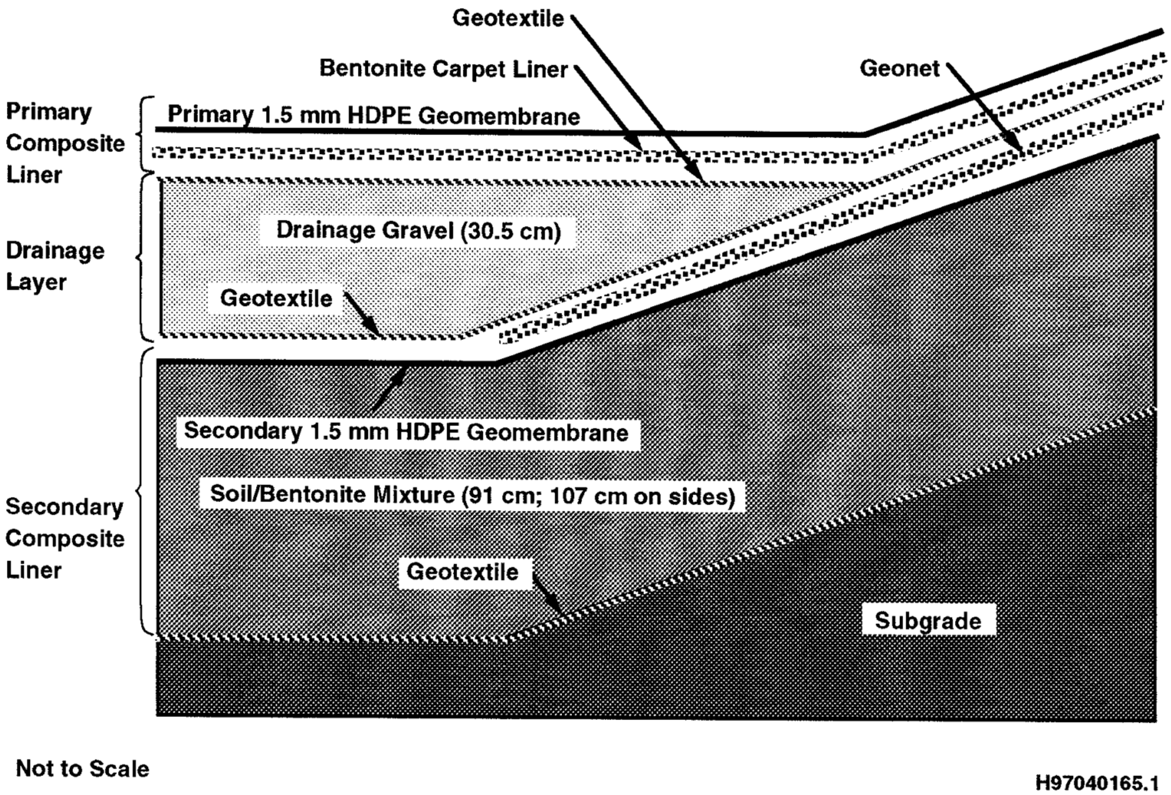
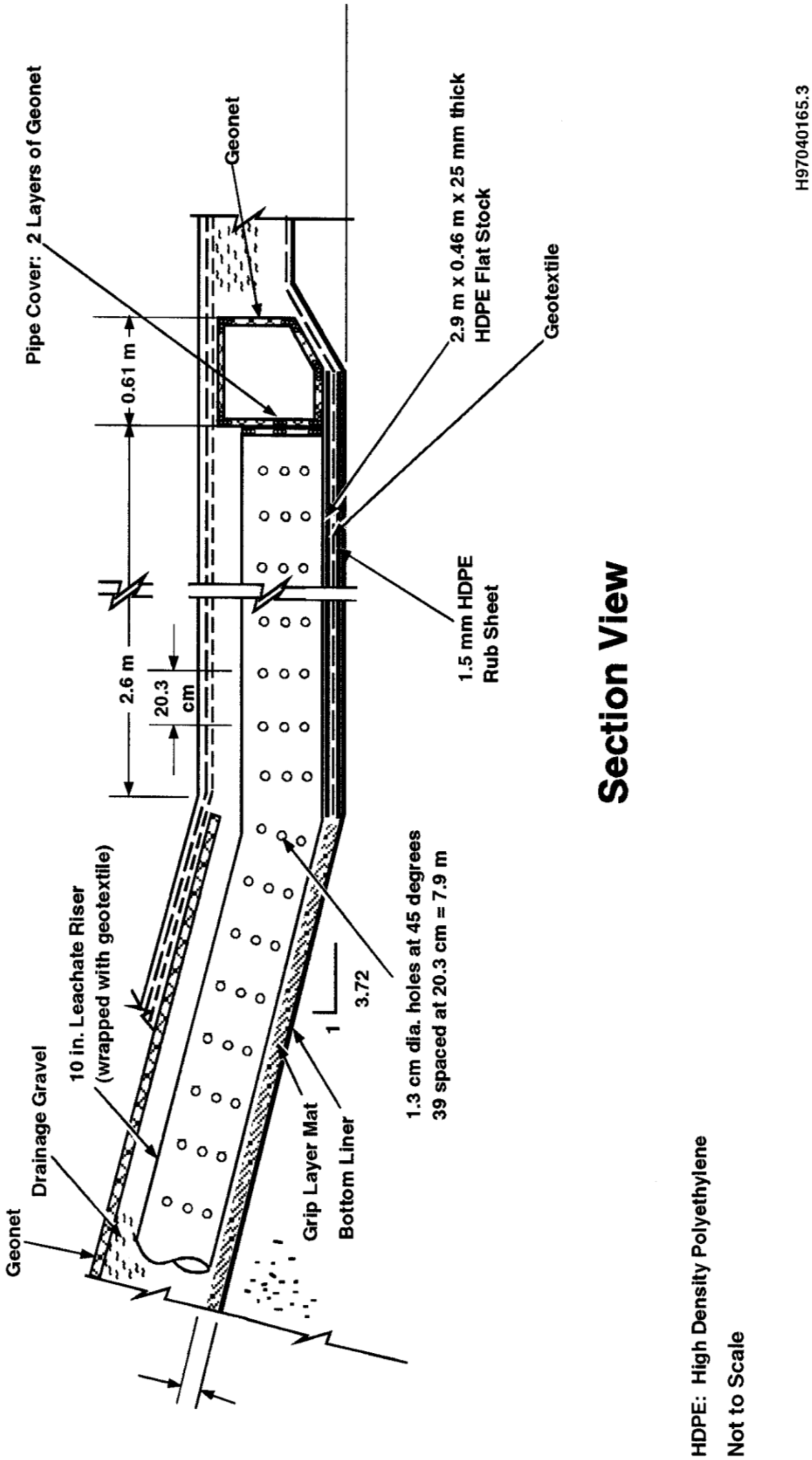


Figure C.18. Detail of Leachate Collection Sump



Hanford Facility RCRA Permit Modification Notification Forms

Part III, Operating Unit 11

Integrated Disposal Facility

Index

Page 2 of 2 Hanford Facility RCRA Permit III.11 Conditions

Submitted by Co-Operator: [signature] 3-8-13
Date

Reviewed by RL Program Office: [signature] 3.7.13
Date

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part
Integrated Disposal Facility	**Part III, Operating Unit 11**

Description of Modification:

Hanford Facility RCRA Permit III.11:

PART III, OPERATING UNIT 11 UNIT-SPECIFIC CONDITIONS
INTEGRATED DISPOSAL FACILITY

III.11.I.2.a.3 A description of production processes including management controls and quality assurance/quality control requirements that assure that glass produced for each formulation will perform in a reasonably similar manner to the waste form assumed in the performance assessment for that formulation.

The Permittees shall update the IWTRD consistent with the above requirements for review by Ecology consistent with their respective roles and authority as provided under the TPA. Ecology comments shall be dispositioned through the Review Comment Record (RCR) process and will be reflected in further modeling to modify the IDF ILAW Chapter 3.0, Waste Analysis Plan as appropriate.

The initial IWTRD contained glass formulation data as required by Permit Condition III.11.I.2.a.1, and was submitted on December 18, 2006 (AR Accession # 0906020182). The performance assessment required by Permit Condition III.11.I.2.a.2, and the quality assurance/quality control requirements process required by Permit Condition III.11.I.2.a.3 shall be submitted for Ecology review as soon as possible after issuance of the Final Tank Closure and Waste Management EIS and receipt of underlying codes and data packages, and at least 180 days prior to the date DOE expects to receive waste at IDF. At a minimum, the Permittees shall submit updates to the IWTRD to Ecology every five years or more frequently with the next one due ~~December 31, 2012~~December 31, 2014, if any of the following conditions exist:

- The Permittees submits a permit modification request allowing additional waste forms to be disposed of at IDF,
- The WTP or other vitrification facility change their glass formulations from those previously included in the IWTRD
- An unanticipated event or condition occurs that Ecology determines would warrant an update to the IWTRD.

WAC 173-303-830 Modification Class [1] [2] Please mark the Modification Class:	Class 1	Class [1]1	Class 2	Class 3
		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: WAC 173-303-830~~(4)(d)~~ Appendix I, A.5.a, changes in Interim Compliance Dates ERS

Enter wording of WAC 173-303-830, Appendix I Modification citation:

Request that the modification be reviewed and approved as a Class [1]1, by agreement with Ecy, letter 13-NWP-018.

Modification Approved: [X] Yes [ ] No (state reason for denial)

Reason for denial:

ERS

Reviewed by Ecology: [signature] 2/28/13

E. R. Skinnarland — Date

[1] Class 1 modifications requiring prior Agency approval.

[2] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to a Class [1]1, if appropriate.

Remove and Replace the Following Sections:

Remove Part III Permit Conditions, dated June 30, 2012, and replace with Permit Conditions, dated March 31, 2013.

PART III, OPERATING UNIT 11 UNIT-SPECIFIC CONDITIONS
INTEGRATED DISPOSAL FACILITY

This document sets forth the operating conditions for the Integrated Disposal Facility (IDF).

III.11.A COMPLIANCE WITH APPROVED PERMIT

The Permittees shall comply with all requirements set forth in the Integrated Disposal Facility (IDF) Permit conditions, the Appendices specified in Permit Condition III.11.A and the Amendments specified in Permit Conditions III.11.B through III.11.I. All subsections, figures, and tables included in these portions are enforceable unless stated otherwise:

OPERATING UNIT 11:

Chapter 1.0	Part A Form, dated October 1, 2008
Chapter 3.0	Waste Analysis Plan, dated April 9, 2006
Chapter 4.0	Process Information, dated December 31, 2008
Appendix 4A	Design Report (as applicable to critical systems), dated March 31, 2008
Appendix 4B	Construction Quality Assurance Plan, dated April 9, 2006
Appendix 4C	Response Action Plan, dated April 9, 2006
Appendix 4D	Technical specifications document (RPP-18-489 Rev 0), dated December 31, 2006
Chapter 5.0	Ground Water Monitoring, dated June 30, 2010
Chapter 6.0	Procedure to Prevent Hazards dated December 31, 2012
Addendum J.1	Contingency Plan – Pre-Active Life, dated June 30, 2012
Addendum J.2	Contingency Plan – Active Life, dated June 30, 2012
Chapter 8.0	Personnel Training, dated November 21, 2007
Chapter 11.0	Closure and Post Closure Requirements, dated December 31, 2008

General and Standard Hanford Facility RCRA Permit, WA7 89000 8967 (Permit) conditions (Part I and Part II Conditions) applicable to the IDF are identified in Permit Attachment 3 (Permit Applicability Matrix).

III.11.B AMENDMENTS TO THE APPROVED PERMIT

III.11.B.1 Portions of Permit Attachment 4, *Hanford Emergency Management Plan* that are not made enforceable by inclusion in the applicability matrix for that document, are not made enforceable by reference in this document.

III.11.B.2 Permittees must comply with all applicable portions of the Permit. The facility and unit-specific recordkeeping requirements are distinguished in the General Information Portion of the Permit, and are tied to the Permit conditions.

III.11.B.3 The scope of this Permit is restricted to the landfill construction and operation as necessary to dispose of: 1) immobilized low activity waste from the WTP, and 2) the Demonstration Bulk Vitrification System and IDF operational waste as identified in Chapter 4.0. Future expansion of the RCRA trench, or disposal of other wastes not specified in this Permit, is prohibited unless authorized via modification of this Permit.

III.11.B.4 In accordance with WAC 173-303-806(11)(d), this Permit shall be reviewed every five (5) years after the effective date and modified, as necessary, in accordance with WAC 173-303-830(3).

III.11.B.5 Inspection Requirements – Pre-Active Life Period and Active Life Period

III.11.B.5.a The Permittees will conduct inspections of the IDF according to the following requirements:

III.11.B.5.a.1 Prior to the start of the active life of the IDF as defined in WAC 173-303-040, according to Chapter 6.0, Table 6.2.

III.11.B.5.a.2 Following the start of the active life of the IDF as defined in WAC 173-303-040, according to Chapter 6.0, Table 6.2A.

III.11.B.5.b The Permittees will remedy any problems revealed by inspections conducted pursuant to Permit Condition III.11.B.5.a on a schedule, which prevents hazards to the public health and the environment and as agreed to in writing, by Ecology. Where a hazard is imminent or has already occurred, remedial action must be taken immediately.

III.11.B.5.c Reserved

III.11.B.5.d Rainwater Management

III.11.B.5.e Prior to the start of the active life of the IDF, the Permittees will manage the discharge of such water in accordance with the pollution prevention and best management practices required by State Waste Discharge Permit Number ST 4511.

III.11.B.5.e.1 Management of Liquids Collected in the Leachate Collection and Removal System (LCRS), Leak Detection System (LDS), and Secondary Leak Detection System (SLDS) prior to the start of the active life of the IDF.

III.11.B.5.e.2 Permittees shall manage the liquid in the LCRS system in a manner that does not allow the fluid head to exceed 30.5 cm above the flat 50-foot by 50-foot LCRS sump HDPE bottom liner, and the LCRS sump trough, except for storms that exceed the 25-year, 24-hour storm event [(WAC 173-303-665(2)(h)(ii)(B). Liquid with a depth greater than 30.5 cm above the LCRS liner will be removed at the earliest practicable time after detection (not to exceed 5 working days).

III.11.B.5.e.3 Accumulated liquid of pumpable quantities in the LDS and SLDS will be managed in a manner that does not allow the fluid head to exceed 30.5 cm above the LDS liner or SLDS liner [WAC 173-303-665(2)(h)(i)(C)(iii)]. Liquid with a depth greater than 30.5 cm above a liner will be removed at the earliest practicable time after detection (not to exceed 5 working days).

III.11.B.5.e.4 The Permittees will use a flow meter to check if the amount of actual liquid pumped corresponds to the amount accumulated in the leachate collection tank to verify the proper function of the leachate collection and removal sump pumps with each use. The Permittees will document in the IDF portion of the facility operating record appropriate quality assurance/quality control requirements for selection and operation of the flow meter based on the required verification. In addition, the Permittees will evaluate the leachate transfer lines for freeze and thaw damage when ambient conditions may cause such damage to occur. The Permittees will document the methods and criteria used for purposes of this evaluation, along with an appropriate justification.

III.11.B.5.e.5 The Permittee will inspect for liquids after significant rainfall events.

III.11.B.5.e.6 The Permittee will annually verify monitoring gauges and instruments are in current calibration; calibration will be performed annually or more frequently at intervals suggested by the manufacturer (refer to Chapter 4.0, §4.3.7.4)

III.11.B.5.f The Permittees will monitor liquids in the Leachate Collection and Removal System and Leak Detection System to ensure the action leakage rate (Chapter 4.0, Appendix 4A) is not exceeded. The Leachate Collection and Removal System will be inspected per Permit Condition III.11.B.5.c.

III.11.B.5.g Soil Stabilization

Prior to the first placement of waste in the IDF, the Permittee will apply soil stabilization materials as needed to prevent soil erosion in and around the landfill.

III.11.C DESIGN REQUIREMENTS

III.11.C.1 IDF is designed in accordance with WAC 173-303-665 and WAC 173-303-640 as described in Chapter 4.0. Design changes impacting IDF critical systems shall be performed in accordance with Permit Conditions III.11.D.1.d.i and III.11.D.1.d.ii.

III.11.C.1.a IDF Critical Systems include the following: The leachate collection and removal system (LCRS), leachate collection tank (LCT), leak detection system (LDS), liner system (LS), and closure cap. H-2 Drawings for the LCRS, LCT, LDS, and LS are identified in Appendix 4A, Section 3 of this Permit. Drawings for the closure cap will be provided pursuant to Permit Condition III.11.C.1.b.

The Permittees shall construct and operate the IDF in accordance with all specifications contained in RPP-18489 Rev 0. Critical systems, as defined in the definitions section of the Site-Wide RCRA Permit, are identified in Appendix 4A, Section 1 of this Permit.

III.11.C.1.b Landfill Cap

At final closure of the landfill, the Permittees shall cover the landfill with a final cover (closure cap) designed and constructed [WAC 173-303-665(6), WAC 173-303-806(4)(h)] to: Provide long-term minimization of migration of liquids through the closed landfill; Function with minimum maintenance; Promote drainage and minimize erosion or abrasion of the cover; Accommodate settling and subsidence so that the cover's integrity is maintained; and have a permeability less than or equal to the permeability of any bottom liner system or natural sub soils present.

III.11.C.1.c Compliance Schedule

Proposed conceptualized final cover design is presented in Chapter 11, Closure and Financial Assurance. Six months prior to start of construction of IDF landfill final cover (but no later than 6 months prior to acceptance of the last shipment of waste at the IDF), the Permittees shall submit IDF landfill final cover design, specifications and CQA plan to Ecology for review and approval. No construction of the final cover may proceed until Ecology approval of the final design is given, through a permit modification.

III.11.C.1.d The Permittees shall notify Ecology at least sixty (60) calendar days prior to the date it expects to begin closure of the IDF landfill in accordance with WAC 173-303-610(c).

III.11.C.2 Design Reports

III.11.C.2.a New Tank Design Assessment Report

Permittees shall generate a written report in accordance with WAC 173-303-640(3)(a), providing the results of the leachate collection tank system design assessment. The report shall be reviewed and certified by an Independent Qualified Registered Professional Engineer (IQRPE)[1] in accordance with WAC-173-303-810(13)(a).

[1] "Independent qualified registered professional engineer," as used here and elsewhere with respect to Operating Unit 11, means a person who is licensed by the state of Washington, or a state which has reciprocity with the state of Washington as defined in RCW 18.43.100, and who is not an employee of the owner or operator of the facility for which construction or modification certification is required. A qualified professional engineer is an engineer with expertise in the specific area for which a certification is given.

III.11.C.2.b Compliance Schedule

Permittees shall submit the leachate collection tank design assessment report to Ecology along with the IQRPE certification, prior to construction of any part of the tank system including ancillary equipment.

III.11.D CONSTRUCTION REQUIREMENTS

III.11.D.1 Construction Quality Assurance

III.11.D.1.a Ecology shall provide field oversight during construction of critical systems. In cases where an Engineering Change Notice (ECN) and/or Non Conformance Report (NCR) are required, Ecology and the Permittees shall follow steps for processing changes to the approved design per Permit Conditions III.11.D.1.d.i and III.11.D.1.d.ii.

III.11.D.1.b Permittees shall implement the Construction Quality Assurance Plan (CQA plan) (Appendix 4B of the permit) during construction of IDF.

III.11.D.1.b.1 The Permittees will not receive waste in the IDF until the owner or operator has submitted to Ecology by certified mail or hand delivery a certification signed by the CQA officer that the approved CQA plan has been successfully carried out and that the unit meets the requirements of WAC 173-303-665(2)(h) or (j); and the procedure in WAC 173-303-810(14)(a) has been completed. Documentation supporting the CQA officer's certification shall be furnished to Ecology upon request.

III.11.D.1.c Construction inspection reports

Permittees shall submit a report documenting the results of the leachate tank installation inspection. This report must be prepared by an independent, qualified installation inspector or a professional independent, qualified, registered, professional engineer either of whom is trained and experienced in the proper installation of tank systems or components. The Permittees will remedy all discrepancies before the tank system is placed in use. This report shall be submitted to Ecology 90 days prior to IDF operation and be included in the IDF Operating Record. [WAC 173-303-640(3)(h)].

III.11.D.1.d ECN/NCR Process for Critical Systems

Portions of the following conditions for processing engineering change notices and non-conformance reporting were extracted from and supersede Site Wide General Permit Condition II.L.

III.11.D.1.d.1 Engineering Change Notice for Critical Systems

During construction of the IDF, the Permittees shall formally document changes to the approved designs, plans, and specifications, identified in Appendices 4A, 4B, 4C, and 4D of this permit, with an Engineering Change Notice (ECN). The Permittees shall maintain all ECNs in the IDF unit-specific Operating Record and shall make them available to Ecology upon request or during the course of an inspection. The Permittees shall provide to Ecology copies of proposed ECNs affecting any critical system within five (5) working days of initiating the ECN. Identification of critical systems is included in Permit Condition III.11.C.1 and Appendix 4A of this permit. Within five (5) working days, Ecology will review a proposed ECN modifying a critical system and inform the Permittees whether the proposed ECN, when issued, will require a Class 1, 2, or 3 Permit modification.

III.11.D.1.d.2 Non-conformance Reporting for Critical Systems

III.11.D.1.d.2.a During construction of the IDF, the Permittees shall formally document with a Nonconformance Report (NCR), any work completed which does not meet or exceed the standards of the approved design, plans and specifications, identified in Appendices 4A, 4B, 4C and 4D of this Permit. The Permittees shall maintain all NCRs in the IDF unit-specific Operating Record and shall make them available to Ecology upon request, or during the course of an inspection.

III.11.D.1.d.2.b The Permittees shall provide copies of NCRs affecting any critical or regulated system to Ecology within five (5) working days after identification of the nonconformance. Identification of critical systems is included in Permit Condition III.11.C.1 and Appendix 4A of this permit. Ecology will review a NCR affecting a critical system and notify the Permittees within five (5) working days, in writing, whether a Permit modification is required for any nonconformance, and whether prior approval is required from Ecology before work proceeds, which affects the nonconforming item.

III.11.D.1.d.2.c As-Built Drawings

Upon completing construction of IDF, the Permittees shall produce as-built drawings of the project, which incorporate the design and construction modifications resulting from all project ECNs and NCRs, as well as modifications made pursuant to WAC 173-303-830. The Permittees shall place the drawings into the Operating Record within twelve (12) months of completing construction.

III.11.D.2 The Permittees shall not reduce the minimum frequency of destructive testing less than one test per 500 feet of seam, without prior approval in writing from Ecology

III.11.E GROUND WATER AND GROUND WATER MONITORING

Ground water shall be monitored in accordance with WAC 173-303 and the provisions contained in the Ecology-approved facility ground water monitoring plan (Chapter 5.0). All wells used to monitor the ground water beneath the unit shall be constructed in accordance with the provisions of WAC 173-160.

III.11.E.1 Ground Water Monitoring Program

III.11.E.1.a Prior to initial waste placement in the IDF landfill, the Permittees shall sample all ground water monitoring wells in the IDF network twice quarterly for one first year to determine baseline conditions. For the first sampling event (and only the first), samples for each well will include all constituents in 40 CFR 264 Appendix IX. Thereafter, sampling will include only those constituents as specified in Chapter 5.0, Table 5-2: chromium (filtered and unfiltered the first year to compare results), specific conductance, TOC, TOX, and pH. Other constituents to be monitored but not statistically compared include alkalinity, anions, ICP metals, and turbidity. These will provide important information on hydrogeologic characteristics of the aquifer and may provide indications of encroaching contaminants from other facilities not associated with IDF.

III.11.E.1.b After the baseline monitoring is completed, and data is analyzed, the Permittees and Ecology shall assess revisions to Chapter 5.0, Table 5-2. Subsequent samples will be collected annually and will include constituents listed in Table 5-2 as approved by Ecology. All data analysis will employ Ecology approved statistical methods pursuant to WAC 173-303-645. Changes to Chapter 5.0 will be subject to the permit modification procedures under WAC 173-303-830.

