This document was too large to scan as a single document. It has been divided into smaller sections.

Section 1 of 2

Document Information			
Document #	05-ESD-0083		
Title	CLASS 1 MOD TO THE HANFORD FACILITY RCRA PERMIT (QUARTER ENDING 06/30/2005)		
Date	07/07/2005		
Originator	KLEIN KA	Originator Co.	DOE-RL
Recipient	DAVIS GP	Recipient Co.	DOEC
References	WA7890008967		
Keywords			
Projects			
Structure			

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

05-ESD-0083

JUL 7 2005

Ms. Greta P. Davis
Nuclear Waste Program
State of Washington
Department of Ecology
3100 Port of Benton Boulevard
Richland, Washington 99352

Dear Ms. Davis:

CLASS 1 MODIFICATIONS TO THE HANFORD FACILITY RESOURCE CONSERVATION AND RECOVERY ACT PERMIT (QUARTER ENDING JUNE 30, 2005)

In accordance with Condition I.C.3 of the Hanford Facility Resource Conservation and Recovery Act Permit (Permit), enclosed for your notification are the Class 1 modifications for quarter ending June 30, 2005. These modifications update information in the List of Attachments, Part II, and Part III of the Permit. The List of Attachments Class 1 modifications pertain to Attachment 4, Hanford Emergency Management Plan. Part II Class 1 modifications pertain to the general Permit conditions. Part III Class 1 modifications pertain to the Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility, 325 Hazardous Waste Treatment Units, and the Waste Treatment and Immobilization Plant. The Class 1 modifications are being made to ensure that all activities are conducted in compliance with the Permit. A record of these modifications is maintained in the Hanford Facility Operating Record.

If you have questions, please contact me, or your staff may contact Doug S. Shoop, Assistant Manager for Safety and Engineering, on (509) 376-0108.

Sincerely,

Keith A. Klein
Manager

ESD:ACM

Enclosures

cc: See page 2

cc w/encls:
S. Harris, CTUIR
R. Jim, YN
P. Sobotta, NPT
J. H. Swailes, DOE-ORP
Administrative Record, HF RCRA Permit
Environmental Portal, LMSI
Ecology NWP Library
HF Operating Record, (S. A. Thompson, FHI)

cc w/o encls:
M. Y. Anderson-Moore, Ecology
K. A. Conaway, Ecology
L. J. Cusack, Ecology
S. L. Dahl-Crumpler, Ecology
L. L. Fritz , FHI
J. P. Henschel, BNI
A. K. Ikenberry, PNNL
R. J. Landon, BHI
J. J. Wallace, Ecology
M. A. Wilson, Ecology

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Washington State Department of Ecology
Nuclear Waste Program
Hanford Project

Document Receipt Verification

ADDRESSEE: GRETA P. DAVIS
RECEIVER SIGNATURE: Sonia C Mendoza
DATE/TIME DELIVERED: Thursday, July 07, 2005 12:45 PM
DOCUMENT TITLE: DEPARTMENT OF ENERGY **DOCUMENT # 05-ESD-0083** **CLASS 1 MODIFICATIONS TO THE HANFORD FACILITY RESOURCE CONSERVATION AND RECOVERY ACT PERMIT (QUARTER ENDING JUNE 30, 2005)**

Hanford Facility RCRA Permit Modification Notification Forms

General Permit Conditions

Index

Page 2of 6:	Acronyms
Page 3of 6:	Permit Condition II.L.
Page 4of 6:	Permit Condition II.I.1.t
Page 5of 6:	Permit Condition II.P
Page 6of 6:	Permit Condition II.Z

Submitted by Co-Operator:

Lori L. Fritz — Date: 6-27-05

Reviewed by RL Program Office:

Lori A. Huffman — Date: 7-6-05

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
General	**Acronyms**

Description of Modification:

ACRONYMS

...

EC	Emergency Coordinator
~~ECN~~	~~Engineering Change Notice~~
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ERA	Expedited Response Action
ERDF	Environmental Restoration and Disposal Facility
ETF	200 Area Effluent Treatment Facility

...

~~NCR~~ ~~Non-conformance Report~~

...

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

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

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

A.1. General Permit Provisions, Administrative and informational changes

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

Reason for denial:

Reviewed by Ecology:

G. P. Davis 6/7/05

G. P Davis Date

1 Class 1 modifications requiring prior Agency approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
General	**Permit Condition II.L**

Description of Modification:

Permit Condition II.L:

II.L DESIGN AND OPERATION OF THE FACILITY

II.L.1 Proper Design and Construction

The Permittees shall design, construct, maintain, and operate the Facility to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous substances to air, soil, ground water, or surface water, which could threaten human health, or the environment.

II.L.2 Design Changes, Nonconformance, and As-Built Drawings

II.L.2.a After completing the Permit modification process in Permit Condition I.C.3, ~~T~~the Permittees shall conduct all construction subject to this Permit in accordance with the approved designs, plans and specifications that are required by this Permit, unless authorized otherwise in Permit Conditions II.L.2.b or II.L.2.c. For purposes of Permit Conditions II.L.2.b and II.L.2.c, an Ecology construction inspector, or TSD unit manager, are designated representatives of Ecology.

II.L.2.b During construction of a project subject to this Permit, changes to the approved designs, plans and specifications shall be formally documented ~~with an Engineering Change Notice (ECN)~~. All design change documentation ~~ECNs~~ shall be maintained in the TSD unit-specific Operating Record and shall be made available to Ecology upon request or during the course of an inspection. The Permittees shall provide copies of design change documentation ~~ECNs~~ affecting any critical system to Ecology within five (5) working days of initiating the design change documentation ~~ECN~~. Identification of critical systems shall be included by the Permittees in each TSD unit-specific dangerous waste Permit application, closure plan or Permit modification, as appropriate. Ecology will review an design change documentation ~~ECN~~ modifying a critical system, and inform the Permittees in writing within two (2) working days, whether the proposed design change documentation ~~ECN~~, when issued, will require a Class 1, 2, or 3 Permit modification. If after two (2) working days Ecology has not responded, it will be deemed as acceptance of the design change documentation ~~ECN~~ by Ecology.

II.L.2.c During construction of a project subject to this Permit, any work completed which does not meet or exceed the standards of the approved design, plans and specifications shall be formally documented with ~~a N~~nonconformance documentation~~Report (NCR)~~. All nonconformance documentation~~NCRs~~ shall be maintained in the TSD unit-specific Operating Record and shall be made available to Ecology upon request, or during the course of an inspection. The Permittees shall provide copies of nonconformance documentation~~NCRs~~ affecting any critical system to Ecology within five (5) working days after identification of the nonconformance. Ecology will review ~~a~~ nonconformance documentation ~~NCR~~ affecting a critical system and inform the Permittees in writing, within two (2) working days, whether a Permit modification is required for any nonconformance, and whether prior approval is required from Ecology before work proceeds, which affects the nonconforming item. If Ecology does not respond within two (2) working days, it will be deemed as acceptance and no Permit modification will be required.

II.L.2.d Upon completion of a construction project subject to this Permit, the Permittees shall produce as-built drawings of the project which incorporate the design and construction modifications resulting from all project design change documentation ~~ECNs~~ and nonconformance documentation~~NCRs~~, as well as modifications made pursuant to WAC 173-303-830. The Permittees shall place the drawings into the Operating Record within twelve (12) months of completing construction, or within an alternate period of time specified in a unit-specific Permit Condition in Part III or V of this Permit.

II.L.2.e Facility Compliance

The Permittees in receiving, storing, transferring, handling, treating, processing, and disposing of dangerous waste, shall design, operate, and/or maintain the Facility in compliance with all applicable federal, state, and local laws and regulations.

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

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

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

A.1. General Permit Provisions, Administrative and informational changes

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

Reason for denial:

Reviewed by Ecology:

G. P. Davis 6/7/05

G. P Davis Date

1 Class 1 modifications requiring prior Agency approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
General	**Permit Condition II.I.1.t**

Description of Modification:

Permit Condition II.I.1.t:

II.I FACILITY OPERATING RECORD

...

II.I.1.t. All other reports as required by this Permit, including design change documentation ~~ECNs~~ and nonconformance documentation~~NCRs~~.

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

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

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

A.1. General Permit Provisions, Administrative and informational changes

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

Reason for denial:

Reviewed by Ecology:

G. P. Davis 6/7/05

G. P Davis Date

1 Class 1 modifications requiring prior Agency approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
General	**Permit Condition II.P**

Description of Modification:

Permit Condition II.P:

II.P MANIFEST SYSTEM

II.P.1 The Permittees shall comply with the manifest requirements of WAC 173-303-370 for waste received from off-site and WAC 173-303-180 for waste shipped off-site.

II.P.2 Transportation of dangerous wastes along roadways ~~State Highways 240, 24, and 243, and Route 4 South (Stevens Drive) south of the Wye Barricade~~, if such routes are not closed to general public access at the time of transport~~shipment~~, can~~shall~~ be manifested pursuant to an alternate tracking system as allowed by WAC 173-303-180(6)~~Condition II.P.1~~. The alternate tracking system can be a paper system or an electronic system. The roadways addressed by this condition are a public or private right-of-way within or along the border of contiguous property where the movement is under control of the USDOE. The alternate tracking system shall consist of documentation between the offering Hanford Facility location and the receiving Hanford Facility location containing the following information:

II.P.2.a Hanford Facility offeror name, location, and telephone number;

II.P.2.b Hanford Facility receiver name, location, and telephone number;

II.P.2.c Description of waste;

II.P.2.d Number and type of containers;

II.P.2.e Total quantity of waste;

II.P.2.f Unit volume/weight;

II.P.2.g Dangerous waste number(s) or U.S. Department of Transportation hazard class; and

II.P.2.h Special handling instructions including emergency contacts.

II.P.3 The Hanford Facility offeror and receiver shall resolve any discrepancies of information found related to Permit Conditions II.P.2.a through II.P.2.h.

II.P.4 If the discrepancies cannot be resolved at the Hanford Facility receiving location, a new Hanford Facility receiver location will be agreed upon, or the dangerous waste will be returned to the offeror location. The documentation accompanying the movement of dangerous waste will be updated to reflect the new receiving location.

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

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

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

A.1. General Permit Provisions, Administrative and informational changes

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

Reason for denial:

Reviewed by Ecology:

G. P. Davis 6-29-05

G. P Davis Date

1 Class 1 modifications requiring prior Agency approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
General	**Permit Condition II.H**

Description of Modification:

Permit Condition II.Z:

II.Z. Waste Minimization

II.Z.1 In accordance with WAC 173-303-380(1)(q), and Section 3005(h) of RCRA, 42 U.S.C. 6925(h), the Permittee must place a certification in the operating record, unit-specific file on an annual basis that:

II.Z.1.a A program is in place to reduce the volume and toxicity of hazardous waste generated to the degree determined by the Permittee to be economically practicable; and,

II.Z.1.b The proposed method of treatment, storage or disposal is that practicable method currently available to the Permittee, which minimizes the present and future threat to human health and the environment.

II.Z.2 The Permittee shall maintain each such certification of waste minimization in the operating record as required by Permit Condition II.I.1.

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

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

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

A.1. General Permit Provisions, Administrative and informational changes

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

Reason for denial:

Reviewed by Ecology:

G. P. Davis 6/7/05

G. P Davis Date

1 Class 1 modifications requiring prior Agency approval.

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

Hanford Facility RCRA Permit Modification Notification Forms

List of Attachments, Attachment 4
DOE/RL-94-02, Hanford Emergency Management Plan

Index

Page 2 of 3: Attachment 4, Appendix C, Hanford Fire Department Equipment List
Page 3 of 3: Attachment 4, Appendix C, Hanford Fire Department Equipment List

Submitted by Co-Operator:

David T. Carter — Date: 5-18-05

Reviewed by RL Program Office:

for Doug S. Shoop — Date: 5/25/05

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
List of Attachments	**Attachment 4**

Description of Modification:

Attachment 4, Appendix C, Hanford Fire Department Equipment List

EQUIPMENT	DESCRIPTION	*NORMALLY LOCATED
Engines 4 pumpers 3 ladders 1 aerial ladder	Examples of equipment contained on engines: • 1,500-2,000 gal/min (5,678.1-7,570.8 L/min) pump; • 300-500 gal (1,135.6-1,892.7 L) water tank; • 1 – 85' aerial ladder platform; • 3 – telescoping 65'-75' ladder trucks with nozzle; and • Jaws of Life.	1 pumper at ~~each~~ ~~s~~Station 91, 92, 93, and 94 1 ladder at Station 91 1 ladder at Station 93 1 ladder at Station 94 Aerial at Station 92
Brush Fire Trucks 6 each	Examples of equipment contained on brush fire trucks: • 500 gal/min (1,892.7 L/min) pump; • 1,500 gal (5,678.1 L)-2,500 gal (9463.5 L) water tank; • 6x6 with 2,000 gal (7,570.8 L)-2,500 gal (9463.5 L) porti-tank; and • hose, nozzles, fittings, and tools.	1 at Station 91 2 at Station 92 2 at Station 93 1 at Station 94
Water Tenders 1 each	Examples of equipment contained on water tenders: • 1000 gal/min (3785.4 L/min) pump; • 2 - 2,500 gal (9463.5 L) porti-tanks; • 4,500 gal (17,034.3 L) water tank; and • hose, nozzles, fittings, and tools.	Station 92
Grass Fire Units 4 each	Examples of equipment contained on grass fire units: • 100 gal/min (378.5 L/min) pump; • 250 - 400 gal (946.3 – 1514.2 L) water tank; • 4-wheel drive; and • hose, nozzles, fittings, and tools.	1 at each station
Ambulances 6 each	Examples of equipment contained on ambulances: • life support systems; and • medical and emergency response supplies.	1 at Station 91 2 at Station 92 ~~2~~1 at Station 93 ~~1~~2 at Station 94
Command Vehicles 3 each	Contains communications equipment and protective equipment for commander.	Station 92

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

Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.6.b.

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

B.6.b General Facility Standards, Contingency plan: Replacement with functionally equivalent equipment, upgrade, or relocate emergency equipment listed.

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
List of Attachments	**Attachment 4**

Description of Modification:
Attachment 4, Appendix C, Hanford Fire Department Equipment List

EQUIPMENT	DESCRIPTION	*NORMALLY LOCATED
Mobile Incident Command Vehicle 1 each	Examples of equipment contained on mobile incident command vehicle: • communications equipment; • radio communications in Tri-County area; • cell phones (including satellite); • 10,000 watt generator; and • copier, fax.	Station 92
Attack Vehicles 1 each	Examples of equipment contained on attack vehicles: • 450 lb (204.1 kg) of purple-K; • 300 gal (1,1335.6 L) aqueous film-forming foam concentrate; • 300 gal (1,135.6 L) of aqueous film-forming foam pre-mix solution; and • hose, nozzles, fittings, and tools.	Station 91
Hazardous Materials Vehicle 2 each	Examples of equipment contained on hazardous materials vehicle: • protective clothing for Hazardous Materials Response Team; • breathing apparatus for Hazardous Materials Response Team; • diking, plugging, and damming equipment; • detection instruments for Hazardous Materials Response Team; • tools for plugging and repairing leaking containers; • overpack containers for leaking containers; • command module with material safety data sheets, software, and portable meteorological station; and • tools and communications devices necessary to provide communications during emergency response activities.	1 at Station 92 1 at Station 93
Metal Fire Response Vehicle 1 each	Examples of equipment contained on metal fire response vehicle: • equipment for response to special metals fire; • 500 lb (226.8 kg) of extinguishing powder; and • 1,000 lb (453.6 kg) of carbon microspheroids.	Station 94
Rescue Truck 1 each	Examples of equipment contained on rescue truck: • heavy and light rescue; • water rescue; • hi/lo angle rescue; and • trench rescue.	Station 92
Mobile Air Vehicle 1 each	Examples of equipment contained on mobile air vehicle: • mobile air compressor, recharges self-contained breathing apparatus cylinders; and • tools and fittings for operation of vehicle and spare cylinders.	Station 91

*The Hanford Fire Department Chief has the authority to: 1) direct the placement of equipment as needed to control emergency events; and 2) take proactive action and assign different vehicle locations based on conditions such as fuel moisture content, area fire history, work in progress, or other conditions that could arise.

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

Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.6.b

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

B.6.b General Facility Standards, Contingency plan: Replacement with functionally equivalent equipment, upgrade, or relocate emergency equipment listed.

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

Reason for denial:

Reviewed by Ecology:

G. P Davis Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Forms

Part III, Chapter 4 and Attachment 34
Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility

Index

Page 2 of 5 Hanford Facility RCRA Permit, III.4
Page 3 of 5: Chapter 11.0, §11.2.2
Page 4 of 5: Chapter 11.0, §11.3.4.4
Page 5 of 5: Chapter 11.0, §11.6

Submitted by Co-Operator: 6-22-05

for D. E. McKenney Date

Reviewed by RL Program Office: 6/28/05

M. S. McCormick Date

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
LERF & 200 Area ETF	**Part III, Chapter 4 and Attachment 34**

Description of Modification:

Hanford Facility RCRA Permit, III.4:

CHAPTER 4

Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility

This Chapter sets forth the operating Conditions for the Liquid Effluent Retention Facility (LERF) and the Effluent Treatment Facility (ETF).

III.4.A COMPLIANCE WITH APPROVED PERMIT APPLICATION

The Permittees shall comply with all requirements set forth in Attachment 34, including the Amendments specified in Condition III.4.B, if any exist. Enforceable portions of the application are listed below; all subsections, figures, and tables included in these portions are also enforceable, unless stated otherwise:

ATTACHMENT 34:

Chapter 1.0	Part A Dangerous Waste Permit, Revision 0, from Class 1 modification dated May 2005
Chapter 2.0	Unit Description from Class 1 modification dated March 2003
Chapter 3.0	Waste Analysis Plan, from Class 1 modification dated August 2004
Chapter 4.0	Process Information, from Class 1 modification dated December 31, 2004
Chapter 5.0	Ground Water Monitoring (PNNL-11620 and WHC-SD-EN-AP-024), from Class 1 modification dated March 2003
Chapter 6.0	Procedures to Prevent Hazards, from Class 1 modification dated December 31, 2003
Chapter 7.0	Contingency Plan, from Class 1 modification dated August 2004
Chapter 8.0	Personnel Training, from Class 1 modification dated March 2003
Chapter 11.0	Closure and Financial Assurance, from Class 1 modification dated June 30, 2005~~February 2004~~
Chapter 12.0	Reporting and Recordkeeping, from Class 1 modification dated August 2004
Chapter 13.0	Other Federal and State Laws, from Class 1 modification dated August 2004

III.4.B. AMENDMENTS TO THE APPROVED PERMIT APPLICATION

III.4.B.1. Interim status Groundwater Monitoring Plan for the 200 East Area Liquid Effluent Treatment Facility, WHC-SD-EN-AP-024

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

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

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

A.1. General Permit Provisions, Administrative and informational changes

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 modifications requiring prior Agency approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
LERF & 200 Area ETF	**Part III, Chapter 4 and Attachment 34**

Description of Modification:

Remove and replace Chapter 11.0 with the attached Chapter 11.0 dated June 30, 2005.
Chapter 11.0, §11.2.2:

11.2.2 Closure Standards for Internal and External Piping

The internal and external piping of both LERF and ETF will be flushed and drained as part of closure. For piping where the contaminated surfaces can be inspected, an inspection will be performed to see if the piping meets the clean debris surface standard in 40 CFR 268.45 incorporated by reference and can be declared non-dangerous in accordance with WAC 173-303-071(3)(qq).~~The rinsate will be sampled and analyzed. Results less than designation limits for the constituents of concern will be accepted as indicating that the piping is clean with respect to dangerous waste or dangerous waste residues. If the rinsate designates as a dangerous waste, the piping will be flushed again.~~ If it is not possible to inspect the contaminated surfaces or meet the clean debris surface ~~closure~~ performance standard, the particular piping of concern will be removed, designated, and disposed of accordingly.

Dangerous and/or mixed-waste materials generated during closure activities will be managed in accordance with WAC 173-303-610(5). Removal of any dangerous wastes or dangerous constituents during partial or final closure will be handled in accordance with applicable requirements of WAC 173-303-610(5).

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 modifications requiring prior Agency approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
LERF & 200 Area ETF	**Part III, Chapter 4 and Attachment 34**

Description of Modification:

Remove and replace Chapter 11.0 with the attached Chapter 11.0 dated June 30, 2005.
Chapter 11.0, §11.3.4.4:

11.3.4.4 Internal and External Piping and Ancillary Equipment

The internal piping and ancillary equipment for both LERF and ETF will be flushed and drained as part of closure. For piping where the contaminated surfaces can be inspected, an inspection will be performed to see if the piping meets the clean debris surface standard in 40 CFR 268.45 and can be declared non-dangerous ~~rinsed and the rinsate will be sampled and analyzed for constituents of concern. The rinsate will be designated and disposed of appropriately. If the rinsate does not designate based on the concentrations of the constituents of concern, the internal piping will be blanked to ensure that the tanks are isolated and the piping will be considered clean with respect to RCRA. If the rinsate designates as a dangerous waste, the piping will be flushed again. If necessary, the piping will be rinsed with a decontamination solution before sampling and analyses~~. If it is not possible to meet the clean debris surface~~closure~~ standard or the piping cannot be inspected, portions of the internal piping will be removed, designated, and disposed of accordingly. ~~The ancillary equipment will be removed, designated, and disposed of accordingly.~~

External piping (transfer lines) and ancillary equipment associated with ~~between the 242-A Evaporator and LERF and between~~ LERF and ETF consist of below grade and above grade piping. Below grade piping, will be dispositioned at closure consistent with the practices for below grade piping in the 200 Areas at the time of closure. For above grade piping, it will be dispositioned consistent with the provisions for internal piping ~~flushed and the rinsate analyzed for constituents of concern. If the rinsate designates as a dangerous waste, the piping will be flushed again. If necessary, the piping will be rinsed with a decontamination solution before sampling and analyses. If it is not possible to meet the clean closure standard, the piping will be removed and disposed of accordingly. If the rinsate does not designate, the piping will be considered clean and will remain in place~~.

~~If the rinsate designates as dangerous waste, r~~Rinsate from the external piping and LERF internal piping will be processed through ETF. Rinsate from closure of the ETF that cannot be treated at ETF will be managed in accordance with WAC 173-303-610(5)~~transferred to another TSD unit~~. Detail regarding the process for rinsing any internal and external piping and ancillary equipment will be provided in the closure plan in accordance with WAC 173-303-610(3)(a)(v) upon modification as stated in Section 11.6.

Dangerous and/or mixed-waste materials generated during closure activities will be managed in accordance with WAC 173-303-610(5). Removal of any dangerous wastes or dangerous constituents during partial or final closure will be handled in accordance with applicable requirements of WAC 173-303-610(5).

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 modifications requiring prior Agency approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
LERF & 200 Area ETF	**Part III, Chapter 4 and Attachment 34**

Description of Modification:

Remove and replace Chapter 11.0 with the attached Chapter 11.0 dated June 30, 2005.
Chapter 11.0, §11.6:

11.6 SCHEDULE FOR CLOSURE [I-1f]

Closure of LERF and ETF is not anticipated to occur within the next 30 years. The actual year of closure will depend on the time required for current waste to be processed and what role the LERF and ETF will play in processing additional waste generated during future activities in the 200 Areas. Other factors affecting the year of closure include changes in operational requirements, lifetime extension upgrades, and unforeseen factors. When a definite closure date is established, a revised closure plan will be submitted to Ecology.

The activities required to complete closure are planned to be accomplished within 180 days in accordance with WAC 173-303-610(4)(b). Should a modified schedule be necessary, a revised schedule will be presented and agreed to before closure in accordance with WAC 173-303-610(4)(c).

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 modifications requiring prior Agency approval.

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

Hanford Facility RCRA Permit Modification Notification Forms

Part III, Chapter 6
325 Hazardous Waste Treatment Units

Index

Page 2 of 31:	Hanford Facility RCRA Permit, III.6	Page 17 of 31:	Chapter 3.0, §3.3.5
Page 3 of 31:	Chapter 2.0, §2.1	Page 18 of 31:	Chapter 3.0, §3.3.6
Page 4 of 31:	Chapter 2.0, §2.1:1	Page 19 of 31:	Chapter 3.0, §3.4.1
Page 5 of 31:	Chapter 2.0, §2.1.2	Page 20 of 31:	Chapter 3.0, §3.4.2
Page 6 of 31:	Chapter 3.0, §3.1	Page 21 of 31:	Chapter 3.0, §3.6
Page 7 of 31:	Chapter 3.0, §3.1.1	Page 22 of 31:	Chapter 3.0, Table 3.1
Page 8 of 31:	Chapter 3.0, §3.1.7	Page 23 of 31:	Chapter 3.0, Table 3.2
Page 9 of 31:	Chapter 3.0, §3.1.7.1	Page 24 of 31:	Chapter 3.0, Table 3.3
Page 10 of 31:	Chapter 3.0, §3.1.7.2	Page 25 of 31:	Chapter 3.0, §3.11
Page 11 of 31:	Chapter 3.0, §3.1.8	Page 26 of 31:	Chapter 4.0, §4.2.1
Page 12 of 31:	Chapter 3.0, §3.3	Page 27 of 31:	Chapter 4.0, §4.2.1.1.1
Page 13 of 31:	Chapter 3.0, §3.3.1	Page 28 of 31:	Chapter 4.0, §4.2.1.2.3
Page 14 of 31:	Chapter 3.0, §3.3.2	Page 29 of 31:	Chapter 4.0, §4.2.1.3
Page 15 of 31:	Chapter 3.0, §3.3.3	Page 30 of 31:	Chapter 6.0, §6.2.2
Page 16 of 31:	Chapter 3.0, §3.3.4	Page 31 of 31:	Chapter 7.0, Table 7.1

Submitted by Co-Operator:

Alice K. Ikenberry 6 June 05

Alice K. Ikenberry Date

Reviewed by RL Program Office:

L. Erickson 6-16-05

L. Erickson Date

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:
Hanford Facility RCRA Permit, III.6:

CHAPTER 6

325 Hazardous Waste Treatment Units

The 325 Hazardous Waste Treatment Units (325 HWTUs) consist of the Shielded Analytical Laboratory (SAL) which includes Rooms 32, 200, 201, 202, and 203; and the Hazardous Waste Treatment Unit (HWTU) encompassing Rooms 520, 524 and 528 of the 325 Building.

III.6.A. COMPLIANCE WITH APPROVED PERMIT APPLICATION

The Permittees shall comply with all requirements set forth in Attachment 36, including the Amendments specified in Condition III.6.B. All subsections, figures, and tables included in these portions are enforceable.

ATTACHMENT 36:

Chapter 1.0 Part A Dangerous Waste Permit, Revision 5, from Class 1 modification dated May 2005

Chapter 2.0 Unit Description, from Class 1 modification dated June 30, 2005~~December 31, 2002~~

Chapter 3.0 Waste Analysis Plan, from Class 1 modification dated June 30, 2005~~June 30, 2004~~

Chapter 4.0 Process Information, from Class 1 modification dated June 30, 2005~~August 2004~~

Chapter 6.0 Procedures to Prevent Hazards, from Class 1 modification dated June 30, 2005~~August 2004~~

Chapter 7.0 Contingency Plan, from Class 1 modification dated June 30, 2005~~September 30, 2004~~

Chapter 8.0 Personnel Training, from Class 1 modification dated September 30, 2003

Chapter 11.0 Closure and Financial Assurance, from Class 1 modification dated August 2004

Chapter 12.0 Reporting and Recordkeeping, from Class 1 modification dated August 2004

Chapter 13.0 Other Federal and State Laws, from Class 1 modification dated August 2004

III.6.B AMENDMENTS TO THE APPROVED PERMIT APPLICATION

III.6.B.1 Portions of 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.

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 2.0 with the attached Chapter 2.0 dated June 30, 2005.
Chapter 2.0, §2.1:

2.1 DESCRIPTION OF 325 HAZARDOUS WASTE TREATMENT UNITS

The 325 HWTUs are located within the 325 Building, located in the 300 Area on the Hanford Facility. The 325 Building (known as the Radiochemical Processing Laboratory (RPL)) includes the following: (1) a central portion (completed in 1953) that consists of three floors (basement, ground, and second) containing offices and general purpose laboratories, provided with special ventilation and work enclosures, designed for radiochemical work; (2) a south (front) wing containing office space, locker rooms, and a lunch room; and (3) east and west wings containing shielded "hot cells" with remote manipulators. Non-Treatment, Storage, and Disposal (non-TSD) activities within the 325 Building include radiochemistry research, radioanalytical service, and radiochemical process development activities.

Please note that source, special nuclear, and by-product materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at DOE facilities exclusively by DOE acting pursuant to its AEA authority. These materials are not subject to regulation by the State of Washington. All information contained herein and related to, or describing AEA-regulated materials and processes in any manner, may not be used to create conditions or other restrictions set forth in any permit, license, order, or any other enforceable instrument. DOE asserts that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and by-product materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

The 325 HWTUs include two subunits located in portions of the basement and ground floors. The Shielded Analytical Laboratory (SAL) is located in Rooms 32, 200, 201, 202, and 203. The HWTU is located in Rooms 520, 524, and 528.

The 325 HWTUs receive, store, and treat dangerous waste generated by Hanford programs (primarily from research activities in the 325 Building and other Pacific Northwest National Laboratory [PNNL] facilities). Storage and treatment of dangerous waste in containers occurs in the HWTU. At the SAL, dangerous waste is stored and treated in a tank and in containers. As detailed in Chapter 4.0, containers are managed in accordance with WAC 173-303-630, and the tank systems are managed and operated in accordance with WAC 173-303-640. A more detailed discussion of the waste types treated and stored and the identification of processes and equipment are provided in Chapters 3.0 and 4.0, respectively.

Container and tank storage limits, and annual and daily treatment limits are listed in Chapter 1.0. Waste treatment processes could include pH adjustment, ion exchange, carbon absorption, oxidation, reduction, and waste concentration by evaporation, precipitation, filtration, solvent extraction, phase separation, solids washing, catalytic destruction, and solidification and/or stabilization. These waste treatments are conducted on small quantities of diverse dangerous waste generated from research and development and analytical chemistry activities.

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 2.0 with the attached Chapter 2.0 dated June 30, 2005.
Chapter 2.0, §2.1:1:

2.1.1 Shielded Analytical Laboratory

The west wing of the 325 Building houses a hot cell area (completed in 1963 and upgraded in the mid-1970s) known as the Shielded Analytical Laboratory (SAL). The SAL consists of five rooms: basement level Room 32 and ground-floor level Rooms 200, 201, 202, and 203. Chapter 1.0 provides a drawing of Room 32 showing the location of the SAL tank.

The SAL is designed as a high-level radiation analytical chemistry area where activities are integrated with the operations of other analytical chemistry laboratories in the 325 Building. The SAL is divided into four distinct areas: the front face (Room 201), the hot cells, the back face (Rooms 200, 202, and 203), and Room 32.

The SAL includes eight hot cells, six of which are interconnected and situated side by side. Two hot cells located in Room 203 are used for work with highly radioactive materials, and not to treat or store dangerous waste. The six interconnected hot cells are designed to handle samples with high radiation dose rates. The east side of each compartment, which faces into Room 201, is equipped with two manipulators and with high-density lead-glass viewing windows having the same shielding effect as the walls. These compartments are used for analytical chemistry operations as well as for TSD operations. An interconnected stainless steel trough runs along the front of all the hot cells. The trough is the means by which liquid dangerous waste flows by gravity through stainless steel piping to the SAL tank.

The back face of the SAL is divided into three rooms (Rooms 200, 202, and 203). For ALARA reasons, a special storage area exists in Room 202 is used to store containers of mixed waste with high radiological dose rate material.

The SAL hazardous waste tank system is located in Room 32, which is in the basement of the 325 Building. This tank system consists of the tank; associated piping, valves and pumps; and the secondary containment. The SAL tank is a double-walled tank constructed of stainless steel with a capacity of 1,218 liters. The tank is placed within a cylindrical stainless steel containment structure that provides tertiary containment. The liquid dangerous waste drains by gravity from the trough in the SAL hot cells to the SAL tank via stainless steel drain lines. The RLW system piping is a 316L stainless steel single pipeline inside the basement. A pressurized transfer line allows the tank contents to be transferred back up to the hot cells for treatment prior to disposal. The SAL tank utilizes a remote video monitoring system and three tank-level monitoring devices.

The SAL serves two purposes: (1) sample preparation and analyses of mixed waste and highly radioactive materials for various clients and (2) treatment of dangerous waste generated during analytical work within the SAL and potentially from other onsite and/or offsite facilities. Dangerous waste treatment could include pH adjustment, ion exchange, and waste concentration by evaporation, precipitation and/or filtration and solvent extraction, solids washing, and solidification and/or stabilization. Operations are conducted by manipulator or other remote equipment.

WAC 173-303-830 Modification Class [1 2]	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:
A.1. General Permit Provisions, Administrative and informational changes

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 2.0 with the attached Chapter 2.0 dated June 30, 2005.
Chapter 2.0, §2.1.2:

2.1.2 Hazardous Waste Treatment Unit

The HWTU consists of three rooms (Rooms 520, 524 and 528) located in the northeast corner of the main floor of the 325 Building. The rooms are multipurpose laboratory space that has been adapted to hazardous waste management. The three rooms together occupy an area approximately 69'x32'. Containerized dangerous and mixed waste is stored and/or treated in these rooms. The storage of containers in the HWTU for greater than 90 days is conducted in compliance with WAC 173-303-630.

Container storage takes place in cabinets, drums, and other devices in these rooms. Engineered devices (such as pans and containment pallets) are used where necessary to store drums and other large containers requiring secondary containment.

The treatment processes used in the unit are bench-scale operations that are portable and can be conducted at various locations within the HWTU. Routine treatments that could be conducted in the HWTU include pH adjustment, ion exchange, carbon absorption, oxidation, reduction, and waste concentration by evaporation, precipitation, filtration, phase separation, catalytic destruction, and solidification and/or stabilization.

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.1:

3.1 CHEMICAL, BIOLOGICAL, AND PHYSICAL ANALYSIS

The dangerous waste managed at the 325 HWTUs can be categorized as originating from the following general sources:

- listed waste from specific and nonspecific sources
- laboratory waste resulting from analysis of samples
- discarded commercial chemical products
- hazardous or mixed waste from chemicals synthesized or created in research activities using radioactive isotopes
- discarded commercial chemical products exhibiting dangerous-waste characteristics and/or criteria.

Each of these waste categories is discussed in the following sections, including waste descriptions, hazard characteristics, and basis for hazard designations. This information includes data that must be known to treat, store, or dispose of the waste as required under WAC 173-303-806(4)(a)(ii). Process information is provided in Chapter 4.0.

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.1.1:

3.1.1 Listed Waste from Specific and Nonspecific Sources

Waste from specific and nonspecific sources consists of listed waste identified in WAC 173-303-9904. Chapter 1.0, for the 325 HWTUs identifies the following waste from this category:

- F001 – Spent halogenated degreasing solvents and sludges
- F002 – Spent halogenated solvents and still bottoms
- F003 – Spent nonhalogenated solvents and still bottoms
- F004 – Spent nonhalogenated solvents and still bottoms
- F005 – Spent nonhalogenated solvents and still bottoms
- F006 – Wastewater-treatment sludges from electroplating operations
- F007 – Spent cyanide-plating-bath solutions from electroplating operations
- F009 – Spent stripping- and cleaning-bath solutions from electroplating operations where cyanides are used in the process
- F027 – Discarded polychlorinated phenol formulations
- F039 – Leachate resulting from the disposal of more than one restricted waste classified as hazardous
- K011 – Bottom stream from the wastewater stripper in the production of acrylonitrile
- K013 – Bottom stream from acrylonitrile column in the production of acrylonitrile
- K048 – Dissolved air flotation (DAF) float from petroleum-refining industry
- K049 – Slop oil-emulsion solids from the petroleum-refining industry
- K050 – Heat exchange, bundle-cleaning sludge from petroleum-refining industry
- K051 – American Petroleum Institute separator sludge from the petroleum-refining industry
- K052 – Tank bottoms (leaded) from the petroleum-refining industry.

These halogenated and nonhalogenated solvents are in the form of spent solvents; no still bottoms are managed. These listed solvents are managed in containers and in the SAL tank system. Degreasing solvents (F001) as well as spent halogenated solvents (F002) are generated primarily in research and analytical processes. Spent nonhalogenated solvents (F003, F004, and F005) also come primarily from research laboratories. Much of the waste to be treated in the 325 HWTUs results from analyses of waste samples from sources already designated as F001 through F005. Manufacturing activities are not performed on the Hanford Facility; therefore, dangerous waste from specific sources (WAC 173-303-9904 K-listed waste) is not generated at PNNL. Small quantities of K-listed waste, however, have been generated from treatability studies at PNNL in the past; the residues from these tests could be treated at the 325 HWTUs.

The F-listed waste is designated on the basis of the process knowledge (e.g., information from container labels, material safety data sheets [MSDS], or process information). Sampling might be performed if additional information is needed to document the composition and characteristics of the waste. The generator is responsible for specifying the characteristics of the waste, based on knowledge of the chemical products used (i.e., information supplied by the manufacturer) and the process that generated the waste. The F001- and F002-listed waste types are designated according to WAC 173-303-70 through WAC 173-303-100.

The K-listed waste in Chapter 1.0, is designated based on the source of the process generating the original waste. These waste types are designated as dangerous waste, unless the waste is mixed with other constituents that require the mixture to be designated as extremely hazardous waste.

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.1.7:

3.1.7 Manifest System

Onsite waste shipments are manifested pursuant to Hanford Facility RCRA Permit (Permit) Condition II.P.2. Offsite waste shipments are manifested in accordance with the requirements of WAC 173-303-370 and -180. The process for managing waste shipment documentation is given in Section 3.10.

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.1.7.1:

3.1.7.1 Procedures for Receiving Shipments

The onsite generator is responsible for identifying waste composition accurately and arranging for the transport of the waste. A copy of all other pertinent operating records are maintained by the 325 HWTUs for 5 years. The waste-tracking methods are as follows.

Inspection of Transfer Papers/Documentation – The necessary transfer papers for the entire transfer are verified (i.e., signatures are dated, all waste containers included in the transfer are accounted for and correctly indicated on the transfer documentation, there is consistency ~~throughout the different transfer~~between documents provided that describe the waste(s) being transferred~~ation~~, and the documentation matches the labels on the containers).

Inspection of Waste Containers – The condition of waste containers is checked to verify that the containers are in good condition (e.g., free of holes and punctures).

Inspection of Container Labeling – Transfer documentation is used to verify containers are labeled with the appropriate "Hazardous/Dangerous Waste" labeling and associated markings according to the contents of the waste container.

Acceptance of Waste Containers – The 325 HWTUs personnel sign the transfer documents and retain a copy.

If transport will be over public roads (unless those roads are closed to public access during waste transport), a Uniform Hazardous Waste Manifest will be prepared identifying the 325 HWTUs as the receiving unit. The 325 HWTUs operations staff will sign and date each copy of the manifest to certify that the dangerous waste covered by the manifest was received. The transporter will be given at least one copy of the signed manifest. A copy of the manifest will be returned to the generator within 30 days of receipt at the 325 HWTUs. A copy of the manifest also will be retained in the 325 HWTUs operating record for 5 years.

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.1.7.2:

3.1.7.2 Response to Significant Discrepancies

The primary concern during acceptance of containers for storage is improper packaging or waste-tracking form discrepancies. ~~Containers with such discrepancies are not accepted at the 325 HWTUs.~~ Depending on the nature of the condition, ~~such~~ waste-tracking form discrepancies can be resolved through the stepwise use of ~~one or more of~~ the following alternatives.

- Contact the generator and transporter to reconcile the discrepancy. Incorrect or incomplete entries thus identified on the Uniform Hazardous Waste Manifest or the onsite waste-tracking form can be corrected or completed with concurrence of the onsite generator or offsite generator. Corrections are made by drawing a single line through the incorrect entry. Corrected entries are initialed and dated by the individual making the correction.
- The waste packages can be held and the onsite generator or offsite waste generator can be requested to provide written instructions for use in correcting the condition before the waste is accepted.
- Waste packages can be returned as unacceptable.
- The onsite generator or offsite waste generator can be requested to correct the condition on the Hanford Facility before the waste is accepted.
- If a noncompliant dangerous-waste package is received from an offsite waste generator, and the waste package is nonreturnable because of condition, packaging, etc., and if an agreement cannot be reached among the involved parties as to resolving the noncompliant condition, then the issue will be referred to the U.S. Department of Energy-Richland Operations Office (DOE-RL) and the Washington State Department of Ecology (Ecology) for resolution. Ecology will be notified if a discrepancy is not resolved within 15 days after receiving a noncompliant shipment. Such waste packages, although not accepted, might be placed in the 325 HWTUs pending resolution. The package will be segregated from other waste and labeled in accordance with instructions in the unit contingency plan in the "Event Scenarios" section.

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.1.8:

3.1.8 Tracking System

Upon generation or receipt into the 325 HWTUs, each container of waste is assigned a unique tracking number. This number is used to track the following information:

- a description and the quantity of each dangerous waste received and the method(s) and date(s) of storage or treatment in the 325 HWTUs, in accordance with WAC 173-303-380(2)
- the location of each dangerous-waste container stored within the unit and the quantity at each location, including cross-reference to any applicable manifest and/or waste-tracking numbers
- waste-analysis results.

This system effectively tracks waste containers as the containers move through treatment or storage at the 325 HWTUs. The information is retained as part of the 325 HWTUs operating record, readily accessible for 5 years ~~(refer to Attachment 36, Chapter 6.0, §6.2.2)~~.

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.3:

3.3. DESCRIPTION OF UNIT PROCESSES AND ACTIVITIES

The 325 HWTUs store and treat dangerous waste generated by Hanford Facility programs (primarily from research activities in the 325 Building and other Pacific Northwest National Laboratory [PNNL] facilities) and potentially from other onsite/offsite laboratories. Storage in containers and bench- or small-scale treatment of dangerous waste occur in both the HWTU and the SAL. As described in further detail in Chapter 4.0, containers are managed in accordance with WAC 173-303-630; the SAL tank is managed and operated in accordance with WAC 173-303-640.

...

All flammable-liquid waste is stored in compatible containers and in Underwriter's Laboratory (UL)-listed and Factory Mutual (FM)-approved flammable-storage cabinets or DOT-approved shipping containers. Solid chemicals are stored on shelving/flat surfaces in specifically designated areas based on need. All incompatible materials will be segregated. ~~Storage of dangerous waste in the HWTU is governed by the Uniform Building Code restrictions (ICBO 1991).~~

...

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.3.1:

3.3.1 Identification/Classification and Quantities of Dangerous Waste Generated or Managed at the 325 HWTUs and Restricted/Prohibited

The dangerous waste managed at the 325 HWTUs can be categorized as originating from the following general sources:

- listed waste from specific and nonspecific sources
- laboratory waste resulting from analysis of samples
- discarded commercial chemical products
- waste from hazardous or mixed chemicals synthesized or created in research activities using radioactive isotopes
- discarded commercial chemical products exhibiting dangerous-waste characteristics and/or criteria.

Each of these waste categories is discussed in ~~the following sections~~Section 3.1, including waste descriptions, hazard characteristics, and basis for hazard designations. This information includes data that must be known to treat, store, or dispose of the waste as required under WAC 173-303-806(4)(a)(ii).

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.3.2:

~~3.3.2Listed Waste from Specific and Nonspecific~~
~~Waste from specific and nonspecific sources consists of listed waste identified in WAC 173-303-9904. Attachment 36, Chapter 1.0, for the 325 HWTUs identifies the following waste from this category:~~
- ~~F001 spent halogenated degreasing solvents and sludges~~
- ~~F002 spent halogenated solvents and still bottoms~~
- ~~F003 spent nonhalogenated solvents and still bottoms~~
- ~~F004 spent nonhalogenated solvents and still bottoms~~
- ~~F005 spent nonhalogenated solvents and still bottoms~~
- ~~F006 wastewater treatment sludges from electroplating operations~~
- ~~F007 spent cyanide plating bath solutions from electroplating operations~~
- ~~F009 spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process~~
- ~~F027 discarded polychlorinated phenol formulations~~
- ~~F039 leachate resulting from the disposal of more than one restricted waste classified as hazardous~~
- ~~K011 bottom stream from the wastewater stripper in the production of acrylonitrile~~
- ~~K013 bottom stream from acrylonitrile column in the production of acrylonitrile~~
- ~~K048 dissolved air flotation (DAF) float from petroleum refining industry~~
- ~~K049 slop oil emulsion solids from the petroleum refining industry~~
- ~~K050 heat exchange, bundle cleaning sludge from petroleum refining industry~~
- ~~K051 American Petroleum Institute separator sludge from the petroleum refining industry~~
- ~~K052 tank bottoms (leaded) from the petroleum refining industry.~~

~~These halogenated and nonhalogenated solvents are in the form of spent solvents. Degreasing solvents (F001) as well as spent halogenated solvents (F002) are generated primarily in research and analytical processes. Spent nonhalogenated solvents (F003, F004, and F005) also come primarily from research laboratories. Much of the waste to be treated in the 325 HWTUs results from analyses of waste samples from sources already designated as F001 through F005. Manufacturing activities are not performed on the Hanford Facility; therefore, dangerous waste from specific sources (WAC 173-303-9904 K-listed waste) typically is not generated at PNNL. Small quantities of K-listed waste, however, have been generated from treatability studies and sample-characterization activities at PNNL in the past; the residues from these tests could be treated at the 325 HWTUs (if covered in Attachment 36, Chapter 1.0).~~
~~The F-listed waste is designated on the basis of the process knowledge (e.g., information from container labels, MSDS, or process information). Sampling might be performed if additional information is needed to document the composition and characteristics of the waste. The generating unit is responsible for specifying the characteristics of the waste, based on knowledge of the chemical products used (i.e., information supplied by the manufacturer) and the process generating the waste. The F001 and F002 listed waste types are designated according to WAC 173-303-70 through WAC 173-303-100.~~
~~The K-listed waste in Attachment 36, Chapter 1.0, is designated based on the source of the process generating the original waste. These waste types are designated as dangerous waste, unless the waste is mixed with other constituents that require the mixture to be designated as extremely hazardous waste.~~

WAC 173-303-830 Modification Class [1 2]	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:
A.1. General Permit Provisions, Administrative and informational changes

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.3.3:

~~3.3.3Laboratory Waste Resulting from Analysis of Samples~~

~~Laboratory waste resulting from analyzing samples makes up the largest volume of waste to be treated or stored in the 325 HWTUs. These waste types include those designated from the dangerous waste source list as described in WAC 173-303-082, designated as characteristic dangerous waste under WAC 173-303-090, and designated as dangerous waste by the criteria set forth under WAC 173-303-100. These waste types are designated based on process knowledge (e.g., project requirements, client-supplied information, and process information) as well as analytical results. Currently, much of this waste is designated as listed waste from the dangerous waste source list, based on information provided by the generator. The waste is designated as dangerous waste unless constituent concentrations in the waste require the designation to be extremely hazardous waste.~~

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.3.4:

~~3.3.4Discarded Commercial Chemical Products~~

~~Discarded chemical products consist of those products listed in WAC 173-303-081. Attachment 36, Chapter 1.0, for the 325 HWTUs identifies all of the discarded chemical products listed in WAC 173-303-9903 (P001 through P123 and U001 through U359) and specifies an estimated maximum annual management quantity. Typically, only a few of these waste types are generated at any one time. Attachment 36, Chapter 1.0, lists all of the wastes, because the wide variety of research activities conducted on the Hanford Facility presents the potential for generating these waste types.~~

~~Waste types in this category are designated based on process knowledge. Because this waste is usually in the original container, information on the container label is verified by process knowledge (i.e., knowledge that material is in its original container) and the label is used to identify contents. Excess or expired chemicals that have been determined to be waste and that are still in the original container will not be sampled. These listed waste types contain those designated as dangerous waste as well as those designated as extremely hazardous waste. These waste types also are subject to LDR regulations under 40 CFR 268 and WAC 173-303-140, including disposal prohibitions and treatment standards.~~

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.3.5:

~~3.3.5Hazardous or Mixed Waste from Chemicals Synthesized or Created in Research Activities Using Radioactive Isotopes~~

~~Dangerous waste from research activities using radioactive isotopes is designated as dangerous waste and typically is generated in small quantities ranging from a few grams to a few liters. These waste types consist primarily of contaminated chemicals, such as organics. Waste is designated based on process knowledge or on the basis of sampling and analysis. Process knowledge is used if the generator has kept accurate records of the identities and concentrations of constituents present in the waste (e.g., log sheets for accumulation containers). If information available from the generator is inadequate for waste designation, then the waste is sampled and the results of the analysis are used for designation. These waste types include waste designated as characteristic dangerous waste mixtures under WAC 173-303-090 and waste designated as dangerous waste under WAC 173-303-100. Attachment 36, Chapter 1.0, includes all categories of toxic and persistent waste mixtures (i.e., both dangerous waste and extremely hazardous waste). While not all of these waste types currently are generated or have been generated, the wide variety of research activities conducted on the Hanford Facility presents the potential that these waste types could be generated and could require subsequent management at the 325 HWTUs. Similarly, Attachment 36, Chapter 1.0, includes the characteristic dangerous waste categories D001 through D043 (i.e., ignitable, corrosive, reactive, and TCLP toxic because of metals or organics content).~~

~~The waste also could be LDR waste, regulated under 40 CFR 268 and WAC 173-303-140.~~

WAC 173-303-830 Modification Class [1 2]	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:
A.1. General Permit Provisions, Administrative and informational changes

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.3.6:

~~**3.3.6Discarded Commercial Chemical Products Exhibiting Dangerous Waste Characteristics and/or Criteria**~~

~~Many discarded chemical products handled in the 325 HWTUs are not listed in WAC 173-303-9903 but are still considered dangerous waste because these products exhibit at least one dangerous waste characteristic and/or criterion (WAC 173-303-090 and WAC 173-303-100). This waste is included in Attachment 36, Chapter 1.0, under waste numbers D001 through D043, WT01, WT02, WP01, WP02, WP03, and WSC2. This waste typically is received in the manufacturer's original container.~~

~~Waste in this category is designated based on the process knowledge. As this waste is usually in the original container, information on the container label is used to identify the contents. This waste includes waste designated as dangerous waste and waste designated as extremely hazardous waste. The waste also could be LDR waste regulated under 40 CFR 268 and WAC 173-303-140.~~

WAC 173-303-830 Modification Class [1 2]	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:
A.1. General Permit Provisions, Administrative and informational changes

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.4.1:

3.4.1 Pre-Shipment Review

Essentially all of the waste received at the 325 HWTUs is characterized before acceptance because the waste streams are generated from known processes. Unknown wastes are analyzed by the generator before they are accepted into the 325 HWTUs. Nearly all dangerous waste generated in the 325 Building is generated from analytical or research processes, both of which require detailed records. This data is provided for review prior to shipment to determine acceptability and to verify the waste in accordance with Section 3.4.2.

The primary source of information used by the generator to complete the waste-tracking form is process knowledge. Other information sources could be used, so long as these sources provide detailed information on the chemical constituents present, chemical concentrations, material characteristics (e.g., physical state, ignitability), and the characterization requirements on the waste-tracking form.

If the MSDS, laboratory reagent, process knowledge, or analytical information provides insufficient information for a complete designation, the 325 HWTUs personnel require the generator to provide laboratory analyses before acceptance of the waste at the 325 HWTUs.

All process knowledge and analytical data that are used for waste characterization, LDR determination, and/or treatment activities at this TSD unit shall be documented and placed in the Operating Record.

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.4.2:

3.4.2 Verification

Where potential deficiencies exist in the information provided or where additional waste constituents might be expected to be present that do not appear in the supporting documentation, the generator is contacted by 325 HWTUs personnel for resolution. Upon approval, the 325 HWTUs personnel review the data package to determine whether or not the information is sufficient to complete the following:

...

Exceptions to physical screening for verification are:

- Shielded, classified, and remote-handled mixed waste are not required to be physically screened; however, 325 HWTUs staff must perform a more rigorous documentation review utilizing the radionuclide content information as an indicator of the accuracy of process knowledge of RCRA-regulated components and obtain the raw data to characterize the waste (<1 percent of current waste receipts).
- Waste which cannot be verified at the 325 HWTUs must be verified at the generating unit (e.g., large components, containers which cannot be opened, for ALARA reasons, or will not fit into the NDE unit). Physical screening at the customer location consists of observing packaging of the waste.

If ~~no location can be found to do~~ the physical screening cannot be performed due to a location having adequate radiological and hazardous materials safety provisions for the container(s) involved, then no screening is required and the waste is eligible for acceptance. A more rigorous documentation review utilizing the radionuclide content information is used as an indicator of the accuracy of process knowledge of RCRA-regulated components.

- Wastes which are packaged by the 325 HWTUs authorized independent agent are considered to have met the physical screening requirements (e.g., PNNL-packaged waste which is transferred to PNNL-operated TSD units).

A bulk-waste stream (e.g., large volumes of waste from a single generating event, such as soil remediation from a single event) may be verified by screening the allowable rate of the total number of loads throughout the waste stream.

WAC 173-303-830 Modification Class [1 2]	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:
A.1. General Permit Provisions, Administrative and informational changes

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.6:

3.6 SELECTING SAMPLING PROCEDURES

Because of physical variations of the waste that could be received at 325 HWTUs, sampling methodologies differ among the waste streams. ~~The specific sampling methods and equipment used will vary with the chemical and physical nature of the waste material and the sampling circumstances. In all instances, the sampling methods adhere to guidance provided in SW-846 and other pertinent references published and accepted by the EPA.~~ In general, aqueous liquids will be sampled using polyethylene samplers, organic liquids will be sampled using glass samplers, and solids will be sampled using polyethylene samplers.

Typical sample-container requirements for aqueous and solid samples are provided in Table 3.1. Containers selected should be durable, and must be compliant with applicable DOT and other shipping requirements if the sample is to be transported offsite for analysis. If any questions arise as to the appropriateness of a sample container for a particular sample, consult the MSDS for the material(s) to be sampled and/or a chemist.

Representative sampling methods for these various types of waste are selected according to the methods and equipment listed in WAC 173-303-110(2). Sampling methods and equipment are identified in Table 3.2. Representative samples of liquid wastes (vertical "core sections") will be obtained using a composite liquid-waste sampler (COLIWASA) or tubing, as appropriate. If a liquid waste has more than one phase, then each phase will be separated for individual testing and designation. Other waste types that may require sampling are sludges, powders, and granules. In general, nonviscous sludges will be sampled using a COLIWASA. Highly viscous sludges and cohesive solids will be sampled using a trier, as specified in SW-846 (EPA 1986). Dry powders and granules will be sampled using a thief, also as specified in SW-846 (EPA 1986). The sampling methods and equipment used are identified on Table 3.2. ~~In all instances, sampling methods will conform to the representative sample methods referenced in WAC 173-303-110(2), i.e., American Society for Testing and Materials (ASTM) standards for solids and SW-846 for liquids.~~

Exceptions to the representative sampling methods may be used if permissible pursuant to the provisions of:

- WAC 173-303-110
- NRC/EPA "Clarification of RCRA Hazardous Waste Testing Requirements for Low-Level Radioactive Mixed Waste – Final Guidance" (62 Federal Register 62080, November 20, 1997)
- Data Quality Objectives developed in accordance with the Tri-Party Agreement Action Plan Section 6.5 or 7.8 (Quality Assurance), and/or
- An alternative approved by Ecology pursuant to the permit modification process.

The number of samples collected will depend on the amount of waste present and on the homogeneity of the waste, as determined by observation. In most instances, there will be only one container of waste present. In such instances, only one vertical composite sample will be collected (e.g., COLIWASA). If more than one container of a waste stream is present, then a random number of samples will be collected and analyzed statistically using the procedures specified in Section 9.2 of SW-846 (EPA 1986).

WAC 173-303-830 Modification Class [1 2]	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:
A.1. General Permit Provisions, Administrative and informational changes

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, Table 3.1:

Table 3.1 Sample-Container Compatibility

Sample	Container		
	Plastic	Glass	Metal
Acids (except hydrofluoric acid)	*	*	
Hydrofluoric acid	*		
Alkali (concentrated)	*	*	
Solvents/solvent-contaminated oils	*[1]	*	*
Oils	*	*	*
Solids	*	*	*
Aqueous waste	*	*	*

* Sample compatible for storage in this type of container.
[1] Polypropylene may be used with some solvent/solvent-oil waste; consult a chemist and/or MSDS for the material(s) being sampled.

WAC 173-303-830 Modification Class [1 2]	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:
A.1. General Permit Provisions, Administrative and informational changes

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

Reviewed by Ecology:

G. P Davis Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, Table 3.2:

Table 3.2. Sampling Methods and Equipment

Material	Sampling Method	Sampling Equipment
Containerized liquids	SW-846	COLIWASA* or tubing
Extremely viscous liquid	ASTM D140-70	Tubing or trier
Crushed or powdered material	ASTM D364-75	Tubing, trier, auger, scoop or shovel
Soil or rock-like material	ASTM D420-69	Tubing, trier, auger, scoop or shovel
Soil-like material	ASTM D1452-65	Tubing, trier, auger, scoop or shovel
Fly ash-like material	ASTM D2234-76	Tubing, trier, auger, scoop or shovel
Containment systems	Wipe sample (OSHA 1977)	Filter paper and cleaning solution

* COLIWASA: composite liquid-waste sampler.

Generators or 325 HWTUs personnel also document the sampling activities and chain of custody and arrange sample shipment. Sampling information, custody records, and analytical results are submitted as part of the waste-tracking form data package submitted by the generator to the waste-management section for review, approval, and designation.

All sampling will ~~conform to~~meet or exceed the protocols in SW-846 or an equivalent. These protocols are described briefly in the following paragraphs.

...

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, Table 3.3:

Table3.3. Summary of Test Parameters, Rationales, and Methods

Parameter [a]	Method [b,c]	Rationale for Selection
Physical Screening		
Visual inspection	Field method - observe phases, presence of solids in waste and look for prohibited articles utilizing x-ray examination when appropriate.	Confirm that waste matches that information described on waste acceptance documentation.
Chemical Screening [e,d]		
Oxidizer	Oxidizer Screen HAZCAT™	Confirm that waste matches that described on waste acceptance documentation; ensure compliance with WAC 173-303-395(1)(b)
pH	pH screen Liquids - SW-846 Method 9041A or 9040B. Solids or semi-solid - SW-846 Method 9045	Confirm that waste matches that described on waste acceptance documentation; ensure compliance with WAC 173-303-395(1)(b)
Cyanides	Cyanide screen HAZCAT™	Confirm that waste matches that described on waste acceptance documentation; ensure compliance with WAC 173-303-395(1)(b)
Sulfides	Sulfide screen HAZCAT™	Confirm that waste matches that described on waste acceptance documentation; ensure compliance with WAC 173-303-395(1)(b)
Halogenated/Volatile Organic Compounds	Photoionizer or Flame Ionizer, or Clor-D-Tect © Kits	Confirm that waste matches that described on waste acceptance documentation
Toxicity characteristic organic compounds [d,e]	Generator knowledge or SW-846 Methods 1311 and 8260 (volatile organic compounds) and 8270 (semivolatile organic compounds)	Identify constituents for compliance with Hanford Facility Permit

[a] Addition parameters can be used on current waste acceptance criteria of the downstream TSD unit. Operation limits transfer/shipments are based on current waste acceptance criteria.
[b] Procedures based on EPA SW-846, unless otherwise noted. When regulations require a specific method, the method shall be followed.
[c] QA/QC requirements associated with these screening methods are addressed by following manufacturer's instructions for instrumentation (such as photoionizer), or test kit instructions. Detection limits are given in the SW-846 method, manufacturer's instructions for instrumentation (such as photoionizer), or test kit instructions.
[d] These test will not be performed on materials known to be organic peroxides, ether, and/or water reactive compounds.
[d,e] This test will only be performed on waste to be stored in tank TK-1waste in addition to any other appropriate chemical screening.

R

WAC 173-303-830 Modification Class [1 2]	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:
A.1. General Permit Provisions, Administrative and informational changes

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

Reviewed by Ecology:

G. P Davis Date

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 3.0 with the attached Chapter 3.0 dated June 30, 2005.
Chapter 3.0, §3.11:

3.11 REFERENCES

~~Budavari, S (ed.). 1989. *The Merck Index*, 11th ed. Merck & Co., Rahway, New Jersey.~~

~~EPA, 1990, 55 *Federal Register*, p. 22669, *Land Disposal Restrictions for Third Third Scheduled Wastes; Rule*. June 1, 1990, Washington, D.C.~~

~~International Conference of Building Officials. 1988. *Uniform Fire Code*, International Conference of Building Officials and Western Fire Chiefs Association, Whittier, California.~~

~~Lide, D. 1993. *CRC Handbook of Chemistry and Physics*, 74th ed. CRC, Boca Raton, Florida.~~

~~Sax, NI and RJ Lewis Sr, eds. 1987. *Hawley's Condensed Chemical Dictionary*, 11th ed. Van Nostrand Reinhold, New York.~~

~~Sittig, Marshall. 1985. *Handbook of Toxic and Hazardous Chemicals and Carcinogens*, 2nd edition. Noyes Publications, Park Ridge, New Jersey.~~

...

U.S. Environmental Protection Agency. 1980. *A Method for Determining the Compatibility of Hazardous Wastes*. EPA-600/2-80-076, Cincinnati, Ohio.

...

U.S. Department of Health and Human Services. 1990. *NIOSH Pocket Guide to Chemical Hazards*, National Institute for Occupational Safety and Health, Cincinnati, Ohio.

U.S. Nuclear Regulatory Commission and U.S. Environmental Protection Agency. 1997. *Clarification of RCRA Hazardous Waste Testing Requirements for Low-Level Radioactive Mixed Waste – Final Guidance*. 62 Federal Register 62080, November 20, 1997, Washington, D.C.

~~Washington State Department of Ecology. 1980. *Biological Testing Methods*. DOE 80-12, revised July 1981, Olympia, Washington.~~

~~Washington State Department of Ecology. 1982. *Chemical Testing Methods for Complying with the State of Washington Dangerous Waste Regulation*. WDOE 83-13, Olympia, Washington.~~

~~Washington State Department of Ecology. 1980. *A Method for Determining the Compatibility of Hazardous Wastes*. EPA-600/2-80-076, Cincinnati, Ohio.~~

Washington State Department of Ecology. 1994a. Letter from T. Thomas, Ecology, to Bill Habenicht, Burlington Environmental, dated March 1, 1994, Ecology compendium number 3140.940301, *State-Only Dangerous Waste and Federal Land Disposal Restrictions*. Olympia, Washington.

~~Washington State Department of Ecology. 1994b. *Satellite Accumulation*, Technical Information Memorandum, Publication 94-120,Olympia, Washington.~~

...

Washington State Department of Ecology. 1998. *Chemical Testing Methods for Designating Dangerous Waste*. Publication 97-407, Olympia, Washington.

Washington State Department of Ecology. 1999. *Biological Testing Methods*. DOE 80-12, revised May 1999, Olympia, Washington.

WG 1996, Ecology/RL Waste Analysis Plan Work Group Definition, December 1996.

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

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

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

A.1. General Permit Provisions, Administrative and informational changes

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 4.0 with the attached Chapter 4.0 dated June 30, 2005.
Chapter 4.0, §4.2.1:

4.2.1 Shielded Analytical Laboratory Tank System

The SAL is an analytical chemistry laboratory used primarily to prepare and analyze samples for research and development activities and waste characterization. ~~As noted in Attachment 36, §3.3, s~~Storage ~~in containers~~ and ~~bench or small-scale~~ treatment of dangerous waste in containers also occurs in the SAL. This work is conducted in six inter-connected hot cells. Liquid waste generated during these operations is collected, treated if necessary and may be containerized or drained from the hot cells to the SAL tank located in Room 32 of the basement directly below the hot cells. A stainless steel trough, 15.2 centimeters wide by 7.62 centimeters deep, traverses the front of all six hot cells in which solution is poured. The trough is equipped with stainless steel grating to capture solids during solution pour. The trough collects any liquid waste poured from analytical chemistry operations, mixed waste treatment operations, other chemical and mixed waste stored in the hot cells, and spills or leaks. The liquid waste is transferred through a common stainless steel pipeline that drains into the SAL tank. The waste is treated in the tank, as needed, and batch transferred from the SAL tank to containers for disposal through a pressurized transfer line that leads back into Cell 6 of the SAL. The SAL tank volume is 1,218 liters and has a throughput of 10,000 kilograms per year.

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 4.0 with the attached Chapter 4.0 dated June 30, 2005.
Chapter 4.0, §4.2.1.1.1:

4.2.1.1.1 Design Requirements

Waste stored in the SAL tank has a pH between 7 and 12. The tank is constructed of 316L stainless steel. This material is compatible with any of the dangerous waste that is discharged to the tank.

The tank system design has been reviewed by an independent, qualified, registered professional engineer to verify that the strength of the material is adequate and that it can withstand the stress of daily operation. The professional engineer evaluation is included in the tank integrity assessment.

The SAL tank is a vertical double-shell tank supported by 3 legs and stands approximately 1.7 meters above the ground. The top head is a 0.95-centimeter-thick flat stainless steel plate. Both bottom heads are flanged and dished heads (torispherical), and the bottom height is 10.2 centimeters above ground. The inner shell is 107 centimeters outside diameter, the outer shell is 114 centimeters outside diameter, and each shell is 0.8-centimeter-thick stainless steel plate. The tank is located inside a containment pan that has a 203-centimeter diameter and is 51 centimeters high; the total volume of the pan is 1,648 liters. The pan provides for secondary containment of leaks from the tank, piping, and ancillary equipment and instruments located above the tank. Flanged and threaded connections are located within the containment boundary of the pan to capture any leaks that might occur from these connections. Outside the containment area, all connections are welded. There are no outlets, drainage or otherwise, on the bottom or sides of the tank.

Solution enters the tank through a gravity flow, welded drain line piped from the hot cells. The SAL sources that tie into this drainpipe includes: the hot cells, sink drain, hood drain via the sink drain, and floor drain. The cup sink drain and hood drain line is sealed off and is not in use. The drain line also functions as the tank vent that is exhausted by the hot cell exhaust system. A return line of stainless steel is attached to the top of the tank and can be 'jetted' using water pressure to transfer the tank contents back up to Cell 6 of the SAL. A mixer is located on top of the SAL tank to provide agitation of the contents for sampling and washout purposes. Process water also is provided to the tank system for cleanout of the tank and associated piping. The solution is stored in the SAL tank, treated as needed and transferred to containers for final disposal.

The SAL tank is located in a controlled access room and is monitored from two operating panels. The smaller sample panel is located next to the SAL tank, and the second main control panel is located in Room 201, the main operating gallery. The sample panel provides control for activities related to pulling a sample, such as activating the sample pump and controlling process water, and monitoring the liquid level of the tank. The main control panel provides the operators with the ability to monitor and control the entire SAL tank system. The main control panel provides level indication, high, and high-high level annunciation and contains switches for controlling pumps, agitators, valves, etc. The SAL tank is instrumented with three types of level-monitoring devices. Two devices are wired into the annunciator at the main control panel to provide high-level alarms, and one high-level alarm annunciates at the annunciator board in the control room on the third floor. This control room is staffed 24 hours a day, 7 days a week. If a high-alarm situation occurs after normal working hour's operations personnel would be notified immediately by the alarm and would take corrective action according to procedure. The SAL tank system normally is operated on the day shift. Personnel occupy the main operating gallery in Room 201, where the personnel would be alerted to off-normal conditions on the main control panel. A high-level alarm also would deenergize the process water solenoid valves to the closed position on three water lines into the hot cells and on the process water lines to the SAL tank. The containment pan contains a conductivity element that alarms at the main control panel should solution be detected in the pan. Operating procedures require that inspections of the entire system be made daily when in use (Chapter 6.0).

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 4.0 with the attached Chapter 4.0 dated June 30, 2005.
Chapter 4.0, §4.2.1.2.3:

4.2.1.2.3 Secondary Containment and Leak Detection Requirements for Ancillary Equipment

Secondary containment for the SAL tank system ancillary equipment is provided by the containment pan below the SAL tank, by double-walled piping for the sample line between the tank and the sample station, and by daily visual inspection during use of the entire system including the existing single-walled piping. Flanged and threaded connections, joints, and other connections are located within the confines of the containment pan. Outside this pan, only double-walled piping and welded piping is allowed. The pumps are magnetic coupling pumps located above the pan. All construction material is stainless steel; for the welded parts, the material is 316L stainless steel. Stainless steel material is compatible with the expected corrosive, dangerous, and mixed waste stored in the SAL tank. The strength and thickness of the piping, equipment supports, and containment pan are designed to onsite standards that take into account seismic requirements for the region and corrosion protection. The entire system is located on an existing basement floor built in the 1960s. The 325 Building has proven over time to be of a sound structural integrity to withstand mild earthquake forces. The containment pan has a liquid element sensor that alarms immediately at the main control panel should any leakage be detected. The containment pan has a 203-centimeter diameter and a 51-centimeter height, or 1,648 liters of capacity. The containment pan will hold the total capacity of the 1,218-liter SAL tank plus any potential process water that also might be released. In the event of an alarm, the process water solenoid valves will become de-energized to the closed position to minimize the loss of additional water.

The 325 Building is staffed or monitored 24 hours a day, 7 days a week. The control system is designed to alarm on any leak/spill or high-level alarm encountered. The personnel responding to the alarm condition will stop or secure the action causing the leak/spill, warn others of the spill, isolate the spill area, and minimize individual contamination and exposure. The spilled or leaked waste will be removed in an expeditious manner according to procedures for cleaning up spills and leaks. Any required release reports will be filed according to the requirements of WAC 173-303-640(7).

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 4.0 with the attached Chapter 4.0 dated June 30, 2005.
Chapter 4.0, §4.2.1.3:

4.2.1.3 Tank Management Practices

According to operating procedures, liquid waste is poured into the troughs. The troughs tie into the 5.08-centimeter drain header located under the hot cells. This drain header is sloped down to the SAL tank located in Room 32 of the basement. The existing drain header is the only method of introducing mixed waste solutions into this tank. The drain line is fully welded and is constructed of 316L stainless steel material. Because this drain line also serves as the SAL tank vent line, the SAL tank operates at the same pressure as that of the hot cells. The heating, ventilation, and air conditioning operating pressure for the hot cells, and therefore the SAL tank, is -1.27 centimeters water (vacuum). The SAL tank operates at slightly subatmospheric pressure, and no pressure controls are necessary for this tank system.

The SAL tank is fully monitored with tank-level instruments. A main control panel provides level status and high-alarm annunciation. Two control panels are provided with the SAL tank monitoring system. One control panel is located adjacent to the sampling station in Room 32 to control the sampling pump when samples are pulled. A second control panel is located on the operating floor in Room 201, the SAL main operating gallery. Tank status is monitored from the first floor control panel. Because waste solution is generated in a batch mode, waste solution drained to the tank is effectively controlled through operating and administrative procedures in order to prevent high-level-alarm conditions. A safety cutoff system for the tank will shut off all incoming water to the SAL in conjunction with a high-level-alarm condition. A backup tank system was determined to be unnecessary for the SAL operations because of the presence of tank monitoring devices and the use of administrative and operational (batch-processing) controls.

