OFFICE OF RIVER PROTECTION
P.O. Box 450, MSIN H6-60
Richland, Washington 99352

JUL 03 2019

19-ECD-0049

Ms. Alexandra K. Smith, Program Manager
Nuclear Waste Program
Washington State
Department of Ecology
3100 Port of Benton Blvd.
Richland, Washington 99354

Ms. Smith:

SUBMITTAL OF CLASS 2 PERMIT MODIFICATION NOTIFICATION TO THE HANFORD FACILITY RESOURCE CONSERVATION AND RECOVERY ACT PERMIT, DANGEROUS WASTE PORTION FOR THE 242-A EVAPORATOR [T-2-6]

This letter transmits a Class 2 Permit Modification for Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste, for the 242-A Evaporator Operating Unit Group 4.

This proposed Class 2 Permit Modification is required to add a backup transfer line from the Waste Treatment and Immobilization Plant Effluent Management Facility to the 242-A Evaporator Permit. The backup transfer line from the Waste Treatment and Immobilization Plant Effluent Management Facility will connect to an existing transfer line between the 242-A Evaporator and the Liquid Effluent Retention Facility.

This transmittal includes:

- Fact Sheet, which provides a summary of the Class 2 permit modification (Attachment 1)
- Permittee Certifications required under WAC 173-303-810(12) to support submittal of the Class 2 permit modification (Attachment 2)
- Permit Change Notice C2-242-A-2019-01 which identifies the proposed changes to the 242-A Evaporator Unit Specific Conditions, Part A Form (Chapter 1), Waste Analysis Plan (Chapter 3), Process Information (Chapter 4), and Procedures to Prevent Hazards (Chapter 6) (Attachment 3)

The Washington State Department of Ecology has requested additional supplemental technical information to support the Class 2 permit modification development and review, but not intended for public comment. The supplemental information is described in Attachment 4, Supplemental Information Index, and provided electronically to the Washington State Department of Ecology.

The public comment period for this permit modification is scheduled to begin on July 18, 2019, and continue through September 16, 2019.

If you have any questions, please contact Joe Sondag, Acting Director, Environmental Compliance Division, (509) 373-9179.

Brian T. Vance
Manager

ECD:RLE

Attachments: (4)

cc w/attachs:
J. Cantu, Ecology (CD Only)
P.M. Pak, RL
Administrative Record (T-2-6) (Hard Copy & CD)
Environmental Portal
WRPS Correspondence

cc w/o attachs:
M. Johnson, CTUIR
A. Carlson, Ecology
S.L. Dahl, Ecology
S. Lowe, Ecology
J.J. Lyon, Ecology
N. Menard, Ecology
A.G. Pomiak, Ecology
D. Einan, EPA
J. Bell, NPT (Acting)
K. Niles, Oregon Energy
R. Buck, Wanapum
J.L. Foster, WRPS
J.A. Joyner, WRPS
S.A. Thompson, WRPS
R. Longoria, YN
D. Rowland, YN

Attachment 1
19-ECD-0049
(4 Pages Excluding Cover Sheet)

Fact Sheet

THE HANFORD SITE

FACT SHEET

PUBLIC COMMENT PERIOD

Proposed Class 2 Permit Modification for the 242-A Evaporator to Add Waste Treatment and Immobilization Plant Backup Transfer Line

The U.S. Department of Energy and Washington River Protection Solutions are holding a 60-day public comment period on a proposed modification to the Hanford Facility Dangerous Waste Permit. This proposed permit modification would add a backup transfer line from the WTP Effluent Management Facility to an existing transfer line between the 242-A Evaporator and the Liquid Effluent Retention Facility.

PUBLIC COMMENT PERIOD: July 18 to September 16, 2019

Background

The Hanford Site is located in southeastern Washington state along the Columbia River. The 580-square-mile site was created in 1943 as part of the Manhattan Project to produce plutonium for the nation's defense program. Today, waste management and environmental cleanup are the main missions at Hanford.

The Department of Energy (DOE) and its contractor Washington River Protection Solutions are requesting a Class 2 modification to the 242-A Evaporator chapter of the Hanford Dangerous Waste Permit. The 242-A Evaporator is a mixed-waste treatment and storage unit that concentrates the liquid (supernatant) portion of double-shell tank waste and is located near the center of the Hanford Site in the 200 East Area (see map).

Overview

The permit establishes requirements to ensure that waste management activities protect human health and the environment. DOE is proposing a Class 2 permit modification pursuant to Washington Administrative Code WAC 173-303-830, which requires a 60-day public review process that includes a public meeting, a newspaper advertisement announcing the meeting, and a fact sheet.

Summary of Changes

If approved, the modification would allow DOE to connect a backup waste transfer line from the Effluent Management Facility (EMF) at the Waste Treatment and Immobilization Plant to an existing transfer line between the 242-A Evaporator and the Liquid Effluent Retention Facility (LERF) and to upgrade the electronic leak detection system. This would allow transfer of effluent waste from the EMF to the LERF. This requires modification to the permit including more detailed information in the permit conditions and applicable chapters. Modifications to the chapters include revised information on the 242-A Evaporator boundary, waste acceptance plan, leak detection, and leak/spill response information.

PUBLIC COMMENT PERIOD

July 18 to September 16, 2019

Get Involved
Stay Involved

Public Meeting:

August 27, 5:30 p.m.
Richland Public Library
955 Northgate Dr.
Richland, WA 99352

Contact Information:

Paula Call, DOE
(509) 376-2048
Paula.Call@orp.doe.gov

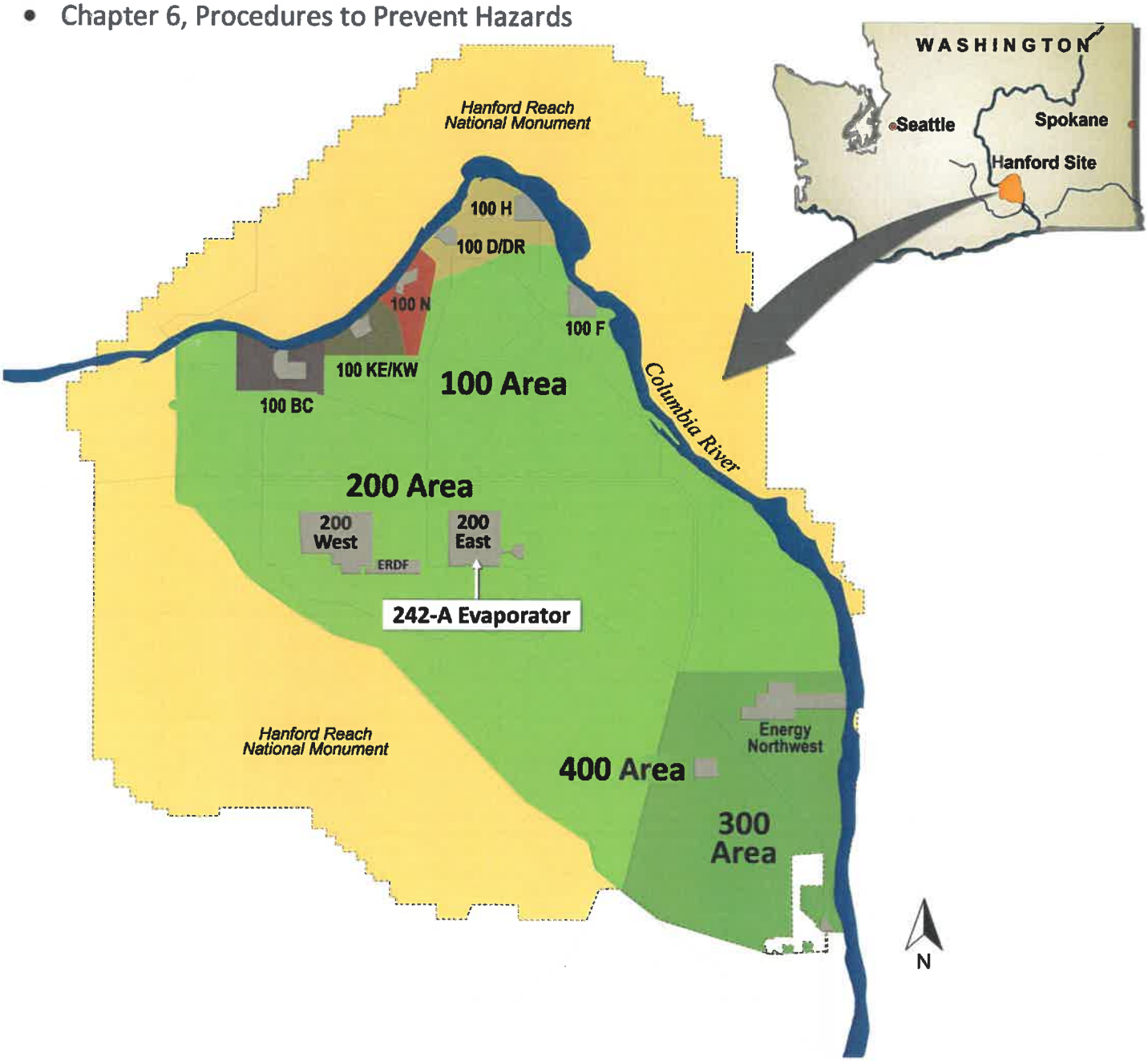
Daina McFadden, Ecology
(509) 372-7950
Hanford@ecy.wa.gov

Administrative Record:
https://go.usa.gov/xyCeC

Submit Comments:
http://wt.ecology.commentinput.com/?id=GU4pS

Permit Chapters Affected by this Modification:

- Permit Conditions
- Chapter 1, Part A Form
- Chapter 3, Waste Analysis Plan
- Chapter 4, Process Information
- Chapter 6, Procedures to Prevent Hazards



A 60-day public comment period will begin July 18 and continue through September 16. A public meeting will be held August 27 at 5:30 p.m. at the Richland Public Library, 955 Northgate Drive, Richland, Washington 99352.

To request disability accommodation, please contact Jennifer Colborn, Jennifer_M_Colborn@rl.gov, (509) 376-5840 at least 10 working days prior to the event.

All comments must be submitted by September 16 in writing by mail or electronically (preferred) to:

Washington State Department of Ecology
3100 Port of Benton Boulevard
Richland, WA 99354
http://wt.ecology.commentinput.com/?id=GU4pS (preferred)

At the conclusion of the public comment period, the Washington State Department of Ecology will address public comments and prepare a Response to Comment document.

Copies of the proposed modification and supporting documentation will be available online during the public comment period at https://go.usa.gov/xyCeC, on Ecology's website and at the Hanford Public Information Repositories at https://go.usa.gov/xyCer.

THE HANFORD SITE

FACT SHEET

Public Involvement Opportunity

We want to hear from you on the proposed changes to the 242-A Evaporator chapter of the Hanford Dangerous Waste Permit

Comment Period: July 18 to September 16, 2019
Public Meeting: August 27, 2019, 5:30 p.m., Richland Public Library

OFFICE OF RIVER PROTECTION
United States Department of Energy

Class 2 Permit Modification Fact Sheet
U.S. Department of Energy
Office of River Protection
P.O. Box 450, H4-02
Richland, WA 99352

Attachment 2
19-ECD-0049
(2 Pages Excluding Cover Sheet)

Permittee Certifications

U.S. Department of Energy, Office of River Protection Certification

The following certification statement is provided for the submittal of the Hanford Facility Resource Conservation and Recovery Act Class 2 Permit Modification Notification C2-242-A-2019-01, for 242-A Evaporator.

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.

Brian T. Vance, Manager U.S. Department of Energy Office of River Protection	7/3/2019 Date

Washington River Protection Solutions LLC Certification

The following certification statement is provided for the submittal of the Hanford Facility Resource Conservation and Recovery Act Class 2 Permit Modification Notification C2-242-A-2019-01, for 242-A Evaporator.

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.

June 27, 2019

John R. Eschenberg
President and Project Manager
Washington River Protection Solutions LLC

Date

Attachment 3
19-ECD-0049
(71 Pages Excluding Cover Sheet)

Hanford Facility RCRA Permit Modification Notification Forms
Part III, Operating Unit 4
242-A Evaporator

Hanford Facility RCRA Permit Modification Notification Forms

Part III, Operating Unit 4

242-A Evaporator

Index

Page 2 of 6: Permit Conditions
Page 3 of 6: Chapter 1, Part A Form
Page 4 of 6: Chapter 3, Waste Analysis Plan
Page 5 of 6: Chapter 4, Process Information
Page 6 of 6: Chapter 6, Procedures to Prevent Hazards

Submitted by Co-Operator:

Jeremy T. Hartley — 6/26/19 Date

Reviewed by DOE Program Office:

Rob G. Hastings — 6/27/19 Date

Hanford Facility RCRA Permit Modification Form	
Unit: ***242-A Evaporator***	Permit Part ***Part III, Operating Unit Group 4***

Description of Modification:

Permit Conditions

- Updated List of Addenda Specific to Operating Unit Group 4 as follows:
  Chapter 1.0 Part A Form, dated TBD ~~November 16, 2017~~
  Chapter 3.0 Waste Analysis Plan, dated TBD ~~April 9, 2018~~
  Chapter 4.0 Process Information, dated TBD ~~April 9, 2018~~
  Chapter 6.0 Procedures to Prevent Hazards, dated TBD ~~April 9, 2018~~
- Added the following Permit Conditions:

III.4.C TANK SYSTEMS

III.4.C.1 Within 90 days of the effective date of the permit modification, the Permittee shall demonstrate to the department that the leak detection system for the combined PC-5000/ 3" WTP-002-M17 transfer lines is designed and operated to detect the presence of liquid in the secondary containment system at the earliest practicable time if the existing detection technologies or site conditions will not allow detection of a release within 24 hours. The Permittees must consider alternative configurations for leak detection and this information will be provided to the department for concurrence. The department will provide a response within 30 days. [WAC 173-303-640(4)(c)(iii)]

III.4.C.2 Prior to receipt of any dangerous waste in the combined PC-5000/3"-WTP-002-M17 waste transfer system, the Permittees will submit the tightness test for the combined PC 5000/3" WTP 002-M17 waste transfer system. [WAC 173-303-640(3)(e)]

III.4.C.2.a Tightness test for the combined waste transfer system piping (PC 5000/3"- WTP 002 M17) will be performed at a frequency of every 10 years upon completion of Permit Condition III.4.C.2.

III.4.C.3 Modifications to the leak detection will be made in accordance with Permit Condition I.C.3.

III.4.C.4 The electronic leak detection system for the combined PC-5000 and 3"-WTP-002-M17 transfer lines shall be maintained and operated continuously when in use with the following exceptions:

III.4.C.4.a If the electronic leak detection system is not available, visual inspection shall be employed at the PC-5000 catch tank 60M-TK-1 (sight glass FG-60M-001).

III.4.C.4.b Ecology must be notified if the electronic leak detection system is out of service for more than 90 days. This notification must include a schedule for repairing and returning the system to service within 90 days from notification, or longer if approved by the department.

WAC 173-303-830 Modification Class	Class 1	Class '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: ☐ Yes ☐ No (*state reason for denial*) Reason for denial:	Reviewed by Ecology: S. L. Dahl-Crumpler Date

Hanford Facility RCRA Permit Modification Form

Unit:	Permit Part
242-A Evaporator	***Part III, Operating Unit Group 4***

Description of Modification:

Chapter 1, Part A Form

Proposed changes:

- Revised TSD unit-group boundary on topographic map to include PC-5000 transfer line up to LERF Catch Basin 242AL-43. The boundary change was made so that the 242-A Evaporator permit includes the entire length of PC-5000, rather than stopping at the fence line. This boundary aligns with integrity assessment scope for 242-A Evaporator, where the integrity assessment addresses the entire length of PC-5000. Additionally, the 242-A Evaporator staff are responsible for responding to leak detection alarms for the transfer line. The staff have access to the sight glass located within the fenced area.
- Show WTP backup transfer line (3”-WTP-002-M17) from the WTP fence line connecting to PC-5000 within 242-A Evaporator TSD boundary
- Updated contact information

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

Enter relevant WAC 173-303-830, Appendix I Modification citation number: -830(4)(d), Other Modifications

Per WAC 173-303-830(4)(d), the Permittee requests that this modification be reviewed and approved as a Class 2

Modification Approved: ☐ Yes ☐ No (*state reason for denial*)

Reason for denial:

Reviewed by Ecology:

S. L. Dahl-Crumpler Date

Hanford Facility RCRA Permit Modification Form	
Unit: ***242-A Evaporator***	Permit Part ***Part III, Operating Unit Group 4***

Description of Modification:

Chapter 3, Waste Analysis Plan – the proposed changes are shown in redline/strikeout.

Proposed changes:

- Editorial corrections
- Deleted the metric conversion chart because units should not be converted
- Addressed waste acceptance for instances where the Waste Treatment and Immobilization Plant (WTP) uses the backup transfer line (3”-WTP-002-M17) connected to PC-5000 (at WTP-MH-001) to transfer waste to the Liquid Effluent Retention Facility (LERF)
- Revised Sections 3.10.1.2 and 3.10.1.3 for consistency between sections, Section 3.10.1.3, 3rd bullet Requirements allows “*Bottles and jars”*, and “*Clear or brown glass or polyethylene”*. This change moved the deviation for VOA analysis from Section 3.10.1.2 to appropriate Section 3.10.1.3, *Deviations from Specified Sampling Practices*.

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

Enter relevant WAC 173-303-830, Appendix I Modification citation number: -830(4)(d), Other Modifications

Per WAC 173-303-830(4)(d), the Permittee requests that this modification be reviewed and approved as a Class 2

Modification Approved: ☐ Yes ☐ No (*state reason for denial*) Reason for denial:	Reviewed by Ecology: S. L. Dahl-Crumpler Date

Hanford Facility RCRA Permit Modification Form

Unit:	Permit Part
242-A Evaporator	***Part III, Operating Unit Group 4***

Description of Modification:

Chapter 4, Process Information – the proposed changes are shown in redline/strikeout.

Proposed changes:

- Editorial corrections and clarifications
- Updates transfer line leak detection information, and added actions for leak/spill in secondary containment for the transfer lines
- Described the WTP backup transfer line (3”-WTP-002-M17) to PC-5000 transfer line
- Identified interface boundaries between 242-A Evaporator and LERF, and 242-A Evaporator and WTP
- Clarified used of vapor-liquid separator vessel drain line (DR-335)
- Replaced drawing H-2-79604 with, H-2-88766, Sheets 1, 3, 5 that depicts the PC-5000 transfer line to LERF Catch Basin 242AL-43 and backup WTP transfer pipeline to PC-5000 transfer line.

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

Enter relevant WAC 173-303-830, Appendix I Modification citation number: -830(4)(d), Other Modifications

Per WAC 173-303-830(4)(d), the Permittee requests that this modification be reviewed and approved as a Class 2

Modification Approved: ☐ Yes ☐ No (*state reason for denial*) Reason for denial:	Reviewed by Ecology: S. L. Dahl-Crumpler Date

Hanford Facility RCRA Permit Modification Form	
Unit: ***242-A Evaporator***	Permit Part ***Part III, Operating Unit Group 4***

Description of Modification:

Chapter 6, Procedures to Prevent Hazards – the proposed changes are shown in redline/strikeout.

Proposed changes:

- Editorial corrections
- Defined inspection frequencies
- Revised PC-5000 transfer line leak detection monitoring/inspection for transfers from 242-A Evaporator to LERF and from WTP to PC-5000 to LERF
- Clarified information pertaining to the inspection logs, and fire department inspections.

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

Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.4

B.4, General Facility Standards, Changes in frequency or content of inspection schedule

Modification Approved: ☐ Yes ☐ No (*state reason for denial*) Reason for denial:	Reviewed by Ecology: S. L. Dahl-Crumpler Date

Revision Instructions:

Remove the following and replace with the revised Permit documentation:

- Permit Conditions
- Chapter 1, Part A Form
- Chapter 3, Waste Analysis Plan
- Chapter 4, Process Information
- Chapter 6, Procedures to Prevent Hazards

OPERATING UNIT 4 UNIT-SPECIFIC CONDITIONS
242-A EVAPORATOR

UNIT DESCRIPTION

The 242-A Evaporator is a mixed waste treatment and storage unit consisting of a conventional forced-circulation, vacuum evaporation system to concentrate mixed-waste solutions located in the 200 East Area.

This document sets forth the operating conditions for the 242-A Evaporator.

III.4.A COMPLIANCE WITH UNIT SPECIFIC PERMIT CONDITIONS

The Permittees shall comply with all requirements set forth in the Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit (Permit) as specified in Permit Attachment 9, Permit Applicability Matrix, including all approved modifications. All chapters, subsections, figures, tables, and appendices included in the following unit-specific Permit Conditions are enforceable in their entirety.

In the event that the Part III-Unit-Specific Conditions for Operating Unit 4, 242-A Evaporator conflict with the Part I-Standard Conditions and/or Part II-General Facility Conditions of the Permit, the unit-specific conditions for Operating Unit 4, 242-A Evaporator prevail.