III.11.E.1.c All constituents used as tracers to assess performance of the facility through computer modeling should be sampled at least annually to validate modeling results. Groundwater monitoring data and analytes to be monitored will be reviewed periodically as defined in Chapter 5.0 of this Permit.

III.11.E.1.d Upon Ecology approval of the leachate monitoring plan, leachate monitoring and groundwater monitoring activities should be coordinated as approved by Ecology to form an effective and efficient means of monitoring the performance of the IDF facility.

III.11.E.1.e Groundwater monitoring data shall be reported to Ecology annually by July 30.

III.11.F LEACHATE COLLECTION COMPONENT MANAGEMENT

Permittees shall design, construct, and operate all leachate collection systems to minimize clogging during the active life and post closure period

III.11.F.1 Leachate Collection and Removal System (LCRS)

III.11.F.1.a At least 120 days prior to initial waste placement in the IDF, the Permittees shall submit a Leachate monitoring plan to Ecology for review, approval, and incorporation into the permit. Upon approval by Ecology, this plan will be incorporated into the Permit as a class 1' modification. The Permittees shall not accept waste into the IDF until the requirements of the leachate monitoring plan have been incorporated into this permit.

III.11.F.1.b Leachate in the LCRS (primary sump) shall be sampled and analyzed monthly for the first year of operation of the facility and quarterly thereafter (pursuant to WAC 173-303-200). Additionally, leachate shall be sampled and analyzed to meet waste acceptance criteria at the receiving treatment storage and disposal facility.

III.11.F.1.c Permittees shall manage the leachate in the LCRS system in a manner that does not allow the fluid head to exceed 30.5 cm above the flat 50-foot by 50-foot LCRS sump HDPE bottom liner except for rare storm events as discussed in Chapter 4.0, §4.3.6.1 and the LCRS sump trough [(WAC 173-303-665(2)(h)(ii)(B). Liquid with a depth greater than 30.5 cm above the SLDS liner will be removed at the earliest practicable time after detection (not to exceed 5 working days).

III.11.F.1.d After initial waste placement, Permittees shall manage all leachate from the permitted cell as dangerous waste (designated with Dangerous Waste Number F039) in accordance with WAC 173-303.

III.11.F.2 Monitoring and Management of Leak Detection System (LDS/ secondary sump)

III.11.F.2.a Permittees shall manage the leachate in the LDS system in a manner that does not allow the fluid head to exceed 30.5 cm above the LDS liner (WAC 173-303-665(2)(h)(ii)(B).

III.11.F.2.b Permittees shall monitor and record leachate removal for comparison to the Action Leakage Rate (ALR) as described in Appendix 4C, Response Action Plan. If the leachate flow rate in the LDS exceeds the ALR, the Permittees shall implement the Ecology approved response action plan (Appendix 4C).

III.11.F.2.c Leachate from the LDS (secondary sump) shall be sampled semi-annually if a pumpable quantity of leachate is available for sampling.

III.11.F.2.d Accumulated liquid of pumpable quantities in the LDS will be managed in a manner that does not allow the fluid head to exceed 30.5 cm above the LDS liner [WAC 173-303-665(2)(h)(i)(C)(iii)]. Liquid with a depth greater than 30.5 cm above the LDS liner will be removed at the earliest practicable time after detection (not to exceed 5 working days).

III.11.F.3 Monitoring and Management of the Secondary Leak Detection System (SLDS)

III.11.F.3.a At least 180 days prior to initial waste placement, the, the Permittees shall submit to Ecology for approval a sub-surface liquids monitoring and operations plan (SLMOP) for the SLDS to include the following: monitoring frequency, pressure transducer configuration, liquid collection and storage processes, sampling and analysis and response actions. The SLMOP shall be approved by Ecology prior to placement of waste in the IDF, and incorporated into the Permit as a Class 1' modification.

III.11.F.3.b Permittees shall monitor and manage the SLDS (tertiary sump) pursuant to the approved sub-surface liquids monitoring and operations plan.

III.11.F.3.c Accumulated liquid of pumpable quantities in the SLDS will be managed in a manner that does not allow the fluid head to exceed 30.5 cm above the SLDS liner [WAC 173-303-665(2)(h)(i)(C)(iii)]. Liquid with a depth greater than 30.5 cm above the SLDS liner will be removed at the earliest practicable time after detection (not to exceed 5 working days).

III.11.F.3.d After initial waste placement, Permittees shall manage all leachate from the permitted cell as dangerous waste in accordance with WAC 173-303.

III.11.G CONSTRUCTION WATER MANAGEMENT

III.11.G.1 During construction, it is anticipated that liquids will accumulate on top of all liners and sumps. Permittees shall manage the construction wastewater in accordance with State Waste Discharge Permit ST 4511.

III.11.G.2 Liquid accumulation within the LCRS, LDS, and SLDS prior to initial waste placement will be considered construction wastewater (i.e., not leachate).

III.11.H LANDFILL LINER INTEGRITY MANAGEMENT & LANDFILL OPERATIONS

III.11.H.1 Permittees shall design, construct, and operate the landfill in a manner to protect the liners from becoming damaged. Temperature: Waste packages with elevated temperatures shall be evaluated and managed in a manner to maintain the primary (upper) liner below the design basis temperature for the liner (e.g.,160 F). Weight: Waste, fill material and closure cover shall be placed in a manner that does not exceed the allowable load bearing capacity of the liner (weight per area 13,000 lb/ft^2). Puncture: At least 3 feet of clean backfill material shall be placed as an operations layer over the leachate collection and removal system to protect the system from puncture damage.

III.11.H.1.a All equipment used for construction and operations inside of the IDF shall meet the weight limitation as specified in Permit Condition III.H.1. Only equipment that can be adequately supported by the operations layer as specified in Permit Condition III.H.1 (e.g., will not have the potential to puncture the liner) shall be used inside of the IDF. All equipment used for construction and operations outside of the IDF shall not damage the berms. Changes to any equipment will follow the process established by condition II.R of the site wide permit. Within 120 days from the effective date for the permit, a process for demonstrating compliance with this condition shall be submitted for review by Ecology. This process will be incorporated into appropriate IDF operating procedures prior to IDF operations.

III.11.H.2 The Permittees shall construct berms and ditches to prevent run-on and run-off in accordance with the requirements of Section 4.3.8 of this permit. Before the first placement of waste in the IDF, the Permittees shall submit to Ecology a final grading and topographical map on a scale sufficient to identify berms and ditches used to control run-on and run-off. Upon approval, Ecology will incorporate these maps into the permit as a Class 1' modification.

III.11.H.3 The Permittees shall operate the RCRA IDF Cell (Cell1) in accordance with WAC 173-303-665(2) and the operating practices described in Chapters 3.0, 4.0, 6.0, 7.0, 8.0 and Appendix 4A, §1, subsection 7, except as otherwise specified in this Permit.

III.11.H.4 The Permittees shall maintain a permanent and accurate record of the three-dimensional location of each waste type, based on grid coordinates, within the RCRA IDF Cell (Cell1) in accordance with WAC 173-303-665(5).

III.11.I WASTE ACCEPTANCE CRITERIA

The only acceptable waste form approved for disposal at the RCRA cell of IDF are IDF operational waste, Immobilized Low Activity Waste (ILAW) in glass form from the Waste Treatment Plant (WTP) Low Activity Waste (LAW) Vitrification facility and ILAW from the Bulk Vitrification Research Demonstration and Development facility (up to 50 boxes). Specifics about waste acceptance criteria for each of these wastes are detailed below.

No other waste forms may be disposed at the RCRA cell of IDF unless authorized via a Final Permit modification decision. Requests for Permit modifications must be accompanied by an analysis adequate for Ecology to comply with SEPA, as well as by a risk assessment and groundwater modeling to show the environmental impact. Permit Condition III.11.I.5 outlines the process by which waste sources in the IDF are modeled in an ongoing risk budget and a ground water impact analysis.

III.11.I.1 Six months prior to IDF operations Permittees shall submit to Ecology for review, approval, and incorporation into the permit, all waste acceptance criteria to address, at a minimum, the following: physical/chemical criteria, liquids and liquid containing waste, land disposal restriction treatment standards and prohibitions, compatibility of waste with liner, gas generation, packaging, handling of packages, minimization of subsidence.

III.11.I.1.a All containers/packages shall meet void space requirements pursuant to WAC 173-303-665(12).

III.11.I.1.b Compliance Schedule

III.11.I.1.b.1 Six months prior to IDF operations, the Permittees shall submit to Ecology for review, approval, and incorporation into the permit any necessary modifications to the IDF Waste Acceptance Plan (Appendix 3A of the permit application, DOE/RL-2003-12, Rev 1).

III.11.I.2 ILAW Waste Acceptance Criteria

The only ILAW forms acceptable for disposal at IDF are: (1) approved glass canisters that are produced in accordance with the terms, conditions, and requirements of the WTP portion of the Permit, and (2) the 50 bulk vitrification test boxes as specified in the DBVS test plans.

To assure protection of human health and the environment, it is necessary that the appropriate quality of glass be disposed at IDF. The LDR Treatment Standard for eight metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver), when associated with High Level Waste, is HLVIT (40 CFR 268). Because these metals are constituents in the Hanford Tanks Waste, the LDR standard for ILAW disposed to IDF is HLVIT.

For any ILAW glass form(s) that DOE intends to dispose of in IDF, DOE will provide to Ecology for review, an ILAW Waste Form Technical Requirements Document (IWTRD). The IWTRD will contain:

III.11.I.2.a WTP ILAW Waste Acceptance Criteria

III.11.I.2.a.1 A description of each specific glass formulation that DOE intends to use including a basis for why each specific formulation is proposed for use, which specific tank wastes the glass formulation is proposed for use with, the characteristics of the glass that are key to satisfactory performance (e.g., VHT, PCT, and TCLP and/or other approved performance testing methodologies that the parties agree are appropriate and necessary), the range in key characteristics anticipated if the specific glass formulation is produced on a production basis with tank waste, and the factors that DOE must protect against in producing the glass to ensure the intended glass characteristics will exist in the actual ILAW.

III.11.I.2.a.2 A performance assessment that provides a reasonable basis for assurance that each glass formulation will, once disposed of in IDF in combination with the other waste volumes and waste forms planned for disposal at the entire Integrated Disposal Facility, be adequately protective of human health and the environment; and will not violate or be projected to violate all applicable state and federal laws, regulations and environmental standards.

Within 60 days of a request by Ecology, the Permittees shall provide a separate model run using Ecology's assumptions and model input.

III.11.I.2.a.3 A description of production processes including management controls and quality assurance/quality control requirements that assure that glass produced for each formulation will perform in a reasonably similar manner to the waste form assumed in the performance assessment for that formulation.

The Permittees shall update the IWTRD consistent with the above requirements for review by Ecology consistent with their respective roles and authority as provided under the TPA. Ecology comments shall be dispositioned through the Review Comment Record (RCR) process and will be reflected in further modeling to modify the IDF ILAW Chapter 3.0, Waste Analysis Plan as appropriate.

The initial IWTRD contained glass formulation data as required by Permit Condition III.11.I.2.a.1, and was submitted on December 18, 2006 (AR Accession # 0906020182). The performance assessment required by Permit Condition III.11.I.2.a.2, and the quality assurance/quality control requirements process required by Permit Condition III.11.I.2.a.3 shall be submitted for Ecology review as soon as possible after issuance of the Final Tank Closure and Waste Management EIS and receipt of underlying codes and data packages, and at least 180 days prior to the date DOE expects to receive waste at IDF. At a minimum, the Permittees shall submit updates to the IWTRD to Ecology every five years or more frequently with the next one due December 31, 2014, if any of the following conditions exist:

- The Permittees submits a permit modification request allowing additional waste forms to be disposed of at IDF,
- The WTP or other vitrification facility change their glass formulations from those previously included in the IWTRD
- An unanticipated event or condition occurs that Ecology determines would warrant an update to the IWTRD.

III.11.I.2.a.4 The Permittees shall not dispose of any WTP ILAW not described and evaluated in the IWTRD.

III.11.I.3 ILAW Waste Acceptance Criteria Verification

III.11.I.3.a Six months prior to disposing of ILAW in the IDF, the Permittees will submit an ILAW verification plan to Ecology for review and approval. This plan will be coordinated with WTP, Ecology, and the Permittees personnel. This plan will outline the specifics of verifying ILAW waste acceptance through WTP operating parameters, and/or glass sampling. The Plan will include physical sampling requirements for batches, glass formulations, and/or feed envelopes.

III.11.I.4 Demonstration Bulk Vitrification System (DBVS) Bulk Vitrification Waste Acceptance Criteria

III.11.I.4.a Bulk Vitrification waste forms that are acceptable to be disposed of at IDF are up to 50 boxes of vitrified glass produced pursuant to the DBVS RD&D Permit from processing Hanford Tank S-109 tank waste.

III.11.I.4.b If Bulk Vitrification is selected as a technology to supplement the Waste Treatment Plant, the IDF portion of the Permit will need to be modified to accept Bulk Vitrification Full Scale production waste forms. This modification will need to be accompanied by appropriate TPA changes (per M-062 requirements) and adequate risk assessment information sufficient for the Department of Ecology to meet its SEPA obligations.

III.11.I.4.c DBVS Waste Acceptance Verification will occur on 100% of the waste packages. Pursuant to the DBVS RD&D Permit, a detailed campaign test report will be produced and submitted to Ecology detailing results of all testing performed on each waste package that is produced. IDF personnel shall review these reports to verify that the waste packages meet IDF Waste Acceptance Criteria.

III.11.I.4.d The Permittees shall not dispose of any waste forms that do not comply with all appropriate and applicable treatment standards, including all applicable Land Disposal Restrictions (LDR).

III.11.I.5 Modeling – Risk Budget Tool

III.11.I.5.a The Permittees must create and maintain a modeling - risk budget tool, which models the future impacts of the planned IDF waste forms (including input from analyses performed as specified in Permit Conditions III.11.I.2.a through III.11.I.2.a.ii) and their impact to underlying vadose and ground water. This software tool will be submitted for Ecology review as soon as possible after issuance of Final Tank Closure and Waste Management EIS and receipt of underlying codes and data packages, and at least 180 days prior to the date DOE expects to receive waste at IDF. The risk budget tool shall be updated at least every 5 years. The model will be updated more frequently if needed, to support permit modifications or SEPA Threshold Determinations whenever a new waste stream or significant expansion is being proposed for the IDF. This risk budget tool shall be conducted in manner that is consistent with state and federal requirements, and represents a risk analysis of all waste previously disposed of in the entire IDF (both cell 1 and cell 2) and those wastes expected to be disposed of in the future for the entire IDF to determine cumulative impacts. The groundwater impact should be modeled to evaluate fate and transport in the groundwater aquifer(s) and should be compared against various performance standards including but not limited to drinking water standards (40 CFR 141 and 40 CFR 143). Ecology will review modeling assumptions, input parameters, and results and will provide comments to the Permittees. Ecology comments shall be dispositioned through the Review Comment Record (RCR) process and will be reflected in further modeling to modify the IDF ILAW waste acceptance criteria as appropriate.

III.11.I.5.a.1 The modeling-risk budget tool will include a sensitivity analysis reflecting parameters and changes to parameters as requested by Ecology.

III.11.I.5.a.2 If these modeling efforts indicate results within 75% of a performance standard [including but not limited to federal drinking water standards (40 CFR 141 and 40 CFR 143)], Ecology and the Permittees will meet to discuss mitigation measures or modified waste acceptance criteria for specific waste forms.

III.11.I.5.a.3 When considering all the waste forms to be disposed of in IDF, the Permittees shall not dispose of any waste that will result (through forward looking modeling or in real groundwater concentrations data) in a violation of any state or federal regulatory limit, specifically including but not limited to drinking water standards for any constituent as defined in 40 CFR 141 and 40 CFR 143.

III.11.I.6 The Permittees shall not dispose of any waste that is not in compliance with state and federal requirements as identified in Chapter 13.0.

III.11.I.6.a In accordance with DOE's authority under the Atomic Energy Act of 1954, as amended and other applicable law, prior to disposing of any mixed immobilized low-activity waste (ILAW) in the IDF, DOE will certify to the State of Washington that it has determined that such ILAW is not high-level waste and meets the criteria and requirements outlined in DOE's consultation with the U.S. Nuclear Regulatory Commission beginning in 1993 (Letter from R.M. Bernero, USNRC to J. Lytle, USDOE, dated March 2, 1993; Letter from J. Kinzer, USDOE, to C. J. Paperiello, USNRC, Classification of Hanford Low-Activity Tank Waste Fraction, dated March 7, 1996; and Letter from C.J. Paperiello, USNRC, to J. Kinzer, USDOE, Classification of Hanford Low-Activity Tank Waste Fraction, dated June 9, 1997). While the requirement to provide such certification is an enforceable obligation of this permit, the provision of such certification does not convey, or purport to convey, authority to Ecology to regulate the radioactive hazards of the waste under this permit.

III.11.I.7 IDF Operational Waste Acceptance Criteria

III.11.I.7.a IDF operational activities (including decontamination, cleanup, and maintenance) will generate a small amount of waste. Waste that can meet IDF waste acceptance without treatment will be disposed of at the IDF. All other IDF operational waste will be managed pursuant to WAC 173-303-200.

This page intentionally left bank.

Quarter Ending 12/31/2012

24590-LAB-PCN-ENV-12-001

Hanford Facility RCRA Permit Modification Notification Form
Part III, Operating Unit 10
Waste Treatment and Immobilization Plant

Index

Page 2 of 3: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant

Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant, update *System Logic Description for Analytical Laboratory - Radioactive Liquid Waste (RLD) System*, 24590-LAB-PER-J-03-001, in Appendix 11.13

Submitted by Co-Operator:

D. M. Busche 12/18/12 Date

Reviewed by ORP Program Office:

D. L. Noyes 1/4/13 Date

Quarter Ending 12/31/2012 24590-LAB-PCN-ENV-12-001

Hanford Facility RCRA Permit Modification Notification Form	
Unit: **Waste Treatment and Immobilization Plant**	Permit Part: **Part III, Operating Unit 10**

Description of Modification:

The purpose of this Class 1 prime modification is to update *System Logic Description for Analytical Laboratory - Radioactive Liquid Waste (RLD) System*, 24590-LAB-PER-J-03-001, in Appendix 11.13.

The following system logic description is submitted to replace the document currently in Appendix 11.13:

Appendix 11.13			
Replace:	24590-LAB-PER-J-03-001, Rev. 1	With	24590-LAB-PER-J-03-001, Rev. 2

This modification requests Ecology approval and incorporation into the permit the specific changes to this permit document as summarized below:

- Revised Table of Contents and pagination to reflect text changes
- Added LKY - level rate of change calculation to the Acronym List
- Revised Figures to add a new Figure 2, and revised the numbering to reflect a total of four figures
- Added Figure 2, Typical Vessel Cell Sump Level Detection, and incorporated the visual representation of the interlocks and alarms for the vessel cell level detection functions, including the LKY sump fill rate function
- Changed the existing Figure 2 into Figure 3, and made it specific to the interlocks and alarms associated with the Typical Pump and Piping (Equipment) Sump Level Detection functions
- Changed the existing Figure 3 into Figure 4, to provide a visual representation of the interlocks and alarms associated with the Typical Leak Detection Box Level Detection functions
- Moved the text describing the permit or regulatory function of the LAB Floor Drain Collection Vessel (RLD-VSL-00163) from Section 3.1 and made it a footnote to the list of tanks and ancillary equipment associated with dangerous waste management within the RLD system on Page 2 of the document
- Modified the last bullet in Section 3.1 to read: "The level of the receiving vessel reaches its LAH. During routine operations, pretreatment plant wash vessel, PWD-VSL-00044 or the pretreatment ultimate overflow vessel, PWD-VSL-00033, receive transfer line flushes."
- Modified the second bullet in Section 3.2 to read: "The level of the sending vessel reaches its LAL."

  For clarity this section of text now reads:

  "During normal operation, the batch transfer sequence is stopped by the control system when any of the following conditions are met:

  - The level in the lab area sink drain collection vessel (RLD-VSL-00164) reaches its LAH
  - The level of the sending vessel reaches its LAL"

To more accurately reflect the LAB design and associated leak detection processes Section 3.3 was completely revised. A summary of the Section 3.3 changes include:

- Clarification of the two types of LAB sumps - vessel cell sumps and pump and piping pit sumps and associated leak detection functions and the operating evolutions that will occur if a leak is detected
- Added subsection 3.3.1, *Vessel Cell Sumps,* to expand description of potential source of a spill or leak that could occur in the vessel cell sumps, define normal and off-normal functions, add regulatory requirements to detect a leak, define leak detection functions and the operating evolutions that will occur if a leak is detected

Quarter Ending 12/31/2012 24590-LAB-PCN-ENV-12-001

Subsection 3.3.1 defines three alarm points, expands the description of how the transfer pumps and suction lines function, describes waste transfer functions, and incorporates a description of the LKY level rate of change instrument function. The LKY function provides a continuous rate change calculation of sump liquid levels until residual flush liquids evaporate from the sump:

- Revised text to incorporated reference Figure 2 in Section 3.3.1
- Added subsection 3.3.2, *Pump and Piping Pit Sumps,* to expand the description of the removable weir and associated alarm functions and operator evolutions that will occur if a leak is detected
- Revised text to incorporate reference to Figure 3 in Section 3.3.2
- Revised text to incorporate reference to Figure 4 in Section 3.4

Other changes to the document include:

- Revised Table 1 to incorporate the LKY level rate of change - instrument control device for RLD-SUMP-00041 and RLD-SUMP-00042

To support the review of this modification references to the J3 Logic Diagrams associated with instrumentation in the LAB RLD System Logic description are provided for information below:

- 24590-LAB-J3-RLD-00006, *Logic Diagram Radioactive Liquid Waste Disposal System C2 Collection and Transfer YV-6802, YV-6222, YV-6221, YV-6512, YV-6513, and Level Switches*

- 24590-LAB-J3-RLD-01002, *Functional Diagram Radioactive Liquid Waste Disposal System C5 Collection and Transfer RLD SUMPS 00042, and 00043A LVL Indication*

- 24590-LAB-J3-RLD-01007, *Functional Diagram Radioactive Liquid Waste Disposal System C3 Collection and Transfer RLD VSL 00164, RLD SUMPS 00045, and 00041 LVL*

In accordance with Permit Condition III.10.C.2.e, this permit modification sent to Ecology may include page changes to the Permit, attachments, and permit application supporting documentation.

WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: NA

Enter wording of WAC 173-303-830, Appendix I Modification citation:

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

Modification Approved/Concur: [X] Yes [ ] Denied (state reason below)

Reason for denial:

Reviewed by Ecology:

S. Dahl (signature) 2-25-13

Date

ISSUED BY
RPP-WTP PDC

R11560748

Document title: **System Logic Description for Analytical Laboratory - Radioactive Liquid Waste (RLD) System**

Document number: 24590-LAB-PER-J-03-001, Rev 2

Contract number: DE-AC27-01RV14136

Department: Controls and Instrumentation

Author(s): **Mike Dingeldein**

Checked by: **Rod Busalpa**

Issue status: Issued for Permitting Use

Approved by: **Neal Schertz**

Approver's position: C&I Engineering Group Supervisor

Approver's signature: ____________________ Signature   12/12/12 Date

River Protection Project
Waste Treatment Plant
2435 Stevens Center Place
Richland, WA 99354
United States of America
Tel: 509 371 2000

This bound document contains a total of 19 sheets

Notice

Please note that source, special nuclear, and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the US Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

History Sheet

Rev	Reason for revision	Revised by
0	Issued for Permitting Use	A. Pfeif
1	Revised to include changes to permitted instruments	N. A. Gergely
2	**Revised to include changes to sump leak alarms**	**M. D. Dingeldein**

Contents

Notice iii
History Sheet iv
Acronyms vi
Glossary vii
1 Introduction 1
2 Applicable Documents 1
3 Description 2
3.1 Hotcell Drain Collection Vessel 3
3.2 Radiological Laboratory Area Sink Drain Collection Vessel 4
3.3 Cell and Equipment Sumps 4
3.4 Leak Detection Boxes 6

Tables

Table 1 Associated Instruments for LAB Radioactive Liquid Waste Disposal System 7

Figures

Figure 1 Typical Drain Collection Vessel Level Detection 9
Figure 2 Typical Vessel Cell Sump Level Detection 10
Figure 3 Typical Pump or Piping Pit (Equipment) Sump Level Detection 11
Figure 4 Typical Leak Detection Box Level Detection 12

Acronyms

AEA	Atomic Energy Act
DOE	US Department of Energy
DWP	Dangerous Waste Permit
LAB	analytical laboratory
LAH	level alarm high
LAHH	level alarm high high
LAL	level alarm low
LI	level indicator
LKY	**level rate of change calculation**
LSH	level switch high
LT	level transmitter
P&ID	piping and instrumentation diagram
RLD	radioactive liquid waste disposal
WTP	Hanford Tank Waste Treatment and Immobilization Plant

Glossary

acquire	Acquire is a command under batch control that reserves a group of equipment for a particular batch control operation.
batch	Batch is the material that is being produced or that has been produced by a single execution of a batch process.
batch control	Batch control refers to control activities and control functions that provide an ordered set of processing activities to complete a batch process.
batch process	A batch process is a process that leads to the production of finite quantities of material by subjecting quantities of input materials to an ordered set of processing activities over a finite period of time using one or more pieces of equipment.
control system	Refers to electronic processors that perform regulatory and logical control functions necessary for normal plant operation
exception handling	Exception handling refers to those functions that deal with plant or process contingencies and other events that occur outside the normal or desired behavior of batch control.
level alarm high (LAH)	A vessel high-level setpoint used to stop a transfer-in batch operation to a vessel under normal plant operation.
level alarm high high (LAHH)	Refers to a notification in the control system that is activated when the applicable variable reaches a point that is significantly higher than that expected during normal operation
level alarm low (LAL)	A vessel low-level set point used to stop a transfer-out batch operation from a vessel under normal plant operations.
release	Release is a command under batch control that opens up a group of equipment for any batch control to acquire.

1 Introduction

This document describes the instrument control logic for Dangerous Waste Permit (DWP) tank and ancillary equipment in the radioactive liquid waste disposal (RLD) system within the analytical laboratory (LAB) associated with dangerous waste management. **This document has been prepared as one of the documents that have been or will be developed to provide tank, ancillary equipment, and leak detection system instrument control logic narrative description (e.g., software functional specifications, descriptions of fail-safe conditions, etc.) to meet the requirements of permit condition III.10.E.9.d.vii;**

2 Applicable Documents

24590-WTP-M6-50-00001	*P&ID Symbols and Legend Sheet 1 of 8*
24590-WTP-M6-50-00002	*P&ID Symbols and Legend Sheet 2 of 8*
24590-WTP-M6-50-00003	*P&ID Symbols and Legend Sheet 3 of 8*
24590-WTP-M6-50-00004	*P&ID Symbols and Legend Sheet 4 of 8*
24590-WTP-M6-50-00005	*P&ID Symbols and Legend Sheet 5 of 8*
24590-WTP-M6-50-00006	*P&ID Symbols and Legend Sheet 6 of 8*
24590-WTP-M6-50-00007	*P&ID Symbols and Legend Sheet 7 of 8*
24590-WTP-M6-50-00008	*P&ID Symbols and Legend Sheet 8 of 8*
24590-LAB-M6-RLD-00001001	***P&ID - LAB Radioactive Liquid Waste Disposal System C5 Collection and Transfer RLD-VSL-00165***
24590-LAB-M6-RLD-00001002	***P&ID - LAB Radioactive Liquid Waste Disposal System C5 Collection and Transfer RLD-PMP-00183A***
24590-LAB-M6-RLD-00001003	***P&ID - LAB Radioactive Liquid Waste Disposal System C5 Collection and Transfer RLD-PMP-00183B***
24590-LAB-M6-RLD-00001004	***P&ID - LAB Radioactive Liquid Waste Disposal System C5 Collection and Transfer Valve Pit***
24590-LAB-M6-RLD-00002001	***P&ID - LAB Radioactive Liquid Waste Disposal System C3 Collection & Transfer RLD-VSL-00164***
24590-LAB-M6-RLD-00002003	***P&ID - LAB Radioactive Liquid Waste Disposal System C3 Collection & Transfer RLD-PMP-00182A/B***
24590-LAB-M6-RLD-00006001	***P&ID - LAB Radioactive Liquid Waste Disposal System C3 RAD LAB Collection***

24590-LAB-M6-RLD-00006002	*P&ID - LAB Radioactive Liquid Waste Disposal System C3 RAD LAB Collection*
24590-LAB-M6-RLD-00006003	*P&ID - LAB Radioactive Liquid Waste Disposal System C3 RAD LAB Collection*
24590-LAB-M6-RLD-00007001	*P&ID - LAB Radioactive Liquid Waste Disposal System C3 Leak Detection Boxes*
24590-LAB-M6-RLD-00007002	*P&ID - LAB Radioactive Liquid Waste Disposal System C3 Collection Drain Header*
24590-LAB-M6-RLD-00008001	*P&ID - LAB Radioactive Liquid Waste Disposal System - C5 Leak Detection Boxes*
24590-LAB-M6-RLD-00008002	*P&ID - LAB Radioactive Liquid Waste Disposal System C5 Drain Collection Headers*
24590-LAB-3YD-RLD-00001	*System Description for the Analytical Laboratory Radioactive Liquid Waste Disposal System (RLD)*

3 Description

The DWP tank and ancillary equipment associated with dangerous waste management within the RLD system are the following:

- RLD-VSL-00165 Hotcell drain collection vessel (C5 vessel)
- **RLD-VSL-00164 Lab area sink drain collection vessel (C3 vessel)**
- RLD-PMP-00183A Hotcell drain collection vessel pump (C5 vessel)
- RLD-PMP-00183B Hotcell drain collection vessel pump (C5 vessel)
- RLD-PMP-00182A Lab area sink drain collection vessel pump (C3 vessel)
- RLD-PMP-00182B Lab area sink drain collection vessel pump (C3 vessel)
- **RLD-SUMP-00042 C5 vessel cell sump**
- RLD-SUMP-00041 C3 vessel cell pump
- RLD-SUMP-00043A C5 pump pit sump
- RLD-SUMP-00043B C5 pump pit sump
- RLD-SUMP-00044 C5 piping pit sump
- RLD-SUMP-00045 C3 pump pit sump
- RLD-LDB-00002 Hotcell collection leak detection box
- RLD-LDB-00004 C3 transfer leak detection box
- RLD-LDB-00005 RAD Lab sink collection header leak detection box
- RLD-LDB-00006 PVA drain header leak detection box
- RLD-LDB-00007 C3 maintenance drain header leak detection box
- RLD-LDB-00008 Sample receive/send drain header leak detection box
- RLD-LDB-00009 Glovebox header leak detection box
- RLD-LDB-00011 ASX equipment drain collection header leak detection box

Note: The Floor Drain Collection Vessel (RLD-VSL-00163) collects, contains, and transfers non-contaminated liquid effluent. Although the floor drain collection vessel is identified as part of the RLD system, it is not designed or permitted to manage mixed or dangerous wastes.

3.1 Hotcell Drain Collection Vessel

The hotcell drain collection vessel (RLD-VSL-00165) receives effluent from hotcell glovebox drains, hotcell cupsinks, hotcell transfer drawers, the master-slave manipulator decontamination glovebox, hotcell sample drop station, and the hotcell drain collection vessel pump pits and valve pit sumps. Effluents from the lab area sink drain collection vessel (RLD-VSL-00164) and the floor drain collection vessel (RLD-VSL-00163) can also be transferred to the hotcell drain collection vessel (RLD-VSL-00165). For waste management reliability, batch controlled transfers into RLD-VSL-00165 are limited by the control system to one transfer in or out at a time by the batch control mechanism of acquiring and releasing. Once acquired, no other batch control operation will be able to coordinate activities with the hotcell drain collection vessel (RLD-VSL-00165) until it is released.

When the vessel is available to receive effluent, the operator will initiate the transfer-in sequence. Once the sequence is initiated, the control system will verify that instruments, utilities, and equipment associated with the transfer are within operational parameters. If any of the monitored parameters are not within the specified limits during the transfer, the control system will switch to exception handling logic that will return the equipment associated with the transfer to a safe state. During normal operation, the batch transfer sequence is stopped by the control system when any of the following **conditions are met**:

- The level in the hotcell drain collection vessel (RLD-VSL-00165) reaches its level alarm high (LAH)
- The level of the sending equipment reaches its level alarm low (LAL).

When the LAH of the hotcell drain collection vessel (RLD-VSL-00165) is reached, the control system will notify an operator through the plant control system interface that the hotcell drain collection vessel (RLD-VSL-00165) is ready to transfer its contents. The operator will then initiate the transfer-out sequence within the control system. Once initiated, the control system verifies that instruments, utilities, and equipment associated with the transfer are within operational parameters and remain as such throughout the transfer. If any of the monitored parameters are not within the specified limits during the transfer, the control system will switch to exception handling logic that will return the equipment associated with the transfer to a safe state. During normal operation, the batch transfer sequence will end when any of the following **conditions are met**:

- The level in the hotcell drain collection vessel (RLD-VSL-00165) reaches its LAL
- The level of the receiving **vessel** reaches its LAH. During routine operations, pretreatment plant wash vessel, PWD-VSL-00044 or the pretreatment ultimate overflow vessel, PWD-VSL-00033, **receive** transfer line flushes.

When the level is **above** the normal operating range due to an abnormality, interlocks and alarms within the control system help prevent an overflow condition. Figure 1 shows the interlocks and alarms for the level instrument associated with the hotcell drain collection vessel (RLD-VSL-00165). At the **high** high-alarm setpoint, an alarm **(LAHH)** is generated and all dedicated controlled feeds are isolated. Isolation occurs by stopping the motive force, closing valves, or a combination of both.

3.2 Radiological Laboratory Area Sink Drain Collection Vessel

The radiological laboratory (referred to in this document as the lab) area sink drain collection vessel (RLD-VSL-00164) receives effluent from the lab sinks, the lab fume hood sinks, decontamination showers and sinks, autosampling system equipment drains, the receiving and shipping area, process vacuum equipment, other floor drains throughout the LAB, and the C3 pump pit sump (RLD-SUMP-00045). Effluents from the floor drain collection vessel (RLD-VSL-00163) can also be transferred to the lab area sink drain collection vessel (RLD-VSL-00164). **Batch** controlled transfers into RLD-VSL-00164 are limited by the control system to one transfer in or out at a time by the batch control mechanism of acquiring and releasing. Once acquired, no other batch control operation will be able to coordinate activities with the lab area sink drain collection vessel (RLD-VSL-00164) until it is released.

When the vessel is available to receive effluent, the operator will initiate the transfer-in sequence. Once the sequence is initiated, the control system will verify that instruments, utilities, and equipment associated with the transfer are within operational parameters. If any of the monitored parameters are not within the specified limits during the transfer, the control system will switch to exception handling logic that will return the equipment associated with the transfer to a safe state. During normal operation, the batch transfer sequence is stopped by the control system when any of the following **conditions are met**:

- The level in the lab area sink drain collection vessel (RLD-VSL-00164) reaches its LAH
- The level of the sending **vessel** reaches its LAL

When the LAH of the lab area sink drain collection vessel (RLD-VSL-00164) is reached, the control system will notify an operator through the plant control system interface that the lab area sink drain collection vessel is ready to transfer its contents. The operator will then initiate the transfer-out sequence within the control system. Once initiated, the control system verifies that instruments, utilities, and equipment associated with the transfer are within operational parameters and remain as such throughout the transfer. If any of the monitored parameters are not within the specified limits during the transfer, the control system will switch to exception handling logic that will return the equipment associated with the transfer to a safe state. During normal operation, the batch transfer sequence will end when any of the following **conditions are met**:

- The level in the lab area sink drain collection vessel (RLD-VSL-00164) reaches its LAL
- The level of the receiving equipment reaches its LAH.

When the level is **above** the normal operating range due to an abnormality, interlocks along with alarms within the control system help prevent an overflow condition. Figure 1 shows the interlocks and alarms for the level instrument associated with the lab area sink drain collection vessel (RLD-VSL-00164). At the **high** high-alarm setpoint, an alarm **(LAHH)** is generated and all dedicated controlled feeds are isolated. Isolation occurs by stopping the motive force, closing valves, or a combination of both.

3.3 Cell and Equipment Sumps

The LAB has two different types of sumps: **vessel cell sumps and** pump or piping pit sumps. The hotcell drain collection vessel (RLD-VSL-00165) and the lab area sink drain collection vessel (RLD-VSL-00164) have their own set of sumps. The sumps for the hotcell drain collection vessel (RLD-VSL-00165) are the C5 vessel cell sump (RLD-SUMP-00042), the C5 pump pit sumps (RLD-SUMP-00043A and

RLD-SUMP-00043B), and the C5 piping pit sump (RLD-SUMP-00044). In the event of a level detection in the C5 vessel cell sump, the operator routes the liquid to the pretreatment plant wash vessel (PWD-VSL-00044).

The sumps for the lab area sink drain collection vessel (RLD-VSL-00164) are the C3 vessel cell sump (RLD-SUMP-00041) and the C3 pump pit sump (RLD-SUMP-00045). In the event of a level detection in the C3 vessel cell sump, the operator routes the liquid to the hotcell drain collection vessel (RLD-VSL-00165). **A general description of radar level detection in sumps can be found in Section 3.2.1 of *Leak Detection in Secondary Containment Systems* (24590-WTP-PER-J-02-002). In the event of a level detection alarm, the source of the spill will be identified and isolated, and notifications, spill response and waste removal will be completed in accordance with WTP Operating and Spill Response procedures.**

3.3.1 Vessel Cell Sumps

Lab vessel cell sumps start out dry, and typically will remain dry, but can receive liquids during normal or off-normal operations. A sump leak detection alarm can result from vessel cell decontamination flushes, a vessel or piping leak in the vessel cell, or fire water from C3/C5 sprinkler system that flows into the vessel causing the vessel to overflow into the cell sump. Sump liquids from normal operations will typically include decontamination flushes of vessel cells. Sump liquids from off-normal operations include spills (vessel overflow) or leaks from vessels, piping, or pumps. Identification of the source of the sump liquids is a DWP requirement that stipulates that the operator determine the source of a spill or leak, determine if the sump liquid is a dangerous waste, and determine where the liquids will be transferred.

Figure 2 shows the alarms for the level instrument associated with the C5 vessel cell sump (RLD-SUMP-00042), which also serves as a typical method of operation for the C3 vessel cell sump (RLD-SUMP-00041). These level instruments have three alarm points to meet leak detection requirements. The first alarm point assumes that the sump is completely dry. The first alarm point alerts the operator when the fluid level in the sump is less than 2.4 gallons based on a leak of 0.1 gallons per hour within 24 hours as provided in permit condition III.10.E.9.e.iii. Once the alarm is received, the sump liquids are transferred from the sump to the appropriate downstream vessel. The liquids may be recirculated to the vessel in the affected cell if it has been documented that the source of the sump liquid is the flushing of the vessel cell. The sumps and transfer lines are flushed with demineralized water (DIW) after any detected sump liquids are transferred.

Due to the design of the transfer pumps and suction lines, some residual flush liquids will remain in the vessel cell sumps after the sump has been pumped out and flushed. The second alarm point is a calculated leak detection rate that is used after the sump has been flushed, and some volume of flush liquids remain in the sump. The second alarm point, or LKY level rate of change function, will calculate any change in fluid level above the first alarm set point until the residual flush liquids evaporate. The LKY instrument function shown on Figure 2 detects a change in sump liquid levels when residual liquids remain in the sump and provides a means for detection of new liquids flushed, leaked, or spilled into the sump. A third alarm will alert the operator that the sump has reached its maximum volume.

3.3.2 Pump and Piping Pit Sumps

The sumps in the pump and piping pits are equipped with removable weir that after accumulating enough fluid to activate the leak detection alarm drains back to their respective vessel. Upon detection of a high liquid level in a pit sump, the control system alarms at which point the operator can remove the weir from the sump, flush the sump, and diagnose the source of the leak. Figure 3 shows the alarms for the level instrument associated with one of the C5 pump pit sumps (RLD-SUMP-00043A), which serves as a typical method of operation for all pit sumps in the LAB.

3.4 Leak Detection Boxes

The LAB has leak detection boxes on the headers **of the coaxial piping or double-walled piping** draining into the hotcell drain collection vessel (RLD-VSL-00165) and the lab area sink drain collection vessel (RLD-VSL-00164). The leak detection boxes **(LDBs)** are designed to detect a leak in the annular space of the coaxial. **The LDB is separated into two parts by a weir equipped with** a drain plug in the closed position to create a detectable **liquid** level. **A thermal level switch is used to** detect **liquid in the LDB, and activate** the control system alarms**. In the event of a level detection alarm, the source of the spill will be identified and isolated, and notifications, spill response and waste removal will be completed in accordance with WTP Operating and Spill Response procedures.** An overflow plug **is provided on the opposite side of the weir** in **an** open position **that** prevents **overfilling** of the leak detection box until it can be drained.

The leak detection boxes for the C3 drain collection headers drain to the C3 vessel cell sump (RLD-SUMP-**100041**). Similarly, the leak detection boxes for the C5 drain collection headers and the C3 transfer line for the lab area sink drain collection vessel (RLD-VSL-**00164**) drain to the C5 vessel cell sump (RLD-SUMP-**200042**). Figure 4 shows the alarm **function** for the **thermal** level **switch** instrument associated with one of the C3 transfer leak detection box (RLD-LDB-00004), which serves as a typical method of operation for all leak detection boxes in the LAB.

Table 1 Associated Instruments for LAB Radioactive Liquid Waste Disposal System

P&ID	Monitoring/control parameter	Type of instrument/control device	Instrument/control device tag number
24590-LAB-M6-RLD-00001001	Level Measurement for RLD-VSL-00165	Level Element	LE-6104
		Level Transmitter	LT-6104
		Level Indicator	LI-6104
24590-LAB-M6-RLD-00001001	Level Measurement for RLD-SUMP-00042	Level Transmitter	LT-6115
		Level Indicator	LI-6115
		Leak Rate	**LKY-6115**
24590-LAB-M6-RLD-00001002	Level Measurement for RLD-SUMP-00043A	Level Transmitter	LT-6116
		Level Indicator	LI-6116
24590-LAB-M6-RLD-00001003	Level Measurement for RLD-SUMP-00043B	Level Transmitter	LT-6124
		Level Indicator	LI-6124
24590-LAB-M6-RLD-00001004	Level Measurement for RLD-SUMP-00044	Level Transmitter	LT-6123
		Level Indicator	LI-6123
24590-LAB-M6-RLD-00002001	Level Measurement for RLD-VSL-00164	Level Element	LE-6202
		Level Transmitter	LT-6202
		Level Indicator	LI-6202
24590-LAB-M6-RLD-00002001	Level Measurement for RLD-SUMP-00041	Level Transmitter	LT-6211
		Level Indicator	LI-6211
		Leak Rate	**LKY-6211**
24590-LAB-M6-RLD-00002003	Level Measurement for RLD-SUMP-00045	Level Transmitter	LT-6212
		Level Indicator	LI-6212
24590-LAB-M6-RLD-00007001	Level Measurement for RLD-LDB-00005	Level High Switch	LSH-6215
		Level High Alarm	LAH-6215
24590-LAB-M6-RLD-00007001	Level Measurement for RLD-LDB-00006	Level High Switch	LSH-6701
		Level High Alarm	LAH-6701

24590-LAB-M6-RLD-00007001	Level Measurement for RLD-LDB-00007	Level High Switch	LSH-6702
		Level High Alarm	LAH-6702
24590-LAB-M6-RLD-00007001	Level Measurement for RLD-LDB-00008	Level High Switch	LSH-6703
		Level High Alarm	LAH-6703
24590-LAB-M6-RLD-00007001	Level Measurement for RLD-LDB-00011	Level High Switch	LSH-6704
		Level High Alarm	LAH-6704
24590-LAB-M6-RLD-00008001	Level Measurement for RLD-LDB-00002	Level High Switch	LSH-6120
		Level High Alarm	LAH-6120
24590-LAB-M6-RLD-00008001	Level Measurement for RLD-LDB-00004	Level High Switch	LSH-6118
		Level High Alarm	LAH-6118
24590-LAB-M6-RLD-00008001	Level Measurement for RLD-LDB-00009	Level High Switch	LSH-6801
		Level High Alarm	LAH-6801