The tank transfer controls provide similar safety features. ~~Once t~~The SAL tank ~~contains sufficient~~ volume maybe transfered, ~~the tank's solution is prepared for transfer~~ to SAL Cell 6 for treatment and/or subsequent storage in containers using a pressurized transfer line. As with the drain lines, the pressurized line is constructed of single-wall stainless steel piping. All connections outside the tank's secondary containment system are welded. ~~After waste characterization is completed, the transfer is initiated~~.

WAC 173-303-830 Modification Class [1] [2]	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:
A.1. General Permit Provisions, Administrative and informational changes

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form	
Unit: **325 Hazardous Waste Treatment Units**	Permit Part & Chapter: **Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 6.0 with the attached Chapter 6.0 dated June 30, 2005.
Chapter 6.0, §6.2.2:

6.2.2 Tank System Inspection

The Shielded Analytical Laboratory (SAL) tank located in Room 32 is used to store mixed waste generated because of waste treatment activities. Routine inspections of the SAL tank system are conducted in accordance with WAC 173-303-640. Inspections involve a combination of visual, mechanical, and electronic means. Due to ALARA considerations, visual inspections of the tank system are conducted by remotely operated cameras mounted in Room 32~~ and the tank pit~~. These visual inspections are limited to areas of the tank system that can be observed by the camera. In the event of a camera system malfunction, the tank system will be visually inspected from the doorway of Room 32 until the malfunction has been corrected. A mirror is mounted on the back wall of Room 32 to allow viewing the rear of the tank from the window in the door. A logbook or inspection sheet of all inspections is maintained in the operating record for at least 5 years from the date of the inspection.

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

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

Modification Approved: ☐ Yes ☐ No (state reason for denial) Reason for denial:	Reviewed by Ecology:
	G. P Davis — Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
325 Hazardous Waste Treatment Units	**Part III, Chapter 6 and Attachment 36**

Description of Modification:

Remove and replace Chapter 7.0 with the attached Chapter 7.0 dated June 30, 2005.
Chapter 7.0, Table 7.1:

Table 7.1. Hanford Facility Documents Containing Contingency Plan Requirements of WAC 173-303-350(3).

WAC Requirement WAC 173-303-XXX	Permit Attachment 4 *Hanford Emergency Management Plan* DOE/RL-94-02[1]	325 Building Emergency Procedure[2]	Permit, Part III, 325 HWTUs
None	N/A	§1.1 thru 1.4	Chapter 1.0, Site Plan
-350(3)(d)	N/A	§12.2.1[3]	N/A
-360(1)	N/A	§3.1.1, 28th bullet	Chapter 8.0, references Training Plan
-350(3)(a), (b)	§1.3.4	§6.1, §6.3, and §6.4	§3.10 (activation of plan for damaged shipment)
-360(2)(a)	§1.3.4 §5.2.1	§1.5, §6.1, §6.3, and §6.4	N/A
-360(2)(b)	§2.2.1.1.3(g)	§3.1.1, 17th bullet; §9.2	N/A
-360(2)(c), (d), and (e)	§2.2.1.1.3(a) and (c), §4.2, 5.1.1, and §5.1.2	§3.7 notification §4.0 criteria	N/A
-360(2)(f) and (g); -630(2), and -640(7)	§2.2.1.1.3(g)	§3.1.1, 17th bullet; §4.0	N/A
-360(h), (i), (j), and (k)	§5.1.2.2, §5.1.2.3, §9.2.3, and §11.2	§3.1.1, 25th bullet; §3.7, §9.2, and §9.3	§6.4.5 (restocking of protective equipment as it is used)
-350(3)(e)	Appendix C	§10	§6.3.1 emergency equipment and §6.4.5 protective clothing
-350(3)(c) and -340(4)	§3.2.3, §3.3.1, §3.3.2, §3.4, §3.4.1.1, §3.4.1.2, §3.4.1.3, §3.7, and Table 3-1	§1.7	N/A
-350(3)(f)	Figure 7-3, Table 5-1	§1.5 and §1.6; Exhibits 13.1 through 13.4	N/A
-360(2)(k)	§5.1.2.2	§3.1.1, 25th bullet; §3.7, §9.2, and §9.3	N/A
-640(7)(d)(iii) and -640(7)(f)	§5.1.2.2 and §5.1.2.3	§3.1.1, 25th bullet; §3.7, §9.2, and§ 9.3	§.2.1.2.3 non-emergency reporting

[1] Sections of the *Hanford Emergency Management Plan* and the 325 BEP not referenced here are not enforceable under the Permit. Refer to Permit Condition III.6.B.a.
[2] March 2005 version.
[3] This information is not required pursuant to Permit Condition II.A.4 and is included only in order to avoid modification to the complete Building Emergency Procedure.

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

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

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

Reviewed by Ecology:

G. P Davis Date

[1] Class 1 Modifications requiring prior Agency Approval.

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

Hanford Facility RCRA Permit Modification Notification Forms

Part III, Chapter 10 and Attachment 51
Waste Treatment and Immobilization Plant (WTP)

Index

Ecology approved PCNs for quarter ending June 30, 2005:

PCN	Ecology Approval Date
24590-HLW-PCN-ENV-05-002	06-21-2005
24590-PTF-PCN-ENV-05-007	05-11-2005
24590-PTF-PCN-ENV-05-008	06-24-2005
24590-WTP-PCN-ENV-04-0014	06-15-2005
24590-WTP-PCN-ENV-05-001	04-19-2005
24590-WTP-PCN-ENV-05-002	04-19-2005
24590-WTP-PCN-ENV-05-003	06-17-2005
24590-WTP-PCN-ENV-05-004	06-17-2005

Quarter Ending 6/30/2005 24590-HLW-PCN-ENV-05-002

Hanford Facility RCRA Permit Modification Notification Form
Part III, Chapter 10 and Attachment 51
Waste Treatment and Immobilization Plant

Index

Page 2 of 2: Hanford Facility RCRA Permit, Part III, Attachment 51
Modification to Update Existing HDH System Information in Appendix 10.0

Submitted by Co-Operator: Reviewed by ORP Program Office:

Rick F. Beranek	5/15/05	for Shirley Olinger	6/9/05
F. Beranek	Date	R.J. Schepens	Date

Quarter Ending 6/30/2005

24590-HLW-PCN-ENV-05-002

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
Waste Treatment and Immobilization Plant	**Part III, Chapter 10 and Attachment 51**

Description of Modification:

The purpose of this modification is to update existing HLW Facility HDH System information including a Process Flow Diagram (PFD), Piping and Instrumentation Diagrams (P&IDs), as well as an Independent Qualified Registered Professional Engineer report in Appendix 10.0 of the Dangerous Waste Permit (DWP). The PFDs and P&IDs have been revised to reflect the following minor design changes to the HDH Tank System ancillary equipment (i.e., piping) as indicated on the updated HDH drawings listed below:

- Re-sized vessel vent line (HDH-VSL-00003)
- Extended overflow line inside vessel (HDH-VSL-00003)
- Updated label information on connecting flag (E8) downstream of HDH-EJCTR-00057 (HDH-VSL-00003)
- Added vent lines to the Pulse Jet Ventilation header on vessel overflows (HDH-VSL-00002/00004)

The updated Independent Qualified Registered Professional Engineer report (24590-CM-HC4-HXYG-00138-02-00055, Rev. A) evaluates the addition of a vent line on vessel HDH-VSL-00002/00004 overflow line.

Appendix 10.1			
Replace:	24590-HLW-M5-V17T-P0006, Rev. 1	With:	24590-HLW-M5-V17T-P0006, Rev. 2
Appendix 10.2			
Replace:	24590-HLW-M6-HDH-P0001, Rev. 0	With:	24590-HLW-M6-HDH-P0001, Rev. 1
Replace:	24590-HLW-M6-HDH-P0002, Rev. 0	With:	24590-HLW-M6-HDH-P0002, Rev. 1
Replace:	24590-HLW-M6-HDH-P20001, Rev.0	With:	24590-HLW-M6-HDH-P20001, Rev. 1
Appendix 10.11			
Replace:	24590-CM-HC4-HXYG-00138-02-00012, Rev. 0	With:	24590-CM-HC4-HXYG-00138-02-00055, Rev. A

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

Enter Relevant WAC 173-303-830, Appendix I Modification citation number: N/A

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

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

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

Reason for denial:

Reviewed by Ecology:

S. Dahl — Date: June 21 05

[1] Class 1 modifications requiring prior Agency approval.

[2] This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

R10571126

COGEMA-IA-081, Rev. 0

STRUCTURAL INTEGRITY ASSESSMENT OF THE HIGH LEVEL WASTE (HLW) CANISTER DECONTAMINATION HANDLING SYSTEM (HDH) ANCILLARY EQUIPMENT

Job No 24590

Bechtel National, Inc

SUPPLIER DOCUMENT STATUS

1. [X] Work may proceed.
2. [ ] Revise and resubmit. Work may proceed subject to resolution of indicated comments.
3. [ ] Revise and resubmit. Work may not proceed.
4. [ ] Review not required. Work may proceed.

Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations.

REVIEWED									

G-321 Document Category N/A
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable, or "N/A" if SSRS is used]

Supersedes BNI Document No. _____ Rev _____
[When applicable]

Accepted by M. W. Hoffmann (Print Name) (Signature) 5/19/05 (Date)

Released by _____ (Print Name) _____ (Signature) _____ (Date)
[When applicable]

416 GP&S 7-03

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

24590-CM-HC4-HXYG-00138-02-00055 Rev 00A

IQRPE REVIEW
OF
THE HIGH LEVEL WASTE (HLW) CANISTER DECONTAMINATION HANDLING SYSTEM (HDH) ANCILLARY EQUIPMENT

"I, Tarlok Hundal have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the High Level Waste (HLW) Canister Decontamination Handling System (HDH) Ancillary Equipment as required by the Washington Administrative Code, *Dangerous Waste Regulations*, Section WAC-173-303-640(3) (a) through (g) applicable components."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design fully satisfies the requirements of the WAC.

The attached review is seven (7) pages numbered one (1) through seven (7).

TARLOK SINGH HUNDAL
STATE OF WASHINGTON
20213
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES: 02/15/06

T S Hundal
Signature

5/13/05
Date

Scope	Scope of this Integrity Assessment	This Integrity Assessment addresses ancillary equipment associated with the High Level Waste (HLW) Canister Decontamination Handling System (HDH) vessels located in the south east corner of the HLW facility. The ancillary equipment associated with these vessels is shown on P&ID drawings 24590-HLW-M6-HDH-P0001, -P0002, and -P20001. This includes the ancillary equipment associated with the following HDH vessels : (1) One Canister Rinse Bogie Decon Vessel (HDH-VSL-00001) located at Elevation (-) 16'-6" in Room H-B039B; a secondary containment structure. (2) Two Canister Decon Vessels (HDH-VSL-00002/4) and one Waste Neutralization Vessel (HDH-VSL-00003), all located at Elevation (-) 16'-0" in Room H-B035; a secondary containment structure. Ancillary equipment located inside the HLW (HDH) system vessels is addressed separately in the Integrity Assessments for these plant items.
References	Drawings and System Description	Drawings: 24590-HLW-P1-P01T-P0001, Rev. 6, HLW Vitrification Building General Arrangement (Permit) Plan at El.(-)21'- 0"; 24590-HLW-P1-P01T-P0002, Rev. 3, HLW Vitrification Building General Arrangement (Permit) Plan at El. 0'- 0"; 24590-HLW-P1-P01T-P0009, Rev. 6, HLW Vitrification Building General Arrangement (Permit) Sections D-D, E-E & F-F; 24590-HLW-P1-P01T-P0010, Rev. 6, HLW Vitrification Building General Arrangement (Permit) Section G-G & H-H; 24590-HLW-M6-HDH-P0001, Rev. 1, P&ID –HLW Canister Decontamination Handling System; 24590-HLW-M6-HDH-P0002, Rev. 1, P&ID – HLW Canister Decontamination Handling System; 24590-HLW-M6-HDH-P20001, Rev. 1, P&ID – HLW Canister Decontamination Handling System; 24590-HLW-M5-V17T-P0006, Rev. 2, P&ID –Process Flow Diagram HLW Canister Decon (System HDH). 24590-QL-POA-MQTS-00002-01-86, Rev. 000C, Decontamination Vessel Pump Assembly (HDH-PMP-00001); 24590-HLW-P3-HDH-WS00010001, Rev. 0, HLW Vitrification Isometric (Line No. HDH-WS-00010-T11A-1); 24590-HLW-P3-HDH-ZT00008001, Rev. 0, HLW Vitrification Isometric (Line No. HDH-ZT-00008-S11P-1); 24590-HLW-P3-HDH-PA00003001, Rev. 1, HLW Vitrification Isometric (Line No. HDH-PA-00003-T11A-3); 24590-HLW-P3-HDH-DB00007001, Rev. A, HLW Vitrification Isometric (Line No. HDH-DB-00007-T11A-1); 24590-HLW-P3-HDH-PA00007001, Rev. A, HLW Vitrification Isometric (Line No. HDH-PA-00007-S11F-2); 24590-HLW-HDH-H00013, Rev. 0, Pipe Support Drawing; 24590-HLW-HDH-H00015, Rev. 0, Pipe Support Drawing; 24590-HLW-HDH-H30050, Rev. 0, Pipe Support Drawing; 24590-HLW-HDH-H20004, Rev. 0, Pipe Support Drawing; 24590-HLW-HDH-H30003, Rev. 0, Pipe Support Drawing. System Description: 24590-HLW-3YD-HDH-00002, Rev. 2, System Description for HLW System Canister Decontamination Handling.
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure that the design fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations* for Tank Systems.

	Information Assessed	Source of Information	Assessment
Design	Ancillary equipment design standards are appropriate and adequate for the equipment's intended use.	Drawings and System Description listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers.	The Pipe Stress Design Criteria identifies ASME B31.3 as the design code for piping systems of the WTP. The Process System Description document states that the HDH system does not have any important to safety function. Drawings show that the ancillary equipment is of commercial quality grade and is Seismic Category SC-III. The Pipe Stress Design Criteria document provides a detailed discussion of seismic categories. The codes and standards used are acceptable and adequate for the design of the ancillary piping for the intended service.
	If the ancillary equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-3DP-G04T-00906, Rev. 2, Isometric Drawings and Associated Calculations.	The ancillary equipment are designed and built to the design standards and codes. The Pipe Stress Design Criteria specifies that piping is to be designed in accordance with ASME B31.3 Code. The review of the sample isometric drawings listed in References and of the design process and controls described in Isometric Drawings and Associated Calculations document provides adequate assurance that HDH ancillary equipment are properly designed, installed, and verified to meet the requirements of the applicable design criteria established for the project. The documentation reviewed demonstrates that sound design engineering principles are used for the design and construction.

Information Assessed		Source of Information	Assessment
Design	Ancillary equipment has adequate strength at the end of its design life to withstand the operating pressure, operating temperature, thermal expansion, and seismic loads. Equipment is protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.	24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" ASME Boiler and Pressure Vessel Code, Section III, Division 1, Rules for Construction of Nuclear Power Plant Components, American Society of Mechanical Engineers, 1995; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; Uniform Building Code (UBC), 1997; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment.	The Pipe Stress Design Criteria requires the use of the ASME B31.3 Code for process piping design. ASME B31.3 requires explicit consideration of operating pressure, operating temperature, thermal expansion/contraction, settlement, vibration, and corrosion allowance in the design of piping. ASME Section III, Subsection NC and Appendix F, and the Uniform Building Code (UBC) are used to supplement the requirements of ASME B31.3 for seismic design of Seismic Category (SC-III/IV) ancillary equipment. Details of the seismic design methods are discussed in the Pipe Stress Design Criteria document. These are appropriate and adequate codes and standards to assure that the ancillary equipment has adequate strength at the end of its design life to withstand all anticipated loads.

	Information Assessed	Source of Information	Assessment
Supports	Ancillary equipment supports are adequately designed.	Drawings listed above under References; 24590-WTP-DC-PS-01-002, Rev. 3, Pipe Support Design Criteria; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code, Section III, Division 1, Rules for Construction of Nuclear Power Plant Components, American Society of Mechanical Engineers, 1995; Uniform Building Code (UBC), 1997; 24590-WTP-PER-PS-02-001, Rev. 4, Ancillary Equipment Pipe Support Design; 24590-WTP-PL-PS-01-001, Rev 1, Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS). 24590-QL-POA-MQTS-00002-02-10, Rev. 00B, Stress Analysis of Decontamination Pump Support Frame; 24590-WTP-3DP-G04T-00906, Rev. 2, Isometric Drawings and Associated Calculations.	The Pipe Support Design Criteria document considers all loadings identified in ASME B31.3 and utilizes ASME BPV Code, Section III, Division 1, Subsection NF and Appendix F and UBC, to supplement the requirements of ASME B31.3 for seismic design of Seismic Category (SC-III/IV) pipe supports. Bounding load cases are passed to the pipe support designers from the results of the ancillary equipment piping stress analyses. Details of the seismic design methodology are discussed in the Pipe Support Design Criteria document. Examples of typical ancillary equipment supports are shown in the Ancillary Equipment Pipe Support Design document. Analysis is by manual calculation or approved computer programs that have been verified and validated. These are appropriate codes and standards for design of ancillary equipment supports for the HDH system. Ancillary equipment supports are to be designed to allow a minimum of heat to be transferred to the building structures. The temperature of the building structures is not to exceed 150°F for concrete and 200°F for steel. The review of the sample isometric drawings, support calculations, and drawings and that of the design process and controls described in Isometric Drawings and Associated Calculations document provides sufficient assurance that HDH ancillary equipment supports are adequately designed, installed, and verified to meet the requirements of the applicable design criteria established for the project.
	The system will withstand the effects of frost heave.	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 6, Structural Design Criteria.	The HDH ancillary equipment system considered in this assessment is located inside the process cells at Elevation (-) 16'-0", in the HLW facility. The Structural Design Criteria requires that all structural foundations shall extend into the surrounding soil below the frost line to preclude frost heave. The HLW facility structural foundations are well below the grade elevation, therefore, the HDH system is not subjected to any frost heave effects.

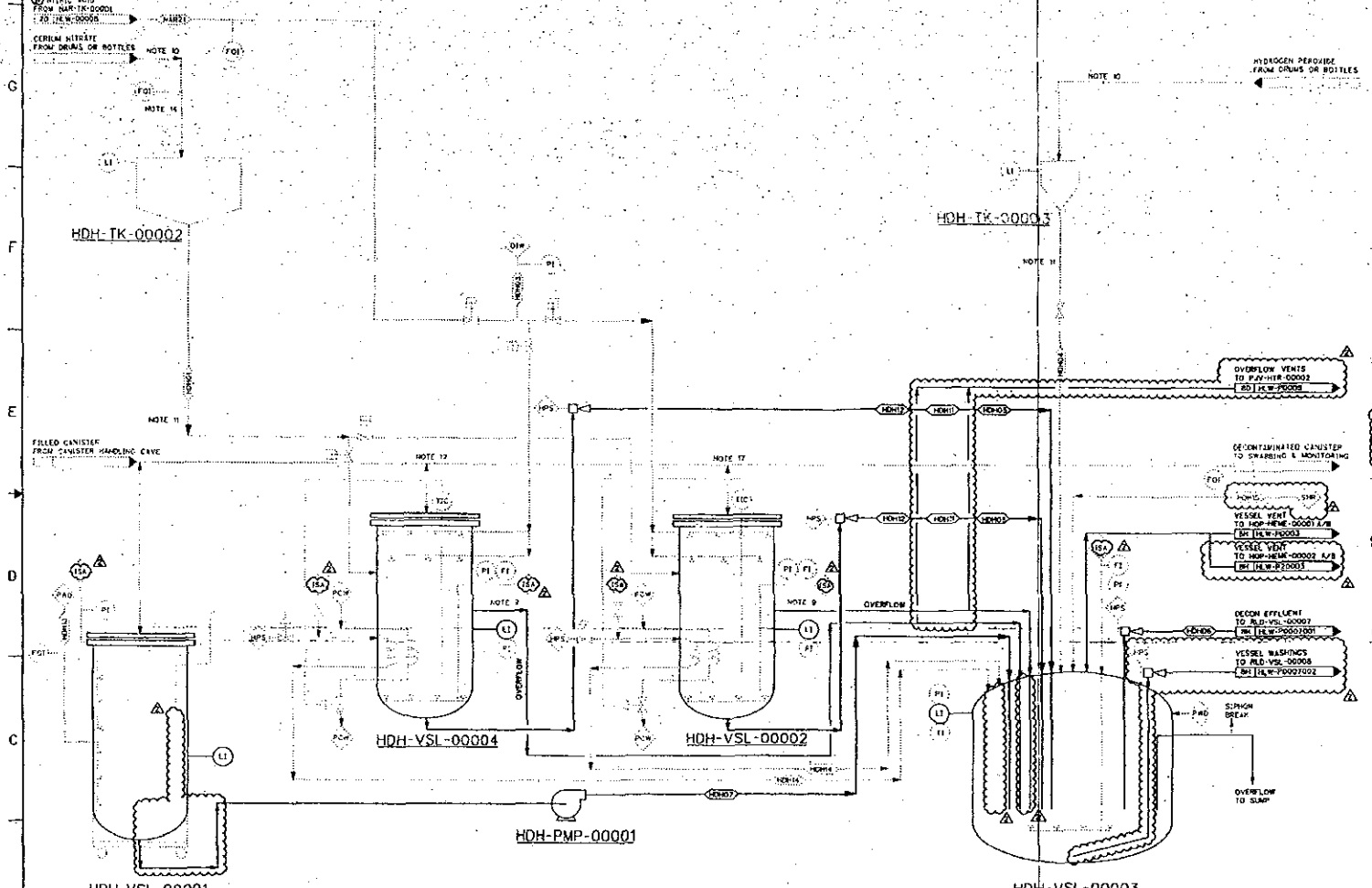
Information Assessed		Source of Information	Assessment
Connections	Seams and connections are adequately designed.	24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME B16.5, Piping Flanges and Flanged Fittings, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications, American Society of Mechanical Engineers.	The Pipe Stress Design Criteria specifies the ASME B31.3 Process Piping design code for the piping systems. Welding is to be performed in accordance with the requirements of ASME B31.3 and the ASME B&PV Code, Section IX. ASME B16.5 is specified for flange designs. These are appropriate codes and standards for design and fabrication of the HDH System ancillary equipment.
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, temperature)	System Description listed above under References; 24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems; 24590-WTP-PER-PR-03-002, Rev. 2, Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Treatment Unit Systems.	The HDH System Description states that the Canister Rinse Bogie Decon Vessel (HDH-VSL-00001), Canister Decontamination Vessels (HDH-VSL-00002/4), and Waste Neutralization Vessel (HDH-VSL-00003) have no important to safety functions. The primary function of the HDH ancillary equipment is containment of the radioactive decontamination fluids. The Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems document indicates that flammable or explosive concentrations of hydrogen are not expected in the HLW facility systems ancillary equipment. Similarly, the Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Treatment Unit Systems document provides a summary of the HLW facility ancillary equipment design features that provide for confinement and treatment of chronically toxic vapors and emissions during normal operations, abnormal operations, and during and after a Design Basis seismic event.
	Ancillary equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	System Description listed above under References; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment.	The Materials for Ancillary Equipment document specifies that ancillary equipment materials that contact the waste are to be equal to or better than those of the upstream source vessels. The System Description states that compatible reagents (Nitric Acid from tank NAR-TK-00001, Ceric Nitrate from tank HDH-TK-00002, and Hydrogen Peroxide from tank HDH-TK-00003) are added to the HDH vessels during normal operations.

	Information Assessed	Source of Information	Assessment
Compatibility	The pH range of the waste, waste temperature and the corrosion behavior of the structural materials are adequately addressed. Ancillary equipment material and protective coatings ensure the ancillary equipment structure is adequately protected from the corrosive effects of the waste stream and external environments. The protection is sufficient to ensure the equipment will not leak or fail for the design life of the system.	24590-WTP-DB-ENG-01-001, Rev. 1C, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-3PS-NN00-T0001, Rev. 0, Engineering Specification for Hot and Anti-Sweat Thermal Insulation.	The Basis of Design document identifies a service design life of 40 years for the ancillary equipment. Detailed materials selection (corrosion) evaluations are conducted for each vessel in the HLW facility during process design to assure a 40 year service life. The Materials for Ancillary Equipment document requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessel. The Thermal Insulation specification requires that all insulating materials used on the outside of ancillary equipment be pre-approved for use on austenitic stainless steel in accordance with applicable ASTM standards and tests to preclude external corrosion of ancillary equipment. Therefore, the ancillary equipment will provide the expected design service life.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the ancillary equipment.	System Description listed above under References; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description. 24590-WTP-DB-ENG-01-001, Rev. 1C, Basis of Design;	ASME B31.3 is the design code for the WTP piping. Consideration of corrosion, including corrosion allowance, is a mandatory requirement of ASME B31.3. A required service life of 40 years is identified in the Basis of Design for ancillary equipment. Detailed materials selection (corrosion) evaluations are conducted for each vessel in the HLW facility during process design to assure a 40 year service life. The Materials for Ancillary Equipment document requires that downstream ancillary equipment is to be constructed of equal or better materials, and with the same corrosion allowance as the source vessel. Corrosion/Erosion allowances are listed for the ancillary equipment (each piping class and associated valves, fittings, etc.) in the Piping Material Class Description document.

	Information Assessed	Source of Information	Discussion
Strength	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessels are exceeded.	24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers.	The Pipe Stress Design Criteria document specifies ASME B31.3 as the design code for the WTP piping. ASME B31.3 requires provision be made to safely contain or relieve any pressure to which the piping may be subjected. ASME B31.3 piping not protected by a pressure relieving device, or that can be isolated from a pressure reliving device must be designed for at least the highest pressure that can be developed.
	Maximum flows and any unusual operating stresses are identified	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description.	The expected flow paths for the ancillary equipment are identified on the P&ID drawings. The Pipe Stress Design Criteria specifies the ASME B31.3 code for piping design. This code requires piping to be designed to the highest pressure that can be developed in a piping system assuring that maximum operating stresses remain within code allowables. Piping material classes are shown on the P&ID drawings, embedded in the item numbers for each ancillary equipment component. The Piping Material Class Description document lists the bounding pressure and temperature limits for each piping material class.
Secondary Containment	Ancillary equipment is designed with secondary containment that is constructed of materials compatible with the waste and of sufficient strength to prevent failure (pressure gradients, waste, climatic conditions, daily operations), provided with a leak-detection system, and designed to drain and remove liquids.	Drawings listed above under References.	The ancillary equipment considered in this assessment is located in Rooms H-B039B and H-B035, within the HLW building. These HLW rooms or cells are secondary containment concrete structures provided with stainless steel liner plates and sumps (HDH-SUMP-00001/3), as shown on the general arrangement drawings, which are outside the scope of this integrity assessment. The assessment of the secondary containment structures is conducted in a separate document.

24590-HLW-M6-V17T-P0006

PLANT ITEM NUMBER / DESCRIPTION	HDH-TK-00002 CERIUM 4+ ADDITION TANK	HDH-VSL-00001 CANISTER RINSE BOGIE DECON VESSEL	HDH-VSL-00004 CANISTER DECON VESSEL (2)	HDH-PMP-00001 BOGIE DECON CANISTER PUMP	HDH-VSL-00002 CANISTER DECON VESSEL	HDH-TK-00003 HYDROGEN PEROXIDE ADDITION TANK	HDH-VSL-00003 WASTE NEUTRALIZATION VESSEL



NOTES:

1. SEE DRAWING 24590-HLW-M6-V17T-P0001 FOR SYMBOLS AND LEGEND
2. MAJOR INDICATION AND CONTROL INSTRUMENTATION ONLY SHOWN
3. VALVES SHOWN ONLY TO INDICATE PROCESS INTENT
4. DELETED
5. DELETED.
6. DELETED
7. DELETED.
8. DELETED.
9. DURING NORMAL OPERATION, EACH CANISTER DECONTAMINATION VESSEL'S OVERFLOW ACTS AS AN INTENTIONAL VENT PATH WHEN THE VESSEL CONTAINMENT LID IS OPEN. THE VENT PATH GENERATES AN AIR SWEEP TO MINIMIZE CONTAMINATION SPREAD DURING CANISTER INSERTION AND REMOVAL. HOWEVER, IT WILL GENERATE A SHORT, BUT SIGNIFICANT, INCREASE IN VESSEL VENTILATION GAS FLOW.
10. CERIUM NITRATE AND 30 WT% HYDROGEN PEROXIDE SOLUTIONS ARE MANUALLY LOADED.
11. HDH01 AND HDH04 ARE GRAVITY TRANSFERS
12. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
13. DELETED
14. LOCAL FLOW TOTALIZER WILL BE INSTALLED ON THE PORTABLE TRANSFER LINE CONNECTING HDH-TK-00002 TO A CERIUM STORAGE DRUM.
15. DELETED.
16. DELETED.
17. EACH CANISTER ENTERS ONLY ONE OF THE CANISTER DECON VESSELS: HDH-VSL-00002/4 DURING THE DECONTAMINATION PROCESS.
18. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON-PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.

REFERENCES:

1. DELETED.
2. DELETED.
3. DELETED.
4. DELETED.
5. DELETED.
6. DELETED.
7. DELETED.
8. DELETED.
9. DELETED.
10. DELETED.
11. DELETED.

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV	DESCRIPTION	CHKD	CHKD	APVD	APVD	DATE
2	ISSUED FOR PERMITTING USE					
1	ISSUED FOR PERMITTING USE	RR	MJ	JP	JFS	3-3-04
0	ISSUED FOR PERMITTING USE	RR	SC	AO	GO	10-4-02

REVISION HISTORY

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

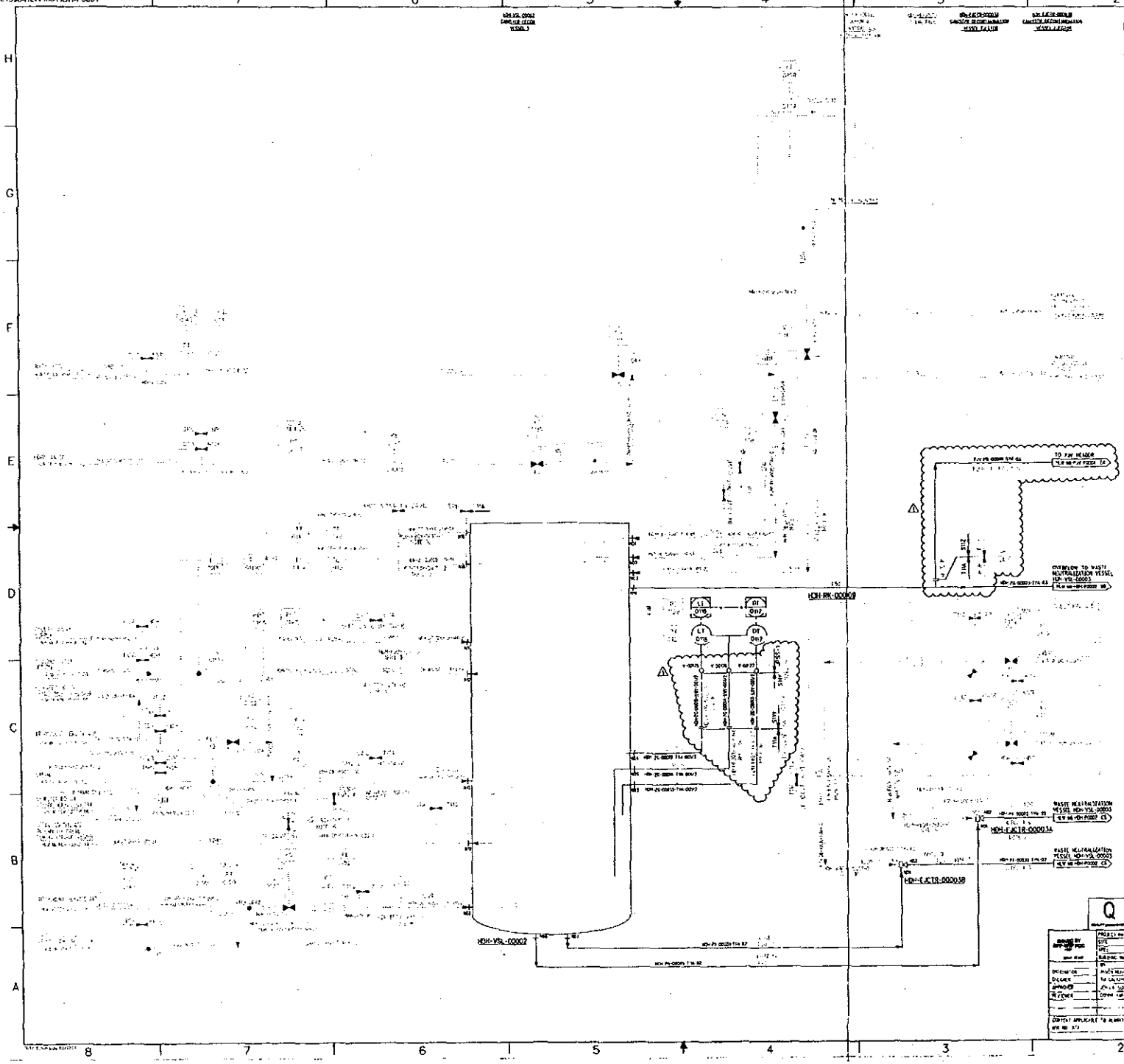
CONTRACT No. DE-AC27-01RV14136

PROCESS FLOW DIAGRAM
HLW VITRIFICATION
HLW CANISTER DECON
(SYSTEM HDH)

SCALE NTS | 24590-HLW-M6-V17T-P0006 | REV 2

BEST AVAILABLE COPY

24590-HLW-M6-HOH-P0001



NOTES:

THE FOLLOWING NOTES ARE GENERAL NOTES FOR HOH SYSTEM

1. SEE DRAWINGS 24590-WTP-M6-S0-P0001 THROUGH 24590-WTP-M6-S0-P0004 FOR GENERAL NOTES, SYMBOLS AND LEGEND.

THE FOLLOWING NOTES ARE SPECIFIC TO THIS DRAWING.

5. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.

20. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.

REFERENCES:

1. PROCESS FLOW DIAGRAM HLW VITRIFICATION HOH CANISTER DECON (SYSTEM HOH), 24590-WTP-M5-V101-P0006.

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA) ARE REGULATED BY THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ISSUES, THAT PURSUANT TO THE AEA IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIAL AT DOE OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN OR IN THE DRAWING(S) IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV.	DESCRIPTION	DRN	CHK	APPROVED	DATE
1	ISSUED FOR PERMITTING USE	KAH	SK	GJ	12/7/05
0	ISSUED FOR PERMITTING USE	JM	MC	AJ	11/14

REVISION HISTORY

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

P&ID HLW CANISTER DECONTAMINATION HANDLING SYSTEM

24590-HLW-M6-HOH-P0001 REV 1

BEST AVAILABLE COPY

24590-HLW-M6-HDH-P0002

NOTES:

THE FOLLOWING NOTES ARE GENERAL NOTES FOR HDH SYSTEM.

1. SEE DRAWINGS 24590-WTP-M6-S0-P0001 THROUGH 24590-WTP-M6-S0-P0006 FOR GENERAL NOTES, SYMBOLS AND LEGEND.
2. [illegible]

THE FOLLOWING NOTES ARE SPECIFIC TO THIS DRAWING.

3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. AN INFLATABLE SEAL IS INSTALLED AT THE TOP OF THE CONTAINER.
8. [illegible]
9. [illegible]
10. [illegible]
11. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
12. [illegible]
13. [illegible]
14. [illegible]
15. [illegible]
16. [illegible]
17. [illegible]
18. [illegible]
19. [illegible]
20. [illegible]
21. [illegible]
22. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.

[illegible]

1. [illegible]
2. [illegible]
3. [illegible]

REFERENCES:

1. PROCESS FLOW DIAGRAM HLW VITRIFICATION HLW CANISTER DECON (SYSTEM HDH), 24590-HLW-M5-VIT1-P0006.
2. [illegible]
3. [illegible]
4. [illegible]

REV	DESCRIPTION	ORIG	CHKD	REVWD	APVD	DATE
1	ISSUED FOR PERMITTING USE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0	ISSUED FOR PERMITTING USE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

REVISION HISTORY

Q

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT NO. DE-AC27-01RV14136

P&ID - HLW
CANISTER DECONTAMINATION HANDLING SYSTEM

SCALE: NONE

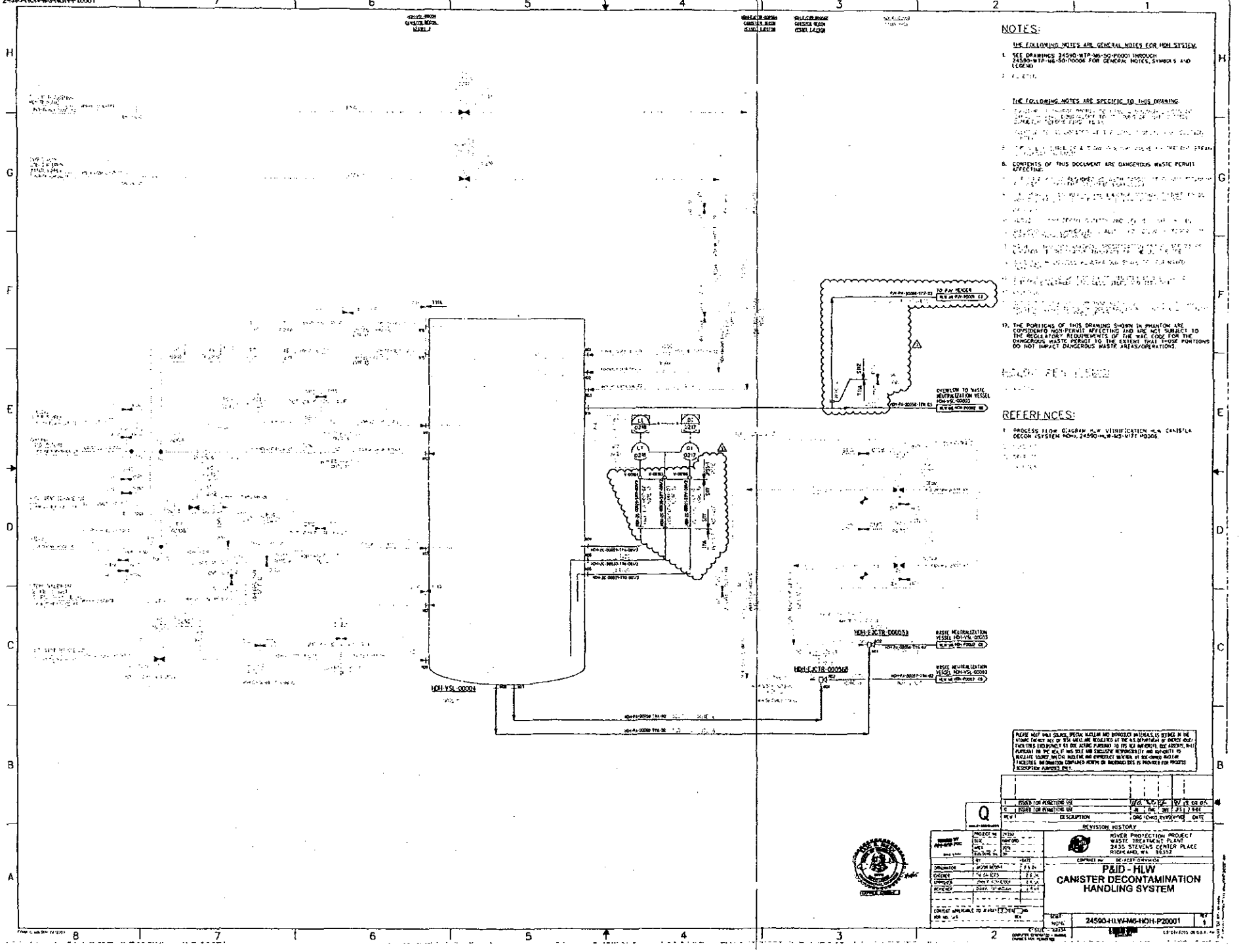
24590-HLW-M6-HDH-P0002

REV 1

BEST AVAILABLE COPY

BEST AVAILABLE COPY

24590-HLW-M5-HOH-P20001



Attachment 2
05-ED-045

System Description for HLW System HDH Canister Decontamination Handling (24590-HLW-3YD-HDH-00002, Revision 2)

R10487052

ISSUED BY
RPP-WTP PDC

Document title: **System Description for HLW System HDH Canister Decontamination Handling**

Contract number: DE-AC27-01RV14136

Department: HLW Mechanical Handling

Author(s): Julian Leam

Principal author signature:

Document number: 24590-HLW-3YD-HDH-00002, Rev 2

Checked by: Alfredo Ceja

Checker signature:

Date of issue: 2-17-05

Issue status: Approved

Approved by: John Schneider

Approver's position: HLW Area Project Engineering Manager

Approver signature: SLW for

Content applicable to ALARA? ☑ Yes ☐ No

ADR No. 24590-HLW-ADR-M-02-002 **Rev** 1

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process desciption purposes only.

River Protection Project
Waste Treatment Plant
2435 Stevens Center Place
Richland, WA 99354
United States of America
Tel: 509 371 2000

History Sheet

Rev	Date	Reason for revision	Revised by
0	10/30/03	Issued for Design - Supersedes SD-W375HV-G00002 Rev C	Julian Leam
1	12/16/03	Issued for Design - Added Appendix G and Appendix H, Performed general revision-see revision bars	Julian Leam
2	2/17/05	Issued for Design - General rewrite to incorporate System HDH process decontamination equipment and TAC. Incorporated System Description Change Notice: 24590-HLW-3YN-HDH-00001 24590-HLW-3YN-HDH-00002 24590-HLW-3YN-HDH-00003 Supercedes 24590-HLW-3YD-HDH-00001, Rev. 1	Julian Leam

Contents

Abbreviations and Acronyms vi

Glossary viii

1 Introduction 1

2 Scope 1

2.1 System Identification 1

2.2 Limitations for Use 3

3 Functions 3

3.1 Primary Functions 3

3.2 Store and Supply Reagents 4

3.3 Recover and Install Equipment 4

3.4 Important to Safety Functions 4

4 Requirements 4

4.1 General Requirements 4

5 Design Standardization 5

5.1 Hatches (24590-HLW-AD-HDH-HTCH-00002, 24590-HLW-AD-HDH-HTCH-00003, 24590-HLW-AD-HDH-HTCH-00004) 5

5.2 Decontamination Cave Crane (24590-HLW-MJ-HDH-CRN-00005) 5

5.3 Crane Maintenance Vertical Shield Door (24590-HLW-AD-HDH-DOOR-00002) 5

5.4 Shielded Personnel Access Doors (24590-HLW-AD-HDH-DOOR-00003, 24590-HLW-AD-HDH-DOOR-00004, 24590-HLW-AD-HDH-DOOR-00005, 24590-HLW-AD-HDH-DOOR-00006) 5

5.5 Canister Grapple (24590-HLW-FH-HDH-TOOL-00001) 5

5.6 Canister Rinse Bogie (24590-HLW-MQ-HDH-TRLY-00003) 6

5.7 Canister Storage Transfer Bogie (24590-HLW-MQ-HDH-TRLY-00004) 6

5.8 Canister Storage Rack (24590-HLW-MH-HDH-MHAN-00006) 6

5.9 Swabbing Equipment 6

5.10 Posting Equipment 6

5.11 Process Equipment 6

6 Description 9

6.1 Configuration Information 9

6.2 Description of Mechanical Handling Equipment 12

6.3 Description of Process Equipment 20

6.4 Utilities 25

6.5 Cameras and Lights 25
6.6 Design Considerations 25
7 Operations 27
7.1 Normal Operation 27
7.2 Off-normal Operations 40
8 Maintenance 45
8.1 Platforms 45
8.2 Equipment 45
9 Interfacing Systems 45
10 Applicable Documents 46
10.1 Regulatory Documents 46
10.2 WTP Project Documents 47
10.3 System Documents 48
10.4 Supplemental Documents 48
11 Appendices 49

Appendices

Appendix A –Supporting Documents A-1
Appendix B – Requirements and Compliance Matrix B-1
Appendix C –Major Equipment List C-1
Appendix D –Canister Decontamination Handling System HDH Layout D-1
Appendix E –Maintenance Platform Table E-1
Appendix F –Maintenance Equipment Table F-1
Appendix G -Test Acceptance Criteria G-1
Appendix H -Ceric Nitrate Solution Material Safety Data Sheet (MSDS) H-1
Appendix I -Normal Operations Sequence Diagrams I-1
Appendix J -Sequence Times J-1
Appendix K –Mechanical Flow Diagram Level I K-1
Appendix L -Mechanical Flow Diagram Level II, Diagram-01 ..... L-2

Tables

Table 1 Piping Systems/Class/Fluid Code 7
Table 2 Crane Data 12
Table 3 Canister Rinse Bogie Data 15
Table 4 Canister Storage Transfer Bogie Data 15
Table 5 Canister Hatches Data 16
Table 6 Faults Indicated by HDH Alarms and Trips 43
Table 7 System HDH Interfaces 45

Figures

Figure 1 Canister Decontamination Cave Layout 2
Figure 2 Simplified Process Flow Diagram for the HLW Canister Decontamination System 10
Figure 3 Canister Decontamination Vessels Removable Coil Assembly (24590-HLW-MV-HDH-VSL-00002/4) 23
Figure 4 Canister Decontamination Rinse Bogie Vessel (24590-HLW-MV-HDH-VSL-00001) and Canister Decon Vessels (24590-HLW-MV-HDH-VSL-00002/4) State Diagrams 28
Figure 5 Waste Neutralization Vessel (24590-HLW-MV-HDH-VSL-00003) and Cerium 4+ Addition Tank (24590-HLW-MT-HDH-TK-00002) State Diagrams 29
Figure 6 Hydrogen Peroxide Addition Tank (24590-HLW-MT-HDH-TK-00003) and Canister Decontamination Rinse Bogie Pump (24590-HLW-MP-PMP-00001) State Diagrams 30

Abbreviations and Acronyms

AB	Authorization Basis
ALARA	As Low As Reasonably Achievable
ANSI	American National Standard Institute
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
BNFL	British Nuclear Fuels Limited
BOD	Basis of Design
BOF	Balance of Facilities
C3V	C3 Ventilation System
C5V	C5 Ventilation System
CAS	Chemical Abstract Service
CCN	Correspondence Control Number
CCTV	Closed Circuit Television
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980CFL Cave Face Layout
CFR	Code of Federal Regulations
CMAA	Crane Manufacturers Association of America, Inc.
CMA	Crane Maintenance Area
CWC	Central Waste Complex
DCD	Design Criteria Database
DIW	Demineralized Water System
DOE	Department of Energy
DOT	Department of Transportation
DPD	Design Proposal Drawing
E&NS	Environmental and Nuclear Safety
FS	Functional Specification
GA	General Arrangement Drawing
HDH	HLW Canister Decontamination Handling System
HEH	HLW Canister Export Handling System
HPH	HLW Canister Pour Handling System
HIW	Holes in Walls
HLW	High Level Waste
HPS	High Pressure Steam System
HVAC	Heating, Ventilation, and Air Conditioning
IHLW	Immobilized High-Level Waste
ISA	Instrument Service Air System
ISM	Integrated Safety Management

ISMP	Integrated Safety Management Plan
ITS	Important to Safety
LAW	Low Active Waste
LVE	Low Voltage Electrical (480/208/120 V) System
MCOMP	Major Component Requirement
MDS	Mechanical Data Sheet
MFD	Mechanical Flow Diagram
MHD	Mechanical Handling Diagram
MMS	Maintenance Management System
MSD	Mechanical Sequence Diagram
MSDS	Material Safety Data Sheet
MSM	Master Slave Manipulator
MTG	Metric Tons of Glass
NAR	Nitric Acid Reagent System
NEMA	National Electrical Manufacturers Association
NIOSH	National Institute for Occupational Safety and Health
NFPA	National Fire Protection Agency
ORD	Operations Requirement Document
OSHA	Occupational Safety and Health Administration
P&E	Plant and Equipment Layout
P&ID	Piping and Instrumentation Diagram
PCS	Process Control System
PCW	Plant Cooling Water System
PDS	Process Data Sheet
PFD	Process Flow Diagram
PJV	Pulse Jet Ventilation System
PSA	Plant Service Air System
PSAR	Preliminary Safety Analysis Report
PSW	Process Service Water System
PTF	Pretreatment Facility
PVV	Process Vessel Vent Extraction System
PWD	Plant Wash and Disposal System
RCRA	Resource Conservation and Recovery Act
RFD	Reverse Flow Diverter
RLD	Radioactive Liquid Waste Disposal System
RPP	Radiological Protection Plan
RPP-WTP	River Protection Project - Waste Treatment Plant
SARA	Superfund Amendments and Reauthorization Act
SCW	Steam Condensate Water System
SDS	Safety Design Significant
SDC	Safety Design Class
SDP	Sellafield DryPac Plant
SFUNCT	System Functional Requirements

SHR	Sodium Hydroxide Reagent System
SIPD	Standards Identification Process Database
SRD	Safety Requirements Document
SSC	Structures Systems Components
SWL	Safe Working Load
TRU	Transuranic Element
TSCA	Toxic Substances Control Act
WAC	Washington Administrative Code
WASRD	Waste Acceptance System Requirements Document
WPEP	Waste Packaging & Encapsulation Plant
WTP	Waste Treatment Plant
WVDP	West Valley Demonstration Project

Glossary

Abnormal operations	Predetermined activities/sequences, based on postulated scenarios, that are considered recovery actions from an out-of-specification or upset condition to return the plant to normal operations.
Administrative controls	Provisions relating to organization and management, based on postulated scenarios, that are considered recovery actions from an out-of-specification or upset condition to return the plant to normal operations.
Alarm	An electronic device that serves to warn of off-normal conditions by means of a sound or signal.
Batch Capacity	Batch volume plus contingency.
Batch Volume	Volume of transferred process liquid/slurry received into a vessel or tank during a specified time cycle.
Bogie	Wheeled cart pulled along guide rails used primarily to transport the canister decontamination rinse bogie vessel (24590-HLW-MV-HDH-VSL-00001)
Control Area	Location of remote operator interface with the system. Remote controls for equipment or processes and alarms are located here.
Inhibit	Interlock which does not allow a device to change state or a sequence to start. Once a device has changed state of a sequence has started, inhibits continue to have an effect on the device or sequence.
Maximum capacity	The maximum available space in the vessel or tank below the overflow level; the sum of the operating volume and operator response volume at high levels.
Normal operations	Frequent or infrequent activities/sequences that are performed within the bounds of normal parameters and specifications.

Permissive	Interlock which allows a device to change state or a sequence to start. Once a device has changed state or a sequence has started, permissives have no further effect on the device or sequence.
Rack	Loop of piping extending through a shielded process cell wall, allowing hands-on access to process components without entering or opening the process cell.
Set point control	Type of primary control dedicated to maintaining a process variable or variables at or near some desired value.
State	The condition of an equipment entity (e.g., pump, vessel, column) at a given time.
Trip	Interlock which does not allow a device to change state or a sequence to start. Once a device has changed state or a sequence has started, trips continue to have an effect on the device or sequence.

This page intentionally left blank.

1 Introduction

Radioactive and chemical wastes are stored in underground tanks at the Department of Energy's Hanford Site in southeastern Washington State. The Waste Treatment Plant (WTP) will convert this waste into a stable solid by mixing it with molten glass in a process known as vitrification. Bechtel National, Inc is the Prime Contractor for the design, procurement, construction, and startup of the WTP.
The WTP site is located in the 200 East area of the Hanford Site. The site is approximately between 672' and 682' above mean sea level, generally sloping from the Southwest to the Northeast. The single process facility is made up of three facilities, Pretreatment (PTF), Low Active Waste (LAW), and High Level Waste (HLW). The balance of WTP facilities (BOF) are generally located to the South of the main WTP site.

HLW System HDH (HLW Decontamination Handling) is provided to ensure that non-fixed surface contamination is removed from Immobilized High Level Waste (IHLW) canisters prior to shipping. Following the canister rinse and chemical etch decontamination process, swabbing of the canister surface and monitoring of the swabs are performed to verify the effectiveness of the decontamination process prior to transportation of the canister to the Canister Export Cave (System HEH).

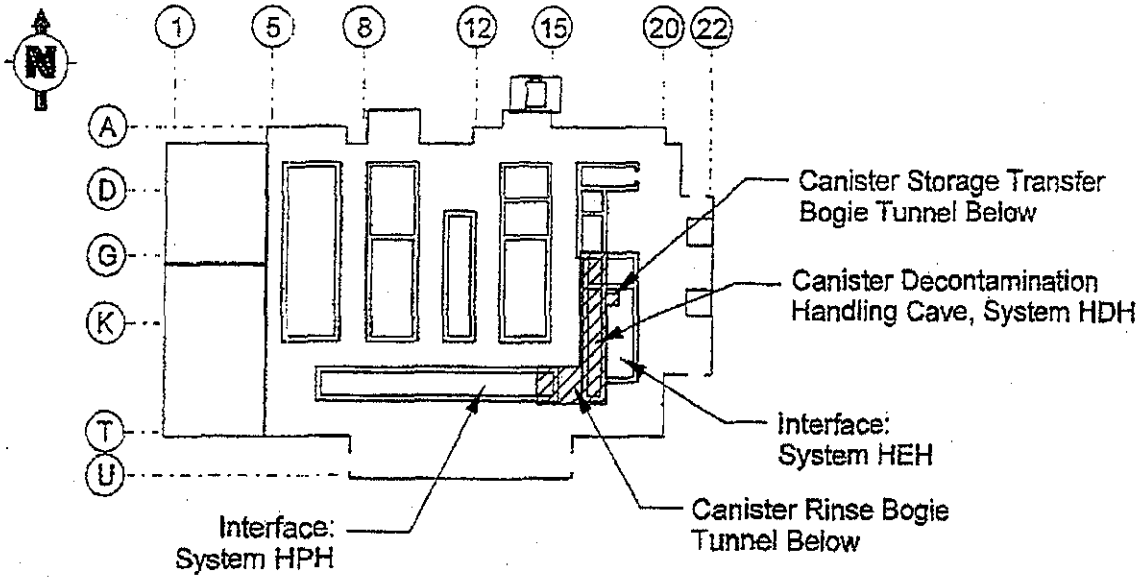
The cerium canister decontamination process has operated successfully at the West Valley Demonstration Project (WVDP). The WVDP process is the reference for the design of the HDH system within the River Protection Project - Waste Treatment Plant (RPP-WTP) HLW Vitrification plant.

2 Scope

2.1 System Identification

The HLW canister decontamination handling system takes filled and sealed canisters and decontaminates them using a ceric nitrate bath. The system includes all mechanical and process equipment necessary to perform these tasks, including the vessels and piping for the cerium process and the cranes and bogies for canister handling.

Figure 1 **Canister Decontamination Cave Layout**



Key Plan at 14'-0" Elevation

The IHLW canisters are to be constructed from stainless steel and are cylindrical, 4.5m (14' 9") long with a nominal diameter of 0.61m (2'). Safe handling and storage of the filled canisters requires that radionuclides not be present as smearable contamination on the outer walls of the canisters in concentrations greater than that specified in ICD14 and DOE letter CCN 090362. It is likely that during the glass pour and handling of the product canisters, contamination of the outer surface will occur, and therefore a product canister decontamination, swabbing and swab monitoring facility is required.

The purpose of System HDH, Canister Decontamination Handling, is to remove smearable radionuclide contamination from the filled and sealed canister surface, perform surface swabbing, swab monitoring and packaging of used swabs for disposal. System HDH includes canister rinse process and equipment to perform the cerium (Ce4+) chemical etching decontamination process to each canister. In addition to this, swabbing of the canister and canister weight and geometry measurement will be carried out in the decontamination cave.

The major interfaces with the HDH system are the HLW Canister Pour Handling system (HPH), HLW Canister Export Handling system (HEH), and Radioactive Liquid Waste Disposal system (RLD). The canisters are placed into the canister decontamination rinse bogie vessel (24590-HLW-MV-HDH-VSL-00001) by system HPH equipment. The interface is the hatch through which the canister is lowered into the canister rinse bogie. After decontamination, swabbing and monitoring, system HDH equipment positions the canister for collection by system HEH equipment. The interface with system HEH is at the hatch where the canister is raised into the HEH system. The neutralized decontamination effluents are sent to the RLD system for sampling. The interface with the RLD system is the wet process cell wallbox.

2.2 Limitations for Use

The Mechanical Handling and Process equipment described within this SD will be procured via design/supply procurements. The detailed design for the equipment mentioned herein will therefore not be completed until the chosen vendor finalizes their design.

3 Functions

3.1 Primary Functions

System HDH has two primary functions. The first of these functions is the removal of smearable radionuclides from the surface of the IHLW canister. The second function is the neutralization and return of the decontamination process effluent to the RLD system for sampling. The activities that cause these functions to be fulfilled are summarized in the following paragraphs.

3.1.1 Receive Canisters

The system receives canisters from the Canister Handling Cave (System HPH):

- Receive canister from System HPH into canister rinse bogie.
- Move rinse bogie to rinse position.

The system receives canister for rework:

- Canister is returned to decontamination vessel if swabbing indicates decontamination has been unsuccessful
- Canister is returned to System HPH via the Rinse Tunnel if glass deposits are discovered.

3.1.2 Decontaminate Canisters

The system rinses canisters:

- Contain and rinse removable gross contamination from canister surface.
- Remove rinse effluent from rinse bogie vessel to neutralization vessel.

The system decontaminates canisters and neutralizes the decontamination effluent:

- Etch canister surface to remove smearable radionuclides
- Remove decontamination effluent from decontamination vessel to neutralization vessel.
- Completely neutralize spent canister decontamination solution, specifically the ceric ion (Ce^{4+}).
- Transfer contents of neutralization vessel to the RLD system for sampling.

3.1.3 Transfer Canisters

The system transfers canisters to the decontamination vessel:

- Transfer canister from rinse bogie to Decontamination Cave
- Enter canister into decontamination vessel

The system transfers canisters to the swab station:

- Remove canister from decontamination vessel.
- Inspect canister for glass spatter.
- Weigh canister
- Transfer canister to Swabbing Station

The system transfers canisters to System HEH for eventual transfer to the Canister Export Cave:

- Canister is transferred to Storage Transfer Bogie.
- Move Storage Transfer Bogie to position for transfer into Storage Cave by System HEH equipment.

3.1.4 Report Data

The system swabs and monitors canisters for contamination:

- Swab underside of canister
- Monitor swab
- Swab top and sides of canister
- Monitor swabs
- Verify canister dimensions

The system reports other canister data such as weight and dimensions.

3.2 Store and Supply Reagents

The system stores and supplies reagents:

- Store reagents for decontamination process.
- Supply reagents to the decontamination process.

3.3 Recover and Install Equipment

For the recovery functions of the system see Section 7.2, Off-normal Operations. For the maintenance functions of the system see Section 8, Maintenance.

3.4 Important to Safety Functions

See Section 4.0 Requirements section for specific ITS functions.

4 Requirements

4.1 General Requirements

Refer to Appendix B

5 Design Standardization

Using standardized plant equipment improves operator familiarity with the equipment, reduces the maintenance training requirements, minimizes the spare parts inventories, reduces the maintenance procedures, and reduces the overall design effort. Items that are non-standard are minimized in the system.

5.1 Hatches (24590-HLW-AD-HDH-HTCH-00002, 24590-HLW-AD-HDH-HTCH-00003, 24590-HLW-AD-HDH-HTCH-00004)

Common design features were integrated into HLW designs to the extent practicable. Hatches are generally rack and pinion gear driven and are located near walls of the caves to facilitate out-cave through wall mechanisms. HLW tunnels will have limited access for maintenance operations.

Systems HPH and HEH both have similar shielded hatches.

5.2 Decontamination Cave Crane (24590-HLW-MJ-HDH-CRN-00005)

System HDH 6-ton overhead high integrity crane is similar to System HPH and HEH cranes.

5.3 Crane Maintenance Vertical Shield Door (24590-HLW-AD-HDH-DOOR-00002)

The Crane Maintenance Shield Door, in addition to all other vertical shielding and containment doors for cranes, incorporates a through floor screw jack design. Identical components have been utilized, where possible, to reduce the variation in types of parts required.

Shield doors having similar components to System HDH are the Melter Cave crane maintenance shield door (System HSH), Canister Storage crane maintenance shield door (System HEH), Canister Handling crane maintenance shield door (System HPH), and the Filter Cave crane maintenance shield door (System HFH).

5.4 Shielded Personnel Access Doors (24590-HLW-AD-HDH-DOOR-00003, 24590-HLW-AD-HDH-DOOR-00004, 24590-HLW-AD-HDH-DOOR-00005, 24590-HLW-AD-HDH-DOOR-00006)

The Shielded Personnel Access (SPA) door design will be used throughout the HLW facility with some variation in thickness depending on shielding requirements.

5.5 Canister Grapple (24590-HLW-FH-HDH-TOOL-00001)

The grapple design for lifting the IHLW canister is of a similar design used at the West Valley Demonstration Project (WVDP). The RPP-WTP and WVDP have similar canister and lid (primary and secondary) configurations. The main difference between the two canisters is the length (15' for RPP-WTP and 10' for WVDP) and the wall thickness. The dimensions of the canister flange and lids are identical; therefore, RPP-WTP utilizes the same concept as the WVDP grapple design.

5.6 Canister Rinse Bogie (24590-HLW-MQ-HDH-TRLY-00003)

The bogie chassis, axle assemblies, on board drive module, and recovery system have been standardized, as far as possible, across the HLW facility.

The canister rinse bogie is similar in design to System RWH bogies in that they all incorporate a floor mounted rail design and carry their payload above the rails.

5.7 Canister Storage Transfer Bogie (24590-HLW-MQ-HDH-TRLY-00004)

The bogie chassis, axle assemblies, on board drive module and recovery system have been standardized, where possible, across the HLW facility.

The canister storage transfer bogie is similar in design to System HRH, HPH and HEH bogies in that it incorporates an elevated rail design and carries its payload in a canister support sleeve that is supported through the bogie frame structure.

5.8 Canister Storage Rack (24590-HLW-MH-HDH-MHAN-00006)

The storage rack used in the Canister Decontamination Cave is similar in design to those used in other areas within the HLW facility, including within the Canister Handling Cave (HPH) and the Canister Export Cave (HEH).

5.9 Swabbing Equipment

The canister turntable (24590-MJ-HDH-TTBL-00001) in System HDH is operated via a through wall drive (24590-MJ-HDH-DRIV-00004). This is required due to greater canister throughput requirements and radiological requirements.

5.10 Posting Equipment

The posting port (24590-HLW-DD-HDH-TWDVC-00002) with attached glovebox (24590-HLW-MH-HDH-MHAN-00001) has been standardized across the HLW and PTF facilities.

5.11 Process Equipment

The canister decontamination process is similar to the process used at WVDP. NOTE: The low-activity waste (LAW) facility is not using the cerium nitrate process that the HLW facility uses due to the lower level of contamination present on the LAW containers, the LAW facility's higher throughput requirements, and the need for multiple high-cost titanium system components for the LAW facility.

The canister decontamination process uses many standard, "off-the-shelf" items in order to standardize the plant equipment.

Standardized components of System HDH are:

- Steam ejectors used for liquid transfers
- Waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003)

- All indication instruments (level, density, temperature, pressure, flow, etc.)
- Centrifugal pumps
- Air-spargers used for mixing
- Pipeline sizes and materials
- Isolation valves and control valves
- Joggled penetrations into cave
- Operator reaction time for planned evolutions is 10 mins. Operator reaction time for casualty (such as pipe leak, leaking isolation valve) is 30 mins

All piping systems have been designated with a cleanness class as a function of fluid code for each particular service. Refer to Table 1, Piping Systems/Class/Fluid Code, for details. For additional information reference specification, Cleanness Requirements for WTP Fluid Systems, (24590-WTP-3PS-G000-T0005, Rev 0). Pipe cleanliness and system flushing shall be performed to meet ASME NQA-2, for the following piping systems:

Table 1 Piping Systems/Class/Fluid Code

Piping Systems	Class	Fluid Code
DIW	C	WE
HPS	C	DB
ISA	B	GL
NAR	C	HN
PCW	D	WS
PJV	D	PW
PVV	D	GV
PWD	C	ZE
SCW	C	ZU
SHR	C	JS
HDH-VSL-00001 to HDH-VSL-00003	C	ZE
HDH-TK-00002 to HDH-VSL-00002	C	HC
HDH-VSL-00002 to HDH-VSL-00003	C	PA
HDH-TK-00002 to HDH-VSL-00004	C	HC
HDH-VSL-00004 to HDH-VSL-00003	C	PA
HDH-VSL-00003 to RLD-VSL-00007	C	PA
HDH-VSL-00003 to RLD-VSL-00008	C	PA
HDH	B	ZG

HDH	C	HC, HN, ZT, WS, GQ, ZR, DB, PA, JS, GR, ZC, ZE, WE
HDH	D	GV

Three of the vessels within the canister decontamination process do not follow the *Design Guide for Vessel Sizing* (24590-WTP-GPG-M-019). These are the canister rinse bogie vessel (24590-HLW-MV-HDH-VSL-00001) and the canister decontamination vessels (24590-HLW-MV-HDH-VSL-00002/4). Justification for the non-standard design of the canister rinse bogie vessel and canister decontamination vessels follows in Sections 5.11.1 and 5.11.2, respectively.

5.11.1 Canister Decontamination Rinse Bogie Vessel (24590-HLW-MV-HDH-VSL-00001)

The justification for the unique design of the canister decontamination rinse bogie vessel as compared to the rest of the WTP facilities, is that the vessel holds an entire canister and rinses it. Non-standard characteristics of the canister decontamination rinse bogie vessel are:

- Size is based on canister dimensions, not batch volume
- More wash rings than standard vessel
- Primary purpose of wash rings is to rinse canister, not vessel
- The transferred volume is larger than the batch volume of the canister decontamination rinse bogie vessel.
- The canister decontamination rinse bogie vessel receives and transfers water at the same time.
- Internals include guide rails and canister stand
- Removable seal used at top of vessel

5.11.2 Canister Decontamination Vessels (24590-HLW-MV-HDH-VSL-00002/4)

The justification for the unique design of the canister decontamination vessels is that the vessels hold a canister inside for the purpose of etching off a layer of stainless steel. Non-standard characteristics of the canister decontamination vessels are:

- Size is based on canister size, not batch volume
- Primary purpose of wash rings is to rinse canister, not vessel
- Internals include guide rails and canister stand
- Lid opens using through-wall drive and does not form complete seal on vessel
- Volume to overflow does not include standard 30 minute operator reaction time typically present in other vessels (trips are present after the alarm that activate prior to the 30 minute response time).
- Non-standard material (titanium)

6 Description

6.1 Configuration Information

System HDH consists of all items used to perform the decontamination of a sealed IHLW canister, measurement of surface contamination level (through swabbing and swab monitoring), recording contamination swab data, and measurement of the canister geometric properties. Following decontamination, the canister is inspected for glass spatter, swabbed using a telerobotic manipulator and swabs measured for contamination. The swabs are transferred through the cell wall using a shielded swab posting port with intermediate gamma monitoring. The swabs are then hand monitored in a glovebox to obtain canister surface contamination information. When canister surface cleanliness has been verified, the canister's geometric properties are checked for correct measurements prior to being placed into the bogie located below the decontamination cave floor and transferred to the C3 Canister Export Cave (System HEH) for storage and export. System HDH will also provide for the possibility of extending the Canister Storage Transfer tunnel to a future additional storage vault. An equipment list is provided in Appendix C.

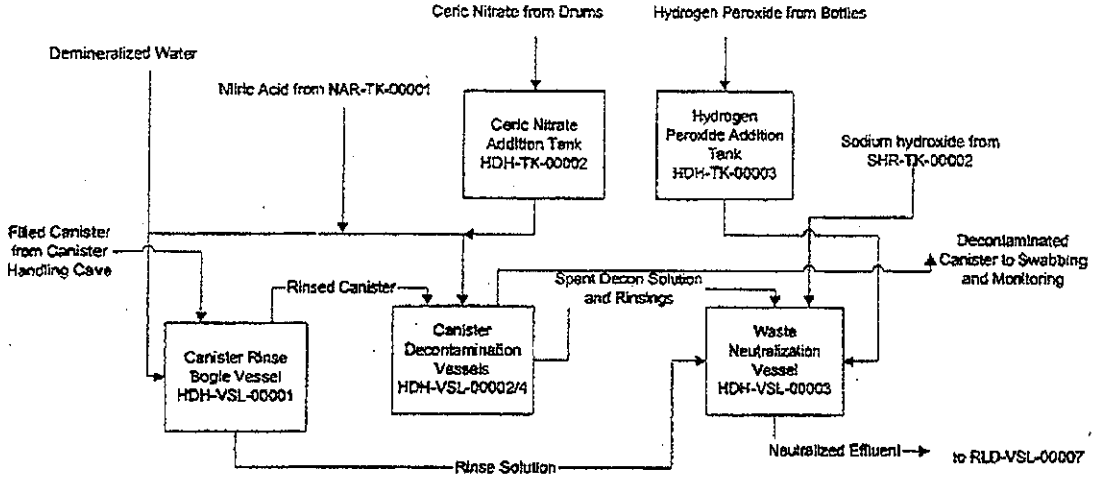
6.1.1 System Description

System HDH contains all bogies and associated canister handling equipment, swabbing and monitoring equipment, vessels, and associated process equipment to carry out the following activities:

a) Receive IHLW canister from System HPH into Canister Rinse tunnel.
b) Rinse canister with demineralized water
c) Transfer IHLW canister into Canister Decontamination Cave.
d) Decontaminate IHLW canister
e) Transfer canister to the Swabbing Station.
f) Swab canister and monitor swabs via a through-wall posting/monitoring machine and glovebox.
g) Transfer canister to the C3 Canister Export Cave (System HEH).

The HDH system is designed to decontaminate two canisters per day, based on the facility throughput of 6.0 MTG per day and one HLW canister holding 3.1 MTG (24590-WTP-DB-ENG-01-001). The decontamination of one canister takes approximately 18 hours (total time from Appendix I), but adding the second decontamination vessel allows for an overlap of decontamination procedures allowing the system to meet the throughput of 2 canisters per day. The simplified process flow diagram, Figure 2, depicts the overall inputs to the process equipment, the system products and the destination of the system products.

Figure 2 Simplified Process Flow Diagram for the HLW Canister Decontamination System



To isolate workers from the high radiation fields associated with the vitrified waste, all equipment used to process the waste canisters is located inside a shielded cave.

This system consists of all items associated with the decontamination of a sealed, product canister, and the measurement of surface contamination level through swabbing and swab monitoring and recording of swab data. The canister is initially washed with low-pressure demineralized water to remove any loose contamination that may be spread into the C3 Canister Decontamination Cave from the C5 Canister Handling Cave (System HPH). The water wash is performed in a vessel mounted on a transfer bogie, which travels from below the Canister Handling Cave (System HPH) to below the Canister Decontamination Cave.

After the water rinse, the canister is further decontaminated in the Canister Decontamination Cave by chemically etching stainless steel from the canister surface using a decontamination solution made up of 1M nitric acid and 0.5M ceric nitrate.