CHAPTERS SPECIFIC TO OPERATING UNIT GROUP 4:

Chapter 1.0 Part A Form, dated ~~November 16, 2017~~TBD

Chapter 3.0 Waste Analysis Plan, dated ~~April 9, 2018~~TBD

Chapter 4.0 Process Information, dated ~~April 9, 2018~~TBD

Chapter 5.0 Groundwater Monitoring, (not applicable)

Chapter 6.0 Procedures to Prevent Hazards, dated ~~April 9, 2018~~TBD

Chapter 7.0 Contingency Plan, dated November 16, 2017

Chapter 8.0 Personnel Training, dated September 30, 2013

Chapter 11.0 Closure, dated September 30, 2013

III.4.B COMPLIANCE WITH UNIT-SPECIFIC PERMIT CONDITIONS

III.4.B.1 Portions of permit attachment 4 (DOE/RL-94-02) that are not made enforceable by inclusion in the applicability matrix for that document are not made enforceable by reference in this document.

III.4.C TANK SYSTEMS

III.4.C.1 Within 90 days of the effective date of the permit modification, the Permittee shall demonstrate to the department that the leak detection system for the combined PC-5000/ 3” WTP-002-M17 transfer lines is designed and operated to detect the presence of liquid in the secondary containment system at the earliest practicable time if the existing detection technologies or site conditions will not allow detection of a release within 24-hours. The Permittees must consider alternative configurations for leak detection and

this information will be provided to the department for concurrence. The department will provide a response within 30 days. [WAC 173-303-640(4)(c)(iii)]

III.4.C.2 Prior to receipt of any dangerous waste in the combined PC-5000/3”-WTP-002-M17 waste transfer system, the Permittees will submit the tightness test for the combined PC-5000/3”-WTP-002-M17 waste transfer system. [WAC 173-303-640(3)(e)]

III.4.C.2.a Tightness test for the combined waste transfer system piping (PC-5000/3”-WTP-002-M17) will be performed at a frequency of every 10 years upon completion of Permit Condition III.4.C.2.

III.4.C.3 Modifications to the leak detection will be made in accordance with Permit Condition I.C.3.

III.4.C.4 The electronic leak detection system for the combined PC-5000 and 3”-WTP-002-M17 transfer lines shall be maintained and operated continuously when in use with the following exceptions:

III.4.C.4.a If the electronic leak detection system is not available, visual inspection shall be employed at the PC-5000 catch tank 60M-TK-1 (sight glass FG-60M-001).

III.4.C.4.b Ecology must be notified if the electronic leak detection system is out of service for more than 90 days. This notification must include a schedule for repairing and returning the system to service within 90 days from notification, or longer if approved by the department.

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CHAPTER 1
242-A EVAPORATOR
PART A FORM

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WASHINGTON STATE DEPARTMENT OF ECOLOGY

Dangerous Waste Permit Application Part A Form

Date Received	Reviewed by:	Date:
Month Day Year	Approved by:	Date:

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

U.S. Department of Energy – Hanford Facility

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

Refer to Permit Attachment 2, Hanford Facility Permit Legal Description

City or Town	State	ZIP Code
Near Richland	WA	

County Code	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)		11 19 1980

V. Facility Mailing Address

Street or P.O. Box

P.O. Box 450

City or Town	State	ZIP Code
Richland	WA	99352

VI. Facility contact (Person to be contacted regarding waste activities at facility)		
Name (last)	**(first)**	
Vance	Brian	
Job Title	**Phone Number**	
Manager	(509) 376-7395	
Contact Address		
Street or P.O. Box		
P.O. Box 450		
City or Town	**State**	**ZIP Code**
Richland	WA	99352

VII. Facility Operator Information	
A. Name	**Phone Number**
U.S. Department of Energy Owner/Operator Washington River Protection Solutions, LLC Co-Operator for 242-A Evaporator	(509) 376-7395 (509) 376-2574
Street or P.O. Box	
P.O. Box 450 P.O. Box 850	

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	
If yes, provide the scheduled date for the change:	**Month**	**Day** / **Year**
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**
U.S. Department of Energy Owner/Operator	(509) 376-7395
Street or P.O. Box	
P.O. Box 450	

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

X. Other Environmental Permits

A. Permit Type	B. Permit Number	C. Description
E	AOP00-05-006	Title V Air Operating Permit. Incorporation of current non-radiological Notice of Construction permits and FF-01 radiological licenses into the AOP may be delayed up to 2 years.
E	601-319-23	Petroleum Underground Storage Tank License

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

The 242-A Evaporator is a mixed waste treatment and storage unit that pretreats Double-Shell Tank (DST) waste supernatant. 242-A Evaporator operations began in March 1977; the evaporator is located in Hanford's 200 East Area. Tank waste is transferred from DST feed tank 241-102-AW to the 242-A Evaporator, where the evaporator removes water and most volatile organics.

T04 – Other Treatment - Evaporation:

The Evaporator is a conventional forced-circulation, vacuum evaporation system to reduce mixed waste from the DST System. The evaporator treats the waste by removing water and most volatile organics. This process creates two waste streams, which leave the 242-A Evaporator following the treatment process.

- Concentrated slurry (approximately 40 to 60 percent of the water is removed during evaporation along with a portion of volatile organics), is pumped back into the DST System.
- Process condensate (containing a portion of the volatile organics removed from the mixed waste during the evaporation process), is routed through condensate filters before release to the Liquid Effluent Retention Facility (LERF). Off gasses from the process are routed through a de-entrainment unit, a prefilter, and high-efficiency particulate air filters before being discharged to the environment.

S02 – Tank Storage

Tank C-A-1 Evaporator Vessel: Process slurry from the reboiler discharges to Tank C-A-1. Concentrated process slurry exits the lower section of Tank C-A-1 through a 28-inch recirculating line. Vapor flows out of Tank C-A-1 through a 42-inch vapor line at the top. The maximum design capacity of Tank C-A-1 is 35,600 gallons. Tank C-A-1 is in the Evaporator Room and consists of two sections:

- Lower (liquid) section, is a 14-foot diameter stainless steel shell.
- Upper (vapor) section is an 11.6-foot diameter stainless steel shell. The upper section contains two wire-mesh de-entrainment pads for the removal of liquids and solids that could be carried into the vapor header.

Tank TK-C-100: Process condensate from the primary, inter-, and after-condensers drain by gravity to tank TK-C-100. Tank TK-C-100 receives potentially contaminated drainage from the vessel vent system via a 27-gallon seal pot. Tank TK-C-100, is a 14-foot diameter x 19-foot high stainless steel tank located in the Condensate Room. The maximum design capacity of Tank TK-C-100 is 17,800 gallons.

The waste fed to the 242-A Evaporator is regulated as a mixed waste with the same waste constituents as the waste in the DST System. The concentrated slurry is a characteristic waste (D001, D002, and D003), toxic waste (D004 through D011, D018, D019, D022, D028 through D030, D033 through D036, D038 through D041, and D043), nonspecific source waste (F001 through F005 and F039), and state-only characteristic waste (WT01, WT02, WP01, WP02. Multi-source leachate (F039) is included as a waste derived from nonspecific source waste F001 through F005. The process condensate is regulated as a mixed waste due to the toxicity of ammonia (WT02) and because it is derived from the waste with a nonspecific source wastes F001 through F005. Multi-source leachate (F039) is included as a waste derived from nonspecific source waste F001 through F005. Section XIV.A includes a list of some dangerous waste constituents that may not have already been detected in the waste; however, knowledge of the processes providing the waste to the 242-A Evaporator indicates that these constituents are present in the waste or there is a potential for treating these constituents in the future.

Section XII, XIII, and XIV Capacity and Estimated Annual Quantities of Waste

T04 – Other Treatment (evaporation) process design capacity is 346,000 gallons per day based on a continuous feed operating 24 hours a day. The estimated annual quantity of waste treated for evaporation (T04) is 841,000,000 pounds per year based on 182 days of operation, processing 346,000 gallons per day, at a specific gravity (SpG) of 1.6.

S02 – Tank Storage process design capacity is 53,400 gallons based on the capacity of Tank C-A-1 (35,600 gallons), and TK-C-100 (17,800 gallons). The estimated annual quantity of waste for tank storage at any one time is 603,000 pounds per year based on the capacity of Tanks C-A-1 and TK-C-100 and each tanks SpG for the waste (1.6 and 1.0 SpG respectively).

NAICS Codes

NAICS Codes listed in Section IX.B – IX.D, apply to the Hanford Facility and not to this unit.

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								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	T	0	4	346,000	U	001		1	T	0	4	346,000	U	001	Evaporation
	2	S	0	2	53,400	G	002		2							
	3								3							
	4								4							
	5								5							
	6								6							
	7								7							
	8								8							
	9								9							
1	0							1	0							
1	1							1	1							
1	2							1	2							
1	3							1	3							
1	4							1	4							
1	5							1	5							
1	6							1	6							
1	7							1	7							
1	8							1	8							
1	9							1	9							
2	0							2	0							
2	1							2	1							
2	2							2	2							
2	3							2	3							
2	4							2	4							
2	5							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	841,000,000	P	T	0	4							Evaporation
2	D	0	0	2												Included with above
3	D	0	0	3												Included with above
4	D	0	0	4												Included with above
5	D	0	0	5												Included with above
6	D	0	0	6												Included with above
7	D	0	0	7												Included with above
8	D	0	0	8												Included with above
9	D	0	0	9												Included with above
10	D	0	1	0												Included with above
11	D	0	1	1												Included with above
12	D	0	1	8												Included with above
13	D	0	1	9												Included with above
14	D	0	2	2												Included with above
15	D	0	2	8												Included with above
16	D	0	2	9												Included with above
17	D	0	3	0												Included with above
18	D	0	3	3												Included with above
19	D	0	3	4												Included with above
20	D	0	3	5												Included with above
21	D	0	3	6												Included with above
22	D	0	3	8												Included with above
23	D	0	3	9												Included with above
24	D	0	4	0												Included with above
25	D	0	4	1												Included with above

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												Included with above
27	F	0	0	1												Included with above
28	F	0	0	2												Included with above
29	F	0	0	3												Included with above
30	F	0	0	4												Included with above
31	F	0	0	5												Included with above
32	F	0	3	9												Included with above
33	W	P	0	1												Included with above
34	W	P	0	2												Included with above
35	W	T	0	1												Included with above
36	W	T	0	2												Included with above
37	D	0	0	1	624,000	P	S	0	2							Tank Storage
38	D	0	0	2												Included with above
39	D	0	0	3												Included with above
40	D	0	0	4												Included with above
41	D	0	0	5												Included with above
42	D	0	0	6												Included with above
43	D	0	0	7												Included with above
44	D	0	0	8												Included with above
45	D	0	0	9												Included with above
46	D	0	1	0												Included with above
47	D	0	1	1												Included with above
48	D	0	1	8												Included with above
49	D	0	1	9												Included with above
50	D	0	2	2												Included with above
51	D	0	2	8												Included with above
52	D	0	2	9												Included with above
53	D	0	3	0												Included with above
54	D	0	3	3												Included with above
55	D	0	3	4												Included with above

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)]
56	D	0	3	5												Included with above
57	D	0	3	6												Included with above
58	D	0	3	8												Included with above
59	D	0	3	9												Included with above
60	D	0	4	0												Included with above
61	D	0	4	1												Included with above
62	D	0	4	3												Included with above
63	F	0	0	1												Included with above
64	F	0	0	2												Included with above
65	F	0	0	3												Included with above
66	F	0	0	4												Included with above
67	F	0	0	5												Included with above
68	F	0	3	9												Included with above
69	W	P	0	1												Included with above
70	W	P	0	2												Included with above
71	W	T	0	1												Included with above
72	W	T	0	2												Included with above
73																
74																
75																
76																
77																
78																
79																
80																
81																
82																
83																
84																

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.

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) Brain T. Vance, Manager U.S. Department of Energy Office of River Protection	**Signature**	**Date Signed** 7/3/2019
Co-Operator* Name and Official Title (type or print) John R. Eschenberg President and Project Manager Washington River Protection Solutions, LLC	**Signature**	**Date Signed** June 27, 2019
Co-Operator – Address and Telephone Number* P.O. Box 850 Richland, WA 99352 (509) 376-2574		
Facility-Property Owner Name and Official Title (type or print) Brain T. Vance, Manager U.S. Department of Energy Office of River Protection	**Signature**	**Date Signed** 7/3/2019

XIX. Comments

Photos 3/2016

Figure A.1. 242-A Evaporator

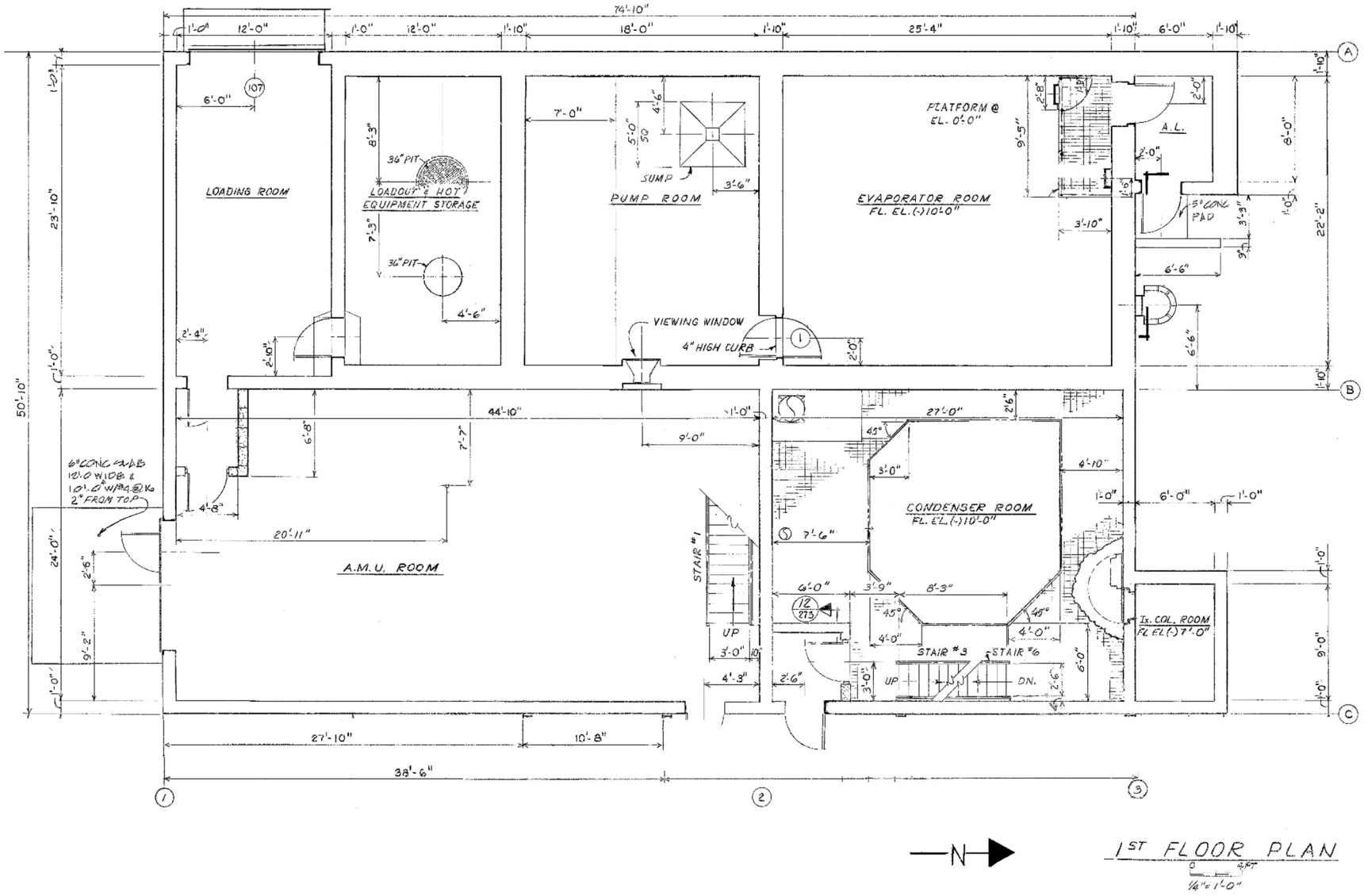
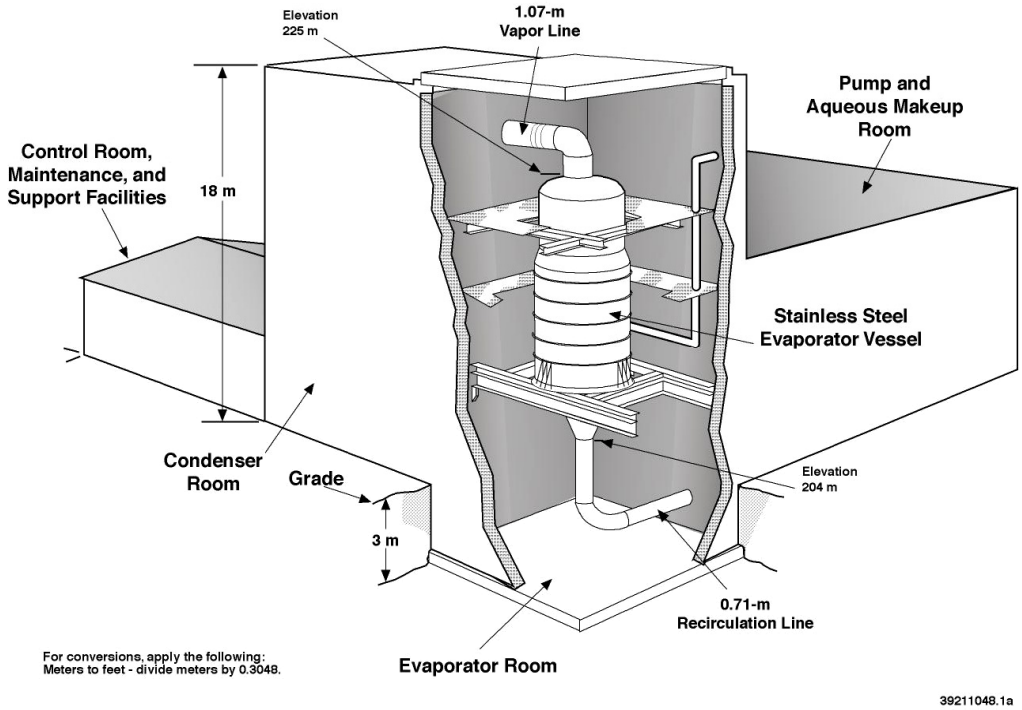