Figure 1 Typical Drain Collection Vessel Level Detection

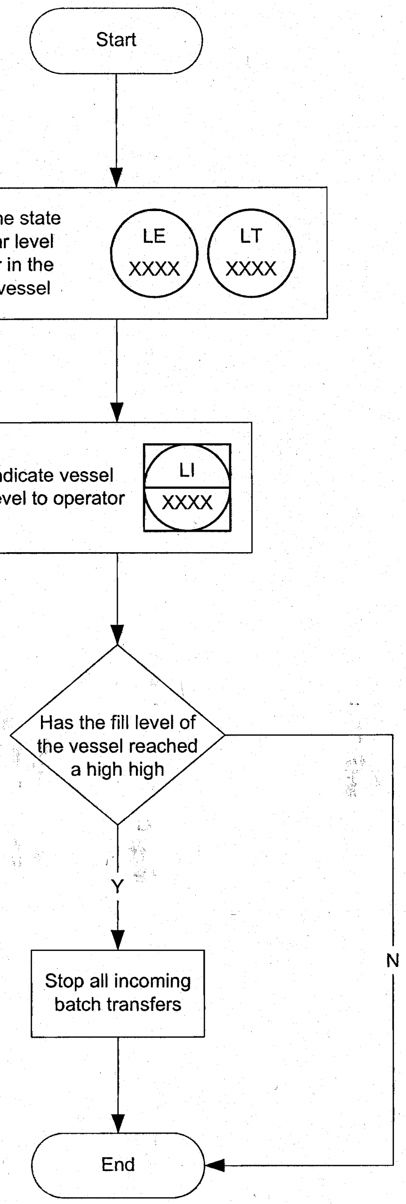


Figure 2 Typical Vessel Cell Sump Level Detection

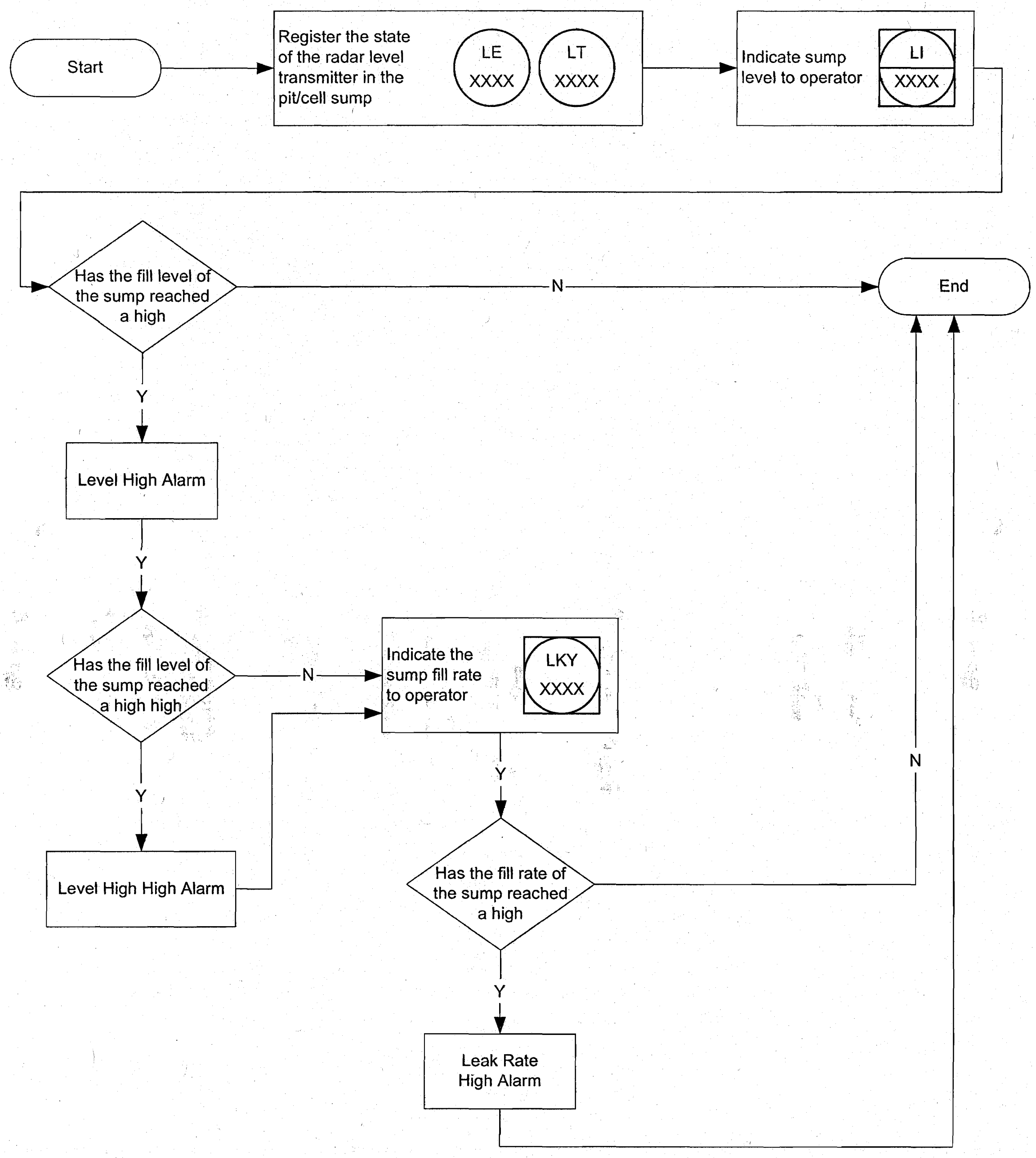


Figure 3 Typical Pump or Piping Pit (Equipment) Sump Level Detection

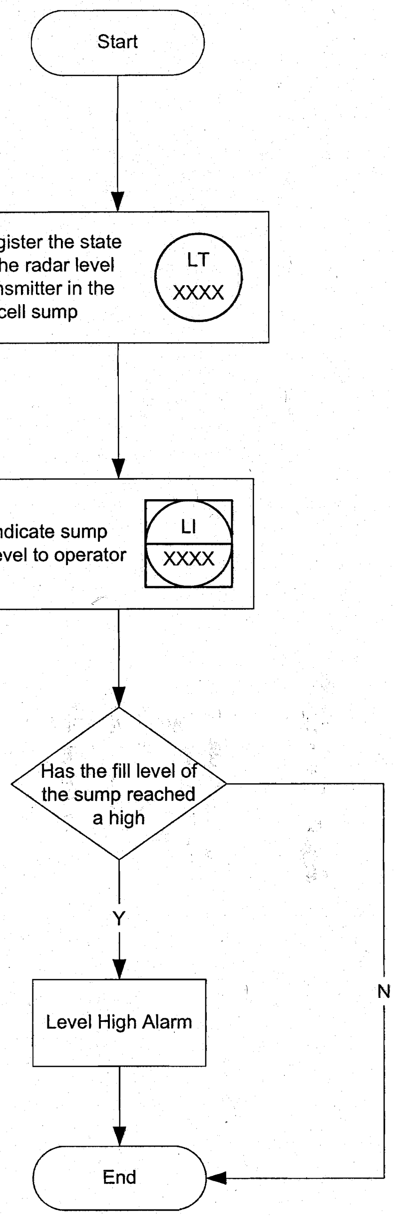
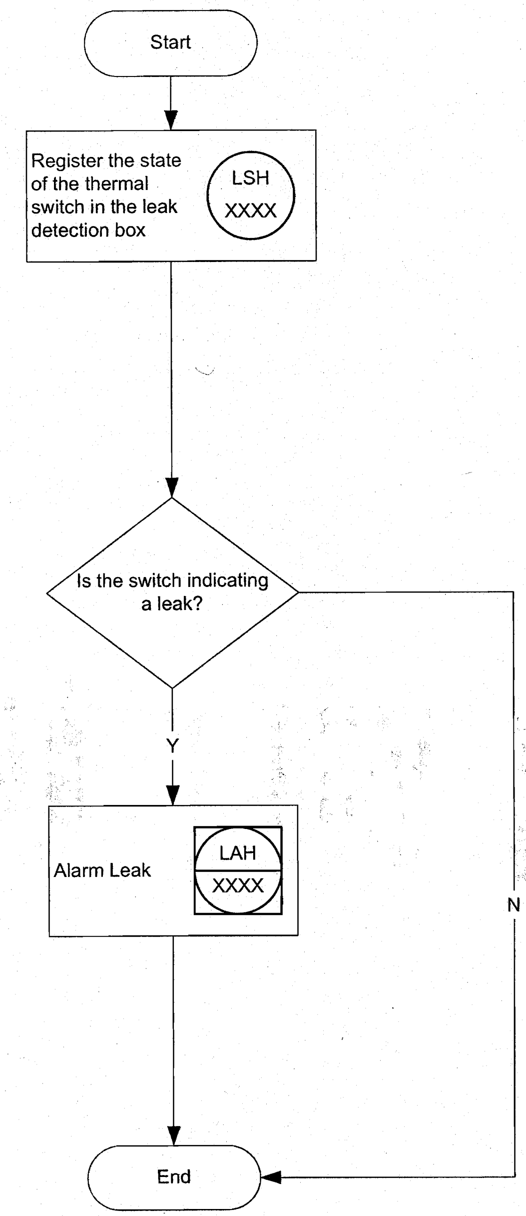


Figure 4 Typical Leak Detection Box Level Detection



Quarter Ending March 31, 2013 24590-LAW-PCN-ENV-12-003

Hanford Facility RCRA Permit Modification Notification Form

Part III, Operating Unit 10

Waste Treatment and Immobilization Plant

Index

Page 2 of 2: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant

Revise Dangerous Waste Permit (DWP) Table III.10.H.B - LAW Vitrification System Secondary Containment Systems Including Sumps and Floor Drains, Table III.10.E.L - LAW Vitrification Plant Tank Systems Secondary Containment Systems, Including Sumps, Bulges, Autosamplers, and Floor Drains, and Chapter 4 Table C-9.

Submitted by Co-Operator: Reviewed by ORP Program Office:

D. M. Busche	12/10/12 Date	D. L. Noyes	12/10/12 Date

Quarter Ending March 31, 2013 24590-LAW-PCN-ENV-12-003

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part:
Waste Treatment and Immobilization Plant	**Part III, Operating Unit 10**

Description of Modification:

The purpose of this Class 1 modification is to update DWP Table III.10.H.B - LAW Vitrification System Secondary Containment Systems Including Sumps and Floor Drains, DWP Table III.10.E.L - LAW Vitrification Plant Tank Systems Secondary Containment Systems, Including Sumps, Bulges, Autosamplers, and Floor Drains, and Chapter 4, Table C-9.

The following tables are being submitted to replace the tables currently in section III.10.H and III.10.E of the DWP:

Replace: Table III.10.H.B. - LAW Vitrification System Secondary Containment Systems Including Sumps and Floor Drains

With: Table III.10.H.B. - LAW Vitrification Miscellaneous Unit System Secondary Containment Sumps and Floor Drains (Attached)

Replace: Table III.10.E.L - LAW Vitrification Plant Tank Systems Secondary Containment Systems, Including Sumps, Bulges, Autosamplers, and Floor Drains

With: Table III.10.E.L - LAW Vitrification Plant Tank Systems Secondary Containment Systems, Including Sumps, Bulges, Autosamplers, and Floor Drains (Attached)

Replace: Chapter 4, Table C-9 WTP Sumps, Leak Detection Boxes, and Floor Drains/Lines

With: Chapter 4, Table C-9 WTP Sumps, Leak Detection Boxes, and Floor Drains/Lines (Attached)

In accordance with Permit Condition III.10.C.2.e, this permit modification may include page changes to the Permit, attachments, and permit application supporting documentation. The necessary permit changes were submitted for Ecology's approval. Ecology is requested to approve the attached permit changes and incorporate the changes in the next revision of the WTP Dangerous Waste Permit.

WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1 and A.3

Enter wording of WAC 173-303-830, Appendix I Modification citation:

Appendix I A. General Permit Provisions

A.1: Administrative and informational changes

A.3: Equipment replacement or upgrading with functionally equivalent components (e.g., pipes, valves, pumps, conveyors, controls)

Modification Approved/Concur:	☑ Yes ☐ Denied (state reason below)	Reviewed by Ecology:
Reason for denial:		S. Dahl ___ Date ___

Table III.10.H.B - LAW Vitrification Miscellaneous Unit System Secondary Containment ~~Systems Including~~ Sumps and Floor Drains

Sump/Floor Drain I.D.# & Room Location	Maximum Sump Capacity (gallons)	Sump Dimensions[a] (feet) & Materials of Construction	Engineering Description (Drawing Nos., Specification Nos., etc.)
~~RESERVED~~	~~RESERVED~~	~~RESERVED~~	~~RESERVED~~
RLD-SUMP-00029 L-0123 (Process Cell, El. +3')	37	30" Dia. By 12" deep Stainless Steel (6% Mo)	**24590-LAW** -M6-RLD-00003002 -P1-P01T-00002
RLD-SUMP-00030 L-0123 (Process Cell, El. +3')	37	30" Dia. By 12" deep Stainless Steel (6% Mo)	**24590-LAW** -M6-RLD-00003002 -P1-P01T-00002
RLD-SUMP-00031 L-0124 (Process Cell Sump, El. +3')	37	30" Dia. By 12" deep Stainless Steel (6% Mo)	**24590-LAW** -M6-RLD-00003002 -P1-P01T-00002
RLD-SUMP-00032 L-0124 (Process Cell, El. +3')	37	30" Dia. By 12" deep Stainless Steel (6% Mo)	**24590-LAW** -M6-RLD-00003002 -P1-P01T-00002
LOP-FD-00001 L-0123 (LOP-BULGE-00001 D~~d~~rain~~-~~ El. +3')	N/A	2" Dia. 6% Mo	**24590-LAW** -M6-LOP-00001003
RLD-WS-20037-S11B-01 L-0123 (Melter 1 Encasement Assembly Drain, El. +3')	N/A	1" Dia. 316L	**24590-LAW** -M6-LMP-00012001
LOP-FD-00002 L-0124 (LOP-BULGE-00002 Drain, El. +3')	N/A	2" Dia. 6% Mo	**24590-LAW** -M6-LOP-00002003
RLD-WS-20033-S11B-01 L-0124 (Melter 2 Encasement Assembly Drain, El. +3')	N/A	1" Dia. 316L	**24590-LAW** -M6-LMP-00042001

Table III.10.H.B - LAW Vitrification Miscellaneous Unit System Secondary Containment ~~Systems Including~~ Sumps and Floor Drains

Sump/Floor Drain I.D.# & Room Location	Maximum Sump Capacity (gallons)	Sump Dimensions[a] (feet) & Materials of Construction	Engineering Description (Drawing Nos., Specification Nos., etc.)
RLD-FD-00025 L-0304F (Curb F~~f~~loor D~~d~~rain for Caustic Scrubber, El. 48')	N/A	4" Dia. 316L	**24590-LAW** -M6-RLD-00003001

Footnotes:
[a]Dimensions listed are based on permitted design. Actual dimensions may vary within acceptable design tolerances. ~~plus or minus (TBD).~~

Table III.10.E.L - LAW Vitrification Plant Tank Systems Secondary Containment Systems, Including Sumps, Bulges, Autosamplers, and Floor Drains

Sump or Drain Line I.D.# & Room Location	Maximum Sump (gallons) or Drain Line (gallons per minute) Capacity	Sump Type/Nominal Operating Volume (gallons)	Sump or Drain Line Dimensions[a] (inches) & Materials of Construction	Engineering Description (Drawing Nos., Specifications Nos., etc.)
RLD-SUMP-00028 L-B001B (C3/C5 Drains/Sump Collection Vessel Cell, El. –21')	59	Dry Sump	24" Dia. By 30" deep Stainless Steel (6% Mo)	**24590-LAW** -M6-RLD-00002001, Rev 0 -M6-RLD-00002002, Rev 0 -M6-RLD-00002003, Rev 0 -M6-RLD-00002004, Rev 0 -M6-RLD-00002005, Rev 0 -P1-P01T-00001, Rev 3
RLD-SUMP-00029 L-0123 (Process Cell, El. +3')	3037	Dry Sump	30" Dia. By 12" deep Stainless Steel (6% Mo)	**24590-LAW** -M6-RLD-00003001, Rev 0 -M6-RLD-00003002, Rev 0 -M6-RLD-00003003, Rev 0 -P1-P01T-00002, Rev 65 -P1-P01T-00010, Rev 8
RLD-SUMP-00030 L-0123 (Process Cell, El. +3')	3037	Dry Sump	30" Dia. By 12" deep Stainless Steel (6% Mo)	**24590-LAW** -M6-RLD-00003001, Rev 0 -M6-RLD-00003002, Rev 0 -M6-RLD-00003003, Rev 0 -P1-P01T-00002, Rev 65 -P1-P01T-00010, Rev 8
RLD-SUMP-00031 L-0124 (Process Cell Sump, El. +3')	3037	Dry Sump	30" Dia. By 12" deep Stainless Steel (6% Mo)	**24590-LAW** -M6-RLD-00003001, Rev 0 -M6-RLD-00003002, Rev 0 -M6-RLD-00003003, Rev 0 -P1-P01T-00002, Rev 65 -P1-P01T-00010, Rev 8
RLD-SUMP-00032 L-0124 (Process Cell, El. +3')	3037	Dry Sump	30" Dia. By 12" deep Stainless Steel	**24590-LAW** -M6-RLD-00003001, Rev 0 -M6-RLD-00003002, Rev 0

Table III.10.E.L - LAW Vitrification Plant Tank Systems Secondary Containment Systems, Including Sumps, Bulges, Autosamplers, and Floor Drains

Sump or Drain Line I.D.# & Room Location	Maximum Sump (gallons) or Drain Line (gallons per minute) Capacity	Sump Type/Nominal Operating Volume (gallons)	Sump or Drain Line Dimensions[a] (inches) & Materials of Construction	Engineering Description (Drawing Nos., Specifications Nos., etc.)
			(6% Mo)	~~-M6-RLD-00003003, Rev~~ ~~-P1-P01T-00010, Rev 8~~ -P1-P01T-00002, Rev 6
RLD-SUMP-00035 L-0126 (Effluent Cell, El. +3')	~~30~~37	Dry Sump	30" Dia. By 12" deep Stainless Steel (6% Mo)	**24590-LAW** ~~-M6-RLD-00003001, Rev 0~~ ~~-M6-RLD-00003002, Rev 0~~ -M6-RLD-00003003, Rev 0 -P1-P01T-00002, Rev 6~~5~~ ~~-P1-P01T-00010, Rev 8~~
RLD-SUMP-00036 L-0126 (Effluent Cell, El. +3')	~~30~~37	Dry Sump	30" Dia. By 12" deep Stainless Steel (6% Mo)	**24590-LAW** ~~-M6-RLD-00003001, Rev 0~~ ~~-M6-RLD-00003002, Rev 0~~ -M6-RLD-00003003, Rev 0 -P1-P01T-00002, Rev 6~~5~~ ~~-P1-P01T-00010, Rev 8~~
Drain Line ID# = RLD-FD-00001 L-B001B (RLD-BULGE-00001 Drain, El. -21')	N/A	N/A	2" Dia. 316L	**24590-LAW** ~~-M6-RLD-00002001, Rev 0~~ ~~-M6-RLD-00002002, Rev 0~~ -M6-RLD-00002003, Rev 0 ~~-M6-RLD-00002004, Rev 0~~ ~~-M6-RLD-00002005, Rev 0~~
Drain Line ID# = RLD-FD-00035 L-0126 (RLD-BULGE-0000-4 Drain El. +3')	N/A	N/A	2" Dia. 6% Mo	**24590-LAW** ~~-M6-RLD-00001001, Rev 0~~ ~~-M6-RLD-00001002, Rev 0~~ ~~-M6-RLD-00001003, Rev 0~~ ~~-M6-RLD-00001004, Rev 0~~ -M6-RLD-00001005, Rev 0 ~~-M6-RLD-00001006, Rev 0~~

Table III.10.E.L - LAW Vitrification Plant Tank Systems Secondary Containment Systems, Including Sumps, Bulges, Autosamplers, and Floor Drains

Sump or Drain Line I.D.# & Room Location	Maximum Sump (gallons) or Drain Line (gallons per minute) Capacity	Sump Type/Nominal Operating Volume (gallons)	Sump or Drain Line Dimensions[a] (inches) & Materials of Construction	Engineering Description (Drawing Nos., Specifications Nos., etc.)
Drain Line ID# = LOP~~F~~-FD-00001 L-0123 (LOP-BULGE-00001 drain El. +3)	N/A	N/A	2” Dia. 6% Mo	**24590-LAW** -M6-LOP-~~P~~0001003, Rev 0~~2~~
Drain Line ID# = LCP-FD-00001 L-0123 (LCP-BULGE-00001 Drain, El. +3’)	N/A	N/A	2” Dia. 316L	**24590-LAW** -M6-LCP-~~P~~00001001, Rev ~~3~~0
Drain Line ID# = LCP-FD-00002 L-0123 (LCP-BULGE-00002 Drain, El. +3’)	N/A	N/A	2” Dia. 316L	**24590-LAW** -M6-LCP-~~P~~00001004, Rev ~~3~~0
Drain Line ID# = RLD-WS-20037-S11B-01 L-0123 (Melter 1 Encasement Assembly Drain, El. +3’)	N/A	N/A	1” Dia. 316L	**24590-LAW** -M6-LMP-00012001, Rev ~~5~~0
Drain Line ID# = LFP-FD-00001 L-0123 (LFP-BULGE-00001 Drain, El. +3)	N/A	N/A	2” Dia. 316L	**24590-LAW** -M6-LFP-~~P~~00001005, Rev ~~2~~0
Drain Line ID# = LOP-FD-00002 L-0124 (LOP-BULGE-00002 Drain, El. +3)	N/A	N/A	2” Dia. 6% Mo	**24590-LAW** -M6-LOP-~~P~~00002003, Rev ~~2~~0
Drain Line ID# = LCP-FD-00003 L-0124 (LCP-BULGE-00003	N/A	N/A	2” Dia. 316L	**24590-LAW** -M6-LCP-~~P~~00002001, Rev ~~2~~0

Table III.10.E.L - LAW Vitrification Plant Tank Systems Secondary Containment Systems, Including Sumps, Bulges, Autosamplers, and Floor Drains

Sump or Drain Line I.D.# & Room Location	Maximum Sump (gallons) or Drain Line (gallons per minute) Capacity	Sump Type/Nominal Operating Volume (gallons)	Sump or Drain Line Dimensions[a] (inches) & Materials of Construction	Engineering Description (Drawing Nos., Specifications Nos., etc.)
Drain, El. +3)				
Drain Line ID# = LFP-FD-00002 L-0124 (LFP-BULGE-00002 Drain, El. +3)	N/A	N/A	2” Dia. 316L	**24590-LAW** -M6-LFP-~~P~~0003005, Rev ~~2~~0
Drain Line ID# = RLD-WS-20033-S11B-01 L-0124 (Melter 2 Encasement Assembly Drain, El. +3’)	N/A	N/A	~~2~~1” Dia. 316L	**24590-LAW** ~~-M6-LMP-0004, Rev 5~~ -M6-LMP-00042001, Rev 0
LVP-FD-00001 L-0218 (Berm floor drain for LVP-TK-00001, El. 28’)[b]	N/A	N/A	4” Dia. 316L	**24590-LAW** ~~-M6-LVP-00002001, Rev 0~~ ~~-M6-LVP-00002002, Rev 0~~ -M6-LVP-00002003, Rev 0 ~~-M6-LVP-00002004, Rev 0~~ ~~-M6-LVP-00002005, Rev 0~~ ~~-M6-LVP-00002006, Rev 0~~
RLD-FD-00025 L-0304F (Curb floor drain for ~~LVP-TK-00001~~Caustic Scrubber, El. 48’)[b]	N/A	N/A	4” Dia. 316L	**24590-LAW** -M6-RLD-00003001, Rev 0 ~~-M6-RLD-00003002, Rev 0~~ ~~-M6-RLD-00003003, Rev 0~~
ASX Sampler 00012 Lower Containment Trough/Dam (L-0301, El. 48’)	N/A	N/A	3” Dia. Stainless Steel (316L)	**24590-LAW** -M6-RLD-00003001, Rev 0 ~~-M6-RLD-00003002, Rev 0~~ ~~-M6-RLD-00003003, Rev 0~~

Table III.10.E.L - LAW Vitrification Plant Tank Systems Secondary Containment Systems, Including Sumps, Bulges, Autosamplers, and Floor Drains

Sump or Drain Line I.D.# & Room Location	Maximum Sump (gallons) or Drain Line (gallons per minute) Capacity	Sump Type/Nominal Operating Volume (gallons)	Sump or Drain Line Dimensions[a] (inches) & Materials of Construction	Engineering Description (Drawing Nos., Specifications Nos., etc.)
ASX Sampler 00013 Lower Containment Trough/Dam (L-0301, El. 48')	N/A	N/A	3" Dia. Stainless Steel (316L)	**24590-LAW** -M6-RLD-00003001, Rev 0 ~~-M6-RLD-00003002, Rev 0~~ ~~-M6-RLD-00003003, Rev 0~~

Footnotes:
[a]Dimensions listed are based on permitted design. Actual dimensions may vary within plus or minus (TBD).
[b] ~~[a]~~This sump is routinely accessible for inspections and maintenance.