Decontamination of the HLW canisters (type 304L stainless steel) is achieved through a chemical dissolution of a thin layer of metal from the canister surface using ceric ion (Ce^{4+}) in a nitric acid solution. The chemical dissolution reaction takes place when the canister is soaked in the decontamination solution at 149 ± 5 °F for 6 hours while gentle air sparging, 5 scfm [tolerance TBD], agitates the solution. The ceric ion etches stainless steel; therefore, the thickness of the layer of stainless steel removed from the canister is controlled by the amount of ceric nitrate available. The amount of ceric nitrate used in the process (20 gal [tolerance TBD]) limits the thickness of the layer removed to a nominal 0.00039 inches (10μm). The chemical reactions that take place to allow for the dissolution of the thin layer of type 304L stainless steel (an alloy of iron, nickel, and chromium) are:

$$Fe + 3\ Ce^{4+} \rightarrow Fe^{3+} + 3\ Ce^{3+}$$

$$Ni + 2\ Ce^{4+} \rightarrow Ni^{2+} + 2\ Ce^{3+}$$

$$Cr + 6\ Ce^{4+} \rightarrow Cr^{6+} + 6\ Ce^{3+}$$

The decontamination of the canister is followed by a nitric acid spray and then a demineralized water spray.

Any unreacted ceric ion (Ce^{4+}) remaining after the decontamination of the canister is reduced to the cerous ion (Ce^{3+}) by 30 % hydrogen peroxide in the waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003). Peroxide neutralization of the ceric ion is performed as a precaution as it is unlikely that unreacted ceric ion will remain in the solution after the decontamination process has been completed. Adding hydrogen peroxide neutralizes the reactivity of the ceric ion so that the decontamination solution does not etch any of the stainless steel in the waste neutralization vessel, or in any of the vessels or instruments downstream from the waste neutralization vessel. The reduction reaction is:

$$2\ Ce^{4+} + H_2O_2 \rightarrow 2\ Ce^{3+} + 2\ H^+ + O_2$$

Sodium hydroxide is also added to the waste neutralization vessel to bring the pH of the contents to at least 8 before transfer to the RLD system for sampling.

The decontamination station is located in front of a shielded viewing window. The overhead bridge crane in the cave is employed when performing canister transfer operations.

After washing with nitric acid and then demineralized water, the canister is inspected for glass spatter and swabbed using a programmable telerobotic manipulator. The swabs are transferred through the posting port using a shielded tray with intermediate gamma monitoring. The swabs are then hand monitored inside a glovebox to obtain surface contamination information.

Swabs that are too active to be entered into the glovebox will be temporarily stored in the in-cave wastebasket until a cave entry is due to be made. The only non-metallic portion of the swab and holder is constructed from non-flammable foam and is approximately 1" in diameter by 1" in length. The wastebasket is less than one gallon in volume and will be capable of holding approximately 10 swabs and holders. The wastebasket will be remotely removed via the Decontamination Cave Crane maintenance area using the overhead process crane.

When surface cleanliness has been verified, the canister is placed into a bogie located below the decontamination cell floor. This bogie travels to a position below the C3 Canister Export Cave (System HEH). System HDH will also provide for the possibility of extending the Canister Storage Transfer tunnel to a future additional storage vault.

6.1.2 System Architecture, Arrangement, Location

Refer to Appendix D for Canister Decontamination, Swabbing and Monitoring facility layout.
Note: Appendix D facility layout does not include out-cave chemical mixing stations.

System HDH consists of a decontamination station and a swabbing station in a 81'-6" long x 11'-0" wide cave at the (-) 16'-6", 14'-0" and the 0'-0" levels. Adjacent to that area, but separated by a shield door, is a crane maintenance area that is 21'-6" long x 11'-0" wide and located at the 20'-0" level. Beneath the decontamination/swab cave is the Canister Rinse Bogie Tunnel at the (-) 16'-0" level and the Canister Storage Transfer Bogie tunnel at the (-) 31'-0" level. Above the decontamination/swab cave is the HDH decontamination reagents room at the 58'-0" level.

The Canister Rinse tunnel, excluding the Canister Rinse Bogie maintenance area, is 54' long x 11'-3" wide. Adjacent to the tunnel and separated by a shield door, is the Canister Rinse Bogie Maintenance Area. This houses the Canister Rinse Bogie, which transfers the canister from the Canister Handling Cave to the Canister Decontamination Cave and performs a pre-wash at an intermediate station. The Canister Storage Transfer tunnel is 59'-0" long x 12'-0" wide and houses the canister storage transfer bogie that transfers the decontaminated canister from the Canister Decontamination Cave to the Canister Export Cave (System HEH).

A provision has been made at the East end of the tunnel for a future extension of the System HDH Canister Storage Transfer tunnel. This contingency will permit transportation of the canisters to a storage facility adjacent to the HLW Facility.

6.2 Description of Mechanical Handling Equipment

6.2.1 Cranes and Components

6.2.1.1 Canister Decontamination Cave Crane (24590-HLW-MJ-HDH-CRN-00005)

The Canister Decontamination Cave Crane is a 6-ton capacity, overhead, top running, bridge crane and is located on wall mounted rails supported on structural steel work in the Canister Decontamination Cave. The rails extend from the canister decontamination cave through the shield door into the Crane Maintenance Area (CMA). The walls remain the same thickness during the transition between the canister decontamination cave and CMA and the crane rail supporting steelwork remains the same design.

Table 2 Crane Data

Runway Length	107'-0"	
Hook Approach -Bridge to end walls	5'-0"	
Runway Span	9'-8"	
Hook Approach- Trolley to side walls	4'-0"	
Average Lift - Main Hoist	44'-0"	10 lifts/day @ 25 ft/min main, 5 ft/min creep speed
Average moves/day - bridge	6	@ 10 ft/min main (normal) 0-50 ft/min max
Average moves/day - trolley	6	@ 10 ft/min main (normal) 0-25 ft/min max

The overhead crane transports a full canister (4.63 tons) through the decontamination and swabbing process of the canister. For additional information reference specification, "CMAA 70 High Integrity Cranes"(24590-WTP-3PS-MJKG-T0003).

6.2.1.2 Maintenance Cranes (24590-HLW-MJ-HDH-CRN-00001, 24590-HLW-MJ-HDH-CRN-00002, 24590-HLW-MJ-HDH-CRN-00004, 24590-HLW-MJ-HDH-CRN-00006, 24590-HLW-MJ-HDH-CRN-00007)

The maintenance cranes are either manual pendant controlled top running, single girder bridge or wall mounted jib cranes. The payload is as follows:

- Canister storage transfer bogie maintenance crane (24590-HLW-MJ-HDH-CRN-00001): 5 Ton, Safe Working Load (SWL).
- Canister rinse bogie maintenance crane lower (24590-HLW-MJ-HDH-CRN-00002): 5 Ton, SWL
- Canister rinse bogie maintenance crane upper (24590-HLW-MJ-HDH-CRN-00004): 5 Ton, SWL.
- Decontamination Cave Crane maintenance area West jib crane (24590-HLW-MJ-HDH-CRN-00006): 5 Ton, SWL
- Decontamination Cave Crane maintenance area East jib crane (24590-HLW-MJ-HDH-CRN-00007): 5 Ton, SWL

The maintenance cranes will be used to assist in all maintenance activities in the bogie and crane maintenance areas. For additional information reference specifications, "CMAA 74 Top Running and Under Running Single Girder Electric Overhead Traveling Cranes-Commercial Quality"(24590-WTP-3PS-MJKG-T0002) and "Commercial Quality Monorail Hoists and Jib Cranes"(24590-WTP-3PS-MJKH-T0002).

6.2.1.3 Crane Cable Reel Assembly (24590-HLW-MH-HDH-RCVY-00004)

The cable reel assembly is capable of paying out and retrieving the umbilical (multi-conductor) cable to the crane, while operating over the full range of movement. The cable reel assembly is located in the crane maintenance area. For additional information reference specification, "High Integrity CMAA 70 Cranes"(24590-WTP-3PS-MJKG-T0003).

6.2.2 Shield Doors

6.2.2.1 Decontamination Cave Crane Vertical Shield Door (24590-HLW-AD-HDH-DOOR-00002)

Shield doors will allow the cranes to travel between operations areas and maintenance areas. When closed, the doors provide radiological shielding and aid in contamination control by regulating airflow from room to room. The facility ventilation system and shield doors work in tandem to maintain deliberate pressure differentials between adjoining rooms that insure air always flows from areas of lower contamination into areas of higher contamination. For additional information reference specification, "HLW/PTF Crane Maintenance Shield Doors" (24590-WTP-3PS-ADDH-T0003).

6.2.2.2 Rinse Bogie Decontamination Area Horizontal Shield Door (24590-HLW-AD-HDH-DOOR-00001)

The rinse bogie has the ability to leave its process area through the shield door and enter an adjoining room where decontamination and maintenance activities can be performed. Shield doors will allow the bogies to travel between operations and maintenance areas and, when closed, provide radiological shielding to protect personnel and equipment positioned inside the maintenance areas.

Additionally, the shield doors will provide contamination control by incorporating seals or an engineered air gap. Pressure differentials will be maintained between adjoining rooms to assure that air always flows from areas of lower contamination into areas of higher contamination. Shield doors that incorporate seals will prevent the flow of air between adjoining rooms. Doors with an engineered air gap will allow air to cascade from room to room. For more information reference specifications, "HLW/PTF Bogie Shield

Doors"(24590-WTP-3PS-ADDH-T0001) and "WTP Shield Door Recovery System"(24590-WTP-3PS-ADDH-T0004).

6.2.2.3 Shielded Personnel Access (SPA) Door, 12" Thick (24590-HLW-AD-HDH-DOOR-00003, 24590-HLW-AD-HDH-DOOR-00006)

The Storage Transfer Bogie tunnel SPA door (24590-HLW-AD-HDH-DOOR-00003) provides maintenance access into the Storage Transfer Bogie tunnel from the sub-change room at floor elevation -31'-0". The Canister Decontamination Cave SPA door (24590-HLW-AD-HDH-DOOR-00006) provides maintenance access into the Canister Decontamination Cave from the corridor H-0131 at floor elevation 3'-0". The 12-inch thick SPA doors shield personnel from potential radiation and contamination present in the Storage Transfer Bogie tunnel or the Canister Decontamination Cave during normal operations.

For additional information refer to "Engineering Specification for QL Shielded Personnel Access Doors"(24590-WTP-3PS-ADDH-T0004).

6.2.2.4 Shielded Personnel Access (SPA) Door, 3" Thick (24590-HLW-AD-HDH-DOOR-00004, 24590-HLW-AD-HDH-DOOR-00005)

The Rinse Bogie maintenance area SPA door (24590-HLW-AD-HDH-DOOR-00004) provides maintenance access into the Rinse Bogie maintenance area from the sub-change room at floor elevation -16'-0" (Door threshold elevation is at -15'-0"). The Decontamination Cave Crane maintenance area SPA door (24590-HLW-AD-HDH-DOOR-00005) provides maintenance access into the Decontamination Cave Crane maintenance area from the Sub-Change room at floor elevation 37'-0". The 3-inch thick SPA doors shield personnel from potential radiation and contamination present in the Rinse Bogie maintenance area or the Rinse Bogie maintenance area during normal operations.

For additional information refer to "Engineering Specification for QL Shielded Personnel Access Doors"(24590-WTP-3PS-ADDH-T0004).

6.2.2.5 Decontamination Cave Airlock Personnel Access Door (24590-HLW-AD-HDH-DOOR-00007)

Containment airlock personnel access door keeps air from flowing freely from the Decontamination Cave through sub-change room into corridor H-0131A during entry into the cave for maintenance activities. This door is closed while the Decontamination Cave SPA door (24590-HLW-AD-HDH-DOOR-00006) is opened.

6.2.3 Transfer Bogies and Components

Bogies are four-wheeled carts that travel on rails. They are utilized in several different areas inside the various WTP facilities to transport maintenance equipment and canisters containing radioactive material from one specific location in a facility to another specific location.

6.2.3.1 Canister Rinse Bogie (24590-HLW-MQ-HDH-TRLY-00003)

The canister rinse bogie is used to transport Immobilized High Level Waste (IHLW) canisters containing radioactive material from one location to another during process activities. A rinse vessel (24590-HLW-MV-HDH-VSL-00001) mounted on the bogie holds the canister and performs a rinse of the

canister at an intermediate station. The bogie travels in a process tunnel during normal operation, but has the ability to leave its radioactive process area and enter an adjoining room where maintenance activities on the bogie can be performed. A shield door separates the process and maintenance areas, and provides radiological shielding. For additional information reference specification, HLW System HDH Canister Rinse Bogie (24590-HLW-3PS-MQR0-T0002).

Table 3 Canister Rinse Bogie Data

Bogie Travel Length	70'-6"	
Average running moves in one direction / day	5	@ 10 ft/min maximum
Average ramp up/down moves in one direction / day	4	@ 3 ft/min minimum creep

6.2.3.2 Canister Storage Transfer Bogie (24590-HLW-MQ-HDH-TRLY-00004)

The canister storage Transfer Bogie, which operates in the Canister Storage Transfer Tunnel, (System HDH) is of an elevated design, utilizing an on board motor drive with an integral canister support frame. This bogie operates in the East-West direction. The bogie operates in a high radiation environment, transporting decontaminated Immobilized High Level Waste (IHLW) canisters. For additional information, reference specification, "HLW Standardized Bogies"(24590-WTP-3PS-MQR0-T0002).

Table 4 Canister Storage Transfer Bogie Data

Bogie Travel Length	44'-2"	
Average running moves in one direction / day	3	@ 10 ft/min maximum
Average ramp up/down moves in one direction / day	2	@ 3 ft/min minimum creep

6.2.3.3 Bogie Rails (24590-HLW-MH-HDH-RAIL-00002, 24590-HLW-MH-HDH-RAIL-00003, 24590-HLW-MH-RAIL-00004)

The bogie rails support and guide the bogies.

The Canister Rinse tunnel bogie rails (24590-HLW-MH-HDH-RAIL-00002) shall be constructed from a suitable grade stainless steel, with the running rail made from an age-hardened martensitic stainless steel. Two wall mounted rails (24590-HLW-MH-HDH-RAIL-00004) are provided to prevent the bogie from derailing during a seismic event. For additional information reference specification, "HLW System HDH Canister Rinse Bogie"(24590-HLW-3PS-MQR0-T0002).

The Canister Storage Transfer tunnel bogie Rails (24590-HLW-MH-HDH-RAIL-00003) are a standard ASCE rail and would be interchangeable with other rails in PTF/HLW. These rails are not procured by the Mechanical Handling Group, Material Requisition packages for System HDH, but are the responsibility of CS&A.

6.2.4 Hatches

6.2.4.1 Canister Transfer Hatches (24590-HLW-AD-HDH-HTCH-00002, 24590-HLW-AD-HDH-HTCH-00003, 24590-HLW-AD-HDH-HTCH-00004)

Hatches serve as movable covers for transfer ports that allow cylindrical canisters and drums to travel between floors within the HLW facility. Normally, the hatches will sit in the closed position to provide radiological shielding and/or to regulate airflow. The hatches and the facility ventilation system will work in tandem to maintain deliberate pressure differentials that insure air always flows from areas of lower contamination into areas of higher contamination. When a container is required to travel between floors, the appropriate hatch will be opened to allow a crane or hoist to raise or lower the canister or drum through the transfer port. Once the transfer is complete, and the hoist has been withdrawn, the hatch will be closed. For additional information reference specification, System Transfer Hatches, Hatch Drives, and Floor Penetration Liners (24590-WTP-3PS-ADDC-T0002).

Table 5 Canister Hatches Data

Hatch Travel Length	54"/67"	
Running moves in one direction	1	4 moves/day @ 10 ft/min +/- 1ft/min

6.2.4.2 Hatch Through Wall Drives with Proximity Sensors

Chain driven through wall drives from a 480V/3ph/60 Hz motor are used on the following equipment:

a) Canister Handling Cave Export Hatch Through Wall Drive (24590-HLW-MJ-HDH-DRIV-00003)
b) Canister Decontamination Cave Import Hatch Through Wall Drive (24590-HLW-MJ-HDH-DRIV-00002)
c) Canister Decontamination Cave Export Hatch Through Wall Drive (24590-HLW-MJ-HDH-DRIV-00005)

Manual override of the hatch is accomplished through use of a handwheel engaged at the right angle gear box/electronic linear actuator. A sprocket/chain assembly affords flexible positioning of the drive motor relative to the through wall penetration. For additional information reference specification, System transfer hatches, hatch drives, and floor penetration liners (24590-WTP-3PS-ADDC-T0002).

The hatch through wall drives incorporates a push rod to detect the opened/closed status of the hatch. The pushrod translates motion from two in cave cams mounted on the hatches to out-cave proximity switches. A roller is mounted to one end of a stepped shaft, which either engages the open position or closed position cam. The shaft is spring loaded to return to a neutral position when the roller is not in contact with a cam. Proximity switches are secured to the out-cave segment of the shaft, which are logic tied to the control system (see Section 7.1.12). For additional information reference specification, System Transfer Hatches, Hatch Drives, and Floor Penetration Liners (24590-WTP-3PS-ADDC-T0002).

6.2.5 Decontamination Cave Components

6.2.5.1 Canister Grapple (24590-HLW-FH-HDH-TOOL-00001, 24590-HLW-FH-HDH-TOOL-00004)

The canister grapple is a three-jaw mechanical sequence-lifting device. The operation of the grapple is based on mechanical principles utilizing a combination of cams, linkage, and slides. The raising and lowering of a weighted portion of the assembly actuates the grapple by driving a rotating ratchet assembly. The grapple fingers are in full engagement with the canister flange during lifting.

The automatic disengaging sequence for the grapple requires two lowering or "set-downs" to fully disengage the grapple. This will prevent inadvertent actuation should a canister land on an obstacle or be lowered in the wrong place. The grapple is designed to assure full engagement and full disengagement so that a canister cannot be lifted while partially engaged. The grapple has a Safe Working Load (SWL) of 10,000 lbs. The grapple is 24-inches in diameter and weighs approximately 380 lbs. For additional information reference specification, HLW Canister Grapple (24590-HLW-3PS-MQL0-T0001). The system requires two grapples based on their intended use as follows:

a) Decontamination Cave Clean Grapple (24590-HLW-FH-HDH-TOOL-00001)
b) Decontamination Cave Dirty Grapple (24590-HLW-FH-HDH-TOOL-00004)

6.2.5.2 Grapple Stand (24590-HLW-MH-HDH-MHAN-00004, 24590-HLW-MH-HDH-MHAN-00013, 24590-HLW-MH-HDH-MHAN-00014)

Provides a secure park/storage position for the canister grapple. Grapple stands are used in the following areas:

a) Decontamination Cave Crane Maintenance Area grapple stand (24590-HLW-MH-HDH-MHAN-00004)
b) Decontamination Cave clean grapple stand (24590-HLW-MH-HDH-MHAN-00013)
c) Decontamination Cave dirty grapple stand (24590-HLW-MH-HDH-MHAN-00014)

6.2.5.3 Canister Storage Rack (24590-HLW-MH-HDH-MHAN-00006)

A single canister storage rack is provided for temporarily storing a canister in the cave. Canister racks will hold the canisters in an upright orientation and will facilitate the temporary storage of canisters at various process stages throughout the HLW Facility. For additional information reference specification, HLW Canister Racks (24590-HLW-3PS-30-T0001).

6.2.6 Decontamination System Vessel Components

6.2.6.1 Decontamination Vessel Lid Through Wall Drive (24590-HLW-MJ-HDH-DRIV-00001, 24590-HLW-MJ-HDH-DRIV-00008)

Two through wall drives (North (24590-HLW-MJ-HDH-DRIV-00008) and South (24590-HLW-MJ-HDH-DRIV-00001)) provide a mechanical linkage to both vessel lids for remote opening and closing operations during the canister decontamination process. The through wall drive

translates rotary motion from a 460V 3 phase motor. Overload protection in the form of a torque limiter is included to protect the drive train from catastrophic failure. The motor support bracket is fastened to the wall flange embed plate. For more information, reference specification, System HDH Swabbing and Monitoring System (24590-HLW-3PS-HDYR-T0001).

6.2.7 Canister Swabbing and Monitoring System Components

6.2.7.1 Telerobotic Manipulator (24590-HLW-MJ-HDH-MANIP-00001)

The swabbing manipulator is a robustly designed programmable unit.

The system is mounted on a carriage that travels on a vertical rail assembly mounted to the wall and is translated by a dual chain system and through wall drive. With the manipulator traveling in a vertical direction, the robot is able to swab a predetermined surface of a product canister as it is turning on the canister turntable.

The manipulator can be programmed to perform any type of swabbing operations from a single swipe to a full canister body check in conjunction with the turntable. The manipulator's speed and flexibility enable the facility's operational times to be adequately met. The arm also has the ability to pick up clean swabs in cave and deposit active swabs into the through wall posting port. Force feedback is monitored and maintained for continuous swabbing force against the canister surface.

The power and control systems for the manipulator arm are supplied from the control console located out cave. This enables all control operations to be remote and enables all maintenance of the control system to be performed without the need for manned entry into the cave.

The operator can switch to manual control and perform maintenance operations using a joystick mounted on a local control panel. By means of a viewing window as well as in-cave cameras, the operator can remotely operate the unit and perform maintenance activities on equipment situated within reach of the manipulator.

The manipulator arm is designed to be detachable, using the in cave crane, so that it can be removed from the cave for maintenance.

For more information, reference specification, System HDH Swabbing and Monitoring System (24590-HLW-3PS-HDYR-T0001).

6.2.7.2 Swabbing Manipulator Carriage (24590-HLW-MH-HDH-MHAN-00018)

Carriage provides a mounting support for the Telerobotic Manipulator assembly. For more information, reference specification, System HDH Swabbing and Monitoring System (24590-HLW-3PS-HDYR-T0001).

6.2.7.3 Swabbing Manipulator Vertical Rail Assembly (24590-HLW-MH-HDH-RAIL-00005)

The rails are wall mounted with dual chains between the rails. The rail assembly serves as the guide for the manipulator during swabbing operations. From this rail assembly, the manipulator can reach over to

pick up and return swabs from and to the Swab Posting Port. This vertical rail assembly is long enough to provide easy access from the bottom of the canister to the welded canister lid. For more information, reference specification, System HDH Swabbing and Monitoring System (24590-HLW-3PS-HDYR-T0001).

6.2.7.4 Swabbing Manipulator Elevator Through Wall Drive (24590-HLW-MJ-HDH-DRIV-00007)

The through wall drive provides a mechanical linkage to the jack screw which operates the manipulator carriage and hence moves the manipulator assembly up and down. The through wall drive translates rotary motion from a 460V 3 phase motor. Overload protection in the form of a torque limiter is included to protect the drive train from catastrophic failure. The motor support bracket is fastened to the wall flange embed plate. The encoder is mounted to a through wall shaft to determine key location points along the vertical rail. For more information, reference specification, System HDH Swabbing and Monitoring System (24590-HLW-3PS-HDYR-T0001).

6.2.7.5 Canister Swabbing Turntable (24590-HLW-MJ-HDH-TTBL-00001)

The turntable is shaft driven from an out cave motor and gearbox. The in cave portion incorporates a right angle gearbox and drives the slewing ring. An out-cave encoder connected to the drive motor is used for positioning of the turntable as well as determining the number of revolutions. For more information, reference specification, System HDH Swabbing and Monitoring System (24590-HLW-3PS-HDYR-T0001).

6.2.7.6 Canister Turntable Through Wall Drive (24590-HLW-MJ-HDH-DRIV-00004)

The through wall drive provides a mechanical linkage to the turntable drive extension shaft drive coupling to operate the turntable. The through wall drive translates rotary motion from a 460V 3 phase motor. Overload protection in the form of a torque limiter is included to protect the drive train from catastrophic failure. The motor support bracket is fastened to the wall flange embed plate. The encoder is mounted to the through wall shaft to determine location and rotation of the turntable. For more information, reference specification, System HDH Swabbing and Monitoring System (24590-HLW-3PS-HDYR-T0001).

6.2.7.7 Canister Guide Assembly (24590-HLW-MH-HDH-MHAN-00003)

The canister guide assembly consists of two support/guide halves that are supported off the cave wall. Each half is fitted with a canister lead in steelwork with spring loaded ball transfer units to guide the canister equally through the support assembly without damaging the canister. Having the support assembly in halves, the manipulator can swab between the steelwork while the canister is rotating on the turntable. For more information, reference specification, System HDH Swabbing and Monitoring System (24590-HLW-3PS-HDYR-T0001).

6.2.7.8 Failed Swab Container (24590-HLW-MH-HDH-MHAN-00021)

Provides a temporary accumulation site within the cave for high level swabs. For more information, reference specification, System HDH Swabbing and Monitoring System (24590-HLW-3PS-HDYR-T0001).

6.2.7.9 Swab Sampling Port System (24590-HLW-DD-HDH-TWDVC-00002) and Glovebox (24590-HLW-MH-HDH-MHAN-00001)

Clean and dirty swabs are passed through the decontamination posting port (24590-HLW-DD-HDH-TWDVC-00002) to or from the swabbing glovebox (24590-HLW-MH-HDH-MHAN-00001). There are two shield doors for the posting port located at in-cave and out-cave ends of the posting port. The posting port shield doors have a minimum steel thickness of 10 in. for shielding purposes. The in-cave shield door is closed and locked when the out-cave shield door is opened. Clean swabs are posted through the port for the manipulator to pick up and swab the canister. The dirty swab that the manipulator has returned to the posting port is monitored for gamma radiation. If the swab passes this monitoring it is then accepted into the glovebox where it is further analyzed for contamination and results recorded. The swabs are then disposed of on a periodic basis via a bagging port. If the radiation levels are too high, the swab will be returned to the cave and deposited in the waste storage basket by the manipulator.

For additional information refer to "Engineering Specification for WTP Facility Posting Port" (24590-WTP-3PS-M000-T0006) and "Engineering Specification for WTP Facility Posting Port Glovebox" (24590-WTP-3PS-M000-T0007)

6.2.7.10 Shielded Windows (24590-HLW-WTP-AD-30-SWIN-00030, 24590-HLW-WTP-AD-30-SWIN-00031, 24590-HLW-WTP-AD-30-SWIN-00032)

The windows are used for viewing process operations and direct viewing of personnel in cave during off normal recovery operations or maintenance activities. The window is made up of blocks of lead glass and has an out cave bottle fed nitrogen supply for purging of the blocks and seals.

6.3 Description of Process Equipment

6.3.1 Tanks and Vessels

6.3.1.1 Cerium 4+ Addition Tank (24590-HLW-MT-HDH-TK-00002)

The cerium 4+ addition tank provides for the storage of the ceric nitrate (see MSDS in Appendix G) used in the canister decontamination process. The cerium 4+ addition tank is located in the canister decontamination reagents room (room H-0418, a C2/R2 room at elevation +58 ft on 24590-HLW-P1-P01T-00005), and is gravity drained to the canister decontamination vessels (24590-HLW-MV-HDH-VSL-00002/4) through a remotely-operated valve (24590-HLW-M6-HDH-00001/20001). The ceric nitrate and the nitric acid are mixed inline before the solutions reach the decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4). The cerium 4+ addition tank is fabricated from titanium and has a batch volume of 20 gallons [tolerance TBD] (24590-HLW-MVC-HDH-00005). The cerium 4+ addition tank is equipped with remote and local level indication. During normal operations, the cerium 4+ addition tank is filled manually in the canister decontamination reagents room and emptied remotely from a control area.

The top of the cerium 4+ addition tank has a 3" nozzle with a screwed cap. The nozzle is used for adding the ceric nitrate. Ceric nitrate is delivered to the WTP in 55 gallon drums and is transferred in 20 gallon batches [tolerance TBD] to the cerium 4+ addition tank using a drum pump. A hose is located in the canister decontamination reagents room that can also be inserted into the nozzle for tank flushing, as necessary. The tank can only overflow during filling, since the screwed cap is removed during filling it will act as the overflow. The tank is located in a contained area to hold in any spilled reagents.

6.3.1.2 Hydrogen Peroxide Addition Tank (24590-HLW-MT-HDH-TK-00003)

The hydrogen peroxide addition tank is a small, stainless steel tank that provides storage of the 30 wt% hydrogen peroxide solution used for the neutralization of the spent decontamination solution after the canister decontamination process. The hydrogen peroxide addition tank is designed in compliance with ASME Section VIII, *Rules for Construction of Pressure Vessels*, Division 1. The hydrogen peroxide addition tank is located in the canister decontamination reagents room (H-0418), a C2/R2 area at elevation +58 ft on (24590-HLW-P1-P01T-00005), and is gravity drained to the waste neutralization tank through a remotely-operated valve (24590-HLW-M6-HDH-00002). The batch volume of the hydrogen peroxide addition tank is 0.5 gallons [tolerance TBD] (24590-HLW-MVC-HDH-00005), the amount of hydrogen peroxide used per canister during the decontamination process. The hydrogen peroxide addition tank is manually filled during each ceric nitrate soaking of the canister. The hydrogen peroxide addition tank is equipped with local and remote level indication. A hose is located in the canister decontamination reagents room that can be inserted into the top of the hydrogen peroxide addition tank for tank flushing, as necessary. During normal operations, the hydrogen peroxide addition tank is filled manually in the canister decontamination reagents room and emptied remotely from a control area. The tank can only overflow during filling, since the top is removed during filling it will act as the overflow. The tank is located in a contained area to hold in any spilled reagents.

6.3.1.3 Canister Decontamination Rinse Bogie Vessel (24590-HLW-MV-HDH-VSL-00001)

The canister decontamination rinse bogie vessel is located on the rinse bogie in the Canister Rinse Bogie tunnel, room H-B039B at elevation -16'-6" (a C3/C5/R3/R5 room on 24590-HLW-P1-P01T-00001). The canister decontamination rinse bogie vessel is designed in compliance with ASME Section VIII, *Boiler and Pressure Vessel Code*. The canister rinse bogie tunnel is considered a C5/C3 transition area from the handling cave to the decontamination station. The water rinse cleans loose contamination from the canister to keep the decontamination cave (H-B035) as clean as possible. The canister decontamination rinse bogie vessel and its internal components are made of 316L stainless steel (24590-HLW-N1D-HDH-00007). The batch volume for the canister decontamination rinse bogie vessel is 360 gallons [tolerance TBD] (24590-HLW-MVC-HDH-00005). The canister decontamination rinse bogie vessel (24590-HLW-MV-HDH-VSL-00001) has the canister decontamination rinse bogie pump (24590-HLW-MP-HDH-PMP-00001) running during the batch transfers so that the batch is pumped out as the rinse water is added in. Therefore, the canister decontamination rinse bogie vessel is not required to hold the entire batch volume of demineralized water during normal operations.

The canister decontamination rinse bogie vessel is equipped with service piping for demineralized water, ventilation to the room through a vent tube, overflow to sump 24590-HLW-DD-HDH-SUMP-00001 through the vent line, a spray ring assembly that rinses the entire canister, level transmitter and a level switch, a pump suction line and centrifugal pump (24590-HLW-MP-HDH-PMP-00001) from the canister decontamination rinse bogie vessel (24590-HLW-MV-HDH-VSL-00001) to the waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003), and a plant service air line for the inflatable seal (24590-HLW-M6-HDH-00002). The canister spray rings can also be used to sufficiently flush the bogie vessel for maintenance operations. During normal operations, the canister decontamination rinse bogie vessel is operated remotely from a control area.

6.3.1.4 Canister Decontamination Vessels (24590-HLW-MV-HDH-VSL-00002/4)

The canister decontamination vessels are titanium vessels (24590-HLW-N1D-HDH-00003) that are used to hold the filled canister and the ceric nitrate solution during the decontamination process. The canister decontamination vessels are designed in compliance with ASME Section VIII, *Boiler and Pressure Vessel Code*. The canister decontamination vessels are located in the canister decontamination/swabbing cave (H-B035, a C3/R5 room at elevation -16 ft on 24590-HLW-P1-P01T-00001). The total batch volume of each canister decontamination vessel is 215 gallons [tolerance TBD] (24590-HLW-MVC-HDH-00005), which does not include the 346 gallons displaced by the canister. Nitric acid and demineralized water spray washes also take place in the canister decontamination vessels. The canister is lifted at a rate of five ft/min through the spray rings at the top of the canister decontamination vessels during the acid and water sprays.

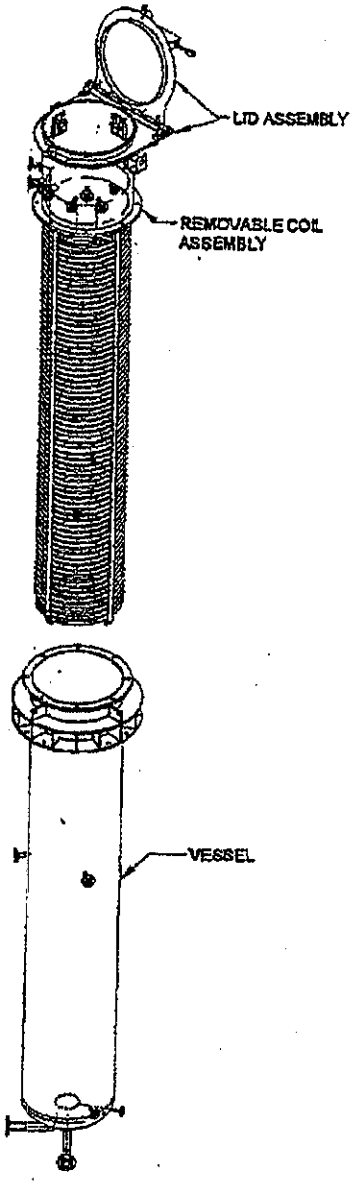
The canister decontamination vessels are equipped with service piping for demineralized water (connected to the nitric acid addition line, not the canister decontamination vessels), high pressure steam, condensate effluent to the waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003), cooling water supply, cooling water return, and process air for sparging. The canister decontamination vessels are also equipped with dual thermocouples with controllers for the heating/cooling coils, level, pressure, and density transmitters, two spray rings for the nitric acid and demineralized water rinses, a nozzle for the decontamination solution, dual steam ejectors, an overflow line to the waste neutralization vessel, and dual thermocouples with controllers for the coils, one for heating and one for cooling the decontamination solution (24590-HLW-M6-HDH-00001/20001). The overflow line of the canister decontamination vessels empties to the waste neutralization vessel. The overflow line is dipped in the waste neutralization vessel with a tee to the PJV system for vessel venting. The steam line to the vessel coil has an instrument air connection for coil pressurization when the steam is not in use. During normal operations, the canister decontamination vessels are operated remotely from a control area. The canister spray rings can also be used to sufficiently flush the canister decon vessels for maintenance operations.

The canister decontamination vessels can be used simultaneously, but utilities other than steam and air can only be sent to one vessel at a time. Both canister decon vessels can be performing the decon solution soak, but only one vessel at a time can perform the nitric acid and demineralized water sprays.

The heating/cooling coils are fabricated from titanium and each have a surface area of 60 ft^2. High pressure steam at 343 °F is supplied at a minimum of 170 lb/hr (24590-HLW-M4C-HDH-00001) to raise the solution temperature from 73 °F to 149 °F in one and a half hours. Process cooling water is supplied at a minimum of 6 gal/min (24590-HLW-MEC-HDH-00001) and a maximum of 83 °F (24590-WTP-DB-ENG-01-001) in order to lower the solution temperature before transfer.

To aid maintenance and the life of the canister decontamination vessels, the coil assembly has been designed to be completely removable from the vessels. The removable coil assembly is shown in the figure below.

Figure 3 Canister Decontamination Vessels Removable Coil Assembly (24590-HLW-MV-HDH-VSL-00002/4)



6.3.1.5 Waste Neutralization Vessel (24590-HLW-MV-HDH-VSL-00003)

The waste neutralization vessel is a 304L stainless steel vessel used as a holding point for the neutralization of the spent decontamination solution from the canister decontamination vessels, steam condensate, nitric acid and demineralized water rinses from the canister decontamination vessel, steam jet dilution, and washing water from the canister decontamination rinse bogie vessel (24590-HLW-MV-HDH-VSL-00001) prior to transfer to the RLD system for sampling. The waste neutralization vessel is designed in compliance with ASME Section VIII, *Boiler and Pressure Vessel Code*. The waste neutralization vessel is located in the canister decontamination/swabbing cave (H-B035,

a C3/R5 room at elevation -16 ft on 24590-HLW-P1-P01T-00001). The operating batch volume of the waste neutralization vessel is 2,217 gallons [tolerance TBD] and the batch capacity plus contingency is 4,074 gallons (24590-HLW-MVC-HDH-00005).

The waste neutralization vessel is equipped with service piping for plant wash to the vessel spray rings, sodium hydroxide addition, hydrogen peroxide addition, process air, and provided with ventilation. The waste neutralization vessel also has level, temperature, and pressure transmitters. Three steam ejectors empty the waste neutralization vessel (dual ejectors to 24590-HLW-MV-RLD-VSL-00007 and one to completely empty the vessel to the plant wash and drains vessel 24590-HLW-MV-RLD-VSL-00008. The waste neutralization vessel has an overflow line to sump 24590-HLW-DD-HDH-SUMP-00003 and inlet nozzles from the canister decontamination vessels overflows, steam condensate from the canister decontamination vessels heating coils, effluents from the canister decontamination vessels (24590-HLW-MV-HDH-VSL-00002/4) and effluents from the canister decontamination rinse bogie vessel (24590-HLW-MV-HDH-VSL-00001). During normal operations, the waste neutralization vessel is operated remotely from a control area.

6.3.2 Pumps and Ejectors

6.3.2.1 Steam Ejectors (24590-HLW-MP-HDH-EJCTR-00002/3/56 A/B and 57)

Dual steam ejectors (24590-HLW-MP-HDH-EJCTR-00003/56 A/B) move the spent decontamination solution from the canister decontamination vessel to the waste neutralization vessel. Dual steam ejectors (24590-HLW-MP-HDH-EJCTR-00002 A/B) are used to move the neutralized effluent from the waste neutralization vessel to the acidic condensate vessel (24590-HLW-MV-RLD-VSL-00007) for sampling. A fifth ejector (24590-HLW-MP-HDH-EJCTR-00057) in the waste neutralization vessel transfers the entire contents of the waste neutralization vessel to the plant wash and drains vessel (24590-HLW-MV-RLD-VSL-00008) as necessary. All five of the steam ejectors in the system receive steam from the canister decontamination steam rack (HDH-RK-00009). During normal operations, the ejectors are operated remotely from a control area.

6.3.2.2 Canister Decontamination Rinse Bogie Pump (24590-HLW-MP-HDH-PMP-00001)

The canister decontamination rinse bogie pump is used to remove rinse water from the canister decontamination rinse bogie vessel (24590-HLW-MV-HDH-VSL-00001) during rinse operations. The water is sent to the waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003). The canister decontamination rinse bogie pump is designed in compliance with API 610, *Pumps - Centrifugal* and the *Design Guide for ALARA* (24590-WTP-GPG-SRAD-001). The canister decontamination rinse bogie pump is located on the bogie (24590-HLW-MQ-HDH-TRLY-00003), next to the canister decontamination rinse bogie vessel. The canister decontamination rinse bogie vessel, pump, and bogie are all located in the canister rinse bogie tunnel, room H-B039B at elevation -16 ft (a C3/C5/R3/R5 room). The canister decontamination rinse bogie pump operates at 80 gpm [tolerance TBD]. Pump failure is inferred by the auxiliary contactor on the motor starter and level indicators in the canister rinse bogie vessel. During normal operations, the canister decontamination rinse bogie pump is operated remotely from a control area.

6.3.3 Valves

6.3.3.1 Control Valves

Control valves are normally closed and opened only when performing their necessary operation. All of the control valves in the HDH system are ball valves and each control valve is surrounded by isolation valves. These allow the valve to be isolated for change-out or maintenance as necessary. All of the valves fail closed. During normal operations, all of these valves are operated remotely from a control area.

6.3.3.2 Isolation Valves

Isolation valves are used throughout the HLW facility to isolate pieces of equipment for maintenance. All isolation valves are designed in compliance with API Spec 6D, *Specification for Pipeline Valves (Gate, Plug, Ball, and Check Valves)*. These valves are normally open and close only when maintenance is needed on the equipment the valves are isolating. These valves are used during off-normal and maintenance operations and are operated manually in place.

6.3.3.3 Check Valves

Check valves are placed throughout the HDH system to prevent back-flow from various tanks and vessels. All check valves are designed in compliance with API Spec 6D, *Specification for Pipeline Valves (Gate, Plug, Ball, and Check Valves)*. Check valves are used to prevent liquids and gases from reaching the non-radioactive decontamination reagents room.

6.3.3.4 Pressure Control Valves

Pressure control valves are used to control the pressure of a line. All pressure control valves are designed in compliance with API Spec 6D, *Specification for Pipeline Valves (Gate, Plug, Ball, and Check Valves)*. These valves are set and operated manually in place.

6.4 Utilities

Instrument air, breathing air, plant wash water, plant cooling water, reagents (nitric acid, demineralized water, and sodium hydroxide), and steam are delivered to in-cave equipment via racks, joggle wallboxes, and valve manifolds located out cave in C2 or C2/C3 areas. Process steam (e.g., transfer ejectors) is supplied via steam rack 24590-HLW-PY-HDH-RK-00009.

6.5 Cameras and Lights

The above items are covered by other disciplines - see Section 9 (Interfacing Systems).

6.6 Design Considerations

6.6.1 Materials Requirements

When considering materials selection, although not intended as an exhaustive list, the following characteristics are addressed:

a) Corrosion
b) Erosion (i.e., resistance to decontamination agents)
c) Surface finish (i.e., decontaminability)
d) Radiation tolerance
e) Material Code Compliance
f) Density
g) Hardness
h) Temperature characteristics
i) Friction / Wear / Lubrication
j) Tensile strength
k) Compressive strength

Materials that contact the canister are stainless steel with the exception of the decontamination vessels, which are titanium.

6.6.2 Safety Features

Safety features incorporated into the design of the HLW Canister Decontamination Handling System are discussed in Section 7.1.13 (Interlock Features). Safety features are based on the Integrated Safety Management Plan (ISMP) and the Standard Identification Process Database (SIPD) requirements for this system.

6.6.3 System Availability

Reference the Operational Research (OR) Assessment for the RPP-WTP Project as a *guide* on system availability and overall equipment effectiveness as documented by the Operations Research Assessment Report 24590-WTP-RPT-P0-03-045.

6.6.4 Sequence and Time for each Operation

See Appendix J

6.6.5 Environmental Considerations

Items that are considered are as follows:

a) Sumps to collect and confine liquid waste
b) Cladding for confinement & ease of decontamination
c) Ventilation control
d) Life time radiation exposure dose rates on equipment

6.6.6 ALARA Considerations

Design of System HDH shall incorporate safety features to comply with the occupational exposure limits set forth in procedure 24590-WTP-GPP-SRAD-002, *Application of ALARA in the Design Process*. Semi-

automation of the system shall minimize exposure by minimizing manual operations and the need for manual intervention. Bulk shielding, remote handling using Master Slave Manipulators (MSMs), and remote viewing windows along with in-cave cameras shall also minimize exposure. Design of equipment shall incorporate the ability to be accessible and easily decontaminated such that maintenance operations do not compromise the dose uptake limits. The following design features of HDH system minimize exposure:

a) Overhead process crane operated remotely.
b) Although the canister decontamination and swab cave is C3, cascading air principle will be used to minimize contamination levels in the cave (C2 corridor areas and air in-bleed systems will flow into C3 caves and C5 caves).
c) Separate maintenance area provided for overhead crane.
d) Separate maintenance area provided for canister rinse bogie
e) Decontamination equipment operated remotely
f) Swabbing and monitoring process operated remotely

7 Operations

7.1 Normal Operation

This system consists of all items associated with the decontamination of filled, sealed product canisters, measurement of surface contamination level through swabbing and swab monitoring, and recording of swab data. The canister is initially rinsed to remove any loose contamination that may be spread into the C3 Canister Decontamination Cave from the C5 Canister Handling Cave. The water rinse is performed in a vessel mounted on a transfer bogie that travels from below the Canister Handling Cave to below the Canister Decontamination Cave.

The state diagrams for the HDH process equipment are shown below.

Figure 4 Canister Decontamination Rinse Bogie Vessel (24590-HLW-MV-HDH-VSL-00001) and Canister Decon Vessels (24590-HLW-MV-HDH-VSL-00002/4) State Diagrams

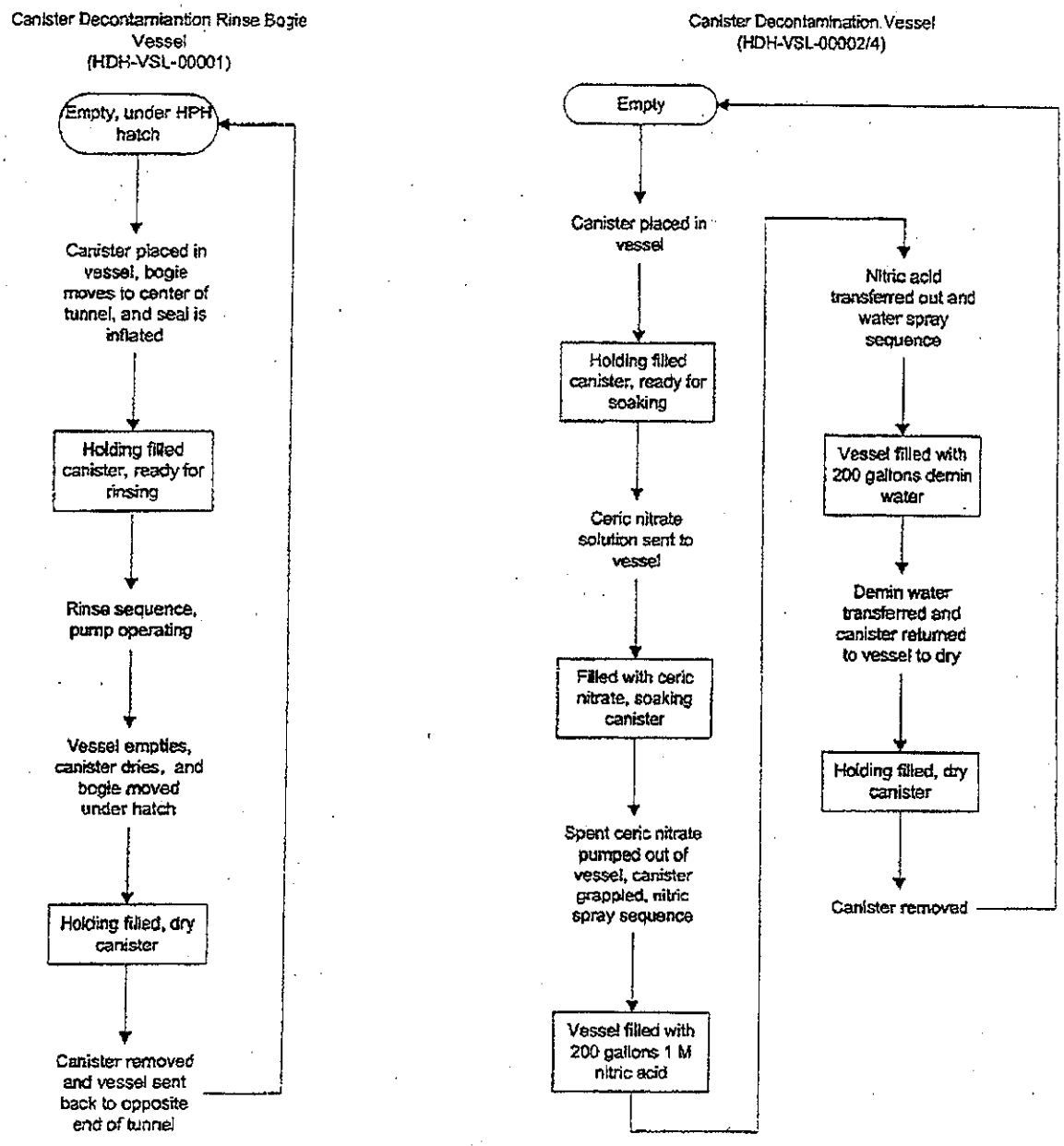


Figure 5 Waste Neutralization Vessel (24590-HLW-MV-HDH-VSL-00003) and Cerium 4+ Addition Tank (24590-HLW-MT-HDH-TK-00002) State Diagrams

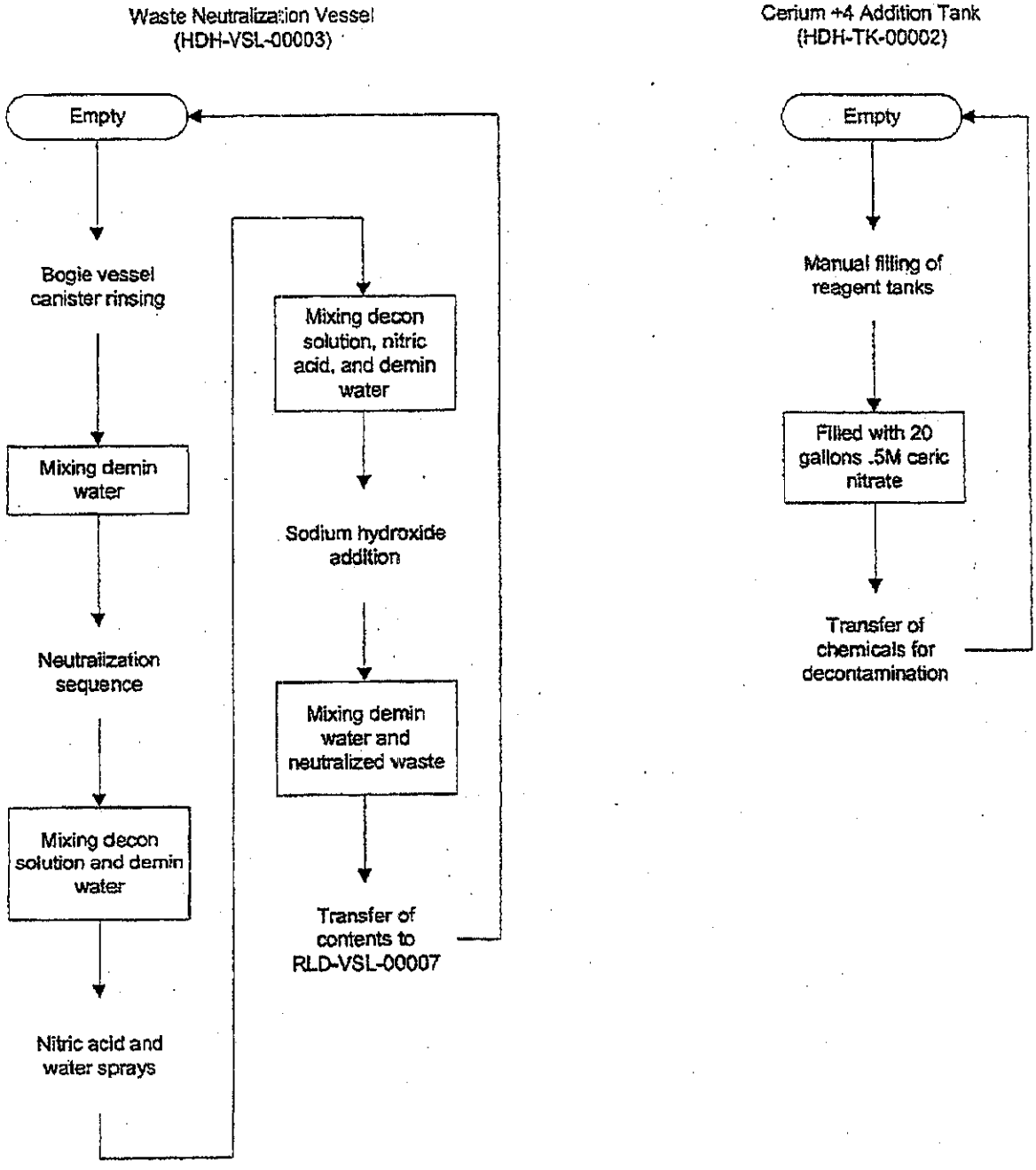
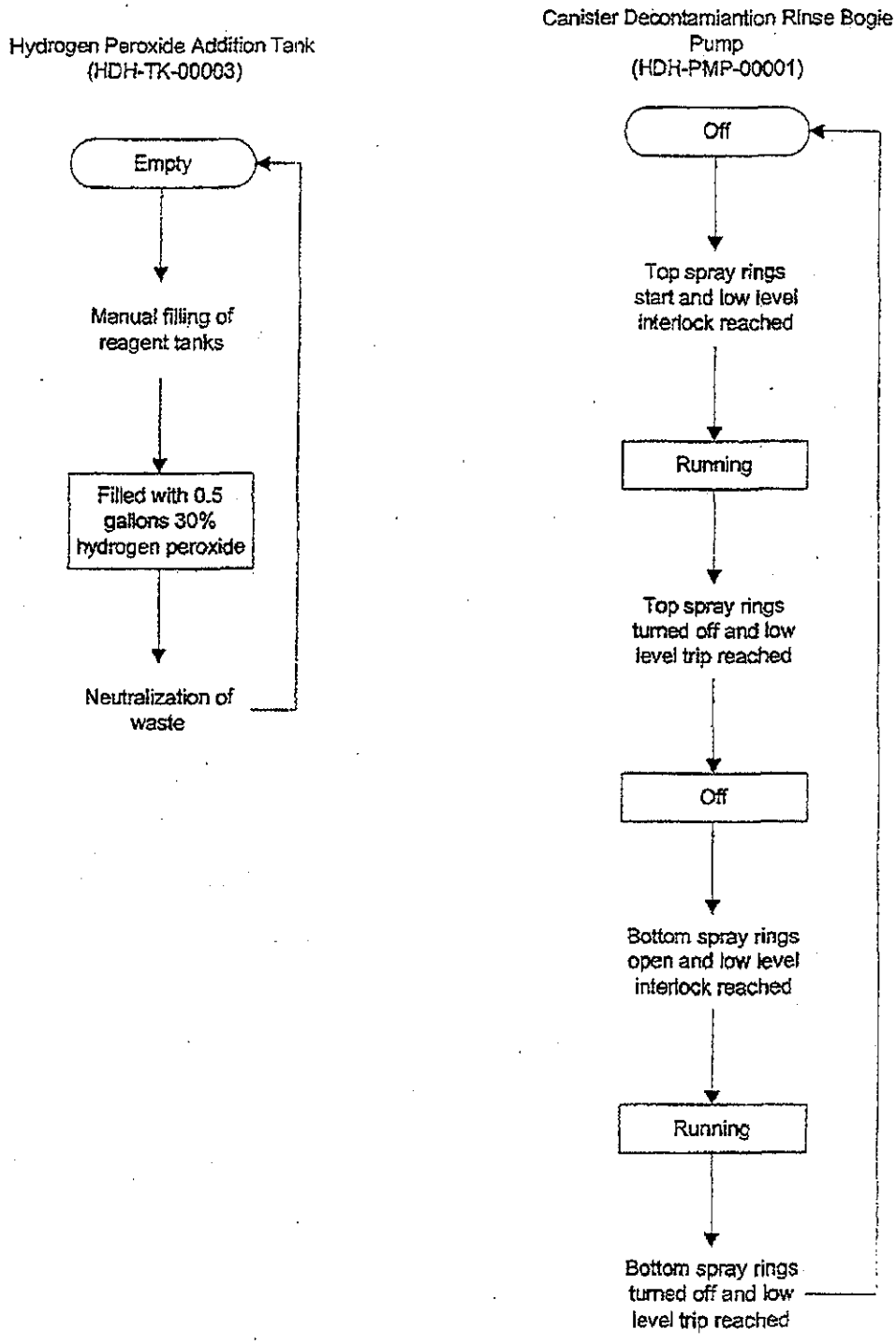


Figure 6 Hydrogen Peroxide Addition Tank (24590-HLW-MT-HDH-TK-00003) and Canister Decontamination Rinse Bogie Pump (24590-HLW-MP-PMP-00001) State Diagrams



Refer to Section 10 for the Maintenance description of equipment provided for recovery and maintenance of the mechanical handling equipment. Refer to the Level 2 Mechanical Flow Diagram for a specific sequence of events and the Mechanical Sequence Diagram for event interlocks that may apply. The Level 2 Mechanical Flow Diagram is located in Appendix J of this document and the Mechanical Sequence Diagram is listed in Appendix A.

The process of canister decontamination starts at the System HPH weld station. Visual and closed circuit television examinations for the presence of glass on the upper surface, the flange, and the lid of the canister is performed. In the event that glass is found, a scabbling tool is used to remove the glass. After lid closure by welding, System HDH process begins as follows:

7.1.1 Transfer Canister from Canister Pour Handling Cave to Rinse Bogie

- The Canister Pour Handling Cave export hatch is opened and the canister is lowered into the canister rinse bogie.
- The grapple is released from the canister and is raised clear. The Canister Pour Handling Cave export hatch is closed.

7.1.2 Rinse Canister

- The canister rinse bogie is positioned under the canister rinse station and the rinse vessel seal is inflated against the ceiling mounted spool piece.
- The rinse cycle is initiated.

7.1.3 Bogie Vessel Canister Rinse

- After the canister decontamination rinse bogie vessel (24590-HLW-MV-HDH-VSL-00001) has been taken to the wash station in the center of the canister rinse tunnel, inflate the seal on the canister decontamination rinse bogie vessel.
- Check the pressure indication to ensure the inflatable seal above the canister decontamination rinse bogie vessel is pressurized.
- Open the demineralized water valve for the top half of the spray ring to start the first rinse cycle.
- Check inlet flow rate to ensure water is entering at 90 gpm [tolerance TBD].
- After the vessel has filled to approximately 10 gallons, check that the canister decontamination rinse bogie pump (24590-HLW-MP-HDH-PMP-00001) has started.
- After washing with 180 gallons [tolerance TBD] of water in 2 minutes, close top demineralized water line. After 2.5 minutes, the canister decontamination rinse bogie vessel should be empty (check the level indicator on the canister decontamination rinse bogie vessel).
- Open the valve for the bottom half of the spray ring to start the second rinse cycle.
- Check inlet flow rate to ensure water is entering at 90 gpm [tolerance TBD].

- After the vessel has filled to approximately 10 gallons, check that the canister decontamination rinse bogie pump has started.

- After washing with 180 gallons [tolerance TBD] of water in 2 minutes, close bottom demineralized water line.

- After the canister decontamination rinse bogie vessel is emptied (2.5 minutes), ensure the canister rinse bogie vessel pump is shut off and depressurize the inflatable seal.

7.1.4 Transfer Canister to Canister Decontamination Cave

- The vessel seal is deflated and the canister rinse bogie is positioned under the Canister Decontamination Cave Import Hatch.
- The Decontamination Cave Import Hatch is opened and the rinse vessel transfer grapple is lowered to the canister, engaged and raised to transfer height.
- The Decontamination Cave Import Hatch is closed.

7.1.5 Decontamination of Canister

7.1.5.1 Manual Filling of Cerium 4+ Addition Tank (24590-HLW-MT-24590-HLW-MT-HDH-TK-00002) and Hydrogen Peroxide Addition Tank (24590-HLW-MT-HDH-TK-00003); (HDH-SEQ-0201)

- Check the level indication on the cerium 4+ addition tank to ensure that the cerium 4+ addition tank is empty.

- Manually transfer 20 gallons [tolerance TBD] of ceric nitrate solution from the shipping containers into the cerium 4+ addition tank using a drum pump.

- NOTE: Ceric nitrate solution is corrosive to skin and eyes but is not an inhalation hazard. Precautions should be taken as required in the MSDS.

- Ensure that the manual drum pump flow totalizer and local level indication on the cerium 4+ addition tank match after the transfer.

Check the local level indication on the hydrogen peroxide addition tank to ensure that the hydrogen peroxide addition tank is empty.

- Manually add 0.5 gallons [tolerance TBD] of hydrogen peroxide to the hydrogen peroxide addition tank Check level indication on the hydrogen peroxide addition tank to get correct batch volume. Ensure that the lid is closed to prevent decomposition of the hydrogen peroxide.

7.1.5.2 Transfer of Chemicals for Decontamination (HDH-SEQ-0103)

- The mechanical handling equipment in the HDH system moves the canister from the canister decontamination rinse bogie vessel (24590-HLW-MV-HDH-VSL-00001) to the canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4) and closes the lid.

- Check windows or closed circuit television (CCTV) to ensure that the lid of the canister decontamination vessel is closed.

- Confirm that the canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4) is empty (check level indicator on the canister decontamination vessel) and ready to accept a 215 gallon batch volume [tolerance TBD] of decontamination solution.

- Establish the sparge air flow to the canister decontamination vessel.

- Check pressure and flow instrumentation on the canister decontamination vessel sparge air line indicates 25 psig and 5 scfm [tolerance TBD], respectively, to properly regulate the sparge air supply.

- Contact nitric acid system (NAR) and input 194 gal batch volume [tolerance TBD] into flow totalizer. Initiate the control sequence to automatically open the nitric acid addition valve and the ceric nitrate addition valve simultaneously so that the ceric nitrate mixes with the nitric acid in the line during the transfer.

- When the cerium 4+ addition tank (24590-HLW-MT-HDH-TK-00002) is empty (check level indicator), close the ceric nitrate addition valve.

7.1.5.3 Decontamination of the Canister (HDH-SEQ-0104)

- Check the level indicators on the canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4) to ensure that the decontamination solution has been sent to the canister decontamination vessel. Monitor the sparge air line pressure and flow instrumentation to ensure that the sparge air is supplied at 25 psig and 5 scfm [tolerance TBD].

- Heat the decontamination solution to 149 ± 5 °F and initiate the control logic to maintain the temperature for 6 hours. Check on the temperature of the solution throughout the six hours to ensure that the heating is working correctly. Monitor the pressure and flow of the sparge air throughout the decontamination to ensure that air is being supplied.

- After 6 hours turn off the temperature control for the solution.

7.1.5.4 Neutralization of the Waste (HDH-SEQ-0105)

- Ensure proper sparge air supply to canister decon vessels and waste neutralization vessel by checking the pressure and flow instrumentation. Sparge air is supplied at 25 psig and 5 scfm [tolerance TBD].

- During the chemical soak cycle, ensure that there is sufficient volume in the waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003) to receive the spent decontamination solution from the canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4).

- After the 6 hour decontamination process, cool decontamination solution to below 104 °F. Before transfer to the waste neutralization vessel, ensure temperature is at or below 104 °F

- Initiate the control sequence to activate the operating sequence for the canister decontamination vessel steam ejectors (HDH-EJCTR-00003/56 A/B) and open the hydrogen peroxide addition valve automatically. This sequence transfers the spent decontamination solution from the canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4) to the waste neutralization vessel and sends 0.5 gallons [tolerance TBD] of hydrogen peroxide from the hydrogen peroxide addition tank (24590-HLW-MT-HDH-TK-00003) to reduce residual ceric ion (Ce^{4+}) to cerous ion (Ce^{3+}). After the control sequence has finished, check that both hydrogen peroxide addition tank and canister decontamination vessel are empty.

- Ensure air sparger continues to be supplied at 25 psig and 5 scfm [tolerance TBD], until the time for transferring the waste out of the waste neutralization vessel.

7.1.5.5 Acid and Water Rinsing (HDH-SEQ-0107)

- Ensure the top of the canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4) is closed.

- Contact NAR system and input 10 gallon batch volume [tolerance TBD] into nitric acid line flow totalizer. Spray the top of the canister with nitric acid at 50 psig [tolerance TBD]. The nitric acid addition pump shuts off automatically after 10 seconds of rinse.

- The mechanical handling equipment in the HDH system opens the top of the canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4). The mechanical handling equipment grapples the canister and pulls the canister through the spray rings. The canister is lifted until the grapple is above the spray rings.

- Continue acid spray cycle by contacting the NAR system and inputting 191 gallon batch volume [tolerance TBD] into the nitric acid line flow totalizer. While the nitric acid is flowing from the spray rings at 50 psig [tolerance TBD], lift the canister through the spray rings and out of the canister decontamination vessel at a rate of 5 ft/min maximum. When the canister is above the top spray ring, hold the canister at the top position until the nitric acid transfer is finished. Transfer the liquid contents to the waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003) by opening the high pressure steam supply valve to the canister decontamination vessel ejectors (24590-HLW-MP-HDH-EJCTR-00003/56 A/B). When the canister decontamination vessel is empty, close the steam supply valve.

- The mechanical handling equipment in the HDH system lowers the canister into the canister decontamination vessel, disengages the grapple, and closes the lid using the through wall drive.

- Verify that the waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003) has sufficient volume to receive the water spray before initiating the water spray cycle.

- Begin water spray cycle by activating the demineralized water addition valve for 10 seconds to rinse off the lid at a pressure of 50 psig [tolerance TBD]. The demineralized water addition valve shuts off after 10 seconds of rinse.

- The mechanical handling equipment in the HDH system opens the top of the canister decontamination vessel. The mechanical handling equipment grapples the canister and pulls the canister through the spray rings. The canister is lifted until the grapple is above the spray rings.

- Continue the water spray cycle by reopening the demineralized water addition valve. While the water is flowing from the spray rings at 50 psig [tolerance TBD], lift the canister through the spray rings and out of the canister decontamination vessel. When the canister is above the top spray ring, hold the canister at the top position until the canister decontamination vessel level indicator reads 200 gallons [tolerance TBD]. Close the demineralized water addition valve. Transfer the liquid contents to the waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003) by opening the high pressure steam supply valve to the canister decontamination vessel ejectors (24590-HLW-MP-HDH-EJCTR-00003/56 A/B). When the canister decontamination vessel is empty, close the steam supply valve.

- Contact sodium hydroxide system (SHR). Input 83 gallon batch volume [tolerance TBD] into flow totalizer on sodium hydroxide addition line. Valve closes automatically after batch volume is received.

- After spraying the canister, the canister must be allowed to dry prior to swabbing. Drying of the canister is done by returning the canister to the canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4) and leaving the top open. The decontamination vessel, when lid is left open, will suck in air and reduces the canister drying time. After the canister is dry, the canister is ready to be transferred to the swab testing station. Close the lid of the canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4) after the canister has been removed.

7.1.5.6 Transferring of Waste to 24590-HLW-MV-RLD-VSL-00007

- After two canisters are decontaminated (approximately every 24 hours during normal operations), verify that the HLW acidic condensate vessel (24590-HLW-MV-RLD-VSL-00007) has sufficient working volume to receive the contents of the waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003). An acknowledgement from the RLD system that it can accept the transfer is received before the transfer is begun. Transfer the liquid out of the waste neutralization vessel by opening the high pressure steam supply valve to the waste neutralization vessel ejectors (24590-HLW-MP-HDH-EJCTR-00002 A/B). When the waste neutralization vessel is empty (as indicated by its level indication), close the steam supply valve.

7.1.6 Transfer Canister to Swab Station

- The Decontamination Vessel lid is opened and the Canister Grapple is lowered to engage the Canister. The Canister is then raised to transfer height.
- The Decontamination Vessel lid is closed and the Canister is positioned over the Swabbing Turntable.

7.1.7 Inspect Canister for Glass Spatter

- The Canister is lowered to inspection height and while rotating on the crane hook an operator performs a visual inspection utilizing a through wall camera.

7.1.8 Swab and Monitor Bottom of Canister

- A clean swab is obtained from the posting port using the telerobotic manipulator and is used to swab the bottom of the canister. The swab is returned to the posting port and transferred to the glovebox for the swab to be analyzed for contamination.
- Once the swab is determined below allowable levels of contamination, the canister is lowered onto the turntable. The canister grapple is disengaged and raised clear. (Reference Section 7.2.13, for swabs with high levels of contamination).

7.1.9 Swab and Monitor Top and Sides of Canister

- A clean swab is obtained from the posting port using the telerobotic manipulator. While the canister is rotating on the swabbing turntable, the telerobotic manipulator takes a representative swab of the sides and top of canister.
- The swab is delivered back to the posting port and passed through to the glovebox for analyzing.

7.1.10 Measure Canister

- A geometric profile of the canister is built utilizing the Telerobotic Manipulator in order to confirm the physical dimensions of the canister.
- The Telerobotic Manipulator shall verify that the filled canister fits into a right-circular, cylindrical cavity (64-cm diameter and 4.51-m length).

7.1.11 Transfer Canister to Canister Storage Transfer Tunnel

- The Canister Grapple is lowered onto the canister and engaged. The canister is raised to transfer height and is positioned over the Decontamination Cave export hatch.
- The Decontamination Cave export hatch is opened and the canister is lowered into the Canister Storage transfer bogie. The canister grapple is disengaged and raised clear. The Decontamination Cave export hatch is closed.
- The Canister Storage transfer bogie is then positioned below the Canister Storage Cave import hatch.
- System HDH functions are concluded at this point in the sequence.

7.1.12 Manual Operations

Three through wall manipulators have been provided as an aid to recovery operations. There are no manual operations to be performed.

7.1.13 Interlock Features

7.1.13.1 Canister Decontamination Cave

a) The Shielded Personnel Access (SPA) door into the crane maintenance area is interlocked with the crane maintenance shield door to prevent opening at the same time. Locks and administrative controls prevent the SPA door from being opened when radiation/contamination level exceed limits.

b) The SPA Door into the Canister Decontamination Cave is interlocked with the crane maintenance area shield door and with the Canister Decontamination Cave import and export Hatchs, to prevent opening at the same time. Locks and administrative controls prevent the SPA door from being opened when radiation/contamination level exceed limits.

c) The crane is prevented from striking the crane maintenance area shield door by end of travel and over travel limit switches.

d) Opening of the Canister Decontamination import hatch is interlocked to prevent opening unless the following conditions are satisfied. The canister rinse bogie is in position under the hatch. The Canister Decontamination Cave Crane maintenance area shield door is closed. The Canister Rinse Bogie maintenance area shield door is closed. The Canister Handling Cave export hatch is closed. The Canister Decontamination export hatch is closed. The Canister Decontamination Cave SPA door is closed.

e) Opening of the Canister Decontamination Cave export hatch is interlocked to prevent opening unless the following conditions are satisfied. The Canister Storage Transfer bogie is in position under the hatch. The Canister Export Cave import hatch is closed. The Canister Decontamination Cave import hatch is closed. The Canister Decontamination Cave SPA door is closed. The Canister Storage Transfer tunnel SPA door is closed. The Canister Decontamination Cave crane maintenance area shield door is closed.

7.1.13.2 Canister Rinse Tunnel

a) Opening of the Canister Handling Cave export hatch is interlocked to prevent opening unless the following conditions are satisfied. The canister rinse bogie is in position under the Canister Handling Cave export hatch. The Canister Decontamination Cave import hatch is closed. The Rinse Bogie maintenance area shield door is closed. The pour tunnel hatches 1 and 2 are closed. The Canister Handling Cave import hatch is closed. The Canister Handling Cave crane maintenance area horizontal and vertical shield doors are closed.

b) The rinse cycle is interlocked to prevent initiation until the rinse bogie is in position and the vessel seal is pressurized.

c) Locks and administrative controls prevent the SPA door into the Canister Rinse Bogie maintenance area from being opened when radiation/contamination levels exceed limits.

d) The canister rinse bogie is prevented from striking the maintenance area shield door by end of travel and over travel limit switches.