Figure A.2. 242-A Evaporator 1st Level Plan



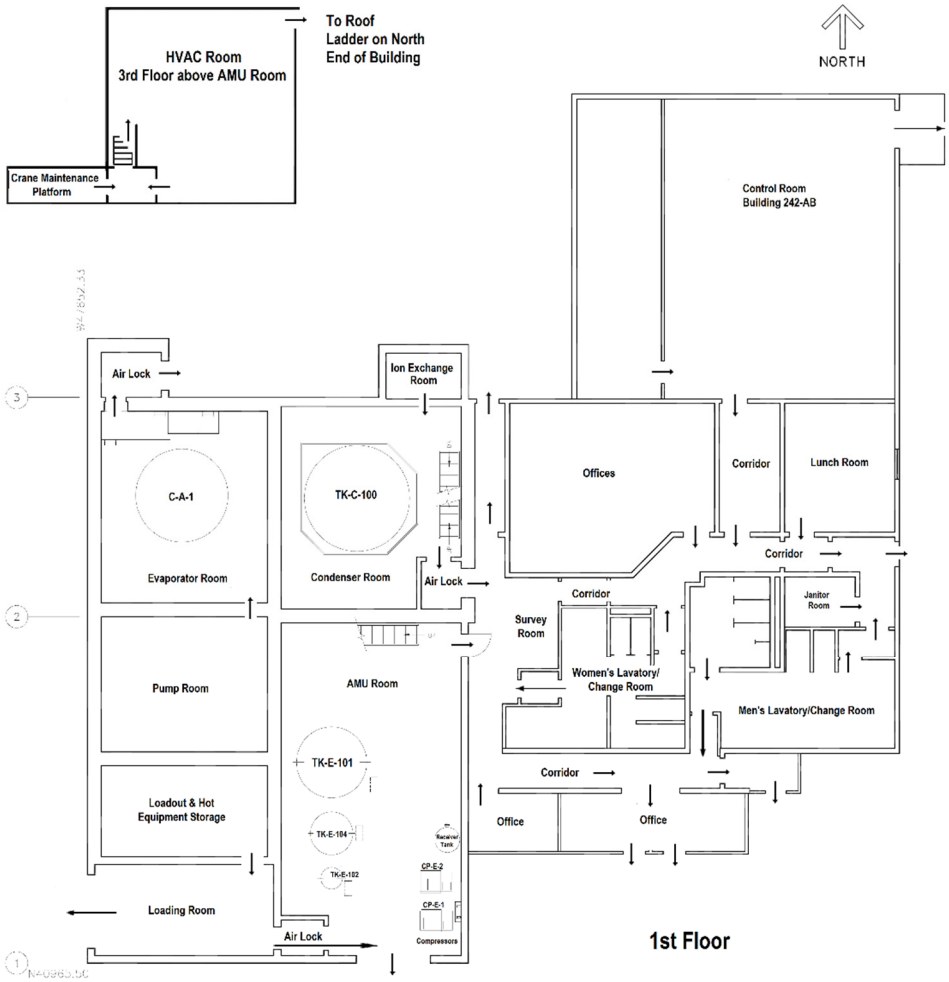
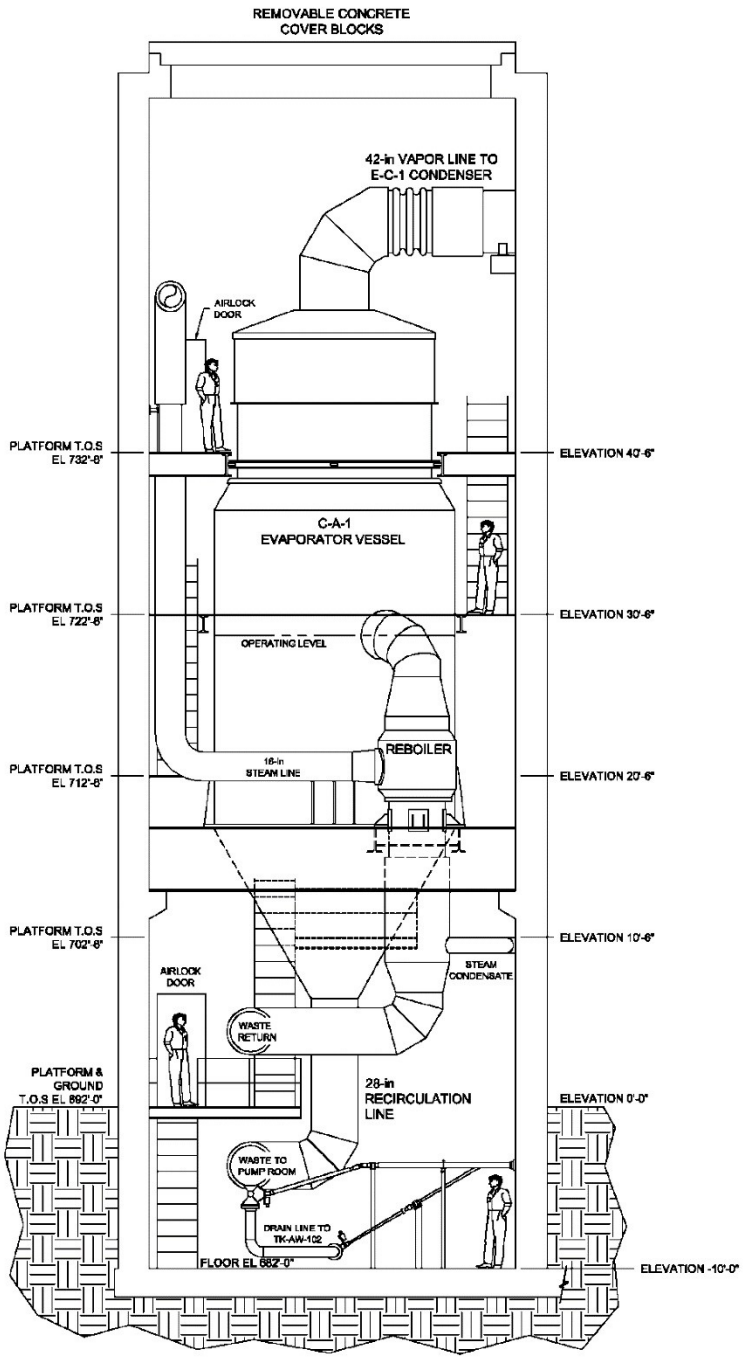


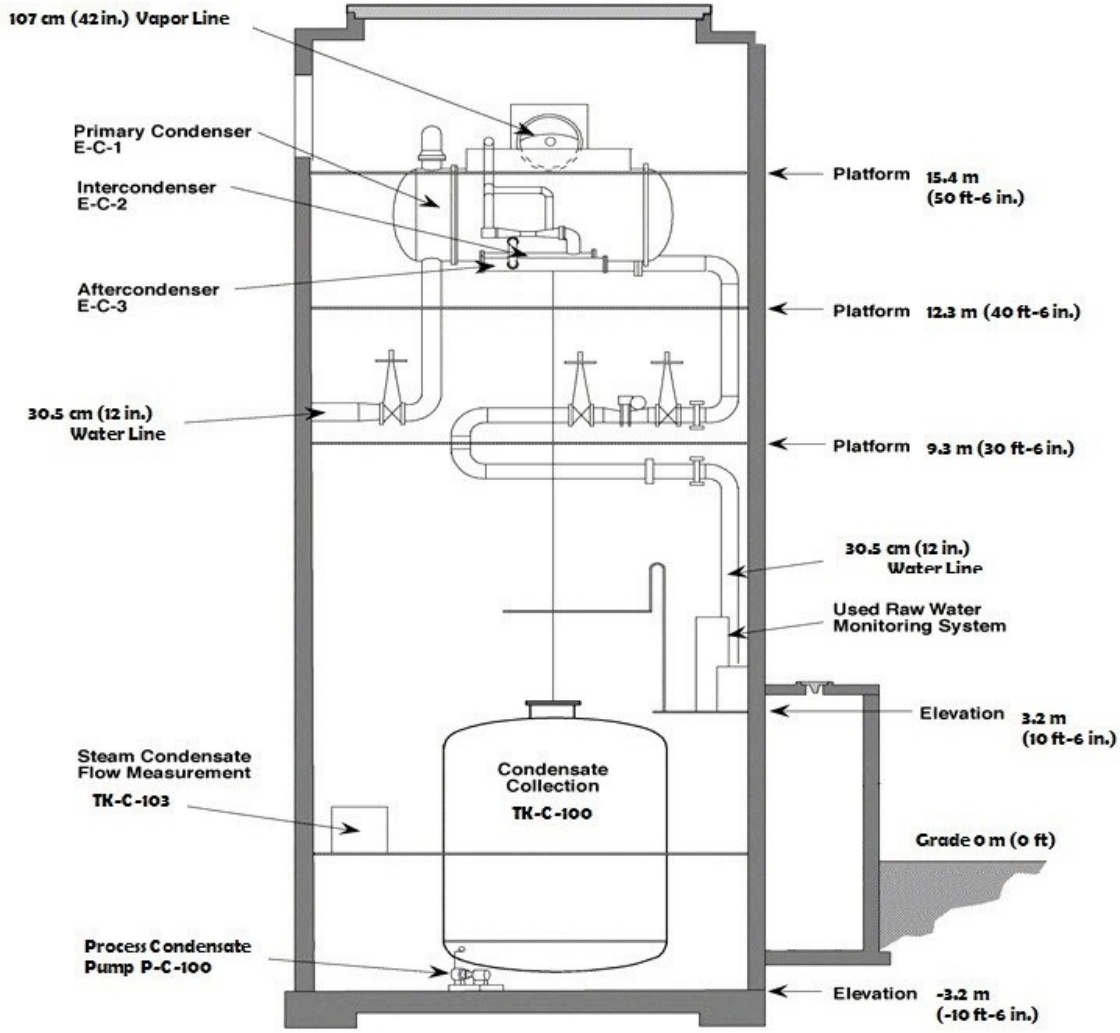
Figure A.3. 242-A Layout



Tank C-A-1 Evaporator Vessel *Photo 1/2008*

Figure A.4. Evaporator Room

Process Condensate Collection Tank TK-C-100 *Photo 1/2008*

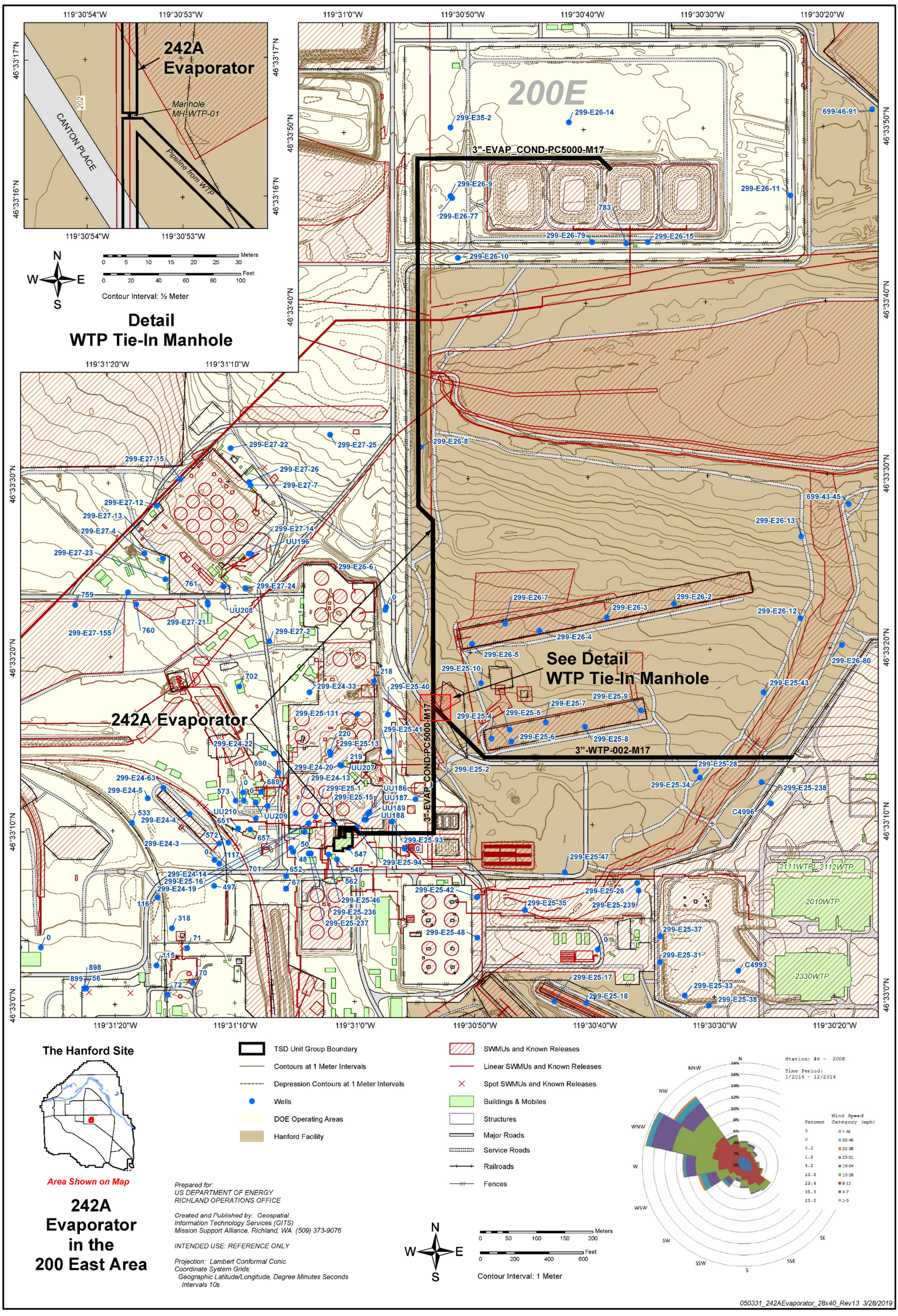


Vacuum Condenser System

Figure A.5. Condenser Room

Pump Room view from the Shield Window *Photo 9/2016*

Figure A.6. Pump Room


242A Evaporator
Manhole MH-WTP-01
CANTON PLACE
Pipeline from WTP
Detail
WTP Tie-In Manhole
200E
3"-EVAP_COND-PC5000-M17
3"-WTP-002-M17
See Detail
WTP Tie-In Manhole
242A Evaporator
2111WTP
2112WTP
2010WTP
2330WTP
Contour Interval: ½ Meter
Contour Interval: 1 Meter
The Hanford Site
Area Shown on Map
242A Evaporator in the 200 East Area
TSD Unit Group Boundary
Contours at 1 Meter Intervals
Depression Contours at 1 Meter Intervals
Wells
DOE Operating Areas
Hanford Facility
SWMUs and Known Releases
Linear SWMUs and Known Releases
Spot SWMUs and Known Releases
Buildings & Mobiles
Structures
Major Roads
Service Roads
Railroads
Fences
Prepared for:
US DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE
Created and Published by: Geospatial
Information Technology Services (GITS)
Mission Support Alliance, Richland, WA (509) 373-9076
INTENDED USE: REFERENCE ONLY
Projection: Lambert Conformal Conic
Coordinate System Grids:
Geographic Latitude/Longitude, Degree Minutes Seconds
Intervals 10s
Station: #6 - 200E
Time Period:
1/2014 - 12/2014
Wind Speed Category (mph)
050331_242AEvaporator_28x40_Rev13 3/28/2019

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CHAPTER 3.0
WASTE ANALYSIS PLAN

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~~3.10.2 Analyte Selection and Rationale ..... 19~~
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~~3.11.1 Laboratory Selection ..... 20~~
~~3.11.2 Analytical Methods ..... 21~~
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~~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~~	~~0.14504~~	~~pounds per square inch~~

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

1

3.0 WASTE ANALYSIS PLAN

3.1 Introduction

This waste analysis plan (WAP) addresses analysis necessary to manage the waste at the 242-A Evaporator according to requirements included in the *Hanford Facility Resource Conservation and Recovery Act, Dangerous Waste Portion, Permit*, WA7890008967 (Permit), and Washington Administrative Code (WAC) Chapter 173-303.

The PC-5000 transfer pipeline (3"-EVAP_COND-PC5000-M17) is used to transfer process condensate from the 242-A Evaporator to Liquid Effluent Retention Facility (LERF). The Waste Treatment and Immobilization Plant (WTP) backup transfer line (3”-WTP-002-M17) is used to transfer process condensate from WTP to the PC-5000 transfer line (merges at caisson WTP-MH-01), for transfer to LERF. The PC-5000 transfer line has limited capacity, and cannot be used by both the 242-A Evaporator and WTP at the same time. Consequently, the use of the PC-5000 transfer line to transfer liquid effluent from WTP to LERF will be coordinated by the 242-A Evaporator.

Modifications of the WAP require modifications of the Permit. Permit modifications are discussed in Permit Condition I.C and WAC 173-303-830.

Where information regarding treatment, management, and disposal of the radioactive source byproduct material and/or special nuclear components of mixed waste (as defined by the Atomic Energy Act of 1954 as amended) has been incorporated into this document, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this Permit or chapter 70.105 RCW and its implementing regulations but is provided for information purposes only.

3.2 Purpose

The purpose of the WAP is to ensure waste at the 242-A Evaporator is managed properly in accordance with WAC 173-303-300. To ensure the waste analysis is comprehensive, a data quality objectives (DQO) analysis was performed on all streams at the 242-A Evaporator. Sampling and analysis identified in the DQO analysis related to meeting Resource Conservation and Recovery Act (RCRA) requirements are included as an integral part of this WAP.

Regulatory and safety issues are addressed in the WAP by establishing boundary conditions for waste to be received and treated at the 242-A Evaporator. The boundary conditions are set by establishing limits for items such as reactivity, waste compatibility, and control of vessel vent organic emissions. Waste that exceeds the boundary conditions would not be acceptable for processing without further actions, such as blending with other waste. In some cases, individual waste streams not acceptable at the 242-A Evaporator may be pre-treated or blended with other compatible waste streams to meet the 242-A Evaporator waste acceptance criteria. Such pre-treatment or blending, however, would occur at dangerous waste management unit(s) other than the 242-A Evaporator.

3.3 Scope

This WAP discusses sampling and analysis of waste to determine the acceptability of the waste in ‘candidate feed tank(s)’ for processing at the 242-A Evaporator and characterization of dangerous waste streams generated from the treatment process. A ‘candidate feed tank(s)’ means one or more tanks in the Double Shell Tank (DST) System, and is typically not the feed tank (241-AW-102). Refer to additional discussion in Section 3.5 for ‘candidate feed tanks.’

- **Candidate Feed Tank Acceptance Process** – This process determines the acceptability of DST System waste at the 242-A Evaporator operating capabilities prior to acceptance of the waste at the 242-A Evaporator for treatment. Refer to Section 3.7.

- **Dangerous Waste Generated from the Treatment Process** – Sampling and analysis is used to characterize the process condensate waste stream generated from the treatment process. The process condensate is transferred to the ~~Liquid Effluent Retention Facility (~~LERF~~)~~. Sampling can be performed either at the 242-A Evaporator or at LERF. A discussion of process condensate sampling at the 242-A Evaporator is included in this WAP, while discussion of process condensate sampling at LERF is included in the Permit, Part III, ~~Liquid Effluent Retention Facility~~ LERF and 200 Area ETF~~Effluent Treatment Facility~~, Waste Analysis Plan. Refer to Section 3.8.

- Samples of other 242-A Evaporator waste streams, such as steam condensate, cooling water, and 242-A-81 back flush water, are taken as required for process control but are excluded from this plan because these streams have been previously characterized and determined to be nondangerous waste streams.

3.4 242-A Evaporator Process Description

The 242-A Evaporator, located in the 200 East Area of the Hanford Site, separates the incoming waste from the DST System into two mixed waste aqueous streams the slurry and the process condensate as described in the following paragraph. The 242-A Evaporator also generates utility waste streams such as cooling water and steam condensate, which do not designate as dangerous waste. Description of the waste processed by the 242-A Evaporator is described in Section 3.5.

The 242-A Evaporator process uses a conventional forced-circulation, vacuum evaporation system to concentrate mixed waste solutions from the DST System tanks. The incoming stream is separated by evaporation into two liquid streams: a concentrated slurry stream and a process condensate stream. The slurry contains the majority of the radionuclides and inorganic constituents. After the slurry is concentrated to the desired amount, the slurry stream is pumped back to the DST System and stored for further treatment. Vapor from the evaporation process is condensed, producing process condensate. The process condensate is transferred to LERF for storage and treatment. Vacuum for the evaporator vessel is provided by two steam jet ejectors. The 242-A Evaporator vessel vent stream is filtered and discharged through an exhaust stack. Figure 3.1 shows a simplified schematic of the 242-A Evaporator process. A more detailed description of the 242-A Evaporator process is provided in Chapter 4.0.

3.5 Waste Identification

All of the waste accepted by the 242-A Evaporator is stored in the DST System. Waste characterization for a campaign is based on sampling and analysis results and/or process knowledge. Based on this information, certain DST System tanks are selected as 'candidate feed tanks' for processing in the 242-A~~-~~ Evaporator. The contents of these candidate feed tanks are subjected to closer scrutiny and evaluated against 242-A Evaporator waste acceptance criteria before the final tank selection is made. To meet waste acceptance criteria, the contents of several tanks could be blended together in the feed tank (241-AW-102) prior to processing. The 241-AW-102 tank is not typically considered a candidate feed tank but can become a candidate feel tank if waste is staged and sampling is performed there. Selection of candidate feed tank(s) for a campaign is outside the scope of this WAP and based on operational needs of the DST system.

Process knowledge is used to determine whether actions to add waste to a tank are acceptable after a candidate feed tank(s) or the 241-AW-102 feed tank has been isolated for a campaign. Operational and maintenance activities can occur at the 242-A Evaporator or the DST System which results in the introduction of operational and maintenance additions into a candidate feed tank(s) or the 241-AW-102 feed tank. In most cases, operational and maintenance waste solution additions are anticipated. Prior to anticipated activities occurring, documentation will be placed in the ~~Hanford Facility Operating Record,~~ 242-A Evaporator Operating Record~~unit-specific portion~~, to show waste acceptance criteria will still be met. The calculation(s) will use, as appropriate, candidate feed tank sampling and analysis results for the

proposed campaign, candidate feed tank sampling and analysis results from the previous campaign for waste residing in the 241-AW-102 feed tank, coupled with information about the type and quantity of solutions to be introduced into the isolated waste. When the operational and maintenance waste solution addition occurs and is unanticipated, documentation will be prepared after the event and prior to processing and will be placed in the ~~Hanford Facility Operating Record,~~ 242-A Evaporator Operating Record~~unit-specific portion~~, in a similar fashion to the anticipated event.

Anticipated or unanticipated water additions to isolated candidate feed tank(s) or the 241-AW-102 feed tank do not require documentation. Water additions will not affect whether the waste acceptance criteria will be met.