Table C-9 WTP Sumps, Leak Detection Boxes, and Floor Drains/Lines

Sump/Leak Detection Box, or Floor Drain/Line I.D.#, Room, and Elevation	Maximum Sump/Leak Detection Box Capacity (gallons)	Sump/Leak Detection Box Level Detection Type	Sump, Leak Detection Box or Floor Drain/Line Dimensions (approximate) and Materials of Construction	Piping and Instrumentation Diagram Number
PWD-FD-347 Floor Drain P-0105B (Feed Receipt Process Area, El. 0')	N/A	N/A	6" Dia. Stainless Steel	**24590-PTF** -M6-PWD-00044
PWD-FD-346 Floor Drain P-0105C (Feed Receipt Process Area, El. 0')	N/A	N/A	4" Dia. Stainless Steel	**24590-PTF** -M6-PWD-00044
Autosampler Drain Lines				
ASX-ZF-00013-S11B-03 ASX Sampler 00017 Lower Containment Drain Line (P-0311B, El. 56')	N/A	Thermal Dispersion	3" Dia. Stainless Steel	**24590-PTF** -M6-PWD-00007001
ASX-ZF-00015-S11B-03 ASX Sampler 00019 Lower Containment Drain Line (P-0302, El. 56')	N/A	Thermal Dispersion	3" Dia. Stainless Steel	**24590-PTF** -M6-PWD-00007001
ASX-ZF-00016-S11B-03 ASX Sampler 00020 Lower Containment Drain Line (P-0301, El. 56')	N/A	Thermal Dispersion	3" Dia. Stainless Steel	**24590-PTF** -M6-PWD-00007001
ASX-ZF-00027-S11B-03 ASX Sampler 00025 Lower Containment Drain Line (P-0307, El. 56')	N/A	Thermal Dispersion	3" Dia. Stainless Steel	**24590-PTF** -M6-PWD-00007001
LAW Vitrification Facility				
Sumps				
RLD-SUMP-00028 L-B001B (C3/C5 Drains/Sump Collection Vessel Cell, El. –21')	59	Radar	24" Dia. x 30" Deep Stainless Steel (6% Mo)	**24590-LAW** -M6-RLD-00002005
RLD-SUMP-00029	37	Radar	30" Dia. x 12" Deep	**24590-LAW**

Table C-9 WTP Sumps, Leak Detection Boxes, and Floor Drains/Lines

Sump/Leak Detection Box, or Floor Drain/Line I.D.#, Room, and Elevation	Maximum Sump/Leak Detection Box Capacity (gallons)	Sump/Leak Detection Box Level Detection Type	Sump, Leak Detection Box or Floor Drain/Line Dimensions (approximate) and Materials of Construction	Piping and Instrumentation Diagram Number
L-0123 (Process Cell, El. 3'			Stainless Steel (6% Mo)	-M6-RLD-00003002
RLD-SUMP-00030 L-0123 (Process Cell, El. 3')	37	Radar	30" Dia. x 12" Deep Stainless Steel (6% Mo)	**24590-LAW** -M6-RLD-00003002
RLD-SUMP-00031 L-0124 Process Cell Sump, El. 3')	37	Radar	30" Dia. x 12" Deep Stainless Steel (6% Mo)	**24590-LAW** -M6-RLD-00003002
RLD-SUMP-00032 L-0124 (Process Cell, El. 3')	37	Radar	30" Dia. x 12" Deep Stainless Steel (6% Mo)	**24590-LAW** -M6-RLD-00003002
RLD-SUMP-00035 L-0126 (Effluent Cell, El. 3')	37	Radar	30" Dia. x 12" Deep Stainless Steel (6% Mo)	**24590-LAW** -M6-RLD-00003003
RLD-SUMP-00036 L-0126 (Effluent Cell, El. 3')	37	Radar	30" Dia. x 12" Deep Stainless Steel (6% Mo)	**24590-LAW** -M6-RLD-00003003
Bulges/Floor Drains				
RLD-FD-00001 Floor Drain L-B001B (RLD-BULGE-00001 Drain, El. -21')	N/A	N/A	2" Dia. 316L6 Mo	**24590-LAW** -M6-RLD-00002003
RLD-FD-00035 Floor Drain L-0126 (RLD-BULGE-0000-4 Drain El. 3')	N/A	N/A	2" Dia. 6% Mo	**24590-LAW** -M6-RLD-00001005
LOF-FD-00001 Floor Drain L-0123 (LOP-BULGE-00001 drain El. 3)	N/A	N/A	2" Dia. 6% Mo	**24590-LAW** -M6-LOP-00001003
LCP-FD-00001 Floor Drain L-0123 (LCP-BULGE-00001 Drain, El. 3')	N/A	N/A	2" Dia. 316L	**24590-LAW** -M6-LCP-00001001
LCP-FD-00002 Floor Drain	N/A	N/A	2" Dia.	**24590-LAW**

Table C-9 WTP Sumps, Leak Detection Boxes, and Floor Drains/Lines

Sump/Leak Detection Box, or Floor Drain/Line I.D.#, Room, and Elevation	Maximum Sump/Leak Detection Box Capacity (gallons)	Sump/Leak Detection Box Level Detection Type	Sump, Leak Detection Box or Floor Drain/Line Dimensions (approximate) and Materials of Construction	Piping and Instrumentation Diagram Number
L-0123 (LCP-BULGE-00002 Drain, El. 3')			316L	-M6-LCP-00001004
LFP-FD-00001 Floor Drain L-0123 (LFP-BULGE-00001 Drain, El. 3)	N/A	N/A	2" Dia. 316L	**24590-LAW** -M6-LFP-00001005
LOP-FD-00002 Floor Drain L-0124 (LOP-BULGE-00002 Drain, El. 3)	N/A	N/A	2" Dia. 6% Mo	**24590-LAW** -M6-LOP-00002003
LCP-FD-00003 Floor Drain L-0124 (LCP-BULGE-00003 Drain, El. 3)	N/A	N/A	2" Dia. 316L	**24590-LAW** -M6-LCP-00002001
LFP-FD-00002 Floor Drain L-0124 (LFP-BULGE-00002 Drain, El. 3)	N/A	N/A	2" Dia. 316L	**24590-LAW** -M6-LFP-00003005
LVP-FD-00001 Floor Drain L-0218 (Berm floor drain for LVP-TK-00001, El. 28')	N/A	N/A	4" Dia. 316L	**24590-LAW** -M6-LVP-00002003
RLD-FD-00025 Floor Drain L-0304F (Curb floor drain for LVP-TK-00001, El. 48')	N/A	N/A	4" Dia. 316L	**24590-LAW** -M6-RLD-00003001
Drain Lines				
RLD-WS-20037-S11B-01 Drain Line L-0123 (Melter 1 Encasement Assembly Drain, El. 3')	N/A	N/A	1" Dia. 316L	**24590-LAW** -M6-LMP-00012001
RLD-WS-20033-S11B-11 Drain Line L-0124 (Melter 2 Encasement Assembly Drain, El. 3')	N/A	N/A	1" Dia. 316L	**24590-LAW** -M6-LMP-00042001
Autosampler Drain Lines				
RLD-WU-22123-S11B-03 ASX Sampler 00012 Lower Containment Drain Line (L-0301, El.	N/A	Thermal Dispersion	3" Dia. Stainless Steel	**24590-LAW** -M6-RLD-00003001

Table C-9 WTP Sumps, Leak Detection Boxes, and Floor Drains/Lines

Sump/Leak Detection Box, or Floor Drain/Line I.D.#, Room, and Elevation	Maximum Sump/Leak Detection Box Capacity (gallons)	Sump/Leak Detection Box Level Detection Type	Sump, Leak Detection Box or Floor Drain/Line Dimensions (approximate) and Materials of Construction	Piping and Instrumentation Diagram Number
48')			316L	
RLD-WU-22117-S11B-03 ASX Sampler 00013 Lower Containment Drain Line (L-0301, El. 48')	N/A	Thermal Dispersion	3" Dia. Stainless Steel 316L	**24590-LAW** -M6-RLD-00003001
HLW Vitrification Facility				
Sumps				
HCP-SUMP-00001 H-B014 (Wet Process Cell, El. -21')	75	Radar	30" Dia. x 18" Deep Stainless Steel	**24590-HLW** -M6-RLD-00015001
RLD-SUMP-00001 H-B014 (Wet Process Cell, El. -21')	75	Radar	30" Dia. x 18" Deep Stainless Steel	**24590-HLW** -M6-RLD-00015001
HOP-SUMP-00003 H-B021 (SBS Drain Collection Cell 1, El. -21')	75	Radar	30" Dia. x 18" Deep Stainless Steel	**24590-HLW** -M6-RLD-00015001
HOP-SUMP-00008 H-B005 (SBS Drain Collection Cell 2, El. -21'	75	Radar	30" Dia. x 18" Deep Stainless Steel	**24590-HLW** -M6-RLD-20004001
HDH-SUMP-00001 H-B039B (Canister Rinse Tunnel, El. -16.5')	75	Radar	30" Dia. x 18" Deep Stainless Steel	**24590-HLW** -M6-RLD-00016001
HDH-SUMP-00002 H-B039A (Canister Rinse Bogie Maintenance Room, El. -16')	75	Radar	30" Dia. x 18" Deep Stainless Steel	**24590-HLW** -M6-RLD-00016001
HDH-SUMP-00003 H-B035 (Canister Decon Cave, El. -16')	75	Radar	30" Dia. x 18" Deep Stainless Steel	**24590-HLW** -M6-RLD-00004002
HFP-SUMP-00002 H-0117 (Melter Cave 1, El. 5')	50	Radar	30" x 24" x 16" Deep Stainless Steel	**24590-HLW** -M6-RLD-00008002
HFP-SUMP-00005 H-0106 (Melter Cave 2 El. 5')	50	Radar	30" x 24" x 16" Deep Stainless Steel	**24590-HLW** -M6-RLD-20005001

Quarter Ending 12/31/2012 24590-PTF-PCN-ENV-12-011

Hanford Facility RCRA Permit Modification Notification Form

Part III, Operating Unit 10

Waste Treatment and Immobilization Plant

Index

Page 2 of 3: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant

Update PTF Piping and Instrumentation Diagrams (P&ID) for Ultrafiltration Process System Pulse Pots UFP-PP-00003A/B and Permeate Collection Vessels UFP-VSL-00062A/B/C in Appendix 8.2 of the Dangerous Waste Permit (DWP). Also, remove P&ID for Steam Rack HPS-RK-00002.

Submitted by Co-Operator:		Reviewed by ORP Program Office:	
Donna Busche	10/19/12	[signature]	11/2/12
D. M. Busche	Date	D. L. Noyes	Date

Quarter Ending 12/31/2012 24590-PTF-PCN-ENV-12-011

Hanford Facility RCRA Permit Modification Notification Form	
Unit: **Waste Treatment and Immobilization Plant**	Permit Part: **Part III, Operating Unit 10**

Description of Modification:

The purpose of this Class 1 prime modification is to update PTF P&ID for the Ultrafiltration Process System Pulse Pots UFP-PP-00003A/B and Permeate Collection Vessels UFP-VSL-00062A/B/C as well as to remove a P&ID for Steam Rack HPS-RK-00002. The following P&IDs are submitted to replace those currently found in Appendix 8.2 as well as to remove one that does not contain DWP structures, systems, or components.

Appendix 8.2			
Replace:	24590-PTF-M6-UFP-00002007 Rev. 0	With:	24590-PTF-M6-UFP-00002007 Rev. 1
	24590-PTF-M6-UFP-00003007 Rev. 0		24590-PTF-M6-UFP-00003007 Rev. 1
	24590-PTF-M6-UFP-00004001 Rev. 0		24590-PTF-M6-UFP-00004001 Rev. 1
	24590-PTF-M6-UFP-00004002 Rev. 0		24590-PTF-M6-UFP-00004002 Rev. 1
	24590-PTF-M6-UFP-00004003 Rev. 0		24590-PTF-M6-UFP-00004003 Rev. 1
Remove:	24590-PTF-M6-UFP-P0013 Rev. 0		

Revised P&IDs noted in the table above incorporate changes provided in applicable document change forms (e.g., DCN, SCN, SDDR, FCN, FCR, etc.) and changes associated with the resolution of comments on change documents since the issuance of the last revision of the permitted drawing. This modification requests Ecology approval and incorporation into the permit, the specific changes to these P&IDs that are indicated by notes, clouds, and revision triangles and removal of a drawing that does not contain DWP structures, systems, or components. Revisions are the result of ongoing design changes. The following identifies the significant types of changes on the attached drawings:

24590-PTF-M6-UFP-00002007 and 24590-PTF-M6-UFP-00003007:

- Modified UFP pulse pot hot cell layout to support Plant Design and Plant Equipment due to space constraints
- Changed on/off jumper plug valves to on/off jumper ball valves
- Revised slope directions and slope of pipelines shown on 24590-PTF-M6-UFP-00002007 and 24590-PTF-M6-UFP-00003007
- Eliminated dedicated permeate return path from pulse pots to feed vessels
- Revised pipeline numbers and re-sequenced lines
- Added note to clarify quality level and seismic category of flexible pneumatic jumpers (Q/SC-IV)
- Revised quality and seismic levels of UFP hot cell piping and equipment from Q/SC-II to Q/SC-III
- In addition to revisions specified in change documents, these Pulse Pot 3A/B drawings were further revised to increase permeate line size from NPS 2 to 3 and add solids wash permeate lines to PWD-VSL-00015 and PWD-VSL-00016
- Added/revised/deleted notes and references

24590-PTF-M6-UFP-00004001 thru 24590-PTF-M6-UFP-00004003:

- Revised seismic category for pipe from UFP pulse pots to UFP-VSL-00062A/B/C from Seismic Level II to Seismic Level III
- Changed on/off jumper plug valves to on/off jumper ball valves
- Changed slope on 24590-PTF-M6-UFP-00004003 pipeline UFP-PP-01639-S11B-03 from 1:20 to 1:50
- Deleted reducers and added dual slope directions
- Added note to clarify quality level and seismic category of flexible pneumatic jumpers (Q/SC-IV)

Quarter Ending 12/31/2012 24590-PTF-PCN-ENV-12-011

- In addition to revisions specified in change documents, these UFP Vessel 62A/B/C drawings were further revised to increase permeate line size from NPS 2 to 3, add recirculation vessel heating capabilities, change vessel emptying design from steam ejector to mechanical pump technology
- Revised/added/deleted notes and references

24590-PTF-M6-UFP-P0013:

- This drawing does not contain DWP structures, systems, or components (SSCs). The source drawing was superseded by 24590-PTF-M6-UFP-00013 that was later split into daughter drawings 24590-PTF-M6-UFP-00013001 and -00013002. All of these drawings pertain to Steam Rack HPS-RK-00002 and none of them contain DWP SSCs.

The following outstanding change documents have been submitted to Ecology pursuant to permit condition III.10,C.9.h and are maintained in the WTP Operating Record:

- 24590-PTF-M6N-UFP-00254 (Pertains to 24590-PTF-M6-UFP-00002007 and -00003007)
- 23590-PTF-M6LN-UFP-00086 (Pertains to 24590-PTF-M6-UFP-00004001, -00004002, and -00004003)

In accordance with permit condition III.10.C.2.e, this permit modification sent to Ecology may include page changes to the Permit attachments, and permit application supporting documents.

WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: NA

Enter wording of WAC 173-303-830, Appendix I Modification citation:

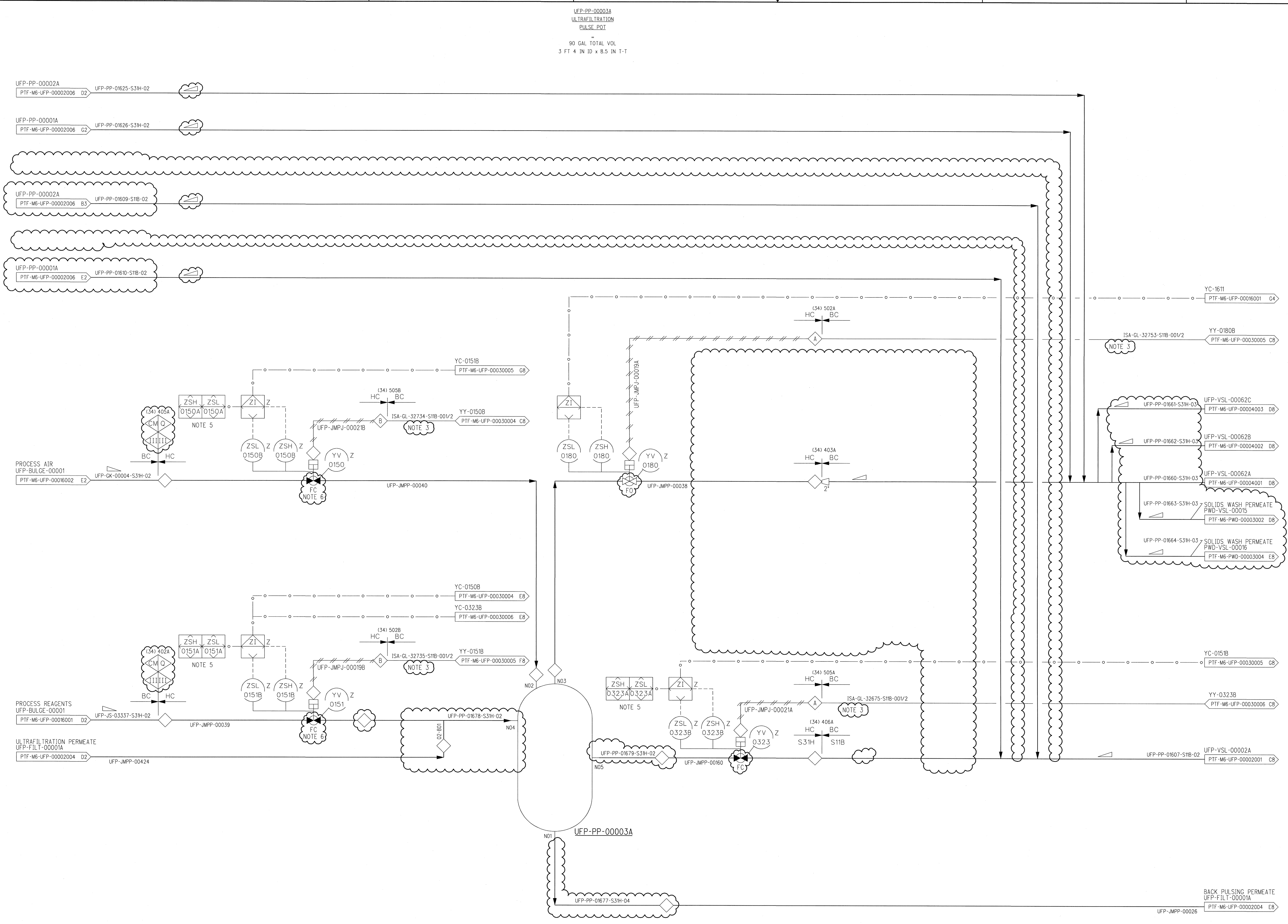
In accordance with WAC 173-303-830(4)(d)(i), this modification is requested to be reviewed and approved as a Class '1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

Modification Approved/Concur: [X] Yes [ ] Denied (state reason below)

Reason for denial:

Reviewed by Ecology:

S. Dahl — Date: 2/5/13



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED. FLEXIBLE PNEUMATIC JUMPERS ARE QUALITY LEVEL CM AND SEISMIC CATEGORY IV. ISA PIPING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I FOR FUNCTION.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
5. ICN ALARM IS ACTUATED ON VALVE POSITION MISMATCH.
6. TIMER TO LIMIT VALVE RUN TIME.
7. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND IN PART SUPERSEDES 24590-PTF-M6-UFP-00002 REV 2 AND 24590-PTF-M6-UFP-00026 REV. 1. THIS IS A MAJOR REVISION, NO REVISION CLOUDS ARE SHOWN. THIS DRAWING MAY INCLUDE INFORMATION FROM 24590-PTF-M6N-M80T-00017, -00037, -00038, 24590-PTF-M6N-UFP-00043, -00060, -00065, -00068, -00086, -00087 AND -00104.
8. REVISION 1: INCORPORATED 24590-PTF-M6LN-UFP-00002, -00017, 24590-PTF-M6N-10-00011, 24590-PTF-M6N-UFP-00119, -00120, -00206, AND -00217. FURTHER REVISED TO INCREASE PERMEATE LINE SIZE FROM NPS 2 TO 3, AND ADD SOLIDS WASH PERMEATE LINES TO PWD-VSL-00015 AND -00016. ADDED/REVISED/DELETED NOTES, AND REFERENCES.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. DELETED
2. 24590-PTF-3YD-UFP-00001, SYSTEM DESCRIPTION FOR THE ULTRAFILTRATION PROCESS SYSTEM (UFP).

Please note that source, special nuclear, and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA) are regulated at the U. S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts that pursuant to AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

Q
QUALITY DESIGNATOR

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
1	REVISED PER NOTE 8	[signature]	[signature]	[signature]	[signature]	9/23/11
0	ISSUED FOR CONSTRUCTION, SEE NOTE 7	DVV	SJ	ES/CL	RS/JM	11/12/08

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	10

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	VO, DOUGLAS	11/11/08
CHECKER	JAIN, SATISH	11/11/08
APPROVER	STEVENS, ROBERT	11/12/08
REVIEWER	STRIEPER, EGBERT	11/12/08

P&ID - PTF ULTRAFILTRATION PROCESS SYSTEM PULSE POT UFP-PP-00003A

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-PTF-ADR-M-02-046 REV: 4
E&NS SCREENING REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES GDH

SCALE: NONE

24590-PTF-M6-UFP-00002007 REV 1

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

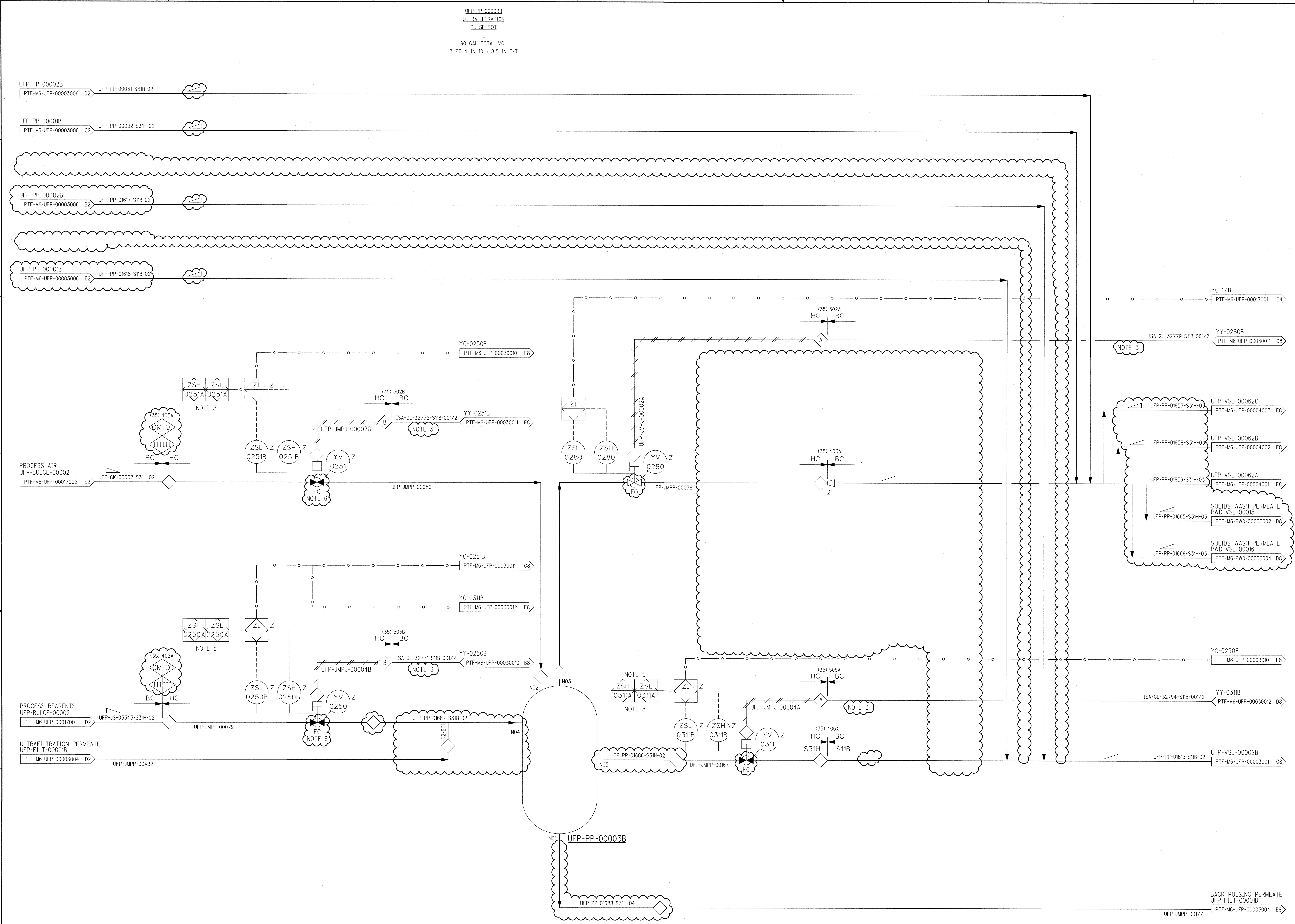
'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

R11430223

7/26/2011 4:17:43 PM

C:\Work\mdritter\dms03837\PTFM6UFP00002007.dgn
PLOTTED BY: mdritter

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED. FLEXIBLE PNEUMATIC JUMPERS ARE QUALITY LEVEL CM AND SEISMIC CATEGORY IV. ISA PIPING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I FOR FUNCTION.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
5. ICN ALARM IS ACTUATED ON VALVE POSITION MISMATCH.
6. TIMER TO LIMIT VALVE RUN TIME
7. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND IN PART SUPERSEDES 24590-PTF-M6-UFP-00003 REV 2 AND 24590-PTF-M6-UFP-00026 REV 1. THIS IS A MAJOR REVISION, NO REVISION CLOUDS ARE SHOWN. THIS DRAWING MAY INCLUDE INFORMATION FROM 24590-PTF-M6N-M80T-00017, -00037, -00038, 24590-PTF-M6N-UFP-00044, -00056, -00060, -00066, -00069, -00087 AND -00104.
8. REVISION 1: INCORPORATED 24590-PTF-M6LN-UFP-00002, -00017, -00034; 24590-PTF-M6N-10-00011, 24590-PTF-M6N-UFP-00119, -00120, -00206, AND -00217. FURTHER REVISED TO INCREASE PERMEATE LINE SIZE FROM NPS 2 TO 3, AND ADD SOLIDS WASH PERMEATE LINES TO PWD-VSL-00015 AND -00016. ADDED/REVISED/DELETED NOTES, AND REFERENCES.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. DELETED
2. 24590-PTF-3YD-UFP-00001, SYSTEM DESCRIPTION FOR THE ULTRAFILTRATION PROCESS SYSTEM (UFP).