7.1.13.3 Canister Storage Transfer Tunnel

The Shielded Personal Access, (SPA) door in the Canister Storage Transfer tunnel maintenance area is interlocked with the Decontamination Cave export hatch and System HEH Export Cave import hatch to prevent opening at the same time. Locks and administrative controls prevent the SPA door from being opened when radiation/contamination levels exceed limits.

7.1.13.4 Process Equipment/Sequence Interlocks

7.1.13.4.1 Canister Rinse in Bogie Vessel

The following permissives allow the initial canister rinse sequence to start:

- Level in canister decontamination rinse bogie vessel (24590-HLW-MV-HDH-VSL-00001) is low.
- Level in waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003) is sufficient for holding rinse water.

The following trip does not allow initial canister rinse sequence to start or continue once the initial canister rinse sequence has started:

- Level in canister decontamination rinse bogie vessel is above high level.
- Pressure on air line for seal is above high level.
- Pressure on air line for seal is below low level.

7.1.13.4.2 Transfer of Chemicals for Decontamination

The following permissives allow the transfer of chemicals for decontamination sequence to start:

- Level in canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4) is sufficient to hold 215 gal.
- Air sparger in canister decontamination vessel is functioning.

The following trip does not allow the transfer of chemicals for decontamination sequence to start or continue once the transfer of the chemicals for decontamination has started:

- Level in canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4) is above high level.

7.1.13.4.3 Decontamination of the Canister

The following permissive allows the decontamination of the canister sequence to start:

- Level in canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4) is at 215 gal [tolerance TBD].
- Sparge air pressure and flow within operational limits.

The following trips do not allow the decontamination of the canister sequence to start or to continue once the decontamination of the canister has started:

- Temperature is above high high temperature.
- Level falls below top of canister.

7.1.13.4.4 Neutralization of the Waste

The following permissive allows the neutralization of the waste sequence to start:

- Level in waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003) is sufficient for transfer of spent decontamination solution
- Level in waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003) is at least 360 gal.
- Temperature of canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4) contents are at or below 104 °F
- Air sparger in waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003) is working properly.
- Level in hydrogen peroxide addition tank (24590-HLW-MT-HDH-TK-00003) is 0.5 gal [tolerance TBD].

The following trip does not allow neutralization of the waste sequence to start or to continue once neutralization of the waste has started:

- Level in waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003) is above high level

7.1.13.4.5 Acid and Water Rinses

The following permissives allow the acid and water rinsing sequence to start:

- Level in waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003) is sufficient for nitric acid and demineralized water rinse solutions.
- Air sparger in waste neutralization vessel is functioning properly
- Level in canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4) is low.

The following trips do not allow acid and water rinsing sequence to start or to continue once acid and water rinsing has started:

- Level in canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4) is above high level
- Level in waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003) is above high level
- Temperature of rinse solutions in canister decontamination vessel (24590-HLW-MV-HDH-VSL-00002/4) is above high level

7.1.13.4.6 Transfer of Waste to RLD System

The following manual checks allow the transferring of the waste to RLD sequence to start:

Level in HLW acidic waste vessel is sufficient to hold the contents of the waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003).

- Temperature in waste neutralization vessel (24590-HLW-MV-HDH-VSL-00003) is at or below 113 °F

The following trip does not allow the transferring of the waste to RLD sequence to start or continue once transferring of the waste to pretreatment has started:

- Level in HLW acidic waste vessel is above high high level

7.1.13.5 Canister Decontamination Cave Swab Posting Port

The decontamination posting port has an ITS interlock to prevent the in-cave posting port (24590-HLW-DD-HDH-TWDVC-00002) shield door from opening if the out-cave posting port shield door is open.

The out-cave posting port shield door also has a gamma interlock to prevent the door from opening when a high radiation source is present.

7.2 Off-normal Operations

7.2.1 Decontamination Cave Crane (24590-HLW-MJ-HDH-CRN-00005)

The in-cave crane is recoverable via redundant drives on all motions, where necessary. The redundant drives allow recovery from credible failures including seized or free spinning trolley wheels, seized or free spinning bridge wheels, and seized or free spinning hoist drive trains. These redundant drives will be inspected and exercised on a periodic basis to protect from potential seizure due to being retained in their static position for prolonged periods. For additional information reference specification, "High Integrity CMAA 70 Cranes"(24590-WTP-3PS-MJKG-T0003).

7.2.2 Decontamination Cave Crane Cable Reel Assembly (24590-HLW-MH-HDH-RCVY-00004)

The electrical cable contains strainer wires to facilitate crane retrieval if the primary means of recovery fails. For additional information reference specification, "High Integrity CMAA 70 Cranes"(24590-WTP-3PS-MJKG-T0003).

7.2.3 Decontamination Cave Crane Vertical Shield Door (24590-HLW-AD-HDH-DOOR-00002)

In the event of a drive system malfunction or failure, vertical doors shall be capable of being closed using the remote recovery system without requiring personnel to enter the decontamination or maintenance area. Once the door is closed, maintenance personnel will be able to enter the decontamination or maintenance area to perform repairs. For additional information reference specification, Shield Door Recovery Systems, (24590-WTP-3PS-ADDH-T0004).

7.2.4 Rinse Bogie Decontamination Area Horizontal Shield Door (24590-HLW-AD-HDH-DOOR-00001)

Shield door remote recovery systems shall be able to reach, connect to, and apply the required pulling forces to the specified shield doors without requiring personnel to enter the room that houses the door panel. For additional information reference specification, WTP Shield Door Recovery Systems, (24590-WTP-3PS-ADDH-T0004).

7.2.5 Bogie Recovery Systems (24590-HLW-MH-HDH-RCVY-00007, 24590-HLW-MH-HDH-RCVY-00009)

The recovery system is a static line along the full length of the rail attached to a drag block that is fastened to the rail. This recovery drag block would be used in the event of a component failure on the bogies.

The canister rinse bogie recovery system (24590-HLW-MH-HDH-RCVY-00009) is located in the Rinse Bogie maintenance area. For additional information reference specification, HLW System HDH Canister Rinse Bogie, (24590-HLW-3PS-MQR0-T0002).

The canister storage transfer bogie recovery system (24590-HLW-MH-HDH-RCVY-00007) is located in the tunnel with a through wall drive located outside the tunnel. For additional information, reference specification, HLW Standardized Bogies (24590-WTP-3PS-MQR0-T0002).

7.2.6 Canister Storage Transfer Bogie Recovery Through Wall Drive (24590-HLW-DD-HDH-TWDVC-00008)

The through wall drive translates rotary motion from a motor to a cable reel drum located in the bogie tunnel. Overload protection in the form of a torque limiter is included to protect the drive train from catastrophic failure. A sprocket/chain assembly affords flexible positioning of the drive motor relative to the through wall penetration. For additional information, reference specification, HLW Standardized Bogies, (24590-WTP-3PS-MQR0-T0002).

7.2.7 Canister Hatches (24590-HLW-AD-HDH-HTCH-00003, 24590-HLW-AD-HDH-HTCH-00004, 24590-HLW-AD-HDH-HTCH-00002)

A manual override adapter shall be incorporated into the accessible portion of the drive train on all rack and pinion drives. The manual override shall enable personnel to manually actuate hatches, through their entire range of motion, without requiring them to enter the room containing the hatch cover. A removable handwheel/shaft assembly is provided for this purpose. For additional information reference specification, System Transfer Hatches, Hatch Drives, and Floor Penetration Liners (24590-WTP-3PS-ADDC-T0002).

7.2.8 Canister Grapple (24590-HLW-FH-HDH-TOOL-00001)

The grapple shall be equipped with means to disengage the canister using the crane or a Master Slave Manipulator (MSM) if the normal disengagement mechanism fails. For additional information reference specification, HLW Canister Grapple (24590-HLW-3PS-MQL0-T0001).

7.2.9 Decontamination Vessel Lid Through Wall Drive (24590-HLW-MJ-HDH-DRIV-00001, 24590-HLW-MJ-HDH-DRIV-00008)

The decontamination vessel lid is operated via a through-wall mechanism with the actuator motor components, including actuator motor and supply, mounted outside the cave on the wall adjacent to the penetration. In the event of motor failure the vessel lid may be operated by either (1) disconnecting the mechanical linkage to the shaft and manually turn the shaft with a tool or (2) disconnect the mechanical

linkage to the shaft and use the in-cave Master Slave Manipulators. For more information, reference specification, System HDH Swabbing and Monitoring System, (24590-HLW-3PS-HDYR-T0001).

7.2.10 Canister Swabbing Turntable (24590-HLW-MJ-HDH-TTBL-00001)

The drive system shall be provided with slipping clutch coupling(s) and/or torque limiter(s), as required to prevent stalling of the motor or damage to drive system components in the event of a malfunction. For more information, reference specification, System HDH Swabbing and Monitoring System, (24590-HLW-3PS-HDYR-T0001).

7.2.11 Swabbing Vertical Rail Assembly Through Wall Drive (24590-HLW-MJ-HDH-DRIV-00007)

The drive system shall be provided with slipping clutch coupling(s) and/or torque limiter(s), as required to prevent stalling of the motor or damage to drive system components in the event of a malfunction. For more information, reference specification, System HDH Swabbing and Monitoring System, (24590-HLW-3PS-HDYR-T0001).

7.2.12 Detection of Glass Spatter on Canister

Reference Section 7.1.7, Inspect Canister for Glass Spatter - if inspection should detect glass spatter, the following additional steps will take place:

1. The canister is raised to transfer height and is positioned above the Decontamination Cave Import Hatch.
2. The Decontamination Cave Import Hatch is opened and the canister is lowered into the Canister Rinse Bogie. The canister grapple is disengaged and raised clear.
3. The Decontamination Cave Import Hatch is closed and the Canister Rinse Bogie is positioned under the Canister Handling Cave Export Hatch.
4. The Canister Handling Cave Export Hatch is opened; the grapple is lowered and is engaged on the canister and raised into the cave.
5. The Canister Handling Cave Export Hatch is closed.
6. System HPH receives the canister and stores it in the buffer area, until disposed of.

7.2.13 Detection of Contamination on Canister Bottom

Reference Section 7.1.8, Swab and Monitor Bottom of Canister - should Swab be determined "above" allowable levels the following additional steps will take place:

1. Swabs that indicate gamma readings above the threshold for entry into the glovebox are collected at the Posting Port by the swabbing Telerobotic Manipulator and placed in the failed swab basket.
2. The canister is raised to transfer height and is returned to the canister decontamination vessel for repeat of the decontamination process, see Section 7.1.5.

OR

1. Swabs that indicate radiation readings above the DOE requirement are stored in the glovebox, awaiting bag out.

2 The canister is raised to transfer height and is returned to the canister decontamination vessel for repeat of the decontamination process, see Section 7.1.5.

7.2.14 Detection of Contamination on Canister Top and Sides

Reference Section 9.1.8, Sequence Step 2-should Swab be determined "above" allowable levels the following additional steps will take place:

1 Swabs that indicate radiation readings above the threshold for entry into the glovebox are collected at the posting port by the swabbing telerobotic manipulator and placed in the failed swab basket.
2 The canister is raised to transfer height and is returned to the canister decontamination vessel for repeat of the decontamination process, see Section 7.1.5.

OR

1 Swabs that indicate radiation readings above the DOE requirement are stored in the glovebox, awaiting bag out.
2 The canister is raised to transfer height and is returned to the canister decontamination vessel for repeat of the decontamination process, see Section 7.1.5.

7.2.15 Canister Drop

A canister drop is detected visually. Recovery operations will depend on the damage incurred. A dropped canister recovery tool hanging from the crane hook is provided to upright the canister. The recovery tool is collected by the crane from the crane maintenance area.

7.2.16 Loss of Electrical Power

On loss of electrical power, ITS instrumentation and controls would continue to operate on back-up power. During the power restoration effort, normal decontamination procedures are discontinued. All crane operations cease in a fail to safe manner.

7.2.17 Decontamination Process

Failure of the decontamination process may be caused by loss of cooling water, loss of heating coil steam, loss of process air, loss of instrument air, or chemical addition vessel drain valve failure. The alarms and trips associated with these failures are listed below.

Table 6 Faults Indicated by HDH Alarms and Trips

Equipment	Instrument and Alarm/Trips	Faults
HDH-VSL-00001	Level - High - Trip closes inlet valves	HDH-PMP-00001 malfunctioning (stopped or not running at a high enough flow rate) Outlet line is plugged Level instrumentation failure

Equipment	Instrument and Alarm/Trips	Faults
	Level - Control - Interlock stops and starts 24590-HLW-MP-HDH-PMP-00001 at high and low set points.	
	Flow - Low - Alarm	Nozzles plugged PCV0156 malfunctioning Flow instrumentation failure
HDH-VSL-00002/4	Level - High - Alarm Level - High-High - Trip closes inlet valves	Cooling water coil leaking Level instrumentation failure
	Temperature - Above Normal - Alarm	Cooling water line plugged or not being sent. Temperature instrumentation failure
	Temperature - Control - Interlock sends PCW at high temperature, send HPS at low temperature	
	Flow (Sparge Air) - Low - Alarm	PCV0149 failed Sparge line or nozzles plugged Flow instrumentation failure
	Flow (Nitric Acid) - Low - Alarm	Nitric acid pump failure Flow instrumentation failure
HDH-VSL-00003	Level - High - Alarm Level - High-high - Interlock to stop all transfers to vessel	Overflow in canister decontamination vessel (HDH-VSL-00002) Level instrumentation failure
	Level - Low - Interlock to stop all transfers from vessel	
	Temperature - High - Alarm	Temperature instrumentation failure
	Temperature - High-high - Interlock to stop transfers to vessel	Stop ejector and sodium hydroxide transfer to HDH-VSL-00003
	Flow (Sparge Air) - Low - Alarm	PCV0164 failed Sparge line or nozzles plugged Flow instrumentation failure
HDH-TK-00002	Level - High - Local Alarm	Drum pump malfunction Operator error Level instrumentation failure
HDH-TK-00003	Level - High - Local Alarm	Operator error

Equipment	Instrument and Alarm/Trips	Faults
		Level instrumentation failure

The recovery from process equipment failures is based on the need to enter the cave. If the problem cannot be fixed outside of the cave, all of the HDH vessels are emptied to the acidic waste vessel (24590-HLW-MV-RLD-VSL-00007). If entry is required, all of the vessels are emptied to the acidic waste vessel (24590-HLW-MV-RLD-VSL-00007), the canister is moved back to the bogie vessel (24590-HLW-MV-HDH-VSL-00001), and the vessels are washed and completely emptied to the plant wash vessel (24590-HLW-MV-RLD-VSL-00008).

8 Maintenance

8.1 Platforms

For a list of all maintenance Platforms refer to Appendix E

8.2 Equipment

For a list of all maintenance Equipment refer to Appendix F

9 Interfacing Systems

Table 7 System HDH Interfaces

COMMON TO WTP: Shield Windows MSMs Out Cave Cranes Containers, Flasks and Drums Industrial Safety Equipment Standard Through wall Liners and Plugs Cave Camera's Through Wall Lighting	Standard items throughout HLW facility
CANISTER POUR HANDLING CAVE: System HPH -Canister Pour Handling System	System HPH provides filled sealed product canisters to system HDH. It is also used for removal of any glass spatter detected in system HDH.
CANISTER EXPORT HANDLING CAVE: System HEH - Canister Export Handling System	System HEH receives decontaminated filled sealed canisters from System HDH for storage and export
EFFLUENTS System RLD - Radioactive Liquid Waste Disposal System	Receives wash water from the tunnel & CMA sumps. Receives neutralized decon effluents and vessel washings for sampling and storage.

UTILITIES System ISA - Instrument Service Air System	Provides sparge air to HDH vessels in decon/swab cave. Provides instrument air to the Canister Rinse Bogie for seal inflationProvides air to instruments and control valves.
UTILITIES System DIW - Demineralized Water System System PWD - Plant Wash and Disposal System System NAR - Nitric Acid Reagent System System PCW - Plant Cooling Water System System HPS - High Pressure Steam System System SHR - Sodium Hydroxide Reagent System System SCW - Steam Condensate Water System	Provides demin water for canister rinse. Provides plant water to the Canister Rinse Bogie and tunnel /in cave spray lances Provides plant wash water for vessel and canister washings Provides 1M nitric acid for decon solution and canister rinse Provides cooling water for decon vessels' coils Provides steam for steam ejectors and decon vessels' coils Provides sodium hydroxide for decon waste neutralization Collects condensate from various systems
Electrical / C&I: System LVE - Low Voltage Electrical (480/ 208/120 V) System System UPE - 120 VAC Un-interruptible Power Electrical System (UPS) System LTE -Electrical Lighting System System GRE -Grounding/Lightning Protection Electrical System System PTJ - Process/Mechanical Handling CCTV System PCJ - Process Control system System MHJ - Mechanical Handling Control System System PVV - Process Vessel Vent Extraction System System PJV - Pulse Jet Ventilation System	Provides controls & instrumentation for overhead crane, power manipulator, bogies, decontamination system, swabbing system, MSMs, lighting, monitoring equipment, and cameras
HVAC: System C2V- C2 Ventilation System System C3V - C3 Ventilation System System C5V - C5 Ventilation System	Provides and maintains adequate air flows & negative pressure for the control of contamination

10 Applicable Documents

10.1 Regulatory Documents

DOE/DE-AC06-96RL13308, *River Protection Project, Waste Treatment Plant (RPP-WTP) Contract* - Part I, Section C, as amended, U.S. Department of Energy, Office of River Protection, Richland, Washington, USA.

10 CFR 835, Title 10 Code of Federal Regulations Part 835, *Occupational Radiation Protection*, as amended, U.S. Department of Energy, Office of Environment, Safety and Health, Washington D.C., USA.

DOE/RW-0351P, *Waste Acceptance System Requirements Document (WASRD)*, as amended, U.S. Department of Energy; Office of Civilian Radioactive Waste Management, Washington, D.C., USA.

HNF-EP-0063, *Hanford Sight Solid Waste Acceptance Criteria (HSSWAC)*, as amended, Richland, Washington, USA.

WA7890008967, as amended, *Dangerous Waste Portion of the Hanford Facility Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste, Chapter 10 and Attachment 51, "Waste Treatment and Immobilization Plant", Washington Department of Ecology.*

10.2 WTP Project Documents

10.2.1 Authorization Basis Documents

The Authorization Basis (AB) is a composite of the River Protection Project-Waste Treatment Plant (RPP-WTP) information describing the safety and administrative control requirements for the design, construction, operation, maintenance, and deactivation of the facility. A listing of the applicable sections from these documents which apply to System HDH are provided in Appendix B. The AB documents, which provide design inputs to System HDH are as follows:

a) 24590-WTP-ISMP-ESH-01-001, as amended, *Integrated Safety Management Plan.*

b) 24590-WTP-PSAR-ESH-01-002-01, as amended, *Preliminary Safety Analysis Report to Support Construction Authorization; General Information.*

c) 24590-WTP-PSAR-ESH-01-002-04, as amended, *Preliminary Safety Analysis Report to Support Construction Authorization; HLW Facility Specific Information.*

d) 24590-WTP-QAM-QA-01-001, as amended, *Quality Assurance Manual*

e) 24590-WTP-RPP-ESH-01-001, as amended, *Radiation Protection Program for Design & Construction.*

f) 24590-WTP-SRD-ESH-01-001-02, as amended, *Safety Requirements Document, Volume II.*

10.2.2 Project Design Input Documents

a) 24590-WTP-DB-ENG-01-001, as amended, *Basis of Design (BOD).*

b) 24590-WTP-PL-G-01-001, as amended, *Functional Specification (FS).*

c) 24590-WTP-RPT-OP-01-001, as amended, *Operations Requirements Document.*

10.2.3 Project General Documents

a) 24590-WTP-3PS-JXXE-T0002, *Engineering Specification for C&I Enclosures, Panels, Cabinets, and Racks*, Bechtel National, Inc., Richland, Washington.

b) 24590-WTP-3PS-M000-T0002, *General Specification for Mechanical Handling Equipment Design & Manufacture*, Bechtel National, Inc., Richland, Washington.

c) 24590-WTP-3PS-SS00-T0001, *Engineering Specification for Welding of Carbon Structural Steel*, Bechtel National, Inc., Richland, Washington.

d) 24590-WTP-3PS-SS00-T0002, *Welding of Structural Stainless Steel and Welding of Structural Carbon Steel to Structural Stainless Steel*, Bechtel National, Inc., Richland, Washington.

e) 24590-WTP-3PS-SS90-T0001, *Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks*, Bechtel National, Inc., Richland, Washington.

10.3 System Documents

Mechanical Sequence Diagrams (MSDs), Mechanical Handling Diagrams (MHDs), and Design Proposal Drawings (DPDs) applicable to System HDH are listed in Appendix A.

10.4 Supplemental Documents

10.4.1 WTP Project Interfacing System Descriptions

a) 24590-HLW-3YD-HPH-00001, *System Description for HLW System HPH Canister Pour Handling.*

b) 24590-HLW-3YD-HEH-00001, *System Description for HLW System HEH Canister Export Handling.*

c) 24590-HLW-3YD-RLD-00001, *System Description for HLW Radioactive Liquid Waste Disposal System (System RLD).*

d) 24590-WTP-3YD-SHR-00001, *System Description for WTP Reagents (SHR, NAR, AFR, SPR, STR, and SNR).*

10.4.2 WTP Project Specifications

a) 24590-HLW-3PS-30-T0001, *Engineering Specification for HLW Canister Racks.*

b) 24590-WTP-3PS-ADDC-T0002, *Engineering Specification for HLW / PT System Transfer Hatches, Hatch Drives, Hatch Pushrod Assemblies, and Penetration Liners.*

c) 24590-HLW-3PS-HDYR-T0001, *Engineering Specification for System HDH Swabbing and Monitoring System.*

d) 24590-HLW-3PS-MQL0-T0001, *HLW Canister Grapples.*

e) 24590-HLW-3PS-MQL0-T0002, *Dropped Canister Retrieval Tool.*

f) 24590-HLW-3PS-MQR0-T0002, *Engineering Specification for HLW System HDH Canister Rinse Bogie.*

g) 24590-WTP-3PS-ADDH-T0001, *Engineering Specification for HLW/PTF Bogie Shield Doors.*

h) 24590-WTP-3PS-ADDH-T0003, *Engineering Specification for HLW/PTF Crane Maintenance Shield Doors.*

i) 24590-WTP-3PS-ADDH-T0004, *WPT Shield Door Recovery Systems.*

j) 24590-WTP-3PS-HD00-T0001, *Engineering Specification for Maintenance Decontamination Equipment.*

k) 24590-WTP-3PS-MJKG-T0002, *Engineering Specification for CMAA 74 Top Running and Under Running Single Girder Electric Overhead Traveling Cranes.*

l) 24590-WTP-3PS-MJKH-T0002, *Engineering Specification for Process Monorail Hoists.*

m) 24590-WTP-3PS-MJKG-T0003, *Engineering Specification for CMAA 70 High Integrity Cranes.*

n) 24590-WTP-3PS-MQL0-T0001, *Design and Fabrication of Grapple Stands.*

o) 24590-WTP-3PS-MQR0-T0002, *Engineering Specification for HLW Standardized Bogies.*

p) 24590-WTP-3PS-MX00-T0003, *Engineering Specification for QL Through-Wall Devices.*

q) 24590-WTP-3PS-MV00-T0001, *Engineering Specification for Pressure Vessel Design and Fabrication.*

r) 24590-WTP-3PS-M000-T0006, *Engineering Specification for WTP Facility Posting Port*

s) 24590-WTP-3PS-M000-T0007, *Engineering Specification for WTP Facility Posting Port Glovebox*

t) 24590-WTP-3PS-G000-T0005, Rev 0, *Engineering Specification for Cleanness Requirements for WTP Fluid Systems*

11 Appendices

This page intentionally left blank.

Appendix A
–Supporting Documents

Plant Item Number	Document Number	ITS Quality Level	Document Type	Document Name
N/A	24590-HLW-M7-HDH-00001001		MHD	HLW VITRIFICATION SYSTEM HDH MECHANICAL HANDLING DIAGRAM CANISTER DECONTAMINATION HANDLING SYSTEM
N/A	24590-HLW-M1-HDH-00002		MSD	HLW SYSTEM HDH MECHANICAL SEQUENCE DIAGRAM
N/A	24590-M0K-HDH-00008001		P&E	HLW VITRIFICATION SYSTEM HDH PLANT AND EQUIPMENT LAYOUT CANISTER DECONTAMINATION HANDLING
N/A	24590-M0K-HDH-00001001		CFL	HLW VITRIFICATION SYSTEM HDH PLANT & EQPT CAVE FACE LAYOUT CANISTER DECONTAMINATION HANDLING (EL -21'-0")
N/A	24590-M0K-HDH-00006001		CFL	HLW VITRIFICATION SYSTEM HDH PLANT & EQPT CAVE FACE LAYOUT CANISTER DECONTAMINATION HANDLING (EL. 0 FT-0 IN)
N/A	24590-M0K-HDH-00003001		HIW	HLW VITRIFICATION SYSTEM HDH HOLES AND EMBEDDED ITEMS CANISTER DECONTAMINATION HANDLING CANISTER RINSE TUNNEL
N/A	24590-M0K-HDH-00002001		HIW	HLW VITRIFICATION SYSTEM HDH HOLES AND EMBEDDED ITEMS CANISTER DECONTAMINATION HANDLING CANISTER STORAGE TRANSFER TUNNEL
N/A	24590-M0K-HDH-00005001		HIW	HLW VITRIFICATION SYSTEM HDH HOLES AND EMBEDDED ITEMS CANISTER DECONTAMINATION HANDLING CAVE
N/A	24590-HLW-M0-HDH-00033001		DPD	SWABBING AND MONITORING SYSTEM ARRANGEMENT
24590-HLW-MJ-HDH-CRN-00005	24590-HLW-M0D-HDH-00021	2	MDS	DECONTAMINATION SWABBING AND MONITORING CRANE

Plant Item Number	Document Number	ITS Quality Level	Document Type	Document Name
24590-HLW-AD-HDH-DOOR-00001	24590-HLW-M0-HDH-00001001	2	DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING CANISTER RINSE BOGIE DECON/MAINT SHIELD DOOR ARRANGEMENT
24590-HLW-AD-HDH-DOOR-00002	24590-HLW-M0-HDH-00015001	2	DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING CANISTER DECON & SWAB CRANE MAINTENANCE SHIELD DOOR ARRANGEMENT
24590-HLW-AD-HDH-DOOR-00003	24590-HLW-MX-30-00001001	1	DPD	HLW VITRIFICATION DESIGN PROPOSAL DRAWING PERSONNEL SHIELDED ACCESS DOOR SCHEDULE
24590-HLW-AD-HDH-DOOR-00004	24590-HLW-MX-30-00001004	1	DPD	DESIGN PROPOSAL DRAWING PERSONNEL SHIELDED ACCESS DOOR (3 INCH) DOOR ASSEMBLY
24590-HLW-AD-HDH-DOOR-00005	24590-HLW-MX-30-00001004	1	DPD	DESIGN PROPOSAL DRAWING PERSONNEL SHIELDED ACCESS DOOR (3 INCH) DOOR ASSEMBLY
24590-HLW-AD-HDH-DOOR-00006	24590-HLW-MX-30-00001001	1	DPD	HLW VITRIFICATION DESIGN PROPOSAL DRAWING PERSONNEL SHIELDED ACCESS DOOR SCHEDULE
24590-HLW-AD-HDH-DOOR-00007	24590-HLW-M0-HDH-00045		DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING CANISTER DECONTAMINATION HANDLING SYSTEM AIRLOCK DOOR DETAIL
24590-HLW-MJ-HDH-DRIV-00001	24590-HLW-M0-HDH-00047		DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING DECONTAMINATION VESSEL LID SOUTH THROUGH WALL DRIVE
24590-HLW-AD-HDH-HTCH-00002	24590-WTP-M0-30-00007001	2	DPD	HLW VITRIFICATION SYSTEM HDH, HEH, HRH DESIGN PROPOSAL DRAWING TRANSFER HATCH ASSEMBLY
24590-HLW-AD-HDH-HTCH-00003	24590-WTP-M0-30-00007001	2	DPD	HLW VITRIFICATION SYSTEM HDH, HEH, HRH DESIGN PROPOSAL DRAWING TRANSFER HATCH ASSEMBLY
24590-HLW-AD-HDH-HTCH-00004	24590-HLW-M0-HDH-00004001	2	DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING CANISTER DECON CAVE IMPORT HATCH ARRANGEMENT
24590-HLW-MJ-HDH-DRIV-00004	24590-HLW-M0-HDH-00034		DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING SWAB MONITOR SYSTEM CANISTER TURNTABLE THROUGH WALL DRIVE DETAIL

Plant Item Number	Document Number	ITS Quality Level	Document Type	Document Name
24590-HLW-MJ-HDH-DRIV-00007	24590-HLW-M0-HDH-00037		DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING SWAB MONITOR SYSTEM MANIPULATOR ELEVATOR THROUGH WALL DRIVE
24590-HLW-MJ-HDH-DRIV-00008	24590-HLW-M0-HDH-00048		DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING DECONTAMINATION VESSEL LID NORTH THROUGH WALL DRIVE
24590-HLW-MH-HDH-MHAN-00001	24590-WTP-M0-M10T-00002001	1	DPD	WTP DESIGN PROPOSAL DRAWING GLOVEBOX
24590-HLW-MH-HDH-MHAN-00003	24590-HLW-M0-HDH-00039		DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING SWAB MONITORING SYSTEM CANISTER GUIDE DETAIL
24590-HLW-MH-HDH-MHAN-00006	24590-HLW-M0-HDH-00041		DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING CANISTER DECON HANDLING CANISTER RACK
24590-HLW-DD-HDH-PLUG-00001	24590-HLW-M0-HDH-00001001	1	DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING CANISTER RINSE BOGIE DECON/MAINT SHIELD DOOR ARRANGEMENT
24590-HLW-MH-HDH-RAIL-00004	24590-HLW-M0-HDH-00010	2	DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING CANISTER RINSE BOGIE SEISMIC RAILS
24590-HLW-MH-HDH-RAIL-00005	24590-HLW-M0-HDH-00035		DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING SWAB MONITOR SYSTEM VERTICAL RAIL DETAIL
24590-HLW-MH-HDH-RCVY-00004	24590-HLW-M2D-HDH-00001	2	MDS	DECONTAMINATION SWABBING AND MONITORING CABLE REELING SYSTEM
24590-HLW-MH-HDH-RCVY-00007	24590-HLW-M0-HDH-00030		DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING CANISTER STORAGE TRANSFER BOGIE RECOVERY SYSTEM
24590-HLW-MH-HDH-RCVY-00009	24590-HLW-M0-HDH-00029		DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING CANISTER RINSE BOGIE RECOVERY SYSTEM
24590-HLW-FH-HDH-TOOL-00001	24590-HLW-M0-30-00012	2	DPD	HLW VITRIFICATION DESIGN PROPOSAL DRAWING MECHANICAL SEQUENCE CANISTER GRAPPLE
24590-HLW-MQ-HDH-TRLY-00003	24590-HLW-M0-HDH-00013001	2	DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING CANISTER RINSE BOGIE ARRANGEMENT

Plant Item Number	Document Number	ITS Quality Level	Document Type	Document Name
24590-HLW-MQ-HDH-TRLY-00004	24590-HLW-M0-HDH-00011001	2	DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING CANISTER STORAGE TRANSFER BOGIE
24590-HLW-MJ-HDH-TTBL-00001	24590-HLW-M0-HDH-000031		DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING SWAB MONITOR SYSTEM CANISTER TURNTABLE ASSEMBLY
24590-HLW-DD-HDH-TWDCV-00008	24590-HLW-M0-30-00020	1	DPD	HLW VITRIFICATION DESIGN PROPOSAL DRAWING BOGIE RECOVERY THROUGH WALL DRIVE
24590-HLW-DD-HDH-TWDVC-00002	24590-WTP-M0-M10T-00001001	1	DPD	WTP DESIGN PROPOSAL DRAWING POSTING PORT
24590-HLW-MJ-HDH-DRIV-00005	24590-WTP-M0-30-00007001		DPD	HLW VITRIFICATION SYSTEM HDH, HEH, HRH DESIGN PROPOSAL DRAWING TRANSFER HATCH ASSEMBLY
24590-HLW-MJ-HDH-DRIV-00002	24590-HLW-M0-HDH-00004001		DPD	HLW VITRIFICATION SYSTEM HDH DESIGN PROPOSAL DRAWING CANISTER DECON CAVE IMPORT HATCH ARRANGEMENT
24590-HLW-MJ-HDH-DRIV-00003	24590-WTP-M0-30-00007001		DPD	HLW VITRIFICATION SYSTEM HDH, HEH, HRH DESIGN PROPOSAL DRAWING TRANSFER HATCH ASSEMBLY
24590-HLW-MJ-HDH-MANIP-00001	24590-HLW-E0D-HDH-00001		MDS	Canister Swabbing Robot
24590-HLW-MJ-HDH-MANIP-00002	24590-WTP-M0-10-00014	1	MDS	WTP VITRIFICATION SYSTEM DESIGN PROPOSAL DRAWING MSM MANIPULATOR DIMENSIONS
24590-HLW-MJ-HDH-MANIP-00003	24590-WTP-M0-10-00014	1	MDS	WTP VITRIFICATION SYSTEM DESIGN PROPOSAL DRAWING MSM MANIPULATOR DIMENSIONS
24590-HLW-MJ-HDH-MANIP-00004	24590-WTP-M0-10-00014	1	MDS	WTP VITRIFICATION SYSTEM DESIGN PROPOSAL DRAWING MSM MANIPULATOR DIMENSIONS
24590-HLW-MJ-HDH-CRN-00006	24590-HLW-M0D-HDH-00066		MDS	HDH WEST JIB DECON CAVE MAINTENANCE AREA CRANE
24590-HLW-MJ-HDH-CRN-00007	24590-HLW-M0D-HDH-00067		MDS	HDH EAST JIB DECON CAVE MAINTENANCE AREA CRANE
24590-HLW-MJ-HDH-CRN-00002	24590-HLW-M0D-HDH-00002		MDS	RINSE BOGIE MAINTENANCE CRANE 1 (ROOM H-B039A)

Plant Item Number	Document Number	ITS Quality Level	Document Type	Document Name
24590-HLW-MJ-HDH-CRN-00004	24590-HLW-M0D-HDH-00003		MDS	RINSE BOGIE MAINTENANCE CRANE 2 (ROOM H-B039A)
24590-HLW-MJ-HDH-CRN-00001	24590-HLW-M0D-HDH-00004		MDS	CANISTER STORAGE TRANSFER BOGIE MAINTENANCE CRANE (ROOM H-B037B)
24590-HLW-MJ-HDH-CRN-00005	24590-HLW-M0D-HDH-00021	2	MDS	DECONTAMINATION SWABBING AND MONITORING CRANE
24590-HLW-MH-HDH-MHAN-00011	24590-HLW-M0D-HDH-00029		MDS	SPOOL PIECE (= FLANGED, METAL CYLINDER) FOR THE CANISTER-RINSE BOGIE (INCLUDES SHIM STOCK & MOUNTING PLATE)
24590-HLW-FH-HDH-TOOL-00005	24590-HLW-M0D-HDH-00031		MDS	CANISTER SWABBING TOOL
24590-HLW-MJ-HDH-TTBL-00001	24590-HLW-M0C-HDH-00007		Calculation	WEIGHTS AND CENTER OF GRAVITY CALCULATION FOR HLW HDH TURNTABLE
24590-HLW-MJ-HDH-DRIV-00004	24590-HLW-M0C-HDH-00008		Calculation	SWABBING TURNTABLE THROUGH-WALL DRIVE
24590-HLW-MH-HDH-RAIL-00005	24590-HLW-M0C-HDH-00010		Calculation	HLW SYS HDH SWAB MONITOR SYSTEM VERTICAL RAIL WEIGHT AND CENTER OF GRAVITY
24590-HLW-MJ-HDH-DRIV-00007	24590-HLW-M0C-HDH-00011		Calculation	SWABBING ROBOT VERTICAL RAIL THROUGH-WALL DRIVE
24590-HLW-MH-HDH-MHAN-00018	24590-HLW-M0C-HDH-00012		Calculation	HLW SYS HDH SWABBING ROBOT CARRIAGE WEIGHT AND CENTER OF GRAVITY
24590-HLW-MH-HDH-RAIL-00005	24590-HLW-M0C-HDH-00015		Calculation	HDH VERTICAL RAIL BEARING AND BEARING LIFE
24590-HLW-MJ-HDH-DRIV-00001	24590-HLW-M0C-HDH-00016		Calculation	HLW SYSTEM HDH DECON VESSEL LID SOUTH THROUGH WALL DRIVE WEIGHT, CENTER OF GRAVITY, AND POWER
24590-HLW-MJ-HDH-DRIV-00008	24590-HLW-M0C-HDH-00018		Calculation	HLW SYSTEM HDH DECON VESSEL LID NORTH THROUGH WALL DRIVE WEIGHT, CENTER OF GRAVITY, AND POWER
24590-HLW-AD-HDH-DOOR-00007	24590-HLW-M0C-HDH-00017		Calculation	HLW VITRIFICATION SYSTEM HDH CANISTER DECONTAMINATION AIRLOCK DOOR WEIGHT AND CENTER OF GRAVITY

Plant Item Number	Document Number	ITS Quality Level	Document Type	Document Name
NA	24590-HLW-M5-V17T-00006		PFD	PROCESS FLOW DIAGRAM HLW VITRIFICATION HLW CANISTER DECON (SYSTEM HDH) System HDH
NA	24590-HLW-M6-HDH-00001		P&ID	P&ID - HLW CANISTER DECONTAMINATION HANDLING SYSTEM
NA	24590-HLW-M6-HDH-00002		P&ID	P&ID - HLW CANISTER DECONTAMINATION HANDLING SYSTEM
NA	24590-HLW-M6-HDH-20001		P&ID	P&ID - HLW CANISTER DECONTAMINATION HANDLING SYSTEM
24590-HLW-MV-HDH-VSL-00001/2/3/4 24590-HLW-MT-HDH-TK-00002/3	24590-HLW-MVC-HDH-00005		Calculation	HDH VESSEL AND TANK PROCESS DATA CALCULATION
NA	24590-HLW-M6-HDH-00003		P&ID	P&ID - HLW CANISTER DECONTAMINATION AREA STEAM RACK HDH-RK-00009

Appendix B
– Requirements and Compliance Matrix

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
SFUNCT-1	System	Remove smearable radionuclides from canister surface. The HLW canister is sealed via welding (System HPH function) and weighed (System HDH function). The canister is decontaminated using a chemical etching process that uses Ce (IV) as the chemical reagent. Following decontamination, the canister is checked for straightness and ovality. Temperature and gamma dose rate measurements will be taken on selected canisters (not System HDH function).	24590-WTP-PL-G-01-001, Rev 4, Functional Specification, Section 3.1.1.3	24590-HLW-MV-24590-HLW-MV-HDH-VSL-00002/4 24590-HLW-MV-HDH-VSL-00004 24590-HLW-MH-HDH-MANIP-00001 24590-HLW-MH-HDH-TOOL-00001	Yes	All canisters are decontaminated, monitored, weighed and measured for straightness prior to transfer to System HEH	SD Section 6.3
SFUNCT-2	System	Neutralization and return of the decontamination process effluent to the PTF building Hot Commissioning shall be considered completed for Schedule Performance Fee purposes when the production quantities noted in Table C.6-5.2 below have been met for all Facilities and the final can or canister of vitrified waste has been processed in accordance with paragraph (vi) and/or (vii) below, regardless of whether Duration rates have been achieved. Table C.6-5.2 Hot Commissioning Performance Testing Facility Production Duration (Days) Minimum Expected HLW 56 Canisters 56 43	WTP Contract No. DE-AC27-01RV14136, Section C.6 Standard 5: (g)(4)(ii)	All system equipment	Yes	System designed to decontaminate 2 canisters per day.	SD Section 6.3
MCOMP-1	Specific	Data Management Philosophy Collection of certain categories of data is required to provide support of WTP operation and product data to the customer and regulatory bodies. The system designated to provide this data is the plant information network (PIN). The PIN is used to support the following: · Laboratory information management · Data warehousing of process and production data in order to satisfy data recording, archiving and reporting requirements intrinsic to the following: - Operations	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 7.5	N/A	Yes	Data warehousing of production data to satisfy data recording, archiving and reporting requirements.	SD Section 9

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
		- Management - Customer (DOE) - Regulatory - E&NS - Engineering					
MCOMP-2	System	To the extent practicable, systems are designed so systems can be commissioned independently.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 9.10	All system equipment	Yes	Equipment is pretested before delivery to field	N/A
MCOMP-3	Specific	At time of delivery to DOE, the HLW form shall stand upright without support on a flat horizontal surface and properly fit into a tight-circular, cylindrical cavity (64-cm diameter and 4.51-m length).	WTP Contract No. DE-AC27-01RV14136, Section C.8 Specification 1: 1.2.2.1.4	N/A	Yes	Canister is measured to these dimensions	SD Section 7.1.10
MCOMP-4	System	The HLW Facility waste treatment capacity shall be capable of producing an average of 480 canisters per year assuming 1.16 cubic meters of glass per canister.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 6.2.3	All system equipment	Yes	Building layout	SD Section 6.1.1
MCOMP-5	System	Disposal routes and shielding methods for packaging and shipping of failed contaminated equipment.	24590-WTP-RPT-OP-01-001, Rev 2, Operations Requirements Document, Section 14.8	N/A	Yes	Equipment is removed via the floor plugs in the maintenance areas	SD Section 7.2
MCOMP-6	System	Reliance on single systems is minimized, particularly if failure of a plant item constitutes a risk to the process. Justification for single items is not solely based on minimizing initial capital costs. The design must also address safety requirements and operational costs.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 11.4.2	24590-HLW-MV-HDH-VSL-00002/4 24590-HLW-MP-HDH-EJCTR-00002 A/B 24590-HLW-MP-HDH-EJCTR-00003/56 A/B 24590-HLW-MP-HDH-EJCTR-00057	Yes	Second decon vessel added. System can be maintained to fix single components.	SD Section 6.3.1.4 and 6.3.2.1
MCOMP-7	System	For high-frequency sampling and for highly radioactive, medium active, and transuranic bearing streams, designs will include the use of automated systems.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 11.6.7	N/A	Yes	Decon effluents are sent to the RLD system for sampling	SD Section 3.1.2
MCOMP-8	Specific	The grapple and lifting flange shall satisfy the following design requirements. The grapple shall be capable of being remotely engaged and disengaged from the flange. The grapple, when attached to a suitable hoist and engaged with the flange, shall be capable of raising and lowering a container/canister in a vertical direction. The grapple, in the disengaged position, shall be capable of being inserted into and withdrawn in a vertical direction from a right-circular, cylindrical cavity with a diameter equal to that of the container/canister. The grapple shall include features that will prevent an inadvertent release of a suspended container/canister when the grapple is engaged with the flange. -Compatible with the container/canister lifting flange and suitable for use at the repository.	24590-WTP-RPT-OP-01-001, Rev 2, Operations Requirements Document, Section 14.12	24590-HLW-FH-HDH-TOOL-00001 24590-HLW-FH-HDH-TOOL-00004	Yes	The grapple has a safe working load limit of 10,000 lbs with a design factor of 3 based on material yield, or 5 based on ultimate stress. It is also of a sufficient physical size to satisfy the insertion requirement	SD Section 6.2.5.

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
MCOMP-9	Specific	Provisions shall be made to prevent contamination of clean containers/canisters with contaminated grapples. An acceptable approach is to use two grapples, one clean and one dirty, and to provide separate storage for both when not in use.	24590-WTP-RPT-OP-01-001, Rev 2, Operations Requirements Document, Section 14.11	24590-HLW-FH-HDH-TOOL-00001 24590-HLW-FH-HDH-TOOL-00004	Yes	Two grapples are provided. One handles the canisters prior to decontamination and one after.	SD Section 6.2.5.
MCOMP-10	Specific	Shield Doors:- - Shall be designed and constructed for ease of decontamination. - To control the spread of contamination, airtight seals for complete sealing, or an engineered gap provided to maintain sufficient air velocities at the interface shall be used. - Design of shield door assembly shall permit simultaneous control of contamination and routing of breathing air hoses.	24590-WTP-RPT-OP-01-001, Rev 2, Operations Requirements Document, Section 7.1.	24590-HLW-AD-HDH-DOOR-00001 24590-HLW-AD-HDH-DOOR-00002 24590-HLW-AD-HDH-DOOR-00003 24590-HLW-AD-HDH-DOOR-00006	Yes	Shield doors designed to accommodate requirements	SD Section 6.2.2
MCOMP-11	Specific	Cranes and Hoists In-cell/In-cave cranes and hoists shall be designed to be of modular construction to facilitate removal and replacement of failed components. In addition, components shall be oriented such that the time for maintenance will be minimized. CCTV cameras installed on cranes shall be operated from a remote control station and shall be used to operate the crane. Cranes shall be operated via direct observation through windows where cameras do not warrant proper safe operation of cranes and hoists. Modules shall have quick connectors to allow rapid reconnection of cabling or other services. Typically there shall be no on-board logic and all power and signal cables shall be marshaled off-board. Maintenance cranes shall be designed and installed such that there is no interference with normal operations of the process cranes. Cranes and hoists shall be designed to be removed to dedicated maintenance areas for replacement of mechanical equipment, controls, and other components. Standardized operator controls shall be provided as much as possible to avoid errors which might occur when moving from one crane to another. Provisions shall be made, where applicable, for decontamination using carbon dioxide, pressurized warm water, detergent solution, and steam. Facilities for the decontamination shall be provided, including disposal of the waste liquid. Electrical and mechanical parts, and controls shall not be degraded as a result of decontamination. Brakes on hoists shall be designed to set when power is off. Lights shall be mounted on cranes to illuminate the working	24590-WTP-RPT-OP-01-001, Rev 2, Operations Requirements Document, Section 14.16	24590-HLW-MJ-HDH-CRN-00005	Yes	Cranes designed to accommodate all requirements	SD Section 6.2.1

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
		area below (except on single girder cranes with adequate lighting below). Components between cranes shall be standardized and interchangeable to the maximum extent possible. Features shall be included in the design to retrieve failed cranes to their maintenance areas. Under-the-hook lifting devices/beams shall be designed for multiple use for in-cell equipment. Engineered anchor points shall be provided in order to accommodate the use of rigging and portable hoists/cranes. Fall protection tie-off points or handrails shall be provided in appropriate locations. The crane systems for HLW, LAW, and PT shall be designed with an area that meets the ALARA criteria to enable inspection of all critical crane components prior to use. This may require platforms and catwalks. Crane systems shall be designed with lubrication systems that are accessible for ease of maintenance. Cranes shall be designed with limited automation, as they will be primarily operated directly.					
MCOMP-12	Specific	Bogies: - Shall include backup/recovery provisions in the event of a failure. Maximum loads shall be incorporated into the design of the recovery system. - Shall include modular components where possible, such as wheel assemblies (assumed locked/failed wheel), to accommodate ease of maintenance.	24590-WTP-RPT-OP-01-001, Rev 2, Operations Requirements Document, Section 7.1	24590-HLW-MQ-HDH-TRLY-00003 24590-HLW-MQ-HDH-TRLY-00004 24590-HLW-MH-HDH-RCVY-00009 24590-HLW-MH-HDH-RCVY-00007	Yes	Bogies are recovered with winches in the event of failure	SD Section 6.2.3
MCOMP-13	System	The facility design shall include consideration of normal operation (including startup, testing and maintenance), anticipated operational occurrences, external events, and accident conditions.	24590-WTP-SRD-ESH-01-001-02, Rev 3N, Safety Requirements Document Volume II, Section 4.1 - 1	All system equipment	Yes	Equipment is designed for maintenance and recovery features	SD Section 8
MCOMP-14	System	Structures, systems, and components designated as Important to Safety shall be designed, fabricated, erected, constructed, tested, inspected, and maintained to quality standards commensurate with the importance of the safety functions to be performed. Where generally recognized codes and standards are used, they shall be identified and evaluated to determine their applicability, adequacy, and sufficiency and shall be supplemented or modified as necessary to assure a quality product in keeping with the required safety function	24590-WTP-SRD-ESH-01-001-02, Rev 3N, Safety Requirements Document Volume II, Section 4.1 - 2	All system equipment designated ITS	Yes	ITS equipment has been identified as listed in Appendix A and meets appropriate requirements	SD Appendix A

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
MCOMP-15	System	Structures, systems, and components designated as Safety Design Class shall be appropriately protected against dynamic effects (e.g., the effects of missiles, pipe whipping, and discharging fluids) that may result from failures of moderate and high energy systems or other accident conditions.	24590-WTP-SRD-ESH-01-001-02, Rev 3N, Safety Requirements Document Volume II, Section 4.1 - 4	All system equipment designated SDC	Yes	SDC equipment has been identified and designed to meet appropriate requirements	SD Appendix A
MCOMP-16	System	Structures, systems, and components important to Safety shall be designed and qualified to function as intended in the environments associated with the events for which they are intended to respond. The effects of aging on normal and abnormal functioning shall be considered in design and qualification.	24590-WTP-SRD-ESH-01-001-02, Rev 3N, Safety Requirements Document Volume II, Section 4.4 - 1	QL-1, QL-2 and QL-3 equipment listed in Appendix A	Yes	Equipment designed to function in intended environment	SD Appendix A
MCOMP-17	System	Structures, systems, and components important to Safety shall be designated, designed and constructed to permit appropriate inspection, testing, and maintenance throughout their operating lives to verify their continued acceptability for service with an adequate safety margin.	24590-WTP-SRD-ESH-01-001-02, Rev 3N, Safety Requirements Document Volume II, Section 4.4 - 2	QL-1, QL-2 and QL-3 equipment listed in Appendix A.	Yes	Equipment designed to permit inspection, testing and maintenance. See Appendices E & F for specific methodology	SD Appendix A
MCOMP-18	System	Proven Technology The incorporation of equipment designs with proven operational performance is followed where possible. Similarly, existing technology, where available and suitable from other nuclear establishments, is used in the design of plant and equipment in preference to untried "novel" technology. The intent of these approaches is to minimize lifecycle costs. Where possible, the use of commercially available plant items is incorporated. Where proven technology is not available, appropriate technical development and testing programs is undertaken to establish feasibility, reliability, and lifecycle cost.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 11.4.3	All system equipment	Yes	Reference equipment Technical Specification	SD Section 5
MCOMP-19	Specific	In-cell equipment is designed, where possible, with minimal variations in fastening sizes. This reduces the need for numerous tools and the consequent manipulator tool changes. Lifting beams for the introduction, operation and removal of in-cell equipment is multi-purpose in that a single beam can perform a number of different duties. Where possible, commercially available items, without modification, are selected from the manufacturer's standard range. This reduces spares holding, cost, and lead times to obtain spares.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 11.4.5	Various	Yes	Reference equipment Technical Specification	SD Section 5
MCOMP-20	Specific	In-Cell and In-Cave Design In-cell equipment is simplified and minimized wherever practicable to improve reliability, operability, and maintainability. This philosophy also minimizes waste generated from associated disposal and decontamination. In-cell and in-cave operations are performed remotely. The design incorporates features to facilitate this mode of operation. Where possible, components that require a high degree of maintenance or service should be placed out-cave. Motor drives and valve power actuators should be operated through the wall	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 11.4.1	All system equipment	Yes	Reference equipment Technical Specification	SD Section 6

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
		and be maintained external to the cells and caves. This improves maintenance operations and reduces meantime to repair. Process operations within the cell or cave are, generally performed by dedicated equipment. Any maintenance operations are carried out by maintenance equipment. Certain equipment, such as in-cave cranes, is used for both process and maintenance operations tasks and care is taken to avoid over-utilization or excessive duty. Recovery operations on failed in-cell and in-cave equipment is addressed in the design to enable repair to be undertaken in the worst-case credible failure mode. This ensures that meantime to repair and cost to production is kept to a minimum. In-cell and in-cave equipment is designed to fail safely and to allow recovery operations to be undertaken. In-cave equipment is to be designed to be remotely removable and replaceable. Consumable components of in-cave process or mechanical equipment are also remotely removable and replaceable, while minimizing the potential for the release of radioactive contamination to the cave environment. Selection of materials of construction addresses the in-cave chemical, radiological, and thermal environment to minimize maintenance requirements. In-cave components are designed to incorporate remote-handling features to facilitate handling by remote techniques (such as by in-cave cranes, power manipulators, or master-slave manipulators (MSMs). Process and service piping connections are designed to minimize the potential for liquid waste leakage or seepage when disconnected. In-cave equipment and components are designed to minimize the potential for radioactive contamination and include features to facilitate appropriate decontamination techniques. In-cave decontamination techniques are incorporated to minimize the spread or buildup of radioactive contamination. Where practicable, mechanical cleanout provisions (such as clean out ports) shall be provided for piping with a recognized potential to plug.						
MCOMP-21	System	Plant and equipment may be designed for modular installation and maintenance. This may facilitate offsite testing and ease of component replacement during operations.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 11.4.4	All system equipment	Yes	Reference equipment Technical Specification	SD Section 5
MCOMP-22	System	Embodying ALARA principles, where practicable, in design features contributes to the minimization of manual intervention by maximizing the use of automatic control systems. Material transport systems and in-cell handling equipment is maintained in purpose-built maintenance facilities, after being decontaminated in a decontamination facility to a contamination	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 11.5.1	All system equipment	Yes	Equipment designed for its environment	SD Section 6.6.6

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
		level that allows hands-on maintenance.					
MCOMP-23	System	Important to Safety engineered safety systems shall be designed for high functional reliability and in-service testability commensurate with the safety functions to be performed.	24590-WTP-SRD-BSH-01-001-02, Rev 3N, Safety Requirements Document Volume II, Section 4.3 - 3	All system equipment designated ITS	Yes	Reference equipment Technical Specification	SD Section 5
MCOMP-24	System	Plant items performing similar duties will, as far as possible, be standardized so that one particular make, model and size can be used in all similar applications. This philosophy will reduce and simplify the operational spares inventory.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 11.4.5	Various	Yes	Common design features have been incorporated into the design to the extent practical	SD Section 5
MCOMP-25	Specific	Glove Boxes Access to plant equipment shall be maximized. Assessment of normal, abnormal, and maintenance conditions shall be required in the design of the glove box. The accessibility of all maintainable items shall be demonstrated through mock up, simulation, or start-up. Glove port positioning shall take into account typical operator size and strength within the limiting environment of a glove box. There shall be no sharp edges or the potential to generate sharp edges within a glove box or wash cabinet. The use of braided metal hosing, glass, or plastic (that is likely to degrade) is to be avoided unless suitable justification is provided. Equipment within glove boxes shall be minimized and the use of common supplies maximized. Glove boxes shall be held at negative pressure relative to their room location. A differential pressure indicator should be mounted to the glove boxes. To prevent the potential for siphoning of hot liquid into the secondary containment, the glove box shall be located at least one barometric head above the primary vessel. Wherever practical glove boxes will be designed to contain the minimum volume of active liquor bearing piping. The impact of temperature, shielding, and environment (acid vapor and corrosion) shall be taken into account in the design, in terms of corrosion of mild steel, degradation of gloves, and accessibility to equipment. Dismantling of plant and equipment contained within glove boxes shall be simple and easy. Direct handling will be minimized through modularization or lifting equipment. All valves and instruments within a glove box shall be labeled clearly. Suitable design precautions shall be taken to prevent the migration of contaminates into the secondary containment via	24590-WTP-RPT-OP-01-001, Rev 2, Operations Requirements Document, Section 14.15	24590-HLW-MH-HDH-MHAN-00001	Yes	Glove box is designed to *Guideline for Gloveboxes*, AGS-G0001-1998	SD Section 6.2.7.9

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
		the process line (for example, seal pots/loops, vacuum breakers, or air purges).					
MCOMP-26	Specific	The reference canister system used to contain the HLW product shall be a 4.5 meter long by 0.61 meter diameter canister system with a neck and flange design similar to that used at the West Valley Demonstration Project.	WTP Contract No. DE-AC27-01RV14136, Section C.8 Specification 1: 1.2.2.1.2	N/A	Yes	Canister is designed with these dimensions	N/A
MCOMP-27	Specific	The SDS shield hatches are motor-driven horizontal hatches mounted on rails. They serve as a movable cover over transfer ports used to move cylindrical containers from one elevation within the facility to another. When closed, the hatches provide an adjustable engineered ventilation air gap between their underside and the stainless steel penetration liners and prevent objects from falling into the transfer port. Exceptions are as follows: the clean canister import (SDC), canister storage cave import (SDC), and the drum swabbing and monitoring cask handling hatch (SDC) provide both shielding and an engineered air gap adjustable to a nominal 1/8 inch (i.e., < ¼ inch) between separate exhaust areas; the pour tunnel hatch to the melter cave does not provide shielding. The SDS hatches also include additional cover thickness and liners that incorporate additional material denser than the surrounding concrete to function as a radiological shield. The horizontal shield hatches also incorporate proximity switches indicating the "closed" position (SDC). The proximity switches are part of the mechanical interlocks discussed in section 4.3.11.	24590-WTP-SRD-ENS-03-002-04, Rev L, Safety Envelope Document: HLW Facility Specific Information, Section 4.3.11 & 4.4.1.2	24590-HLW-AD-HDH-HTCH-00002 24590-HLW-AD-HDH-HTCH-00003 24590-HLW-AD-HDH-HTCH-00004	Yes	Hatches are adjustable in the range specified.	SD Section 6.2.4
MCOMP-28	Specific	The SDS shield doors provide a shielding function and an engineered air gap to maintain cascade airflow when closed. Shield doors can be in a horizontal or vertical configuration. For doors that provide an engineered air gap, a sufficient range of adjustment will be incorporated into the door design to enable the door to provide the specified range of air gaps. The shield doors also incorporate proximity switches indicating a "closed" position (SDC). The proximity switches are part of the mechanical interlocks discussed in section 4.3.11. A guide system or shield blocks (SDS) will be utilized, as needed, at the bottom of shield doors to provide radiological shielding for shine paths created by gaps between the bottom of the door and the floor. The shielded doors and hatches provide radiation shielding and engineered air gaps from areas of lower contamination into areas of higher contamination. Maintenance area shield doors will withstand impacts from loaded crates or bogies, as applicable, without catastrophically failing and creating a direct shine path into the maintenance area. The shield doors will be SC-II and	24590-WTP-SRD-ENS-03-002-04, Rev L, Safety Envelope Document: HLW Facility Specific Information, Section 4.3.11, 4.4.1.2 & 4.4.1.3	24590-HLW-AD-HDH-DOOR-00001 24590-HLW-AD-HDH-DOOR-00002 24590-HLW-AD-HDH-HTCH-00002 24590-HLW-AD-HDH-HTCH-00003 24590-HLW-AD-HDH-HTCH-00004	Yes	Doors provide appropriate shielding function and air gap. Hatches designed with appropriate shielding and air gap adjustability	SD Section 6.2.2, 6.2.4 & 6.2.7.9

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
		designed to meet SRD Safety Criteria 1.0-5, 3.2-1, 4.1-2, 4.1-3, and 4.4-1. SDS SSCs will meet QL-2 requirements.					
MCOMP-29	Specific	Cranes and their rigging will provide a highly reliable method of transporting secondary waste containers and secondary waste casks throughout the facility. The cranes will not drop significant crane components during and after the design basis earthquake. Utilizing the referenced design specifications for cranes and ITS crane components conforms to the top level safety standards. Specifications were developed by the CMMA and ASME for the mechanical, structural, and electrical design of cranes as well as formulating guidelines for the proper use, operation, and maintenance of those cranes. They are the most widely accepted crane standard. Likewise, the monorail hoist (MH) standard was developed as a consensus standard for underhung cranes and monorails by the Monorail Manufacturers Association. Utilizing the referenced design specifications for cranes and ITS crane components conforms to the top level safety standards. Specifications were developed by the Crane Manufacturers Association (CMAA) for the mechanical, structural, and electrical design of cranes as well as formulating guidelines for the proper use, operation, and maintenance of those cranes. They are the most widely accepted crane standard. Likewise, the monorail hoist (MH) standard was developed as a consensus standard for underhung cranes and monorails by the Monorail Manufacturers Association. As the CMAA and MH design specifications are written for general non-nuclear industry, they are supplemented by additional standards when utilized for nuclear duty to mitigate natural phenomenon and environmental conditions that could lead to an unacceptable release of radioactivity during the operational life of the facility (specifically, seismic qualification and, where appropriate, radiation resistance). ASME NUM-1 provides nuclear industry rules for underhung cranes, monorail hoists, jib cranes, and others. ASME NOG-1 provides nuclear industry rules for multiple girder overhead cranes. As appropriate, select sections of ASME NUM-1 or ASME NOG-1 provide the nuclear industry standards for safeguards against environmental conditions and natural phenomenon occurrences for ITS crane components. ASME NUM-1 and ASME NOG-1 were developed to cover underhung, monorail, and overhead gantry multiple girder cranes with top running bridge and trolley used at nuclear facilities. These standards are utilized within the commercial nuclear power industry and will increase the safety of the ITS and general crane components by providing	24590-WTP-SUD-ENS-03-002-04, Rev L, Safety Envelope Document; HLW Facility Specific Information, Section 4.4.9.5 & 4.4.10.5	24590-HLW-AD-HDH-CRN-00001 24590-HLW-AD-HDH-CRN-00002 24590-HLW-AD-HDH-CRN-00004 24590-HLW-AD-HDH-CRN-00005 24590-HLW-AD-HDH-CRN-00006 24590-HLW-AD-HDH-CRN-00007 24590-HLW-AD-HDH-RCVY-00004	Yes	Appropriate duty class assigned. Cable trough provided for in cave crane cable reel	SD Section 6.2.1

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
		safeguards against environmental and natural phenomenon hazards. The cable troughs, which retain gross contamination from the bogie and crane cables, will be designed from commercial standards and will be appropriately shielded. The trough in the process area will have an open base to prevent contamination buildup that is inaccessible. The trough in the decontamination area and crane maintenance area will have a closed base with suitable drain holes to facilitate occasional cleanout.					
MCOMP-30	Specific	The cranes are designed to meet the generic requirements of CMAA 70, Specification for Electric Overhead Traveling Cranes. The canister handling crane specification will be service class "E," and the cask export crane specification will be service class "D" with enhancements to ensure a low probability of load drop. The crane and crane components will be seismically qualified such that their failure will not fail a SDC SSC below the crane. The hoist has two upper limit switches. The maximum operating speed is conservatively less than allowed by CMAA 70 preventing swinging loads and catastrophic impacts with walls, shield doors, shield windows, etc. The crane hoist drive train has a redundant load path, fail-safe brakes, and over-speed detection to prevent a load drop if a barrel coupling or hoist drive train experiences a catastrophic failure. However, the cask export crane has a NOG-6422 (ASME NOG-1, Rules for Construction of Overhead Gantry Cranes (top Running Bridge, Multiple Girder)) requirement for emergency lowering of a load by alternative means of operation of the holding brake if a barrel coupling or hoist drive train experiences a catastrophic failure. The hoist ropes have load cells or other load-sensing devices to prevent an overload situation. The hoist drums have cable misreeving detection to reduce the probability of damage to the hoist ropes. Load retention and crane operability during and after the DBE earthquake are not required by accident analysis. However, the crane will be designed to maintain structural integrity and to remain on the rails to prevent damage to the confinement boundary and to allow recovery. Stress levels in structural components without a redundant load path (bridge beams) are designed so that inelastic deformations do not produce a loss of resistance to support. If seismic analysis indicates uplift forces sufficient to lift the bridge or trolley from their respective rails, seismic holding hooks or similar devices will be incorporated in the design. The canister grapple is designed to a safe working load limit with a design factor of 3 based on material yield stress, or 5	24590-WTP-SED-ENS-03-002-04, Rev L, Safety Envelope Document; HLW Facility Specific Information, Section 4.4.9.2	24590-HLW-AD-HDH-CRN-00001 24590-HLW-AD-HDH-CRN-00002 24590-HLW-AD-HDH-CRN-00004 24590-HLW-AD-HDH-CRN-00005 24590-HLW-AD-HDH-CRN-00006 24590-HLW-AD-HDH-CRN-00007 24590-HLW-FH-HDH-TOOL-00001 24590-HLW-FH-HDH-TOOL-00004 24590-HLW-AD-HDH-RCVY-00004	Yes	Crane features listed in requirements are incorporated into the crane design. Grapple is designed to the appropriate load factors. Cable trough provided for in cave crane cable reel	SD Section 6.2.1

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
		based on ultimate stress, whichever is less. The grapple will be fully seated on the canister for the mechanically operated jaws to engage. To prevent inadvertent release of a suspended canister, the grapple has a sequential mechanism that requires the canister to be set down two full times before the canister is disengaged. If the grapple fails while holding a canister, it will fail in the closed position. The design prevents release of the canister even if it hits an obstruction during transport. The cable trough is a stationary passive design feature that will retain gross contamination and will be accessible in the decontamination area and crane maintenance area for occasional clean out. The trough itself will be appropriately shielded.					
MCOMP-31	Specific	HLW Canister Handling Cranes and Lifting Devices Design features of the HLW canister handling cranes and lifting devices include the following: · The crane and crane components will be seismically qualified such that their failure will not fail a SDC SSC below the crane. · The cranes must be designed to maintain structural integrity and to remain on the rails during and after a DBE earthquake. · The hoist must have will have two upper-limit switches. · The maximum operating speed must be low enough such that swinging loads and catastrophic impacts with walls, shield doors, and shield windows are prevented. · The crane hoist drive train must have a redundant load path. · The crane hoist drive train must have fail-safe brakes. · The crane hoist drive train must have over speed detection to prevent a load drop if a barrel coupling or hoist drive train experiences a catastrophic failure. · The hoist ropes much have load-sensing devices to prevent an overload situation. · The hoist drums must have cable misreeving detection to reduce the probability of damage to the hoist ropes. · The canister grapple must be designed to a safe working load limit with a design factor of 3 based on material yield stress, or 5 based on ultimate stress, whichever is less. · The design of the grapple must be such that it will be fully seated on the canister for the mechanically operated jaws to engage. · The grapple must fail in the closed position while holding a canister. · The design of the grapple must prevent release of a canister even if it hits and obstruction during transport. · The grapple must have a sequential mechanism that requires the canister to be set down two full times before the canister is disengaged.	24590-WTP-SED-ENS-03-002-04, Rev L, Safety Envelope Document; HLW Facility Specific Information, Section 5.6.16	24590-HLW-AD-HDH-CRN-00005 24590-HLW-FH-HDH-TOOL-00001 24590-HLW-FH-HDH-TOOL-00004	Yes	Crane features listed in requirements are incorporated into the crane design. Grapple is designed to the appropriate load factors.	SD Section 6.2.1

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
MCOMP-32	Specific	Bogie Rails Bogies transfer the product containers from one location to another. There are three types of bogie rails: floor mounted, elevated, and seismic. The only bogie rails that are SDS are the elevated running rails and the canister-rinse bogie's seismic rails (not its running rails). During a seismic DBE, side (seismic) restraints for the canister rinse bogie only are credited with keeping floor-mounted bogies on their rails. For bogies that travel on elevated rails, the rails are credited with keeping the bogie in its elevated position during a seismic DBE. The safety function of the seismic bogie rails, elevated bogie rails, and seismic side restraints is to prevent their respective bogies from de-railing during a seismic DBE. The bogie is required to maintain its load.	24590-WTP-SED-ENS-03-002-04, Rev L, Safety Envelope Document; HLW Facility Specific Information, Section 4.4.15 & 4.4.15.1	24590-HLW-AD-HDH-TRLY-00003 24590-HLW-AD-HDH-TRLY-00004	Yes	Bogie is provided with seismic restraints	SD Section 6.2.3
RAD-1	System	Table 5-1 provides the criteria to be used for each radiological area classification. Appropriate levels of radiological shielding are supplied to achieve these targets. ALARA assessments are performed to ensure adequate shielding is provided in the design.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 5.1.1	N/A	Yes	System HDH areas have been classified based on the shielding assessments	SD Section 6.1.2
RAD-2	System	One or more of the following features shall be used for each entrance or access point to a high radiation area where radiation levels exist such that an individual could exceed a deep dose equivalent to the whole body of 1 rem (0.01 sievert) in any one hour at 30 centimeters from the source or from any surface that the radiation penetrates: (1) A control device that prevents entry to the area when high radiation levels exist or upon entry causes the radiation level to be reduced below that level defining a high radiation area; (2) A device that functions automatically to prevent use or operation of the radiation source or field while individuals are in the area; (3) A control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the high radiation area and the supervisor of the activity are made aware of the entry; (4) Entryways that are locked. During periods when access to the area is required, positive control over each entry is maintained; (5) Continuous direct or electronic surveillance that is capable of preventing unauthorized entry; (6) A control device that will automatically generate audible and visual alarm signals to alert personnel in the area before use or operation of the radiation source and in sufficient time to permit evacuation of the area or activation of a secondary control device that will prevent use or operation of the source.	24590-WTP-RPP-ESH-01-001, Rev 0, Radiation Protection program for Design and Construction, App A Sec. 835.502 (b)	Various	Yes	Gamma detectors are provided in maintenance areas and are interlocked with the corresponding shield doors and personnel access doors	SD Section 7.1.13
RAD-3	System	Systems containing radioactive substances are provided with	24590-WTP-DB-ENG-01-	All system check valves	Yes	Check valves are located	SD Section 6.3.3

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
		suitable isolation provisions to mitigate diffusion, backflow, or other methods of leakage of the contents to areas where the material is not intended.	001, Rev 1C, Basis of Design, Section 5.1.2			on the utility lines to prevent radioactive backflow	
ALARA-1	System	The WTP shall be designed, constructed, and operated in compliance with the as low as reasonably achievable (ALARA) requirements of 10 CFR 835. Radiation exposure to workers shall be maintained ALARA, economic factors being taken into account, and no exposure shall be authorized without the expectation of a net positive benefit from the activity.	24590-WTP-RPT-OP-01-001, Rev 2, Operations Requirements Document, Section 8.1.3.1.1	N/A	Yes	All normal operations are performed remotely. Defined procedures for decontamination equipment before maintenance operations.	SD Section 6.6.6
ENV-1	System	SSCs designated as ITS shall be designed to withstand the effects of NPH(1) events such as earthquakes, wind, and floods without loss of capability to perform specified safety functions. This includes both the primary and support systems that must function for an NPH event such that the public, co-located worker, or facility worker exposure standards of Safety Criteria 2.0-1 or 2.0-2 are not exceeded. The design shall consider both direct and indirect NPH effects, including common cause effects and interactions from failures of other SSCs.	24590-WTP-SRD-ESH-01-001-02, Rev 3N, Safety Requirements Document Volume II, Section 4.1 - 3	SC-I and SC-II equipment	Yes	Equipment designed to withstand the DBE	SD Section 6 for referral to specifications
HMI-1	System	A process and mechanical handling monitoring closed circuit television (CCTV) system is required for remote viewing of equipment and operations within cave areas and where the radiation levels are too high for personnel access. Cameras are located to give optimum viewing angles and distance to suit the process and are radiation tolerant, where required.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 9.3	N/A	Yes	Consideration to integration given	SD Section 6.5
CSA-1	System	There shall be an engineered method for removal of equipment from cells, caves and bulges (except for black cells or cells with no access), taking into consideration containment and radiation control	24590-WTP-RPT-OP-01-001, Rev 2, Operations Requirements Document, Section 8.1.3	Various	Yes	Equipment routes through crane decon and maint area and equipment hatches provided.	SD Section 8.2
MECH-1	System	Mechanical equipment is designed for a nominal plant life of 40 years (Section C.7, WTP Contract No. DE-AC27-01RV14136). All non-maintainable items of equipment are designed to last the life of the facility.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 11.1.1	All non-maintainable items of equipment	Yes	System HDH has designed equipment with a life of 40 years, where this was impractical the equipment was designed for maintenance or replacement	SD Section 6 for referral to specification
MECH-2	System	Essentially, all non-maintainable equipment located within cells where routine access is not possible, is selected to have a design life commensurate with that of the facility.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 11.7.4	All non-maintainable items of equipment	Yes	Equipment designed for its environment	SD Section 8.2
MECH-3	System	When selecting materials for plant and equipment, the following characteristics are addressed, as appropriate: Service conditions (including normal, abnormal, and faulted conditions, as appropriate). Surface finish - for corrosion, wear, and decontamination ability. Chemical resistance - for uniform corrosion as well as localized corrosion such as pitting, crevice corrosion, and cracking. Chemical resistance will control the need for access for maintainability.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 11.9	All system equipment	Yes	Specifications consider environmental and material conditions and specify those prohibited for use in the radiation environment.	SD Section 6.6.1