3.5.1 General Constituent Description

The only waste stream processed at the 242-A Evaporator is the DST System waste stream. The mixed waste is an aqueous solution containing dissolved inorganic salts such as sodium, potassium, aluminum, hydroxides, nitrates, and nitrites. The mixed waste in some tanks has detectable levels of heavy metals such as lead, chromium, and cadmium. The radionuclide content includes fission products such as Sr-90 and Cs-137, and actinide series elements such as uranium and plutonium. Small quantities of ammonia and organics, such as acetone, butanol, and tri-butyl phosphate, could be present. Waste received in the DST System has been chemically adjusted to ensure the waste is compatible with materials used for construction of the waste tanks and the 242-A Evaporator. The physical consistency of the waste in the DST System ranges from liquid supernate to thick sludge. Waste fed to the 242-A Evaporator is supernate taken from the DST System; the sludge is not processed through the 242-A Evaporator.

The slurry, which results from treatment of DST System waste in the 242-A Evaporator, is an aqueous solution containing the same components as the feed stream with increased concentrations of non-volatile organic and inorganic constituents. The slurry may also contain solids precipitated due to the liquid volume reduction. Most of the volatile constituents in the feed are separated into the process condensate. The process condensate, a mixed waste, is a dilute aqueous solution with ammonia, volatile organics, and trace quantities of non-volatile constituents.

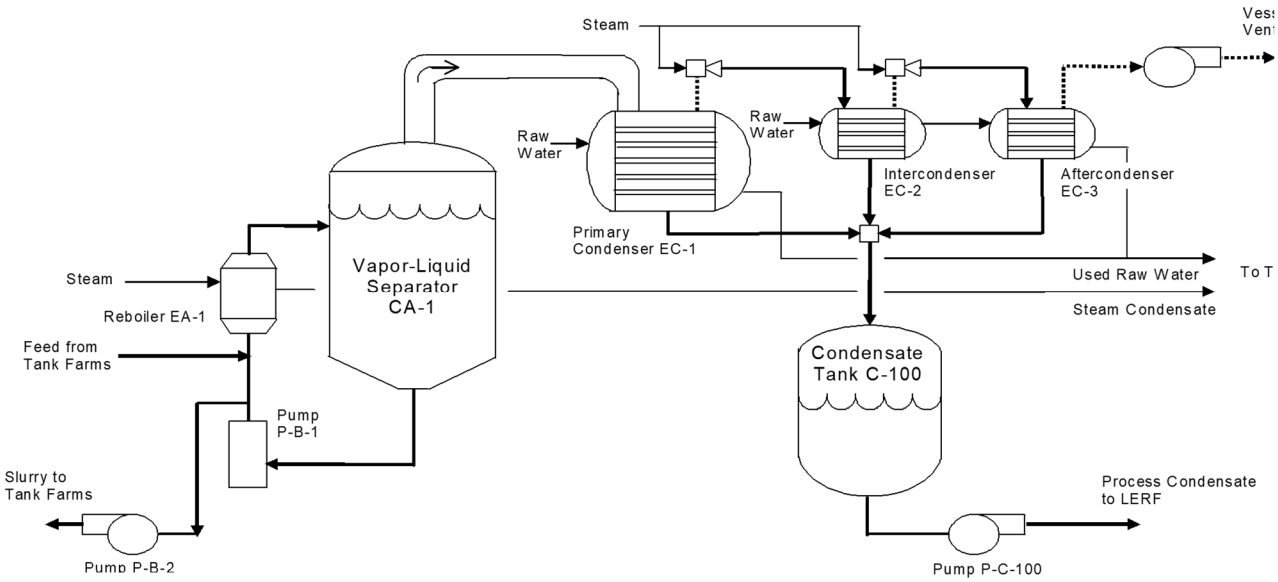

Figure 3.1. 242-A Evaporator Simplified Schematic

3.6 Waste Acceptance Process

This section describes the actions performed before every campaign to determine candidate feed tank waste is acceptable for treatment at the 242-A Evaporator.

Because initial acceptance of the process condensate at LERF is based on completion of a waste stream profile using candidate feed tank data, LERF waste acceptance criteria are also considered in the selection of a candidate feed tank. DST wastes are not accepted for treatment in the 242-A Evaporator unless the 242-A Evaporator waste acceptance criteria are satisfied, and the process condensate projected to be generated via treatment in the 242-A Evaporator satisfies LERF waste acceptance criteria.

The 242-A operates as a batch treatment system. Feed for each evaporator campaign must follow this waste acceptance process for waste verification and waste acceptance. Therefore, there is no need to periodically re-evaluate any waste stream.

Evaluation of data produced from the sampling and analysis of candidate feed tank waste for each campaign are documented in the campaign specific process control plan, process memo and associated engineering calculations, which are maintained in the ~~Hanford Facility Operating Record,~~ 242-A Evaporator Operating Record~~, unit specific portion~~. Process control plans are prepared to describe and define the specific controls required for a planned campaign. Each process control plan includes the information described below:

- **Waste Feed Description** – Describes the source, volume, and any potential mixing or blending data.
- **Campaign Objectives** – Details the waste reduction volume estimates and specific gravities expected for each campaign.
- **Candidate Feed Tank Sampling and Analysis Evaluation** – Describes the actual sampling and analysis data for each candidate feed tank for each campaign. This evaluation includes review of data to the 242-A Evaporator waste acceptance criteria, other health and safety controls beyond the scope of the Permit for operation of the 242-A Evaporator, and calculation of the expected process condensate constituent concentrations for review to the LERF waste acceptance criteria.
- **Process Controls and Campaign Recommendations** – Describes the limits and conditions for each campaign based on the campaign objectives and candidate feed tank analytical data.

3.7 Candidate Feed Tank Waste Acceptance Process

Once possible feed candidate tanks have been identified, the method for determining if the waste in a candidate feed tank is acceptable for processing is followed. This section describes the waste acceptance process and Figure 3.2 provides an overall process flow.

The following activities are performed to determine if candidate waste feed will meet the 242-A Evaporator waste acceptance criteria.

- Perform a boil down study to evaluate the impacts of solids formation as specified in the *242-A Evaporator Data Quality Objectives* (SD-WM-DQO-014, 2009)~~Evaporator DQO (Banning 2009)~~.
- Evaluate Potential for Energetics/Uncontrolled Chemical Reactions: There must be no exothermic reaction of waste constituents that occur below 168°C (335ºF), and the ratio of exotherm-to-endotherm energy be less than 1.
- Evaluate Potential for Separable Organic Phase: Prior to operation of the evaporator, the absence of separable organics in the feed must be verified or managed to preclude transfer to the 242-A Evaporator.

- Calculate Process Condensate Ammonia and Organic Concentrations: Ammonia and volatile organic concentrations are needed for the LERF waste profile sheet (refer to the ~~Permit, Part III,~~ LERF and 200 Area ~~Effluent Treatment Facility (~~ETF~~)~~ Permit, ~~unit-specific conditions and~~ Addendum B~~Chapter 3.0~~, Waste Analysis Plan.)

3.7.1 Selecting Candidate Feed Tanks

For each 242-A Evaporator campaign, DST System tanks are selected as candidate feed tanks based on process knowledge of chemical properties with respect to waste acceptance criteria (Section 3.6.1).

The initial determination of possible candidate feed tanks is outside the scope of this WAP and is based on operational needs of the DST system.

3.7.2 Candidate Feed Tank Sampling

After a candidate tank is selected, the waste in the tank is sampled and analyzed and the data evaluated to confirm waste acceptability through development of a Tank Sampling and Analysis Plan (Figure 3.2). Every candidate feed tank is sampled and analyzed to confirm waste acceptability. Sampling of a candidate feed tank waste for treatment in the 242-A Evaporator is performed according to the requirements of this WAP. The WAP reflects the rationale for determining the number of samples in the *242-A Evaporator Data Quality Objectives* (SD-WM-DQO-014, 2009)~~DQO (Banning 2009)~~. The waste is sampled in the DST System, prior to transfer and acceptance at the 242-A Evaporator.

Four (4) representative samples of aqueous candidate feed tank waste supernatant, from one tank riser, are required. These samples are adequate to ensure the resulting waste characterization data are of sufficient quality for the data's planned purposes. The data are compared to the 242-A Evaporator waste acceptance criteria, applied to the 242-A Evaporator Process Control Plan for purposes of predicting process condensate properties, and used for comparison to LERF waste acceptance criteria for liner compatibility. The rationale for this statement is that the estimates of the variability of DST System content wastes properties is sufficiently defined and consistent that four (4) samples are sufficient. No solid samples are collected.

The four (4) samples will be collected from the following depths. One (1) surface sample to address the possible existence of a separable organic layer and three (3) subsurface samples are obtained from each waste candidate feed tank. The depths of the subsurface samples are determined by the Permittees based on best professional judgment (based on Table 3.3). In the event multiple candidate feed tanks are identified, sampling can occur after wastes are blended. The identified candidate feed tanks coupled with process knowledge of the feed tank (241-AW-102) provide a representative set of data for determining waste acceptance in the 242-A Evaporator. This is due to the consistency in the type of feed waste and the source of the waste. Waste in candidate feed tanks must first be accepted into the DST System by meeting the corresponding DST System waste acceptance criteria. Waste management in the DST System results in supernatant that is relatively homogeneous within each tank recognizing some concentration gradients may exist vertically within each tank caused by the transfer history and limited mixing actions within the DST System. Lateral stratification is not expected.

3.7.3 Assessing Candidate Feed Tank Sampling and Analysis Results

Candidate feed tank sampling and analysis, in conjunction with the waste acceptance criteria in Section 3.9, are used to assess whether established limits (limits are defined in the *242-A Evaporator Data Quality Objectives* (SD-WM-DQO-014, 2009)~~242 Evaporator DQO, Banning 2009~~ and ~~Permit, Part III,~~ LERF and 200 Area ETF Permit, ~~unit-specific conditions and~~ Addendum B, ~~Chapter 3.0,~~ Waste Analysis Plan) would be exceeded. Based on the results, three possible options are implemented:

- The waste is acceptable for processing at the 242-A Evaporator without further actions.

- The waste is unacceptable for processing as a single batch, but is acceptable if blended with other waste to be processed or the waste can be pre-treated as necessary to fully satisfy the 242-A Evaporator waste acceptance criteria.
- The waste is unacceptable for processing, and no acceptable pre-treatment or blending options can be identified.

3.8 Sampling Process for Dangerous Wastes Generated From Treatment

Two mixed waste streams are generated as the result of the 242-A Evaporator process: process condensate and concentrated waste slurry. Sampling of the concentrated waste slurry is not necessary under this WAP in order to return the waste back to the DST System.

Sampling of process condensate is required for confirmation that the waste meets the LERF waste acceptance criteria with respect to LERF liner compatibility.

Depending on programmatic needs, this sampling can be performed at the 242-A Evaporator during a campaign or at LERF after the campaign is completed.

Before the start of a 242-A Evaporator campaign, the decision whether process condensate sampling will be performed at the 242-A Evaporator or at LERF is documented in the process control plan, which is maintained in the ~~Hanford Facility Operating Record,~~ 242-A Evaporator Operating Record~~Unit specific portion~~. Planning for process condensate sampling at the 242-A Evaporator (i.e., number of samples, when samples are taken, etc.) is completed before starting the campaign. Sampling at LERF is beyond the scope of this WAP.

3.8.1 Determining the Number of Process Condensate Samples

The purpose of sampling the process condensate stream at the 242-A Evaporator is to confirm that the stream is acceptable for treatment at the 200 Area ETF. Before starting a 242-A Evaporator campaign where sampling will be performed at the 242-A Evaporator instead of LERF, characterization of the process condensate will be developed based on process knowledge. Process knowledge includes previous documented process condensate analysis, estimated concentrations based on documented candidate feed tank sampling and analysis, etc. Sampling of the process condensate stream at the 242-A Evaporator is performed during the campaign to confirm the characterization. Sampling frequency is determined using the following equation:

Number of process condensate = N + 1 samples required (per campaign). Where N is the number of candidate feed tanks to be processed during the campaign.

For example, a campaign processing waste from only one candidate feed tank would require two samples, while a campaign processing waste from three candidate feed tanks would require four samples. Sampling is spread approximately evenly through the campaign, allowing for operational events such as unexpected shutdowns and planned maintenance outages. This sample frequency represents a confirmation rate of about one sample every 5 to 8 days of processing. This is reasonable based on the relatively homogeneous tank waste feed and the more or less steady state of evaporator operations. Therefore, the process condensate waste stream should also be relatively homogeneous, and multiple samples are not necessary to document or account for waste stream variability. A minimum of two samples is taken to meet LERF waste acceptance criteria.

3.8.2 Assessing Process Condensate Sampling and Analysis Results

The process condensate sample and analysis results are assessed against the LERF waste acceptance criteria.

3.9 Waste Acceptance

~~3.8.3~~3.9.1 242-A Evaporator Waste Acceptance Criteria

Waste acceptance criteria for the 242-A Evaporator have been established from regulatory requirements, operating experience, previous sample analyses, and engineering calculations. Processing criteria are maximum and/or minimum values of a waste analyte that, if exceeded, alert the operator that management of the waste requires further attention. The rationale for selecting a given analyte for inclusion in this WAP, as required by WAC 173-303-300, is indicated in this section for each test and/or analyte.

Additional analyses (such as specific gravity and radionuclide analysis) of the feed tanks, process condensate, and other streams are performed to ensure that the facility is operating within established parameters. This process control sampling and analysis is outside the scope of this plan because it is not used to assess compatibility of the waste with other waste and with the 242-A Evaporator tank systems.

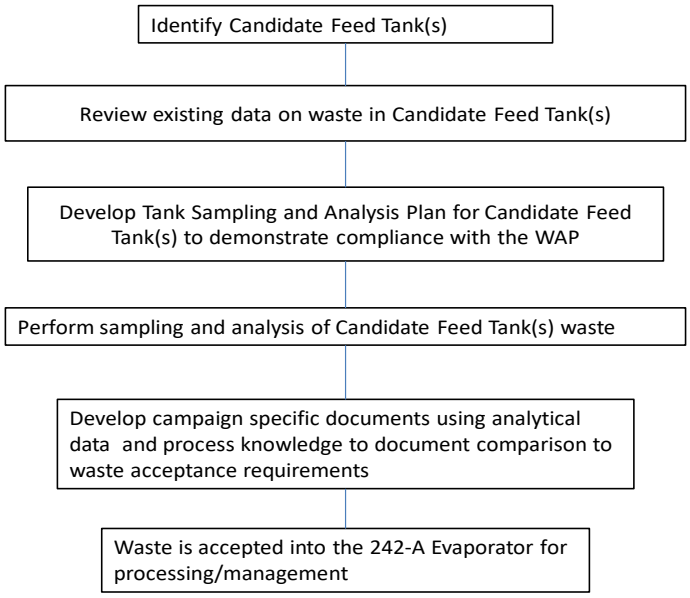

Figure 3.2. 242-A Evaporator Waste Acceptance Process

~~3.8.4~~3.9.2 Candidate Feed Tank Waste Acceptance Criteria

The following sections discuss waste acceptance criteria for candidate feed tanks to be processed in the 242-A Evaporator.

~~3.8.4.1~~3.9.2.1 Exothermic Reactions

WAC 173-303-395(1) requires waste handling be conducted to prevent an uncontrolled reaction that could damage the tank system structural integrity or threaten human health or the environment. To evaluate the possibility of an uncontrolled reaction at the elevated temperatures in the evaporator vessel, a differential scanning calorimeter (DSC) test is performed on samples of all candidate waste to be processed. DSC measures the amount of heat absorbed or released by a sample as the temperature is increased. Waste exhibiting exotherms below 168 °C (335 °F), or with an absolute value of the exotherm-to-endotherm ratio greater than one, will not be processed in the 242-A Evaporator without further technical evaluation.

~~3.8.4.2~~3.9.2.2 Compatibility

WAC 173-303-640(10) and WAC 173-303-395(1) requires waste handling be conducted to prevent an uncontrolled reaction that could damage the 242-A Evaporator tank system structural integrity or threaten human health or the environment. To verify there will be no adverse effects because of mixing the contents of different candidate feed tanks in the feed tank (241-AW-102) and the 242-A Evaporator vessel (C-A-1), a compatibility evaluation is performed on waste in the candidate feed tanks. As samples from each of the planned waste sources are mixed, observations are made to note any changes in color, temperature, clarity, or other visually determinable characteristic. This would indicate an unexpected chemical reaction that might have an impact on 242-A Evaporator operations.

If such visible changes are observed when mixing samples, the waste would not be processed in the 242-A Evaporator without further technical evaluation.

~~3.8.4.3~~3.9.2.3 Separable Organics

The waste surface layer sample collected from each candidate feed tank or combined feed in 241-AW-102 is visually inspected to determine whether separable organics are present in the waste and requires the waste feed to be rejected for processing or allows waste processing. In addition, testing of the sample is performed by either percent water to determine if the whole sample is organic and cannot be discerned visibly or by total carbon/total inorganic carbon. The action limit of 25% water will indicate if the sample is all organic. Results of the visual inspection and testing are used together to determine if the waste can be accepted at the 242-A Evaporator for processing. If there is a separate visible organic layer in the candidate feed tank samples then the waste transfer to 242-A Evaporator must incorporate engineering controls to eliminate (exclude) the organic layer during the transfer.

~~3.8.4.4~~3.9.2.4 Organic Constituents

Because process condensate generated at the 242-A Evaporator is transferred only to the LERF, the 242-A Evaporator will not accept waste for treatment whose data review does not allow treatment and storage in LERF. Process condensate could contain trace quantities of chemicals that could cause degradation of the liner material if found to exceed specifications. To predict the concentrations expected in the process condensate, the candidate feed tank waste is sampled and analyzed for organics and the results are then used to predict the concentrations in the campaign specific process condensate. The level of volatile organics in the feed is limited to ensure organic constituents that transfer to the process condensate are compatible with the LERF liner as specified in the LERF waste acceptance criteria.

The 242-A Evaporator performs distillation of waste containing organic concentrations greater than 10 parts per million by weight; therefore, organic air emissions are subject to WAC 173-303-690 (which incorporates 40 CFR 264, Subpart AA, by reference). Organic emissions from TSD units on the Hanford Site subject to 40 CFR 264, Subpart AA are controlled to ensure emissions to do not exceed 1.4 kilograms per hour and 2,800 kilograms per year. To ensure these requirements are met, the levels of volatile organics in the 242-A Evaporator feed must be limited to prevent excessive organic emissions during processing. Engineering calculations were used to determine the feed limits given in Table 3.2. The limits include a modifier "(R-1)/R", which adjusts the limits based on the campaign's planned boiloff rate. R is the ratio of feed flow rate to slurry flow rate. Typically, R is between 1 to 2, making the range of (R-1)/R 0 to 0.5.

In addition, analysis of the individual components in Table 3.2, total carbon (C_T) and total inorganic carbon (IC_T) analysis are performed as a screening tool to account for other organic species that might be present in the waste. The value of C_T minus IC_T represents the total organic concentration in the waste. If the C_T minus IC_T limit is exceeded, additional volatile organic species might be present and a more detailed evaluation will be conducted to determine organic emissions out of the vessel vent. The limit for evaluation is 174.4 milligrams per liter, based on the conservative assumption that all organic species

present in the waste are as volatile as acetone. Acetone was chosen because of its relatively high volatility and low percentage of carbon.

Based on the liner manufacturer's compatibility data, waste acceptance criteria from the LERF will impose concentration limits on classes of constituents that could potentially degrade the liner. To ensure that these limits are not exceeded in the process condensate, the concentration limits are applied to the candidate feed tanks as well, with the modifier "(R-1)/R". A C_T minus IC_T analysis, similar to the one described previously, is also applied to the LERF liner limits. The strictest limit for organic species is 2,000 milligrams per liter. Assuming the organic is acetone (with its low percentage of carbon); this converts to a carbon value of 1,240 milligrams per liter.

The calculations in Table 3.2 require use of the ɔsum of the fractionsɔ technique. A calculation is performed where the analysis of each constituent is divided by its associated limit to produce a fraction of the limit. If the sum of these fractions is less than 1, the waste meets the requirements in the tables.

~~3.8.5~~3.9.3 Process Condensate Waste Acceptance Criteria

The waste acceptance criteria for process condensate sampling, including treatability, LERF liner compatibility, compatibility with other waste, etc., is given in the ~~Permit, Part III,~~ LERF and 200 Area ETF Permit ~~unit-specific conditions and~~ Addendum B~~Chapter 3.0~~, Waste Analysis Plan.

Table 3.2. Candidate Feed Tank Limits for Vessel Vent Organic Discharge[a]

Feed Constituent	Limit (milligrams per liter)[b, c]
Acetone	174.4 ([R-1]/R)
1-Butanol	452 ([R-1]/R)
2-Butoxyethanol	190.4 ([R-1]/R)
2-Butanone	116 ([R-1]/R)
Tri-butyl phosphate	2.03E+4 ([R-1]/R)
Total carbon and Total inorganic carbon	(CT-ICT) < 174.4 ([R-1]/R) (as acetone)

[a] Limits are based on a maximum continuous operating time equivalent to 6 months per year. If total operating time is expected to exceed 6 months per year, the limits must be re-evaluated.