Please note that source, special nuclear, and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA) are regulated at the U. S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts that pursuant to AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

Q
QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
1	REVISED PER NOTE 8	PM	mjd	DVV/RLC	RW	9/23/11
0	ISSUED FOR CONSTRUCTION, SEE NOTE 7	DVV	PM	ES/CL	RS/JM	11/12/08

REVISION HISTORY

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	10

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	VO, DOUGLAS	11/12/08
CHECKER	MARTINELLI, PIETRO	11/12/08
APPROVER	STEVENS, ROBERT	11/12/08
REVIEWER	STRIEPER, EGBERT	11/12/08

P&ID - PTF ULTRAFILTRATION PROCESS SYSTEM PULSE POT UFP-PP-00003B

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-PTF-ADR-M-02-046 REV: 4
E&NS SCREENING REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES GD

SCALE: NONE

24590-PTF-M6-UFP-00003007 REV 1

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

R11430224

7/26/2011 4:26:34 PM

FORM E_SDN.DGN 02/2009

PLOTTED BY: mdritter C:\Work\mdritter\dms03837\PTFM6UFP00003007.dgn

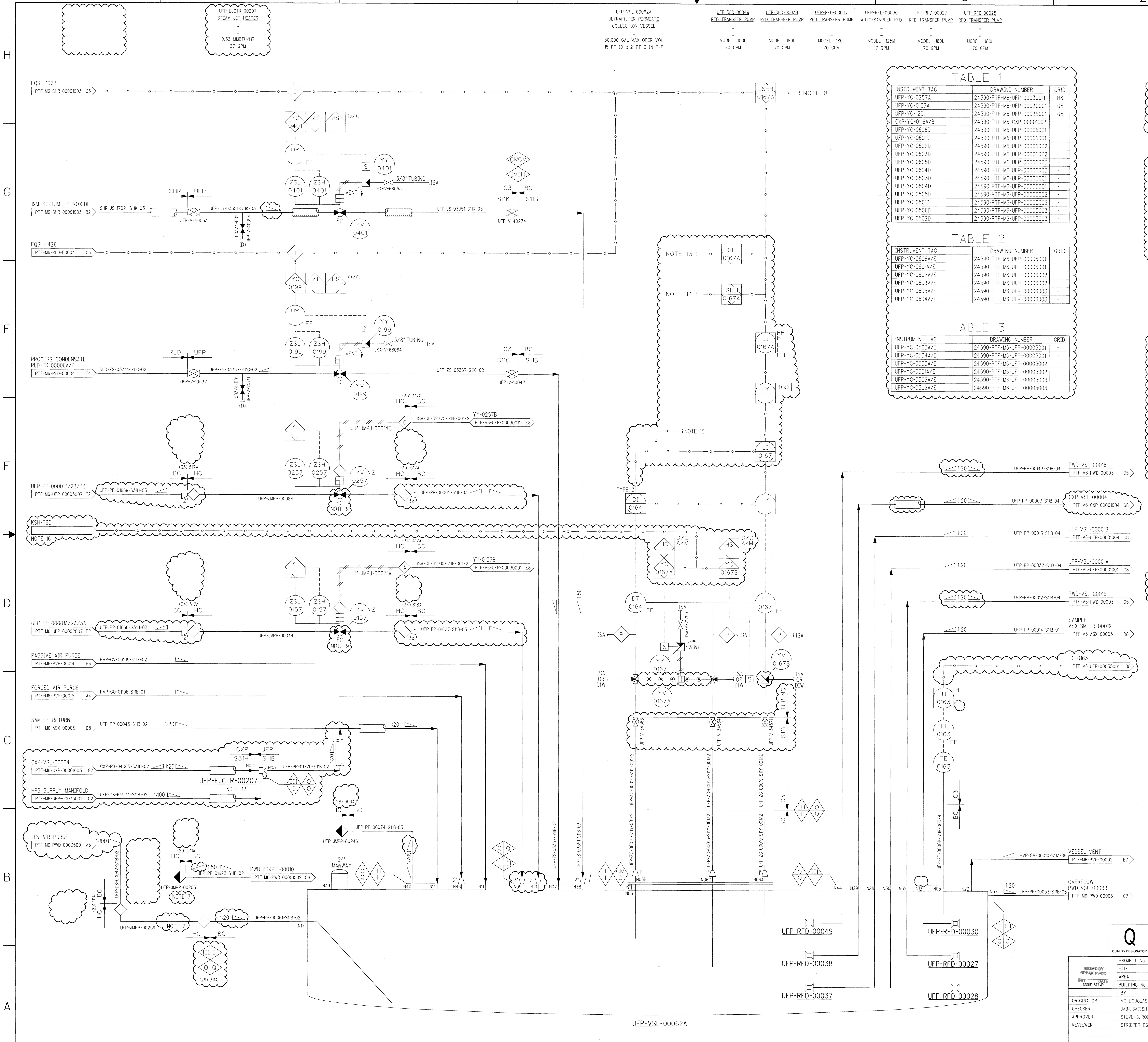


TABLE 1

INSTRUMENT TAG	DRAWING NUMBER	GRID
UFP-YC-0257A	24590-PTF-M6-UFP-00030011	H8
UFP-YC-0157A	24590-PTF-M6-UFP-00030001	G8
UFP-YC-1201	24590-PTF-M6-UFP-00035001	G8
CXP-YC-0116A/B	24590-PTF-M6-CXP-00001003	-
UFP-YC-0606D	24590-PTF-M6-UFP-00006001	-
UFP-YC-0601D	24590-PTF-M6-UFP-00006001	-
UFP-YC-0602D	24590-PTF-M6-UFP-00006002	-
UFP-YC-0603D	24590-PTF-M6-UFP-00006002	-
UFP-YC-0605D	24590-PTF-M6-UFP-00006003	-
UFP-YC-0604D	24590-PTF-M6-UFP-00006003	-
UFP-YC-0503D	24590-PTF-M6-UFP-00005001	-
UFP-YC-0504D	24590-PTF-M6-UFP-00005001	-
UFP-YC-0505D	24590-PTF-M6-UFP-00005002	-
UFP-YC-0501D	24590-PTF-M6-UFP-00005002	-
UFP-YC-0506D	24590-PTF-M6-UFP-00005003	-
UFP-YC-0502D	24590-PTF-M6-UFP-00005003	-

TABLE 2

INSTRUMENT TAG	DRAWING NUMBER	GRID
UFP-YC-0606A/E	24590-PTF-M6-UFP-00006001	-
UFP-YC-0601A/E	24590-PTF-M6-UFP-00006001	-
UFP-YC-0602A/E	24590-PTF-M6-UFP-00006002	-
UFP-YC-0603A/E	24590-PTF-M6-UFP-00006002	-
UFP-YC-0605A/E	24590-PTF-M6-UFP-00006003	-
UFP-YC-0604A/E	24590-PTF-M6-UFP-00006003	-

TABLE 3

INSTRUMENT TAG	DRAWING NUMBER	GRID
UFP-YC-0503A/E	24590-PTF-M6-UFP-00005001	-
UFP-YC-0504A/E	24590-PTF-M6-UFP-00005001	-
UFP-YC-0505A/E	24590-PTF-M6-UFP-00005002	-
UFP-YC-0501A/E	24590-PTF-M6-UFP-00005002	-
UFP-YC-0506A/E	24590-PTF-M6-UFP-00005003	-
UFP-YC-0502A/E	24590-PTF-M6-UFP-00005003	-

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. ALL ISA BLACK CELL PIPING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I. FLEXIBLE PNEUMATIC JUMPERS ARE QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV. REVERSE FLOW DIVERTERS AND INTERNAL PIPING FOR RFDS ARE QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
5. SEE PLANT WASH DRAWING 24590-PTF-M6-UFP-00015001 FOR VESSEL WASH REPRESENTATION.
6. SEE DRAWINGS 24590-PTF-M6-UFP-00005001 THROUGH -00005007 AND 24590-PTF-M6-UFP-00006001 THROUGH -00006007 FOR REVERSE FLOW DIVERTER/PULSE JET MIXERS REPRESENTATION.
7. JUMPERS UFP-JMPP-00205 AND UFP-JMPP-00259 ARE NORMALLY INSTALLED. DURING VESSEL EMPTYING OPERATIONS IN SUPPORT OF DECOMMISSIONING, THESE JUMPERS ARE REMOVED AND HLP-PMP-00022 (FUTURE) IS TO BE USED ON AN AS-NEEDED BASIS, VIA FLEXIBLE JUMPERS, FOR EMPTYING VESSEL UFP-VSL-00062A. SEE DRAWING 24590-PTF-M6-HLP-00029001 FOR PUMP DETAILS.
8. VALVES LISTED IN TABLE 1 WILL CLOSE ON HIGH HIGH LEVEL DETECTION (UFP-LSHH-0167A).
9. TIMER TO LIMIT VALVE RUN TIME.
10. SEE DRAWING 24590-PTF-M6-ISA-00011 FOR BUBBLER RACK AND SYSTEM CONNECTION
11. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-UFP-00004 REV 2. THIS IS A MAJOR REVISION, NO REVISION CLOUDS ARE SHOWN. THIS DRAWING MAY INCLUDE INFORMATION FROM 24590-PTF-M6N-M80T-00017, -00037, -00038, 24590-PTF-M6N-UFP-00045, -00064, AND -00078.
12. STEAM JET HEATER TO BE LOCATED ABOVE THE ELEVATION OF THE VESSEL NOZZLE AND AT LEAST ONE BAROMETRIC HEAD BELOW THE STEAM SUPPLY MANIFOLD (C3/BC BOUNDARY).
13. ON LOW LOW LEVEL DETECTION (UFP-LSLL-0167A), VALVES LISTED IN TABLE 2 WILL CLOSE.
14. ON LOW LOW LOW LEVEL DETECTION (UFP-LSLL-0167A), VALVES LISTED IN TABLE 3 WILL CLOSE.
15. DI-0164 AND LI-0167 INTERLOCKS WITH PJM & RFD TAGS IN TABLE 2 AND TABLE 3 TO ADJUST DRIVE AND SUCTION TIME.
16. BUBBLER FLUSH/PURGE TO BE AUTO INITIATED BY PCJ TIMER SWITCH.
17. REVISION 1: INCORPORATED 24590-PTF-M6LN-M80T-00023, 24590-PTF-M6LN-UFP-00010, 24590-PTF-M6N-10-00011, 24590-PTF-M6N-UFP-00120, AND -00209. FURTHER REVISED TO INCREASE PERMEATE LINE SIZE FROM NPS 2 TO 3, ADDED RECIRCULATION VESSEL HEATING CAPABILITIES, CHANGED VESSEL EMPTYING DESIGN FROM STEAM-EJECTOR TO MECHANICAL-PUMP TECHNOLOGY. REVISED/ADDED/DELETED NOTES AND REFERENCES.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. DELETED
2. 24590-PTF-3YD-UFP-00001, SYSTEM DESCRIPTION FOR ULTRAFILTRATION PROCESS SYSTEM (UFP).

DRAWING INDEX	
DWG NO	TITLE
24590-PTF-M6-UFP-00004001	UFP SYSTEM PERMEATE COLLECTION UFP-VSL-00062A
24590-PTF-M6-UFP-00004002	UFP SYSTEM PERMEATE COLLECTION UFP-VSL-00062B
24590-PTF-M6-UFP-00004003	UFP SYSTEM PERMEATE COLLECTION UFP-VSL-00062C

Q
QUALITY DESIGNATOR

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
1	REVISED PER NOTE 17	[signature]	[signature]	DVV/RLC	[signature]	9/23/11
0	ISSUED FOR CONSTRUCTION SEE NOTE 11	DVV	SJ	ES/CL	RS/JM	11/12/08

ISSUED BY RPP-WTP PDC — INIT / DATE — ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	10

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

	BY	DATE
ORIGINATOR	VO, DOUGLAS	11/11/08
CHECKER	JAIN, SATISH	11/11/08
APPROVER	STEVENS, ROBERT	11/12/08
REVIEWER	STRIEPER, EGBERT	11/12/08

CONTRACT No: DE-AC27-01RV14136

P&ID - PTF ULTRAFILTRATION PROCESS SYSTEM PERMEATE COLLECTION UFP-VSL-00062A

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-PTF-ADR-M-02-046 REV: 4
E&NS SCREENING REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES [initials]

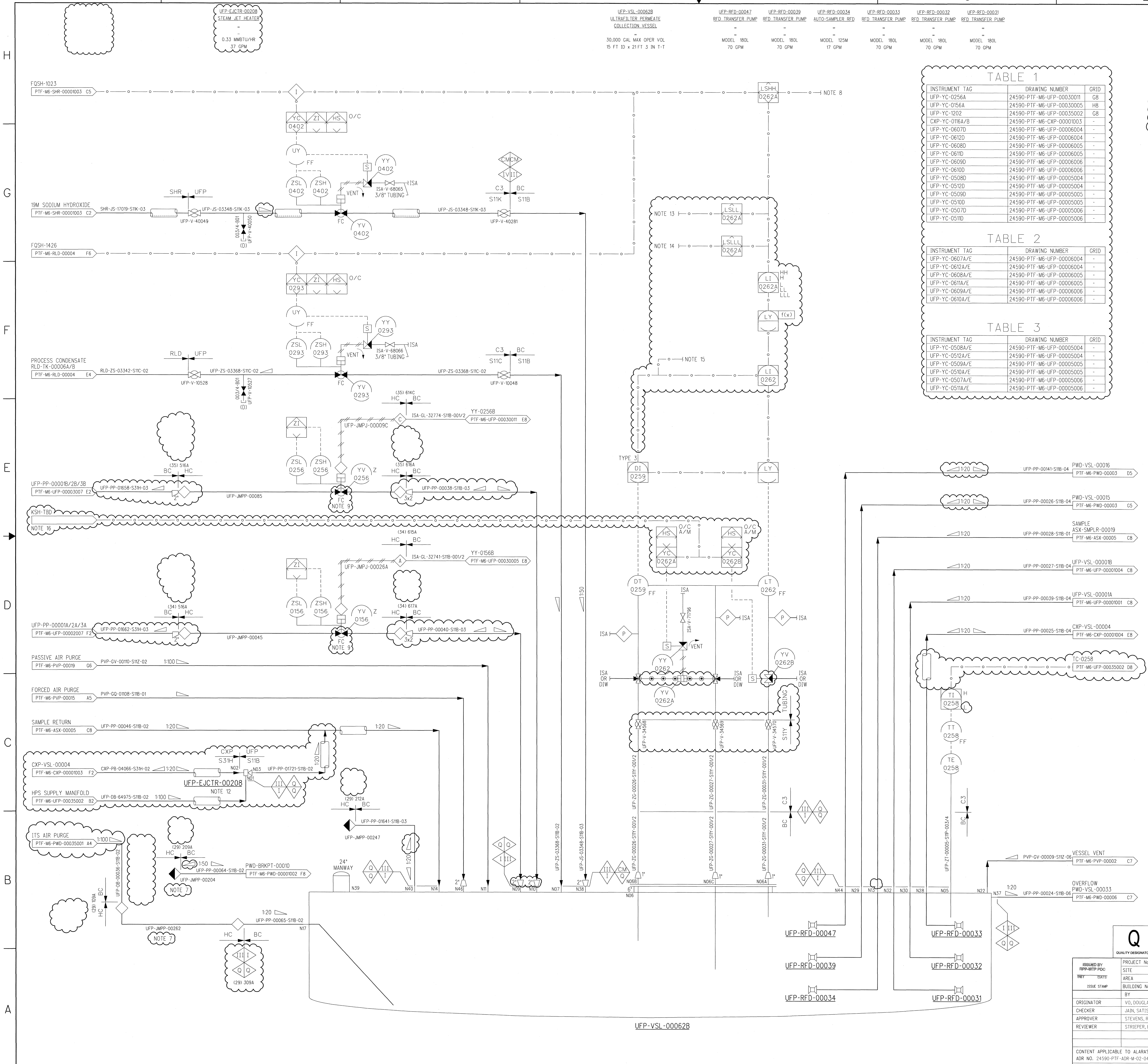
SCALE: NONE

24590-PTF-M6-UFP-00004001 REV 1

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL

R11430225



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. ALL ISA BLACK CELL PIPING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I. FLEXIBLE PNEUMATIC JUMPERS ARE QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV. REVERSE FLOW DIVERTERS AND INTERNAL PIPING FOR RFDS ARE QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
5. SEE PLANT WASH DRAWING 24590-PTF-M6-UFP-00015001 FOR VESSEL WASH REPRESENTATION.
6. SEE DRAWINGS 24590-PTF-M6-UFP-00005001 THROUGH -00005007 AND 24590-PTF-M6-UFP-00006001 THROUGH -00006007, FOR REVERSE FLOW DIVERTER/PULSE JET MIXERS REPRESENTATION.
7. JUMPERS UFP-JMPP-00204 AND UFP-JMPP-00262 ARE NORMALLY INSTALLED. DURING VESSEL EMPTYING OPERATIONS IN SUPPORT OF DECOMMISSIONING, THESE JUMPERS ARE REMOVED AND HLP-PMP-00022 (FUTURE) IS TO BE USED ON AN AS-NEEDED BASIS, VIA FLEXIBLE JUMPERS, FOR EMPTYING VESSEL UFP-VSL-00062B. SEE DRAWING 24590-PTF-M6-HLP-00029001 FOR PUMP DETAILS.
8. VALVES LISTED IN TABLE 1 WILL CLOSE ON HIGH HIGH LEVEL DETECTION (UFP-LSHH-0262A).
9. TIMER TO LIMIT VALVE RUN TIME.
10. SEE DRAWING 24590-PTF-M6-ISA-00011 FOR BUBBLER RACK AND SYSTEM CONNECTION.
11. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-UFP-00004 REV 2. THIS IS A MAJOR REVISION, NO REVISION CLOUDS ARE SHOWN. THIS DRAWING MAY INCLUDE INFORMATION FROM 24590-PTF-M6N-M80T-00017, -00037, -00038, 24590-PTF-M6N-UFP-00045, -00064, AND -00078.
12. STEAM JET HEATER TO BE LOCATED ABOVE THE ELEVATION OF THE VESSEL NOZZLE AND AT LEAST ONE BAROMETRIC HEAD BELOW THE STEAM SUPPLY MANIFOLD (C3/BC BOUNDARY).
13. ON LOW LOW LEVEL DETECTION (UFP-LSLL-0262A), VALVES LISTED IN TABLE 2 WILL CLOSE.
14. ON LOW LOW LOW LEVEL DETECTION (UFP-LSLL-0262A), VALVES LISTED IN TABLE 2 WILL CLOSE.
15. DI-0259 AND LI-0262 INTERLOCKS WITH PJM & RFD TAGS IN TABLE 2 AND TABLE 3 TO ADJUST DRIVE AND SUCTION TIME.
16. BUBBLER FLUSH/PURGE TO BE AUTO INITIATED BY PCJ TIMER SWITCH.
17. REVISION 1: INCORPORATED 24590-PTF-M6LN-M80T-00023, 24590-PTF-M6LN-UFP-00010, 24590-PTF-M6N-10-00011, 24590-PTF-M6N-UFP-00120, AND -00209. FURTHER REVISED TO INCREASE PERMEATE LINE SIZE FROM NPS 2 TO 3, ADDED RECIRCULATION VESSEL HEATING CAPABILITIES, CHANGED VESSEL EMPTYING DESIGN FROM STEAM-EJECTOR TO MECHANICAL-PUMP TECHNOLOGY.
REVISED/ADDED/DELETED NOTES AND REFERENCES.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. DELETED
2. 24590-PTF-3YD-UFP-00001, SYSTEM DESCRIPTION FOR ULTRAFILTRATION PROCESS SYSTEM (UFP).