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
		Radiation resistance - particularly in the case of polymers and for metals if the dose rate is high. Pressure effects - primarily if the pressure cycles. Temperature effects - suitable controls are needed to ensure that the maximum design operating temperature is not exceeded. Corrosion is very sensitive to temperature and if the temperature controlling the mechanical strength is used, exotic materials may be needed. Hardness - partly of concern for resistance to wear in valves and under erosion conditions. The selection must take into account the possibility of galling and fretting. Fatigue - the primary factor will be cyclic stresses with or without the presence of aggressive chemicals. Material failure mechanisms (plastic deformation, brittle fracture, and so on)					
PROC-1	System	HP steam - High-pressure (HP) steam is supplied at a mean pressure and temperature of 109 lb/in^2 gage and 343 °F. It is used within the buildings for steam ejectors. Cooling water - Cooling water is provided at a temperature in the range 57 °F to 77 °F (as received by the user facility from BOF). The secondary circuit cooling water temperature range is however 63 °F to 83 °F and at a mean pressure of 65 lb/in^2 gage. Process water - Process water is provided at ambient temperature and at an average pressure of 72.5 lb/in^2 gage. Demineralized water - Demineralized water is provided at ambient temperature and at an average pressure of 72.5 lb/in^2 gage. Instrument air - Instrument air is required at a mean temperature and pressure of 60 °F and 100 lb/in^2 gage. Nitric acid - This reagent will be supplied as a 12 molar solution (57 wt %) and is diluted for a number of duties.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 6.3	24590-HLW-MV-HDH-VSL-00001/2/3/4	Yes	All process and mechanical systems calculations use BOD values as inputs or basis of bounding assumptions	SD Appendix A

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
PROC-2	System	The transfer philosophy applied to radioactive systems basically gives 5 acceptable options: gravity transfers, mechanical pumps, steam ejectors, reverse flow diverters (RFD), and twin RFDs with a breakpot giving a relatively continuous flow. The selection of a liquid transfer device for a particular duty needs to be considered on a case-by-case basis. In determining the appropriate liquid transfer device, the following shall be considered: The required liquid transfer flow rates. The required head and suction lift. The activity, composition, and rheology properties of the liquid. The maintenance requirements and resulting dose uptake to operators. Evaluation against ALARA principles. Layout constraints. Range of flow control required. Impact of the liquid transfer device on the process conditions and associated plant (such as ventilation systems).	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 6.6.2	24590-HLW-MT-HDH-TK-00002/3 24590-HLW-MP-HDH-EJCTR-00002 A/B 24590-HLW-MP-HDH-EJCTR-00003/56 A/B 24590-HLW-MP-HDH-EJCTR-00057 24590-HLW-MP-HDH-PMP-00001	Yes	Transfer device selection considered transfer, fluid, and equipment conditions.	SD Section 6.3.1.1, 6.3.1.2, 6.3.2.1, 6.3.2.2
PROC-3	System	The WTP has the requirement for both liquid-liquid and solid-liquid agitation. The requirements are as follows: Re-suspend settled solids and maintain suspension of solids within vessels.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 6.6.3	24590-HLW-MV-HDH-VSL-00002/3/4	Yes	Vessels with mixed contents have air spargers for solids suspension.	SD Section 6.3.1.4 and 6.3.1.5
PROC-4	System	The types of agitation systems to be considered are mechanical agitators, mechanical pump recirculation, and pulse-jet mixers (lift and discharge under pressure or by gravity). In addition, for out-cell mixing duties, static in-line mixers should be considered for the dilution of solid chemicals. Criteria to be applied in the selection of the agitation method or methods include the following: Safety. Ability to fulfill process duty (for example, the degree of mixing, mixing time, and physical properties of the components) Minimum overall lifetime costs. High availability/achievable utilization. Minimum cell volume and height. Minimum maintenance. ALARA dose. Waste qualification (homogeneity).	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 6.6.3	24590-HLW-MV-HDH-VSL-00002/3/4	Yes	Agitation system selection considered content and equipment conditions.	SD Section 6.3.1.4 and 6.3.1.5

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
PROC-5	System	Overflowed process streams must be returned to the waste treatment process. The overflow system for any vessel must be instantaneously and continuously available for use. Overflow systems must meet the requirements of WAC 173-303, Dangerous Wastes Regulations. In meeting this requirement, overflowing direct to the cell floor shall only be considered as the last overflow in a cascaded system. Where an overflow is from a vessel to the cell, the overflow system maintains segregation of the cell and vessel ventilation systems. Any deviation from this requirement or those of the code is referred to WTP Environmental and Nuclear Safety (E&NS). A vessel overflow line is sized to handle the maximum inflow to the vessel without the liquid level in the overflowing tank reaching an unacceptably high level. No valves or other restrictions are permitted in the overflow line. This line is also designed to prevent the buildup of material that could cause blockages. The overflow receiver is sufficiently sized to contain the overflow.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 6.6.5	24590-HLW-MT-HDH-TK-00002/3 24590-HLW-MV-HDH-VSL-00001/2/3/4	Yes	Tanks overflow to containment area. Bogie and waste neutralization vessel overflow to sumps. Canister decon vessels overflow to waste neutralization vessel.	SD Section 6.3.1.1, 6.3.1.2, 6.3.1.3, 6.3.1.4, 6.3.1.5
PROC-6	System	The C5 area ventilation system maintains the pressure in the C5 areas at a higher negative pressure relative to the C3 areas.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 12.4.5.4	N/A	Yes	Rooms designated C3 or C3/C5 as appropriate.	SD Section 6.3.1.3, 6.3.1.4, 6.3.1.5
PROC-7	System	Tank System Design Requirements: The tank system must comply with requirements of WAC 173-303-640.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 14.10.1				
PROC-8	System	Use of utilities and services, including electricity, raw water, and potable water, will be minimized and shall be within the requirements of the Interface Control Documents (ICD). Where appropriate, utility system connections to the process shall have properly engineered devices such as air gaps or adequate backflow preventers.	24590-WTP-RPT-OP-01-001, Rev 2 Operations Requirements Document, Section 7.1	N/A	Yes	Utility lines have check valves to prevent backflow.	SD Section 6.3.3.1
PROC-9	System	Process vessels requiring heating and cooling shall have independent coils/jackets for each duty to prevent thermal cycling and reduced life. If vessels have a heat transfer coil inside, special care and conservative design shall be used for the coil support system to avoid wear due to thermal cycling. Where steam is the heating medium for the vessels, there shall be automatic air pressurization, or equivalent system, when the steam is shutoff to prevent migration of contamination to lower contamination zones. Tanks with heating/cooling coils will be evaluated for the potential of coil corrosion and mechanical failure. Where a 40 year life would be compromised, design features will be incorporated to provide for redundancy or facilitate change-out of the coils or the vessel.	24590-WTP-RPT-OP-01-001, Rev 2 Operations Requirements Document, Section 14.2	24590-HLW-MV-HDH-VSL-00002/4	Yes	Vessels have 2 separate coils for heating and cooling, instrument air connections to the steam line, and the ability to remove the coil bundle from the rest of the vessel.	SD Section 6.3.1.1

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
PROC-10	System	Process vessels shall generally be equipped with interior perimeter spray rings, or equivalent, for decontamination or flushing.	24590-WTP-RPT-OP-01-001, Rev 2 Operations Requirements Document, Section 13.2	24590-HLW-MV-HDH-VSL-00001/2/3/4	Yes	All vessels contain spray rings.	SD Section 6.3.1.3, 6.3.1.4, and 6.3.1.5
DECON-1	System	Process Cells Liners are provided, as required by the WAC. Liners are sized to contain 100 % of the total volume of the largest tank in the respective cells or 110 % of volume up to the overflow of the largest vessel, whichever is larger. They also contain sumps to allow for leak collection and detection and may be fitted with transfer devices for emptying purposes. For gaseous releases, the C5 cell ventilation extract systems are fitted with radiation detection systems. Additional requirements on secondary confinement are found in Section 14, Environmental Basis of Design.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 11.3.5.1	N/A	Yes	Decon Vessel pit & rinse tunnel provided with sst liners	SD Section 6.6.5
DECON-2	Specific	Where crane decontamination is required, provisions must be made for use of CO2, pressurized warm water, detergent solution, and steam. Normally this would be for isolated areas on the crane to minimize damage to electrical gear on the crane; however, the design would cover the entire crane. A location for the decontamination must be provided, including disposal of the waste liquid. Rotating hooks shall not be degraded because of crane decontamination, therefore, sealed bearings and motor shall be used..	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 11.8.3.1.	24590-HLW-MJ-HDH-CRN-00005	Yes	Specifications consider environmental and material conditions. Crane decontamination area provided. Sumps provided for collection of liquid waste.	SD Section 8.2.1
ELECT-1	Specific	Where operators will be co-located with operating machinery and physical injury is determined to be credible dedicated emergency-stop (E-Stop) buttons will be provided near the machinery. The location of such stops will depend on the machine's physical and operational characteristics. Commissioning aspects should also be considered when locating E-stops.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 7.3.9.1	N/A	Yes	Reference equipment Technical Specification	SD Section 8.2
ELECT-2	System	Procurement specifications shall be developed for all major electrical equipment, including the equipment stated in this section. Appropriate NEMA class enclosures shall be used, with a minimum requirement of Type 1 for indoor use and Type 3R for outdoor use.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 8.4	All major electrical system equipment	Yes	Reference equipment Technical Specification	SD Section 8.2
ELECT-3	System	Lighting systems shall be in accordance with Illuminating Engineering Society of North America (IESNA) Standards RP-7 and RP-16.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 8.6	N/A	Yes	Building layout	SD Section 8.2.9
I&C-1	System	The wet process and ventilation systems will be designed to be commissioned from the normal control points, which are the control rooms.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 7.2.3	All Mechanical systems components	Yes	Reference Process System Description	SD Section 8.2.6
I&C-2	Specific	Monitors and operator controls are provided at the cave face and other local control stations where required (for example, mechanical handling), and also at various locations, such as the	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 9.3	N/A	Yes	Through wall and wall mounted cameras are provided	SD Section 8.2.9

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
		main control room (MCR) or facility control room (FCR), which are located away from the cave face. Control features such as pan, tilt, focus, and so forth are selectable at any location where an operator requires a variable view to assist in operations					
OP-1	Specific	Provide a station to perform manual override of the HLW System HDH mechanical sequence grapple. This is required if the (HDH) sequence grapple cannot be released from a canister using the standard release sequence.	MH Design Requirement	Various	Yes	Canister positions in reach of MSMs are available.	SD Section 8.2.5.2
OP-2	System	A process and mechanical handling monitoring closed circuit television (CCTV) system is required for remote viewing of equipment and operations within cave areas and where the radiation levels are too high for personnel access. Cameras are located to give optimum viewing angles and distance to suit the process and are radiation tolerant, where required. . Safety, operational, and surveillance requirements determine the location of monitors. Consideration is also given to the integration of the CCTV system with the control system. Areas are classified according to their respective hazard, with C&I equipment, specification, design, and installation engineered appropriately in accordance with the NFPA guidelines listed in Section 9.1.2.1.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 9.3	N/A	Yes	Cameras are provided for general viewing and for canister inspection.	SD Section 8.2.9
OP-3	System	The weight of a HLW canister is estimated at about 3.1 MTG/canister (two significant figures) which corresponds to an approximate density of glass at 2.7 MTG/m3. Canisters are filled to 95 % which corresponds to a fill volume of 1.1 cubic meters and a glass weight of close to 3 MTG/canister. The melter offgas treatment system will be designed to accommodate anticipated offgas flow surges to prevent melter damage, glass release from the melter, and offgas release to the melter cell. The HLW vitrification facility is capable of producing 6 MTG/d at the facility design capacity.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 6.2.3	N/A	Yes	Two decontamination vessels are provided to process 6.0MT/Day.	SD Section 8.2
OP-5	System	The possibility of human error in facility operations shall be taken into account in the design by facilitating correct decisions by operators and inhibiting wrong decisions and by providing means for detecting and correcting or compensating for error.	24590-WTP-SRD-ESH-01-001-02, Rev 3N, Safety Requirements Document Volume II, Section 4.3 - 6	N/A	Yes	Reference equipment Technical Specification	SD Section 8.2 & 5.3
OP-6	System	Equipment will be managed from the cave face rather than from the FCR when an in-cave operation requires direct operator viewing or constant operator intervention, or if the operation is generally ad hoc and has no repeatable sequences.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 7.2.1.5	N/A	Yes	Building layout with view windows	SD Section 8.1.1
OP-7	System	Operation of the WTP facilities will be by either: 1) batch control, 2) procedural control, 3) basic control (regulatory, discrete, or interlocking), 4) monitoring, or 5) direct control. All of these control based on the requirements of each system or subsystem. Operator interaction will be provided where	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 7.3.1	N/A	No	The Swabbing equipment utilizes sequence control however, all other equipment is manually operated at the request of	SD Section 9.1 & 8.1.1

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
		decisions are required or when approval of status prior to initiation of a specific process operation is considered beneficial. The decision or approval process is substantiated by plant status data available at the operator station, a direct view of the operation, or by CCTV.				operations	
OP-8	System	To support waste form qualification, provisions will be made for collecting and storing certain product quality information against the container and canister number. The data collected includes the following: Container and canister data (including locations, cooling times, weights, and heat generation) Container surface contamination Pour data (including start or stop dates and times) Weld data	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 7.5.3	N/A	Yes	Provisions are made at the Swabbing and Monitoring Station for collecting product quality information.	SD Section 8.2.7.9
OP-9	System	Operator reaction time for planned evolutions is 10 minutes. Operator reaction time for casualty (such as piping leak, leaking isolation valve) is 30 minutes.	24590-WTP-RPT-OP-01-001, Rev 2 Operations Requirements Document, Section 11.1	All process equipment	No	Height restrictions on the decon vessels do not allow for 30 mins for casualty. Trips and interlocks are present to prevent vessel overflow.	SD Section 5.11.2 and 7.2.17
MAINT-1	System	Modularization of systems and components shall be provided to minimize onsite fabrication requirements, assist in equipment installation, and minimize maintenance time.	24590-WTP-RPT-OP-01-001, Rev 2 Operations Requirements Document, Section 7.4	All system equipment	Yes	Design of equipment incorporates modularization. Refer to Technical Specification	SD Section 8.2
MAINT-2	System	In HLW vitrification, in-cave equipment shall be remotely maintainable and replaceable. In-cave equipment disassembly, maintenance, and replacement shall be accomplished by local remote handling equipment or by remote handling equipment in dedicated maintenance areas or caves.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 11.3.2.	Various	Yes	Equipment design incorporates remote features. Refer to Technical Specification	SD Section 8.2
TEST-1	System	Consideration is given early in the design process to identify systems that can be designed, manufactured, and delivered to the site as a fully tested and commissioned system	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design. Section 11.4.7	Various	Yes	Equipment is pretested before delivered to field. Refer to Technical Specification	SD Section 8.2
INST-1	Specific	Soft Volumes required for MSM removal.	MH Design Requirement	24590-HLW-HDH-MANIP-00002 24590-HLW-HDH-MANIP-00003 24590-HLW-HDH-MANIP-00004	Yes	Soft volumes identified in plant model.	Plant Model
RAM-1	System	The approach towards duplicating equipment or including redundancy is based on assessment of the operational research (OR) model, safety criteria (identified by the ISM process), operating experience with mechanical and process plant equipment, maintenance and testing requirements, and sensitivity to breakdowns.	24590-WTP-DB-ENG-01-001, Rev 1C, Basis of Design, Section 11.4.2.	N/A	Yes	Equipment is designed with maintenance and recovery features	SD Section 8.2

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
SAF-1	Specific	Hoisting equipment shall be designed appropriately (including parameters such as material selection, operating conditions, operating methods, operating speeds, controls and interlocks) to minimize unplanned and uncontrolled load movement including load drops.	(SIPD) SCR-HMECH/N0001	24590-HLW-MJ-HDH-CRN-00005	Yes	Certification of singular load path components whose failure could result in a dropped load. High and high high hoist limit switches and overload protection.	SD Section 8.2.1
SAF-2	Specific	Crane rails designed to support crane during a design basis seismic event.	(SIPD) SCR-HMECH/N0015	24590-HLW-FH-HDH-TOOL-00001 24590-HLW-FH-HDH-TOOL-00004	Yes	The grapple has a safe working load limit of 10,000 lbs with a design factor of 3 based on material yield, or 5 based on ultimate stress.	SD Section 8.2.1
SAF-3	Specific	Bogie, bogie restraints, and bogie rails designed to maintain container and prevent overturning including during a design basis seismic event.	(SIPD) SCR-HMECH/N0020	24590-HLW-MQ-HDH-TRLY-00003 24590-HLW-MQ-HDH-TRLY-00004	Yes	Bogie components that maintain structural integrity are designed to a high reliability. These include the chassis, canister sleeve, seismic restraints and bolted or welded connections on the load path. The bogie and rails are designed to prevent derailing or loss of load under equipment failure or the DBE.	SD Section 8.2.3
SAF-4	System	Important to Safety instrumentation and controls shall be provided to monitor variables and systems and control systems and components over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate public and worker safety by compliance to the standards of Safety Criteria 2.0-1 and 2.0-2, including those variables and systems that can affect the performance of Important to Safety facility conditions. Appropriate controls shall be provided to maintain these variables and systems within prescribed operating ranges. The instrumentation and controls provided shall provide the ability to detect off normal conditions, mitigate accidents, and place the facility in a safe state.	24590-WTP-SRD-ESH-01-001-02, Rev 3N, Safety Requirements Document Volume II Section 4.3 - 4	N/A	Yes	Structures, systems, and components designated as Important to Safety are designed, fabricated, erected, constructed, tested, inspected, and maintained to quality standards commensurate with the importance of the safety functions to be performed.	SD Section 5.3
SAF-5	System	Important to Safety liquid and gaseous systems and components, including pressure vessels, tanks, heat exchangers, piping, and valves, shall be designed to retain their hazardous inventory such that the radiological and chemical worker or public exposure standards of Safety Criteria 2.0-1 and/or 2.0-2 are not exceeded. A liquid collection and removal system to minimize the accumulation of liquid on the primary barrier of the containment	24590-WTP-SRD-ESH-01-001-02, Rev 3N, Safety Requirements Document Volume II, Section 4.2 - 2. 24590-WTP-DB-ENG-01-001, Rev 1C Basis of Design, Section	Various	Yes	System HDH has a liquid collection system for cave decontamination. Sumps are designed to retain hazardous inventory.	SD Section 8.1.2

Requirements Matrix				Compliance Matrix			
Requirements Code	System or Specific Requirement?	Requirement Description	Requirement Basis	Applicable Plant Item Number(s)	Compliance Achieved? Yes/No	Compliance Features OR Justification for Non-Compliance	Refer to:
		building. The primary barrier must be sloped to drain liquids to the associated collection system, and liquids and waste must be collected and removed, to minimize hydraulic head on the containment system, at the earliest practicable time.	14.12				
SAF-6	System	Non-hoisting SSCs shall be designed appropriately (including parameters such as material selection, operating conditions, thickness, corrosion/erosion allowances, appropriate seismic qualifications, etc.).	SCR-HMECH/N0004	All process equipment	Yes	Appropriate considerations listed on mechanical systems equipment data sheets.	24590-HLW-MVD-HDH-00002/6/9/12 and 24590-HLW-MTD-HDH-00005/6
SAF-7	System	Vessels and piping shall be designed to ensure confinement of the HLW low activity effluents / non-active condensates in accordance with best commercial practices	SCR-HPIPN/N0007	N/A	Yes	Utility lines contain check valves.	SD Section 6.3.3.4
SAF-8	System	The facility design shall provide for the prevention and mitigation of the risks associated with radiological and chemical material inventories and energy sources. The facility design shall include consideration of normal operation (including startup, testing and maintenance), anticipated operational occurrences, external events, and accident conditions.	24590-WTP-SRD-ESH-01-001-02, Rev 3N, Safety Requirements Document Volume II, Section 4.1-1	All system equipment	Yes	Normal operations, maintenance, and accidents and their recoveries are considered and discussed.	SD Section 7.and 8
SAF-9	System	Items and processes shall be designed using sound engineering/scientific principles and appropriate standards.	24590-WTP-SRD-ESH-01-001-02, Rev 3N, Safety Requirements Document Volume II, Section 4.1-2	All system equipment	Yes	Appropriate design specifications are listed and adhered to in equipment design.	SD Section 10.4.2
SAF-810	System	Operator initiates a pre-planned response on detection/notification of abnormal/upset condition.	SCR-HADM/N0002	System instrumentation	Yes	Notifications of problems (alarms) and conditions are considered.	SD Section 7.2.17

This page intentionally left blank.

Appendix C
–Major Equipment List

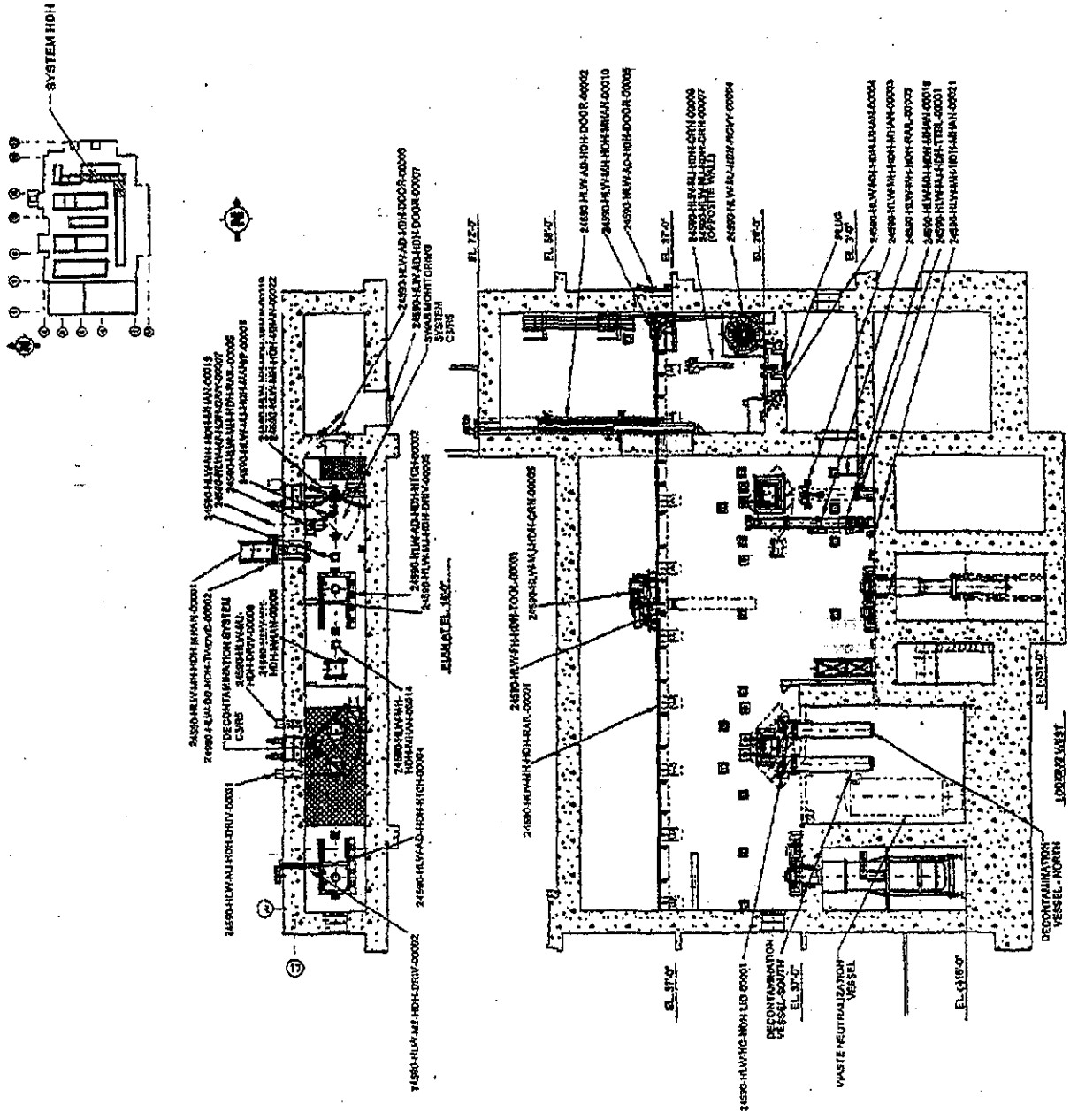
Plant Item Number	Quantity	Description	Remarks
24590-HLW-MJ-HDH-CRN-00001	1	Canister storage transfer bogie maintenance area crane	Located in canister storage transfer tunnel maintenance area
24590-HLW-MJ-HDH-CRN-00002	1	Rinse bogie maintenance area crane - lower	Located in canister rinse bogie maintenance area
24590-HLW-MJ-HDH-CRN-00004	1	Rinse bogie maintenance area crane - upper	Located in canister rinse maintenance area
24590-HLW-MJ-HDH-CRN-00005	1	Cave crane	Located in decon/swab cave
24590-HLW-MJ-HDH-CRN-00006	1	Cave crane maintenance area Jib crane-west	Located in Decon Cave crane maintenance area
24590-HLW-MJ-HDH-CRN-00007	1	Cave crane maintenance area Jib crane-east	Located in Decon Cave crane maintenance area
24590-HLW-AD-HDH-DOOR-00001	1	Canister rinse bogie decon shield door	Located in decon area of rinse bogie tunnel
24590-HLW-AD-HDH-DOOR-00002	1	Crane maint shield door	Located in decon/swab cave
24590-HLW-AD-HDH-DOOR-00003	1	12" SPA door (store transfer tunnel)	Located in maint area of store transfer bogie tunnel
24590-HLW-AD-HDH-DOOR-00004	1	3" SPA door (canister rinse tunnel)	Located in maint area of rinse bogie tunnel
24590-HLW-AD-HDH-DOOR-00005	1	3" SPA door (crane maint area)	Located in crane maint area
24590-HLW-AD-HDH-DOOR-00006	1	12" SPA door (cave access door)	Located on north end of HDH cave
24590-HLW-AD-HDH-DOOR-00007	1	HDH Airlock Door (isolates cave SPA door)	Located in corridor at EL 3'-0"

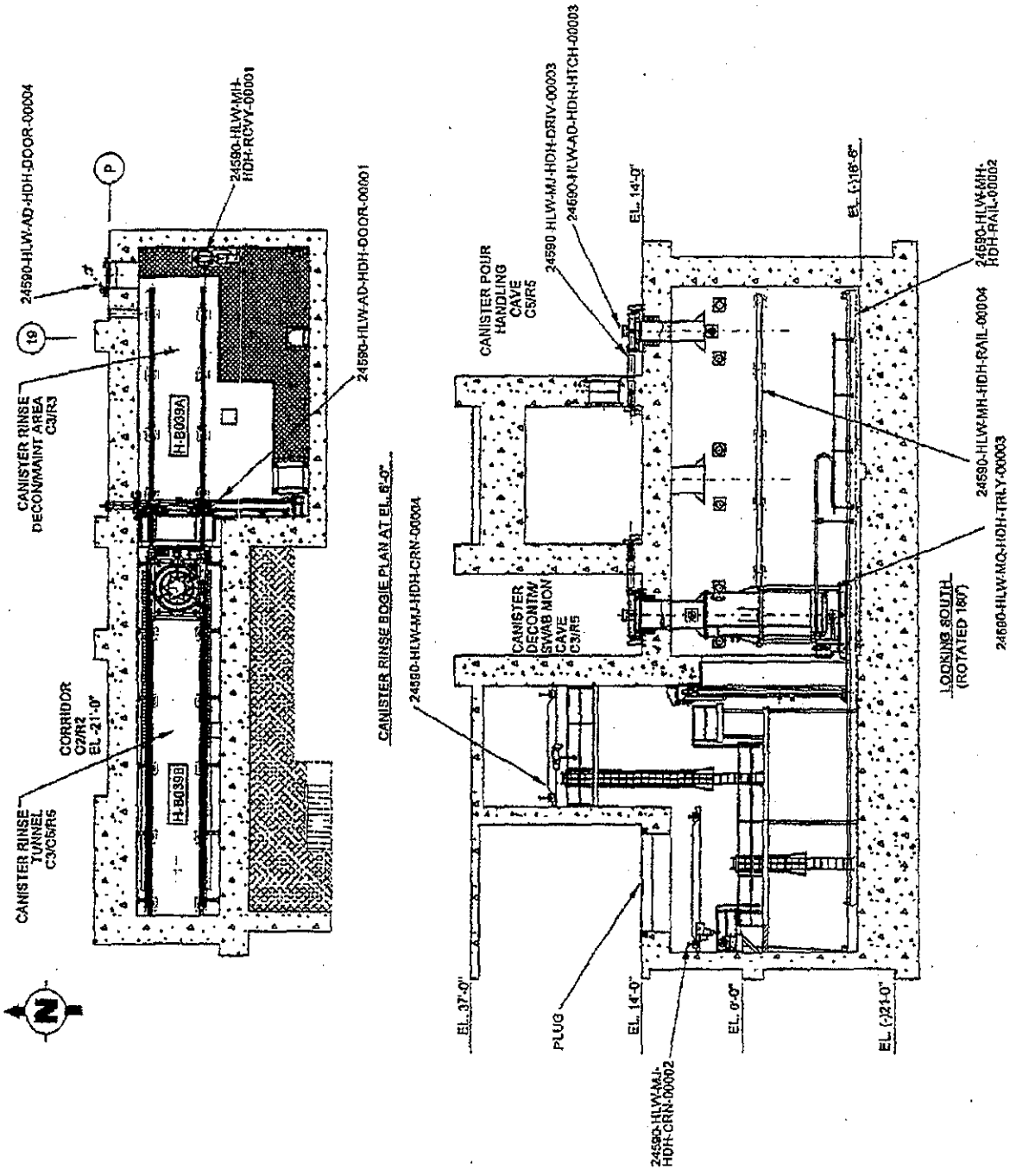
Plant Item Number	Quantity	Description	Remarks
24590-HLW-MJ-HDH-DRIV-00001	1	Decon vessel lid drive assembly - South	Located in operating cave face at decon station
24590-HLW-MJ-HDH-DRIV-00002	1	Hatch through wall drive assembly	Located in operating cave face at import hatch
24590-HLW-MJ-HDH-DRIV-00003	1	Hatch through wall drive assembly	Located in operating cave face of canister handling cave at export hatch
24590-HLW-MJ-HDH-DRIV-00004	1	Turntable drive assembly	Located in operating cave face at swabbing station
24590-HLW-MJ-HDH-DRIV-00005	1	Hatch through wall drive assembly	Located in operating cave face at export hatch
24590-HLW-MJ-HDH-DRIV-00007	1	Swabbing Manipulator elevator through wall drive	Located in the Decon Swabbing station
24590-HLW-MJ-HDH-DRIV-00008	1	Decon vessel lid drive assembly - North	Located in operating cave face at decon station
24590-HLW-AD-HDH-HTCH-00002	1	Decon cave export hatch	Located in decon/swab cave above canister store transfer bogie tunnel
24590-HLW-AD-HDH-HTCH-00003	1	Canister handling cave export hatch	Located in canister handling cave above rinse bogie tunnel
24590-HLW-AD-HDH-HTCH-00004	1	Decon cave import hatch	Located in decon/swab cave above rinse bogie tunnel
24590-HLW-MJ-HDH-MANIP-00001	1	Telerobotic manipulator	Located in operating cave face at swabbing station
24590-HLW-MJ-HDH-MANIP-00002	1	Master slave manipulator	Located in operating cave face at decon station
24590-HLW-MJ-HDH-MANIP-00003	1	Master slave manipulator	Located in operating cave face at decon station

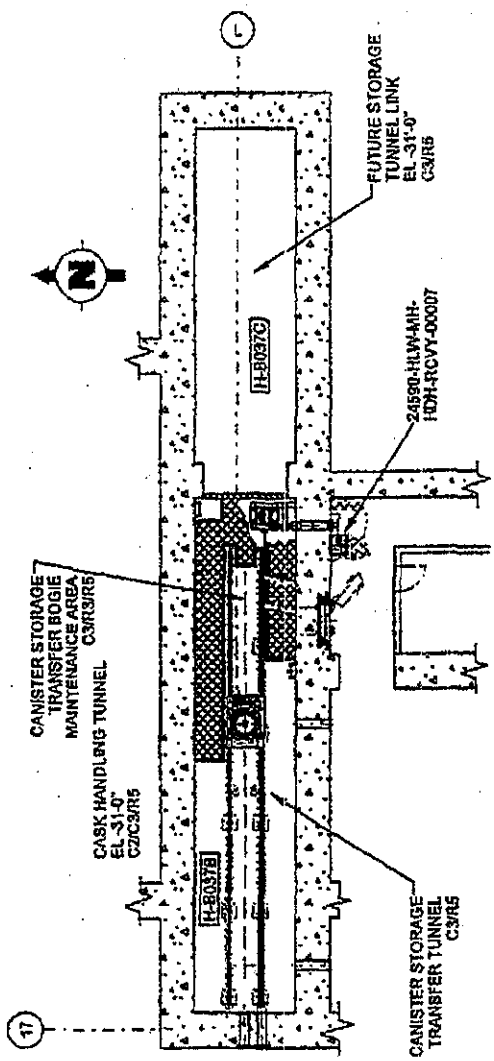
Plant Item Number	Quantity	Description	Remarks
24590-HLW-MJ-HDH-MANIP-00004	1	Master slave manipulator	Located in operating cave face at swabbing station
24590-HLW-MH-HDH-MHAN-00001	1	Swabbing glove box	Located out cave at swabbing station
24590-HLW-MH-HDH-MHAN-00003	1	Canister guide assembly	Located in decon/swab cave, attached to wall at swabbing station
24590-HLW-MJ-HDH-MHAN-00006	1	Canister set-down rack	Located in decon/swab cave
24590-HLW-DD-HDH-PLUG-00001	1	Horizontal shield door through wall recovery plug	Located in decon area of rinse bogie tunnel
24590-HLW-MH-HDH-RAIL-00005	1	Swabbing Manipulator rail assembly	Located in the Decon Swabbing station
24590-HLW-MH-HDH-RCVY-00004	1	Crane Maintenance Recovery Cable Reel	Located in the Decon Cave crane maintenance area
24590-HLW-MH-HDH-RCVY-00007	1	Storage Transfer Bogie Recovery Winch	Located in the Storage Transfer Tunnel Maintenance area
24590-HLW-MH-HDH-RCVY-00009	1	Rinse Bogie recovery winch	Located in Rinse Bogie Maintenance Area
24590-HLW-FH-HDH-TOOL-00001	1	Canister grapple	Located in decon/swab cave
24590-HLW-FH-HDH-TOOL-00004	1	Canister grapple	Located in decon/swab cave
24590-HLW-MQ-HDH-TRLY-00003	1	Canister rinse bogie	Located in rinse bogie tunnel.
24590-HLW-MQ-HDH-TRLY-00004	1	Canister store transfer bogie	Located in store transfer bogie tunnel
24590-HLW-MJ-HDH-TTBL-00001	1	Turntable assembly	Located in decon/swab cave at swabbing station
24590-HLW-DD-HDH-TWDVC-00002	1	Swab posting port	Located in operating cave face at swabbing station

Plant Item Number	Quantity	Description	Remarks
24590-HLW-DD-HDH-TWDVC-00008	1	Canister storage transfer bogie maintenance area through wall recovery through wall drive	Located in the Storage Transfer Tunnel Maintenance area
24590-HLW-MV-HDH-VSL-00001	1	Canister bogie decon vessel	Located on the rinse bogie in the canister rinse bogie tunnel
24590-HLW-MV-HDH-VSL-00002	1	Canister decontamination vessel	Located in the decon/swab cave
24590-HLW-MV-HDH-VSL-00003	1	Waste neutralization vessel	Located in the decon/swab cave
24590-HLW-MV-HDH-VSL-00004	1	Canister decontamination vessel	Located in the decon/swab cave
24590-HLW-MP-HDH-PMP-00001	1	Canister bogie vessel pump	Located on the rinse bogie in the canister rinse bogie tunnel
24590-HLW-MT-HDH-TK-00002	1	Ceric nitrate addition tank	Located in decon reagents room
24590-HLW-MT-HDH-TK-00003	1	Hydrogen peroxide addition tank	Located in decon reagents room

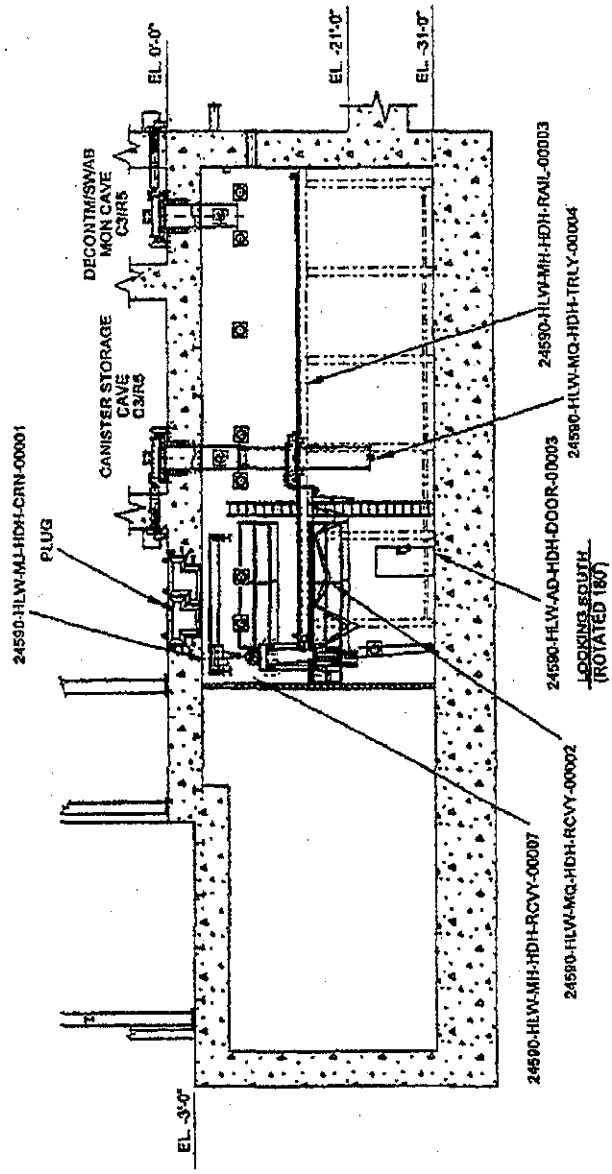
Appendix D
–Canister Decontamination Handling System HDH Layout




24590-HLW-AD-HDH-DOOR-00004
24590-HLW-MH-HDH-RCVY-00001
CANISTER RINSE DECON/MAINT AREA C3/R3
H-B039A
H-B039B
CORRIDOR C2/R2 EL -21'-0"
CANISTER RINSE TUNNEL C3/C5/R5
24590-HLW-AD-HDH-DOOR-00001
CANISTER RINSE BOGIE PLAN AT EL. 8'-0"
24590-HLW-MJ-HDH-CRN-00004
CANISTER POUR HANDLING CAVE C5/R5
24590-HLW-MJ-HDH-DRIV-00003
24590-HLW-AD-HDH-HTCH-00003
EL. 14'-0"
EL. (-)16'-6"
24590-HLW-MH-HDH-RAIL-00002
24590-HLW-MH-HDH-RAIL-00004
24590-HLW-MH-HDH-TRLY-00003
24590-HLW-MQ-HDH-TRLY-00003
CANISTER DECONTM/ SWAB MON CAVE C3/R5
LOOKING SOUTH (ROTATED 180°)
EL. 37'-0"
PLUG
EL. 14'-0"
EL. 0'-0"
EL. (-)21'-0"
24590-HLW-MJ-HDH-CRN-00002



CANISTER STORAGE TRANSFER BOGIE PLAN AT EL -9'-0"



Quarter Ending 3/31/2005 24590-PTF-PCN-ENV-05-007

Hanford Facility RCRA Permit Modification Notification Form
Part III, Chapter 10 and Attachment 51
Waste Treatment and Immobilization Plant

Index

Page 2 of 2:	Hanford Facility RCRA Permit, Part III, Attachment 51 Class [1]1 Permit Modification to the Mechanical Systems Data Sheet for Pretreatment Facility Vessel RDP-VSL-00002C
Attachment 1	24590-PTF-MVD-RDP-P0007, Rev. 3, Mechanical Systems Data Sheet for Pretreatment Vessel RDP-VSL-00002C

Submitted by Co-Operator: Reviewed by ORP Program Office:

For F. Bonna	3/23/05		4/19/05
Name	Date	Name	Date

Quarter Ending 3/31/2005

24590-PTF-PCN-ENV-05-007

Hanford Facility RCRA Permit Modification Notification Form	
Unit: **Waste Treatment and Immobilization Plant**	Permit Part & Chapter: **Part III, Chapter 10 and Attachment 51**

Description of Modification:

The purpose of this modification is to update the mechanical systems data sheet associated with the Pretreatment facility Spent Resin Collection and Dewatering Process (RDP) system vessel RDP-VSL-00002C. This change does not affect the form, function, or capacity of the vessel and is discussed by the following:

Mechanical Systems Data Sheets:

The mechanical systems data sheet for vessel RDP-VSL-00002C was revised to identify a change on page 3 to the Equipment Cyclic Data Sheet Maximum Operating Temperature. The operating temperature was changed from 138 degrees F to 113 degrees F to reflect the most current vessel operating conditions.

Attachment 51, Appendix 8.6:

Replace 24590-PTF-MVD-RDP-P0007, Rev. 2 with 24590-PTF-MVD-RDP-P0007, Rev. 3, Mechanical Systems Data Sheet for Pretreatment Vessel RDP-VSL-00002C

See Attachment 1 of this Modification Notification for the updated mechanical system data sheet.

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

Enter Relevant WAC 173-303-830, Appendix I Modification citation number:

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

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

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

Reason for denial:

Reviewed by Ecology:

S. Dahl — Date: 5-11-05

[1] Class 1 modifications requiring prior Agency approval.

[2] This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

Attachment 1

24590-PTF-MVD-RDP-P0007, Rev. 3
Mechanical Systems Data Sheet for Pretreatment Vessel RDP-VSL-00002C

R10523237

BECHTEL	ISSUED BY RPP-WTP PDC **MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-PTF-MV-RDP-VSL-00002C*

Project:	*RPP-WTP*	P&ID:	*24590-PTF-M6-RDP-P0001, 24590-PTF-M6-RDP-P0006, 24590-PTF-M6-CNP-P0005*
Project No:	*24590*	Process Calculation:	*Deleted*
Project Site:	*Hanford*	Vessel Drawing	*24590-PTF-MV-RDP-P0003*
Description:	*Spent Resin Slurry Vessel*		

Reference Data

Charge Vessels (Tag Numbers)	*N/A*
Pulsejet Mixers / Agitators (Tag Numbers)	*RDP-PJM-00009-00010-00011-00012*
RFDs/Pumps (Tag Numbers)	

Design Data

Quality Level		*QL-1*		Fabrication Specs	*24590-WTP-3PS-MV00-TP001*		
Seismic Category		*SC-I*		Design Code	*ASME VIII Div 1*		
Service/Contents		*Resin Slurry*		Code Stamp	*Yes*		
Design Specific Gravity		*1.22*		NB Registration	*Yes*		
Maximum Operating Volume	gal	*12,688*		Weights (lbs)	Empty	Operating	Test
otal Volume	gal	*15,230*		Estimated	*36,500*	*168,000*	*164,000*
				Actual *			

Inside Diameter	inch	*144*			Wind Design	*Not Required*	
Length/Height (TL-TL)	inch	*168*			Snow Design	*Not Required*	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	*24590-WTP-3PS-MV00-TP002* *24590-WTP-3PS-SS90-T0001*	
Internal Pressure	psig	*0*	*15*	*N/A*	Seismic Base Moment *	ft*lb	
External Pressure	psig	*0.22*	*FV*	*N/A*	Postweld Heat Treat	*Not Required*	
Temperature	°F	*113*	*138*		Corrosion Allowance	inch	*0.04 (Notes 8, 9)*
Min. Design Metal Temp.	°F	*30*			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED PROFESSIONAL ENGINEER
3/28/05
EXPIRES 12/10/06

This Bound Document Contains a total of 5 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
3	3/28/05	Issued for Permitting Use				
2	1/25/05	Issued for Permitting Use	C. Thompson	H. Khurana	C. Slater	M. Hoffmann
1	4/28/04	Issued for Permitting Use	K. Brightman	H. Khurana	C. Slater	M. Hoffmann
0	12/18/02	Issued for Permitting Use	J. Jackson	C. Slater	N/A	S. Kirk

	MECHANICAL DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-RDP-VSL-00002C

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	SA 240 316 Note 1	See Drawing	Auxiliary (See Note 5)
Shell	SA 240 316 Note 1	See Drawing	Primary (See Note 5)
Bottom Head	SA 240 316 Note 1	See Drawing	Primary (See Note 5)
Support	SA 240 304 Note 1	See Drawing	N/A
Jacket/Coils/Half-Pipe Jacket	N/A	N/A	N/A
Internals	SA 240 316 Note 1	See Drawing	N/A
Pipe/Nozzles	SA 312 TP 316 Note 1 (Seamless)	See Drawing	Primary (See Note 5)
Forgings/ Bar stock	SA 182 F316 Note 1	See Drawing	N/A
Gaskets	N/A	N/A	N/A
Bolting	N/A	N/A	N/A

Miscellaneous Data

Orientation	Vertical	Support Type	Skirt
Insulation Function	Not Applicable	Insulation Material	Not Applicable
Insulation Thickness (inch)	Not Applicable	Internal Finish	Note 3
		External Finish	Note 3

Remarks

* To be determined by the vendor.
Note 1: Max. Carbon content 0.030%
Note 2: Deleted
Note 3: Welds de-scaled as laid
Note 4: This vessel is in a Black Cell
Note 5: All welds forming part of the Primary and Auxiliary Containment, including nozzle attachment welds, shall be subjected to 100% volumetric examination
Note 6: Contents of this document are Dangerous Waste Permit affecting.
Note 7: Deleted.
Note 8 : Seller shall ensure that an additional 0.060" is available for erosion in the bottom head and shall report the minimum thickness required for all specified loading conditions, exclusive of erosion and corrosion allowances.
Note 9: Seller shall ensure that an additional 0.038" is available for erosion in the lower 4" of the interior conical surface of the pulse jet mixers.

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-PTF-MV-RDP-VSL-00002C*

Equipment Cyclic Data Sheet

Component Plant Item Number:	***RDP-VSL-00002C***
Component Description	***Parent Vessel***

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	***SA 240 316 with 0.03% max. carbon***
Design Life	***40 Years***
Component Function and Life Cycle Description	***The purpose of the Spent Resin Slurry Vessel is to receive and hold one batch of spent resin.***

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	***FV***	***15***	***10***	***Nominal Assumption***
Operating Pressure	psig	***-0.22***	***0***	***N/A***	***This vessel will remain under constant pressure depending upon the vessel plant HVAC system.***
Operating Temperature	°F	***59***	***113°F*** (3)	***N/A***	***Temperature will not cycle appreciably with vessel cycling.***
Contents Specific Gravity		****1.00***	***1.22***	***N/A***	**** The value given is for the pure liquid phase of vessel contents. The vessel will normally contain slurry of resin particles with particle density of approximately 1.4g/cc. The slurry solids content will be between 0 and 35 % by volume.***
Contents Level	inch	***0***	***139***	***1.56×10^4***	
Localized Features					
Nozzles					
Supports					

Notes

- ***Cycle Increase: The seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***

	MECHANICAL DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-RDP-VSL-00002C

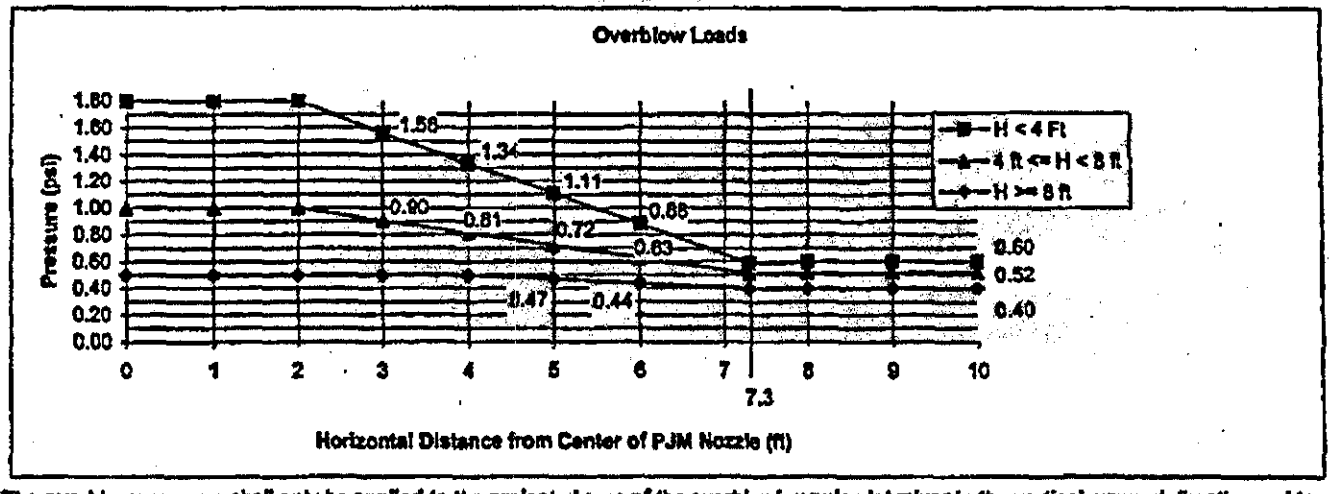
Hydrodynamic Loading

In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overblow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed for the combination of the normal operational hydrodynamic loads and overblow loads, and this load combination is also to be assumed to act concurrently with seismic loads.

Hydrodynamic loads acting on a surface vary with the location of the surface within the vessel. The following table indicates the normal hydrodynamic pressure ranges and the number of design cycles. The hydrodynamic forces cycle between the indicated pressure ranges applied across the projected area of the component. Positive hydrodynamic forces act in the radial, outward direction and the vertical, upward direction. Seller shall apply the radial load simultaneously in the radial direction and normal to the radial direction in the horizontal plane.

Condition	Hydrodynamic Pressure Range, psi				Number of Cycles
	Between PJM Center and Vessel Wall		Between Vessel Center and PJM Center		
	Radial	Vertical	Radial	Vertical	
Normal Operation	-0.80 to 0.80	-0.80 to 0.40	-0.20 to 0.30	-0.20 to 0.25	6.2×10^6

Overblow loads vary as a function of the distance from the center of the overblowing pulse jet mixer nozzle and the elevation 'H' above the overblowing pulse jet mixer nozzle up to the overflow level as plotted:



The overblow pressure shall only be applied to the projected area of the overblowing pulse jet mixer in the vertical, upward direction and to all surrounding components in the horizontal plane, radiating from the overblowing pulse jet mixer. Seller shall consider that any single pulse jet mixer may overblow 100 cycles.

Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-PTF-MV-RDP-VSL-00002C*

Equipment Cyclic Data Sheet

Component Plant Item Number:	*24590-PTF-MV-RDP-PJM-00009, 00010, 00011, 00012*
Component Description	*Pulse Jet Mixers*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*SA 240 316 with 0.03% max. carbon*
Design Life	*40 Years*
Component Function and Life Cycle Description	*These pulse jet mixers are cyclically loaded using vacuum to fully fill the pulse jet mixer with process liquid and compressed air to fully empty the pulse jet mixer. The pulse jet mixers are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum operating pressure and the minimum operating pressure plus the external static head imposed by the parent vessel. The pulse jet mixer supports shall be designed to cycle between fully buoyant (pulse jet mixer empty and parent vessel full) and fully loaded (pulse jet mixer full and parent vessel empty) in addition to thrust. Thrust load shall be applied only to the fully Buoyant state. Assume the parent vessel is full for 50% of number of cycles of PJM.*

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*80*	*6.2x10⁶*	*Based upon 168 sec cycle time, assuming that the parent vessel will be used 200 times in 40 years for 2 months at a time.*
Operating Pressure	psig	*FV*	*72.5*	*6.2x10⁶*	
Operating Temperature	°F	*59*	*113*	*N/A*	*Temperature will not cycle appreciably with vessel cycling.*
Contents Specific Gravity		**1.00*	*1.22*	*N/A*	**The value given is for the pure liquid phase of vessel contents. The vessel will normally contain slurry of resin particles with particle density of approximately 1.4g/cc. The slurry solids content will be between 0 and 35 % by volume.*
Contents Level	inch	*Empty*	*Flooded*	*6.2x10⁶*	*Based upon 168 sec cycle time, assuming that the parent vessel will be used 200 times in 40 years for 2 months at a time.*
Thrust		*0*	*262*	*6.2x10⁶*	
Localized Features					
Nozzles					
Supports					

Attachment 2
05-ED-031

Bechtel National, Inc. Certification Statement

Bechtel National, Inc. Certification

The following certification statement is provided consistent with Contract No. DE-AC27-01RV14136, Section H.26, Environmental Permits, paragraph (g) for the submittal of the Hanford Tank Waste Treatment and Immobilization Plant - Hanford Facility RCRA Permit Notification Form 24590-PTF-PCN-ENV-05-007.

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.

J. P. Henschel

J. P. Henschel
Project Director

4/4/05
Date

Quarter Ending 6/30/2005 24590-PTF-PCN-ENV-05-008

Hanford Facility RCRA Permit Modification Notification Form
Part III, Chapter 10 and Attachment 51
Waste Treatment and Immobilization Plant

Index

Page 2 of 2: Hanford Facility RCRA Permit, Part III, Attachment 51
Class [1] 1 Permit Modification to the Mechanical Systems Data Sheets and the Plant Item Material Selection Data Sheet for Pretreatment Facility Vessels CXP-VSL-00026 A/B/C

Submitted by Co-Operator: 5/27/05
F. Beranek Date

Reviewed by ORP Program Office: 6/15/05
R. J. Schepens Date

Quarter Ending 6/30/2005

24590-PTF-PCN-ENV-05-008

Hanford Facility RCRA Permit Modification Notification Form	
Unit:	Permit Part & Chapter:
Waste Treatment and Immobilization Plant	**Part III, Chapter 10 and Attachment 51**

Description of Modification:

The purpose of this modification is to update the format of the mechanical systems data sheets and the plant item material selection data sheet (attached) associated with the Pretreatment facility Cesium Ion Exchange Process System (CXP) system vessels CXP-VSL-00026A/B/C. In addition, information on load and stress calculations is provided, as well as final design information based on the vessel's as built construction. These documents have been revised based upon updates to source documents. These changes do not affect the form, function, or capacity of the vessels.

Mechanical Systems Data Sheets:

Attachment 51, Appendix 8.6:

Replace 24590-PTF-MVD-CXP-P0021, Rev. 0 with 24590-PTF-MVD-CXP-P0021, Rev. 1, Mechanical Systems Data Sheet for Pretreatment Vessel CXP-VSL-00026A

Replace 24590-PTF-MVD-CXP-P0022, Rev. 0 with 24590-PTF-MVD-CXP-P0022, Rev 1, Mechanical Systems Data Sheet for Pretreatment Vessel CXP-VSL-00026B

Replace 24590-PTF-MVD-CXP-P0023, Rev. 0 with 24590-PTF-MVD-CXP-P0023, Rev 1, Mechanical Systems Data Sheet for Pretreatment Vessel CXP-VSL-00026C

Material Selection Data Sheet:

Attachment 51, Appendix 8.9:

Replace 24590-PTF-N1D-CXP-P0003, Rev. 0 with 24590-PTF-N1D-CXP-P0003, Rev. 1, Plant Item Material Selection Data Sheet for Pretreatment Vessels CXP-VSL-00026 A/B/C

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

Enter Relevant WAC 173-303-830, Appendix I Modification citation number:

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

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

Modification Approved: [X] Yes [ ] No (state reason for denial)	Reviewed by Ecology:
Reason for denial:	S. Dahl — Date 6/23/05

[1] Class 1 modifications requiring prior Agency approval.

[2] This is only an advanced notification of an intended Class [1]1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

R10429490

MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No.
24590-PTF-MV-CXP-VSL-00026A

Project:	*RPP-WTP*	P&ID:	*24590-PTF-M6-CXP-P0010, 24590-PTF-M6-CXP-P0011, 24590-PTF-M6-CXP-P0013*
Project No:	*24590*	Process Calculation:	*Deleted* 1
Project Site:	*Hanford*	Vessel Drawing	*24590-PTF-MV-CXP-P0008*
Description:	*Cesium Ion Exchange Treated LAW Collection Vessel*		

Reference Data

Charge Vessels (Tag Numbers)	
Pulsejet Mixers / Agitators (Tag Numbers)	*CXP-PJM-00002, CXP-PJM-00003, CXP-PJM-00004, CXP-PJM-00005, CXP-PJM-00006, CXP-PJM-00007*
RFDs/Pumps (Tag Numbers)	

Design Data

Quality Level		*See Vessel Drawing*	Fabrication Specs	*24590-WTP-3PS-MV00-TP001*		
Seismic Category		*SC-I*	Design Code	*ASME VIII Div 1*		
Service/Contents		*Radioactive Liquid*	Code Stamp	*Yes*		
Design Specific Gravity		*1.26*	NB Registration	*Yes*		
Maximum Operating Volume	gal	*34,370 (Note 3)*	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	*39,000 (Note 3)*	Estimated	*81,400*	*447,000*	*407,000*
Environmental Qualification 1		*N/A*	Actual * (lbs) 1	*75,000*	*440,000*	*400,000*

Inside Diameter	inch	*180*			Wind Design	*Not Required*	
Length/Height (TL-TL)	inch	*294*			Snow Design	*Not Required*	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	*24590-WTP-3PS-MV00-TP002* *24590-WTP-3PS-SS90-T0001*	
Internal Pressure	psig	*Atm*	*15*	*N/A*	Seismic Base Moment *	ft*lb	
External Pressure	psig	*0.12*	*FV*	*N/A*	Postweld Heat Treat	*Not Required*	
Temperature	°F	*113*	*138*	*N/A*	Corrosion Allowance	inch	*0.04*
Min. Design Metal Temp.	°F	*40*			Hydrostatic Test Pressure *	psig	*20* 1

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY
RPP-WTP PDC

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED PROFESSIONAL ENGINEER
6/2/05
EXPIRES 12/10/06

This Bound Document Contains a total of 5 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
1	6/2/05	Issued for Permitting Use				
0	5/26/04	Issued for Permitting Use	K. Brightman	R. Simmons	C. Slater	M. Hoffmann

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-PTF-MV-CXP-VSL-00026A*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SA-240 316 (Note 2)***	***See Drawing***	***Auxiliary (Note 1)***
Shell	***SA-240 316 (Note 2)***	***See Drawing***	***Primary (Note 1)***
Bottom Head	***SA-240 316 (Note 2)***	***See Drawing***	***Primary (Note 1)***
Support & Vacuum Ring 1	***SA-240 304 (Note 2)***	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***N/A***	***N/A***	***N/A***
Internals	***SA-240 316 (Note 2)***	***See Drawing***	***Thermowells Primary (Note 1)***
Pipe	***SA-312 TP316 Seamless (Note 2)***	***See Drawing***	***Note 1***
Forgings/ Bar stock	***SA-182 F316 (Note 2)***	***See Drawing***	***Note 1***
Gaskets	***N/A***	***N/A***	***N/A***
Bolting	***N/A***	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Welds Descaled as Laid***
		External Finish	***Welds Descaled as Laid***

Remarks

**** To be determined by the vendor***

Note 1: All welds forming part of the primary and auxiliary containments, including the nozzle attachment welds shall be subjected to 100% volumetric examination.

Note 2: Maximum carbon content of 0.030% for all welded components.

Note 3: Vessel volumes are approximate and do not account for manufacturing tolerances, nozzles, and displacement of internals.

Note 4: This vessel is located in a Black Cell.

Note 5: Contents of this document are Dangerous Waste Permit affecting.

Note 6: Deleted. 1

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. ***24590-PTF-MV-CXP-VSL-00026A***

Equipment Cyclic Data Sheet

Component Plant Item Number:	***24590-PTF-MV-CXP-VSL-00026A***
Component Description	***Parent Vessel***

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	***SA-240 316***
Design Life	***40 Years***
Component Function and Life Cycle Description	***This vessel receives and stores waste in a batch transfer. It shall be designed to be filled to the maximum content level over a period of 22 hours and emptied in 10 hours to complete a 32 hour cycle. Additionally, this vessel will be subjected to fluid dynamic forces from the operation of the pulse jet mixers during the process of suspending the solids. This vessel is washed down not more than once per year.***

Load Type		Min.	Max	Number of Cycles	Comment
Design Pressure	psig	***FV***	***15***	***10***	***Nominal assumption for testing***
Operating Pressure	psig	***-0.12***	***0***	***N/A***	***This vessel will remain under constant pressure depending upon the vessel vent system***
Operating Temperature	°F	***59***	***113***	***N/A***	***Temperature will not cycle appreciably with vessel cycling***
Contents Specific Gravity		***1.00***	***1.26***	***N/A***	***Normally 1.2 without cycling***
Contents Level	inch	***43***	***309***	***3690***	***Liquid level from crown of bottom head***
Localized Features					
Supports				***Same as contents level***	

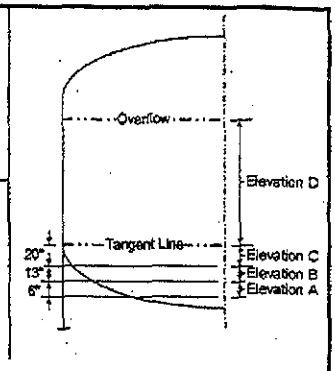
Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***

Hydrodynamic Loading 1

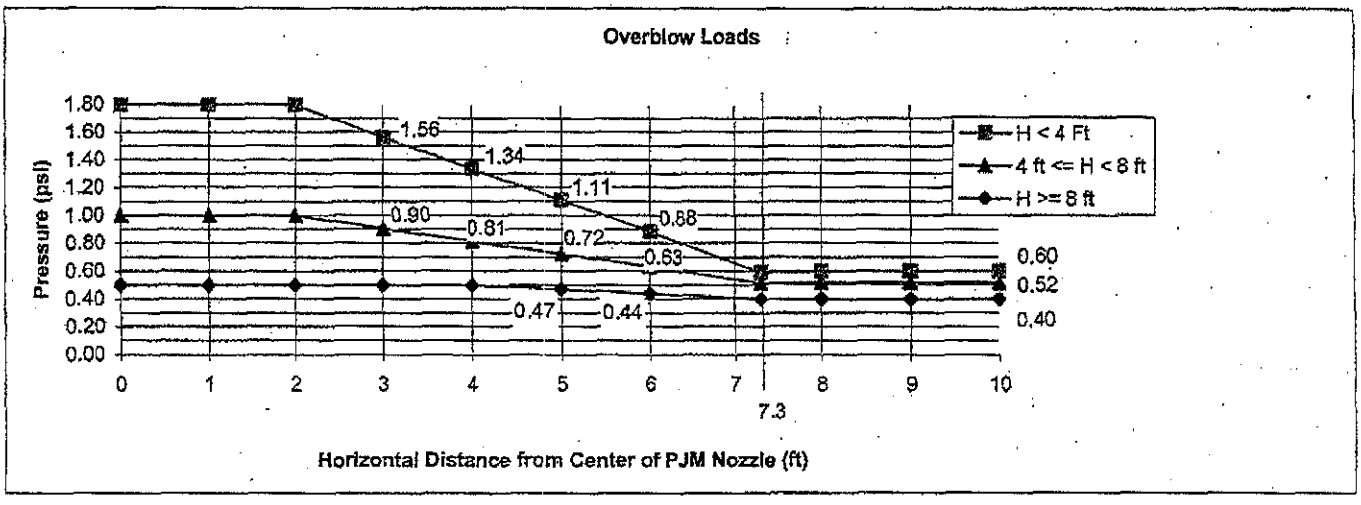
In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overblow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed for the combination of the normal operational hydrodynamic loads and overblow loads, and this load combination is also to be assumed to act concurrently with seismic loads.

The following table indicates the normal hydrodynamic pressure for ranges of elevations in the vessel and the number of design cycles for each condition. The hydrodynamic forces cycle between the indicated pressure ranges applied across the projected area of the component. Positive hydrodynamic forces act in the radial, outward direction and the vertical, upward direction. Seller shall apply the radial load simultaneously in the radial direction and normal to the radial direction in the horizontal plane.



Normal Operation Hydrodynamic Pressure Range, psi								Number of Cycles
Elevation A		Elevation B		Elevation C		Elevation D		
Radial	Vertical	Radial	Vertical	Radial	Vertical	Radial	Vertical	
-0.09 to 0.29	*-0.74 to 0.48*	*-0.02 to 0.22*	*-0.01 to 0.40*	*-0.05 to 0.12*	*-0.01 to 0.40*	*-0.03 to 0.10*	*-0.01 to 0.40*	*21.5 X 10⁶*

Overblow loads vary as a function of the distance from the center of the overblowing pulse jet mixer nozzle and the elevation 'H' above the overblowing pulse jet mixer nozzle up to the overflow level as plotted:



The overblow pressure shall only be applied to the projected area of the overblowing pulse jet mixer in the vertical, upward direction and to all surrounding components in the horizontal plane, radiating from the overblowing pulse jet mixer. Seller shall consider that any single pulse jet mixer may overblow 100 cycles.

Notes

- *Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-PTF-MV-CXP-VSL-00026A*

Equipment Cyclic Data Sheet

Component Plant Item Number:	*24590-PTF-MV-CXP-PJM-00002, 24590-PTF-MV-CXP-PJM-00003, 24590-PTF-MV-CXP-PJM-00004, 24590-PTF-MV-CXP-PJM-00005, 24590-PTF-MV-CXP-PJM-00006, 24590-PTF-MV-CXP-PJM-00007*
Component Description	*Pulse Jet Mixers*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*SA-240 316*
Design Life	*40 Years*
Component Function and Life Cycle Description	*These pulse jet mixers (PJMs) are cyclically loaded using vacuum to fully fill the PJM with process liquid and compressed air to fully empty the PJM. The PJMs are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The PJM supports shall be designed to cycle between fully buoyant (PJM empty and parent vessel full) and fully loaded (PJM full and parent vessel empty) states. Thrust load shall be applied only to the fully buoyant state. Assume the parent vessel is full for 50% of the number of PJM cycles.* 1

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*80*	*10*	*Nominal assumption for testing*
Operating Pressure	psig	*FV*	*72.5*	*2.15×10^7*	
Operating Temperature	°F	*59*	*113*	*N/A*	*Temperature will not cycle appreciably with vessel cycling.*
Contents Specific Gravity		*1.00*	*1.26*	*N/A*	*Normally 1.2 without cycling*
Contents Level	inch	*Empty*	*Flooded*	*2.15×10^7*	
Thrust 1	lbf	*0*	*314*	*2.15×10^7*	
Localized Features					
Nozzles					
Supports		*Buoyant/Loaded*		*Same as contents level*	

Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***

R10429491

MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No.
24590-PTF-MV-CXP-VSL-00026B

Project:	RPP-WTP	P&ID:	24590-PTF-M6-CXP-P0010, 24590-PTF-M6-CXP-P0011, 24590-PTF-M6-CXP-P0013
Project No:	24590	Process Calculation:	Deleted 1
Project Site:	Hanford	Vessel Drawing	24590-PTF-MV-CXP-P0009
Description:	Cesium Ion Exchange Treated LAW Collection Vessel		

Reference Data

Charge Vessels (Tag Numbers)	
Pulsejet Mixers / Agitators (Tag Numbers)	CXP-PJM-00008, CXP-PJM-00009, CXP-PJM-00010, CXP-PJM-00011, CXP-PJM-00012, CXP-PJM-00013
RFDs/Pumps (Tag Numbers)	

Design Data

Quality Level		See Vessel Drawing	Fabrication Specs	24590-WTP-3PS-MV00-TP001		
Seismic Category		SC-I	Design Code	ASME VIII Div 1		
Service/Contents		Radioactive Liquid	Code Stamp	Yes		
Design Specific Gravity		1.26	NB Registration	Yes		
Maximum Operating Volume	gal	34,370 (Note 3)	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	39,000 (Note 3)	Estimated	81,400	447,000	407,000
Environmental Qualification 1		N/A	Actual *(lbs) 1	75,000	440,000	400,000

Inside Diameter	inch	180			Wind Design	Not Required	
Length/Height (TL-TL)	inch	294			Snow Design	Not Required	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	24590-WTP-3PS-MV00-TP002 24590-WTP-3PS-SS90-T0001	
Internal Pressure	psig	Atm	15	N/A	Seismic Base Moment *	ft*lb	
External Pressure	psig	0.12	FV	N/A	Postweld Heat Treat	Not Required	
Temperature	°F	113	138	N/A	Corrosion Allowance	Inch	0.04
Min. Design Metal Temp.	°F	40			Hydrostatic Test Pressure * 1	psig	20

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY
RPP-WTP PDC

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED
PROFESSIONAL ENGINEER
6/2/05
EXPIRES 12/10/06

This Bound Document Contains a total of 5 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
1	6/2/05	Issued for Permitting Use				
0	5/26/04	Issued for Permitting Use	K. Brightman	R. Simmons	C. Slater	M. Hoffmann

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. ***24590-PTF-MV-CXP-VSL-00026B***

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SA-240 316 (Note 2)***	***See Drawing***	***Auxiliary (Note 1)***
Shell	***SA-240 316 (Note 2)***	***See Drawing***	***Primary (Note 1)***
Bottom Head	***SA-240 316 (Note 2)***	***See Drawing***	***Primary (Note 1)***
Support & Vacuum Ring 1	***SA-240 304 (Note 2)***	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***N/A***	***N/A***	***N/A***
Internals	***SA-240 316 (Note 2)***	***See Drawing***	***Thermowells Primary (Note 1)***
Pipe	***SA-312 TP316 Seamless (Note 2)***	***See Drawing***	***Note 1***
Forgings/ Bar stock	***SA-182 F316 (Note 2)***	***See Drawing***	***Note 1***
Gaskets	***N/A***	***N/A***	***N/A***
Bolting	***N/A***	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Welds Descaled as Laid***
		External Finish	***Welds Descaled as Laid***

Remarks

**** To be determined by the vendor***

Note 1: All welds forming part of the primary and auxiliary containments, including the nozzle attachment welds shall be subjected to 100% volumetric examination.