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

[b] The limits are applied using the sum of the fractions technique: where i is the number of organic constituents detected in analysis of the waste feed tank. Total carbon and total inorganic carbon analysis are not part of the summation.

[c] R is the ratio of feed flow rate to slurry flow rate (typically R = between 1 and 2).

3.9.4 WTP Process Condensate Waste Acceptance

The waste acceptance criteria for process condensate sampling, including treatability, LERF liner and waste transfer line compatibility, compatibility with other waste, etc., is given in the LERF and 200 Area ETF Permit Addendum B, Waste Analysis Plan.

~~3.9~~3.10 Sample Collection and Analysis

This section discusses sampling and analysis, including sampling procedures, sample collection points, sample quality assurance/quality control (QA/QC), and selection of analytes.

~~3.9.1~~3.10.1 Sample Collection

This section describes collection of candidate feed tank waste and process condenstate samples. Candidate feed tank waste is sampled and analyzed before the start of each 242-A Evaporator campaign. Process condensate samples are taken at the 242-A Evaporator only if the decion is made before the start of the campaign that sampling will be done at the 242-A Evaporator instead of LERF.

~~3.9.1.1~~3.10.1.1 Candidate Feed Tank Sample Collection

Candidate feed tank waste samples are obtained by using a grab sampling method (e.g. "bottle on a string method") specified in ASTM E300-86. The number of lateral sampling locations in candidate feed tanks is limited by the availability of tank risers providing access into the tank. Generally, only a few risers in each tank are actually available for sampling because the risers are dedicated to instrumentation or other uses. Sampling within a vertical column is generally limited only by the depth of waste in the tank.

Riser selection is determined using best professional judgment. Previous waste feed tank sampling campaigns used two or more risers, and showed that negligible lateral variability exists in the DST System waste supernatants; therefore, only one riser will be used. Sample depths are determined depending on whether layering is suspected to exist and applying the requirements given in Table 3.3.

~~3.9.1.2~~3.10.1.2 Candidate Feed Tank Sampling Quality Assurance and Quality Control

For each candidate feed tank waste sample, a sample solution is drawn from the sample riser using one or more precleaned sample bottles and jars that are~~. Sample bottles are precleaned, amber-colored glass bottles~~ sealed with Teflon* caps or septum caps. The ~~exceptions~~ deviations to the sample bottle and jar requirements are provided in Section 3.10.1.3~~: a clear bottle is used for the surface sample to determine the existence of separable organics and the bottle for VOA analysis must be sealed with a septum cap~~.

For candidate feed tank sampling quality control, one field blank, consisting of one or more sample bottles, is taken during the sample event. Field blanks are inserted at least 1-foot into the head space through the sample riser used during the sample event. One trip blank, also consisting of one or more sample bottles, is taken during each sample event. Trip blanks are analyzed as independent samples for VOA. Field and trip blanks use the same types of sample bottles as the actual samples and are filled with reagent-grade water before shipment to the field.

Preservatives are not used with candidate feed tank samples because of concerns with high radiation exposure that would result from additional handling of sample solutions. It is not practical to refrigerate the bulky, shielded sample pigs and shipping containers. Biological activity, generally the largest problem in environmental samples, is unlikely in candidate feed tank samples because of the high salt content, pH, and radioactivity of the sample.

The chain of custody is documented on a data sheet that includes a unique sample number, date and time sample was taken, custody seal number, and signature of the sampler. When possession of the sample is transferred to other persons, such as the shipper or laboratory, the signature of the relinquisher and receiver are recorded, along with date and time of the transfer. The receiver at the laboratory also documents on the data sheet that the sample seal number is correct and the seal is intact. The chain-of-custody data sheets are included in the 242-A Evaporator ~~o~~Operating ~~r~~Record.

~~3.9.1.3~~3.10.1.3 Deviations from Specified Sampling Practices

The WAP requires ASTM E 300 'bottle on a string procedure' for sampling (ASTM E300-86). Due to high radiation fields, some deviations to the standard have been necessary to implement safely the sampling practices in the field. These deviations are documented below.

*Teflon is a trademark of E.I. DuPont de Nemours & Company

- Requirement: The sampling apparatus be filled and allowed to drain before drawing the sample.

  Deviation: Sampling personnel lowers the sampling apparatus to the specified level and collects the sample. To pour the contents out and resample would encourage the spread of radiological contamination and additional whole body and extremity radiation exposure.

- Requirement: Bottles and jars may be made of clear or brown glass or polyethylene with necks shaped to receive glass stopper or a screw cap made of metal or plastic material.

  Deviation: Sampling personnel uses clear or amber ~~glass~~ bottles and jars with necks shaped to receive rubber stoppers; and bottle used for VOA analysis must be sealed with a septum cap. Glass stoppers were used at one time but resulted in broken sample bottles during the removal of the glass stoppers from the glass bottles.

- Requirement: Stopper and label bottles immediately after taking the samples and deliver them to the laboratory.

  Deviation: Sampling personnel screws on the bottle cap after the sample has been collected. Because of the alkalinity of the tank waste sample labels will not stay on bottles after samples are collected. Therefore, sample bottles are etched with the sample numbers before the samples are collected. The samples are shipped to the laboratory as soon as resources are available, within three days of sample collection.

- Requirement: Select wiping cloths so that lint is not introduced, contaminating the samples.

  Deviation: Sampling personnel uses damp cotton towels to wipe down sample bottles after the sample bottles have been capped. The intent is to remove any waste that may have been deposited on the bottle during the sampling event to minimize contamination and personnel exposure.

- Requirement: To prevent the loss of the liquid during shipment and to protect against moisture and dust, cover the closure of the glass bottle with plastic caps, which have been swelled in water, wiped dry, placed over the top of the stoppered bottle, and allowed to shrink tightly in place. Screw-top bottles are recommended. The cap should be lined with material inert to the sample. The screw caps should be secured by use of adhesive tape or similar material.

  Deviation: Sampling personnel uses screw caps and 4-mil plastic bags. The cap is Teflon-lined which is inert to the sample. The sample bottle is placed inside a plastic bag, which is placed inside a steel pig (or sample pig). The steel pig is placed inside a shipping pig. The screw cap is not secured with adhesive tape. Securing the sample bottle caps with tape would present the laboratory with difficulty of removing the caps remotely (in the hot cell). If the sample leaks from the sample bottle, it is trapped in the plastic bag. The custody seal is placed on the shipping pig per procedure.

- Requirement: All sampling apparatus and closures shall be clean, dry, free of contaminants, and constructed of materials that are inert to the product to be sampled.

  Deviation: Prior to sampling, sampling equipment such as the sample holder shall be cleaned using a procedure that is consistent with SW-846, *Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods*, sampling equipment cleaning protocol. The bottles with screw caps are washed and certified and are not opened until at the time of the sampling event. The bottles are opened when the previous sample is completed so that only one bottle is opened at the time of sampling to insert the rubber stopper from the sample holder. The stopper and bottles are constructed from materials that are inert to the product to be sampled.

~~3.9.1.4~~3.10.1.4 Process Condensate Sample Collection

Process condensate samples, when performed at 242-A Evaporator instead of LERF, are taken from the process condensate transfer line in the condenser room of the 242-A Building. Grab sampling is performed during the campaign at the sample port by opening a valve and allowing a small volume of

process condensate to flush valve and line/piping. The required volume of sample is collected into labeled bottles and chain of custody is maintained. Samples of process condensate are collected in a manner to produce a representative sample. Testing methods are used consistent with SW-846 procedures as listed in Table 3.4.

~~3.9.1.5~~3.10.1.5 Process Condensate Sampling Quality Assurance and Quality Control

For information on process condensate sample collection, including the number and types of sample bottles, sampling QA/QC, etc., refer to the ~~Permit, Part III,~~ LERF and 200 Area ETF Permit ~~unit-specific conditions and~~ Addendum B~~Chapter 3.0~~, Waste Analysis Plan.

~~3.9.2~~3.10.2 Analyte Selection and Rationale

The DQO analysis for the 242-A Evaporator examined the data needs for sampling the candidate feed tanks and determined that the analyses in Table 3.4 should be conducted to satisfy WAC 173-303-300 requirements. Table 3.4 also contains the rationale for these parameters being selected. Section 3.7 provides additional detail on the rationale.

For information on process condensate sample analyte selection and rationale, refer to the ~~Permit, Part III,~~ LERF and 200 Area ETF Permit ~~unit-specific conditions and~~ Addendum B~~Chapter 3.0~~, Waste Analysis Plan.

Table 3.3. Candidate Feed Tank Sample Point Selection

Number of Samples	Location of Sample Points
Four samples, no layering suspected	One surface sample to address the potential for a separable organic layer and three subsurface samples: one sample each obtained from the upper third (near the half way point), one sample in the middle third and one sample in the lower third (near the lower limit) of the supernatant layer.
Four samples, layering suspected	One sample taken from the waste surface to address the potential for a separable organic layer. Three samples targeting the expected midpoint of the suspected layers. If more than three layers are suspected, The larger layers have sampling priority.

Table 3.4. Analytes for Candidate Feed Tanks

Parameter	Test technique	Analyte (CAS#)	Rationale
Exotherm	Differential scanning calorimeter	Temperature and energy	Verify the waste will not undergo an exothermic reaction (Section 3.9.1.1).
Compatibility test	Mixing and compatibility study	Visual physical changes	Verify the waste is chemically compatible (Section 3.9.1.2).
Separable Organics	Visual Inspection	Visual Inspection	Process control information needed to evaluate campaign parameters and status (Section 3.9.1.3).
	TGA OR Carbon coulometric detector	Percent Water OR Total carbon, Total Inorganic carbon	Verify surface sample is not a single layer of homogeneous liquid (Section 3.9.1.3).
Organic compounds	Gas chromatograph/ mass spectrometer	Acetone (67-64-1), 1-Butanol (71-36-3), 2-Butoxyethanol (111-76-2), 2-Butanone (78-93-3), Tri-butyl phosphate (126-73-8)	Used in calculations to verify that vessel vent emissions will not exceed regulatory limits and to prevent compatibility problems with the LERF liner (Section 3.9.1.4).
	Carbon coulometric detector	Total carbon, Total inorganic carbon	Used in calculations to verify that vessel vent emissions will not exceed regulatory limits and to prevent compatibility problems with the LERF liner (Section 3.9.1.4).
Ammonia	Ion selective electrode or Ion chromatography	Ammonia (7664-41-7)	To prevent compatibility problems with the LERF liner (Section 3.9.1.4).

CAS# = Chemical Abstract Service Number
LERF = Liquid Effluent Retention Facility
TGA = Thermogravimetric analysis

~~3.10~~3.11 Analytical Methods and Quality Assurance and Quality Control

This section provides information on the analytical methods and QA/QC for candidate feed tank samples, including discussions concerning laboratory selection and analytical methods. For information on process condensate analytical methods and QA/QC, refer to the ~~Permit, Part III,~~ LERF and 200 Area ETF Permit ~~unit-specific conditions and~~ Addendum B~~Chapter 3.0~~, Waste Analysis Plan.

~~3.10.1~~3.11.1 Laboratory Selection

Because of the nature of the samples, it is anticipated that candidate feed tank waste sample testing will be conducted at the 222-S Laboratory Complex. Other laboratories at the Hanford Facility could be used

provided they are equipped to handle such samples. Laboratory selection depends on availability, analytical needs, and the ability of the laboratory to meet Permit and quality assurance requirements.

~~3.10.2~~3.11.2 Analytical Methods

The analytical methods that must be followed for testing candidate feed tanks are included in Table 3.5. Performance-based specifications rather than procedure-based specifications are used for determining the appropriate analytical methods. This allows for necessary adjustments to the methods for Hanford Facility-specific issues; related to high radioactivity of the sample matrix, while ensuring acceptable data quality. Because of the high radioactivity, the analytical method will in some cases deviate from those in national standards such as *Test Methods For Evaluating Solid Waste*, SW-846 (EPA 1986) and *Standard Methods for the Examination of Water and Waste Water* (AWWA 2005).

~~3.10.3~~3.11.3 Laboratory Quality Assurance and Quality Control

Candidate feed tank waste testing and sampling methods conducted as part of this plan must meet the data quality requirements contained in Table 3.6 to be considered acceptable for decision-making purposes. Quality control check samples (i.e., calibration samples and/or laboratory control samples) generally are performed once per sample event (e.g., once for all samples from one candidate feed tank). Matrix spike and duplicate analysis are performed once per sample event for all methods except differential scanning calorimetry (DSC). A duplicate analysis is performed for DSC analysis to determine method precision. Accuracy for DSC is evaluated by using the laboratory control standard.

The QA/QC program for sampling and analysis related to this unit must, at a minimum, comply with the applicable regulatory requirements. All analytical data will be defensible and will be traceable to specific, related quality control samples and calibrations.

Table 3.5. Analytical Methods for Candidate Feed Tank Stream Analytes

Category	Analyte	Performance-based Analytical Methods	Method
Organics	Acetone 1-Butanol 2-Butanone	Purge and trap and GC/MS (VOA)	SW-846 Method 8260
	2-Butoxyethanol Tri-butyl Phosphate	Solvent extraction and GC/MS (semi-VOA)	SW-846 Method 3520B and 8270A
Inorganic	Ammonia	Ion selective electrode and Micro-distillation Ion Chromatography	AWWA Method 4500-NH3 and EPA method 300.7
Other	Exotherm	Differential scanning calorimeter	A sample is placed in the DSC unit and heated to 500° C (932° F). The differential heat flow between the sample and a reference pan is monitored by thermocouples.

~~3.11 References~~

~~ASTM, 1986, *Standard Practice for Sampling Industrial Chemicals*, ASTM E300-86, American Society for Testing and Materials, West Conshohocken, Pennsylvania, updated periodically.~~

~~ASTM, 1988, *Total and Organic Carbon in Water by High Temperature Oxidation and Coulometric Detection*, ASTM D4129-88, American Society for Testing and Materials, West Conshohocken, Pennsylvania, updated periodically.~~

~~AWWA, 2005, *Standard Methods for the Examination of Water and Wastewater*, 17th edition, American Public Health Association/America Water Works Association, Washington, D.C., updated periodically.~~

~~Banning D.L., 2009, *242-A Evaporator Data Quality Objectives (DQO)*, SD-WM-DQO-014 (most current revision), CH2M HILL Hanford Group, Richland Washington.~~

~~EPA, 1986, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods*, SW-846, U.S. Environmental Protection Agency, Washington, D.C., updated periodically.~~

~~EPA, 1994a, *Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Wastes, A Guidance Manual*, PB94-963603, OSWER 9938.4-03, U.S. Environmental Protection Agency, Washington D.C.~~

The 242-A Evaporator process is controlled by operators using the Monitoring Control System (MCS). The MCS computer monitors process parameters and controls the parameters where required. The MCS provides the capability to operate some components (e.g., pumps, valves) in a manual mode. Operations personnel monitor the function of the MCS and process equipment, and operate equipment in a manual mode when required to maintain safe facility operations. Once the configuration parameters and other process control inputs are set, the MCS maintains the process parameters within specified ranges by sending output signals that operate specific pieces of equipment (e.g., control valves). There are redundant MCS components in place that are not used to maintain the integrity of the mixed waste handling system and are not addressed in further detail in this permit.

4.1 Tank Systems

This section discusses information associated with design requirements, integrity assessments, and any additional requirements for tanks used to treat and store mixed waste in the 242-A Evaporator.

The 242-A Evaporator is divided into three major systems that manage mixed wastes. The systems are listed below:

- Transfer lines (PC-5000 and Waste Treatment and Immobilization Plant [WTP] backup transfer line [3”-WTP-002-M17]~~transfer line~~).
- Vapor-liquid separator (C-A-1) and ancillary equipment.
- Condensate collection tank (TK-C-100) and ancillary equipment.

4.1.1 Design Requirements

The following design requirements were addressed in the 242-A Evaporator/Crystallizer Tank System Integrity Assessment Reports (IARs), which are identified in Section 4.1.5:

- Minimum design wall thicknesses and measured wall thicknesses at various points throughout the tank systems.
- Design standards used in construction, including references.
- Waste characteristics.
- Materials of construction and compatibility of materials with the waste being processed.
- Corrosion protection.
- Seismic design basis evaluation.

The conclusion of the latest IARs are that the 242-A Evaporator system and associated PC-5000 transfer line is not leaking and is fit for use. The inspections, tests, and analyses performed provide assurance that the tank system has adequate design, sufficient structural strength, and sufficient compatibility with the waste to not collapse, rupture, or fail during operation. The report also states that a review of construction files indicates that the building structure was designed and constructed to withstand a design-basis earthquake and recommends a frequency of future integrity assessments. The codes and standards applicable to the design, construction, and testing of the 242-A Evaporator tank system are evaluated as part of the fit for use determination [WAC 173-303-640(2)(d)] reached by the latest IARs for the 242-A Evaporator and associated PC-5000 transfer line.

4.1.2 ~~PC-5000~~ Transfer Lines

This permit includes the PC-5000 transfer line (3"-EVAP_COND-PC5000-M17) leaving the 242-A Evaporator and ending at LERF Catch Basin 242AL-43 (TSD unit group boundary between 242-A Evaporator and LERF and 200 Area ETF); and the WTP backup transfer line (3”-WTP-002-M17) leaving WTP and merging with the PC-5000 transfer line at caisson MH-WTP-01 (TSD unit group boundary between 242-A Evaporator and WTP is the WTP fence line). Addendum A, Part A Form topographic map depicts these TSD unit group boundaries.

Caisson MH-WTP-01, is a flat bottomed fiberglass tank that contains valves for the isolation of either PC-5000 (3”-PC-5000-M17) or WTP backup transfer line (3"-WTP-002-Ml7) carrier pipes. All containment pipes open into caisson MH WTP 01 allowing any water leaks to transfer through the caisson to LERF Basin 43. The containment pipe lower internal surfaces are flush with the inside bottom surface of the caisson. The caisson has a 48-inch inside diameter, an overall length of 98-inches and a nominal wall thickness of ½-inch. There are four isolation valves inside the caisson that are controlled by 242-A Evaporator for transfer line use. The valves are 3-inch valves fabricated with stainless steel bodies and pipe extensions.

The PC-5000 transfer line has limited capacity, and cannot be used by both the 242-A Evaporator and WTP at the same time due to valve alignment. The use of the PC-5000 transfer line to transfer liquid effluent from WTP to LERF will be controlled by the 242-A Evaporator. The WTP process condensate transfer to LERF will satisfy the waste acceptance criteria identified in the LERF and 200 Area ETF Permit, Addendum B, Waste Analysis Plan.

4.1.2.1 PC-5000 Transfer Line (3"-EVAP_COND-PC5000-M17)

The PC-5000 primary pipeline (3"-EVAP_COND-PC5000-M17) leaves the 242-A Evaporator and ends at valve 60M-43-P. The PC-5000 encasement line (6”-ENC-M17) includes a single-point electronic leak detection element, PC-5000 encasement catch tank 60M-TK-1, and sight glass FG-60M-001. Process condensate from the 242-A Evaporator is transferred to the LERF using a pump located in the 242-A Evaporator and approximately 5,000 feet 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 approximate flow rates from 40 to 80 gpm.

The encased fiberglass transfer line (PC-5000) exits the 242-A Evaporator below grade and remains below grade at a minimum 4-feet depth for freeze protection, until the pipeline emerges at the LERF ~~c~~Catch ~~b~~Basin 242AL43~~, at the corner of each basin~~. All piping at the catch basin that is ~~less than 4 feet below~~ above grade is wrapped with electric heat tracing tape and insulated for protection from freezing. Additional detail including information on secondary containment, leak detection and integrity assessment for this line is provided in Sections 4.1.7.3.3 and 4.1.5.1. The PC-5000 transfer line leaving the 242-A Evaporator is considered ancillary equipment to the 242-A Evaporator up to LERF Catch Basin 242AL-43~~and 200 Area ETF~~.

4.1.2.2 WTP Backup Transfer Line (3” WTP 002 M17)

The process condensate from WTP can be transferred to LERF by using a pump located at WTP, and approximately 2,380 feet of pipe, consisting of a 3-inch carrier pipe within a 6 inch outer containment pipeline that merges with the PC-5000 transfer line at caisson MH WTP 001. The combined PC 5000 encasement line (6” ENC M17) and WTP backup transfer line (3”-WTP-002-M17) includes a single-point electronic leak detection element is installed at the end of PC-5000 transfer line, PC 5000 encasement catch tank 60M TK-1, and sight glass FG-60M-001.

The encased fiberglass backup transfer line (3” WTP-002-M17) exits the WTP and runs below grade, and merges with the PC 5000 transfer line at caisson MH-WTP-01, for transferring process condensate to LERF. The WTP backup transfer line (3”-WTP-002-M17) leaving the WTP is considered ancillary equipment to the 242 A Evaporator from caisson MH-WTP-01 up to the WTP fence line.