TABLE 1

INSTRUMENT TAG	DRAWING NUMBER	GRID
UFP-YC-0256A	24590-PTF-M6-UFP-00030011	G8
UFP-YC-0156A	24590-PTF-M6-UFP-00030005	H8
UFP-YC-1202	24590-PTF-M6-UFP-00035002	G8
CXP-YC-0116A/B	24590-PTF-M6-CXP-00001003	-
UFP-YC-0607D	24590-PTF-M6-UFP-00006004	-
UFP-YC-0612D	24590-PTF-M6-UFP-00006004	-
UFP-YC-0608D	24590-PTF-M6-UFP-00006005	-
UFP-YC-0611D	24590-PTF-M6-UFP-00006005	-
UFP-YC-0609D	24590-PTF-M6-UFP-00006006	-
UFP-YC-0610D	24590-PTF-M6-UFP-00006006	-
UFP-YC-0508D	24590-PTF-M6-UFP-00005004	-
UFP-YC-0512D	24590-PTF-M6-UFP-00005004	-
UFP-YC-0509D	24590-PTF-M6-UFP-00005005	-
UFP-YC-0510D	24590-PTF-M6-UFP-00005005	-
UFP-YC-0507D	24590-PTF-M6-UFP-00005006	-
UFP-YC-0511D	24590-PTF-M6-UFP-00005006	-

TABLE 2

INSTRUMENT TAG	DRAWING NUMBER	GRID
UFP-YC-0607A/E	24590-PTF-M6-UFP-00006004	-
UFP-YC-0612A/E	24590-PTF-M6-UFP-00006004	-
UFP-YC-0608A/E	24590-PTF-M6-UFP-00006005	-
UFP-YC-0611A/E	24590-PTF-M6-UFP-00006005	-
UFP-YC-0609A/E	24590-PTF-M6-UFP-00006006	-
UFP-YC-0610A/E	24590-PTF-M6-UFP-00006006	-

TABLE 3

INSTRUMENT TAG	DRAWING NUMBER	GRID
UFP-YC-0508A/E	24590-PTF-M6-UFP-00005004	-
UFP-YC-0512A/E	24590-PTF-M6-UFP-00005004	-
UFP-YC-0509A/E	24590-PTF-M6-UFP-00005005	-
UFP-YC-0510A/E	24590-PTF-M6-UFP-00005005	-
UFP-YC-0507A/E	24590-PTF-M6-UFP-00005006	-
UFP-YC-0511A/E	24590-PTF-M6-UFP-00005006	-

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
1	REVISED PER NOTE 17					9/23/11
0	ISSUED FOR CONSTRUCTION SEE NOTE 11	DVV	SJ	ES/CL	RS/JM	11/12/08

REVISION HISTORY

Q
QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	10

	BY	DATE
ORIGINATOR	VO, DOUGLAS	11/11/08
CHECKER	JAIN, SATISH	11/11/08
APPROVER	STEVENS, ROBERT	11/12/08
REVIEWER	STRIEPER, EGBERT	11/12/08

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-PTF-ADR-M-02-046 REV: 4
E&NS SCREENING REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - PTF ULTRAFILTRATION PROCESS SYSTEM PERMEATE COLLECTION UFP-VSL-00062B

SCALE: NONE
24590-PTF-M6-UFP-00004002
REV 1

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

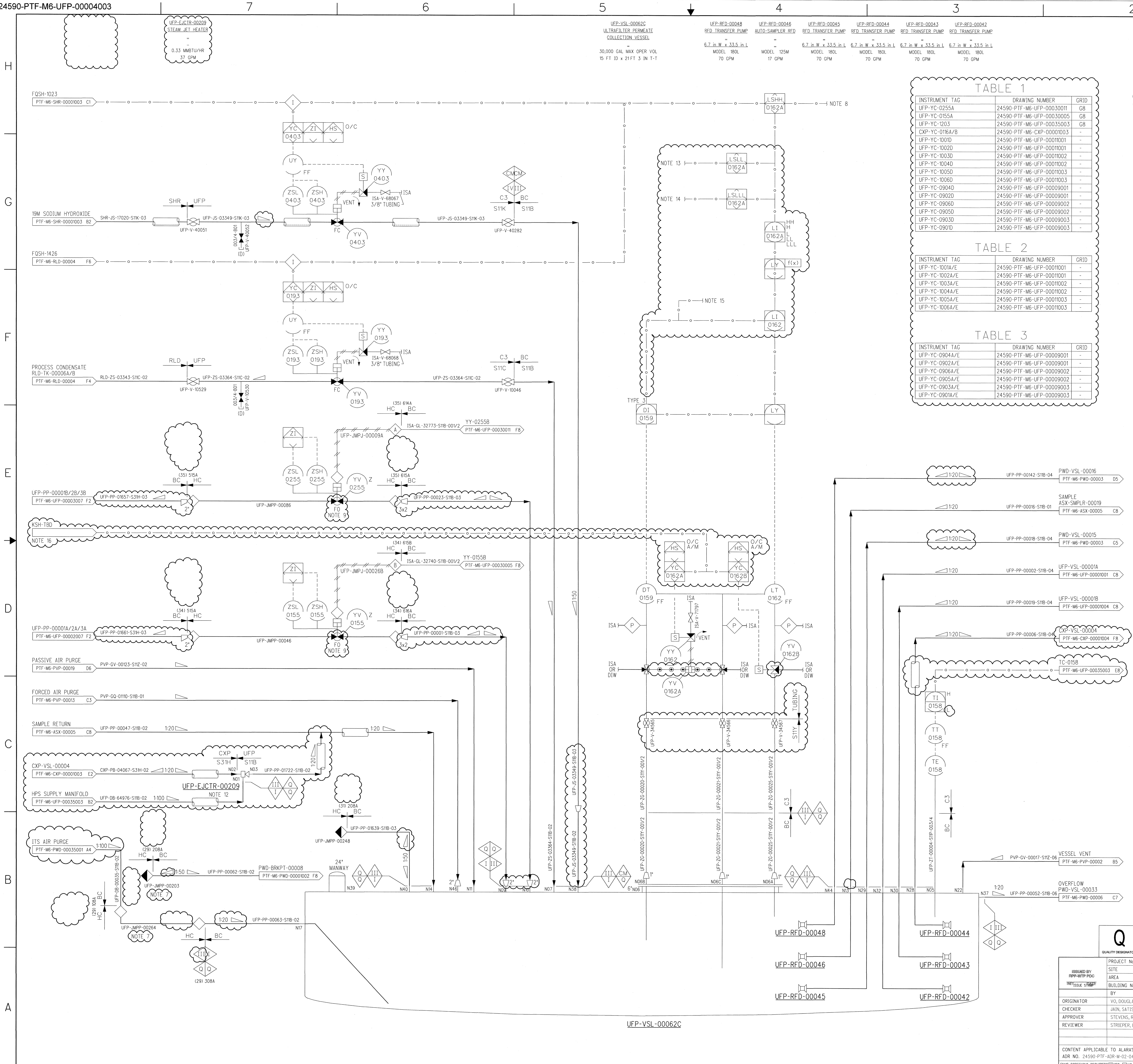
'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

R11430226

9/15/2011 9:11:08 AM

PLOTTED BY: eidorn C:\Work\eidorn\dms03837\PTFM6UFP00004002.dgn

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. ALL ISA BLACK CELL LINES ARE QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I. FLEXIBLE PNEUMATIC JUMPERS ARE QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV. REVERSE FLOW DIVERTERS AND INTERNAL PIPING FOR RFDS ARE QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
5. SEE PLANT WASH DRAWING 24590-PTF-M6-UFP-00015001 FOR VESSEL WASH REPRESENTATION.
6. SEE DRAWINGS 24590-PTF-M6-UFP-00005001 THROUGH -00005007 AND 24590-PTF-M6-UFP-00006001 THROUGH -00006007 FOR REVERSE FLOW DIVERTER/PULSE JET MIXERS REPRESENTATION.
7. JUMPERS UFP-JMPP-00203 AND UFP-JMPP-00264 ARE NORMALLY INSTALLED. DURING VESSEL EMPTYING OPERATIONS IN SUPPORT OF DECOMMISSIONING, THESE JUMPERS ARE REMOVED AND HLP-PMP-00022 (FUTURE) IS TO BE USED ON AN AS-NEEDED BASIS, VIA FLEXIBLE JUMPERS, FOR EMPTYING VESSEL UFP-VSL-00062C. SEE DRAWING 24590-PTF-M6-HLP-00029001 FOR PUMP DETAILS.
8. VALVES LISTED IN TABLE 1 WILL CLOSE ON HIGH HIGH LEVEL DETECTION (UFP-LSHH-0162A).
9. TIMER TO LIMIT VALVE RUN TIME.
10. SEE DRAWING 24590-PTF-M6-ISA-00011 FOR BUBBLER RACK AND SYSTEM CONNECTION.
11. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-UFP-00004 REV 2. THIS IS A MAJOR REVISION, NO REVISION CLOUDS ARE SHOWN. THIS DRAWING MAY INCLUDE INFORMATION FROM 24590-PTF-M6N-M80T-00017, -00037, -00038, 24590-PTF-M6N-UFP-00045, -00064, AND -00078.
12. STEAM JET HEATER TO BE LOCATED ABOVE THE ELEVATION OF THE VESSEL NOZZLE AND AT LEAST ONE BAROMETRIC HEAD BELOW THE STEAM SUPPLY MANIFOLD (C3/BC BOUNDARY).
13. ON LOW LOW LEVEL DETECTION (UFP-LSLL-0162A), VALVES LISTED IN TABLE 2 WILL CLOSE.
14. ON LOW LOW LOW LEVEL DETECTION (UFP-LSLL-0162A), VALVES LISTED IN TABLE 3 WILL CLOSE.
15. DI-0159 AND LI-0162 INTERLOCKS WITH PJM & RFD TAGS IN TABLE 2 AND TABLE 3 TO ADJUST DRIVE AND SUCTION TIME.
16. BUBBLER FLUSH/PURGE TO BE AUTO INITIATED BY PCJ TIMER SWITCH.
17. REVISION 1: INCORPORATED 24590-PTF-M6LN-M80T-00023, 24590-PTF-M6LN-UFP-00010, -00016, -00032, 24590-PTF-M6N-10-00011, 24590-PTF-M6N-UFP-00120, -00196, AND -00209. FURTHER REVISED TO INCREASE PERMEATE LINE SIZE FROM NPS 2 TO 3, ADDED RECIRCULATION VESSEL HEATING CAPABILITIES, CHANGE VESSEL EMPTYING DESIGN FROM STEAM-EJECTOR TO MECHANICAL-PUMP TECHNOLOGY. REVISED/ADDED/DELETED NOTES AND REFERENCES.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. DELETED
2. 24590-PTF-3YD-UFP-00001, SYSTEM DESCRIPTION FOR ULTRAFILTRATION PROCESS SYSTEM (UFP).

TABLE 1

INSTRUMENT TAG	DRAWING NUMBER	GRID
UFP-YC-0255A	24590-PTF-M6-UFP-00030011	G8
UFP-YC-0155A	24590-PTF-M6-UFP-00030005	G8
UFP-YC-1203	24590-PTF-M6-UFP-00035003	G8
CXP-YC-0116A/B	24590-PTF-M6-CXP-00001003	-
UFP-YC-1001D	24590-PTF-M6-UFP-00011001	-
UFP-YC-1002D	24590-PTF-M6-UFP-00011001	-
UFP-YC-1003D	24590-PTF-M6-UFP-00011002	-
UFP-YC-1004D	24590-PTF-M6-UFP-00011002	-
UFP-YC-1005D	24590-PTF-M6-UFP-00011003	-
UFP-YC-1006D	24590-PTF-M6-UFP-00011003	-
UFP-YC-0904D	24590-PTF-M6-UFP-00009001	-
UFP-YC-0902D	24590-PTF-M6-UFP-00009001	-
UFP-YC-0906D	24590-PTF-M6-UFP-00009002	-
UFP-YC-0905D	24590-PTF-M6-UFP-00009002	-
UFP-YC-0903D	24590-PTF-M6-UFP-00009003	-
UFP-YC-0901D	24590-PTF-M6-UFP-00009003	-

TABLE 2

INSTRUMENT TAG	DRAWING NUMBER	GRID
UFP-YC-1001A/E	24590-PTF-M6-UFP-00011001	-
UFP-YC-1002A/E	24590-PTF-M6-UFP-00011001	-
UFP-YC-1003A/E	24590-PTF-M6-UFP-00011002	-
UFP-YC-1004A/E	24590-PTF-M6-UFP-00011002	-
UFP-YC-1005A/E	24590-PTF-M6-UFP-00011003	-
UFP-YC-1006A/E	24590-PTF-M6-UFP-00011003	-

TABLE 3

INSTRUMENT TAG	DRAWING NUMBER	GRID
UFP-YC-0904A/E	24590-PTF-M6-UFP-00009001	-
UFP-YC-0902A/E	24590-PTF-M6-UFP-00009001	-
UFP-YC-0906A/E	24590-PTF-M6-UFP-00009002	-
UFP-YC-0905A/E	24590-PTF-M6-UFP-00009002	-
UFP-YC-0903A/E	24590-PTF-M6-UFP-00009003	-
UFP-YC-0901A/E	24590-PTF-M6-UFP-00009003	-

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
1	REVISED PER NOTE 17	[signature]	[signature]	DVV/ec	[signature]	9/23/11
0	ISSUED FOR CONSTRUCTION, SEE NOTE 11	DVV	SJ	ES/CL	RS/JM	11/12/08

Q
QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	10

	BY	DATE
ORIGINATOR	VO, DOUGLAS	11/11/08
CHECKER	JAIN, SATISH	11/11/08
APPROVER	STEVENS, ROBERT	11/12/08
REVIEWER	STRIEPER, EGBERT	11/12/08

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-PTF-ADR-M-02-046 REV: 4
E&NS SCREENING REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES GOH

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - PTF ULTRAFILTRATION PROCESS SYSTEM PERMEATE COLLECTION UFP-VSL-00062C

SCALE: NONE
24590-PTF-M6-UFP-00004003
REV 1

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

R11430227

9/15/2011 9:10:26 AM

PLOTTED BY: eidorn C:\Work\eidorn\dms03837\PTFM6UFP00004003.dgn

Table III.10.E.A – Pretreatment Plant Tank Systems Description

Dangerous and/or Mixed Waste Tank Systems Name	System Designation	Engineering Description (Drawing Nos., Specifications Nos., etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
		24590-WTP -3PS-G000-T0002, Rev 8 -3PS-MV00-T0001, Rev 4 -3PS-MV00-T0002, Rev3 -3PS-MV00-T0003, Rev 3		
Ultrafiltration Process System UFP-VSL-00001A (Ultrafiltration Feed Preparation Vessel) UFP-VSL-00001B (Ultrafiltration Feed Preparation Vessel) UFP-VSL-00002A (Ultrafiltration Feed Vessel) UFP-VSL-00002B (Ultrafiltration Feed Vessel) UFP-VSL-00062A (Ultrafilter Permeate Collection Vessel) UFP-VSL-00062B (Ultrafilter Permeate Collection Vessel) UFP-VSL-00062C (Ultrafilter Permeate Collection Vessel) UFP-FILT-00001A (Ultrafilter)	UFP	**24590-PTF** -M5-V17T-00009, Rev 2 -M5-V17T-00011, Rev 2 -M6-UFP-00001001, Rev 0 -M6-UFP-00001002, Rev 0 -M6-UFP-00001003, Rev 0 -M6-UFP-00001004, Rev 0 -M6-UFP-00001005, Rev 0 -M6-UFP-00001006, Rev 0 -M6-UFP-00001007, Rev 0 -M6-UFP-00002001, Rev 0 -M6-UFP-00002002, Rev 0 -M6-UFP-00002003, Rev 0 -M6-UFP-00002004, Rev 0 -M6-UFP-00002005, Rev 0 -M6-UFP-00002006, Rev 0 -M6-UFP-00002007, Rev ~~0~~1 -M6-UFP-00002008, Rev 0 -M6-UFP-00003001, Rev 0 -M6-UFP-00003002, Rev 0 -M6-UFP-00003003, Rev 0 -M6-UFP-00003004, Rev 0 -M6-UFP-00003005, Rev 0 -M6-UFP-00003006, Rev 0 -M6-UFP-00003007, Rev ~~0~~1	Section 4.1.2.3; Tables 4-2 and 4-6; and Figures C1-1, C1-2, and C1-02A of Operating Unit Group 10, Addendum C of this Permit.	UFP-VSL-00001A = 75,594 UFP-VSL-00001B = 75,594 UFP-VSL-00002A = 39,629 UFP-VSL-00002B = 40,378 UFP-VSL-00062A = 34,700 UFP-VSL-00062B = 34,700 UFP-VSL-00062C = 34,700 UFP-FILT-00001A= 474 UFP- FILT-00001B = 474 UPF-FILT-00002A = 474 UPF-FILT-00002B = 474 UPF-FILT-00003A = 474 UPF-FILT-00003B = 474

Table III.10.E.A – Pretreatment Plant Tank Systems Description

Dangerous and/or Mixed Waste Tank Systems Name	System Designation	Engineering Description (Drawing Nos., Specifications Nos., etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
UFP-FILT-00001B (Ultrafilter) UFP-FILT-00002A (Ultrafilter) UFP-FILT-00002B (Ultrafilter) UFP-FILT-00003A (Ultrafilter) UFP-FILT-00003B (Ultrafilter) UFP-FILT-00004A (Ultrafilter) UFP-FILT-00004B (Ultrafilter) UFP-FILT-00005A (Ultrafilter) UFP-FILT-00005B (Ultrafilter)		-M6-UFP-00003008, Rev 0 -M6-UFP-00004001, Rev ~~0~~1 -M6-UFP-00004002, Rev ~~0~~1 -M6-UFP-00004003, Rev ~~0~~1 -M6-UFP-00005001, Rev 0 -M6-UFP-00005002, Rev 0 -M6-UFP-00005003, Rev 0 -M6-UFP-00005004, Rev 0 -M6-UFP-00005005, Rev 0 -M6-UFP-00005006, Rev 0 -M6-UFP-00005007, Rev 0 -M6-UFP-00006001, Rev 0 -M6-UFP-00006002, Rev 0 -M6-UFP-00006003, Rev 0 -M6-UFP-00006004, Rev 0 -M6-UFP-00006005, Rev 0 -M6-UFP-00006006, Rev 0 -M6-UFP-00006007, Rev 0 -M6-UFP-00007001, Rev 1 -M6-UFP-00007002, Rev 1 -M6-UFP-00007003, Rev 1 -M6-UFP-00007004, Rev 1 -M6-UFP-00007005, Rev 1 -M6-UFP-00007006, Rev 1 -M6-UFP-00007007, Rev 1 -M6-UFP-00009001, Rev 0 -M6-UFP-00009002, Rev 0 -M6-UFP-00009003, Rev 0 -M6-UFP-00009004, Rev 0 -M6-UFP-00009005, Rev 0 -M6-UFP-00009006, Rev 0 -M6-UFP-00010001, Rev 0		UPF-FILT-00004A = 380 UPF-FILT-00004B = 380 UPF-FILT-00005A = 380 UPF-FILT-00005B = 380

Table III.10.E.A – Pretreatment Plant Tank Systems Description

Dangerous and/or Mixed Waste Tank Systems Name	System Designation	Engineering Description (Drawing Nos., Specifications Nos., etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
		-M6-UFP-00010002, Rev 0 -M6-UFP-00010003, Rev 0 -M6-UFP-00010004, Rev 0 -M6-UFP-00010005, Rev 0 -M6-UFP-00010006, Rev 0 -M6-UFP-00010007, Rev 0 -M6-UFP-00011001, Rev 0 -M6-UFP-00011002, Rev 0 -M6-UFP-00011003, Rev 0 -M6-UFP-00011004, Rev 0 -M6-UFP-00011005, Rev 0 ~~-M6-UFP-P0013, Rev 0~~ -M6-UFP-00015001, Rev 0 -M6-UFP-00015002, Rev 0 -M6-UFP-00016001, Rev 0 -M6-UFP-00017001, Rev 0 -M6-UFP-00021001, Rev 0 -M6-UFP-00021002, Rev 0 -M6-UFP-00022001, Rev 0 -M6-UFP-00022002, Rev 0 -M6-UFP-00027001, Rev 0 -M6-UFP-00027002, Rev 0 -M6-UFP-00027003, Rev 0 -M6-UFP-00027004, Rev 0 -M6-UFP-00027005, Rev 0 -M6-UFP-00027006, Rev 0 -M6-UFP-00027007, Rev 0 -MLD-UFP-P0007, Rev 1 -MVD-UFP-00001, Rev 12 -MVD-UFP-P00014, Rev 0 -MVD-UFP-P00015, Rev 0 -MVD-UFP-00002, Rev 12		

Quarter Ending March 31, 2013 24590-LAW-PCN-ENV-07-007

Hanford Facility RCRA Permit Modification Notification Form

Part III, Operating Unit 10

Waste Treatment and Immobilization Plant

Index

Page 2 of 2: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant

Update the Independent Qualified Registered Professional Engineer (IQRPE) Structural Integrity Assessment Report for the LAW Facility Ancillary equipment in Appendix 9.11 of the Dangerous Waste Permit (DWP).

Submitted by Co-Operator:		Reviewed by ORP Program Office:	
Donna Busche	2/4/13	D. L. Noyes	3/5/13
D. M. Busche	Date	D. L. Noyes	Date

Quarter Ending March 31, 2013 24590-LAW-PCN-ENV-07-007

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part:
Waste Treatment and Immobilization Plant	**Part III, Operating Unit 10**

Description of Modification:

The purpose of this Class 1 prime modification is to update the Structural Integrity Assessment of the LAW Melter Feed Process System (LFP) Elevation 3'-0" Ancillary Equipment in Appendix 9.11 of the DWP. This report includes ancillary equipment identified on Piping and Instrumentation Diagrams (P&ID) 24590-LAW-M6-LFP-00001001 through -00001006 and 24590-LAW-M6-LFP-00003001 through -00003006.

Appendix 9.11			
Replace:	24590-CM-HC4-HXYG-00138-02-00029, Rev. 00A	With:	IQRPE Structural Integrity Assessment Report for the LAW Facility Ancillary Equipment, 24590-CM-HC4-HXYG-00240-02-00007 Rev. 00A (IA-3008268-000)

This modification requests Ecology approval and incorporation into the permit the attached integrity assessment report. The final integrity assessment report reflects the IQRPE's review of a significant number of reference documents. A complete list of reference documents is provided in the Reference and Source of Information sections of the report. The review included reference documents such as plant drawings and building isometrics, P&IDs, process flow diagrams, system description, standard pipe support details and pipe support drawings, pipe support calculations, and structural design criteria and codes.

For each item of "Information Assessed" in the structural integrity assessment report, the items listed under the "Source of Information" column were reviewed and found to furnish adequate design requirements and controls to ensure the design fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations, Tank Systems.*

In accordance with Permit Condition III.10.C.2.e, this permit modification sent to Ecology may include page changes to the Permit, attachments, and permit application supporting documentation.

WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: NA

Enter wording of WAC 173-303-830, Appendix I Modification citation:

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

Modification Approved/Concur: [X] Yes [ ] Denied (state reason below)

Reason for denial:

Reviewed by Ecology:

S. Dahl — Date: 3-28-13

24590-CM-HC4-HXYG-00240-02-00007

REV 00A

**SUBCONTRACT SUBMITTAL
REVIEW NOT REQUIRED**

✓

AFS-13-0009

AREVA

January 15, 2013

Mr. Gary Ellers
Subcontract Administrator
Bechtel National, Inc.
2435 Stevens Center Place
Richland, Washington 99354

Dear Mr. Ellers:

BECHTEL NATIONAL, INC. CONTRACT NO. 24590-CM-HC4-HXYG-00240 IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAW LFP ANCILLARY EQUIPMENT (IA-3008268-000)

The integrity assessment of the subject ancillary equipment has been completed per the contract requirements and is enclosed for your use. The assessment found that the design is sufficient to ensure that the ancillary equipment are adequately designed and have sufficient structural strength, compatibility with the waste(s) to be processed/stored/treated, and corrosion protection to ensure that they will not collapse, rupture, or fail.

If you have any questions, please contact Tarlok Hundal at (509) 371-1975, or via email at tarlok.hundal@areva.com.

Sincerely,

Elizabeth W. Smith, C.P.M
Subcontract Administrator
AREVA Federal Services LLC
Richland Office

Enclosure (1)

LK

cc: D. C. Pfluger, MS5-I w/enclosure (2)

2101 Horn Rapids Road, RC-19, Richland, WA 99354, P.O. Box 840, Richland, WA 99352
Tel.: 509-375-8096 - Fax: 509-375-8495 - www.areva.com

IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAW LFP ANCILLARY EQUIPMENT

IA-3008268-000

IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAW LFP ANICLLARY EQUIPMENT

"I, Tarlok Singh Hundal have reviewed and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the LAW LFP Ancillary Equipment, as required by the Washington Administrative Code, *Dangerous Waste Regulations*, Section WAC-173-303-640(3) (a) through (g) applicable components."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design fully satisfies the requirements of the WAC.

The attached review is thirteen (13) pages numbered one (1) through thirteen (13).