Note 2: Maximum carbon content of 0.030% for all welded components.

Note 3: Vessel volumes are approximate and do not account for manufacturing tolerances, nozzles, and displacement of internals.

Note 4: This vessel is located in a Black Cell.

Note 5: Contents of this document are Dangerous Waste Permit affecting.

Note 6: Deleted. 1

BECHTEL	MECHANICAL DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-CXP-VSL-00026B

Equipment Cyclic Data Sheet

Component Plant Item Number:	***24590-PTF-MV-CXP-VSL-00026B***
Component Description	***Parent Vessel***

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	***SA-240 316***
Design Life	***40 Years***
Component Function and Life Cycle Description	***This vessel receives and stores waste in a batch transfer. It shall be designed to be filled to the maximum content level over a period of 22 hours and emptied in 10 hours to complete a 32 hour cycle. Additionally, this vessel will be subjected to fluid dynamic forces from the operation of the pulse jet mixers during the process of suspending the solids. This vessel is washed down not more than once per year.***

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	***FV***	***15***	***10***	***Nominal assumption for testing***
Operating Pressure	psig	***-0.12***	***0***	***N/A***	***This vessel will remain under constant pressure depending upon the vessel vent system***
Operating Temperature	°F	***59***	***113***	***N/A***	***Temperature will not cycle appreciably with vessel cycling***
Contents Specific Gravity		***1.00***	***1.26***	***N/A***	***Normally 1.2 without cycling***
Contents Level	inch	***43***	***309***	***3690***	***Liquid level from crown of bottom head***
Localized Features					
Supports				***Same as contents level***	

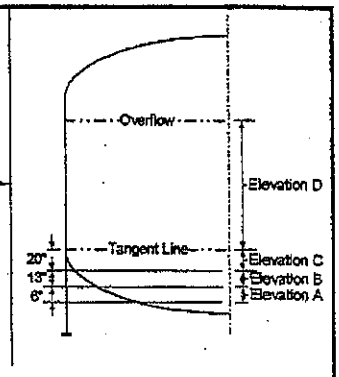
Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***

Hydrodynamic Loading 1

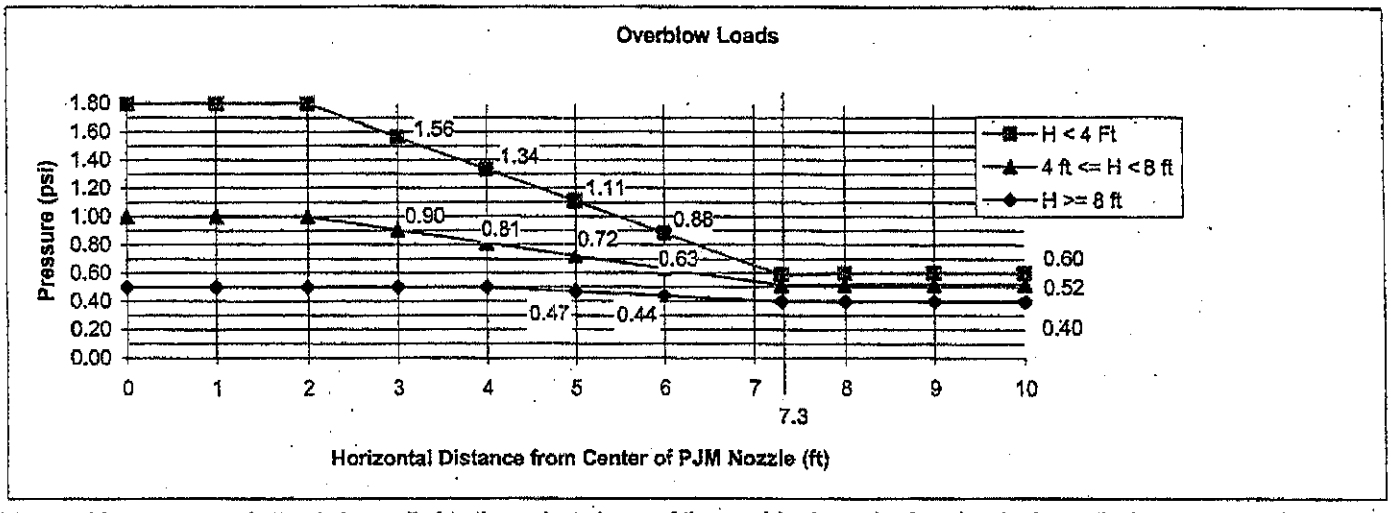
In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overblow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed for the combination of the normal operational hydrodynamic loads and overblow loads, and this load combination is also to be assumed to act concurrently with seismic loads.

The following table indicates the normal hydrodynamic pressure for ranges of elevations in the vessel and the number of design cycles for each condition. The hydrodynamic forces cycle between the indicated pressure ranges applied across the projected area of the component. Positive hydrodynamic forces act in the radial, outward direction and the vertical, upward direction. Seller shall apply the radial load simultaneously in the radial direction and normal to the radial direction in the horizontal plane.



Normal Operation Hydrodynamic Pressure Range, psi								Number of Cycles
Elevation A		Elevation B		Elevation C		Elevation D		
Radial	Vertical	Radial	Vertical	Radial	Vertical	Radial	Vertical	
-0.09 to 0.29	*-0.74 to 0.48*	*-0.02 to 0.22*	*-0.01 to 0.40*	*-0.05 to 0.12*	*-0.01 to 0.40*	*-0.03 to 0.10*	*-0.01 to 0.40*	*21.5 X 10⁶*

Overblow loads vary as a function of the distance from the center of the overblowing pulse jet mixer nozzle and the elevation 'H' above the overblowing pulse jet mixer nozzle up to the overflow level as plotted:



The overblow pressure shall only be applied to the projected area of the overblowing pulse jet mixer in the vertical, upward direction and to all surrounding components in the horizontal plane, radiating from the overblowing pulse jet mixer. Seller shall consider that any single pulse jet mixer may overblow 100 cycles.

Notes

- *Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*

BECHTEL	MECHANICAL DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-CXP-VSL-00026B

Equipment Cyclic Data Sheet

Component Plant Item Number:	24590-PTF-MV-CXP-PJM-00008, 24590-PTF-MV-CXP-PJM-00009, 24590-PTF-MV-CXP-PJM-00010, 24590-PTF-MV-CXP-PJM-00011, 24590-PTF-MV-CXP-PJM-00012, 24590-PTF-MV-CXP-PJM-00013
Component Description	Pulse Jet Mixers

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	SA-240 316
Design Life	40 Years
Component Function and Life Cycle Description	These pulse jet mixers (PJMs) are cyclically loaded using vacuum to fully fill the PJM with process liquid and compressed air to fully empty the PJM. The PJMs are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The PJM supports shall be designed to cycle between fully buoyant (PJM empty and parent vessel full) and fully loaded (PJM full and parent vessel empty) states. Thrust load shall be applied only to the fully buoyant state. Assume the parent vessel is full for 50% of the number of PJM cycles. 1

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	FV	80	10	Nominal assumption for testing
Operating Pressure	psig	FV	72.5	2.15×10^7	
Operating Temperature	°F	59	113	N/A	Temperature will not cycle appreciably with vessel cycling.
Contents Specific Gravity		1.00	1.26	N/A	Normally 1.2 without cycling
Contents Level	inch	Empty	Flooded	2.15×10^7	
Thrust 1	lbf	0	314	2.15×10^7	
Localized Features					
Nozzles					
Supports		Buoyant/Loaded		Same as contents level	

Notes

- Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.

R10429492

MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No.
24590-PTF-MV-CXP-VSL-00026C

Project:	RPP-WTP	P&ID:	24590-PTF-M6-CXP-P0010, 24590-PTF-M6-CXP-P0012, 24590-PTF-M6-CXP-P0013
Project No:	24590	Process Calculation:	Deleted 1
Project Site:	Hanford	Vessel Drawing	24590-PTF-MV-CXP-P0010
Description:	Cesium Ion Exchange Treated LAW Collection Vessel		

Reference Data

Charge Vessels (Tag Numbers)	
Pulsejet Mixers / Agitators (Tag Numbers)	CXP-PJM-00014, CXP-PJM-00015, CXP-PJM-00016, CXP-PJM-00017, CXP-PJM-00018, CXP-PJM-00019
RFDs/Pumps (Tag Numbers)	

Design Data

Quality Level		See Vessel Drawing	Fabrication Specs	24590-WTP-3PS-MV00-TP001		
Seismic Category		SC-I	Design Code	ASME VIII Div 1		
Service/Contents		Radioactive Liquid	Code Stamp	Yes		
Design Specific Gravity		1.26	NB Registration	Yes		
Maximum Operating Volume	gal	34,370 (Note 3)	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	39,000 (Note 3)	Estimated	81,400	447,000	407,000
Environmental Qualification 1		N/A	Actual * (lbs) 1	75,000	440,000	400,000

Inside Diameter	inch	180			Wind Design	Not Required	
Length/Height (TL-TL)	inch	294			Snow Design	Not Required	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	24590-WTP-3PS-MV00-TP002 24590-WTP-3PS-SS90-T0001	
Internal Pressure	psig	Atm	15	N/A	Seismic Base Moment *	ft*lb	
External Pressure	psig	0.12	FV	N/A	Postweld Heat Treat	Not Required	
Temperature	°F	113	138	N/A	Corrosion Allowance	Inch	0.04
Min. Design Metal Temp.	°F	40			Hydrostatic Test Pressure * 1	psig	20

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY
RPP-WTP PDC

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED PROFESSIONAL ENGINEER
6/2/05
EXPIRES 12/10/06

This Bound Document Contains a total of 5 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
1	6/2/05	Issued for Permitting Use				
0	5/26/04	Issued for Permitting Use	K. Brightman	R. Simmons	C. Slater	M. Hoffmann

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-PTF-MV-CXP-VSL-00026C*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SA-240 316 (Note 2)***	***See Drawing***	***Auxiliary (Note 1)***
Shell	***SA-240 316 (Note 2)***	***See Drawing***	***Primary (Note 1)***
Bottom Head	***SA-240 316 (Note 2)***	***See Drawing***	***Primary (Note 1)***
Support & Vacuum Ring 1	***SA-240 304 (Note 2)***	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***N/A***	***N/A***	***N/A***
Internals	***SA-240 316 (Note 2)***	***See Drawing***	***Thermowells Primary (Note 1)***
Pipe	***SA-312 TP316 Seamless (Note 2)***	***See Drawing***	***Note 1***
Forgings/ Bar stock	***SA-182 F316 (Note 2)***	***See Drawing***	***Note 1***
Gaskets	***N/A***	***N/A***	***N/A***
Bolting	***N/A***	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Welds Descaled as Laid***
		External Finish	***None***

Remarks

**** To be determined by the vendor***

Note 1: All welds forming part of the primary and auxiliary containments, including the nozzle attachment welds shall be subjected to 100% volumetric examination.

Note 2: Maximum carbon content of 0.030% for all welded components.

Note 3: Vessel volumes are approximate and do not account for manufacturing tolerances, nozzles, and displacement of internals.

Note 4: This vessel is located in a Black Cell.

Note 5: Contents of this document are Dangerous Waste Permit affecting.

Note 6: Deleted. 1

BECHTEL	MECHANICAL DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-CXP-VSL-00026C

Equipment Cyclic Data Sheet

Component Plant Item Number:	***24590-PTF-MV-CXP-VSL-00026C***
Component Description	***Parent Vessel***

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	***SA-240 316***
Design Life	***40 Years***
Component Function and Life Cycle Description	***This vessel receives and stores waste in a batch transfer. It shall be designed to be filled to the maximum content level over a period of 22 hours and emptied in 10 hours to complete a 32 hour cycle. Additionally, this vessel will be subjected to fluid dynamic forces from the operation of the pulse jet mixers during the process of suspending the solids. This vessel is washed down not more than once per year.***

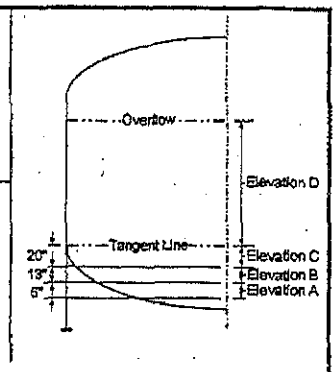
Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	***FV***	***15***	***10***	***Nominal assumption for testing***
Operating Pressure	psig	***-0.12***	***0***	***N/A***	***This vessel will remain under constant pressure depending upon the vessel vent system***
Operating Temperature	°F	***59***	***113***	***N/A***	***Temperature will not cycle appreciably with vessel cycling***
Contents Specific Gravity		***1.00***	***1.26***	***N/A***	***Normally 1.2 without cycling***
Contents Level	inch	***43***	***309***	***3690***	***Liquid level from crown of bottom head***
Localized Features					
Supports				***Same as contents level***	

Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***

Hydrodynamic Loading 1

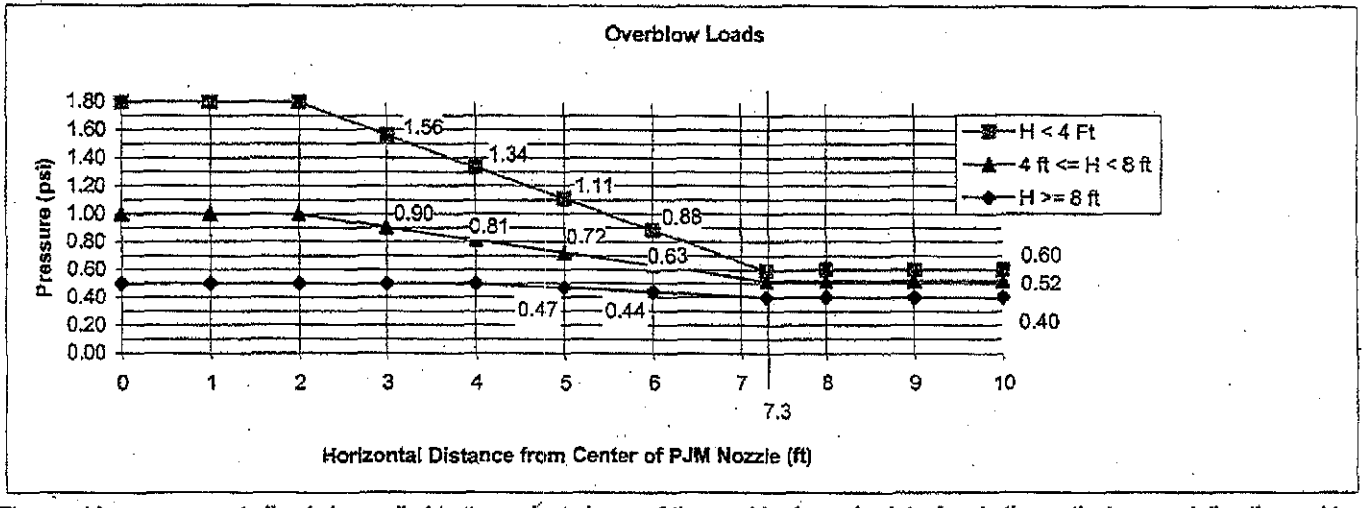
In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overblow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed for the combination of the normal operational hydrodynamic loads and overblow loads, and this load combination is also to be assumed to act concurrently with seismic loads.



The following table indicates the normal hydrodynamic pressure for ranges of elevations in the vessel and the number of design cycles for each condition. The hydrodynamic forces cycle between the indicated pressure ranges applied across the projected area of the component. Positive hydrodynamic forces act in the radial, outward direction and the vertical, upward direction. Seller shall apply the radial load simultaneously in the radial direction and normal to the radial direction in the horizontal plane.

Normal Operation Hydrodynamic Pressure Range, psi								Number of Cycles
Elevation A		Elevation B		Elevation C		Elevation D		
Radial	Vertical	Radial	Vertical	Radial	Vertical	Radial	Vertical	
-0.09 to 0.29	*-0.74 to 0.48*	*-0.02 to 0.22*	*-0.01 to 0.40*	*-0.05 to 0.12*	*-0.01 to 0.40*	*-0.03 to 0.10*	*-0.01 to 0.40*	*21.5 X 10^6*

Overblow loads vary as a function of the distance from the center of the overblowing pulse jet mixer nozzle and the elevation 'H' above the overblowing pulse jet mixer nozzle up to the overflow level as plotted:



The overblow pressure shall only be applied to the projected area of the overblowing pulse jet mixer in the vertical, upward direction and to all surrounding components in the horizontal plane, radiating from the overblowing pulse jet mixer. Seller shall consider that any single pulse jet mixer may overblow 100 cycles.

Notes

- *Cycle Increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*

BECHTEL	MECHANICAL DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-CXP-VSL-00026C

Equipment Cyclic Data Sheet

Component Plant Item Number:	24590-PTF-MV-CXP-PJM-00014, 24590-PTF-MV-CXP-PJM-00015, 24590-PTF-MV-CXP-PJM-00016, 24590-PTF-MV-CXP-PJM-00017, 24590-PTF-MV-CXP-PJM-00018, 24590-PTF-MV-CXP-PJM-00019
Component Description	Pulse Jet Mixers

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	SA-240 316
Design Life	40 Years
Component Function and Life Cycle Description	These pulse jet mixers (PJMs) are cyclically loaded using vacuum to fully fill the PJM with process liquid and compressed air to fully empty the PJM. The PJMs are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The PJM supports shall be designed to cycle between fully buoyant (PJM empty and parent vessel full) and fully loaded (PJM full and parent vessel empty) states. Thrust load shall be applied only to the fully buoyant state. Assume the parent vessel is full for 50% of the number of PJM cycles. △1

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	FV	80	10	Nominal assumption for testing
Operating Pressure	psig	FV	72.5	2.15×10^7	
Operating Temperature	°F	59	113	N/A	Temperature will not cycle appreciably with vessel cycling.
Contents Specific Gravity		1.00	1.26	N/A	Normally 1.2 without cycling
Contents Level	inch	Empty	Flooded	2.15×10^7	
Thrust △1	lbf	0	314	2.15×10^7	
Localized Features					
Nozzles					
Supports		BuoyantiLoaded		Same as contents level	

Notes

- Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.

PLANT ITEM MATERIAL SELECTION DATA SHEET

R10559885

CXP-VSL-00026 A/B/C (PTF)
IX Treated LAW Collection Vessel

- Design Temperature (°F)(max/min): 138/40
- Design Pressure (psig) (max/min): 15/FV
- Location: incell
- PJM Discharge Velocity (fps) (max): 40
- Drive Cycle: 17 % (at 40 fps)

Associated items

CXP-PJM-00002 – CXP-PJM-00019

ISSUED BY
RPP-WTP PDC

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on sheets 5 and 6

Operating Modes Considered:

- The vessel is filled with alkaline waste.
- The vessel is filled with demineralized water with traces of contract maximum waste.

Materials Considered:

Material (UNS No.)	Relative Cost	Acceptable Material	Unacceptable Material
Carbon Steel	0.23		X
304L (S30403)	1.00		X
316L (S31603)	1.18	X	
6% Mo (N08367/N08926)	7.64	X	
Alloy 22 (N06022)	11.4	X	
Ti-2 (R50400)	10.1		X

Recommended Material: 316 (max 0.030% C; dual certified)

Recommended Corrosion Allowance: 0.04 inch (includes 0.024 inch corrosion allowance and 0.004 inch erosion allowance)

Process & Operations Limitations:

- Develop rinsing/flushing procedure for acid and water

STEVEN WAKEMAN VAIL
STATE OF WASHINGTON
35250
REGISTERED PROFESSIONAL ENGINEER
3/29/05
EXPIRES: 12/07/05

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

This bound document contains a total of 6 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	APPROVER
1	3/29/05	Issued for Permitting Use			
0	5/20/04	Issued for Permitting Use	DLA	APR	SWV

PLANT ITEM MATERIAL SELECTION DATA SHEET

Corrosion Considerations:

Vessels receive cesium-depleted LAW and hold the treated LAW while analysis is completed and results reviewed to determine if the batch meets cesium concentration specifications and can be sent on or must be recycled..

a General Corrosion
The vessels will operate between 77 and 113°F. The solutions in the vessels will generally be alkaline.

Hammer (1981) lists a corrosion rate for 304 (and 304L) in NaOH of less than 20 mpy (500 μm/y) at 77°F and over 20 mpy at 122°F. He shows 316 (and 316L) has a rate of less than 2 mpy up to 122°F and 50% NaOH. Sedriks (1996) states that the 300 series are acceptable in up to 50% NaOH at temperatures up to about 122°F or slightly above Davis (1994) states the corrosion rate for 304L in pure NaOH will be less than about 0.1 mpy up to about 212°F though Sedriks states the corrosion rate data beyond about 122°F is low because of the presence of oxidizers.

In this system, the normal hydroxide concentrations and temperatures are such that 304L stainless steel will be acceptable.

Conclusion:
At temperatures less than about 140°F, 304L is expected to be sufficiently resistant to the waste solution with a probable general corrosion rate of less than 1 mpy.

b Pitting Corrosion
Chloride is known to cause pitting in acid and neutral solutions. It is thought that in alkaline solutions, pH>12, chlorides are likely to promote pitting only in tight crevices. Koch (1995) is of the opinion that fluoride will have little effect in an alkaline media.

Because the vessels normally operate below 113°F, 304L stainless steel would be acceptable in the proposed alkaline conditions.

If the vessel were filled with process water and left stagnant, there would be a tendency to pit The time to initiate would depend on the amount of residual chlorides. 316L is considered sufficiently resistant.

Conclusion:
Localized corrosion, such as pitting, is not expected to be a concern under the stated operating conditions. Under those conditions, it is expected that 304L will be satisfactory. However, to allow for the possibility of lower pH conditions during elution, 316L is the recommended alloy.

c End Grain Corrosion
End grain corrosion only occurs in metal with exposed end grains and in highly oxidizing acid conditions.

Conclusion:
Not expected in this system.

d Stress Corrosion Cracking
The exact amount of chloride required to cause stress corrosion cracking is unknown. In part this is because the amount varies with temperature, metal sensitization, and the environment. But it is also unknown because chloride tends to concentrate under heat transfer conditions, by evaporation, and electrochemically during a corrosion process. Hence, even as little as a few ppm can lead to cracking under some conditions. Generally, as seen in Sedriks (1996) and Davis (1987), stress corrosion cracking does not usually occur below the normal maximum operating temperature. During the normal operation, either 304L or 316L are expected to be satisfactory.

Neither 304L nor 316L are susceptible to caustic cracking at the proposed conditions.

Conclusion:
At the normal, stated, operating environment, either 304L or 316L is acceptable.

e Crevice Corrosion
See pitting.

Conclusion:
See Pitting.

f Corrosion at Welds
Corrosion at welds is not considered a problem in the proposed environment.

Conclusion:
Weld corrosion is not considered a problem for this system.

g Microbiologically Induced Corrosion (MIC)
The proposed operating conditions are not conducive to microbial growth if microbes were introduced.

Conclusion:
MIC is not considered a problem.

PLANT ITEM MATERIAL SELECTION DATA SHEET

h Fatigue/Corrosion Fatigue
Not expected to be a concern.

Conclusion:
Not expected to be a concern.

i Vapor Phase Corrosion
The vapor phase portion of the vessel may be contacted with particles of waste. It is unknown whether this will be sufficiently washed or whether residual acids or solids will be present. In the event solids remain, and at the stated chloride concentrations, 316L is the minimum suitable.

Conclusions:
316L is recommended

j Erosion
Based on past experiments by Smith & Elmore (1992), the solids are soft and erosion is not expected to be a concern for the vessel wall. A general erosion allowance of 0.004 inch is adequate for components with solids content less than 2 wt%. No localized protection is necessary for the applicable portions of the bottom head to accommodate PJM discharge velocities of up to 12 m/s for a usage of 100 % operation.

The PJM nozzle requires no additional protection

Conclusion:
The recommended corrosion allowance provides sufficient protection for erosion of the vessel.

k Galling of Moving Surfaces
Not applicable

Conclusion:
Not applicable.

l Fretting/Wear
No contacting surfaces expected.

Conclusion:
Not applicable.

m Galvanic Corrosion
No dissimilar metals are present.

Conclusion:
Not applicable.

n Cavitation
None expected.

Conclusion:
Not believed to be of concern.

o Creep
The temperatures are too low to be a concern.

Conclusion:
Not applicable.

p Inadvertent Nitric Acid Addition
Higher chloride contents and higher temperatures usually require higher alloy materials. Nitrate ions inhibit the pitting and crevice corrosion of stainless alloys. Furthermore, nitric acid passivates these alloys; therefore, lower pH values brought about by increases in the nitric acid content of process fluid will not cause higher corrosion rates for these alloys. The upset condition that was most likely to occur is lowering of the pH of the vessel content by inadvertent addition of 0.5 M nitric acid. Lowering of pH may make a chloride-containing solution more likely to cause pitting of stainless alloys. Increasing the nitric acid content of the process fluid adds more of the pitting-inhibiting nitrate ion to the process fluid. In addition, adding the nitric acid solution to the stream will dilute the chloride content of the process fluid.

Conclusion:
The recommended materials will be able to withstand a plausible inadvertent addition of 0.5 M nitric acid for a limited period.

PLANT ITEM MATERIAL SELECTION DATA SHEET

References:

1. Davis, JR (Ed), 1987, *Corrosion, Vol 13*, In "Metals Handbook", ASM International, Metals Park, OH 44073
2. Davis, JR (Ed), 1994, *Stainless Steels*, In ASM Metals Handbook, ASM International, Metals Park, OH 44073
3. Hamner, NE, 1981, *Corrosion Data Survey*, Metals Section, 5th Ed, NACE International, Houston, TX 77218
4. Koch, GH, 1995, *Localized Corrosion in Halides Other Than Chlorides*, MTI Pub No. 41, Materials Technology Institute of the Chemical Process Industries, Inc, St Louis, MO 63141
5. Sedriks, AJ, 1996, *Corrosion of Stainless Steels*, John Wiley & Sons, Inc., New York, NY 10158
6. Smith, H. D. and M. R. Elmore, 1992, *Corrosion Studies of Carbon Steel under Impinging Jets of Simulated Slurries of Neutralized Current Acid Waste (NCAW) and Neutralized Cladding Removal Waste (NCRW)*, PNL-7816, Pacific Northwest Laboratory, Richland, Washington.

Bibliography:

1. Danielson, MJ & SG Pitman, 2000, *Corrosion Tests of 316L and Hastelloy C-22 in Simulated Tank Waste Solutions*, PNWD-3015 (BNFL-RPT-019, Rev 0), Pacific Northwest Laboratory, Richland WA.
2. Jones, RH (Ed.), 1992, *Stress-Corrosion Cracking*, ASM International, Metals Park, OH 44073
3. Uhlig, HH, 1948, *Corrosion Handbook*, John Wiley & Sons, New York, NY 10158
4. Van Delinder, LS (Ed), 1984, *Corrosion Basics*, NACE International, Houston, TX 77084

PLANT ITEM MATERIAL SELECTION DATA SHEET

OPERATING CONDITIONS

PROCESS CORROSION DATA

Component(s) (Name/ID #) Cs IX treated LAW collection (CXP-VSL-00026A/B/C)

Facility PTF

In Black Cell? Yes

Chemicals	Unit[1]	Contract Max		Non-Routine		Notes
		Leach	No leach	Leach	No Leach	
Aluminum	g/l	3.03E+01	3.05E+01			
Chloride	g/l	1.16E+01	1.40E+01			
Fluoride	g/l	1.38E+01	1.67E+01			
Iron	g/l	2.22E+00	2.50E+00			
Nitrate	g/l	2.14E+02	2.50E+02			
Nitrite	g/l	6.44E+01	7.71E+01			
Phosphate	g/l	4.65E+01	5.45E+01			
Sulfate	g/l	2.47E+01	2.96E+01			
Mercury	g/l	7.26E-02	1.87E-02			
Carbonate	g/l	8.68E+01	9.56E+01			
Undissolved solids	wt%					
Other (NaMnO4, Pb,...)	g/l					
Other	g/l					
pH	N/A					Note 3
Temperature	°F					Note 2

List of Organic Species:

Notes:

1. Concentrations less than $1x\ 10^{-4}$ g/l do not need to be reported; list values to two significant digits max.
2. T normal operation 77 °F to 113 °F (same as for CXP-VSL-00001)
3. pH approximately 12 to 14 (same as for CXP-VSL-00001)

Assumptions:

PLANT ITEM MATERIAL SELECTION DATA SHEET

4.3.6 Cs IX Treated LAW Collection Vessels (CXP-VSL-00026A/B/C)

Routine Operations

The Cs IX treated LAW collection vessels (CXP-VSL-00026A, CXP-VSL-00026B, and CXP-VSL-00026C) are designed to collect batches of cesium-depleted LAW. Three vessels are used so that once a vessel is full it can be sampled and then pumped out while other vessels are still receiving or discharging treated LAW. The samples are analyzed and the results are reviewed before determining whether the batch meets cesium concentration specifications and can be sent on or needs to be recycled. A required 24-hour hold time, based on laboratory estimates, is used to ensure that there is adequate time for sampling, analyses (for cesium), and review of results. Each vessel normally receives a continuous flow of cesium-depleted LAW. In normal operations, one of the three vessels will be in a receiving mode, one vessel will be in a sampling/analyses/review mode, while the third vessel will be in a pump-out mode. Each of the three vessels is equipped with level indication (with density correction capability), sampling provisions, and pulse jet mixers for representative sampling of liquid.

Non-Routine Operations that Could Affect Corrosion/Erosion

None identified.

Attachment 2
05-ED-049

Bechtel National, Inc. Certification Statement

Bechtel National, Inc. Certification

The following certification statement is provided consistent with Contract No. DE-AC27-01RV14136, Section H.26, Environmental Permits, paragraph (g) for the submittal of the Hanford Tank Waste Treatment and Immobilization Plant - Hanford Facility RCRA Permit Notification Form 24590-PTF-PCN-ENV-05-008.

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.

J. P. Henschel
Project Director

6/1/05
Date

Quarter Ending 6/30/2005 24590-WTP-PCN-ENV-04-0014

Hanford Facility RCRA Permit Modification Notification Form
Part III, Chapter 10 and Attachment 51
Waste Treatment and Immobilization Plant

Index

Page 2 - 3: Hanford Facility RCRA Permit, III.6.A, Chapter 10 and Attachment 51, Modification to Update Mechanical Data Sheets in Attachment 51, Appendices 8.6, 9.6, 10.6, and 11.6

Submitted by Co-Operator: Reviewed by ORP Program Office:

For FB	4/13/05		5/2/05
F. Beranek	Date	R. J. Schepens	Date

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part & Chapter:
Waste Treatment and Immobilization Plant	**Part III, Chapter 10 and Attachment 51**

Description of Modification:

The purpose of this permit modification is to transmit selected updated mechanical data sheets listed in the Hanford Facility RCRA Permit, Attachment 51, Appendices 8.6, 9.6, 10.6, and 11.6 for the Pretreatment Facility, Low-Activity Waste Facility, High-Level Waste Facility, and the Laboratory respectively. The data sheets (attached) have been updated to reflect minor design changes that have occurred since the data sheets were originally approved by the Washington State Department of Ecology. This design detail does not affect the form, fit or function of the plant items.

Appendix 8.6			
Replace:	24590-PTF-MVD-PWD-P0001, Rev 1	With:	24590-PTF-MVD-PWD-P0001, Rev 2
Replace:	24590-PTF-MVD-PWD-P0002, Rev 1	With:	24590-PTF-MVD-PWD-P0002, Rev 2
Replace:	24590-PTF-MVD-PWD-P0003, Rev 1	With:	24590-PTF-MVD-PWD-P0003, Rev 2
Replace:	24590-PTF-MVD-UFP-P0002, Rev 0	With:	24590-PTF-MVD-UFP-P0002, Rev 1
Replace:	24590-PTF-MVD-UFP-P0007, Rev 0	With:	24590-PTF-MVD-UFP-P0007, Rev 1

Appendix 9.6			
Replace:	24590-LAW-MVD-LOP-P0004, Rev 0	With:	24590-LAW-MVD-LOP-P0004, Rev 1
Replace:	24590-LAW-MVD-LOP-P0005, Rev 0	With:	24590-LAW-MVD-LOP-P0005, Rev 1
Replace:	24590-LAW-MVD-RLD-P0006, Rev 1	With:	24590-LAW-MVD-RLD-P0006, Rev 2
Replace:	24590-LAW-MVD-LCP-P0004, Rev 0	With:	24590-LAW-MVD-LCP-P0004, Rev 1
Replace:	24590-LAW-MVD-LCP-P0005, Rev 0	With:	24590-LAW-MVD-LCP-P0005, Rev 1
Replace:	24590-LAW-MVD-LFP-P0007, Rev 0	With:	24590-LAW-MVD-LFP-P0007, Rev 1
Replace:	24590-LAW-MVD-LFP-P0008, Rev 0	With:	24590-LAW-MVD-LFP-P0008, Rev 1
Replace:	24590-LAW-MVD-LFP-P0010, Rev 0	With:	24590-LAW-MVD-LFP-P0010, Rev 1
Replace:	24590-LAW-MVD-LFP-P0011, Rev 0	With:	24590-LAW-MVD-LFP-P0011, Rev 1

Appendix 10.6			
Replace:	24590-HLW-MVD-HOP-P0001, Rev 1	With:	24590-HLW-MVD-HOP-P0001, Rev 2
Replace:	24590-HLW-MVD-HOP-P0012, Rev 0	With:	24590-HLW-MVD-HOP-P0012, Rev 1
Replace:	24590-HLW-MED-HOP-P0012, Rev 0	With:	24590-HLW-MED-HOP-P0012, Rev 1
Replace:	24590-HLW-MED-HOP-P0017, Rev 0	With:	24590-HLW-MED-HOP-P0017, Rev 1
Replace:	24590-HLW-MAD-HOP-P0018 Rev 1	With:	24590-HLW-MAD-HOP-P0018 Rev 2

Appendix 11.6			
Replace:	24590-LAB-MVD-RLD-P0164, Rev 0	With:	24590-LAB-MVD-RLD-P0164, Rev 1
Replace:	24590-LAB-MVD-RLD-P0165, Rev 0	With:	24590-LAB-MVD-RLD-P0165, Rev 1

[1] Class 1 modifications requiring prior Agency approval.
[2] This is only an advanced notification of an intended Class [1], 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

Quarter Ending 6/30/2005

24590-WTP-PCN-ENV-04-0014

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

Enter Relevant WAC 173-303-830, Appendix I Modification citation number: N/A

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

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

Modification Approved: [X] Yes [ ] No (state reason for denial) Reason for denial:	Reviewed by Ecology: S. Dahl — Date: June 15 2005

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	PLANT ITEM No. *24590-PTF-MV-PWD-VSL-00033*

Project	*RPP-WTP*	P&ID	*24590-PTF-M6-PWD-P0002*
Project No	*24590*	Process Calculation	*DELETED* 2
Project Site	*Hanford*	Vessel Drawing	*24590-PTF-MV-PWD-P0001001*
Description	*Ultimate Overflow Vessel*		

ISSUED BY RPP-WTP PDC

Reference Data

Charge Vessels (Tag Numbers)	*PWD-VSL-00131, PWD-VSL-00132*
Pulsejet Mixers / Agitators (Tag Numbers)	*PWD-PJM-00031, PWD-PJM-00032, PWD-PJM-00033, PWD-PJM-00034, PWD-PJM-00035, PWD-PJM-00036, PWD-PJM-00037, PWD-PJM-00038*
RFDs/Pumps (Tag Numbers)	*PWD-RFD-00131, PWD-RFD-00132*

Design Data

Quality Level		*QL-1*	Fabrication Specs	*24590-WTP-3PS-MV00-TP001*		
Seismic Category		*SC-I*	Design Code	*ASME VIII Div 1*		
Service/Contents		*Radioactive Liquid*	Code Stamp	*Yes*		
Design Specific Gravity		*1.57*	NB Registration	*Yes*		
Operating Volume	gal	*29,580*	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	*41,650*	Estimated	*115,400*	*503,700*	*465,000*
Environmental Qualifications 2		*N/A*	Actual *	*129,000* 2	*517,300* 2	*499,400* 2

Inside Diameter	Inch	*288*			Wind Design	*Not Required*	
Length/Height (TL-TL)	Inch	*89*			Snow Design	*Not Required*	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	*24590-WTP-3PS-SS90-T0001* *24590-WTP-3PS-MV00-TP002*	
Internal Pressure	psig	*0*	*15*	*N/A*	Seismic Base Moment *	ft*lb	
External Pressure	psig	*0.22*	*FV*	*N/A*	Postweld Heat Treat	*Not Required*	
Temperature	°F	*218* 2	*225* 2	*N/A*	Corrosion Allowance	Inch	*0.08 (Notes 7,8)* 2
Min. Design Metal Temp.	°F	*0*			Hydrostatic Test Pressure *	Psig	*19.5* 2

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

MARK W. HOFFMANN
STATE OF WASHINGTON
21 0030952
REGISTERED PROFESSIONAL ENGINEER
3/28/05
EXPIRES 12/10/06

This Bound Document Contains a total of 6 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
2	3/28/05	Issued for Permitting Use				
1	12/22/03	Issued for Permitting Use	J. Jackson	R. Simmons	C. Slater	M. Hoffmann
0	10/03/03	Issued for Permitting Use	J. Jackson	C. Slater	N/A	S. Kirk

R10523238

	MECHANICAL SYSTEMS DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-PWD-VSL-00033

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	SA 240 316 with max. Carbon of 0.030 %	See Drawing	Auxiliary (Note 1) 2
Shell	SA 240 316 with max. Carbon of 0.030 %	See Drawing	Primary (Note 1) 2
Bottom Head	SA 240 316 with max. Carbon of 0.030 %	See Drawing	Primary (Note 1) 2
Support	SA 240 304 with max. Carbon of 0.030 % (Note 3) 2	See Drawing	N/A
Jacket/Coils/Half-Pipe Jacket	N/A	N/A	N/A
Internals	SA240 316 with max. Carbon of 0.030 %	See Drawing	Thermowell Primary (Note 1)
Pipe	SA312 TP316 Seamless with max. Carbon of 0.030%	See Drawing	See Note 1
Forgings/ Bar stock	SA182 F316/SA 479 316 with max. Carbon of 0.030%	See Drawing	As Note-1 for Nozzle Necks
Gaskets	N/A	N/A	N/A
Bolting	N/A	N/A	N/A

Miscellaneous Data

Orientation	Vertical	Support Type	Skirt
Insulation Function	Not Applicable	Insulation Material	Not Applicable
Insulation Thickness (inch)	Not Applicable	Weld Surface Finish	De-scaled as laid

Remarks

* To be determined by the vendor.

Note 1: All welds forming part of the primary and auxiliary containments, including the nozzle attachment welds shall be subjected to 100% volumetric examination. Radiography is the preferred method of volumetric testing. If it is considered impractical to perform radiographic examination, the Seller may propose ultrasonic examinations. 2

Note 2: Vessel supports shall be designed to restrain the vessel in a fully buoyant state.

Note 3: Ring beam bottom flange material shall be A 572 Gr. 50.

Note 4: Vessel volumes are approximate and do not account for manufacturing tolerances, nozzles, and displacement of internals. 2

Note 5: Contents of this document are Dangerous Waste Permit affecting. 2

Note 6: Deleted 2

Note 7: BNI shall ensure that an additional 0.083" is available for erosion in the bottom head and shall report the minimum thickness required for all specified loading conditions, exclusive of erosion and corrosion allowances. 2

Note 8: BNI shall ensure that an additional 0.053" is available for erosion in the interior conical surface of the pulse jet mixers. 2

Note 9: Required data for thermal stress analysis for nozzles exposed to higher temperatures. 2

- Cell ambient temperature = 113°F
- Headspace temperature or Operating temperature = 218°F
- Ambient and headspace natural convection heat transfer coefficients = 0.895 Btu/hr ft²°F for vessel head and 0.852 Btu/hr ft²°F for vessel shell
- Inlet fluid transfer frequency and mass flow rate for nozzle N39.

  Steam max temperature = 352°F

  Transfer frequency = 1 transfer/month

  Steam mass flow rate = 1,399 lb/hr

Note 10: All hydrodynamic and overblow loads are for BNI internal use only and are to be disregarded by the seller. 2

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	**PLANT ITEM No.** *24590-PTF-MV-PWD-VSL-00033*

Equipment Cyclic Data Sheet

Plant Item Number	*24590-PTF-MV-PWD-VSL-00033*
Component Description	*Parent Vessel*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

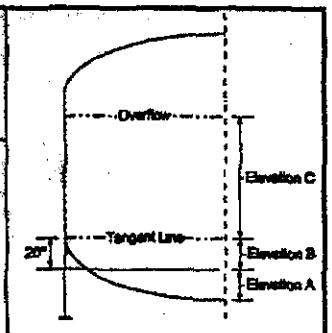
Materials of Construction	*SA 240 316 with max. Carbon of 0.030%*
Design Life	*40 years*
Component Function and Life Cycle Description	*The primary function of the Ultimate Overflow Vessel are to:* • *Collect gravity drains, and line flushes* • *Collect overflows from Pretreatment Facility process vessels.* • *Receive pit sump emptying ejector discharge* *The vessel is normally emptied once every fifty days. Washdown is not more than once per year.*

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*15*	*10*	*Nominal assumption*
Operating Pressure	psig	*-0.22*	*0*	*292*	
Operating Temperature	°F	*59*	*218* △2	*292*	*Uniform material temperature range, not between two points*
Contents Specific Gravity		*1.0*	*1.57*	*NA*	
Contents Level	inch	*Empty*	*Flooded*	*292*	*Coincident with pressure cycles*
Localized Features					
Nozzles		*Within 50°F of operating temperature range*		*As above*	

Hydrodynamic Loading △2

In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overblow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed for the combination of the normal operational hydrodynamic loads and overblow loads, and this load combination is also to be assumed to act concurrently with seismic loads.

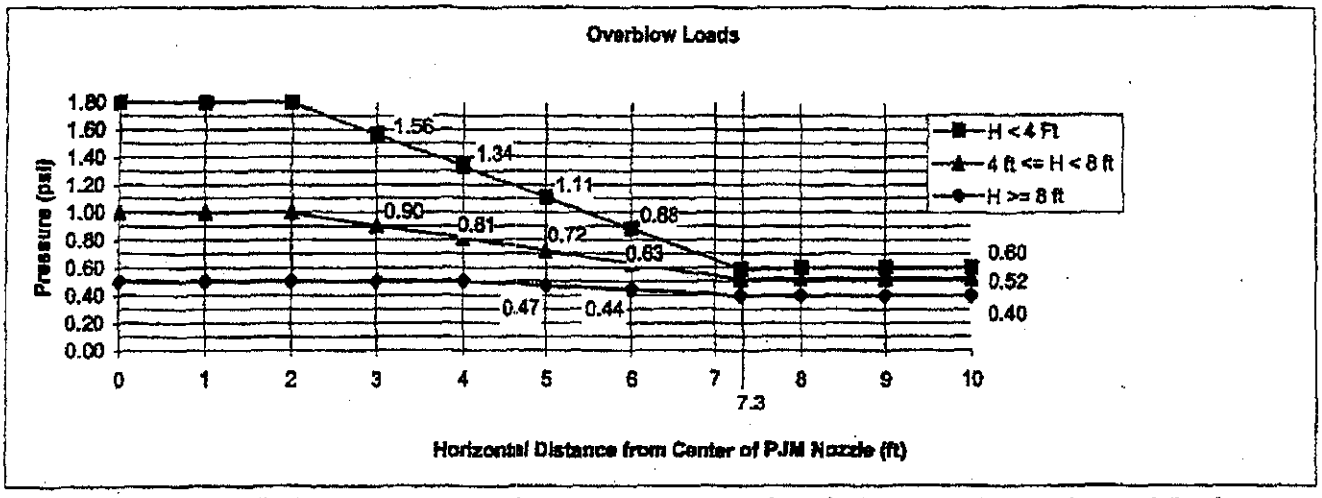
The following table indicates the normal hydrodynamic pressure at ranges of elevations in the vessel and the number of design cycles for each condition. The hydrodynamic forces cycle between the indicated pressure ranges applied across the projected area of the component. Positive hydrodynamic forces act in the radial, outward direction and the vertical, upward direction. Apply the radial load simultaneously in the radial direction and normal to the radial direction in the horizontal plane.



Normal Operation Hydrodynamic Pressure Range, psi						Number of Cycles
Elevation A		Elevation B		Elevation C		
Radial	Vertical	Radial	Vertical	Radial	Vertical	
-0.15 to 0.25	*-0.15 to 0.15*	*-0.05 to 0.12*	*-0.15 to 0.15*	*-0.03 to 0.10*	*-0.06 to 0.15*	*16.6 X 10⁶*

	MECHANICAL SYSTEMS DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-PWD-VSL-00033

Overblow loads vary as a function of the distance from the center of the overblowing pulse jet mixer nozzle and the elevation 'H' above the overblowing pulse jet mixer nozzle up to the overflow level as plotted:



The overblow pressure shall only be applied to the projected area of the overblowing pulse jet mixer in the vertical, upward direction and to all surrounding components in the horizontal plane, radiating from the overblowing pulse jet mixer. Any single pulse jet mixer may overblow 100 cycles. 2

Notes

- *Cycle increase: Increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.* 2
- *Nozzle N39 shall be fatigue assessed/analyzed for 500 temperature/pressure cycles from 0 psig at 59°F to 15 psig at 352°F, the pressure cycles shall coincide with the temperature cycles. See Note 9, on Page 2.* 2

	MECHANICAL SYSTEMS DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-PWD-VSL-00033

Equipment Cyclic Data Sheet

Plant Item Number:	*PWD-VSL-00131, PWD-VSL-00132*
Component Description	*Charge Vessels*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*SA 240 316 with max. Carbon of 0.030 %*
Design Life	*40 years*
Component Function and Life Cycle Description	*These charge vessels are cyclically loaded using vacuum to fully fill the charge vessel with process liquid and compressed air to fully empty the charge vessel. The charge vessels are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The charge vessel supports shall be designed to cycle between fully buoyant (charge vessel empty and parent vessel full) and fully loaded (charge vessel full and parent vessel empty).*

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*55*	*10*	*Nominal assumption*
Operating Pressure	psig	*FV*	*30*	*18,100*	
Operating Temperature	°F	*59*	*218* △2	*292*	*Pressure cycles to be at 218 °F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points.* △2
Contents Specific Gravity		*1.0*	*1.57*	*N/A*	
Contents Level	inch	*Empty*	*Flooded*	*18,100*	*Coincident with pressure cycles*
Localized Features					
Supports		*As above*		*As above with contents level changing coincident with pressure cycles.*	

Notes

- ***Cycle Increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	PLANT ITEM No. *24590-PTF-MV-PWD-VSL-00033*

Equipment Cyclic Data Sheet

Plant Item Number:	*PWD-PJM-00031, PWD-PJM-00032, PWD-PJM-00033, PWD-PJM-00034, PWD-PJM-00035, PWD-PJM-00036, PWD-PJM-00037, PWD-PJM-00038*
Component Description	*Pulse Jet Mixers*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*SA 240 316 with max. Carbon of 0.030 %*
Design Life	*40 years*
Component Function and Life Cycle Description	*These pulse jet mixers (PJMs) are cyclically loaded using vacuum to fully fill the PJM with process liquid and compressed air to fully empty the PJM. The PJMs are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The PJM supports shall be designed to cycle between fully buoyant (PJM empty and parent vessel full) and fully loaded (PJM full and parent vessel empty) in addition to thrust.* 2

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*85*	*10*	*Nominal assumption*
Operating Pressure	psig	*FV*	*60*	*16.6 x 10⁶*	
Operating Temperature	°F	*59*	*218* 2	*16.6 x 10⁶*	*Pressure cycles to be at 218 °F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points.* 2
Contents Specific Gravity		*1.0*	*1.57*	*N/A*	*Nominal assumption*
Contents Level	inch	*Empty*	*Flooded*	*16.6 x 10⁶*	*Coincident with pressure cycles*
Thrust Load 2	lbf	*0*	*262*	*16.6 x 10⁶*	*Coincident with pressure cycles*
Localized Features					
Supports		*As above*		*As above with contents level changing coincident with pressure cycles.*	

Notes

- *Cycle Increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*

MECHANICAL SYSTEMS DATA SHEET: VESSEL

PLANT ITEM No.
24590-PTF-MV-PWD-VSL-00044

R10550705

Project	RPP-WTP	P&ID	24590-PTF-M6-PWD-P0002/P0046 24590-PTF-M6-UFP-P0007/8/9/11 △2
Project No	24590	Process Calculation	Deleted △2
Project Site	Hanford	Vessel Drawing	24590-PTF-MV-PWD-P0010
Description	Plant Wash Vessel		

Reference Data

Charge Vessels (Tag Numbers)	PWD-VSL-00121, PWD-VSL-00122, PWD-VSL-00123, PWD-VSL-00124, PWD-VSL-00125 △2
Pulsejet Mixers / Agitators (Tag Numbers)	PWD-PJM-00021, PWD-PJM-00022, PWD-PJM-00023, PWD-PJM-00024, PWD-PJM-00025, PWD-PJM-00026, PWD-PJM-00027, PWD-PJM-00028
RFDs/Pumps (Tag Numbers)	PWD-RFD-00121, PWD-RFD-00122, PWD-RFD-00123, PWD-RFD-00124, PWD-RFD-00125 △2

Design Data

Quality Level		QL-1	Fabrication Specs	24590-WTP-3PS-MV00-TP001		
Seismic Category		SC-I	Design Code	ASME Section VIII, Div. 1		
Service/Contents		Radioactive Liquid	Code Stamp	YES		
Design Specific Gravity		1.27	NB Registration	YES		
Operating Volume	gal	88,631	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	103,024	Estimated	227,000	1,156,000	1,088,000
Environmental Qualifications △2		N/A	Actual *	204,600 △2	1,127,100 △2	1,064,900 △2

Inside Diameter	inch	276			Wind Design	Not Required	
Length/Height (TL-TL)	inch	306			Snow Design	Not Required	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	24590-WTP-3PS-MV00-TP002 24590-WTP-3PS-SS90-T0001	
Internal Pressure	psig	0.00	15	N/A	Seismic Base Moment *	ft*lb	
External Pressure	psig	0.22	8.0	N/A	Postweld Heat Treat	Not Required	
Temperature	°F	212	237	N/A	Corrosion Allowance	inch	0.08 (Notes 9, 10) △2
Min. Design Metal Temp.	°F	40			Hydrostatic Test Pressure *	Psig	

ISSUED BY
RPP-WTP PDC

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

MANAGING PROFESSIONAL ENGINEER STATE OF WASHINGTON 0030952 REGISTERED PROFESSIONAL ENGINEER 4/7/05

EXPIRES 12/10/06

This Bound Document Contains a total of 5 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
2	4/7/05	Issued for Permitting Use				
1	3/19/04	Issued for Permitting Use	J. Jackson	H. Khurana	C. Slater	M. Hoffmann
0	10/29/02	Issued for Permitting Use	J. Jackson	C. Slater	N/A	S. Kirk

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	PLANT ITEM No. *24590-PTF-MV-PWD-VSL-00044*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	*SA 240 316 Note 1*	*See Drawing*	*Auxiliary (See note 6)* 2
Shell	*SA 240 316 Note 1*	*See Drawing*	*Primary (See note 6)* 2
Bottom Head	*SA 240 316 Note 1*	*See Drawing*	*Primary (See note 6)* 2
Support	*SA 240 304 Note 1*	*See Drawing*	*N/A*
Jacket/Coils/Half-Pipe Jacket	*N/A*	*N/A*	*N/A*
Internals	*SA240 316 Note 1*	*See Drawing*	*Thermowell Primary*
Pipe	*SA312 TP316 Note 1*	*See Drawing*	*Primary (See note 6)* 2
Forgings/ Bar stock	*SA182 F316 Note 1*	*See Drawing*	*N/A*
Gaskets	*N/A*	*N/A*	*N/A*
Bolting	*N/A*	*N/A*	*N/A*

Miscellaneous Data

Orientation	*Vertical*	Support Type	*Skirt*
Insulation Function	*Not Applicable*	Insulation Material	*Not Applicable*
Insulation Thickness (inch)	*Not Applicable*	Internal Finish	*Note 3*
		External Finish	*Note 3*

Remarks

** To be determined by the vendor.*

Note 1: Max. carbon of 0.030 % 2

Note 2: Deleted 2

Note 3: Welds descaled as laid. 2

Note 4: Vessel volumes are approximate and do not account for the manufacturing tolerances, nozzles, and displacement of internals.

Note 5: This vessel is in a Black cell. 2

Note 6: All welds forming part of the primary and auxiliary containment including nozzle attachment welds shall be subjected to 100% volumetric examination. 2

Note 7: Contents of this document are Dangerous Waste Permit affecting. 2

Note 8: Deleted. 2

Note 9: BNI shall ensure that an additional 0.067" is available for erosion in the bottom head and shall report the minimum thickness required for all specified loading conditions, exclusive of erosion and corrosion allowances. 2

Note 10: BNI shall ensure that an additional 0.043" is available for erosion in the lower 4" of the interior conical surface of the pulse jet mixers. 2

Note 11: All hydrodynamic and overblow loads are for BNI internal use only and are to be disregarded by the seller. 2

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	PLANT ITEM No. *24590-PTF-MV-PWD-VSL-00044*

Equipment Cyclic Data Sheet

Component	*24590-PTF-MV-PWD-VSL-00044*
Component Description	*Parent Vessel*

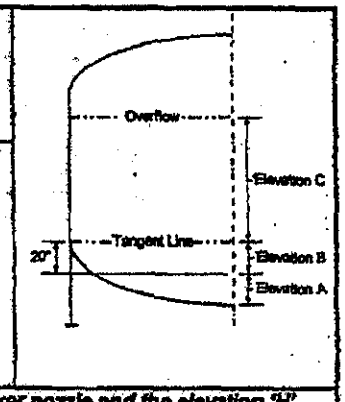
The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*SA 240 316 with max. Carbon of 0.030 %*
Design Life	*40 years*
Component Function and Life Cycle Description	*This is a "batch" vessel and cycle from nearly empty to nearly full. This vessel will be in the fill mode for one day, then the discharge mode over the next day.*

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*-8.0*	*15*	*10*	*Nominal assumption*
Operating Pressure	psig	*-0.22*	*0.00*	*7,300*	
Operating Temperature	°F	*59*	*212*	*7,300*	*Uniform material temperature range, not between two points*
Contents Specific Gravity		*1.00*	*1.27*	*N/A*	
Contents Level	inch	*Empty*	*Flooded*	*7,300*	*Coincident with pressure cycles*
Localized Features					
Nozzles		*Within 50°F of vessel operating range*		*As above*	

Hydrodynamic Loading /2\

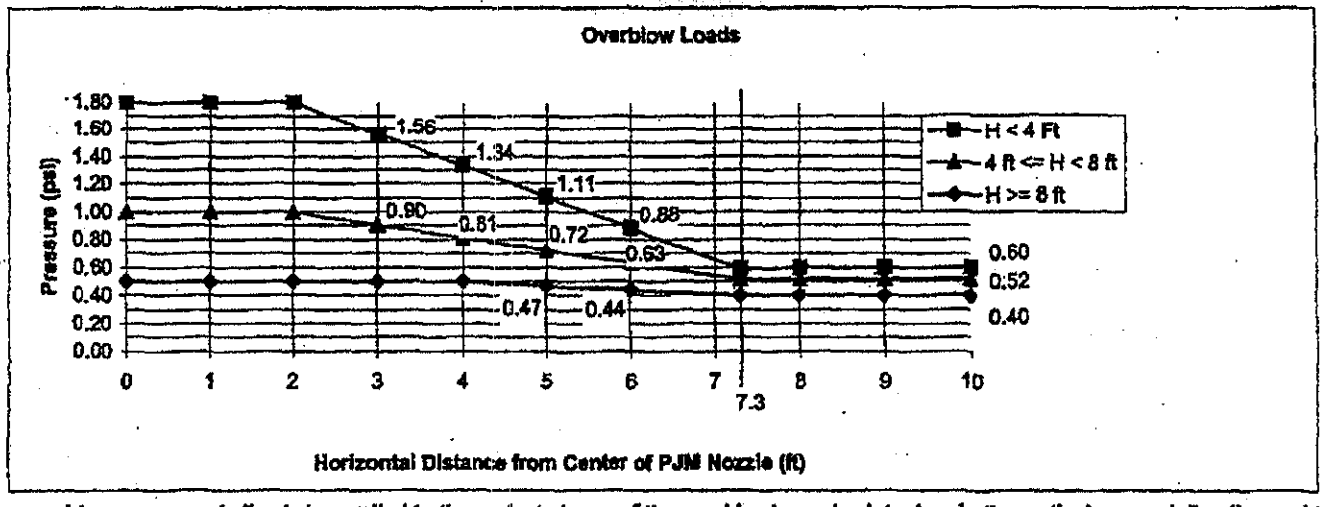
In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overblow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed for the combination of the normal operational hydrodynamic loads and overblow loads, and this load combination is also to be assumed to act concurrently with seismic loads.



The following table indicates the normal hydrodynamic pressure of elevations in the vessel and the number of design cycles for each condition. The hydrodynamic forces cycle between the indicated pressure ranges applied across the projected area of the component. Positive hydrodynamic forces act in the radial, outward direction and the vertical, upward direction. Apply the radial load simultaneously in the radial direction and normal to the radial direction in the horizontal plane.

Normal Operation Hydrodynamic Pressure Range, psi						Number of Cycles
Elevation A		Elevation B		Elevation C		
Radial	Vertical	Radial	Vertical	Radial	Vertical	
-0.15 to 0.25	*-0.15 to 0.15*	*-0.05 to 0.12*	*-0.15 to 0.15*	*-0.03 to 0.10*	*-0.06 to 0.15*	*17.3 X 10⁶*

Overblow loads vary as a function of the horizontal distance from the center of the overblowing pulse jet mixer nozzle and the elevation 'H' above the overblowing pulse jet mixer nozzle up to the overflow level as plotted:



The overblow pressure shall only be applied to the projected area of the overblowing pulse jet mixer in the vertical, upward direction and to all surrounding components in the horizontal plane, radiating from the overblowing pulse jet mixer. Seller shall consider that any single pulse jet mixer may overblow 100 cycles.

Notes

- *Cycle Increase: Increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	PLANT ITEM No. *24590-PTF-MV-PWD-VSL-00044*

Equipment Cyclic Data Sheet

Component	*PWD-VSL-00121, PWD-VSL-00122, PWD-VSL-00123, PWD-VSL-00124, PWD-VSL-00125* 2
Component Description	*Charge Vessels*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*SA 240 316 with max. Carbon of 0.030 %*
Design Life	*40 years*
Component Function and Life Cycle Description	*These charge vessels are cyclically loaded using vacuum to fully fill the charge vessel with process liquid and compressed air to fully empty the charge vessel. The charge vessels are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The charge vessel supports shall be designed to cycle between fully buoyant (charge vessel empty and parent vessel full) and fully loaded (charge vessel full and parent vessel empty).*

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*55*	*10*	*Nominal assumption*
Operating Pressure	psig	*FV*	*30*	*1.8 x 10⁴*	
Operating Temperature	°F	*59*	*212*	*7,300*	*Pressure cycles to be at 212° F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points.*
Contents Specific Gravity		*1.00*	*1.27*	*N/A*	
Contents Level	inch	*Empty*	*Flooded*	*1.8 x 10⁴*	*Coincident with pressure cycles*
Localized Features					
Supports		*As above*		*As above with contents level changing coincident with pressure cycles.*	

Notes

Cycle Increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	PLANT ITEM No. 24590-PTF-MV-PWD-VSL-00044

Equipment Cyclic Data Sheet

Plant Item Number	*PWD-PJM-00021, PWD-PJM-00022, PWD-PJM-00023, PWD-PJM-00024, PWD-PJM-00025, PWD-PJM-00026, PWD-PJM-00027, PWD-PJM-00028*
Component Description	*Pulse Jet Mixers*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*SA 240 316 with max. Carbon of 0.030 %*
Design Life	*40 years*
Component Function and Life Cycle Description	*These pulse jet mixers (PJMs) are cyclically loaded using vacuum to fully fill the PJM with process liquid and compressed air to fully empty the PJM. The PJMs are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The PJM supports shall be designed to cycle between fully buoyant (PJM empty and parent vessel full) and fully loaded (PJM full and parent vessel empty) states. Thrust load shall be applied only to the fully buoyant state. Assume the parent vessel is full for 50% of the number of PJM cycles.* 2

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*85*	*10*	*Nominal assumption*
Operating Pressure	psig	*FV*	*60*	*1.73 x 10⁷*	
Operating Temperature	°F	*59*	*212*	*1.73 x 10⁷*	*Pressure cycles to be at 212° F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points.*
Contents Specific Gravity		*1.00*	*1.27*	*N/A*	
Contents Level	inch	*Empty*	*Flooded*	*1.73 x 10⁷*	*Coincident with pressure cycles*
Thrust 2	lbf	*0* 2	*264* 2	*1.73 x 10⁷* 2	
Localized Features					
Supports		*As above*		*As above with contents level changing coincident with pressure cycles.*	

Notes

- *Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	PLANT ITEM No. 24590-PTF-MV-PWD-VSL-00043

Project	RPP-WTP	P&ID	24590-PTF-M6-PWD-P0002
Project No	24590	Process Calculation	DELETED 2
Project Site	Hanford	Vessel Drawing	24590-PTF-MV-PWD-P0003001
Description	HLW Effluent Transfer Vessel		

ISSUED BY RPP-WTP PDC

Reference Data

Charge Vessels (Tag Numbers)	PWD-VSL-00141, PWD-VSL-00142
Pulsejet Mixers / Agitators (Tag Numbers)	PWD-PJM-00041, PWD-PJM-00042, PWD-PJM-00043, PWD-PJM-00044, PWD-PJM-00045, PWD-PJM-00046, PWD-PJM-00047, PWD-PJM-00048
RFDs/Pumps (Tag Numbers)	PWD-RFD-00141, PWD-RFD-00142

Design Data

Quality Level		QL-1	Fabrication Specs	24590-WTP-3PS-MV00-T0001		
Seismic Category		SC-I	Design Code	ASME VIII Div 1		
Service/Contents		Radioactive Liquid	Code Stamp	Yes		
Design Specific Gravity		1.57	NB Registration	Yes		
Operating Volume	gal	29,580	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	41,650	Estimated	115,400	503,700	465,000
Environmental Qualifications	2	N/A	Actual *	129,000/2	517,300/2	499,400/2

Inside Diameter	inch	288			Wind Design	Not Required	
Length/Height (TL-TL)	inch	89			Snow Design	Not Required	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	24590-WTP-3PS-SS90-T0001 24590-WTP-3PS-MV00-T0002	
Internal Pressure	psig	0	15	N/A	Seismic Base Moment *	ft*lb	
External Pressure	psig	0.22	FV	N/A	Postweld Heat Treat	Not Required	
Temperature	°F	218 2	225/2	N/A	Corrosion Allowance	Inch	0.08 (Notes 7,8)/2
Min. Design Metal Temp.	°F	0			Hydrostatic Test Pressure *	Psig	19.5 2

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED
PROFESSIONAL ENGINEER
3/28/05
EXPIRES 12/10/06

This Bound Document Contains a total of 6 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
2	3/28/05	Issued for Permitting Use				
1	3/27/03	Issued for Permitting Use	J. Jackson	C. Slater	N/A	M. Hoffmann
0	9/17/02	Issued for Permitting Use	J. Jackson	C. Slater	N/A	S. Kirk

R10523239

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	**PLANT ITEM No.** *24590-PTF-MV-PWD-VSL-00043*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	*SA 240 316 with max. Carbon of 0.030 %*	*See Drawing*	*Auxiliary (Note 1)* 2
Shell	*SA 240 316 with max. Carbon of 0.030 %*	*See Drawing*	*Primary (Note 1)* 2
Bottom Head	*SA 240 316 with max. Carbon of 0.030 %*	*See Drawing*	*Primary (Note 1)* 2
Support	*SA 240 304 with max. Carbon of 0.030 % (Note 3)* 2	*See Drawing*	*N/A*
Jacket/Coils/Half-Pipe Jacket	*N/A*	*N/A*	*N/A*
Internals	*SA240 316 with max. Carbon of 0.030 %*	*See Drawing*	*Thermowell Primary (Note 1)* 2
Pipe	*SA312 TP316 Seamless with max. Carbon of 0.030%*	*See Drawing*	*See Note 1*
Forgings/ Bar stock	*SA182 F316/SA 479 316 with max. Carbon of 0.030%*	*See Drawing*	*As Note 1 for Nozzle Necks*
Gaskets	*N/A*	*N/A*	*N/A*
Bolting	*N/A*	*N/A*	*N/A*

Miscellaneous Data

Orientation	*Vertical*	Support Type	*Skirt*
Insulation Function	*Not Applicable*	Insulation Material	*Not Applicable*
Insulation Thickness (inch)	*Not Applicable*	Weld Surface Finish	*De-scaled as laid*

Remarks

* To be determined by the vendor.

Note 1: *All welds forming part of the primary and auxiliary containments, including the nozzle attachment welds shall be subjected to 100% volumetric examination. Radiography is the preferred method of volumetric testing. If it is considered impractical to perform radiographic examination, the Seller may propose ultrasonic examinations.* 2

Note 2: *Vessel supports shall be designed to restrain the vessel in a fully buoyant state.*

Note 3: *Ring Beam bottom flange material shall be A 572 Gr. 50.*

Note 4: *Vessel volumes are approximate and do not account for manufacturing tolerances, nozzles, and displacement of internals.* 2

Note 5: *Contents of this document are Dangerous Waste Permit affecting.* 2

Note 6: *Deleted.* 2

Note 7: *BNI shall ensure that an additional 0.123" is available for erosion in the bottom head and shall report the minimum thickness required for all specified loading conditions, exclusive of erosion and corrosion allowances.* 2

Note 8: *BNI shall ensure that an additional 0.078" is available for erosion in the interior conical surface of the pulse jet mixers.* 2

Note 9: *Required data for thermal stress analysis for nozzles exposed to higher temperatures.* 2

- *Cell ambient temperature = 113°F*
- *Headspace temperature or Operating temperature = 218°F*
- *Ambient and headspace natural convection heat transfer coefficients = 0.895 Btu/hr ft² °F for vessel head and 0.797 Btu/hr ft² °F for vessel shell*
- *Inlet fluid transfer frequency and mass flow rate for nozzle N36.*

  Steam max temperature = 352°F

  Transfer frequency = 1 transfer/month

  Steam mass flow rate = 1,399 lb/hr

Note 10: *All hydrodynamic and overblow loads are for BNI internal use only and are to be disregarded by the seller.* 2

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	PLANT ITEM No. *24590-PTF-MV-PWD-VSL-00043*

Equipment Cyclic Data Sheet

Plant Item Number:	*24590-PTF-MV-PWD-VSL-00043*
Component Description	*Parent Vessel*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

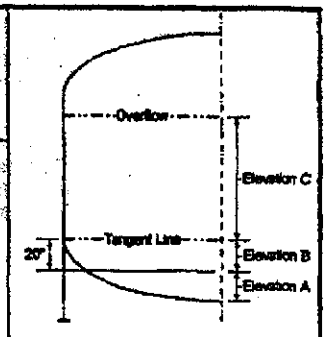
Materials of Construction	*SA 240 316 with max. Carbon of 0.030 %*
Design Life	*40 years*
Component Function and Life Cycle Description	• *Receive and store waste from HLW Vitrification Plant, pit sump (PWD-SUMP-00040), and various line drains.* • *Transfer waste to Plant Wash Vessel (PWD-VSL-00044)* *HLW Effluent Transfer Vessel operates at normal operating level for a ventilation seal between facilities. It's Charge Vessels discharge liquid during normal operation and equal volumes of liquid are received into the vessel. The vessel is normally emptied once per day. Washdown is not more than once per year.*

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*15*	*10*	*Nominal assumption*
Operating Pressure	psig	*-0.22*	*0*	*14,600*	
Operating Temperature	°F	*59*	*218* (2)	*14,600*	*Uniform material temperature range, not between two points*
Contents Specific Gravity		*1.0*	*1.57*	*N/A*	
Contents Level	inch	*Empty*	*Flooded*	*14,600*	*Coincident with pressure cycles*
Localized Features					
Nozzles		*Within 50°F of vessel operating range*		*As above*	

Hydrodynamic Loading (2)

In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overblow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed for the combination of the normal operational hydrodynamic loads and overblow loads, and this load combination is also to be assumed to act concurrently with seismic loads.

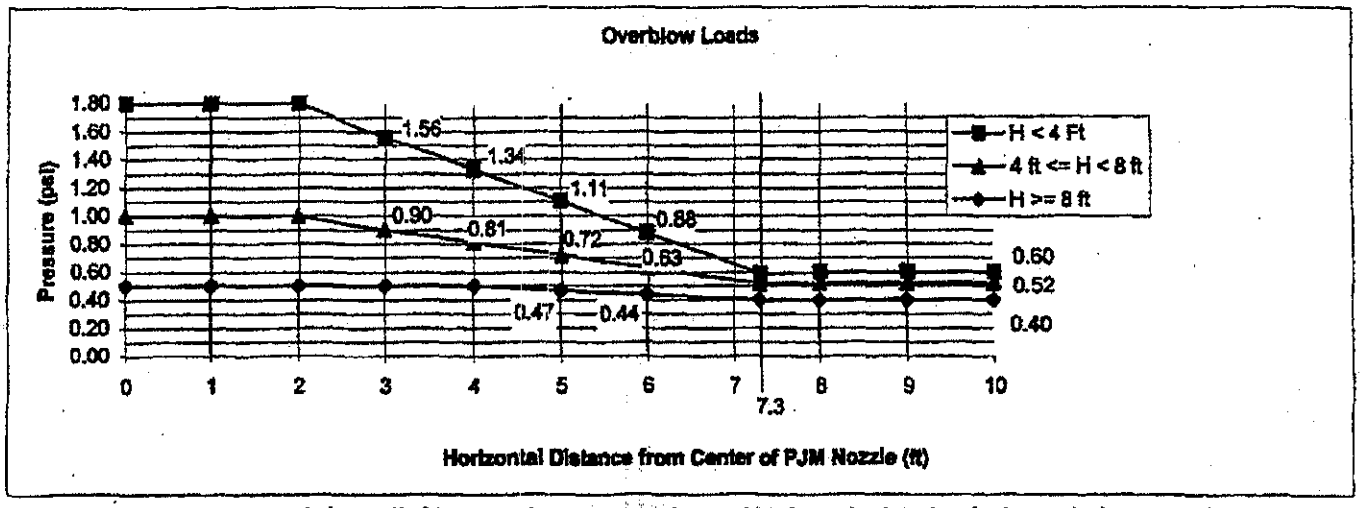
The following table indicates the normal hydrodynamic pressure at ranges of elevations in the vessel and the number of design cycles for each condition. The hydrodynamic forces cycle between the indicated pressure ranges applied across the projected area of the component. Positive hydrodynamic forces act in the radial, outward direction and the vertical, upward direction. Apply the radial load simultaneously in the radial direction and normal to the radial direction in the horizontal plane.