4.1.3 Vapor-Liquid Separator (C-A-1) and Ancillary Equipment

The following sections describe the vapor-liquid separator (C-A-1) and ancillary equipment.

Waste Feed System. Feed to the 242-A Evaporator is supplied via a pump located in the DST System 241-AW-102 feed tank. The feed pump transfers the waste to the 242-A Evaporator through a 3-inch diameter carbon steel transfer pipeline encased in a 6-inch diameter carbon steel pipe to provide

secondary containment. The ~~feed pipeline~~ pump pit is equipped with a leak detector~~detection system~~ that is part of the DST System.

Waste feed will be sampled from 241-AW-102 or identified candidate feed tanks as described in the Waste Analysis Plan (Chapter 3.0). The feed sampler (SAMP-F-1) located in a sample enclosure located in the hot equipment storage room has been isolated and blanked, and will be closed in accordance with the approved Closure Plan.

Evaporator Process Loop. The 242-A Evaporator process loop equipment components are as follows:

- Reboiler (E-A-1)
- Vapor-liquid separator (C-A-1)
- Recirculation pump (P-B-1)
- Recirculation loop

Figure 4.2 is a simplified process flow diagram showing the major components of the process loop.

Reboiler (E-A-1). Waste is heated as the waste passes through the reboiler before entering the vapor-liquid separator (C-A-1). The reboiler (E-A-1) is a vertical tube unit with steam on the shell-side and process solution on the tube-side. The 364 tubes in the reboiler (E-A-1) are enclosed in an approximately 40-inch-outside diameter, 15-feet-long stainless steel shell. Both the reboiler shell and tubes are constructed of 304L stainless steel. The shell is 1/4-inch thick and the tubes are 14-gauge steel. The reboiler is designed to distribute steam evenly and to prevent tube damage from water droplets that may be present in the steam.

Vapor-Liquid Separator (C-A-1). Process solution from the reboiler enters the vapor-liquid separator (C-A-1) via the upper recirculation line. Some of the solution flashes into vapor, which exits through a vapor line at the top of the vapor-liquid separator (C-A-1). The remaining solution (slurry) exits through the recirculation line at the bottom.

The vapor-liquid separator (C-A-1) consists of a lower and upper section. The lower (liquid) section is a stainless steel shell 14 feet in diameter having a 22,500 to 26,000 gallon normal operating capacity (including recirculation loop and reboiler). The maximum design capacity is 35,600 gallons. The upper (vapor) section is a stainless steel shell is 11.5 feet in diameter containing two deentrainment pads. These wire mesh pads remove liquids and solids that entrain into the vapor section of the vessel. Spray nozzles, using recycled process condensate or filtered raw water, wash collected solids from the deentrainment pads and vessel walls; or raw water is used to flush the vapor-liquid separator (C-A-1) vessel. Both sections of the vapor-liquid separator (C-A-1) are constructed of 3/8-inch-thick stainless steel.

Operating parameters in the vapor-liquid separator (C-A-1) are monitored to provide an indication of process problems such as slurry foaming, deentrainer flooding, or excessive vapor temperatures. Instrumentation also is available to monitor the liquid levels in the vapor-liquid separator (C-A-1). Interlocks are activated when high pressures or high- or low-liquid levels are detected, shutting down the evaporation process and placing the facility in a safe configuration. Three configurations can be achieved during operation of the 242-A Evaporator:

- Recirculation with vacuum.
- Recirculation without vacuum.
- Waste in vapor-liquid separator (C-A-1) with no recirculation.

The vapor-liquid separator (C-A-1) and recirculation loop can be drained and flushed to remove any residual solids from the system and/or to reduce radiation levels. The most common flush solution is water, but dilute nitric or citric acid solutions could be used. All acidic flush solutions are chemically adjusted to meet DST acceptance criteria before transfer to the DST System. Antifoam solution is added

(at very low flow rates - approximately 0.01 to 0.1 gpm) to the vessel to prevent foaming. The antifoam solution is a noncorrosive, nonregulated silicone-based solution that is compatible with the evaporator components.

242-A Evaporator shutdown is accomplished by performing manual, localized actions such as system isolation, equipment shutdown, etc. The system is designed to drain so that normal practices effectively drain the system. After shutdown, a small volume of liquid may be present in the vapor-liquid separator (C-A-1).

Recirculation Pump. The stainless steel recirculation pump (P-B-1), is constructed as part of the recirculation loop to the reboiler. The 28-inch diameter axial flow pump has nominal flow rate of 13,000 to 16,000 gpm output. The recirculation pump is designed to handle slurry up to 30 percent undissolved solids by volume at specific gravities up to 1.8. The recirculation pump moves waste at high velocities through the reboiler to improve heat transfer, keep solids in suspension, and reduce fouling of the heat transfer surfaces.

The recirculation pump is equipped with shaft seals with high-pressure recycled process condensate (or water) introduced between the seals to prevent the waste solution from leaking out of the system. Seal water pressure and flow are monitored and controlled to shut down the recirculation pump if conditions are not adequate to prevent waste liquid from migrating into the seal water. The used seal water is routed to the feed tank.

Recirculation Loop. The recirculation loop consists of a 28-inch diameter stainless steel pipe that connects the vapor-liquid separator (C-A-1) to the recirculation pump and reboiler. The lower loop runs from the bottom of the vapor-liquid separator (C-A-1) to the recirculation pump inlet. The upper loop connects the pump discharge to the reboiler and the reboiler to the vapor-liquid separator (C-A-1). The feed line from the DST System feed tank and the slurry line to underground storage tanks are connected to the upper recirculation line.

Slurry System. The slurry system draws a portion of the concentrated waste from the upper recirculation loop and transfers it to the DST System.

The major components of the slurry system are the slurry pump and the slurry transfer pipelines. Figure 4.3 shows a simplified flow diagram of the slurry system. These components are described in the following paragraphs.

The slurry pump (P-B-2) is used to transfer slurry from the recirculation loop to the designated DST System tank. The pump is driven by a variable speed motor and is constructed of 304L stainless steel. The slurry pump is designed to generate high pressures to alleviate the possibility of a transfer line plugging.

Interlocks control the operation of the slurry pump. The slurry pump (P-B-2) is shutdown if any of the following occur:

- Excessive pressure is detected in the slurry lines to 241-AW Tank Farm.
- A leak is detected in the slurry transfer lines secondary containment.
- A leak is detected in the 241-AW Tank Farm valve pits (see Section 4.1.7.3.2).

The slurry pump uses a shaft seal with recycled process condensate (or water) and pressure and flow controls similar to the system described above for the recirculation pump.

Compliant transfer pipelines route slurry to a designated DST System tank within the 200 East Area. The detection of any leak by the DST System automated leak detection system is used to shut off the slurry pump. In lieu of the MCS automated shutdown, the slurry pump (P-B-2) can be manually shutdown at the direction of the Shift manager or 242-A Evaporator Control Room operator if a leak occurs.

leak out. Water from seal leakage is collected in funnels in the pump room and routed to feed tank 241-AW-102 via the 10-inch overflow line described previously.

4.1.7.2.2 Evaporator Room

The evaporator room contains the vapor-liquid separator vessel (C-A-1), part of the recirculation loop, the reboiler, the 42-inch vapor line, and line used to empty the vapor-liquid separator to feed tank 241-AW-102.

The evaporator room secondary containment walls are 22-inch-thick reinforced concrete. The secondary containment floor is 20-inch-thick reinforced concrete. Leaks in the evaporator room flow to a floor drain that routes through a 3-inch line to the pump room sump described in Section 4.1.7.2.1. A leak in the evaporator room would be detected by a rise in the pump room sump level. The floor of the evaporator room and a portion of the pump room floor are 10 feet below grade to contain the entire contents of the vapor-liquid separator, reboiler, and recirculation loop in the event of a catastrophic failure. The floor and walls of the evaporator room up to an elevation of 6 feet are painted with a special protective coating.

4.1.7.2.3 Condenser Room

The condenser room contains ~~all~~ the components of the process condensate system described in Section 4.1.4 (refer Figure 4.4), including the condensate collection tank TK-C-100.

The condenser room secondary containment walls are 12 to 22-inch-thick reinforced concrete. The secondary containment floor is 20-inch-thick reinforced concrete. Leaks in the condenser room flow to two floor drains that join and route through a 6-inch line to feed tank 241-AW-102. Leaks in the condenser room are detected by the following:

- Unexpected changes in liquid level in the condensate collection tank (TK-C-100). Instrumentation is provided to monitor liquid level in the tank, including high- and low-level alarms.
- Daily visual inspections of process condensate system components and piping.
- Unexplained level increases in feed tank 241-AW-102 because of liquid entering the common drain line from 242-A Evaporator.

The floor and walls of the condenser room up to an elevation of 4 feet are painted with a special protective coating.

4.1.7.2.4 Ion Exchange Room

The ion exchange room is a small room connected to the condenser room. This room previously contained an ion exchange column that has since been removed from the processing unit in 2003. The ion exchange room walls are 12 inches thick reinforced concrete. The floor is 20-inch thick reinforced concrete. The room contains a single pipeline used to transfer process condensate during a campaign if the process condensate is diverted to feed tank 241-AW-102. The pipeline within the ion exchange room does not contain valves or other components that could release waste into the ion exchange room other than by a rupture of the line.

Surveillance of the ion exchange room is only required if the piping is returned to service and dangerous waste is reintroduced to the piping as would be the case for diverting process condensate to feed tank 241-AW-102.

4.1.7.2.5 Loading Room and Loadout and Hot Equipment Storage Rooms

The loading room and the load-out and hot equipment storage rooms are used to support maintenance of pump room equipment and store contaminated reusable equipment. Movement of equipment, waste, personnel and other items in and out of the unit as necessary to support ongoing operations and maintenance activities in contaminated zones can occur in these rooms. A contamination control curtain may also be closed in support of evolutions conducted in the load-out and hot equipment storage room to

control the spread of contamination. The load-out and hot equipment storage room contains a slurry sampling system.

The load out and hot equipment storage rooms walls are 12 to 22-inch thick reinforced concrete. The floors are 6-inch thick reinforced concrete. The room contains two recirculation lines and samplers used to sample the feed and slurry streams. The feed sampler has been isolated and is no longer capable of sampling feed. The lines and samplers are located in a shielded enclosure adjacent to the pump room wall.

The load-out and hot equipment storage room contains two sumps: the drain sump and decontamination sump. The sumps are approximately 3 feet in diameter, about 4 feet deep, and lined with stainless steel.

Both sumps drain via a 3-inch drain line to the pump room sump described in Section 4.1.7.2.1. The sumps, floor, and walls of the load out and hot equipment storage room up to an elevation of 12 feet are painted with a special protective coating.

Leaks in the sampler piping, flow into two drains in the sample enclosure that drain via a 2-inch line to the decontamination sump, which drains to the pump room sump (described in Section 4.1.7.2.1). Leak detectors in the sampler enclosures or a rise in the pump room sump level detects leaks in the sampler piping.

4.1.7.2.6 242-A Building Drain Lines

Figure 4.6 provides a simplified process flow schematic of sources routed to the 242-A Building drain lines. The 242-A Evaporator TSD unit group boundary includes these lines up until they exit the 242-A Building. At this point, the lines are considered DST System components. Four lines serve to drain the 242-A Building and equipment to feed tank 241-AW-102:

- Pump room sump drain line (DR-334): 10-inch carbon steel line that transfers process condensate overflow/diverted liquids and empty out of the pump room sump to the feed tank.
- Vapor-liquid separator vessel drain line (DR-335): 10-inch carbon steel line that allows gravity drain of the vessel to the DST feed tank 241-AW-102.
- Condenser room drain line (DR-343): 6-inch carbon steel line that drains potential leakage from the condenser room.
- Diverted process condensate drain line (DR-338): process condensate liquid drains through DR-338 into sump drain line (DR-334) which drains to feed tank 241-AW-102.

The four lines are sloped to drain about 560 feet to feed tank 241-AW-102 via the drain pit (241-AW-02D). Although WAC 173-303-640(1)(c) exempts systems that serve as secondary containment from requiring secondary containment, drain lines DR-334, DR-335, and DR-338 have outer encasement piping and are part of the DST System.

4.1.7.3 Transfer Line Secondary Containment and Leak Detection

This section describes the design and operation of secondary containment and leak detection systems for transfer lines between the DST System and the 242-A Evaporator, ~~and~~ from 242-A Evaporator to LERF, and from WTP Backup Transfer Line to PC-5000. The 242-A Evaporator TSD unit group boundary for lines running between the 242-A Evaporator and the DST System ends at the exterior wall of 242-A building. At this point, these lines (e.g., feed and slurry line piping [SN-269, SN-270, SL-167, and SL-168]) are DST System components.

The PC-5000 transfer line transfers process condensate (Section 4.1.2) from the 242-A building to LERF. The 242-A Evaporator TSD unit boundary includes the PC-5000 transfer line up to the LERF TSD unit group boundary (Part A Form, Chapter 1.0, and Section 4.1.2).

If a leak or spill of dangerous and/or mixed waste is detected in the secondary containment for PC-5000 and WTP backup transfer line (3”-WTP-002-M17), the following actions will be taken:

- Immediately and safely stop the flow of dangerous waste into the tank or secondary containment
- Determine the source of the dangerous waste
- Remove the dangerous waste from secondary containment
- If the cause of the release has not damaged the integrity of the tank system, the Permittee may return the tank system to service. In such a case, the Permittee will take action to ensure the incident that caused liquid to enter the secondary containment will not reoccur.
- If the source of the dangerous waste and/or mixed waste is determined to be a leak from the primary containment, or the tank system is unfit for use as determined through an integrity assessment or other inspection, the Permittee must take the following actions:
  - Close the tank system; or
  - Repair and re-certify the tank system before the tank system is placed back into service.
- The Permittees will notify and report to Ecology any releases to the environment.
- If liquids (e.g., dangerous and/or mixed waste, leaks and spills, precipitation, fire water, liquids from damaged or broken pipes) cannot be removed from the secondary containment system within 24-hours, Ecology will be verbally notified within 24-hours of determination that the liquid cannot be removed. Permittees will provide Ecology with a written demonstration within 14-business days, in accordance with WAC 173-303-640(4)(c)(iv) and WAC 173-303-640(7)(b)(ii)], identifying at a minimum:
  - Reasons for delayed removal.
  - Measures implemented to ensure continued protection of human health and the environment.
  - Current actions being taken to remove liquids from secondary containment.
- The Permittees will document in the operating record the actions/procedures taken to comply with the above conditions.

4.1.7.3.1 Feed Line Piping

Waste feed is supplied to the 242-A Evaporator by two DST System feed lines (SN-269 and SN-270) (one in service and one spare), each consist of 3-inch transfer piping within a 6-inch secondary containment encasement piping. ~~Both the transfer and encasement pipes are constructed of Schedule 40 carbon steel. The lines run below grade about 400 feet from pump pit 241-AW-02E (above feed tank 241-AW-102) to the 242-A Building.~~ If the DST System MCS annunciates a leak alarm associated with the DST System transfer, the transfer operator notifies the 242-A Evaporator Control Room operator of the appropriate action regarding processing operations.

4.1.7.3.2 Slurry Line Piping

The slurry pump (P-B-2) transfers mixed waste through one of two DST System transfer lines: SL-167, for transfer to valve pit 241-AW-B (standard configuration), or SL-168 for transfer to valve pit 241-AW-A (alternate configuration). Slurry solution can be routed via double-encased piping from these valve pits to any designated DST System slurry receiver tank. ~~Both slurry transfer lines consist of 2-inch transfer piping within a 4-inch secondary containment encasement piping. Both the transfer and encasement pipes are constructed of Schedule 40 carbon steel. The lines run below grade about 240 feet between the 242-A Building and the valve pits.~~ If the DST System MCS annunciates a leak alarm associated with the DST System transfer, the transfer operator notifies the 242-A Evaporator Control Room operator of the appropriate action regarding processing operations.

4.1.7.3.3 PC-5000 Transfer Line (3"-EVAP_COND-PC5000-M17)

The process condensate transfer line (PC-5000) from the 242-A Evaporator is centrifugally cast, fiberglass-reinforced epoxy thermoset resin pressure pipe fabricated to meet the requirements of American Society of Mechanical Engineers (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. PC-5000 transfer line leaves the 242-A Evaporator and merges with the WTP backup transfer line (3”-WTP-002-M17) at caisson WTP-MH-01. At the intersection of the transfer lines (3"-EVAP_COND-PC5000-M17 and 3”-WTP-002-M17), caisson MH-WTP-01 provides secondary containment.

The PC-5000 primary pipe leaves the 242-A Evaporator and ends at valve 60M-43-P. The encasement line (6”-ENC-M17) and caission MH-WTP-01 provide secondary containment. If a leak develops in the primary pipe, fluid will travel down the interior of the encasement line to a leak detection system that sounds an alarm in the 242-A Evaporator Control Room. If the electronic leak detection system is not available, visual inspection can be employed at the PC-5000 encasement catch tank 60M-TK-1 (sight glass FG-60M-001). Upon verification of a leak, the 242-A Evaporator shift manager will direct shutdown of the aqueous waste through the transfer line(s) to immediately prevent addition of waste. To stop 242-A Evaporator waste transfer through the PC-5000 transfer line, the condensate pump (P-C-100), located at the 242-A Evaporator is shutdown. Any leaked waste in the encasement line is gravity drained to LERF Basin 43.

Drawing ~~H-2-79604~~ H-2-88766, Sheets 1 and 3, provide~~s~~ details of the piping from the 242-A Evaporator to LERF.

~~This permit includes the portion of the PC-5000 transfer line leaving the 242-A Evaporator to the TSD unit group boundary of LERF and 200 Area ETF (Part A Form, Addendum A).~~

~~Single-point electronic leak detection elements are installed along the transfer line at 1000-foot intervals. The leak detection elements are located in the bottom of specially designed test risers. Each sensor element employs a conductivity sensor, which provides a signal to the 242-A Evaporator control room when a potential leak is detected. If a leak develops in the primary pipe, fluid will travel down the exterior surface of the primary pipe or the interior of the secondary containment pipe. As moisture contacts a sensor unit, a general alarm sounds in the 242-A Evaporator control room on the MCS. In addition, the zone of the sensor unit causing the general alarm can be determined using the leak detection-monitoring panel. Upon verification of a leak, the pump located in the 242-A Evaporator is shutdown, stopping the flow of aqueous waste through the transfer line. When the transfer line is not in use a low-volume air purge of the annulus between the primary pipe and the secondary containment pipe can be used, if needed to prevent condensation buildup and minimize false alarms by the leak detection elements. If the leak detection system is not available, visual inspection is employed at the encasement catch tank 60M-TK-1, at the LERF catch basin (242AL-43). If a leak is detected using visual inspection of the PC-5000 transfer line encasement, the shift manager is notified. The shift manager will direct shutdown of the aqueous waste through the PC-5000 transfer line.~~

4.1.7.3.4 WTP Backup Transfer Line (3”-WTP-002-M17)

The process condensate transfer line (3”-WTP-002-M17) from WTP is centrifugally cast. The piping material is ASTM D-2296, Type 1 Grade 1, Class F, “Filament Wound Fiberglass Resin Pipe”. 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. The backup transfer line leaves WTP and merges with PC-5000 Transfer line at caisson WTP-MH-01. At the intersection of the transfer lines, the caisson (WTP-MH-01) provides secondary containment.

If a leak develops in the primary pipe, fluid will travel down the interior of the secondary containment pipe to a leak detection system located at LERF Catch Basin 242AL-43, which sounds an alarm in the 242-A Evaporator Control Room or 200 Area ETF Control Room. If the electronic leak detection system is not available, visual inspection can be employed at the PC-5000 encasement catch tank 60M-TK-1 (sight glass FG-60M-001). Upon verification of a leak, the shift manager notifies WTP to shutdown the aqueous waste through the backup transfer line from WTP (3"-WTP-002-M17). Any leaked waste in the encasement line is gravity drained to LERF Basin 43.

Drawing H-2-88766, Sheet 5 provides details of the transfer line from WTP to 242-A Evaporator.

4.1.7.4 Additional Requirements for Specific Types of Systems

Addressed in this section are additional requirements in WAC 173-303-640 for vault systems like the 242-A Building to ensure neither buildup of ignitable vapors nor does infiltration of precipitation occur. This section also addresses secondary containment for ancillary equipment and piping associated with the tank systems.

4.1.7.4.1 Vault Systems

The 242-A Building is a vault constructed partially below ground, providing secondary containment for the tank systems. The 242-A Evaporator Part A Form (Chapter 1) contains the ignitable waste number because of the presence of nitrite and nitrate salts, which in sufficient concentrations are considered oxidizers per WAC 173-303-090(5)(a)(iv). Because of their low volatility, these compounds are unlikely to be present in the vapor phase of the tank systems at the 242-A Evaporator. However, to prevent the spread of contamination, the vapor-liquid separator (C-A-1) is ventilated and maintained at lower air pressure than the building air space during operation. This ensures air leakage is from uncontaminated building air space into the tank vapor space. Vapors from the vapor-liquid separator (C-A-1) flow to the vacuum condenser system described in Section 4.0.