Signature

1/15/13

Date

Scope	Scope of this Integrity Assessment	This Integrity Assessment addresses ancillary equipment associated with the LAW Melter Feed Process System (LFP) vessels (LFP-VSL-00001/2/3/4) and bulges (LFP-BULGE-00001/2), located in the LAW facility. The ancillary equipment such as pipelines, valves, and other items associated with these vessels and bulges are conspicuously delineated on the P&ID drawings 24590-LAW-M6-LFP-00001001, thru -00001006, and 24590-LAW-M6-LFP-00003001 thru -00003006. The LFP vessels (LFP-VSL-00001/2) are located in Room L-0123, vessels (LFP-VSL-00003/4) are located in Room L-0124 at El.3'-0" and Bulges (LFP-BULGES-00001/2) are located in Room L-0202 at El. 28'-0" of the LAW facility. Ancillary equipment located inside the LFP system vessels and bulges is addressed separately in the Integrity Assessments for these plant items.
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the documents listed under "Source of Information" were reviewed and found to furnish adequate design requirements and controls to ensure that the design fully satisfies the requirements of Washington Administrative Code (WAC), Chapter 173-303 WAC, *Dangerous Waste Regulations,* WAC-173-303-640, *Tank Systems.*

References	Drawings and System Description	Drawings: 24590-LAW-P1-P01T-00002, Rev. 6, LAW Vitrification Building General Arrangement Plan at El. 3'- 0"; 24590-LAW-P1-P01T-00004, Rev. 4, LAW Vitrification Building General Arrangement Plan at El. 28'- 0"; 24590-LAW-P1-P01T-00007, Rev. 8, LAW Vitrification Building General Arrangement Sections A-A, B-B, C-C, and S-S; 24590-LAW-P1-P01T-00010, Rev. 8, LAW Vitrification Building General Arrangement Sections K-K, L-L, and M-M; 24590-LAW-M6-LFP-00001001, Rev. 0, P&ID-LAW Melter Feed Process System, Melter 1 Feed Preparation LFP-VSL-00001; 24590-LAW-M6-LFP-00001002, Rev. 0, P&ID-LAW Melter Feed Process System, Melter 1 Feed Preparation LFP-VSL-00001; 24590-LAW-M6-LFP-00001003, Rev. 0, P&ID-LAW Melter Feed Process System, Melter 1 Feed Preparation LFP-VSL-00002; 24590-LAW-M6-LFP-00001004, Rev. 0, P&ID-LAW Melter Feed Process System, Melter 1 Feed Preparation LFP-VSL-00002; 24590-LAW-M6-LFP-00001005, Rev. 0, P&ID-LAW Melter Feed Process System, Melter 1 Feed Preparation and Feed LFP-BULGE-00001; 24590-LAW-M6-LFP-00001006, Rev. 0, P&ID-LAW Melter Feed Process System, Melter 1 Feed Preparation and Feed LFP-BULGE-00001; 24590-LAW-M6-LFP-00003001, Rev. 0, P&ID-LAW Melter Feed Process System, Melter 2 Feed Preparation LFP-VSL-00003; 24590-LAW-M6-LFP-00003002, Rev. 0, P&ID-LAW Melter Feed Process System, Melter 2 Feed Preparation LFP-VSL-00003; 24590-LAW-M6-LFP-00003003, Rev. 0, P&ID-LAW Melter Feed Process System, Melter 2 Feed Preparation LFP-VSL-00004; 24590-LAW-M6-LFP-00003004, Rev. 0, P&ID-LAW Melter Feed Process System, Melter 2 Feed Preparation LFP-VSL-00004; 24590-LAW-M6-LFP-00003005, Rev. 0, P&ID-LAW Melter Feed Process System, Melter 2 Feed Preparation and Feed LFP-BULGE-00002; 24590-LAW-M6-LFP-00003006, Rev. 0, P&ID-LAW Melter Feed Process System, Melter 2 Feed Preparation and Feed LFP-BULGE-00002; 24590-LAW-M5-V17T-00001, Rev. 5, Process Flow Diagram LAW Concentrate Receipt & Melter 1 Feed (System LCP, GFR, and LFP); 24590-LAW-M5-V17T-00002, Rev. 5, Process Flow Diagram LAW Concentrate Receipt & Melter 2 Feed (System LCP, GFR, and LFP); 24590-LAW-P3-LFP-PB00026001, Rev. 1, LAW Vitrification Building Isometric (Line No. LFP-PB-00026-S12A-2); 24590-LAW-P3-LFP-PB00031001, Rev. 0, LAW Vitrification Building Isometric (Line No. LFP-PB-00031-S12A-2); 24590-LAW-P3-LFP-PB00031002, Rev. 0 (w/FC-P-09-0226), LAW Vitrification Building Isometric (Line No. LFP-PB-00031-S12A-2); 24590-LAW-P3-LFP-PB00032001, Rev. 1, LAW Vitrification Building Isometric (Line No. LFP-PB-00032-S12A-2); 24590-LAW-P3-LFP-PB00032002, Rev. 1, LAW Vitrification Building Isometric (Line No. LFP-PB-00032-S12A-2); 24590-LAW-P3-LFP-PB00032003, Rev. 1, LAW Vitrification Building Isometric (Line No. LFP-PB-00032-S12A-2); 24590-LAW-P3-LFP-PB00051001, Rev. 1, LAW Vitrification Building Isometric (Line No. LFP-PB-00051-S12A-4); 24590-LAW-P3-LFP-PB03195001, Rev. 1, LAW Vitrification Building Isometric (Line No. LFP-PB-03195-S12A-4); 24590-LAW-P3-LFP-PB02082001, Rev. 0, LAW Vitrification Building Isometric (Line No. LFP-PB-02082-S12A-2); 24590-LAW-P3-LFP-PB02082002, Rev. 0 (w/FC-P-08-0363), LAW Vitrification Building Isometric (Line No. LFP-PB-02082-S12A-2); 24590-LAW-P3-LFP-PB02116001, Rev. 1, LAW Vitrification Building Isometric (Line No. LFP-PB-02116-S12A-2); 24590-LAW-P3-LFP-PB02116002, Rev. 1, LAW Vitrification Building Isometric (Line No. LFP-PB-02116-S12A-2); 24590-LAW-P3-LFP-PB03227001, Rev. 0, LAW Vitrification Building Isometric (Line No. LFP-PB-03227-S12A-2); 24590-LAW-P3-LFP-PB03227002, Rev. 0, LAW Vitrification Building Isometric (Line No. LFP-PB-03227-S12A-2); 24590-LAW-P3-LMP-PB00025001, Rev. 1, LAW Vitrification Building Isometric (Line No. LMP-PB-00025-S12A-0.75); 24590-LAW-P3-LVP-GV00012001, Rev. 1, LAW Vitrification Building Isometric (Line No. LVP-GV-00012-S11B-4); 24590-LAW-P3-LVP-GV00012002, Rev. 1, LAW Vitrification Building Isometric (Line No. LVP-GV-00012-S11B-4);

References (cont'd)	Drawings and System Description	24590-LAW-P3-LVP-GV00013001, Rev. 1, LAW Vitrification Building Isometric (Line No. LVP-GV-00013-S11B-4); 24590-LAW-P3-LVP-GV00015001, Rev. 1, LAW Vitrification Building Isometric (Line No. LVP-GV-00015-S11B-4); 24590-LAW-P3-LVP-GV00015002, Rev. 1, LAW Vitrification Building Isometric (Line No. LVP-GV-00015-S11B-4); 24590-LAW-P3-LVP-GV00018001, Rev. 2, LAW Vitrification Building Isometric (Line No. LVP-GV-00018-S11B-4); 24590-LAW-P3-LVP-GV00018002, Rev. 4, (w/FC-0014 & 0745) LAW Vitrification Building Isometric (Line No. LVP-GV-00018-S11B-4); 24590-LAW-P3-LVP-GV00018003, Rev. 0, (w/FC-0078, 0745 & 0755) LAW Vitrification Building Isometric (Line No. LVP-GV-00018-S11B-4); 24590-LAW-P3-RLD-PB01317001, Rev. 0, LAW Vitrification Building Isometric (Line No. RLD-PB-01317-S12A-2); 24590-WTP-PH-50-00003001, Rev. 4, Standard Pipe Support Details Cantilever-Cantilever CC; 24590-WTP-PH-50-00012001, Rev. 7, Standard Pipe Support Details Guide – U Bolts GU; 24590-WTP-PH-50-00012003, Rev. 4, Standard Pipe Support Details Guide – U Strap GU; 24590-WTP-PH-50-00015001, Rev. 2, Standard Pipe Support Details Rods – Trapeze RT; 24590-WTP-PH-50-00015002, Rev. 2, Standard Pipe Support Details Rods – Trapeze RT; 24590-WTP-PH-50-00024001, Rev. 2, Standard Pipe Support Details Struts-Sway WS; 24590-LAW-LFP-H10105, Rev. 0, Pipe Support Drawing; 24590-LAW-LFP-H10073, Rev. 0, Pipe Support Drawing; 24590-LAW-LFP-H10131, Rev. 0, Pipe Support Drawing; 24590-LAW-LFP-H10157, Rev. 0, Pipe Support Drawing; 24590-LAW-LFP-H10227, Rev. 0, Pipe Support Drawing; 24590-LAW-LFP-H10229, Rev. 0, Pipe Support Drawing; 24590-LAW-LFP-H10233, Rev. 0, Pipe Support Drawing. <u>System Description</u>: 24590-LAW-3YD-LFP-00001, Rev. 3, System Description for Low Activity Waste Melter Feed Process System (LFP), including SDCNs # 00006 and 00008.

Information Assessed		Source of Information	Assessment
Design	Ancillary equipment design standards are appropriate and adequate for the equipment's intended use.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 7C, Pipe Stress Design Criteria Including "Pipe Stress Criteria" and "Span Method Criteria;" ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-RPT-ST-01-001, Rev. 2, RPP-WTP Compliance With Uniform Building Code Seismic Design Requirements.	The Pipe Stress Design Criteria identifies ASME B31.3 as the design code for piping systems of the WTP. Drawings reviewed show that the ancillary equipment is of commercial quality level (CM) grade and is Seismic Category SC-IV. The Pipe Stress Design Criteria and RPP-WTP Compliant documents provide detailed requirements for the SC-IV ancillary equipment design per applicable codes and standards. The codes and standards used are acceptable and adequate for the design of the ancillary equipment for their intended service.

Information Assessed		Source of Information	Assessment
Design (cont'd)	If the ancillary equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 7C, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-LAW-P6C-LFP-10038, Rev. B, Richland RPP-WTP LAW Plant LFP System (Stress Analysis for Pipeline No. LFP-PB-00026-S12A-2); 24590-LAW-P6C-LFP-10004, Rev. C, Richland RPP-WTP/ LAW LFP System (Stress Analysis for Pipeline No. LFP-PB-00031-S12A-2); 24590-LAW-P6C-LFP-10003, Rev. B, Richland RPP-WTP LAW Plant LFP System (Stress Analysis for Pipeline No. LFP-PB-00032-S12A-2); 24590-LAW-P6C-LFP-10005, Rev. B, Richland RPP-WTP LAW LFP System (Stress Analysis for Pipeline No. LFP-PB-00036-S12A-2); 24590-LAW-P6C-LFP-10042, Rev. B, Richland RPP-WTP LAW Plant LFP System (Stress Analysis for Pipeline No. LFP-PB-00282-S12A-2); 24590-LAW-P6C-LFP-10018, Rev. B, Richland RPP-WTP LAW LFP System (Stress Analysis for Pipeline No. LFP-PB-02216-S12A-2); 24590-LAW-P6C-LFP-10025, Rev. C, Richland RPP-WTP/ LAW LFP System (Stress Analysis for Pipeline No. LFP-PB-02138-S12A-2); 24590-LAW-P6C-LFP-10037, Rev. A, Richland RPP-WTP LAW Plant LFP System (Stress Analysis for Pipeline No. LFP-PB-02143-S12A-2); 24590-LAW-P6C-LFP-10007, Rev. B, (Deviation 1) Richland RPP-WTP LAW LFP System (Stress Analysis for Pipeline No. LFP-PB-03224-S12A-2); 24590-LAW-P6C-LFP-10034, Rev. B, Richland RPP-WTP LFP System (Stress Analysis for Pipeline No. LFP-PB-03227-S12A-2); 24590-LAW-PHC-LFP-10004, Rev. A, Pipe Support Calculation (for Support Nos. LAW-LFP-H10073 and –H10131); 24590-LAW-PHC-LFP-10006, Rev. A, Pipe Support Calculation (for Support No. LAW-LFP-H10105); 24590-LAW-PHC-LFP-10012, Rev. A, Pipe Support Calculation (for Support No. LAW-LFP-H10157); 24590-LAW-PHC-LFP-10022, Rev. A, Pipe Support Calculation (for Support No. LAW-LFP-H10227); 24590-LAW-PHC-LFP-10028, Rev. A, Pipe Support Calculation (for Support No. LAW-LFP-H10043); 24590-LAW-PHC-LFP-10029, Rev. A, Pipe Support Calculation (for Support No. LAW-LFP-H10229); 24590-LAW-PHC-LFP-10030, Rev. A, Pipe Support Calculation (for Support No. LAW-LFP-H10233); 24590-WTP-3DP-G04T-00906, Rev. 8A, Isometric Drawings and Associated Calculations; 24590-WTP-3DP-G04B-00037, Rev. 20, Engineering Calculations; 24590-WTP-3PS-PH01-T0002, Rev. 6, Installation of Pipe Supports.	The ancillary equipment is built to design standards. The Pipe Stress Design Criteria specifies that piping is to be designed in accordance with ASME B31.3 Code. The review of the sample isometric and pipe support drawings listed in the References, Pipe Stress Analyses for Pipelines, Pipe Support Calculations, the design process and controls described in Isometric Drawings and Associated Calculations, Engineering Calculations, and Installation of Pipe Supports documents provide adequate assurance that LFP ancillary equipment are properly designed, installed, and verified to meet the requirements of the applicable design criteria established for the project. The review of the aforementioned documents also demonstrates that sound design engineering principles are used for the design and construction of the ancillary equipment.

Information Assessed		Source of Information	Assessment
Design (cont'd)	Ancillary equipment has adequate strength at the end of its design life to withstand the operating pressure, operating temperature, thermal expansion, and seismic loads. Equipment is protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.	24590-WTP-DC-PS-01-001, Rev. 7C, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code, Section III, Division 1, Rules for Construction of Nuclear Power Plant Components, American Society of Mechanical Engineers, 1995; UBC 1997, Uniform Building Code; 24590-WTP-PER-M-02-002, Rev. 3, Materials for Ancillary Equipment; 24590-WTP-GPG-ENG-004, Rev. 2B, Design Guide Pipe Stress, Pipe Layout and Support Spacing; 24590-WTP-SE-ENS-03-704, Rev. 0, Seismic Evaluation for Design (Seismic Design of Piping and Pipe Supports).	The Pipe Stress Design Criteria requires the use of the ASME B31.3 Code for process piping design. ASME B31.3 requires explicit consideration of operating pressure, operating temperature, thermal expansion/contraction, settlement, vibration, and corrosion allowance in the design of piping. For the seismic design of Seismic Category (SC-IV) ancillary equipment, applicable sections of ASME Section III, Division 1, Appendix F, and sections of UBC 1997 are used to supplement the requirements of ASME B31.3. Details of the seismic design methods are discussed in the Pipe Stress Design Criteria and Seismic Evaluation documents. The aforementioned documents, including the Design Guide document provide assurance that the ancillary equipment has adequate strength at the end of its design life to withstand all anticipated loads.

Information Assessed		Source of Information	Assessment
Supports	Ancillary equipment supports are adequately designed.	Drawings listed above under References; 24590-WTP-DC-PS-01-002, Rev. 6, Pipe Support Design Criteria; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; MSS-SP-58, Pipe Hangers and Supports-Materials, Design, and Manufacture, Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; AISC Manual of Steel Construction, ASD, 9th Edition, American Institute of Steel Construction; ASME Boiler and Pressure Vessel (B&PV) Code, Section III, Division 1, Rules for Construction of Nuclear Power Plant Components, American Society of Mechanical Engineers, 1995; 24590-WTP-PER-PS-02-001, Rev. 4, Ancillary Equipment Pipe Support Design; 24590-WTP-PL-PS-01-001, Rev. 2, Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS); 24590-LAW-PHC-LFP-10004, Rev. A, Pipe Support Calculation (for Support Nos. LAW-LFP-H10073 and –H10131); 24590-LAW-PHC-LFP-10006, Rev. A, Pipe Support Calculation (for Support No. LAW-LFP-H10105); 24590-LAW-PHC-LFP-10012, Rev. A, Pipe Support Calculation (for Support No. LAW-LFP-H10157); 24590-LAW-PHC-LFP-10022, Rev. A, Pipe Support Calculation (for Support No. LAW-LFP-H10227); 24590-WTP-GPG-ENG-005, Rev. 5, Engineering Design Guide for Pipe Supports; 24590-WTP-PHC-P50T-00002, Rev. 1, Justification for the use of Standard Supports for RPP-WTP-Project; 24590-WTP-PHC-P50T-00001, Rev. 1, U-Bolt Load Capacity Calculation; 24590-WTP-3DP-G04T-00906, Rev. 8A, Isometric Drawings and Associated Calculations; 24590-WTP-3DP-G04B-00037, Rev. 20, Engineering Calculations, including ECCN # 00001 and 00003); 24590-WTP-PHC-P50-00001, Rev. 1, RPP/WTP Support Standards (including ECCN # 00001); 24590-WTP-PHC-P50T-00004, Rev. 0, Qualification of Pipe Straps (including ECCN # 00001 and 00004; 24590-WTP-SE-ENS-03-704, Rev. 0, Seismic Evaluation for Design (Seismic Design of Piping and Pipe Supports).	The Pipe Support Design Criteria document considers all loadings identified in ASME B31.3 including MSS-SP-58 and AISC Manual and also utilizes ASME B&PV Code, Section III, Division 1, and Appendix F, to supplement the requirements of ASME B31.3 for design of Seismic Category (SC-IV) pipe supports. Bounding load cases are passed to the pipe support designers from the results of the ancillary equipment piping stress analyses. Details of the seismic design methodology are discussed in the Pipe Support Design Criteria document. Examples of typical ancillary equipment supports are shown in the Ancillary Equipment Pipe Support Design document. Analysis is by manual calculation or approved computer programs that have been verified and validated. Ancillary equipment supports are to be designed to allow a minimum of heat to be transferred to the building structures such that the temperature of the building structures does not exceed 150°F for concrete and steel, except for sleeve penetrations where the temperature may rise up to 200°F. The review of the sample isometric drawings, pipe support drawings, Pipe Support Calculations, and that of the design process and controls described in Isometric Drawings and Associated Calculations, Engineering Calculation and other supports associated documents, provides sufficient assurance that LFP ancillary equipment supports are adequately designed, installed, and verified to meet the requirements of the applicable design criteria established for the project.

Information Assessed		Source of Information	Assessment
Foundations	The system will withstand the effects of frost heave.	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria.	The Structural Design Criteria requires that all outdoor equipment structural foundations shall extend into the surrounding soil below the 30" frost line to preclude frost heave. The LFP ancillary equipment system considered in this assessment is located inside the LAW facility. The LAW facility structural foundations are well below the grade elevation as shown on the general arrangement drawings, therefore, the LFP ancillary equipment is not subjected to any frost heave effects.
Connections	Seams and connections are adequately designed.	24590-WTP-DC-PS-01-001, Rev. 7C, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME B16.5, Piping Flanges and Flanged Fittings, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code (B&PV), Section IX, Welding and Brazing Qualifications, American Society of Mechanical Engineers.	The Pipe Stress Design Criteria specifies the ASME B31.3 Process Piping design code for the piping systems. Welding is to be performed in accordance with the requirements of ASME B31.3 and the ASME B&PV Code, Section IX. ASME B16.5 is specified for flange designs. These are appropriate codes and standards for design and fabrication of the LFP System ancillary equipment.

Information Assessed		Source of Information	Assessment
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, temperature)	System Description listed above under References; 24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems; 24590-WTP-PER-PR-03-002, Rev. 3, Control of Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Unit Systems.	The Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit System and System Description documents indicate that flammable or explosive concentrations of hydrogen are not expected in the LAW facility systems ancillary equipment. Similarly, the Control of Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Unit Systems document provides a summary of the LAW facility ancillary equipment design features that provide for confinement and treatment of chronically toxic vapors and emissions during normal operations, abnormal operations, and during and after a Design Basis seismic event. The above mentioned documents appropriately identify the characteristic of the waste to be handled by the LFP system.
	Ancillary equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	24590-WTP-PER-M-02-002, Rev. 3, Materials for Ancillary Equipment.	The Materials for Ancillary Equipment document specifies that ancillary equipment materials that contact the waste are to be equal to or better than those of the upstream source vessels. Selection of proper material for the LFP piping and equipment ensures that the ancillary equipment is appropriately designed to handle the waste.

Information Assessed		Source of Information	Assessment
Compatibility	The pH range of the waste, waste temperature and the corrosion behavior of the structural materials are adequately addressed. Ancillary equipment material and protective coatings ensure the ancillary equipment structure is adequately protected from the corrosive effects of the waste stream and external environments. The protection is sufficient to ensure the equipment will not leak or fail for the design life of the system.	24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 3, Materials for Ancillary Equipment; 24590-WTP-3PS-NN00-T0001, Rev. 2, Engineering Specification for Thermal Insulation for Mechanical Systems; ASTM Annual Book of ASTM Standards, American Society of Testing and Materials.	The Basis of Design document identifies a service design life of 40 years for the ancillary equipment. Detailed materials selection (corrosion) evaluations are conducted for each vessel in the LAW facility during process design to assure a 40-year service life. The Materials for Ancillary Equipment document requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessel. The Thermal Insulation specification requires that all insulating materials used on the outside of ancillary equipment be pre-approved for use on austenitic stainless steel in accordance with applicable ASTM standards and tests to preclude external corrosion of ancillary equipment. Therefore, the ancillary equipment will provide the expected design service life.

Information Assessed		Source of Information	Assessment
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the ancillary equipment.	ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-DC-PS-01-001, Rev. 7C, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 3, Materials for Ancillary Equipment; 24950-WTP-PER-PL-02-001, Rev. 6, Piping Material Class Description.	ASME B31.3 is the design code for the WTP piping. Consideration of corrosion, including corrosion allowance, is a mandatory requirement of ASME B31.3 and is appropriately supplemented in the Pipe Stress Design Criteria document. A required service life of 40 years is identified in the Basis of Design for ancillary equipment. Detailed materials selection (corrosion) evaluations are conducted for each vessel in the LAW facility during process design to ensure a 40-year service life. The Materials for Ancillary Equipment document requires that downstream ancillary equipment is to be constructed of equal or better materials, and with the same corrosion allowance as the source vessel. Corrosion/Erosion allowances are listed for the ancillary equipment (each piping class and associated valves, fittings, etc.) in the Piping Material Class Description document.
Pressure Controls	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessels are exceeded.	24590-WTP-DC-PS-01-001, Rev. 7C, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers.	The Pipe Stress Design Criteria document specifies ASME B31.3 as the design code for the WTP piping. ASME B31.3 requires provision be made to safely contain or relieve any pressure to which the piping may be subjected. ASME B31.3 piping not protected by a pressure relieving device, or that can be isolated from a pressure relieving device must be designed for at least the highest pressure that can be developed.

Information Assessed		Source of Information	Assessment
Pressure Controls (cont'd)	Maximum flows and any unusual operating stresses are identified	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 7C, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-3PS-P000-T0001, Rev. 6, Engineering Specification for Piping Material Classes General Description and Summary ; 24590-WTP-PER-PL-02-001, Rev. 6, Piping Material Class Description; 24590-WTP-3DP-G04T-00906, Rev. 8A, Isometric Drawings and Associated Calculations; 24590-WTP-3DP-G04B-00037, Rev. 20, Engineering Calculations.	The expected flow paths for the ancillary equipment are identified on the P&ID drawings. The Pipe Stress Design Criteria specifies the ASME B31.3 code for piping design. This code requires piping to be designed to the highest pressure that can be developed in a piping system assuring that maximum operating stresses remain within code allowables. Piping material classes are shown on the P&ID drawings, embedded in the item numbers for each ancillary equipment component. The ancillary equipment is designed for the highest anticipated temperature and pressure values which are also within the bounding maximum design temperature and pressure values listed for each piping material class in the Specification for Piping Material Classes and Piping Material Class Description documents. ASME B31.3 and the associated standards are appropriate and adequate for the design of the ancillary equipment. Furthermore, the fabrication of isometric drawings released for construction by Bechtel National, Inc. (BNI), and the design process and controls described in the Isometric Drawings and Associated Calculations, and Engineering Calculations documents provide adequate assurance that subject ancillary equipment are properly designed, installed, and verified to meet the requirements identified in the applicable design criteria established for the project.

Information Assessed		Source of Information	Assessment
Secondary Containment	Ancillary equipment is designed with secondary containment that is constructed of materials compatible with the waste and of sufficient strength to prevent failure (pressure gradients, waste, climatic conditions, daily operations), provided with a leak-detection system, and designed to drain and remove liquids.	Drawings listed above under References; 24590-LAW-PER-M-05-002, Rev. 2, Leak Detection Capability in the Low Activity Waste Facility.	The ancillary equipment considered in this assessment runs from LFP Bulges in Room L-0202 at El. 28'-0" to LFP vessels located in Rooms L-0123 & L-0124 at El. 3'-0" which are directly below Room L-0202 within the LAW building. Rooms L-0123 and L-0124 are secondary containment concrete structures provided with stainless steel liner plates and have sumps (RLD-SUMP-00029/00030) and (RLD-SUMP-00031/00032) respectively, as shown on the general arrangement drawings and in the Leak Detection document. The structural integrity assessment of the above mentioned secondary containment structures is outside the scope of this assessment, however, it is conducted in a separate document.