Normal Operation Hydrodynamic Pressure Range, psi						Number of Cycles
Elevation A		Elevation B		Elevation C		
Radial	Vertical	Radial	Vertical	Radial	Vertical	
-0.15 to 0.25	*-0.15 to 0.15*	*-0.05 to 0.12*	*-0.15 to 0.15*	*-0.03 to 0.10*	*-0.06 to 0.15*	*5.1 X 10⁶*

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	**PLANT ITEM No.** ***24590-PTF-MV-PWD-VSL-00043***

Overblow loads vary as a function of the distance from the center of the overblowing pulse jet mixer nozzle and the elevation 'H' above the overblowing pulse jet mixer nozzle up to the overflow level as plotted:



The overblow pressure shall only be applied to the projected area of the overblowing pulse jet mixer in the vertical, upward direction and to all surrounding components in the horizontal plane, radiating from the overblowing pulse jet mixer. Any single pulse jet mixer may overblow 100 cycles. 2

Notes

- ***Cycle increase: Increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*** 2
- ***Nozzle N36 shall be fatigue assessed/analyzed for 500 temperature/pressure cycles from 0 psig at 59 °F to 15 psig at 352 °F, the pressure cycles shall coincide with the temperature cycles. See Note 9, on Page 2.*** 2

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	**PLANT ITEM No.** *24590-PTF-MV-PWD-VSL-00043*

Equipment Cyclic Data Sheet

Plant Item Number:	*PWD-VSL-00141, PWD-VSL-00142*
Component Description	*Charge Vessels*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*SA 240 316 with max. Carbon of 0.030 %*
Design Life	*40 years*
Component Function and Life Cycle Description	*These charge vessels are cyclically loaded using vacuum to fully fill the vessel with process liquid and compressed air to fully empty the charge vessel. The charge vessels are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The charge vessel supports shall be designed to cycle between fully buoyant (charge vessel empty and parent vessel full) and fully loaded (charge vessel full and parent vessel empty).*

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*55*	*10*	*Nominal assumption*
Operating Pressure	psig	*FV*	*30*	*761,000*	
Operating Temperature	°F	*59*	*218* 2	*14,600*	*Pressure cycles to be at 218 °F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points.* 2
Contents Specific Gravity		*1.0*	*1.57*	*N/A*	
Contents Level	inch	*Empty*	*Flooded*	*761,000*	*Coincident with pressure cycles*
Localized Features					
Supports		*As above*		*As above with contents level changing coincident with pressure cycle*	

Notes

- *Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	PLANT ITEM No. *24590-PTF-MV-PWD-VSL-00043*

Equipment Cyclic Data Sheet

Plant Item Number:	*PWD-PJM-00041, PWD-PJM-00042, PWD-PJM-00043, PWD-PJM-00044, PWD-PJM-00045, PWD-PJM-00046, PWD-PJM-00047, PWD-PJM-00048*
Component Description	*Pulse Jet Mixers*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*SA 240 316 with max. Carbon of 0.030 %*
Design Life	*40 years*
Component Function and Life Cycle Description	*These pulse jet mixers (PJMs) are cyclically loaded using vacuum to fully fill the PJM with process liquid and compressed air to fully empty the PJM. The PJMs are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The PJM supports shall be designed to cycle between fully buoyant (PJM empty and parent vessel full) and fully loaded (PJM full and parent vessel empty) in addition to thrust.* 2

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*85*	*10*	*Nominal assumption*
Operating Pressure	psig	*FV*	*60*	*5.1×10^{4}*	
Operating Temperature	°F	*59*	*218* 2	*5.1×10^{4}*	*Pressure cycles to be at 218 °F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points.* 2
Contents Specific Gravity		*1.0*	*1.57*	*N/A*	
Contents Level	inch	*Empty*	*Flooded*	*5.1×10^{4}*	*Coincident with pressure cycles*
Thrust Load 2	lbf	*0*	*264*	*5.1×10^{4}*	*Coincident with pressure cycles*
Localized Features					
Supports		*As above*		*As above with contents level changing coincident with pressure cycles.*	

Notes

- *Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	PLANT ITEM No. **24590-PTF-MV-UFP-VSL-00001B**

R10523257

Project:	RPP-WTP	P&ID:	24590-PTF-M6-UFP-P0001/P0007/P0008 & 24590-PTF-M6-PWD-P0046 △1
Project No:	24590	Process Calculation:	DELETED △1
Project Site:	Hanford	Vessel Drawing	24590-PTF-MV-UFP-P0002
Description:	Ultrafiltration Feed Preparation Vessel △1		

Reference Data

Charge Vessels (Tag Numbers)	DELETED
Pulsejet Mixers / Agitators (Tag Numbers)	UFP-PJM-00045, UFP-PJM-00046, UFP-PJM-00047, UFP-PJM-00048, UFP-PJM-00049, UFP-PJM-00050, UFP-PJM-00101, UFP-PJM-000102
RFDs/Pumps (Tag Numbers)	DELETED

Design Data

Quality Level		QL-1	Fabrication Specs	24590-WTP-3PS-MV00-TP001		
Seismic Category		SC-I	Design Code	ASME VIII Div 1		
Service/Contents		Radioactive Liquid	Code Stamp	Yes		
Design Specific Gravity		1.32	NB Registration	Yes		
Maximum Operating Volume	gal	64,626	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	73,593	Estimated	184,000	934,000	822,000
Environmental Qualification		N/A △1	Actual *	223,240 △1	970,440 △1	887,140 △1

Inside Diameter	inch	240			Wind Design	Not Required	
Length/Height (TL-TL)	inch	306			Snow Design	Not Required	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	24590-WTP-3PS-MV00-TP002 24590-WTP-3PS-SS90-T0001	
Internal Pressure	psig	ATM	15	35	Seismic Base Moment *	ft*lb	
External Pressure	psig	0.217	12 △1 (Note 3,4)	0.0	Postweld Heat Treat	Not Required	
Temperature	°F	122	150	150 △1	Corrosion Allowance	inch	0.040 (See Notes 12) △1
Min. Design Metal Temp.	°F	40			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY
RPP-WTP PDC

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED
PROFESSIONAL ENGINEER
3/28/05

EXPIRES 12/10/06

This Bound Document Contains a total of 4 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
1	3/28/05	Issued for Permitting Use				
0	10/8/03	Issued for Permitting Use	C. Jackson	H. Khurana	C. Slater	M. Hoffmann

	MECHANICAL SYSTEMS DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-UFP-VSL-00001B

Materials of Construction

Component	Material		Minimum Thickness / Size	Containment
Top Head	SA 240 316	Note 1	See Drawing	Auxiliary (See Note 8) 1
Shell	SA 240 316	Note 1	See Drawing	Primary (See Note 8) 1
Bottom Head	SA 240 316	Note 1	See Drawing	Primary (See note 8) 1
Support	SA 240 304	Note 1	See Drawing	N/A
Jacket/Coils/Half-Pipe Jacket	SA 240 316	Note 1	See Drawing	N/A
Internals	SA 240 316	Note 1	See Drawing	Thermowells Primary
Pipe Nozzles	SA 312 TP316	Note 1	See Drawing	Primary (See note 8) 1
Forgings/ Bar stock	SA 182 F316	Note 1	See Drawing	N/A
Wash Ring Pipe	SA 312 TP316	Note 1	See Drawing	N/A
Bolting/Gaskets	N/A		N/A	N/A
Wear Plates	SA 240 316	Note 1	See Drawing	N/A

Miscellaneous Data

Orientation	Vertical	Support Type	Skirt
Insulation Function	Not Applicable	Insulation Material	Not Applicable
Insulation Thickness (inch)	Not Applicable	Internal Finish	Note 2 1
		External Finish	Note 2 1

Remarks

* To be determined by the vendor.

Note 1. Maximum 0.030% carbon.

Note 2. Welds de-scaled as laid.

Note 3. External design pressure under the jacket shall be rated for the jacket design pressure plus 1 psig internal vacuum in the vessel to account for ventilation fan pressure. 1

Note 4. The vessel design external pressure is estimated only and shall be confirmed by the Seller's calculations. 1

Note 5. DELETED 1

Note 6. Vessel volumes are approximate and do not account for the manufacturing tolerances, nozzles, and displacement of internals. 1

Note 7. This vessel is in a Black Cell. 1

Note 8. All welds forming part of the primary and auxiliary containment including nozzle attachment welds shall be subjected to 100% volumetric examination. 1

Note 9. Contents of this document are Dangerous Waste Permit affecting. 1

Note 10. DELETED 1 1

Note 11. DELETED 1

Note 12. BNI shall ensure that an additional 0.087" is available for erosion in the lower 4" of the interior conical surface of the pulse jet mixers. 1

Note 13. Seller shall provide wear plates for erosion control on the bottom head.

Note 14. All hydrodynamic and overblow loads are for BNI internal use only and are to be disregarded by the seller. 1

Note 15. Required data for thermal stress analysis for nozzles exposed to higher temperatures. 1

- Cell ambient temperature = 113 °F
- Headspace temperature or Operating temperature = 122 °F
- Ambient and headspace natural convection heat transfer coefficients = 0.703 Btu/hr ft² F
- Inlet fluid transfer frequency and mass flow rate for nozzles N15 and N55.

  Fluid max temperature = 212 °F

  Transfer frequency = 1 transfer/9 days for 1.5 hrs.

  Steam mass flow rate = 2885 lb/hr

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	PLANT ITEM No. *24590-PTF-MV-UFP-VSL-00001B*

Equipment Cyclic Data Sheet

Component Plant Item Number:	*24590-PTF-MV-UFP-UFP-VSL-00001B*
Component Description	*Ultrafiltration Feed Preparation Vessel*

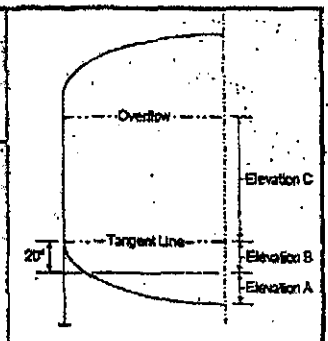
The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*ASME SA240 316, max. Carbon content 0.030 %*
Design Life	*40 Years*
Component Function and Life Cycle Description	*The system receives waste feed from the Waste Feed Evaporation Process System (FEP), and HLW Feed Receipt Vessel (HLP). The vessel is filled over a period of approximately 48 hours. If necessary, the vessel cools the waste prior to ultrafiltration operations. The precipitation of Sr/TRU compounds occurs in this vessel for Envelope C. The main transfer from this vessel occurs through a centrifugal pump to the Ultrafiltration Feed Vessels.* 1

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*-12*	*15*	*10*	*Nominal assumption for testing*
Operating Pressure	psig	*-0.217*	*0*	*N/A*	*The vessel will remain at constant pressure depending upon the HVAC plant*
Operating Temp	°F	*50*	*122*	*3650*	
Contents Specific Gravity		*1.00*	*1.32*	*3650*	
Contents Level	inch	*28*	*350*	*3650*	
Localized Features					
Nozzles		*Within 9°F of operating temperature range*			

Hydrodynamic Loading 1

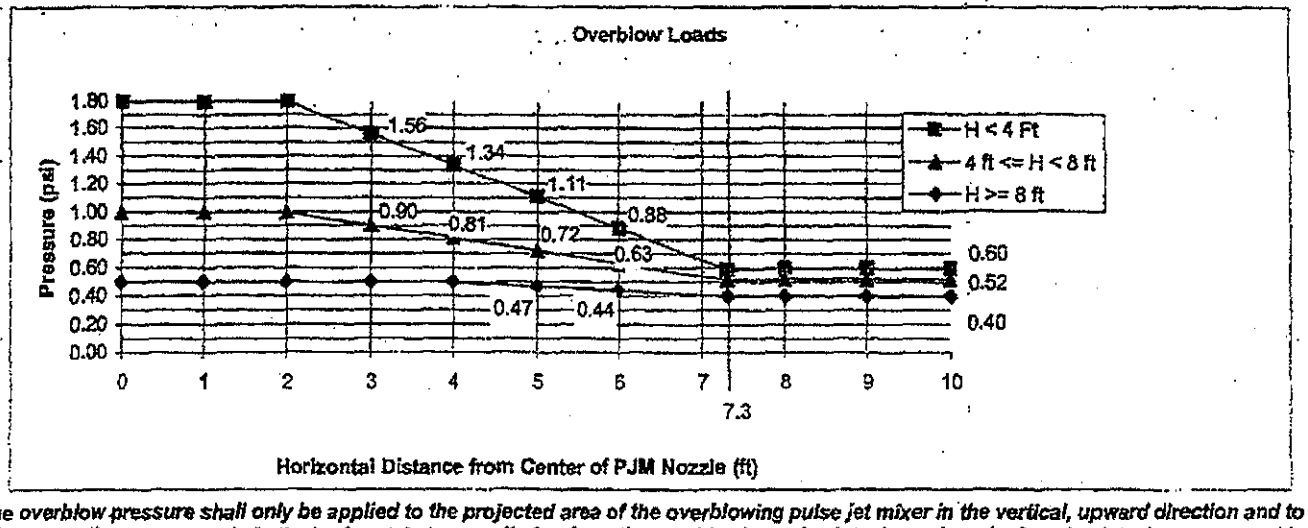
In normal operation, pulse-jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overblow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed for the combination of the normal operational hydrodynamic loads and overblow loads, and this load combination is also to be assumed to act concurrently with seismic loads.



The following table indicates the normal hydrodynamic pressure at ranges of elevations in the vessel and the number of design cycles for each condition. The hydrodynamic forces cycle between the indicated pressure ranges applied across the projected area of the component. Positive hydrodynamic forces act in the radial, outward direction and the vertical, upward direction. Apply the radial load simultaneously in the radial direction and normal to the radial direction in the horizontal plane.

Normal Operation Hydrodynamic Pressure Range, psi						Number of Cycles
Elevation A		Elevation B		Elevation C		
Radial	Vertical	Radial	Vertical	Radial	Vertical	
-0.15 to 0.25	*-0.15 to 0.15*	*-0.05 to 0.12*	*-0.15 to 0.15*	*-0.03 to 0.10*	*-0.06 to 0.15*	*16.4 X 10⁶*

Overblow loads vary as a function of the horizontal distance from the center of the overblowing pulse jet mixer nozzle and the elevation 'H' above the overblowing pulse jet mixer nozzle up to the overflow level as plotted:



The overblow pressure shall only be applied to the projected area of the overblowing pulse jet mixer in the vertical, upward direction and to all surrounding components in the horizontal plane, radiating from the overblowing pulse jet mixer. Any single pulse jet mixer may overblow 100 cycles.

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	PLANT ITEM No. 24590-PTF-MV-UFP-VSL-00001B

Notes

- *Cycle increase: Increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.* 1
- *Nozzles N18 and N55 shall be fatigue assessed/analyzed for 3650 temperature/pressure cycles from 0 psig at 59°F to 15 psig at 212°F, the pressure cycle shall coincide with the temperature cycle. See note 15 on page 2.* 1

Equipment Cyclic Data Sheet

Component Plant Item Number:	*UFP-PJM-00045, UFP-PJM-00046, UFP-PJM-00047, UFP-PJM-00048, UFP-PJM-00049, UFP-PJM-00050, UFP-PJM-00101, UFP-PJM-00102*
Component Description	*Pulse Jet Mixers*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*ASME SA240 316 with max. carbon content of 0.030 % carbon*
Design Life	*40 Years*
Component Function and Life Cycle Description	*These pulse-jet mixers (PJMs) are cyclically loaded using vacuum to fully fill the PJM with process liquid and compressed air to fully empty the PJM. The PJMs are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The PJM supports shall be designed to cycle between fully buoyant (PJM empty and parent vessel full) and fully loaded (PJM full and parent vessel empty) states. Thrust load shall be applied only to the fully buoyant state. Assume the parent vessel is full for 50% of the number of PJM cycles.* 1

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*80*	*10*	*Nominal assumption for testing*
Operating Pressure	psig	*FV*	*72.5*	*1.64x10⁷*	
Operating Temperature	°F	*68*	*122*	*3650*	*Parent vessel will operate normally at a temperature of 77 °F*
Contents Specific Gravity		*1.00*	*1.32*	*3650*	
Contents Level	inch	*Empty*	*Flooded*	*1.64 X 10⁷*	
Thrust 1	lbf	*0*	*330*	*1.64 X 10⁷*	
Localized Features					
Nozzles		*Within 9°F of operating temperature range.*		*As above*	
Supports		*Buoyant*	*Loaded*	*1.64 X 10⁷*	

Notes

- *Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*
- *DELETED*

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	PLANT ITEM No. R10507393 *24590-PTF-MV-UFP-VSL-00062C*

24590-PTF-M6-PWO-P0046

Project:	*RPP-WTP*	P&ID:	*24590-PTF-M6-UFP-P0004 /P0009/P0044/P0046* 1
Project No:	*24590*	Process Calculation:	*DELETED* 1
Project Site:	*Hanford*	Vessel Drawing	*24590-PTF-MV-UFP-P0007*
Description:	*Ultrafiltar Permeate Collection Vessel* 1		

PO#11 3/17/05

Reference Data

Charge Vessels (Tag Numbers)	*UFP-VSL-00023, UFP-VSL-00024, UFP-VSL-00025, UFP-VSL-00069, UFP-VSL-00070, UFP-VSL-00084*
Pulsejet Mixers / Agitators (Tag Numbers)	*UFP-PJM-00070, UFP-PJM-00073, UFP-PJM-00076, UFP-PJM-00077, UFP-PJM-00078, UFP-PJM-00107*
RFDs/Pumps (Tag Numbers)	*UFP-RFD-00042, UFP-RFD-00043, UFP-RFD-00044, UFP-RFD-00045, UFP-RFD-00046, UFP-RFD-00048*

Design Data

Quality Level	*QL-1*	Fabrication Specs	*24590-WTP-3PS-MV00-TP001* 1		
Seismic Category	*SC-I*	Design Code	*ASME VIII Div 1*		
Service/Contents	*Radioactive Liquid*	Code Stamp	*Yes*		
Design Specific Gravity	*1.26*	NB Registration	*Yes*		
Maximum Operating Volume (gal)	*30,072*	Weights (lbs)	Empty	Operating	Test
Total Volume (gal)	*34,700*	Estimated	*95,300*	*417,000*	*385,000*
		Actual *	*100,000* 1	*427,800* 1	*398,100* 1

Inside Diameter	inch	*180*			Wind Design	*Not Required*	
Length/Height (TL-TL)	inch	*255*			Snow Design	*Not Required*	
		Vessel Operat no	Vessel Design	Coil/Jacket Design	Seismic Design	*24590-WTP-3PS-MV00-TP002* *24590-WTP-3PS-SS90-T0001*	
Internal Pressure	psig	*ATM*	*15*	*N/A*	Seismic Base Moment *	ft*lb	
External Pressure	psig	*0.217* 1	*10.29*	*N/A*	Postweld Heat Treat	*Not Required*	
Temperature	°F	*86*	*120*	*N/A*	Corrosion Allowance	inch	*0.04*
Min. Design Metal Temp.	°F	*40*			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY
RPP-WTP PDC

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED
PROFESSIONAL ENGINEER
3/14/05
EXPIRES 12/10/06

This Bound Document Contains a total of 6 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
1	3/14/05	Issued for Permitting Use				
0	10/8/03	Issued for Permitting Use	J. Jackson	H. Khurana	C. Slater	M. Hoffmann

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	**PLANT ITEM No.** ***24590-PTF-MV-UFP-VSL-00062C***

Materials of Construction

Component	Material		Minimum Thickness / Size	Containment
Top Head	***SA 240 316***	***Note 1***	***See Drawing***	***Auxiliary (See Note 6)*** 1
Shell	***SA 240 316***	***Note 1***	***See Drawing***	***Primary (See Note 6)*** 1
Bottom Head	***SA 240 316***	***Note 1***	***See Drawing***	***Primary (See Note 6)*** 1
Support	***SA 240 304***	***Note1***	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***N/A***		***N/A***	***N/A***
Internals	***SA 240 316***	***Note 1***	***See Drawing***	***Thermowells Primary***
Pipe	***SA 312 TP316***	***Note 1***	***See Drawing***	***Primary (See Note 6)*** 1
Forgings/ Bar stock	***SA 182 F316***	***Note 1***	***See Drawing***	***N/A***
Wash Ring Pipe	***SA 312 TP316***	***Note 1***	***See Drawing***	***N/A***
Bolting/ Gaskets	***N/A***		***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Note 3***
		External Finish	***Note 3***

Remarks

* To be determined by the vendor.

Note 1: ***Maximum 0.030% carbon.***

Note 2: ***Deleted*** 1

Note 3: ***Welds descaled as laid.***

Note 4: ***Vessel volumes are approximate and do not account for the manufacturing tolerances, nozzles, and displacement of internals.***

Note 5: ***This vessel is in a Black Cell.*** 1

Note 6: ***All welds forming part of the primary and auxiliary containment including nozzle attachment welds shall be subjected to 100% volumetric examination.*** 1

Note 7: ***Contents of this document are Dangerous Waste Permit affecting.*** 1

Note 8: ***Deleted*** 1

Note 9: ***All hydrodynamic and overblow loads are for BNI internal use only and are to be disregarded by the seller.*** 1

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	PLANT ITEM No. 24590-PTF-MV-UFP-VSL-00062C

Equipment Cyclic Data Sheet

Component Plant Item Number:	*PTF-MV-UFP-VSL-00062C*
Component Description	*Ultrafilter Permeate Collection Vessel (Parent Vessel)* 1

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*ASME SA240 316 with max. Carbon of 0.030%*
Design Life	*40 Years*
Component Function and Life Cycle Description	*This vessel collects permeate from the Ultrafiltration modules. The permeate is transferred from this vessel to the Cesium Ion Exchange Process System, vessel CXP-VSL-00001, for further processing. The permeate is also sampled to check for solids in this vessel. The vessel is filled over a period of approximately 32 hours. An operating cycle for this vessel, filled then emptied, is approximately 48 hours.*

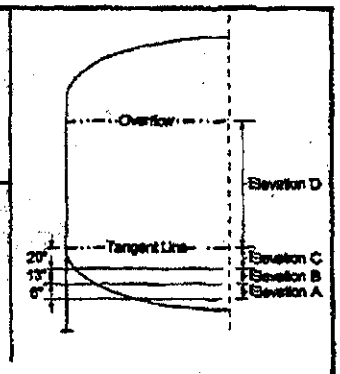
Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*-10.29*	*15*	*10*	*Nominal assumption for testing*
Operating Pressure	psig	*-0.217*	*0.000*	*N/A*	*The vessel will remain under constant pressure depending upon the HVAC plant.*
Operating Temp	°F	*68*	*86*	*10,400*	
Contents Specific Gravity		*1.00*	*1.26* 1	*10,400*	
Contents Level	inch	*27*	*288*	*10,400*	
Localized Features					
Nozzles		*Within 9°F of operating temperature range.*		*As above*	

Notes

- *Cycle Increase: Increase the numbers of operational cycles given by 10% to account for commissioning duty unless otherwise noted* 1
- *DELETED*

Hydrodynamic Loading

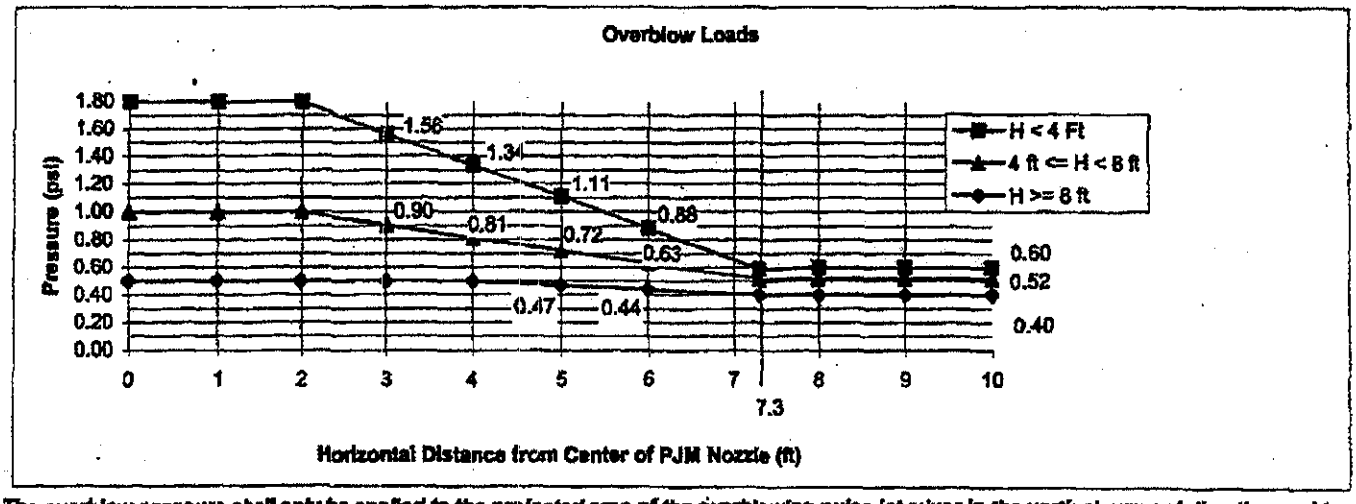
In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overblow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed for the combination of the normal operational hydrodynamic loads and overblow loads, and this load combination is also to be assumed to act concurrently with seismic loads.



The following table indicates the normal hydrodynamic pressure for at ranges of elevations in the vessel and the number of design cycles for each condition. The hydrodynamic forces cycle between the indicated pressure ranges applied across the projected area of the component. Positive hydrodynamic forces act in the radial, outward direction and the vertical, upward direction. Seller shall apply the radial load simultaneously in the radial direction and normal to the radial direction in the horizontal plane.

Normal Operation Hydrodynamic Pressure Range, psi								Number of Cycles
Elevation A		Elevation B		Elevation C		Elevation D		
Radial	Vertical	Radial	Vertical	Radial	Vertical	Radial	Vertical	
-0.09 to 0.29	-0.74 to 0.48	-0.02 to 0.22	-0.01 to 0.40	-0.05 to 0.12	-0.01 to 0.40	-0.03 to 0.10	-0.01 to 0.40	20.7×10^6

Overblow loads vary as a function of the horizontal distance from the center of the overblowing pulse jet mixer nozzle and the elevation 'H' above the overblowing pulse jet mixer nozzle up to the overflow level as plotted:



The overblow pressure shall only be applied to the projected area of the overblowing pulse jet mixer in the vertical, upward direction and to all surrounding components in the horizontal plane, radiating from the overblowing pulse jet mixer. Seller shall consider that any single pulse jet mixer may overblow 180 cycles.

Notes

- *Cycle Increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*

Equipment Cyclic Data Sheet

Component Plant Item Number:	*PTF-MV-UFP-VSL-00023, PTF-MV-UFP-VSL-00024, PTF-MV-UFP-VSL-00025, PTF-MV-UFP-VSL-00069, PTF-MV-UFP-VSL-00070, PTF-MV-UFP-VSL-00084*
Component Description	*Charge Vessels for the following RFDs UFP-RFD-00042, UFP-RFD-00043, UFP-RFD-00044, UFP-RFD-00045, UFP-RFD-00046, UFP-RFD-00048*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*ASME SA240 316 with max. Carbon of 0.030%*
Design Life	*40 Years*
Component Function and Life Cycle Description	*These charge vessels are cyclically loaded using vacuum to fully fill the charge vessel with process liquid and compressed air to fully empty the charge vessel. The charge vessels are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The charge vessel supports shall be designed to cycle between fully buoyant (charge vessel empty and parent vessel full) and fully loaded (charge vessel full and parent vessel empty).* 1

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*80*	*10*	*Nominal assumption for testing*
Operating Pressure	psig	*FV*	*72.5*	*10,400*	
Operating Temperature	°F	*68*	*86*	*10,400*	*Parent vessel will be operating normally at a temperature of 77°F*
Contents Specific Gravity		*1.00*	*1.26*	*10,400*	
Contents Level	inch	*Empty*	*Flooded*	*10,400*	
Localized Features					
Nozzles		*Within 9°F of operating temperature range.*		*As above*	
Supports		*Buoyant*	*Loaded*	*10,400*	

Notes

- *Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*
- *DELETED*

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	**PLANT ITEM No.** *24590-PTF-MV-UFP-VSL-00062C*

Equipment Cyclic Data Sheet

Component Plant Item Number:	*UFP-PJM-00073, UFP-PJM-00070, UFP-PJM-00076, UFP-PJM-00077, UFP-PJM-00078, UFP-PJM-000107*
Component Description	*Pulse Jet Mixers*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*ASME SA240 316 with max. Carbon of 0.030%*
Design Life	*40 Years*
Component Function and Life Cycle Description	*These pulse jet mixers (PJMs) are cyclically loaded using vacuum to fully fill the PJM with process liquid and compressed air to fully empty the PJM. The PJMs are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The PJM supports shall be designed to cycle between fully buoyant (PJM empty and parent vessel full) and fully loaded (PJM full and parent vessel empty) states. Thrust load shall be applied only to the fully buoyant state. Assume the parent vessel is full for 50% of the number of PJM cycles.* 1

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*80*	*10*	*Nominal assumption for testing*
Operating Pressure	psig	*FV*	*72.5*	*2.07×10^7* 1	
Operating Temperature	°F	*58*	*86*	*10,400*	*Parent Vessel will operating normally at a temperature of 77 °F*
Contents Specific Gravity		*1.00*	*1.26*	*2.07×10^7* 1	
Contents Level	inch	*Empty*	*Flooded*	*2.07×10^7* 1	
Thrust 1	lbf	*0*	*330*	*2.07×10^7* 1	
Localized Features					
Nozzles		*Within 9°F of operating temperature range.*		*As above*	
Supports		*Buoyant*	*Loaded*	*2.07×10^7* 1	

Notes

- *Cycle Increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*
- *DELETED*

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	**PLANT ITEM No.** *24590-LAW-MV-LOP-VSL-00001*

Project:	*RPP-WTP*	P&ID:	*24590-LAW-M6-LOP-P0001*
Project No:	*24590*	Process Data Sheet:	
Project Site:	*Hanford*	Vessel Drawing	*24590-LAW-MV-LOP-P0001*
Description:	*LAW Melter 1 SBS Condensate Vessel*		

Reference Data

Charge Vessels (Tag Numbers)	*Not Applicable*
Pulsejet Mixers / Agitators (Tag Numbers)	*24590-LAW-MY-LOP-EDUC-00001A*
RFDs/Pumps (Tag Numbers)	*Not Applicable*

Design Data

Quality Level		*QL-1*	Fabrication Specs	*24590-WTP-3PS-MV00-TP001 (PVDF)*		
Seismic Category		*SC-III* 1	Design Code	*ASME VIII Div 1*		
Service/Contents		*LAW Condensate*	Code Stamp	*Yes*		
Design Specific Gravity		*1.03*	NB Registration	*Yes*		
Maximum Operating Volume	gal	*7,402*	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	*9,056*	Estimated	*25,500*	*91,700*	*100,800*
			Actual *			

Inside Diameter	inch	*144*			Wind Design	*Not Required*	
Length/Height (TL-TL)	inch	*98*			Snow Design	*Not Required*	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	*24590-WTP-3PS-MV00-TP002* *24590-WTP-3PS-FB01-T0001* 1	
Internal Pressure	psig	*2.00*	*15*	*125*	Seismic Base Moment *	ft*lb	
External Pressure	psig	*2.00*	*FV*	*FV*	Postweld Heat Treat	*Not Required*	
Temperature	°F	*212*	*237*	*237*	Corrosion Allowance	inch	*0.08 vessel (Note 5), 0.04 Jacket* 1
Min. Design Metal Temp.	°F	*40*			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY
RPP-WTP PDC

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED
PROFESSIONAL ENGINEER
3/14/05

EXPIRES 12/10/06

This bound document contains a total of 2 sheets.

Rev.	Reason for Revision	By	Checked	Review	Approved	Date
1	Issued for Permitting Use					3/14/05
0	Issued for Permitting Use	K. Brightman	S. Lee	C. Slater	E. Kem	1/27/04

R10507391

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	**PLANT ITEM No.** ***24590-LAW-MV-LOP-VSL-00001***

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SB-575 N06022***	***See Drawing***	***Auxiliary***
Shell	***SB-575 N06022***	***See Drawing***	***Primary***
Bottom Head	***SB-575 N06022***	***See Drawing***	***Primary***
Support	***SA-240 304 (Note 1 & 6)*** 1	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***SA-312 304 (Note 1)***	***See Drawing***	***N/A***
Internals	***SB-575 N06022 / SB-622 N06022 (Note 7)*** 1	***See Drawing***	***Thermowells Primary***
Pipe (Seamless)	***SB-622 N06022 & SB-622 N06276 (For 1 1/2" & 2" Pipe) / SA-312 TP304***	***See Drawing***	***Note 2***
Forgings/ Bar stock	***SB-564 N06022 / SA182 F304***	***See Drawing***	***N/A***
Gaskets (O Ring)	***EPDM***	***N/A***	***N/A***
Bolting	***SA-193 Gr. B8M / SA-194 Gr. 8M***	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Descaled as laid***
		External Finish	***Note 3***

Remarks

**** To be determined by the vendor.***

Note 1: Material shall have Carbon Content of 0.030% Max. Non-welded specialty items are excluded from this requirement.

Note 2: Nozzle necks below normal operating level are Primary, others Auxiliary. See PVDF and vessel drawing for NDT.

Note 3: Shell welds under half pipe coils to be ground smooth. Others descaled as laid.

Note 4: Contents of this document are Dangerous Waste Permit affecting.

Note 5: Corrosion allowance of 0.01" is also to be added to the external surface of shell under the jacket. 1

Note 6: Use SA-240 316 material for skirt and base chair gussets as design change by SDDR No. 24590-WTP-SDDR-PROC-04-00936. 1

Note 7: Use Hastelloy C-276 in lieu of Hastelloy C-22 material for removable eductor guide cone as reference by SDDR No. 24590-WTP-SDDR-PROC-04-01080. 1

Equipment Cyclical Data Sheet

Deleted 1

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-LAW-MV-LOP-VSL-00002*

Project:	*RPP-WTP*	P&ID:	*24590-LAW-M6-LOP-P0002*
Project No:	*24590*	Process Data Sheet	
Project Site:	*Hanford*	Vessel Drawing	*24590-LAW-MV-LOP-P0002*
Description:	*LAW Melter 2 SBS Condensate Vessel*		

Reference Data

Charge Vessels (Tag Numbers)	*Not Applicable*
Pulsejet Mixers / Agitators (Tag Numbers)	*24590-LAW-MY-LOP-EDUC-00002A*
RFDs/Pumps (Tag Numbers)	*Not Applicable*

Design Data

Quality Level		*QL-1*	Fabrication Specs	*24590-WTP-3PS-MV00-TP001 (PVDF)*		
Seismic Category		*SC-III* 1	Design Code	*ASME VIII Div 1*		
Service/Contents		*LAW Condensate*	Code Stamp	*Yes*		
Design Specific Gravity		*1.03*	NB Registration	*Yes*		
Maximum Operating Volume	gal	*7,402*	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	*9,056*	Estimated	*25,500*	*91,700*	*100,800*
			Actual *			

Inside Diameter	inch	*144*			Wind Design	*Not Required*	
Length/Height (TL-TL)	inch	*98*			Snow Design	*Not Required*	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	*24590-WTP-3PS-MV00-TP002* *24590-WTP-3PS-FB01-T0001* 1	
Internal Pressure	psig	*2.00*	*15*	*125*	Seismic Base Moment *	ft*lb	
External Pressure	psig	*2.00*	*FV*	*FV*	Postweld Heat Treat	*Not Required*	
Temperature	°F	*212*	*237*	*237*	Corrosion Allowance	inch	*0.08 vessel (Note 5), 0.04 Jacket* 1
Min. Design Metal Temp.	°F	*40*			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY
RPP-WTP PDC

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED
PROFESSIONAL ENGINEER
3/14/05

EXPIRES 12/10/06

This bound document contains a total of 2 sheets.

Rev.	Reason for Revision	By	Checked	Review	Approved	Date
1	Issued for Permitting Use					3/14/05
0	Issued for Permitting Use	K. Brightman	S. Lee	C. Slater	E. Isom	1/27/04

R10507392

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-LAW-MV-LOP-VSL-00002*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	*SB-575 N06022*	*See Drawing*	*Auxiliary*
Shell	*SB-575 N06022*	*See Drawing*	*Primary*
Bottom Head	*SB-575 N06022*	*See Drawing*	*Primary*
Support	*SA-240 304 (Note 1 & 6)* 1	*See Drawing*	*N/A*
Jacket/Coils/Half-Pipe Jacket	*SA-312 304 (Note 1)*	*See Drawing*	*N/A*
Internals	*SB-575 N06022 / SB-622 N06022 (Note 7)* 1	*See Drawing*	*Thermowells Primary*
Pipe (Seamless)	*SB-622 N06022 & SB-622 N06276 (For 1 1/2", & 2" Pipe) / SA-312 TP304*	*See Drawing*	*Note 2*
Forgings/ Bar stock	*SB-564 N06022 / SA182 F304*	*See Drawing*	*N/A*
Gaskets (O Ring)	*EPDM*	*N/A*	*N/A*
Bolting	*SA-193 Gr. B8M / SA-194 Gr 8M*	*N/A*	*N/A*

Miscellaneous Data

Orientation	*Vertical*	Support Type	*Skirt*
Insulation Function	*Not Applicable*	Insulation Material	*Not Applicable*
Insulation Thickness (inch)	*Not Applicable*	Internal Finish	*Descaled as laid*
		External Finish	*Note 3*

Remarks

** To be determined by the vendor.*

Note 1: Material shall have Carbon Content of 0.030% Max. Non-welded specialty items are excluded from this requirement.

Note 2: Nozzle necks below normal operating level are Primary, others Auxiliary. See PVDF and vessel drawing for NDT.

Note 3: Shell welds under half pipe coils to be ground smooth. Others descaled as laid.

Note 4: Contents of this document are Dangerous Waste Permit affecting.

Note 5: Corrosion allowance of 0.01" is also to be added to the external surface of shell under the jacket. 1

Note 6: Use SA-240 316 material for skirt and base chair gussets as design change by SDDR No. 24590-WTP-SDDR-PROC-04-00936. 1

Note 7: Use Hastelloy C-276 in lieu of Hastelloy C-22 material for removable eductor guide cone as reference by SDDR No. 24590-WTP-SDDR-PROC-04-01080. 1

Equipment Cyclic Data Sheet

Deleted 1

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-LAW-MV-RLD-VSL-00005*

R10505703

Project	*RPP-WTP*	P&ID	*24590-LAW-M6-RLD-P0001*
Project No	*24590*	Process Data Sheet	*Deleted* 2
Project Site	*Hanford*	Vessel Drawing	*24590-LAW-MV-RLD-P0003*
Description	*SBS Condensate Collection Vessel*		

Reference Data

Charge Vessels (Plant Item Numbers)	*Not Applicable*
Pulsejet Mixers (Plant Item Numbers)	*Not Applicable*

Design Data

Quality Level		*CM*	Fabrication Specs	*24590-WTP-3PS-MV00-TP001*		
Seismic Category		*SC-III* 2	Design Code	*ASME VIII Div 1*		
Service/Contents		*SBS Purge Effluents*	Code Stamp	*Yes*		
			NB Registration	*Yes*		
Design Specific Gravity		*1 to 1.38*	Weights (lbs)	Empty	Operating	Test
Operating Volume	gal	*23400*	*Estimated*	*67,700*	*348,800*	*283,000*
Total Volume	gal	*25780*	*Actual* *			

Inside Diameter	inch	*192*			Wind Design	*Not Required*	
Length/Height	inch	*185 (See Vessel Drawing)*			Snow Design	*Not Required*	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	*24590-WTP-3PS-FB01-T0001* *24590-WTP-3PS-MV00-TP002*	
Internal Pressure	psig	*0*	*15*	*N/A*	Seismic Base Moment *	ft*lb	
External Pressure	psig	*2.6*	*15 (FV)*	*N/A*	Postweld Heat Treat	*Not Required*	
Temperature	°F	*167*	*200*	*N/A*	Corrosion Allowance	inch	*0.04*
Min. Design Metal Temp.	°F	*40*			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY
RPP-WTP PDC

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED
PROFESSIONAL ENGINEER
3/7/05

EXPIRES 12/10/06

This Bound Document Contains a total of 2 Sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
2	3/7/05	Issued for Permitting Use				
1	11/12/03	Issued for Permitting Use	J. Jackson	P. DeGraaf	C. Slater	M. Hoffmann
0	9/17/02	Issued for Permitting Use	J. Jackson	C. Slater	N/A	S. Kirk

	MECHANICAL DATA SHEET: VESSEL	PLANT ITEM No. 24590-LAW-MV-RLD-VSL-00005

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head and Top Head Nozzle Re-pads	SA240 316/SA182 F316 with max Carbon of 0.030%	See Drawing	Auxiliary
Top Head Nozzles N01, N02, N02A, N03, N03A, N04, N05, N09, N11, N15, N16, N16A, N18, N19, N20, and N20A 2	SB688 UNS N08367 or SB622 N10276 Seamless* 2	See Drawing	Auxiliary, Note-1
Top Head Nozzles N06, N07, N08, N10, and N17	SA240 316/SA182 F316 with max Carbon of 0.030 % 2	See Drawing	Auxiliary, Note-1
Top Head Nozzles N12, N13, and N14 2	SB622 N10276 Seamless* 2	See Drawing	Auxiliary, Note-1
Shell 2	SB688 UNS N08367 2	See Drawing	Primary, Note-1
Bottom Head	SB688 UNS N08367	See Drawing	Primary
Support 2	SA240 304 with max Carbon of 0.030% 2	See Drawing	N/A
Internals	UNS N08367	See Drawing	Primary
"O" Ring Flanges	UNS N08367	See Drawing	As Note-1 for Nozzle Necks
"O" Ring Gaskets 2	Parker E0540-80 2	See Drawing	As Note-1 for Nozzle Necks
Flat Gaskets 2	EPDM 2		
Bolting (For Flanges)	A193 Gr. B8 Cl. 1	See Drawing	N/A

Miscellaneous Data

Orientation	Vertical	Support Type	Skirt
Insulation Function	Not Applicable	Insulation Material	Not Applicable
Insulation Thickness (inch)	Not Applicable	Welds Surface Finish	De-scaled as Laid

Notes

* To be determined by the vendor.

Note 1: Nozzle necks below the high operating liquid level are Primary, others Auxiliary.

Note 2: NDE for this vessel must meet requirements per paragraph 6.4.2 of 24590-WTP-3PS-MV00-TP001.

Note 3: This vessel is not subjected to thermal cycling or pressure cycling.

Note 4: Vessel volumes are approximate and do not account for manufacturing tolerances, nozzles, and displacement of internals.

Note 5: Contents of this document are Dangerous Waste Permit affecting.

R10505709

MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No.
24590-LAW-MV-LCP-VSL-00001

Project:	RPP-WTP	P&ID:	24590-LAW-M6-LCP-P0001
Project No:	24590	Process Data Sheet:	Deleted /1\
Project Site:	Hanford	Vessel Drawing	24590-LAW-MV-LCP-P0001
Description:	LAW Concentrate Receipt Vessel /1\		

Reference Data

Charge Vessels (Tag Numbers)	Not Applicable
Pulsejet Mixers / Agitators (Tag Numbers)	Not Applicable /1\
RFDs/Pumps (Tag Numbers)	Not Applicable /1\

Design Data

Quality Level		CM (Note 3)	Fabrication Specs	24590-WTP-3PS-MV00-TP001 (PVDF) /1\		
Seismic Category		SC-III	Design Code	ASME VIII Div 1		
Service/Contents		LAW Concentrate Feed	Code Stamp	Yes		
Design Specific Gravity		1.47	NB Registration	Yes		
Maximum Operating Volume	gal	15,435	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	18,130	Estimated	49,200	235,700	199,900
			Actual *			

Inside Diameter	inch	168			Wind Design	Not Required	
Length/Height (TL-TL)	inch	153			Snow Design	Not Required	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	24590-WTP-3PS-MV00-TP002 24590-WTP-3PS-FB01-T0001	
Internal Pressure	psig	0.07	15	None	Seismic Base Moment *	ft*lb	
External Pressure	psig	4.09 /1\	FV	None	Postweld Heat Treat	Not Required	
Temperature	°F	122	150	None	Corrosion Allowance	Inch	0.04
Min. Design Metal Temp.	°F	40			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY
RPP-WTP PDC

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED PROFESSIONAL ENGINEER
3/7/05

EXPIRES 12/10/06

This bound document contains a total of 3 sheets.

Rev.	Reason for Revision	By	Checked	Review	Approved	Date
1	Issued for Permitting Use					3/7/05
0	Issued for Permitting Use	J. Jackson	S. Lee	C. Slater	E. Stern	12/30/03

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-LAW-MV-LCP-VSL-00001*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SA-240 316 (Note 1)***	***See Drawing***	***Auxiliary***
Shell	***SA-240 316 (Note 1)***	***See Drawing***	***Primary***
Bottom Head	***SA-240 316 (Note 1)***	***See Drawing***	***Primary***
Support	***SA-240 304 (Note 1)***	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***N/A***	***N/A*** 1	***N/A***
Internals	***SA-240 316/SA-312 TP316 (Note 1)***	***See Drawing***	***Thermowells Primary***
Pipe	***SA-312 TP316 Seamless (Note 1)***	***See Drawing***	***Note 2***
Forgings/ Bar stock	***SA-182 F316 (Note 1)***	***See Drawing***	***N/A***
Gaskets (O Ring)	***EPDM*** 1	***N/A***	***N/A***
Bolting	***SA-193 Gr. B8M / SA-194 Gr. 8M*** 1	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Welds descaled as laid***
		External Finish	***Welds descaled as laid***

Remarks

**** To be determined by the vendor.***

Note 1: Material shall have Carbon Content of 0.030% Max. Non-welded specialty items are excluded from this requirement.

Note 2: Nozzle necks below normal operating level are Primary, others Auxiliary. See PVDF and vessel drawing for NDE. 1

Note 3: Additional NDE requirements should be as per 6.4 of the PVDF. 1

Note 4: Contents of this document are dangerous waste permit affecting. 1

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. ***24590-LAW-MV-LCP-VSL-00001***

Equipment Cyclic Data Sheet ⚠

Component Plant Item Number:	***24590-LAW-MV-LCP-VSL-00001***
Component Description	***Parent Vessel***

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	***SA-240 316***
Design Life	***40 years***
Component Function and Life Cycle Description	***Equipment Shut Down for maintenance occurs annually.***

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	***FV***	***15***	***100***	
Operating Pressure	psig	***-4.09***	***0.07***	***100***	***Maximum of 100 startistop cycles per 40 years of design life***
Operating Temperature	°F	***59***	***122***	***100***	
Contents Specific Gravity		***1.0***	***1.47***	***100***	
Contents Level	inch	***31.00***	***170.00***	***100***	
Localized Features					
Nozzles		***Within 50° F of vessel temperature.***		***As above.***	
Supports		***Same as vessel***		***Number of cycles same as vessel***	

Notes

- ***Cycle Increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***

R10505710

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. **24590-LAW-MV-LCP-VSL-00002**

Project	RPP-WTP	P&ID.	24590-LAW-M6-LCP-P0002
Project No	24590	Process Data Sheet	~~Deleted~~ 1 3/7/05
Project Site	Hanford	Vessel Drawing	24590-LAW-MV-LCP-P0002
Description	LAW Concentrate Receipt Vessel 1		

Reference Data

Charge Vessels (Tag Numbers)	Not Applicable
Pulsejet Mixers / Agitators (Tag Numbers)	Not Applicable 1
RFDs/Pumps (Tag Numbers)	Not Applicable 1

Design Data

Quality Level		CM (Note 3)	Fabrication Specs	24590-WTP-3PS-MV00-TP001 (PVDF) 1		
Seismic Category		SC-III	Design Code	ASME VIII Div 1		
Service/Contents		LAW Concentrate Feed	Code Stamp	Yes		
Design Specific Gravity		1.47	NB Registration	Yes		
Maximum Operating Volume	gal	15,435	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	18,130	Estimated	49,200	235,700	199,900
			Actual *			

Inside Diameter	inch	168			Wind Design	Not Required	
Length/Height (TL-TL)	inch	153			Snow Design	Not Required	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	24590-WTP-3PS-MV00-TP002 24590-WTP-3PS-FB01-TD001	
Internal Pressure	psig	0.07	15	None	Seismic Base Moment *	ft*lb	
External Pressure	psig	4.09 1	FV	None	Postweld Heat Treat	Not Required	
Temperature	°F	122	150	None	Corrosion Allowance	inch	0.04
Min. Design Metal Temp.	°F	40			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY RPP-WTP PDC

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED PROFESSIONAL ENGINEER
3/7/05

EXPIRES 12/10/06

This bound document contains a total of 3 sheets.

Rev.	Reason for Revision	By	Checked	Review	Approved	Date
1	Issued for Permitting Use					3/7/05
0	Issued for Permitting Use	J. Jackson	S. Lee	C. Slater		12/29/03

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-LAW-MV-LCP-VSL-00002*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	*SA-240 316 (Note 1)*	*See Drawing*	*Auxiliary*
Shell	*SA-240 316 (Note 1)*	*See Drawing*	*Primary*
Bottom Head	*SA-240 316 (Note 1)*	*See Drawing*	*Primary*
Support	*SA-240 304 (Note 1)*	*See Drawing*	*N/A*
Jacket/Coils/Half-Pipe Jacket	*N/A*	*N/A* 1	*N/A*
Internals	*SA-240 316/SA-312 TP316 (Note 1)*	*See Drawing*	*Thermowells Primary*
Pipe	*SA-312 TP316 Seamless (Note 1)*	*See Drawing*	*Note 2*
Forgings/ Bar stock	*SA-182 F316 (Note 1)*	*See Drawing*	*N/A*
Gaskets (O Ring)	*EPDM* 1	*N/A*	*N/A*
Bolting	*SA-193 Gr. B8M / SA-194 Gr. 8M* 1	*N/A*	*N/A*

Miscellaneous Data

Orientation	*Vertical*	Support Type	*Skirt*
Insulation Function	*Not Applicable*	Insulation Material	*Not Applicable*
Insulation Thickness (inch)	*Not Applicable*	Internal Finish	*Welds descaled as laid*
		External Finish	*Welds descaled as laid*

Remarks

** To be determined by the vendor.*

Note 1: Material shall have Carbon Content of 0.030% Max. Non-welded speciality items are excluded from this requirement.

Note 2: Nozzle necks below normal operating level are Primary, others Auxiliary. See PVDF and vessel drawing for NDE. 1

Note 3: Additional NDE requirements should be as per 6.4 of the PVDF. 1

Note 4: Contents of this document are dangerous waste permit affecting. 1

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. ***24590-LAW-MV-LCP-VSL-00002***

Equipment Cyclic Data Sheet ⚠

Component Plant Item Number:	***24590-LAW-MV-LCP-VSL-00002***
Component Description	***Parent Vessel***

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	***SA-240 316***
Design Life	***40 years***
Component Function and Life Cycle Description	***Equipment Shut Down for maintenance occurs annually.***

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	***FV***	***15***	***100***	
Operating Pressure	psig	***-4.09***	***0.07***	***100***	***Maximum of 100 startistop cycles per 40 years of design life***
Operating Temperature	°F	***59***	***122***	***100***	
Contents Specific Gravity		***1.0***	***1.47***	***100***	
Contents Level	inch	***31.00***	***170.00***	***100***	
Localized Features					
Nozzles		***Within 50° F of vessel temperature.***		***As above.***	
Supports		***Same as vessel***		***Number of cycles same as vessel***	

Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***

R10505699

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	**PLANT ITEM No.** *24590-LAW-LFP-VSL-00002*

Project:	*RPP-WTP*	P&ID:	*24590-LAW-M6-LFP-P0001; 24590-LAW-M6-LFP-P0002*
Project No:	*24590*	Process Data Sheet:	*~~Deleted~~* 1 3/7/05
Project Site:	*Hanford*	Vessel Drawing	*24590-LAW-MV-LFP-P0001*
Description:	*Melter 1 Feed Vessel*		

Reference Data

Charge Vessels (Tag Numbers)	*Not Applicable*
Pulsejet Mixers / Agitators (Tag Numbers)	*LFP-AGT-00002*
RFDs/Pumps (Tag Numbers)	*LFP-PMP-00007, LFP-PMP-00008, LFP-PMP-00009, LFP-PMP-00010, LFP-PMP-00011, LFP-PMP-00012, LFP-PMP-00002*
Spray Nozzles	*LFP-NOZ-00003, LFP-NOZ-00004, LFP-NOZ-00005*

Design Data

Quality Level		*CM (Note 4)*	Fabrication Specs	*24590-WTP-3PS-MV00-TP001*		
Seismic Category		*SC-III*	Design Code	*ASME VIII Div 1*		
Service/Contents		*LAW Melter Feed*	Code Stamp	*Yes*		
Design Specific Gravity		*1.90*	NB Registration	*Yes*		
Maximum Operating Volume	gal	*7,689*	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	*9,123*	Estimated	*44,500*	*164,600*	*120,800*
			Actual *			

Inside Diameter	inch	*132*			Wind Design	*Not Required*	
Length/Height (TL-TL)	inch	*126*			Snow Design	*Not Required*	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	*24590-WTP-3PS-MV00-TP002* *24590-WTP-3PS-FB01-T0001*	
Internal Pressure	psig	*0.07*	*15*	*None*	Seismic Base Moment *	ft*lb	
External Pressure	psig	*4.09* 1	*FV*	*None*	Postweld Heat Treat	*Not Required*	
Temperature	°F	*98*	*150*	*None*	Corrosion Allowance	Inch	*0.04 Top Head* *0.125 Shell & Btm Head*
Min. Design Metal Temp.	°F	*40*			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY RPP-WTP PDC

MARK W. HOFFMANN STATE OF WASHINGTON 0030952 REGISTERED PROFESSIONAL ENGINEER 3/7/05

EXPIRES 12/10/06

This bound document contains a total of 2 sheets.

Rev.	Reason for Revision	By	Checked	Review	Approved	Date
1	Issued for Permitting Use					3/7/05
0	Issued for Permitting Use	J. Jackson	S. Lee	C. Slater	E. Ilsem	12/29/03

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-LAW-LFP-VSL-00002*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	*SA-240 316 (Note 2)*	*See Drawing*	*Auxiliary*
Shell	*SA-240 316 (Note 2)*	*See Drawing*	*Primary*
Bottom Head	*SA-240 316 (Note 2)*	*See Drawing*	*Primary*
Support	*SA-240 304 (Note 2)*	*See Drawing*	*N/A*
Jacket/Coils/Half-Pipe Jacket	*N/A*	*N/A* 1	*N/A*
Internals	*SA-240 316 (Note 2)*	*See Drawing*	*Thermowells Primary*
Pipe (Seamless)	*SA-312 TP316 Seamless (Note 2)*	*See Drawing*	*Note 3*
Forgings/ Bar stock	*SA-182 F316 (Note 2)*	*See Drawing*	*N/A*
Gaskets (O Ring)	*EPDM O-Ring*	*N/A*	*N/A*
Bolting	*SA-193 B8M / SA-194 8M*	*N/A*	*N/A*

Miscellaneous Data

Orientation	*Vertical*	Support Type	*Skirt*
Insulation Function	*Not Applicable*	Insulation Material	*Not Applicable*
Insulation Thickness (inch)	*Not Applicable*	Internal Finish	*Welds descaled as laid*
		External Finish	*Welds descaled as laid*

Remarks

** To be determined by the vendor.*
Note 1: Deleted.
Note 2: Material shall have Carbon Content of 0.030% Max. Non-welded items are excluded from this requirement.
Note 3: Nozzle necks below normal operating level are Primary, others Auxiliary. See 24590-WTP-3PS-MV00-TP001 for NDE. 1
Note 4: Additional NDE requirements should be as per 6.4 of 24590-WTP-3PS-MV00-TP001.
Note 5: Contents of this document are dangerous waste permit affecting. 1

R10505700

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. **24590-LAW-LFP-VSL-00004**

Project:	***RPP-WTP***	P&ID:	***24590-LAW-M6-LFP-P0003; 24590-LAW-M6-LFP-P0004***
Project No:	***24590***	Process Data Sheet:	~~Deleted~~ 1 WH 3/7/05
Project Site:	***Hanford***	Vessel Drawing	***24590-LAW-MV-LFP-P0002***
Description:	***Melter 2 Feed Vessel***		

Reference Data

Charge Vessels (Tag Numbers)	***Not Applicable***
Pulsejet Mixers / Agitators (Tag Numbers)	***LFP-AGT-00004***
RFDs/Pumps (Tag Numbers)	***LFP-PMP-00013, LFP-PMP-00014, LFP-PMP-00015, LFP-PMP-00016, LFP-PMP-00017, LFP-PMP-00018, LFP-PMP-00004***
Spray Nozzles	***LFP-NOZ-00008, LFP-NOZ-00009, LFP-NOZ-00010***

Design Data

Quality Level		***CM (Note 4)***		Fabrication Specs	***24590-WTP-3PS-MV00-TP001***		
Seismic Category		***SC-III***		Design Code	***ASME VIII Div 1***		
Service/Contents		***LAW Melter Feed***		Code Stamp	***Yes***		
Design Specific Gravity		***1.90***		NB Registration	***Yes***		
Maximum Operating Volume	gal	***7,589***		Weights (lbs)	Empty	Operating	Test
Total Volume	gal	***9,123***		Estimated	***44,500***	***164,600***	***120,800***
				Actual *			

Inside Diameter	inch	***132***			Wind Design	***Not Required***	
Length/Height (TL-TL)	inch	***128***			Snow Design	***Not Required***	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	***24590-WTP-3PS-MV00-TP002 24590-WTP-3PS-FB01-T0001***	
Internal Pressure	psig	***0.07***	***15***	***None***	Seismic Base Moment *	ft*lb	
External Pressure	psig	***4.09*** 1	***FV***	***None***	Postweld Heat Treat	***Not Required***	
Temperature	°F	***98***	***150***	***None***	Corrosion Allowance	inch	***0.04 Top Head 0.125 Shell & Btm Head***
Min. Design Metal Temp.	°F	***40***			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY
RPP-WTP PDC

MARK W. HOFFMANN
STATE OF WASHINGTON
21
00030952
REGISTERED
PROFESSIONAL ENGINEER

3/7/05

EXPIRES 12/10/06

This bound document contains a total of 2 sheets.

Rev.	Reason for Revision	By	Checked	Review	Approved	Date
1	Issued for Permitting Use					3/7/05
0	Issued for Permitting Use	J. Jackson	S. Lee	C. Slater	E. Isem	12/29/03

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-LAW-LFP-VSL-00004*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	*SA-240 316 (Note 2)*	*See Drawing*	*Auxiliary*
Shell	*SA-240 316 (Note 2)*	*See Drawing*	*Primary*
Bottom Head	*SA-240 316 (Note 2)*	*See Drawing*	*Primary*
Support	*SA-240 304 (Note 2)*	*See Drawing*	*N/A*
Jacket/Coils/Half-Pipe Jacket	*N/A*	*N/A* 1	*N/A*
Internals	*SA-240 316 (Note 2)*	*See Drawing*	*Thermowells Primary*
Pipe (Seamless)	*SA-312 TP316 Seamless (Note 2)*	*See Drawing*	*Note 3*
Forgings/ Bar stock	*SA-182 F316 (Note 2)*	*See Drawing*	*N/A*
Gaskets (O Ring)	*EPDM O-Ring*	*N/A*	*N/A*
Bolting	*SA-193 B8M / SA-194 8M*	*N/A*	*N/A*

Miscellaneous Data

Orientation	*Vertical*	Support Type	*Skirt*
Insulation Function	*Not Applicable*	Insulation Material	*Not Applicable*
Insulation Thickness (inch)	*Not Applicable*	Internal Finish	*Welds descaled as laid*
		External Finish	*Welds descaled as laid*

Remarks

**** To be determined by the vendor.***
Note 1: Deleted.
Note 2: Material shall have Carbon Content of 0.030% Max. Non-welded items are excluded from this requirement.
Note 3: Nozzle necks below normal operating level are Primary, others Auxiliary. See 24590-WTP-3PS-MV00-TP001 for NDE. 1
Note 4: Additional NDE requirements should be as per 6.4 of 24590-WTP-3PS-MV00-TP001.
Note 5: Contents of this document are dangerous waste permit affecting. 1

R10505701

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-LAW-LFP-VSL-00001*

Project:	*RPP-WTP*	P&ID:	*24590-LAW-M6-LFP-P0001; 24590-LAW-M6-LFP-P0002* 1
Project No:	*24590*	Process Data Sheet:	*~~Deleted~~* 1 3/7/05
Project Site.	*Hanford*	Vessel Drawing	*24590-LAW-MV-LFP-P0004*
Description:	*Melter 1 Feed Prep Vessel*		

Reference Data

Charge Vessels (Tag Numbers)	*Not Applicable*
Pulsejet Mixers / Agitators (Tag Numbers)	*LFP-AGT-00001*
RFDs/Pumps (Tag Numbers)	*LFP-PMP-00001A, LFP-PMP-00001B*
Spray Nozzles	*LFP-NOZ-00001, LFP-NOZ-00002*

Design Data

Quality Level		*CM (Note 4)*	Fabrication Specs	*24590-WTP-3PS-MV00-TP001*		
Seismic Category		*SC-III*	Design Code	*ASME VIII Div 1*		
Service/Contents		*LAW Melter Feed*	Code Stamp	*Yes*		
Design Specific Gravity		*1.90*	NB Registration	*Yes*		
Maximum Operating Volume	gal	*7,689*	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	*9,123*	Estimated	*37,000*	*157,100*	*113,300*
			Actual *			

Inside Diameter	inch	*132*			Wind Design	*Not Required*	
Length/Height (TL-TL)	inch	*126*			Snow Design	*Not Required*	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	*24590-WTP-3PS-MV00-TP002* *24590-WTP-3PS-FB01-T0001*	
Internal Pressure	psig	*0.07*	*15*	*None*	Seismic Base Moment *	ft*lb	
External Pressure	psig	*4.09*	*FV*	*None*	Postweld Heat Treat	*Not Required*	
Temperature	°F	*98*	*150*	*None*	Corrosion Allowance	Inch	*0.04 Top Head* *0.125 Shell & Btm Head*
Min Design Metal Temp.	°F	*40*			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY RPP-WTP PDC

MARK W. HOFFMAN STATE OF WASHINGTON 0030952 REGISTERED PROFESSIONAL ENGINEER 3/7/05

EXPIRES 12/10/06

This bound document contains a total of 2 sheets.

Rev.	Reason for Revision	By	Checked	Review	Approved	Date
1	Issued for Permitting Use					3/7/05
0	Issued for Permitting Use	J. Jackson	S. Lee	C. Slater	U. Isem	12/29/03

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-LAW-LFP-VSL-00001*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SA-240 316 (Note 2)***	***See Drawing***	***Auxiliary***
Shell	***SA-240 316 (Note 2)***	***See Drawing***	***Primary***
Bottom Head	***SA-240 316 (Note 2)***	***See Drawing***	***Primary***
Support	***SA-240 304 (Note 2)***	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***N/A***	***N/A*** 1	***N/A***
Internals	***SA-240 316 (Note 2)***	***See Drawing***	***Thermowells Primary***
Pipe (Seamless)	***SA-312 TP316 Seamless (Note 2)***	***See Drawing***	***Note 3***
Forgings/ Bar stock	***SA-182 F316 (Note 2)***	***See Drawing***	***N/A***
Gaskets (O Ring)	***EPDM O-Ring***	***N/A***	***N/A***
Bolting	***SA-193 B8M / SA-194 8M***	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Welds descaled as laid***
		External Finish	***Welds descaled as laid***

Remarks

**** To be determined by the vendor.***
Note 1: Deleted.
Note 2: Material shall have Carbon Content of 0.030% Max. Non-welded items are excluded from this requirement.
Note 3: Nozzle necks below normal operating level are Primary, others Auxiliary. See 24590-WTP-3PS-MV00-TP001 for NDE 1
Note 4: Additional NDE requirements should be as per 6.4 of 24590-WTP-3PS-MV00-TP001.
Note 5: Contents of this document are dangerous waste permit affecting. 1

R10505702

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-LAW-LFP-VSL-00003*

Project:	*RPP-WTP*	P&ID:	*24590-LAW-M6-LFP-P0003; 24590-LAW-M6-LFP-P0004* 1
Project No:	*24590*	Process Data Sheet:	*~~Deleted~~* 1 3/7/05
Project Site:	*Hanford*	Vessel Drawing	*24590-LAW-MV-LFP-P0005*
Description:	*Melter 2 Feed Prep Vessel*		

Reference Data

Charge Vessels (Tag Numbers)	*Not Applicable*
Pulsejet Mixers / Agitators (Tag Numbers)	*LFP-AGT-00003*
RFDs/Pumps (Tag Numbers)	*LFP-PMP-00003A, LFP-PMP-00003B* 1
Spray Nozzles	*LFP-NOZ-00006, LFP-NOZ-00007*

Design Data

Quality Level		*CM (Note 4)*	Fabrication Specs	*24590-WTP-3PS-MV00-TP001*		
Seismic Category		*SC-III*	Design Code	*ASME VIII Div 1*		
Service/Contents		*LAW Melter Feed*	Code Stamp	*Yes*		
Design Specific Gravity		*1.90*	NB Registration	*Yes*		
Maximum Operating Volume	gal	*7,689*	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	*9,123*	Estimated	*37,000*	*157,100*	*113,300*
			Actual *			

Inside Diameter	inch	*132*			Wind Design	*Not Required*	
Length/Height (TL-TL)	inch	*126*			Snow Design	*Not Required*	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	*24590-WTP-3PS-MV00-TP002* *24590-WTP-3PS-FB01-T0001*	
Internal Pressure	psig	*0.07*	*15*	*None*	Seismic Base Moment *	ft*lb	
External Pressure	psig	*4.09* 1	*FV*	*None*	Postweld Heat Treat	*Not Required*	
Temperature	°F	*98*	*150*	*None*	Corrosion Allowance	inch	*0.04 Top Head* *0.125 Shell & Btm Head*
Min. Design Metal Temp.	°F	*40*			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY RPP-WTP PDC

MARK W. HOFFMANN STATE OF WASHINGTON 0030952 REGISTERED PROFESSIONAL ENGINEER 3/7/05

EXPIRES 12/10/06

This bound document contains a total of 2 sheets.

Rev.	Reason for Revision	By	Checked	Review	Approved	Date
1	Issued for Permitting Use					3/7/05
0	Issued for Permitting Use	J. Jackson	S. Lee	C. Slater	E. Ebern	12/29/03

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-LAW-LFP-VSL-00003*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	*SA-240 316 (Note 2)*	*See Drawing*	*Auxiliary*
Shell	*SA-240 316 (Note 2)*	*See Drawing*	*Primary*
Bottom Head	*SA-240 316 (Note 2)*	*See Drawing*	*Primary*
Support	*SA-240 304 (Note 2)*	*See Drawing*	*N/A*
Jacket/Coils/Half-Pipe Jacket	*N/A*	*N/A* 1	*N/A*
Internals	*SA-240 316 (Note 2)*	*See Drawing*	*Thermowells Primary*
Pipe (Seamless)	*SA-312 TP316 Seamless (Note 2)*	*See Drawing*	*Note 3*
Forgings/ Bar stock	*SA-182 F316 (Note 2)*	*See Drawing*	*N/A*
Gaskets (O Ring)	*EPDM O-Ring*	*N/A*	*N/A*
Bolting	*SA-193 B8M / SA-194 8M*	*N/A*	*N/A*

Miscellaneous Data

Orientation	*Vertical*	Support Type	*Skirt*
Insulation Function	*Not Applicable*	Insulation Material	*Not Applicable*
Insulation Thickness (inch)	*Not Applicable*	Internal Finish	*Welds descaled as laid*
		External Finish	*Welds descaled as laid*

Remarks

**** To be determined by the vendor.***

Note 1: Deleted.

Note 2: Material shall have Carbon Content of 0.030% Max. Non-welded items are excluded from this requirement.

Note 3: Nozzle necks below normal operating level are Primary, others Auxiliary. See 24590-WTP-3PS-MV00-TP001 for NDE. 1

Note 4: Additional NDE requirements should be as per 6.4 of 24590-WTP-3PS-MV00-TP001.

Note 5: Contents of this document are dangerous waste permit affecting. 1

MECHANICAL SYSTEMS DATA SHEET: VESSEL

PLANT ITEM No.
24590-HLW-MV-HOP-VSL-00903

R10550706

Project:	RPP-WTP	P&ID:	24590-HLW-M6-HOP-P0006 & 24590-HLW-M6-HOP-P0004
Project No:	24590	Process Data Sheet:	Deleted 2
Project Site:	Hanford	Vessel Drawing	24590-HLW-MV-HOP-P0001
Description:	SBS Condensate Receiver Vessel 2		

ISSUED BY RPP-WTP PDC

Reference Data

Charge Vessels (Plant Item Numbers)	HOP-VSL-00004A/B, HOP-VSL-00101A/B
Pulsejet Mixers / Agitators (Plant Item Numbers)	HOP-PJM-00001, HOP-PJM-00002, HOP-PJM-00003, HOP-PJM-00007
RFD(s)/Pump(s) (Plant Item Numbers)	HOP-RFD-00001A/B, HOP-RFD-00002A/B

Design Data

Quality Level	QL-2 2	Fabrication Specs	24590-WTP-3PS-MV00-TP001 2		
Seismic Category	SC-III 2	Design Code	ASME VIII Div 1		
Service/Contents	Liquid Acidic Condensate	Code Stamp	Yes		
Design Specific Gravity	1.098	NB Registration	Yes		
Operating Volume gal	8199 (Note 5)	Weights (lbs)	Empty	Operating	Test
Total Volume gal	9891 (Note 5)	Estimated	37,900	111,000	121,000
		Actual *	42,810 2	116,070 2	134,470 2

Inside Diameter	inch	144			Wind Design	N/A	
Length/Height (TL-TL)	inch	93			Snow Design	N/A	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	24590-WTP-3PS-SS90-T0001 24590-WTP-3PS-MV00-TP002	
Internal Pressure	psig	Atm	15	65	Seismic Base Moment *	ft*lb	
External Pressure	psig	1.8	FV	FV	Postweld Heat Treat	Not Required	
Temperature	°F	122	165	165	Corrosion Allowance	inch	0.08 Shell / 0.04 Jacket
Min. Design Metal Temp.	°F	40			Hydrostatic Test Pressure *	Psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED PROFESSIONAL ENGINEER
4/7/05

EXPIRES 12/10/06

This Bound Document Contains a total of 8 Sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
2	4/7/05	Issued for Permitting Use				
1	6/4/03	Issued for Permitting Use	J. Jackson	S. Lee	C. Slater	M. Hoffmann
0	9/19/02	Issued for Permitting Use	J. Jackson	C. Slater	N/A	S. Kirk

BECHTEL	**MECHANICAL SYSTEMS DATA SHEET: VESSEL**	PLANT ITEM No. *24590-HLW-MV-HOP-VSL-00903*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	*SB-575 N06022*	*See drawing*	*Auxiliary (Note 1)* 2
Shell	*SB-575 N06022*	*See drawing*	*Primary (Note 1)* 2
Bottom Head	*SB-575 N06022*	*See drawing*	*Primary (Note 1)* 2
Support	*SA-240 304L*	*See drawing*	*N/A (100% RT long seams)*
Jacket/Coils/Half-Pipe Jacket	*SA-240 316L*	*See drawing*	*N/A* 2
Internals (incl. nozzle necks)	*SB-575 N06022 / SB-622 N06022*	*See drawing*	*Thermocouples Primary (Note 1)* 2
Pipe (Internal / Jacket)	*SB-622 N06022 / SA-312 TP316L*	*See drawing*	*Note 1*
Forgings/ Bar stock (Vessel / Jacket)	*SB-564 N06022 / SA-182 F316L*		*Note 1* 2
Gaskets	*None*		*N/A* 2
Bolting	*None*		*N/A* 2

Miscellaneous Data

Orientation	*Vertical*	Support Type	*Skirt*
Insulation Function	*None*	Insulation Material	*N/A*
Insulation Thickness (inch)	*N/A*	Internal Finish	*Note 2* 2
		External Finish	*Note 2* 2

Remarks

**** To be determined by the vendor.***

Note 1: All welds forming part of the primary and auxiliary containments, including the nozzle attachment welds shall be subjected to 100% volumetric examination. Radiography is the preferred method of volumetric testing. If it is considered impractical to perform radiographic examination, the Seller may propose ultrasonic examination. 2

Note 2: All welds descaled, as-laid 2

Note 3: Normal Operating Temperature is 122 °F, Maximum Temperature is 140 °F.