The condensate collection tank (TK-C-100), collects process condensate that is not designated ignitable or reactive.

The tank systems and ancillary equipment are located within the 242-A Building, which is completely enclosed to prevent run-on and infiltration of precipitation into the secondary containment system.

4.1.7.4.2 Ancillary Equipment

The 242-A Building provides secondary containment for ancillary equipment. Double containment is provided for the feed and slurry transfer lines between the 242-A Building and the AW Tank Farm by pipe-in-pipe arrangements. Since the ancillary equipment has compliant secondary containment the daily inspection requirements in WAC 173-303-640(4)(f) are not applicable.

4.1.8 Variances from Secondary Containment Requirements

The IARs identified in Section 4.1.5 discuss the following three deficiencies associated with the secondary containment system:

Pump Room Sump. The pump room sump does not comply with secondary containment requirements because liquid must be kept in the sump to provide a seal to prevent airflow between the pump room and feed tank 241-AW-102. Although the sump has a 0.25-inch-thick stainless steel liner to prevent corrosion of the concrete floor, the sump does not have secondary containment.

Routine Discharges through Secondary Containment. The configuration of the 242-A Evaporator process requires routine, batch discharges of dangerous waste through secondary containment drain lines. These routine discharges include the following.

- Steam condensate, cooling water, and process condensate sample stations drain to the DST feed tank, 241-AW-102, through drain line DR-343. Total discharge is about 10 gallons per month during operation.
- Sample bottle water sprays down in the slurry sample station drains to the decontamination sump in the load out and hot equipment storage room. The decontamination sump then drains to the pump room sump. Total discharge is about 20 gallons per month during operation.
- Vapor-liquid separator (C-A-1) and recirculation loop gravity drain to DST feed tank 241-AW-102, through DR-335. During operations (end of campaigns/shutdown), the waste in the vapor-liquid separator (C-A-1) and recirculation loop can be emptied using the slurry or feed lines; however, this does not fully empty the vapor-liquid separator (C-A-1) and recirculation loop. To ensure that waste is not stored when the 242-A Evaporator is in the shutdown mode, dump valves (HV-CA1-7 and HV-CA1-9) are opened to gravity drain the vapor-liquid separator (C-A-1) and recirculation loop to DST feed tank 241-AW-102 via drain line DR-335. The dump valves may also open to drain the system in the event of equipment failure, interlocks, or power outage.

Transfer Piping Wall Penetrations. Three dangerous waste transfer line piping sections passing through the 242-A Building wall are single-walled, i.e., no secondary confinement in the wall (about 22-inch-thick reinforced concrete).

These deficiencies were identified to Ecology, October 28, 1993. Ecology's response stated:

- "No physical revision of the pipe wall penetrations or the floor drains in the evaporator pump room will be required prior to evaporator restart."
- "If at any time leakage is seen or detected from these installations, or if for any reason these installations are repaired or rebuilt, they will be rebuilt or repaired in accordance with regulations."
- "Should a spill occur in the evaporator pump room, the sump and the piping shall be rinsed three times as required in WAC 173-303-160, as appropriate. 'Appropriate' in this case means that the original regulation was written for a free container, not a sump, so that judgment will have to be used in the application of the regulation. The rinsate shall be transferred to the double-shell tanks."

4.1.9 Tank Management Practices

All waste to be processed at the 242-A Evaporator must be sampled to determine if the waste is compatible with the materials of construction at the 242-A Evaporator. Before each campaign, candidate feed tanks are sampled per the requirements of the Waste Analysis Plan (Chapter 3.0). Based on the results, three possible options are implemented.

- The waste is acceptable for processing without further actions.
- The waste is unacceptable for processing as a single batch, but is acceptable if blended with other waste that is going to be processed.
- The waste is unacceptable for processing.

The 242-A Evaporator process is controlled by operators using the MCS. The MCS computer monitors liquid levels in the vapor-liquid separator (C-A-1) and condensate collection tank (TK-C-100). The MCS system manages liquid levels in the vapor-liquid separator (C-A-1) using a control function that controls feed delivery to the vapor-liquid separator (C-A-1). The MCS system also manages liquid levels in the condensate collection tank (TK-C-100) using a control function to maintain the tank level at approximately 50-percent under normal conditions. The MCS has alarms that annunciate on high-liquid levels for both the vapor-liquid separator (C-A-1) and condensate collection tank (TK-C-100) to notify operators that actions must be taken to prevent overfilling of these vessels.

multiple candidate feed tanks. Waste stored in the condensate collection tank (TK-C-100) contains low quantities of constituents where compatibility from batch to batch is not a concern.

4.2 Air Emissions Control

This section addresses the requirements of Air Emission Standards for Process Vents, under 40 CFR 264 Subpart AA (incorporated by reference in WAC 173-303-690).

4.2.1 Applicability of Subpart AA Standards

The 242-A Evaporator performs distillation that specifically requires evaluation of process vents for the applicability of 40 CFR 264 Subpart AA.

Waste processed at the 242-A Evaporator routinely contains greater than 10 parts per million organic concentrations; therefore, organic air emissions are subject to 40 CFR 264.1032, which requires organic emissions from all affected vents at the Hanford Facility be less than 3 pounds per hour and 3.1 tons per year, or control devices be installed to reduce organic emissions by 95%.

The 242-A Evaporator has one process ventilation system that vents both the vapor-liquid separator (C-A-1) and the condensate collection tank (TK-C-100). The vent lines from both tanks combine before entering an off-gas system consisting of a deentrainer, a prefilter/demister, HEPA filters, and an exhaust fan. The vessel vent off-gas system is located on the third floor of the condenser room, with the exhaust stack extending horizontally through the east wall of the building at an elevation of approximately 48 feet above ground level. The exhaust stack bends to run vertically with the discharge point approximately 111 feet above ground level.

During waste processing, the airflow is about 720 cubic feet per minute, with about 150 cubic feet per minute ventilated from the condensate collection tank (TK-C-100) and the remainder from the vapor-liquid separator (C-A-1) and air in leakage.

Organic emissions occur during waste processing, which is less than 6 months (182 days) each year. This is the maximum annual operating time for the 242-A Evaporator, as shutdowns are required during the year for maintenance outages, candidate feed tank analysis, and establishing transfer routes for staging waste in the DST System.

4.2.2 Process Vents - Demonstrating Compliance

This section outlines how the 242-A Evaporator complies with the requirements of 40 CFR 264, Subpart AA, including a discussion of the basis for meeting the organic emission limits, calculations demonstrating compliance, and conditions for reevaluating compliance.

4.2.2.1 Basis for Meeting Limits/Reductions

The TSD units at the Hanford Facility subject to 40 CFR 264, Subpart AA meet the organic air emission limits of 3 pounds per hour and 3.1 tons per year, established in 40 CFR 264.1032, by the design of the facility. The 242-A Evaporator and the other TSD units collectively can meet these standards without the use of air pollution control devices.

4.2.2.2 Demonstrating Compliance

Process vent organic air emissions are controlled by establishing limits for acceptance of waste at the 242-A Evaporator. Before startup of each campaign, the waste to be processed is sampled in the DST System to determine the organic content. If the concentrations of organic constituents are less than the limits in the Waste Analysis Plan (Chapter 3.0), the waste can be processed, provided the Hanford Facility will not exceed 3 pounds per hour and 3.1 tons per year. The waste acceptance limits in the Waste Analysis Plan (Chapter 3.0) are based on equilibrium calculations and assumptions given in *Organic Emission Calculations for the 242-A Evaporator Vessel Vent System* (WHC-SD-WM-ES-380, 1996). The calculation to determine organic emissions consists of the following steps:

1. Determine the emission rate of each candidate feed tank organic constituent by multiplying the constituent concentration by the corresponding partition factor in *Organic Emission Calculations for the 242-A Evaporator Vessel Vent System* (WHC-SD-WM-ES-380, 1996).
2. Sum the emission rates of all organic constituents to determine the emission rate for the candidate feed tank. The maximum emission rate for the campaign is the rate from the candidate tank with the greatest emission rate.
3. Determine the total amount of emission during the campaign by using operating time and a weighted average emission rate, based on the volume of each candidate feed tank processed.

The organic emission rates and quantity of organics emitted during the campaign are determined using these calculations and are included in the operating record for each campaign, as required by 40 CFR 264.1035. The Hanford Facility has a system to ensure organic emissions from units subject to 40 CFR 264, Subpart AA are less than the limits of 3 pounds per hour and 3.1 tons per year. Records documenting total organic emissions are available for Ecology review on request.

4.2.2.3 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 242-A Evaporator:

- Changes in the configuration or operation that affect the assumptions in the Organic Emission Calculations for the 242-A Evaporator Vessel Vent System (WHC-SD-WM-ES-380, 1996).
- Annual operating time exceeds 182 days.

4.3 Engineering Drawings

The drawings in Table 4.1 are Process and Instrumentation Diagrams (P&IDs) for the systems at the 242-A Evaporator that contact mixed waste. These drawings are provided for general information, and demonstrate adequacy of the tank systems design.

Table 4.1. Process and Instrumentation Diagrams

System	Drawing Number	Drawing Title
Vapor-Liquid Separator (C-A-1)	H-2-98988 Sheet 1	P&ID Evaporator Recirc System
Reboiler (E-A-1)/Recirculation Line	H-2-98988 Sheet 2	P&ID Evaporator Recirc System
Slurry System	H-2-98989 Sheet 1	P&ID Slurry System
Condensate Collection Tank (TK-C-100)	H-2-98990 Sheet 1	P&ID Process Condensate System
Secondary Containment Drain System	H-2-98995 Sheet 1	P&ID Drain System
Secondary Containment Drain System	H-2-98995 Sheet 2	P&ID Drain System
Condensers	H-2-98999 Sheet 1	P&ID Vacuum Condenser System
Pump Room Sump	H-2-99002 Sheet 1	P&ID Jet Gang Valve System
Condensate Recycle System	H-2-99003 Sheet 1	P&ID Filtered Raw Water System
~~Process Condensate Line PC-5000~~	~~H-2-79604~~	~~Piping Plot & Key Plans 242-A Evap Cond Stream~~
PC-5000 Transfer Line (3"-EVAP_COND-PC5000-M17)	H-2-88766, Sheets 1 and 3	P&ID LERF & ETF Influent Evaporator
WTP backup transfer line (3”-WTP-002-M17)	H-2-88766, Sheet 5	P&ID LERF WTP Interface

6.0 PROCEDURES TO PREVENT HAZARDS

This chapter discusses security, inspection schedules, preparedness and prevention requirements, preventive procedures, structures, and equipment, and prevention of reaction of ignitable, reactive, and incompatible waste for the 242-A Evaporator.

6.1 Security

Refer to Permit Attachment 3, Security for compliance with Washington Administrative Code (WAC) 173-303-310(2)(b) and (c). The 242-A Evaporator is located within the 200 Area of the Hanford Facility and access is controlled by physical barriers, which complies with WAC 173-303-310(2)(c). To meet the requirements of WAC 173-303-310(2)(a), signs stating *Danger-Unauthorized Personnel Keep Out*, or equivalent language, legible at 25 feet or more, are posted at each entrance to the active portion or each entrance that will lead to the active portion. The Permittees will post signs on or near the outside doors to the 242-A Evaporator.

6.2 Inspection Plan

This section describes the method and schedule for inspections of the 242-A Evaporator. The purpose of inspections is to identify situations that might cause or lead to a release of mixed waste that could pose a threat to human health and the environment. Abnormal conditions identified by an inspection must be corrected on a schedule that prevents hazards to the public and environment.

6.2.1 General Inspection Requirements

This section provides an overview of inspections performed at the 242-A Evaporator. A copy of the inspection plan is kept in the ~~Hanford Facility Operating Record,~~ 242-A Evaporator Operating Record~~unit-specific portion~~. There are three general classes of inspections at the 242-A Evaporator:

- Monitoring of remote instrumentations and alarms are performed by operating personnel in the 242-A Evaporator ~~c~~Control ~~r~~Room using the monitor control system (MCS) computer.
- Visual inspections of tanks and equipment are performed by operating personnel. Other inspections of 242-A Evaporator equipment are performed as noted in Table 6.1 through Table 6.4.
- Preventive maintenance of equipment and calibration of instruments are performed by maintenance personnel. A computerized tracking system is used to identify and schedule preventive maintenance and calibration activities.

Preventive maintenance and instrument calibrations on certain equipment might not be possible when the 242-A Evaporator is operating. Because of the limited duration of 242-A Evaporator campaigns, these activities are scheduled during outages between campaigns to avoid interference with operating activities. Per Condition II.O.3 inspection of high radiation areas will be addressed on a case-by-case basis.

6.2.1.1 Types of Problems

The 242-A Evaporator inspections include, but are not limited to, the following:

- Condition of tanks and ancillary equipment.
- Condition of secondary containment.
- Evidence of leaks or overflows from tanks, piping, or transfer lines.
- Condition of security equipment.
- Condition of safety, communications, and emergency equipment.

A schedule of inspections, including items to be inspected, problems to look for, frequency of inspections and responsible organization are provided in Table~~s~~ 6.1 through Table 6.4.

6.2.1.2 Frequency of Inspections

The frequency of inspections is based on the significance of a failure of the equipment and on regulatory requirements, Hanford Site and industry standards, and experience of the nature and frequency of equipment failures.

Unless otherwise noted, inspection frequencies are defined by the following periodicities:

- Daily means once per calendar day
- Weekly means once per calendar week, spanning from Sunday to Saturday
- Monthly means once each calendar month
- Quarterly means once per calendar quarter
- Annually means at least once per 12-month period ±30 days.
- Continuous monitoring means instrument monitoring performed remotely (control room) continuously during 242-A Evaporator waste processing operations and/or waste transfers, or WTP waste transfers as appropriate. If instrumentation is not functioning, daily visual inspections are performed as identified in Table 6.3.
- The frequency of inspections for the 242-A Evaporator is given in Table~~s~~ 6.1 through Table 6.4.

6.2.1.3 Maintenance

Leak detectors are functionally checked annually. The frequency of some alarm monitoring is continuous. This means an operator must be present in the control room to monitor alarm instruments that continuously check for conditions such as leaks and high sump levels. Continuous monitoring is only required when the 242-A Evaporator is processing waste.

6.2.2 Tank System Inspections and Corrective Actions

This section discusses the inspections performed on the two tank systems at the 242-A Evaporator: the vapor liquid separator (C-A-1), and the condensate collection tank (TK-C-100). Inspections include secondary containment and leak and overfill prevention equipment.

6.2.2.1 Overfill Prevention

The vapor liquid separator (C-A-1), is equipped with instrumentation that alarms before the tank reaches a level where the tank could overflow or entrain liquid waste into the vacuum condenser system. The alarm annunciates in the 242-A Evaporator ~~c~~Control ~~r~~Room allowing operating personnel to take immediate action to stop the vapor liquid separator (C-A-1) from overfilling.

The condensate collection tank (TK-C-100), was designed with an overflow line that routes waste to the Double Shell Tank (DST) System feed tank 241-AW-102. This design prevents tank overflow to the condenser room.

6.2.2.2 Visual Inspections

Visual inspections of tanks and secondary containments are performed to check for leaks, signs of corrosion or damage, and malfunctioning equipment. The following rooms containing dangerous waste are inspected:

- Condenser room
- Pump room
- Loadout and hot equipment storage room

In addition, the aqueous makeup unit (AMU) and Loading Room are inspected when dangerous waste is present in the room.

The vapor liquid separator (C-A-1) is located in the evaporator room, with a portion of the recirculation loop located in the pump room. Because of the high radiation dose in the evaporator room, visual inspections cannot be performed. Leaks in the evaporator room drain to the pump room sump; monitoring of the pump room sump instrumentation is performed to determine if leaks have occurred. Visual inspection of the pump room and the loadout and hot equipment storage room is performed through the shielding windows in the AMU to constrain personnel radiological exposure to levels that are as low as reasonably achievable (ALARA).

6.2.2.3 Leak Detection~~ors~~

The sample enclosures in the load out and hot equipment storage room have leak detectors for both the feed and slurry samplers. For information on these systems and their secondary containment, refer to Chapter 4.0, Process Information.

During sampling or maintenance activities associated with the evaporator room, pump room, or loadout and hot equipment storage room, a radiological contamination control curtain may be extended over the load out room to reduce the likelihood of contaminants reaching the environment through the load out door. When extended, the contamination control curtain will limit visibility to the load out and hot equipment storage room from the shielding window on the AMU mezzanine while completing inspections. When this is the case, inspection forms will denote that the containment curtain was extended. Leaks in the evaporator room, pump room, and the loadout and hot equipment storage room drain to the pump room sump. The sump high-level alarm serves as a leak detector for these rooms. For information on the rooms and their drain systems, refer to Chapter 4.0, Process Information.

During 242-A Evaporator waste transfers to LERF, the PC-5000 transfer line is continuously monitored by a single-point electronic leak detection element, or by daily visual inspection at the PC-5000 encasement catch tank 60M-TK-1 (sight glass FG-60M-001). The leak detection system alarms are monitored remotely in the 242-A Evaporator Control Room. If any liquid is observed the 242-A Evaporator Shift Manager is notified to take corrective actions. Section 4.1.7.3 addresses secondary containment and leak detection.

During WTP waste transfers to PC-5000, the WTP backup transfer line (3”-WTP-002-M17) is continuously monitored by a single-point electronic leak detection element, or by daily visual inspection at the PC-5000 encasement catch tank 60M-TK-1 (sight glass FG-60M-001). The leak detection system alarms are monitored remotely in the 242-A Evaporator Control Room or the 200 Area ETF Control Room. If any liquid is observed the Shift Manager is notified to take corrective actions. Section 4.1.7.3 addresses transfer line secondary containment and leak detection.

~~The PC-5000 transfer line may be continuously monitored during transfers by an electronic leak detection system (Chapter 4.0, Process Information) or visually inspected at the encasement catch tank (60M-TK-1) in the Liquid Effluent Retention Facility (LERF) catch basin (242AL-43). The leak detection system alarms are monitored in the 242-A Evaporator Control Room on the Monitoring and Control System (Chapter 4.0, Process Information). When necessary, visual inspections of the PC-5000 transfer line encasement are administratively controlled by the 242-A Evaporator Shift Manager and occur at a minimum once every 24 hours during waste water transfers through the PC-5000 transfer line to ensure compliance with WAC 173-303-640(4)(c)(iii). Visual inspection for leaks from the PC-5000 transfer line are performed by 242-A Evaporator Operations, by looking for signs of any liquid not attributed to rain/precipitation at the encasement catch tank (60M-TK-1). If any liquid is observed the 242-A Evaporator Shift Manager is notified to take corrective actions.~~

6.2.2.4 Alternative Leak Detection during Electrical/Ventilation Outages

As part of maintenance or system upgrades, the need to secure electrical power or ventilation to the 242-A Evaporator sometimes becomes necessary. This includes activities such as, but not limited to: cleaning and inspection of the motor control centers (MCCs) for distributing electrical power to the

systems at the 242-A Evaporator, ventilation system maintenance and upgrades. Planned electrical or ventilation outages are performed during periods when DST System waste is not being processed.

During times when access is limited as a result of electrical or ventilation outages, performance of daily inspections specified in Table 6.1 may be impacted. When impacted, an alternative method of leak detection is implemented for the condenser room, and the inspections are suspended in the pump room, loadout and hot equipment storage room, and the loading room.

- **Condenser Room.** ~~When impacted in the condenser room, a~~A camera will be placed above the floor drain to detect the presence of leaks or spills during maintenance as appropriate.~~The process condensate collection tank (TK-C-100), located in the condenser room, is the only tank storing dangerous waste on a routine basis. It is not normal to allow personnel access into the condenser room during extended electrical or ventilation outages unless maintenance activities or upgrades require entry.~~ If required, ~~the~~ the camera and subsequent television monitor will be provided electrical power via an alternative source. Operators will complete their daily ~~observations~~ inspections for leaks or spills using this method for the condenser room. Facility personnel will document the use of this alternative method in the ~~Hanford Facility Operating Record,~~ 242-A Evaporator Operating Record~~unit specific portion~~. The process condensate collection tank (TK-C-100), located in the condenser room, is the only tank storing dangerous waste on a routine basis. It is not normal to allow personnel access into the condenser room during extended electrical or ventilation outages unless maintenance activities or upgrades require entry.

- **Pump Room, Loadout and Hot Equipment Storage Room, and Loading Room.** ~~For the pump room, loadout and hot equipment storage room, and the loading room, are~~ Performance of Table 6.1 daily inspections is not possible during maintenance activities affecting the electrical power supply to the overhead lighting because these rooms do not have the capability for a camera. ~~so those inspections are suspended during maintenance activities affecting the electrical power supply to the overhead lighting. Performance of Table 6.1 daily inspections is not possible.~~ Storage of mixed waste does not occur in these rooms because systems, which manage mixed waste within the pump room and the loadout and hot equipment storage room, are flushed and gravity drained to the extent possible after each campaign. Should any remaining liquid leak from primary containment~~;~~, it is captured by the secondary containment system and routed to the pump room sump and ultimately to the 241-AW-102 DST System feed tank. Quantities of liquid sufficient to reach 241-AW-102 would cause a change in tank level. Facility personnel will document when inspections cannot be performed due to electrical outages in the ~~Hanford Facility Operating Record,~~ 242-A Evaporator Operating Record~~unit specific portion~~.

The process described in the preceding paragraphs of this section may also be implemented when external events cause electrical or ventilation outages.

6.2.2.5 Cathodic Protection

Cathodic protection is not required for the equipment within the 242-A facility boundaries. The only portion of the system, which is underground, is the PC-5000 transfer line. The PC-5000 transfer line is constructed of fiberglass.

6.2.2.6 Tank Assessments

The IARs were issued in 1998 and 2008. The frequency and nature of these assessments are discussed in Chapter 4.0, Process Information.

6.2.3 Storage of Reactive and Ignitable Wastes

Inspection of areas where ignitable or reactive wastes are stored is conducted by a professional person who is familiar with the International Fire Code, or in the presence of the local, state, or federal fire marshal. The inspection record includes the date and time of the inspection, the name of the professional inspector, a notation of the observations made, and any remedial actions which were taken as a result of

the inspection. The completed inspection record is included in the ~~Hanford Facility Operating Record,~~ 242-A Evaporator Operating Record~~unit-specific portion~~.

6.2.4 Air Emissions Control and Detection Inspections

The process vent at the 242-A Evaporator is subject to 40 CFR 264, Subpart AA, which requires organic emissions be limited to 1.4 kilograms (3 pounds) per hour, and 2.8 mega grams (3.1 tons) per year, or controls be installed to reduce organic emissions by 95 percent. Organic concentrations in the waste processed at the 242-A Evaporator are limited to ensure the values of 1.4 kilograms (3 pounds) per hour and 2.8 mega grams (3.1 tons) per year are not exceeded. Therefore, no emission control devices are installed on the 242-A Evaporator vessel ventilation system and no inspections are required (Chapter 4.0, Process Information).

6.2.5 Inspection Logs

Visual inspections (refer to Tables 6.1-6.4) are performed using inspection log sheets (also called round sheets or eRounds) that outline frequency, the components to inspect, operating conditions and ranges, and types of problems. Log sheets are kept in the 242-A Evaporator ~~e~~Control ~~r~~Room or retained on electronic media. Inspectors record the following information:

- Date and time of the visual inspection.
- Printed name and handwritten or electronic signature of the person performing the inspection.
- Notations of the observations made, including space for writing comments.
- An account of spills or discharges in accordance with WAC 173-303-145.

Completed log sheets are reviewed and approved by the shift supervisor, collected, and stored for at least 5 years in the 242-A Evaporator Operating Record. If an inspection log cannot be located in the 242-A Evaporator Operating Record, substitute documentation/log will be added to the 242-A Evaporator Operating Record that documents the missing log. If an inspection was scheduled or attempted; but could not be performed or fully completed due to a planned event (e.g., planned power outage), then a reasonable attempt will be made to re-schedule and complete the inspection within the identified inspection frequency. If an inspection was scheduled or attempted; but could not be performed or fully completed due to an unplanned event (e.g., Hanford Site or local area emergency or injury; unplanned power outage; unexpected or radiological conditions, work, training, or safety restrictions); the missed inspection or portions thereof that were not completed shall be documented on the relevant inspection log or facility logbook; and if applicable, reported in the Hanford Facility Annual Noncompliance Report.

Maintenance inspections are performed as part of the maintenance job control system. After completion, the maintenance documentation is reviewed and signed.

6.2.6 Schedule for Remedial Action for Problems Revealed

If while performing a visual inspection (Table 6.1), a leak or spill is discovered, 242-A Evaporator management responds immediately per Chapter 7.0, Contingency Plan. Action is taken to stop the leak and determine the cause. The waste is removed from the secondary containment within 24 hours or in a timely manner that prevents harm to human health and the environment. The specific actions for the pump room sump are described in Chapter 4.0, Process Information.

If an alarm activates during inspections, an operator responds immediately and implements appropriate actions.

If an inspection identifies equipment that is missing, damaged, or not operating properly, the operator records the problem on a deficiency log in the 242-A Evaporator control room or on electronic media. Repair work is prioritized by 242-A Evaporator management to mitigate health and environmental risks.

6.3 Preparedness and Prevention Requirements

The following sections document the preparedness and prevention measures taken at the 242-A Evaporator.

6.3.1 Equipment Requirements

The following sections describe the internal and external communications and emergency equipment located at the 242-A Evaporator that can be activated by the 242-A Evaporator Building Emergency Director (BED). Hanford Facility-wide equipment is identified in Permit Attachment 4, *Hanford Emergency Management Plan* (DOE/RL-94-02).

6.3.2 Internal Communications

The 242-A Evaporator is equipped with internal communication systems to provide immediate emergency instruction to personnel. The onsite communication systems at the 242-A Evaporator include telephones, hand-held two-way radios, a public address system, and alarm systems. The telephone and radio systems provide for internal and external communication. Alarm systems allow personnel to appropriately respond to various emergencies, including building evacuations, take cover events, fires and/or explosions. The locations of telephones, public address systems, and alarms are given in the Chapter 7.0, Contingency Plan.

Immediate emergency instruction to personnel is provided by a public address system using speaker horns and speakers located throughout the 242-A and 242-AB Buildings and outside.

6.3.2.1 External Communications

The 242-A Evaporator is equipped with devices for summoning emergency assistance from the Hanford Fire Department, the Hazardous Materials Response Team, and/or Hanford Patrol, as necessary. External communication to summon emergency assistance is made by using a telephone communication system, fire alarm pull boxes, or hand-held radio as described in Permit Attachment 4, *Hanford Emergency Management Plan*, (DOE/RL-94-02). These devices are provided throughout the 242-A Evaporator.

During certain periods, only one operator may be available within the 200 East plateau. This operator has access to external communication using telephones located throughout the building.

6.3.2.2 Emergency Equipment

Emergency equipment is available throughout the 242-A Building. The locations of emergency equipment are provided in Chapter 7.0, Contingency Plan.

Major fire damage is unlikely at the 242-A Evaporator because of the concrete construction and because the amount of combustible material is minimized. Temperature activated water sprinkler systems, emergency lights, fire alarms pull boxes, and fire extinguishers are located throughout the 242-A Evaporator. The 242-A Evaporator relies primarily on the Hanford Fire Department to respond to fires and other emergencies as described in Permit Attachment 4, *Hanford Emergency Management Plan*, (DOE/RL-94-02). The Hanford Fire Department is capable of providing rapid response to fires within the 200 East Area.

Safety showers are used to decontaminate personnel. Water for these devices is supplied from the sanitary water system.

Spill kits are used to provide spill control measures. An inventory of the equipment in the spill kit is included inside the cabinet. The spill kit seal is checked monthly to ensure the spill kit has not been used. If used, the spill kit will be replenished by the next monthly inspection and a new seal applied.

If items are unavailable, then this will be noted on the inspection sheet and the kit will be left unsealed until inventory items are replenished.

The 242-A Evaporator operating personnel are trained in the use of emergency equipment (Chapter 8.0, Personnel Training).

6.4.4 Equipment Failure and Power Outages

The 242-A Evaporator is designed to mitigate the effects of failure of a major piece of equipment. In the event of equipment failure or power outages, the evaporator process can be shut down and the vapor liquid separator (C-A-1) gravity drains to the DST System feed tank, 241-AW-102, and the process condensate collection tank (TK-C-100), is designed to overflow to DST System feed tank, 241-AW-102. This places the 242-A Evaporator in a safe configuration, and mitigates failure of the process condensate pump used to transfer the process condensate to LERF.

Upon loss of power the following automatically occur:

- Supernate feed pump AW-P-102, which is located in a DST tank, de-energizes, stopping feed to the vapor liquid separator C-A-1 vessel.
- Supernate feed valve HV-CA1-1 opens, initiating emptying of the vapor liquid separator C-A-1 vessel to 241-AW-102.
- Steam supply valve HV-EA1-5 to the E-A-1 reboiler closes, ceasing boil off in the vapor liquid separator C-A-1 vessel.
- Vapor liquid separator C-A-1 vessel vacuum breaker HV-EC1-5 opens, ceasing boil off in the vapor liquid separator C-A-1 vessel.
- Recirculation pump P-B-1 de-energizes, stopping recirculation through the recirculation loop.
- Dump valves HV-CA1-7 and HV-CA1-9 open, draining waste in the vapor liquid separator C-A-1 vessel to 241-AW-102.
- Uninterruptible power supply (UPS) will provide temporary power to the MCS long enough to monitor the safe shutdown of the process described above.
- Personnel emergency equipment (Fire Alarm Control Panels, Emergency lighting and exit lights) operates on backup battery power to support safe exit from the facility if an emergency condition occurs.

Power Outages are discussed in Chapter 7.0, Contingency Plan.

6.4.5 Personnel Exposure

Design, administrative controls, and personal protective equipment are used at the 242-A Evaporator to prevent undue exposure of personnel to mixed waste.

The following features were incorporated into the 242-A Evaporator design to minimize personnel exposure.

- The 242-A Evaporator is designed for remote operation of equipment containing highly radioactive solutions such as waste feed and slurry. These solutions usually are present only in the pump room and evaporator room, which are heavily shielded and routinely are not entered by operating personnel.
- The 242-A Building ventilation system is designed to provide airflow from uncontaminated zones to progressively more contaminated zones.
- Emergency lighting devices are located strategically throughout the 242-A Evaporator.
- Eyewash stations and safety showers are located as identified in Chapter 7.0, Contingency Plan.
- Methods for decontaminating vessels and equipment are available to reduce personnel exposure if entry for maintenance activity is required.
- Offices, 242-A Evaporator ~~c~~Control ~~r~~Room, change rooms, and lunchroom are situated to minimize casual exposure of personnel.

All operations are conducted so employee exposure to mixed waste are maintained ALARA. Exposures are minimized by engineering or administrative controls with protective gear used where such controls are

Table 6.1. Visual Inspection Schedule for Tanks, Piping, and Rooms

Item	Inspection	Frequency[1]
Tank and Piping Inspection		
Condensate collection (TK-C-100) tank and piping	• Inspect piping for leaks or corrosion	Daily
Caisson MH-WTP-01	• Inspect caisson for evidence of leaks or intrusion	Completed 8/2018, due every 10 years thereafter
Room Inspections		
AMU Mezzanine	• Inspect piping for leaks or corrosion • Inspect floor for spills or damage • Inspect for equipment malfunctions • Inspect for housekeeping	Daily[2]
Pump room	• Inspect piping for leaks or corrosion • Inspect floor for spills or damage • Inspect for equipment malfunctions • Inspect for housekeeping • Monitor pump room sump for overflow	Daily[3]
Loadout and hot equipment storage room	• Inspect piping for leaks or corrosion • Inspect floor for spills or damage • Inspect for housekeeping	Daily[3]
Loading room	• Inspect for housekeeping • Monitor drains	Daily[2,3,4]
Condenser room	• Inspect tanks and piping for leaks or corrosion • Inspect floors for spills or damage • Inspect for equipment malfunctions • Inspect for housekeeping	Daily
IX column[5] room	• Inspect piping for leaks or corrosion • Inspect floor for spills or damage	Daily[6]

[1] ~~Daily: Once each calendar day~~Unless otherwise noted, inspection frequencies are defined in Section 6.2.1.2.

[2] When dangerous waste is present.

[3] Use viewing window in AMU Mezzanine to perform inspections except for the pump room which uses the ground floor window.

[4] Denote use of contamination control curtain when extended.

[5] IX column was removed in 2003. The remaining piping has been drained and isolated.

[6] In accordance with Section 6.2.2.4, visual surveillance is only required if the piping is returned to service and dangerous waste is reintroduced to the piping.

Table 6.2. Inspection Schedule of Safety, Security, and Emergency Equipment

Item	Inspection	Frequency[1]
Personnel Protectiveon Equipment		
Personal protective clothing	Verify availability	Monthly
Security		
Building external doors	Verify external doors are closed and locked when the building is unoccupied[2]	Daily
Posted warning signs	Verify signs are present, legible, and visible at 25 feet	Monthly
Communications		
2-Way Radios	Verify radios are operable and batteries are charged	Monthly
Telephones	Verify telephones are is operable	Quarterly
Intercom/public address system (PAX)	Verify the systems is are working properly	Quarterly
Underground Piping Signs for combined PC 5000 and WTP Backup Transfer Lines	Verify underground transfer pipelines located outside the 200 East Area are marked with signs reading "Buried Dangerous Waste Pipe" in accordance with Permit Condition II.V.	Annually
Emergency Equipment		
Safety showers/eyewash station	Verify operability	Quarterly
Emergency lighting	Verify operability	Monthly
Fire extinguishers	Verify fire extinguishers are in their proper location	Monthly
Spill kit	Verify the spill kit is present and that the seal is intact	Monthly
Respirators	Verify availability and shelf life	Monthly

[1] Inspection frequencies are defined in Section 6.2.1.2. Daily: Once each calendar day;
Monthly: Once each calendar month
Quarterly: Once each quarter, not to exceed 124 days
Annually: Once each calendar year, not to exceed 365 days

[2] Entrances to office areas are allowed to be unlocked

Table 6.3. Inspection Schedule for Alarm Monitoring

Item	Inspection	Frequency[1]
Overfill Protection		
Vapor liquid separator (C-A-1): WFSH-CA11 WFSH-CA12	Monitor for vapor liquid separator (C-A-1) high level. Surveillance required only when solution is in the vapor liquid separator.	Continuously
Leak Detection		
Sampler line: LDS-SMPL2	Monitor slurry sampler lines for leaks. Surveillance required only during slurry sampling.	Continuously
Pump room sump: WFI-SUMP1	Monitor for leaks in the evaporator room, pump room, load out and hot equipment storage room and loading room by monitoring the pump room sump (leaks from these rooms drain to the pump room sump). Surveillance required only when waste solution is present in the rooms listed. Surveillance is not required during maintenance activities or power outages.	Continuously
Transfer pipeline 242-A Evaporator to LERF Basin 43 Leak Alarm LDA-43-2	Verify no leak alarm for transfer pipeline; or perform daily visual inspection to check for liquid in the sight glass (FG-60M-001) at the encasement Catch Tank 60M-TK-1, located in LERF Catch Basin 242AL-43. Note: Monitoring required only during 242-A Evaporator waste transfers.	Continuously
WTP backup transfer pipeline (3"-WTP-002-Ml7) to PC-5000 to LERF Basin 242AL-43 Leak Alarm LDA-43-2	Verify no leak alarm for transfer pipeline in 242-A Evaporator Control Room or 200 Area ETF Control Room; or perform daily visual inspection to check for liquid in the sight glass (FG-60M-001) at the PC-5000 encasement catch tank 60M-TK-1, located in LERF Catch Basin 242AL-43. Note: Monitoring required only during WTP waste transfers. Either the 242-A Evaporator or LERF and 200 Area ETF personnel can perform the monitoring, and either can perform the daily visual inspection.	Continuously

[1] ~~Continuously: An operator must be present in the control room to respond to alarms.~~Unless otherwise noted, inspection frequencies are defined in Section 6.2.1.2.

Table 6.4. Inspection Schedule for Maintenance and Other Inspections

Item	Inspection	Frequency[1]
Instrumentation Functional Checks and Calibrations		
~~Slurry and~~ PC-5000 leak detector~~s~~	Perform leak detector functional checks.	Annually[1~~2~~]
Vapor liquid separator (C-A-1) high level alarms: WFSH-CA11 WFSH-CA12	Perform calibrations of loop instruments.	Annually
Pump room sump level: WFI-SUMP1	Perform calibrations of loop instruments.	Annually
~~**Backup Electrical Equipment**~~		
~~Uninterruptible power supply~~	~~Verify output voltage and inspect battery for signs of damage or tampering.~~	~~Annually~~
Fire Systems		
Fire suppression system	Hanford Fire Department verify annual inspection is performed by qualified inspector [WAC 173 303-395(1)(d)], annual service and flow check completed, and pressures within tolerance.	Annually
~~Fire suppressant and notification systems (i.e., sprinkler system and fire alarm pull boxes)~~	~~Water flow alarm tests of the sprinkler system to ensure the operation of a single sprinkler head will transmit an alarm, and that any of the manual fire alarm boxes will properly transmit an alarm signal.~~	~~Annually~~
~~Visual inspection of the physical condition of the sprinkler system, testing, and calibration of smoke detectors, and testing of heat detectors~~	~~A visual inspection of the sprinkler system to ensure system integrity as well as the required testing and calibration of detectors to ensure functionality. A flow test at the sprinkler system is performed to ensure proper flow to the system riser.~~	~~Biennial~~
Annual ignitable and reactive waste inspection	Inspect areas where ignitable or reactive wastes are permitted to be stored per WAC 173-303-395(1)(d).	Annually

~~[1] Continuously: An operator must be present in the control room to respond to alarms.~~
~~Annually: Once each calendar year, not to exceed 365 days.~~
~~Biennial: Once every 2 years, not to exceed 730 days.~~
~~[2] Refer to Section 4.1.7.3.3, if the leak detection system is not available, visual inspection can be used.~~
[1] Unless otherwise noted, inspection frequencies are defined in Section 6.2.1.2.

Attachment 4
19-ECD-0049
(1 Page Excluding Cover Sheet)

242-A Evaporator Class 2 Modification (C2-242-A-2019-01)

242-A Evaporator Class 2 Modification (C2-242-A-2019-01)

Supplemental Information

The drawings and documentation below are provided for general information, and demonstrate the adequacy of the design of the transfer piping systems.

Drawing	Current Revision	Stamped Revision	Title	ECNs
H-2-79614-1	6	3	Piping Plan Catch Basin 242AL-43	ECN-726659-R4, PC-5000 Leak Detection Upgrades, incorporated into current drawing revision
H-2-79614-2	1	none	Piping Plan Catch Basin 242AL-43	
H-2-88766-1	14	0	P&ID LERF Basin & ETF Influent Evaporator	ECN-715144, PC-5000 Radiological Condensate Transfer Line Leak Detection Realignment
H-2-88766-3	20	0	P&ID LERF Basin & ETF Influent Evaporator	ECN-715144, PC-5000 Radiological Condensate Transfer Line Leak Detection Realignment
H-2-88766-5	2	none	P&ID LERF-WTP Interface	ECN-714451, 310/311 Waste Transfer Line Leak Detector Installation at LERF
H-2-830102-2	2	1	W-519 Site/Utility Systems Basin Piping Sections & Details	ECN-714451, 310/311 Waste Transfer Line Leak Detector Installation at LERF
H-2-830093-1	1	1	W-519 Site/Utility Systems Title Sheet, Dwg List & General Notes	
H-2-830094-1	1	1	W-519 Site/Utility Systems Plan and Profile Sta 0+400 to Sta 0+800	
H-2-830095-1	2	2	W-519 Site/Utility Systems Plan and Profile Sta 0+800 to Sta 1+200	
H-2-830100-1	3	1	W-519 Site/Utility Systems Basin 242AL-43 Pipe Layout	
H-2-830100-2	2	1	W-519 Site/Utility Systems Basin 242AL-43 Pipe Layout	
H-2-830100-3	2	1	W-519 Site/Utility Systems Basin 242AL-43 Pipe Hanger Layout	
H-2-830108-1	1	1	W-519 Site/Utility Systems Leak Detection Details	

New IQRPE assessment for the WTP backup transfer line (3" WTP-002-M17) caisson MH WTP 01, to address WAC 173-303-640(3) requirements for new tank systems

FCI FLT93, Vendor Data Thermal Dispersion Leak Detector

HNF-17201, W-519-IAR-INSTALL (2003), Liquid Effluent Transfer System Project W 519 Installation Assessment Report

RPP-CALC-62638 (2018), TP/Evaporator Transfer System Hydraulic Analysis

RPP-PLAN-60924 (2016), IQRPE Integrity Assessment Report for the 242-A PC-5000 Transfer Pipeline

RPP-PLAN-62620 (2016), Engineering Work Plan Installation Design for ETF Waste Transfer Lines Project

RPP-RPT-46117 (2002), Independent Integrity Assessment Report for 242-A PC-5000 Drain Line Modifications (addresses PC-5000 Catch Tank, sight glass, and leak detection)

RPP-RPT-62135 (2018), MH-WTP-01 Laser Scan Results

W-519-IAR-Design (2001), Liquid Effluent Transfer System Project W-591 Design Integrity Assessment Report

W-519-PI (2002), Performance Specification Liquid Effluent Transfer System