Note 4: Deleted 2

Note 5: Vessel volumes are approximate and do not account for manufacturing tolerances, nozzles, and displacement of internals. 2

Note 6: Deleted. 2

Note 7: Contents of this document are Dangerous Waste Permit affecting. 2

Note 8: This vessel is located in a Black Cell. 2

Note 9: The summary of the hydrodynamic forces for the fatigue case are as follows: 2

Summary of Hydrodynamic Forces for Normal PJM Operation (Fatigue) Case: 2

The peak loads given below are calculated based on velocity time histories generated using the CFD model of the SBSCV vessel for PJM drive flow of about 8 m/s. Force time histories were developed (e.g. see Figure 1) but the results given below are peak force summaries only.

1) Radial Direction - Peak Forces on Piping (Sch 40) below PJM Nozzle Level:

Pipe Diameter	Peak Positive Force/length	Peak Negative Force/length
inches	lbf/ft	lbf/ft
6	50	40
4	23	18
2	7	5
1	3	3

2) Radial Direction - Peak Forces on Piping (Sch 40) above PJM Nozzle Level:

Pipe Diameter	Peak Positive Force/length	Peak Negative Force/length
inches	lbf/ft	lbf/ft
6	3.0	1.0
4	1.5	0.5
2	0.4	0.2
1	0.1	0.1

3) Radial Direction - Charge Vessel Peak Force = 150 lbf

4) Radial Direction - PJM Peak Force = 200 lbf

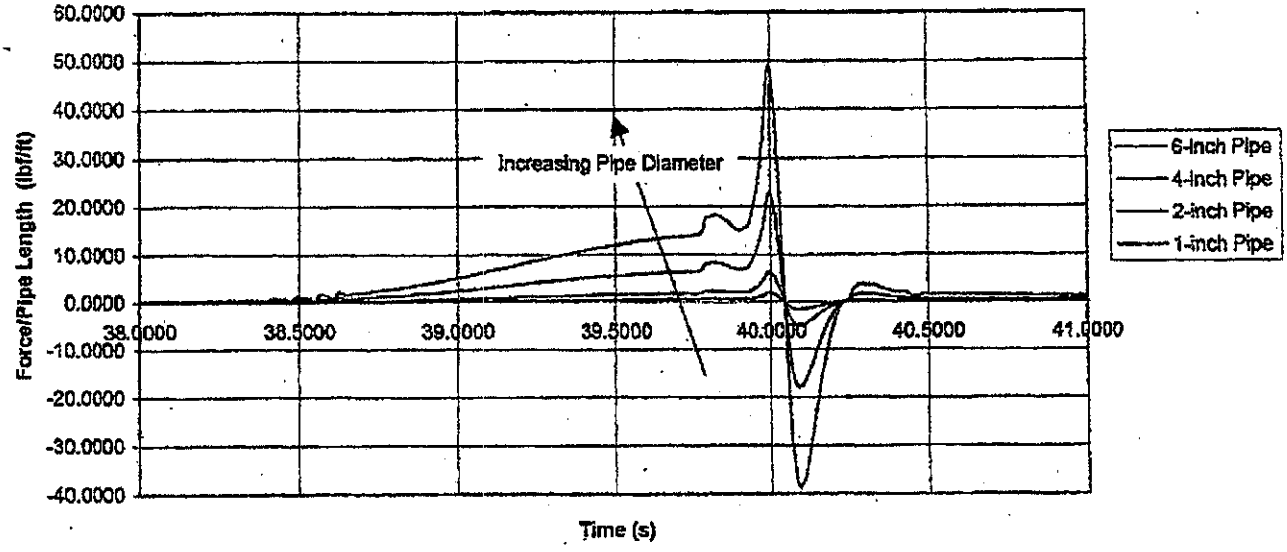
5) Axial (Vertical) Direction - Charge Vessel Peak Force = 70 lbf

6) Axial (Vertical) Direction - PJM Peak Force = 70 lbf

7) Axial (Vertical) Direction – Peak Forces on Horizontal Piping (Sch 40)

Pipe Diameter	Peak Positive Force/length	Peak Negative Force/length
inches	lbf/ft	lbf/ft
6	28	6
4	13	4
2	4	1
1	1	0

Figure 1: Total Drag Loads per PJM Cycle at Monitor Point 20 Below PJM Nozzle Level - Radial Direction 2



Note 10: The Hydrodynamic loads given in Note 9 are bounding loads. 2

Note 11: This Vessel was procured as Quality Level 1 and Seismic Category I. 2

Note 12: The changes implemented by Revision 2 of this data sheet are for BNI use only. 2

1	EQUIPMENT CYCLIC DATA SHEET			
2	Plant Item Number:	24590-HLW-MV-HOP-VSL-00903		
3	Plant Item Description	SBS Condensate Receiver Vessel		
4	Component	Vessel		
5		*The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data or requirement.*		
6				
7	Materials of Construction	SB-575 N06022 △2		
8	Design Life	40 years		
9	Component Function & Life Cycle Description	This is a 'head' tank. It normally operates full. HOP-RFD-00001A/B & HOP-RFD-00002A/B discharge liquid during normal operation and equal volumes of liquid are received by the vessel. The vessel is emptied once a day. Washdown is once per year.		
10	Associated Equipment	Jacket, HOP-PJM-00001, HOP-PJM-00002, HOP-PJM-00003, HOP-PJM-00007 and HOP-VSL-00004A/B, HOP-VSL-00101A/B		
11				
12	**Load Type**	Quantity	Number of Cycles	Comment
13	Design Pressure (+ve/-ve)	15 psig / (FV)	10	Nominal assumption.
14	Operating Pressure (+ve/-ve)	(Atm) / -1.8psi	14235	
15	Operating Temperature (max/min)	122° F / 59° F	14235	Pressure cycles to be at 122° F. This is a uniform material temperature range, not between adjacent points.
16	Contents SG (min/max)	1.000 / 1.098	14235	
17	Contents Level	Empty / Flooded	14235	Coincident with pressure cycles.
18				
19				
20	**Localized Features**			
21	Nozzles			
22	All nozzles	Within 50° F of vessel temperature.	As above.	
23				
24				
25				
26				

27 NOTES.

- Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.
- CVs inside parent vessels shall have buoyancy effects considered. PJMs shall be similarly considered and also the liquid thrust effect. See the Specification for Pressure Vessel Design and Fabrication, 24590-WTP-3PS-MV00-TP001. △2
- Fatigue environmental effects assumed negligible.

1	EQUIPMENT CYCLIC DATA SHEET			
2	Plant Item Number:	24590-HLW-MV-HOP-VSL-00903		
3	Plant Item Description	SBS Condensate Receiver Vessel		
4	Component	**Jacket**		
5		*The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data or requirement.*		
6				
7	Materials of Construction	ASME SA240 316L		
8	Design Life	40 years		
9	Component Function & Life Cycle Description	The jacket provides a cooling duty with cold water when the vessel is in service. *Provisional assumption is shutdown once a day.*		
10	Associated Equipment	24590-HLW-MV-HOP-VSL-00903		
11				
12	**Load Type**	Quantity	Number of Cycles	Comment
13	Design Pressure (+ve/-ve)	65 psig / (FV)	10	Nominal assumption.
14	Operating Pressure (+ve/-ve)	60 psig / (FV)	14235	
15	Operating Temperature (max/min)	122° F / 59° F	14235	Pressure cycles to be at 122° F. This is a uniform material temperature range, not between adjacent points.
16	Contents SG (min/max).	1.000	N/A	
17	Contents Level	Empty / Flooded	13	*3 year maintenance period assumed*
18				
19				
20	**Localized Features**			
21	Nozzles			
22	All nozzles	Within 50° F of vessel and jacket temperatures.	As above.	
23				
24				
25				
26				
27	NOTES. • Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted. • Fatigue environmental effects assumed negligible.			

1	EQUIPMENT CYCLIC DATA SHEET			
2	Plant Item Number:	(Parent) 24590-HLW-MV-HOP-VSL-00903		
3	Plant Item Description	SBS Condensate Receiver Vessel		
4	Component	Charge Vessel HOP-VSL-00004A/B, HOP-VSL-00101A/B		
5		*The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data or requirement.*		
6				
7	Materials of Construction	SB-575 N06022 △2		
8	Design Life	40 years		
9	Component Function & Life Cycle Description	This component is part of a pumping system. It repeatedly floods and empties. The action is caused by vacuum or air pressure being presented to the top nozzle. The surrounding parent vessel may contain any level of the fluid between the maximum operating level and the heel level. The charge vessel is subjected to buoyancy forces when immersed in the parent vessel contents. The vessel is in cyclic duty.		
10	Associated Equipment	See parent vessel MDS details.		
11				
12	**Load Type**	Quantity	Number of Cycles	Comment
13	Design Pressure (+ve/-ve)	32 psig / (FV)	10	Nominal assumption.
14	Operating Pressure (+ve/-ve)	29 psig / (FV)	2.1×10^7	
15	Operating Temperature (max/min)	122° F / 59° F	14235 △2	Pressure cycles to be at 122° F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points. Typically washdown 1/year and shutdowns = 13.
16	Contents SG (min/max)	1.000 / 1.098	14235 △2	
17	Contents Level	Empty / Flooded	2.1×10^7	Coincident with pressure cycles.
18				
20	**Localized Features**			
21	Nozzles			
22	Air Inlet	As above	As above including pressure cycles.	
23	Delivery	As above	As above including pressure cycles.	
24	Supports	As above	As above with contents level changing coincident with pressure cycle. Floatation on parent vessel contents level frequency.	
25				
26				
27	NOTES. • Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted. • CVs inside parent vessels shall have buoyancy effects considered. PJMs shall be similarly considered and also the liquid thrust effect. See the Specification for Pressure Vessel Design and Fabrication, 24590-WTP-3PS-MV00-TP001. △2 • Fatigue environmental effects assumed negligible.			

1	EQUIPMENT CYCLIC DATA SHEET			
2	Plant Item Number:	(Parent) 24590-HLW-MV-HOP-VSL-00903		
3	Plant Item Description	SBS Condensate Receiver Vessel		
4	Component	Pulse Jet Mixer (vessel) HOP-PJM-00001, HOP-PJM-00002, HOP-PJM-00003, HOP-PJM-00007		
5		*The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data or requirement.*		
6				
7	Materials of Construction	SB-575 N06022 △2		
8	Design Life	40 years		
9	Component Function & Life Cycle Description	This component is part of a mixing system. It repeatedly floods and empties. The action is caused by vacuum or air pressure being presented to the top nozzle. The surrounding parent vessel may contain any level of the fluid between the maximum operating level and the heel level. The vessel is subjected to buoyancy forces when immersed in the parent vessel contents. The vessel is in cyclic duty.		
10	Associated Equipment	See parent vessel MDS details.		
11				
12	**Load Type**	Quantity	Number of Cycles	Comment
13	Design Pressure (+ve/-ve)	80 psig / (FV)	10	Nominal assumption.
14	Operating Pressure (+ve/-ve)	58 psig / (FV)	4.2×10^7	
15	Operating Temperature (max/min)	122° F / 59° F	14235 △2	Pressure cycles to be at 122° F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points. Typically washdown 1/year and shutdowns = 13.
16	Contents SG (min/max)	1.000 / 1.098	14235 △2	
17	Contents Level	Empty / Flooded	4.2×10^7	Coincident with pressure cycles.
18	Thrust Load (lb) △2	252	4.2×10^7	See Note below
20	**Localized Features**			
21	Nozzles			
22	Air Inlet	As above	As above including pressure cycles.	
23	Delivery	As above	As above including pressure cycles.	
24	Supports	As above	As above with contents level changing coincident with pressure cycle. Floatation on parent vessel contents level frequency.	

27 NOTES.

- Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.
- CVs inside parent vessels shall have buoyancy effects considered. PJMs shall be similarly considered and also the liquid thrust effect. See the Specification for Pressure Vessel Design and Fabrication, 24590-WTP-3PS-MV00-TP001. △2
- Fatigue environmental effects assumed negligible.
- Thrust loading should be ignored when considering deadweight loading of PJM with empty parent vessel, and should only be applied when considering buoyancy loading of PJM with full parent vessel. Assume parent vessel to be full for 50% of stated number of PJM cycles. △2

MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No.
24590-HLW-MV-HOP-VSL-00904

R10650707

Project:	RPP-WTP	P&ID:	24590-HLW-M6-HOP-P20006 & HLW-M6-HOP-P20004
Project No:	24590	Process Data Sheet:	Deleted 1
Project Site:	Hanford	Vessel Drawing	24590-HLW-MV-HOP-P0003 1
Description:	Melter 2 SBS Condensate Receiver Vessel		

ISSUED BY RPP-WTP PDC

Reference Data

Charge Vessels (Tag Numbers)	HOP-VSL-00905A/B, HOP-VSL-00906A/B
Pulsejet Mixers / Agitators (Tag Numbers)	HOP-PJM-00008, HOP-PJM-00009, HOP-PJM-00010, HOP-PJM-00011
RFDs/Pumps (Tag Numbers)	HOP-RFD-00003A/B, HOP-RFD-00004A/B

Design Data

Quality Level		QL-2 1	Fabrication Specs	24590-WTP-3PS-MV00-TP001 1		
Seismic Category		SC-III 1	Design Code	ASME VIII Div 1		
Service/Contents		Liquid Acidic Condensate	Code Stamp	Yes		
Design Specific Gravity		1.098	NB Registration	Yes		
Maximum Operating Volume	gal	8,199 (Note 6) 1	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	9,891 (Note 6) 1	Estimated	37,900	111,000	121,000
			Actual *	42,810 1	116,070 1	134,470 1

Inside Diameter	inch	144			Wind Design	Not Required	
Length/Height (TL-TL)	inch	93			Snow Design	Not Required	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	24590-WTP-3PS-SS90-T0001 24590-WTP-3PS-MV00-TP002	
Internal Pressure	psig	Atm	15	65	Seismic Base Moment *	ft*lb	
External Pressure	psig	1.8	FV	FV	Postweld Heat Treat	Not Required	
Temperature	°F	122	165	165	Corrosion Allowance	Inch	0.08 Shell / 0.04 Jacket
Min. Design Metal Temp.	°F	40			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED
PROFESSIONAL ENGINEER
4/7/05
EXPIRES 12/10/06

This Bound Document Contains a total of 8 Sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
1	4/7/05	Issued for Permitting Use				
0	10/3/03	Issued for Permitting Use	J. Jackson	S. Lee	C. Slater	M. Hoffmann

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-HLW-MV-HOP-VSL-00904*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	*SB-575 N06022*	*See Drawing*	*Auxiliary (Note 1)* 1
Shell	*SB-575 N06022*	*See Drawing*	*Primary (Note 1)* 1
Bottom Head	*SB-575 N06022*	*See Drawing*	*Primary (Note 1)* 1
Support	*SA-240 304L*	*See Drawing*	*N/A (100% RT long seams)*
Jacket/Coils/Half-Pipe Jacket	*SA-240 316L*	*See Drawing*	*N/A*
Internals (incl. nozzle necks)	*SB-575 N06022 / SB-622 N06022*	*See Drawing*	*Thermocouples Primary (Note 1)* 1
Pipe (Internal / Jacket)	*SB-622 N06022 / SA-312 316L*	*See Drawing*	*Note 1*
Forgings/ Bar stock (Vessel / Jacket)	*SB-564 N06022 / SA-182 F316L*		*Note 1* 1
Gaskets	*None*		*N/A*
Bolting	*None*		*N/A*

Miscellaneous Data

Orientation	*Vertical*	Support Type	*Skirt*
Insulation Function	*None*	Insulation Material	*N/A*
Insulation Thickness (inch)	*N/A*	Internal Finish	*Note 2* 1
		External Finish	*Note 2* 1

Remarks

**** To be determined by the vendor.***

Note 1: All welds forming part of the primary and auxiliary containments, including the nozzle attachment welds shall be subjected to 100% volumetric examination. Radiography is the preferred method of volumetric testing. If it is considered impractical to perform radiographic examination, the Seller may propose ultrasonic examination. 1

Note 2: All welds descaled, as-laid.

Note 3: Deleted.

Note 4: Deleted.

Note 5: Normal Operating Temperature is 122 °F, Maximum Temperature is 140 °F.

Note 6: Vessel volumes are approximate and do not account for manufacturing tolerances, nozzles, and displacement of internals.

Note 7: Contents of this document are Dangerous Waste Permit affecting. 1

Note 8: This vessel is located in a Black Cell. 1

Note 9: The summary of the hydrodynamic forces for the fatigue case are as follows: 1

Summary of Hydrodynamic Forces for Normal PJM Operation (Fatigue) Case: 1

The peak loads given below are calculated based on velocity time histories generated using the CFD model of the SBSCV vessel for PJM drive flow of about 8 m/s. Force time histories were developed (e.g. see Figure 1) but the results given below are peak force summaries only.

1) Radial Direction - Peak Forces on Piping (Sch 40) below PJM Nozzle Level:

Pipe Diameter	Peak Positive Force/length	Peak Negative Force/length
inches	lbf/ft	lbf/ft
6	50	40
4	23	18
2	7	5
1	3	3

2) Radial Direction - Peak Forces on Piping (Sch 40) above PJM Nozzle Level:

Pipe Diameter	Peak Positive Force/length	Peak Negative Force/length
inches	lbf/ft	lbf/ft
6	3.0	1.0
4	1.5	0.5
2	0.4	0.2
1	0.1	0.1

3) Radial Direction - Charge Vessel Peak Force = 150 lbf

4) Radial Direction - PJM Peak Force = 200 lbf

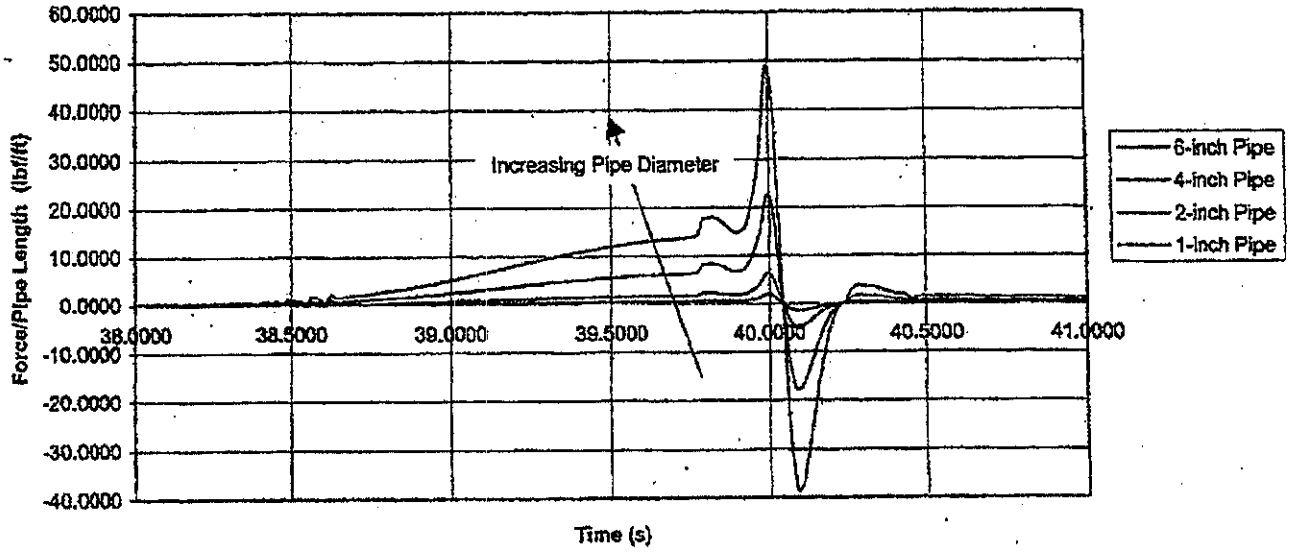
5) Axial (Vertical) Direction - Charge Vessel Peak Force = 70 lbf

6) Axial (Vertical) Direction - PJM Peak Force = 70 lbf

7) Axial (Vertical) Direction – Peak Forces on Horizontal Piping (Sch 40)

Pipe Diameter	Peak Positive Force/length	Peak Negative Force/length
inches	lbf/ft	lbf/ft
6	28	6
4	13	4
2	4	1
1	1	0

Figure 1: Total Drag Loads per PJM Cycle at Monitor Point 20 Below PJM Nozzle Level - Radial Direction



Note 10: The Hydrodynamic loads given in Note 9 are bounding loads.

Note 11: This Vessel was procured as Quality Level 1 and Seismic Category I.

Note 12: The changes implemented by Revision 1 of this data sheet are for BNI use only.

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-HLW-MV-HOP-VSL-00904*

Equipment Cyclic Data Sheet

Component Plant Item Number:	*24590-HLW-MV-HOP-VSL-00904*
Component Description	*Melter 2 SBS Condensate Receiver Vessel*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*SB-575 N06022*
Design Life	*40 Years*
Component Function and Life Cycle Description	*This is a 'head' tank. It is normally operates full. HOP-RFD-00003A/B and HOP-RFD-00004A/B discharge liquid during normal operation and equal volumes of liquid are received into the vessel. The vessel is emptied once a day. Washdown is once per year.*

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*15*	*10*	*Nominal Assumption.*
Operating Pressure	psig	*-1.8*	*Atm*	*14235*	
Operating Temperature	°F	*59°F*	*122*	*14235*	*Pressure cycles to be at 122 °F. This is a uniform material temperature range, not between adjacent points.*
Contents Specific Gravity		*1.00*	*1.098*	*14235*	
Contents Level	Inch	*Empty*	*Flooded*	*14235*	*Coincident with pressure cycles.*
Localized Features					
Nozzles (1)					
Supports (1)		*Within 50 °F of vessel temperature.*		*As above.*	

Notes

- *Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*
- *CVs inside parent vessels shall have buoyancy effects considered. PJMs shall be similarly considered and also the liquid thrust effect. See the Specification for Pressure Vessel Design and Fabrication, 24590-WTP-3PS-MV00-TP001.*
- *Fatigue environmental effects assumed negligible.*

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-HLW-MV-HOP-VSL-00904*

Equipment Cyclic Data Sheet

Component Plant Item Number:	*24590-HLW-MV-HOP-VSL-00904*
Component Description	*Jacket*

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	*SA-240 316L*
Design Life	*40 Years*
Component Function and Life Cycle Description	*The jacket provides a cooling duty with cold water when the vessel is in service. Provisional assumption is shutdown once a day.*

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*65*	*10*	*Nominal assumption.*
Operating Pressure	psig	*FV*	*60*	*14235*	
Operating Temperature	°F	*59°F*	*122 °F*	*14235*	*Pressure cycles to be at 122 °F. This is a uniform material temperature range, not between adjacent points.*
Contents Specific Gravity		*1.00*		*N/A*	
Contents Level	inch	*Empty*	*Flooded*	*13*	*3 year maintenance period assumed*

Localized Features		
Nozzles		
Supports	*Within 50 °F of vessel and jacket temperatures.*	*As above.*

Notes

- *Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*
- *Fatigue environmental effects assumed negligible.*

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-HLW-MV-HOP-VSL-00904*

Equipment Cyclic Data Sheet

Component Plant Item Number:	***HOP-VSL-00905AIB, HOP-VSL-00906AIB***
Component Description	***Charge Vessels***

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	***SB-575 N06022***
Design Life	***40 Years***
Component Function and Life Cycle Description	***This component is part of a pumping system. It repeatedly floods and empties. The action is caused by vacuum or air pressure being presented to the top nozzle. The surrounding parent vessel may contain any level of the fluid between the maximum operating level and the heel level. The charge vessel is subjected to buoyancy forces when immersed in the parent vessel contents. The vessel is in cyclic duty.***

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	***FV***	***32***	***10***	***Nominal assumption.***
Operating Pressure	psig	***FV***	***20***	***2.1×10^7***	
Operating Temperature	°F	***59°F***	***122 °F***	***14235*** (1)	***Pressure cycles to be at 122 °F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points. Typically washdown 1/year and shutdowns = 13.***
Contents Specific Gravity		***1.00***	***1.098***	***14235*** (1)	
Contents Level	inch	***Empty***	***Flooded***	***2.1×10^7***	***Coincident with pressure cycles.***
Localized Features					
Nozzles					
Air inlet		***As above***		***As above including pressure cycles.***	
Delivery		***As above***		***As above including pressure cycles.***	
Supports		***As above***		***As above with contents level changing coincident with pressure cycle. Floatation on parent vessel contents level frequency.***	

Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***
- ***CVs inside parent vessels shall have buoyancy effects considered. PJMs shall be similarly considered and also the liquid thrust effect. See the Specification for Pressure Vessel Design and Fabrication, 24590-WTP-3PS-MV00-TP001.***
- ***Fatigue environmental effects assumed negligible.***

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-HLW-MV-HOP-VSL-00904*

Equipment Cyclic Data Sheet

Component Plant Item Number:	***HOP-PJM-00008, HOP-PJM-00009, HOP-PJM-00010, HOP-PJM0-00011***
Component Description	***Pulse Jet Mixer***

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	***SB-575 N06022***
Design Life	***40 Years***
Component Function and Life Cycle Description	***This component is part of a mixing system. It repeatedly floods and empties. The action is caused by vacuum or air pressure being presented to the top nozzle. The surrounding parent vessel may contain any level of the fluid between the maximum operating level and the heel level. The vessel is subjected to buoyancy forces when immersed in the parent vessel contents. The vessel is in cyclic duty.***

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	***FV***	***80***	***10***	***Nominal assumption.***
Operating Pressure	psig	***FV***	***58***	***4.2×10^7***	
Operating Temperature	°F	***59 °F***	***122 °F***	***14235*** △1	***Pressure cycles to be at 122 °F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points. Typically washdown 1/year and shutdowns = 13.***
Contents Specific Gravity		***1.00***	***1.098***	***14235*** △1	
Contents Level	inch	***Empty***	***Flooded***	***4.2×10^7***	***Coincident with pressure cycles.***
Thrust Load △1	lb		***252*** △1	***4.2×10^7*** △1	***See Note below*** △1
Localized Features					
Nozzles					
Air Inlet		***As above***		***As above including pressure cycles.***	
Delivery		***As above***		***As above including pressure cycles.***	
Supports		***As above***		***As above with contents level changing coincident with pressure cycle. Floatation on parent vessel contents level frequency.***	

Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***
- ***CVs inside parent vessels shall have buoyancy effects considered. PJMs shall be similarly considered and also the liquid thrust effect. See the Specification for Pressure Vessel Design and Fabrication, 24590-WTP-3PS-MV00-TP001.***
- ***Fatigue environmental effects assumed negligible.***
- ***Thrust loading should be ignored when considering deadweight loading of PJM with empty parent vessel, and should only be applied when considering buoyancy loading of PJM with full parent vessel. Assume parent vessel to be full for 50% of stated number of PJM cycles.*** △1

R10484664

MECHANICAL DATA SHEET

PLATE HEAT EXCHANGER

ISSUED BY RPP-WTP PDC

PLANT ITEM No. 24590-HLW-ME-HOP-HX-00002

Data Sheet Number: 24590-HLW-MED-HOP-P0012 Rev. 1

Project:	RPP-WTP	Description:	Silver Mordenite Preheater @ 0' Elv. - Room H-A123
Project No:	24590	Specification:	N/A
Site:	Hanford	P&ID:	24590-HLW-M6-HOP-P0003
Process flow diagram:	24590-HLW-M5-V17T-P0004	Process Data Sht:	Deleted

1

Reference Data

Quality Level	QL-2	Flow Type	* IU
Seismic Category	SC-III	Heat Exchanger Duty (Design with Base surface) Btu/hr	* 465,201
Design Code	Note 4	Heat Exchanger Area (with Oversurface) ft²	* 1920
Code Stamp	No	ΔT (LMTD) (Design) °F	* 63.5
NB Registration	No	Overall Heat Transfer Coefficient (Design) Btu / hr-ft²-°F	* 3.66

Mechanical Design Data

		Hot Side		Cold Side	
Design Pressure (max. / min.)	psig	5	-5	5	-5
Design Temperature (max. / min.)	°F	500	59	500	59
Corrosion Allowance	inch	none		none	
Erosion Allowance	inch	none		none	
Hydro/Pneumatic Test Pressure	psig	per code			
Insulation Type		Calcium Silicate rigid block (note 7)			
Insulation Thickness	inch	Vendor to specify for 140° F surface temperature and meet Note 10			
Thermal Cycling: Design min to max temp	cycles/yr	1			

Process Design Data

		Hot Side	Cold Side
Design Flow Rate	SCFM	2000	2000
Design Density (Avg)	lb/ft³	0.038	0.047
Design Inlet Temperature	°F	500	250
Outlet Temperature (Base Area)	°F	* 317 (Note 11)	* 436 (Note 11)
Outlet Temperature (With Oversurface area)	°F	* 315.5 (Note 11)	* 438 (Note 11)
Specific Heat (Avg)	Btu/lbm-°F	0.30	0.29
Heat Recovery Efficiency	%	70	
Fouling Resistance	hr-ft²-°F / Btu	0.000757	
Pressure Drop (Maximum Allowable)	in-WG	4	4
Overall Flange Inleakage	SCFM	<1	
Oversurface (minimum)	%	15	

Material Data

Plates	SA-240 316L	Nozzles/Flanges	SS T316L
End Covers	SA-240 316L	Removable Shroud	N/A
Hot Side Gaskets	None (Note 5)	Cold Side Gaskets	None (Note 6)
Tightening Bolts	None	Tightening Nuts	None

Construction Data

		Hot Side Piping		Cold Side Piping	
Inlet (Size/Connection Type)	inch	16"	150 lb RF Flange	14"	150 lb RF Flange
Outlet (Size/Connection Type)	inch	14"	150 lb RF Flange	14"	150 lb RF Flange
Plates Total Number (Supplied/Max) (Note 6)		64/64		Plate Dimensions (LxWxThk) inch	120 x 36 x 0.05
Overall Unit Size (LxWxH)	inch	(Note 2)*			
Weight lbf	(Note 3)	Operating Weight lbf	(Note 3)	Test Weight lbf	*

BECHTEL	**MECHANICAL DATA SHEET** **PLATE HEAT EXCHANGER**	**PLANT ITEM No.** **24590-HLW-ME-HOP-HX-00002** **Data Sheet Number:** **24590-HLW-MED-HOP-P0012 Rev. 1**

Thermal/Hydraulic Data

Maximum Conditions

		Hot Side		Cold Side	
Fluid Name		***Melter Offgas***		***Melter Offgas***	
		IN	***OUT***	***IN***	***OUT***
Fluid Quantities: Total (In/Out)	lbm/hr	7529	7529	6392	6392
(Note 13) Condensable Vapor (In/Out)		775	775	684	684
Liquid (In/Out)		0	0	0	0
Noncondensable (In/Out)		6754	6754	5708	5708
Temperature (In/Out) (with Oversurface)	°F	443	* 281 (Note 11)	205	* 399 (Note 11)
Density	lb/ft³	0.034	0.042	0.052	0.041
Viscosity	Cp	0.0263	0.0225	0.0208	0.0247
Molecular Weight, Vapor		18	18	18	18
Molecular Weight, Noncondensable		28	28	28	28
Specific Heat	Btu/lbm-°F	0.311	0.291	0.281	0.301
Thermal Conductivity	Btu/hr-ft-°F	0.023	0.019	0.017	0.021
Inlet pressure	psia	12.0		13.2	
Pressure Drop (with Oversurface)	in-WG	* 0.45		* 0.31	
Heat Recovery	%	* 80%			

△1

Normal Conditions

		Hot Side		Cold Side	
Fluid Name		***Melter Offgas***		***Melter Offgas***	
		IN	***OUT***	***IN***	***OUT***
Fluid Quantities: Total (In/Out)	lbm/hr	6622	6622	5537	5537
(Note 13) Condensable Vapor (In/Out)		364	364	327	327
Liquid (In/Out)		0	0	0	0
Noncondensable (In/Out)		6258	6258	5210	5210
Temperature (In/Out) (with Oversurface)	°F	434	* 254 (Note 11)	168	* 387 (Note 11)
Density	lb/ft³	0.038	0.047	0.057	0.044
Viscosity	Cp	0.0265	0.0223	0.0203	0.0248
Molecular Weight, Vapor		18	18	18	18
Molecular Weight, Noncondensable		28	28	28	28
Specific Heat	Btu/lbm-°F	0.282	0.27	0.265	0.278
Thermal Conductivity	Btu/hr-ft-°F	0.022	0.018	0.016	0.021
Inlet pressure	psia	12.8		13.6	
Pressure Drop (with Oversurface)	in-WG	* 0.33		* 0.22	
Heat Recovery	%	* 82%			

BECHTEL	**MECHANICAL DATA SHEET** **PLATE HEAT EXCHANGER**	**PLANT ITEM No.** **24590-HLW-ME-HOP-HX-00002** **Data Sheet Number:** **24590-HLW-MED-HOP-P0012 Rev. 1**

Notes

1. ***Items identified with an asterisk* are determined and or confirmed by the Vendor.***
2. ***Bounding dimensions not to exceed: 150" L x 56" W x 72" H.***
3. ***The weight shall not exceed 10,000 lbs.***
4. ***The heat exchanger pressure boundary shall be designed to ASME Section VIII, Div 1.***
5. ***Vendor to design the heat exchanger to the Mechanical and Process Design Data, and provide performance data as indicated for Normal and Maximum Conditions.***
6. ***Plates shall be all welded assembly, no gasketed joints allowed.***
7. ***Vendor to provide insulation mounted on exterior of unit.***
8. ***Not Used.***
9. ***There shall be no leakage between hot side and cold side.***
10. ***The total heat loss from the heat exchanger shall not exceed 1.5 kW.***
11. ***For the Process Design Data, Vendor shall provide the outlet temperatures for both the Base surface area and the Oversurface area. For the Maximum and Normal Conditions, provide the outlet temperatures based on Oversurface area.***
12. ***The temperature of the floor shall not exceed 100 °F. The temperature of the local imbeds shall not exceed 150 °F.***
13. ***Condensate vapor present in offgas is steam. There are no liquids present in the offgas stream.***
14. ***The Cold Side flow shall be in the straight pass (i.e., I) and the Hot Side flow in the U-pass.***
15. ***Contents of this document are Dangerous Waste Permit Affecting.***

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ERIC B. ISERN
STATE OF WASHINGTON
33449
REGISTERED
PROFESSIONAL ENGINEER
2/15/05
EXPIRES: 07/28/05

This bound document contains a total of 3 sheets

Rev	Description	System Engr	Equip Engr	Checked	Reviewed	Approved	Date
1	Re-issued for Permitting Use	R. Tomatczak	N/A				2/15/05
0	Issued For Permitting Use	K. Kirschenheiter	N/A	S. Shah	C. Winkler	M. Hoffmann	4/21/04

R10484663

MECHANICAL DATA SHEET
PLATE HEAT EXCHANGER

ISSUED BY RPP-WTP PDC

PLANT ITEM No. 24590-HLW-ME-HOP-HX-00004

Data Sheet Number: 24590-HLW-MED-HOP-P0017 Rev. 1

Project:	RPP-WTP	Description:	Silver Mordenite Preheater @ 0' Elv. - Room H-A123
Project No:	24590	Specification:	N/A
Site:	Hanford	P&ID:	24590-HLW-M6-HOP-P20003
Process flow diagram:	24590-HLW-M5-V17T-P20004	Process Data Sht:	Deleted

1

Reference Data

Quality Level	QL-2	Flow Type	* IU
Seismic Category	SC-III	Heat Exchanger Duty (Design with Base surface) Btu/hr	* 465,201
Design Code	Note 4	Heat Exchanger Area (with Oversurface) ft²	* 1920
Code Stamp	No	ΔT (LMTD) (Design) °F	* 63.5
NB Registration	No	Overall Heat Transfer Coefficient (Design) Btu / hr-ft²-°F	* 3.66

Mechanical Design Data

		Hot Side		Cold Side	
Design Pressure (max. / min.)	psig	5	-5	5	-5
Design Temperature (max. / min.)	°F	500	59	500	59
Corrosion Allowance	inch	none		none	
Erosion Allowance	inch	none		none	
Hydro/Pneumatic Test Pressure	psig	per code			
Insulation Type		Calcium Silicate rigid block (note 7)			
Insulation Thickness	inch	Vendor to specify for 140° F surface temperature and meet Note 10			
Thermal Cycling: Design min to max temp	cycles/yr	1			

Process Design Data

		Hot Side	Cold Side
Design Flow Rate	SCFM	2000	2000
Design Density (Avg)	lb/ft³	0.038	0.047
Design Inlet Temperature	°F	500	250
Outlet Temperature (Base Area)	°F	* 317 (Note 11)	* 436 (Note 11)
Outlet Temperature (With Oversurface area)	°F	* 315.5 (Note 11)	* 438 (Note 11)
Specific Heat (Avg)	Btu/lbm-°F	0.30	0.29
Heat Recovery Efficiency	%	70	
Fouling Resistance	hr-ft²-°F / Btu	0.000757	
Pressure Drop (Maximum Allowable)	in-WG	4	4
Overall Flange Inleakage	SCFM	<1	
Oversurface (minimum)	%	15	

Material Data

Plates	SA-240 316L	Nozzles/Flanges	SS T316L
End Covers	SA-240 316L	Removable Shroud	N/A
Hot Side Gaskets	None (Note 6)	Cold Side Gaskets	None (Note 6)
Tightening Bolts	None	Tightening Nuts	None

Construction Data

		Hot Side Piping		Cold Side Piping	
Inlet (Size/Connection Type)	inch	16"	150 lb RF Flange	14"	150 lb RF Flange
Outlet (Size/Connection Type)	inch	14"	150 lb RF Flange	14"	150 lb RF Flange
Plates Total Number (Supplied/Max) (Note 6)		64/64		Plate Dimensions (LxWxThk) inch	120 x 36 x 0.05
Overall Unit Size (LxWxH)	inch	(Note 2)*			
Weight lbf	(Note 3)	Operating Weight lbf	(Note 3)	Test Weight lbf	*

BECHTEL	**MECHANICAL DATA SHEET** **PLATE HEAT EXCHANGER**	**PLANT ITEM No.** **24590-HLW-ME-HOP-HX-00004** **Data Sheet Number:** **24590-HLW-MED-HOP-P0017 Rev. 1**

Thermal/Hydraulic Data

Maximum Conditions

		Hot Side		Cold Side	
Fluid Name		***Melter Offgas***		***Melter Offgas***	
		IN	***OUT***	***IN***	***OUT***
Fluid Quantities: Total (In/Out)	lbm/hr	*7529*	*7529*	*6392*	*6392*
(Note 13) Condensable Vapor (In/Out)		*775*	*775*	*684*	*684*
Liquid (In/Out)		*0*	*0*	*0*	*0*
Noncondensable (In/Out)		*6754*	*6754*	*5708*	*5708*
Temperature (In/Out) (with Oversurface)	°F	*443*	* 281 (Note 11)	*205*	* 399 (Note 11)
Density	lb/ft³	*0.034*	*0.042*	*0.052*	*0.041*
Viscosity	Cp	*0.0263*	*0.0225*	*0.0208*	*0.0247*
Molecular Weight, Vapor		*18*	*18*	*18*	*18*
Molecular Weight, Noncondensable		*28*	*28*	*28*	*28*
Specific Heat	Btu/lbm-°F	*0.311*	*0.291*	*0.281*	*0.301*
Thermal Conductivity	Btu/hr-ft-°F	*0.023*	*0.019*	*0.017*	*0.021*
Inlet pressure	psia	*12.0*		*13.2*	
Pressure Drop (with Oversurface)	in-WG	* 0.45		* 0.31	
Heat Recovery	%	* 80%			

Normal Conditions

		Hot Side		Cold Side	
Fluid Name		***Melter Offgas***		***Melter Offgas***	
		IN	***OUT***	***IN***	***OUT***
Fluid Quantities: Total (In/Out)	lbm/hr	*6622*	*6622*	*5537*	*5537*
(Note 13) Condensable Vapor (In/Out)		*364*	*364*	*327*	*327*
Liquid (In/Out)		*0*	*0*	*0*	*0*
Noncondensable (In/Out)		*6258*	*6258*	*5210*	*5210*
Temperature (In/Out) (with Oversurface)	°F	*434*	* 254 (Note 11)	*168*	* 387 (Note 11)
Density	lb/ft³	*0.038*	*0.047*	*0.057*	*0.044*
Viscosity	Cp	*0.0265*	*0.0223*	*0.0203*	*0.0248*
Molecular Weight, Vapor		*18*	*18*	*18*	*18*
Molecular Weight, Noncondensable		*28*	*28*	*28*	*28*
Specific Heat	Btu/lbm-°F	*0.282*	*0.27*	*0.265*	*0.278*
Thermal Conductivity	Btu/hr-ft-°F	*0.022*	*0.018*	*0.016*	*0.021*
Inlet pressure	psia	*12.8*		*13.6*	
Pressure Drop (with Oversurface)	in-WG	* 0.33		* 0.22	
Heat Recovery	%	* 82%			

BECHTEL	**MECHANICAL DATA SHEET** **PLATE HEAT EXCHANGER**	**PLANT ITEM No.** **24590-HLW-ME-HOP-HX-00004** **Data Sheet Number:** **24590-HLW-MED-HOP-P0017 Rev. 1**

Notes

1. ***Items identified with an asterisk* are determined and or confirmed by the Vendor.***
2. ***Bounding dimensions not to exceed: 150" L x 56" W x 72" H.***
3. ***The weight shall not exceed 10,000 lbs.***
4. ***The heat exchanger pressure boundary shall be designed to ASME Section VIII, Div 1.***
5. ***Vendor to design the heat exchanger to the Mechanical and Process Design Data, and provide performance data as indicated for Normal and Maximum Conditions.***
6. ***Plates shall be all welded assembly, no gasketed joints allowed.***
7. ***Vendor to provide insulation mounted on exterior of unit.***
8. ***Not Used.***
9. ***There shall be no leakage between hot side and cold side.***
10. ***The total heat loss from the heat exchanger shall not exceed 1.5 kW.***
11. ***For the Process Design Data, Vendor shall provide the outlet temperatures for both the Base surface area and the Oversurface area. For the Maximum and Normal Conditions, provide the outlet temperatures based on Oversurface area.***
12. ***The temperature of the floor shall not exceed 100 °F. The temperature of the local inbeds shall not exceed 150 °F.***
13. ***Condensate vapor present in offgas is steam. There are no liquids present in the offgas stream.***
14. ***The Cold Side flow shall be in the straight pass (i.e., I) and the Hot Side flow in the U-pass.***
15. ***Contents of this document are Dangerous Waste Permit Affecting.***

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ERIC B. ISERN
STATE OF WASHINGTON
33449
REGISTERED
PROFESSIONAL ENGINEER
2/15/05
EXPIRES: 07/28/05

This bound document contains a total of 3 sheets

Rev	Description	System Engr	Equip Engr	Checked	Reviewed	Approved	Date
1	Re-Issued for Permitting Use	R. Tomatigah	N/A				2/15/05
0	Issued For Permitting Use	K. Kirschenheiter	N/A	S. Shah	C. Winkler	M. Hoffmann	4/21/04

R10484685

ISSUED BY RPP-WTP PDC

CENTRIFUGAL BLOWER
Data Sheet:

24590-HLW-MAD-HOP-P0018

MR No.	24590-QL-MRA-MACS-00002
Plant Item No. (See Note 11)	24590-HLW-HOP-FAN-00001A/B/C 24590-HLW-HOP-FAN-00009A/B/C
Rev No.	2

1	Project:	RPP-WTP	Bldg /Room #	HLW / H-R081C	Manufacturer:	The Spencer Turbine Co.	
2	Project No:	24590	Supporting	DELETED			
3	Site:	DOE Hanford	Calculation		Manufacturer	*	
4	Safety Class	SDS	Supporting	24590-HLW-M6-HOP-P0003	Model No:		
5	Seismic Category	SC-III	Drawings	24590-HLW-M6-HOP-P29003	Quantity Required		6
6	System No.	HOP	System Desc	24590-HLW-3YD-HOP-00001	Quality Level		QL2
7			Process Data Sheets	Deleted			
8	Description: Booster Extraction Fan						

9	**DESIGN TEMPERATURES**							
10	Zone Design Temperature	Summer °F	95					
11	Indoor Design Temperature	Minimum °F	59	Maximum °F	95	Relative Humidity	10%	(min.)
12								
13	Contamination Classification Area	DELETED	Elevation:	661	Ft above MSL			

14	**DESIGN CONDITIONS**					
15	Design Fan Capacity	1600	ACFM	Inlet Air Temperature at max flow (Design)	162	°F
16	Design External Static Pres. (Note 12)	84	inches WC	Suction Air Density at max flow (Design)	0.046	lbs/ft³
17	Normal Fan Capacity	847	ACFM	Inlet Air Temperature at normal flow	143	°F
18	External Static Pressure at normal flow	62	inches WC	Suction Air Density at normal flow	0.054	lbs/ft³
19	Minimum Operating Fan Capacity	627	ACFM	Inlet Air Temperature at minimum operating flow	127	°F
20	External Static Pressure at min op flow	37	inches WC	Suction Air Density at minimum operating flow	0.058	lbs/ft³
21	Total Static Pressure (Max)	*	inches WC	Fan Inlet Pressure range	11.0 to 12.7	psia
22	Minimum Fan Efficiency	*	%	Fan Discharge Pressure range	13.9 to 14.0	psia
23	Fan Operating Speed	*	RPM	Fan Motor Operating Weight	*	pounds
24	Power at Operating Conditions	*	BHP	Power at Inlet Temperature	*	BHP
25	Assembly Weight (Mtr + Fan + Base)	*	pounds	Max. Temp. & Rate of Rise for Mech. Design	350 / 30	°F / °F/sec

26	**CONSTRUCTION**			
27	Design Fan Manufacturer	*	Design Fan Model Number	*
28	AMCA Drive Arrangement	8	AMCA Inlet Box Position	*
29	AMCA Motor Position	Direct Drive	AMCA Discharge	Upblast
30	AMCA Rotation	CW (See Note 9)	Fan Scroll Type	*

31	**FAN WHEEL**			
32	Fan Wheel Type	* (See Note 4)	Fan Shaft Diameter	*
33	Design Wheel Diameter	*	Actual Wheel Diameter	*
34	Design Wheel Width	*	Actual Wheel Width	*
35	Design Fan RPM	*	Actual Fan RPM @ design	*
36	Design Brake Horsepower	*	Actual Brake Horsepower	*
37	Fan Bearing Type	*	Fan Bearing Designator	*
38	First Critical Speed Range	* rpm	Second Critical Speed Range	* rpm

39	**FAN MATERIALS**			
40	Housing	316L SS	Fan Wheel	316L SS
41	Evase	N/A	Mounting Frame	316L SS
42	Shaft	316L SS	Inlet Box / Transition Piece	316L SS / 316L SS
43	Inlet Vane	N/A	Discharge Damper	N/A
44	Inlet Screen	N/A	Bearing Special Features	N/A
45	Mechanical Coupling	Falk Flex-Type (or equal)	Safety Guards Types	OSHA Compatible

46	**FAN ACCESSORIES**				
47	Flanged Inlet	Yes		Flanged Inlet Dimensions, in.	*
48	Flanged Discharge	Yes		Flanged Discharge Dimensions, in.	* (See Note 6)
49	Flanged Discharge Evase		No	Flanged Discharge Evase Dimensions, in	N/A
50	Split Housing	Yes		Split Housing Type	*
51	Inlet Box	Yes		Inlet Box Type	*
52	Inlet Damper		No	Inlet Damper Type	N/A
53	Inlet Transition Piece	Yes		Inlet Transition Piece Inlet Flange Dimen, in.	* (See Note 6)
54	Inspection Door	Yes		Inspection Door Size, in.	* 1 in. dia., half-coupling w/ plug (See Note 10)
55	Drain Connection	Yes		Drain Connection Size, in.	* See Spec.
56	Shaft Seals	Yes		Seal Type	* Gas Tight

CENTRIFUGAL BLOWER
Data Sheet:
24590-HLW-MAD-HOP-P0018

MR No. 24590-QL-MRA-MACS-00002

Plant Item No. (See Note 11): 24590-HLW-HOP-FAN-00001A/B/C; 24590-HLW-HOP-FAN-00009A/B/C

Rev No: 2

1	Project	RPP-WTP	Bldg./Room #	HLW / B-B001C	Manufacturer:	The Spencer Turbine Co.
2	Project No	24590	Supporting	DELETED		
3	Site	DOE Hanford	Calculation		Manufacturer	*
4	Safety Class	SDS	Supporting	24590-HLW-M6-HOP-P0003	Model No:	
5	Seismic Category	SC-III	Drawings	24590-HLW-M6-HOP-P20003	Quantity Required	6
6	System No.	HOP	System Desc	24590-HLW-3YD-HOP-00001	Quality Level	QL2
7			Process Data Sheets	Deleted		
8	Description: Booster Extraction Fan					

9	**FAN ACCESSORIES (continued)**				
10	Isolation Base		No	Isolation Base Type	N/A
11				Isolation Base Manufacturer	N/A
12	Isolation Springs	Yes		Isolation Springs Mfr and Model No	*
13				Isolation Springs Minimum Diameter	*
14				Isolation Springs Deflection	*
15				Isolation Springs Restraint Features	*
16	Flexible Inlet Connection	Yes		Flexible Inlet Connection Dimensions	* (See Note 6)
17	Flexible Inlet Connection Type	*			
18	Flexible Inlet Connection Material	* 316L SS			
19	Flexible Inlet Connection Manufacturer and Model No	*			
20	Flexible Outlet Connection	Yes		Flexible Outlet Connection Dimensions	* (See Note 6)
21	Flexible Outlet Connection Type	*			
22	Flexible Outlet Connection Material	* 316L SS			
23	Flexible Outlet Connection Manufacturer and Model No	*			
24	Inlet Screen		No		
25	Inlet Screen Features	N/A			
26	Fan Pedestal	Yes			
27	Fan Pedestal Description	Common mounting base for fan, motor, and bearings			
28	Insulation Studs		No	Insulation thickness	N/A
29	Silencer		No		
30	**MOTOR AND DRIVE REQUIREMENTS**				
31	Deleted				
32	Adjustable Speed Drive	Yes			
33	Special Drive Features	Provide ASD programming for motor RPM to pass through first critical speed dead band to avoid excessive vibration.			

34 NOTES

35 1) * Denotes data to be provided / verified by Vendor

36 2) N/A denotes "Not Applicable".

37 3) TBD denotes "To Be Determined" at a later date.

38 4) The impeller shall be anti-surge design developing continuously rising SP from free delivery thru shutoff.

39 5) Bounding dimensions not to exceed 45" w x 60" h x 105" l (Blower, Motor, Baseplate and Inlet Box).

40 6) Connections shall match Buyer's supply pipe: 10 inch diameter, 316L SS, Sched 40S, w/ 150 lb, RF Flange.

41 7) See Specification 24590-WTP-3PS-MACS-TP004 for additional requirements.

42 8) Motor horsepower to be provided by Vendor. Assume "cold-gas" conditions (59 °F) at startup.

43 9) Rotation is listed as viewed from drive side.

44 10) Provide a plugged inspection port for each stage of the multi-stage blower.

45 11) Driven Equipment / Motor / Adjustable Speed Drive (ASD) equipment tag relationship is as follows:

46	Fan Tag Number		Motor Tag Number		ASD Tag Number
47	HOP-FAN-00001A	/	HOP-MTR-00005A	/	HOP-ASD-00001A
48	HOP-FAN-00001B	/	HOP-MTR-00005B	/	HOP-ASD-00001B
49	HOP-FAN-00001C	/	HOP-MTR-00005C	/	HOP-ASD-00001C
50	HOP-FAN-00009A	/	HOP-MTR-00006A	/	HOP-ASD-00003A
51	HOP-FAN-00009B	/	HOP-MTR-00006B	/	HOP-ASD-00003B
52	HOP-FAN-00009C	/	HOP-MTR-00006C	/	HOP-ASD-00003C

53 12) The External Static Pressure at design, normal, and minimum operating flows includes 2 inches WC maximum drop through the inlet box

54 13) Contents of this document are Dangerous Waste Permit affecting.

CENTRIFUGAL BLOWER
Data Sheet:

24590-HLW-MAD-HOP-P0018

MR No.
24590-QL-MRA-MACS-00002

Plant Item No (See Note 11)
24590-HLW-HOP-FAN-00001A/B/C
24590-HLW-HOP-FAN-00009A/B/C

Rev No 2 △2

1	Project	RPP-WTP	Bldg./Room #	HLW / H-B001C	Manufacturer.	The Spencer Turbine Co.	△2
2	Project No	24590	Supporting Calculation	DELETED			
3	Site:	DOE Hanford			Manufacturer Model No	•	
4	Safety Class	SDS	Supporting Drawings	24590-HLW-M6-HOP-P0003			
5	Seismic Category	SC-III		24590-HLW-M6-HOP-P20003	Quantity Required	6	
6	System No.	HOP	System Desc	24590-HLW-3YD-HOP-00001	Quality Level	QL2	
7			Process Data Sheets	Deleted			△2
8	Description: Booster Extraction Fan						

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ERIC B. ISERN
STATE OF WASHINGTON
33449
REGISTERED
PROFESSIONAL ENGINEER
2/15/05

EXPIRES: 07/28/05

This bound document contains a total of 3 sheets. △2

Rev	Date	Description	Originator	Checker	Reviewer	Approver
2	2/15/05	Re-Issued for Permitting Use	R. Tomatyak	Jason Medina		E. I.
1	9/15/04	Updated design conditions and Re-issued for Permitting Use. Superseded 24590-HLW-MAD-HOP-P0019, P0020, P0035, P0036 & P0037.	K. Kirschenheiter	Jason Medina / SC	N/A	Eric Isern
0	3/19/04	Issued for Permitting Use	Dale E Green	M. Ordona / DMY	N/A	M. Hoffmann

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-LAB-MV-RLD-VSL-00164*

Project:	*RPP-WTP*	P&ID	*24590-LAB-M6-RLD-P0002*
Project No:	*24590*	Process Data Sheet.	*N/A*
Project Site:	*Hanford*	Vessel Drawing	*24590-LAB-MV-RLD-P0001*
Description:	*Lab Area Sink Drain Collection Vessel*		

Reference Data

ISSUED BY RPP-WTP PDC

Charge Vessels (Tag Numbers)	*None*
Pulsejet Mixers / Agitators (Tag Numbers)	*None*
RFDs/Pumps (Tag Numbers)	*None*

Design Data

Quality Level		*Commercial Grade*		Fabrication Specs	*24590-WTP-3PS-MV00-TP001*		
Seismic Category		*SC-III*		Design Code	*ASME Sec VIII Div 1*		
Service/Contents		*Radioactive Liquid Drain*		Code Stamp	*Yes*		
Design Specific Gravity		*1.02*		NB Registration	*Yes*		
Maximum Operating Volume	gal	*2740 (Note 5)*		Weights (lbs)	Empty	Operating	Test
Total Volume	gal	*3180 (Note 5)*		Estimated	*7200*	*28110*	*33910*
				Actual **			

Inside Diameter	inch	*102*			Wind Design	*Not Required*	
Length/Height (TL-TL)	inch	*69*			Snow Design	*Not Required*	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	*24590-WTP-3PS-FB01-T0001 & 24590-WTP-3PS-MV00-TP002*	
Internal Pressure	psig	*0*	*15*	*N/A*	Seismic Base Moment **	ft*lb	
External Pressure	psig	*0.15*	*7*	*N/A*	Postweld Heat Treatment	*Not Required*	
Temperature	°F	*78*	*240*	*N/A*	Corrosion Allowance	Inch	*0.04*
Min. Design Metal Temp.	°F	*-20*			Hydrostatic Test Pressure **	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

MARK W. HOFFMANN STATE OF WASHINGTON 0030952 REGISTERED PROFESSIONAL ENGINEER 3/28/05

EXPIRES 12/10/06

This Bound Document Contains a total of 2 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
1	3/28/05	Issued for Permitting Use				
0	3/5/04	Issued for Permitting Use	K. Brightman	M. Arulampalam	C. Slater	M. Hoffmann

R10523241

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-LAB-MV-RLD-VSL-00164*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***UNS N08367***	***See Drawing***	***Auxiliary***
Shell	***UNS N08367***	***See Drawing***	***Primary***
Bottom Head	***UNS N08367***	***See Drawing***	***Primary***
Support (Skirt)	***SA-240-304 (Carbon Content Max 0.030%)***	**	***N/A***
Jacket/Coils/Half-Pipe Jacket	***N/A***	***N/A***	***N/A***
Internals	***UNS N08367***	***See Drawing***	***Secondary***
Pipe	***UNS N08367, SB622-N10276/N06022, Note 4*** 1	***See Drawing***	***See Note-1***
Forgings/ Bar stock	***UNS N08367***	***See Drawing***	***As Note-1 for Nozzle Necks***
Bolting/Gaskets	***None***	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Weld Surface Finish	***De-scaled as laid***

Remarks

*** To be confirmed by Seller*

Note 1: Nozzle necks below maximum operating level are primary, others auxiliary.

Note 2: Design life is 40 years

Note 3: Deleted

Note 4: Material of construction for nozzle NO 7 and NO 6 shall be Hastelloy C22 or Hastelloy C-276 1

Note 5: Vessel volumes are approximates and do not account for manufacturing tolerances, nozzles, and displacement of internals.

Note 6: Revised design data 1

Note 7: Contents of this document are Dangerous Waste Permit Affecting. 1

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	PLANT ITEM No. *24590-LAB-MV-RLD-VSL-00165*

Project:	*RPP-WTP*	P&ID	*24590-LAB-M6-RLD-P0001*
Project No:	*24590*	Process Data Sheet:	*N/A*
Project Site:	*Hanford*	Vessel Drawing	*24590-LAB-MV-RLD-P0003*
Description:	*Hot Cell Drain Collection Vessel*		

ISSUED BY: RPP-WTP PDC

Reference Data

Charge Vessels (Tag Numbers)	*None*
Pulsejet Mixers / Agitators (Tag Numbers)	*None*
RFDs/Pumps (Tag Numbers)	*None*

Design Data

Quality Level		*QL-2*	Fabrication Specs	*24590-WTP-3PS-MV00-TP001*		
Seismic Category		*SC-III*	Design Code	*ASME Sec VIII Div 1*		
Service/Contents		*Radioactive Liquid Drain*	Code Stamp	*Yes*		
Design Specific Gravity		*1.02*	NB Registration	*Yes*		
Maximum Operating Volume	gal	*6615 (Note 5)* 1	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	*9100 (Note 5)* 1	Estimated	*21185*	*75014*	*97966*
			Actual **			

Inside Diameter	inch	*192*			Wind Design	*Not Required*	
Length/Height (TL-TL)**	inch	*27*			Snow Design	*Not Required*	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	*24590-WTP-3PS-FB01-T0001 & 24590-WTP-3PS-MV00-TP002*	
Internal Pressure	psig	*0*	*15*	*N/A*	Seismic Base Moment **	ft*lb	
External Pressure	psig	*0.15*	*7*	*N/A*	Postweld Heat Treatment	*Not Required*	
Temperature	°F	*78*	*240*	*N/A*	Corrosion Allowance	Inch	*0.04*
Min. Design Metal Temp	°F	*-20*			Hydrostatic Test Pressure **	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED PROFESSIONAL ENGINEER
3/28/05
EXPIRES 12/10/06

This Bound Document Contains a total of 2 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
1	3/28/05	Issued for Permitting Use				
0	3/1/04	Issued for Permitting Use	K. Brightman	M. Arulampalam	C. Slater	M. Hoffmann

R10523240

	MECHANICAL DATA SHEET: VESSEL	PLANT ITEM No. 24590-LAB-MV-RLD-VSL-00165

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***UNS N08367***	***See Drawing***	***Auxiliary***
Shell	***UNS N08367***	***See Drawing***	***Primary***
Bottom Head	***UNS N08367***	***See Drawing***	***Primary***
Support (Skirt)	***SA-240-304 (0.030% Carbon Max)***	**	***N/A***
Jacket/Coils/Half-Pipe Jacket	***N/A***	***N/A***	***N/A***
Internals	***UNS N08367***	***See Drawing***	***Secondary***
Pipe	***UNS N08367/ N06022/N10276, Note 4*** 1	***See Drawing***	***Note-1***
Forgings/ Bar stock	***UNS N08367***	***See Drawing***	***Note-1 for Nozzle Necks***
Bolting/Gaskets	***None***	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Weld Surface Finish	***De-scaled as laid***

Remarks

*** To be confirmed by Seller*

Note 1: Nozzle necks below maximum operating level are primary, others auxiliary.

Note 2: Design life is 40 years

Note 3: Radiography 100% required on the primary confinement welds. 1

Note 4: Material of construction for nozzle NO. 3 and the dip pipe shall be alloy UNS N06022. 1

Note 5: Vessel volumes are approximates and do not account for manufacturing tolerances, nozzles, and displacement of internals.

Note 6: Quality level and seismic category designations on this datasheet reflect requirements beyond those stipulated by the vessel safety function

Note 7: Contents of this document are Dangerous Waste Permit Affecting.

Attachment 2
05-ED-034

Bechtel National, Inc. Certification Statement

Bechtel National, Inc. Certification

The following certification statement is provided consistent with Contract No. DE-AC27-01RV14136, Section H.26, Environmental Permits, paragraph (g) for the submittal of Hanford Facility Resource Conservation and Recovery Act Permit Modification Notification Form (24590-WTP-PCN-ENV-04-0014) to update select mechanical data sheets in Appendices 8.6, 9.6, 10.6, and 11.6 for the Pretreatment Facility, Low-Activity Waste Facility, High-Level Waste Facility, and the Laboratory, respectively, in the Dangerous Waste Permit.

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.

J. P. Henschel
Project Director

4/18/05
Date

Quarter Ending 3/05 24590-WTP-PCN-ENV-05-001

Hanford Facility RCRA Permit Modification Notification Form
Part III, Chapter 10 and Attachment 51
Waste Treatment and Immobilization Plant

Index

Page 1 of 3:	Hanford Facility RCRA Permit, Part III, Attachment 51, Tank System Ancillary Equipment for Analytical Laboratory RLD System
Attachment A	P&ID - Radioactive Liquid Waste Disposal System C5 Collection and Transfer (24590-LAB-M6-RLD-P0001), Revision 2
Attachment B	WTP Analytical Laboratory Process Flow Diagram (24590-LAB-M5-V17T-P0029), Revision 1
Attachment C	The System Description for the Radioactive Liquid Waste Disposal System for the Analytical Laboratory (24590-LAB-3YD-RLD-00001), Revision 2

Submitted by Co-Operator: For F.B. 3/23/05

F. Beranek Date

Reviewed by ORP Program Office: 4/5/05

R. J. Schepens Date

Quarter Ending 3/05

24590-WTP-PCN-ENV-05-001

Hanford Facility RCRA Permit Modification Notification Form	
Unit:	Permit Part & Chapter:
Waste Treatment and Immobilization Plant	**Part III, Chapter 10 and Attachment 51**

Description of Modification:

Analytical Laboratory P&ID - Radioactive Liquid Waste Disposal System C5 Collection and Transfer (24590-LAB-M6-RLD-P0001) and the WTP Analytical Laboratory Process Flow Diagram (24590-LAB-M5-V17T-P0029) have been modified to reflect the deletion of the reference to Pretreatment Plant Waste & Drain Vessel (PWD-VSL-00033) at the waste transfer line from the LAB facility to Pretreatment. Effluent from transfers from Laboratory Area Sink Drain Collection Vessel (RLD-VSL-0164 and the Hotcell Drain Collection Vessel (RLD-VSL-0165) discharge to Pretreatment Plant Waste Vessel (PWD-VSL-00044), and flush water from the waste transfer line was originally diverted to PT Ultimate Overflow Vessel (PWD-VSL-00033). With this modification, both effluent and transfer line flush water are now discharged to Pretreatment PWD vessel PWD-VSL-00044.

The System Description for the Radioactive Liquid Waste Disposal System for the Analytical Laboratory (24590-LAB-3YD-RLD-00001) has been updated to reflect the elimination of Pretreatment Plant Waste & Drain Vessel (PWD-VSL-00033) from the waste transfer line flushing process.

Appendix 11.1

Replace Revision 0 of the WTP Analytical Laboratory Process Flow Diagram (24590-LAB-M5-V17T-P0029) with the attached Revision 1 of the WTP Analytical Laboratory Process Flow Diagram (24590-LAB-M5-V17T-P0029).

Appendix 11.2

Replace Revision 1 of P&ID - Radioactive Liquid Waste Disposal System C5 Collection and Transfer (24590-LAB-M6-RLD-P0001) with attached Revision 2 of P&ID - Radioactive Liquid Waste Disposal System C5 Collection and Transfer (24590-LAB-M6-RLD-P0001)

Administrative Record

Replace Revision 1 of the System Description for the Radioactive Liquid Waste Disposal System for the Analytical Laboratory (24590-LAB-3YD-RLD-00001) with the attached Revision 2 of the System Description for the Radioactive Liquid Waste Disposal System for the Analytical Laboratory (24590-LAB-3YD-RLD-00001) in the Administrative Record.

[1] Class 1 modifications requiring prior Agency approval.

[2] This is only an advanced notification of an intended Class [1] 1, 2, or 3 modification, this should be followed with a formal modification request, and consequently implement the required Public Involvement processes when required.

Quarter Ending 3/05

24590-WTP-PCN-ENV-05-001

WAC 173-303-830 Modification Class: [1,2]	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: N/A SLD

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

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class 1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capability of the facility to protect human health or the environment."

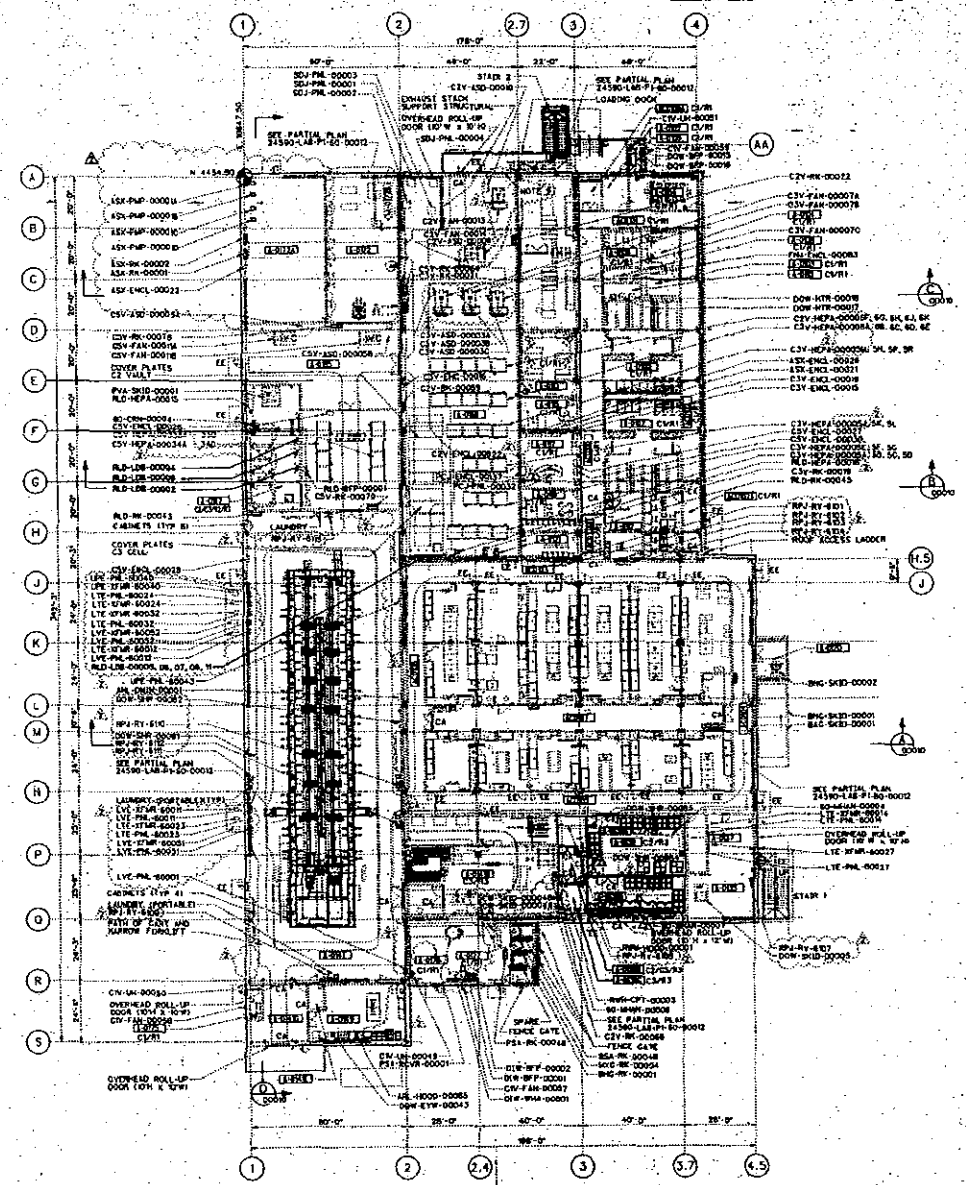
Modification Approved: [X] Yes [ ] No (state reason for denial)

Reason for denial:

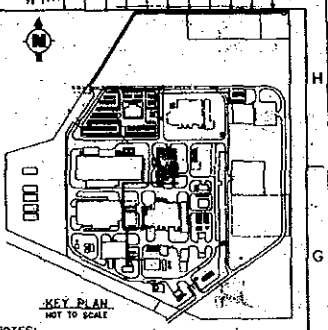
Reviewed by Ecology:

S. Dahl — April 19, 2005 Date

24590-LAB-P1-60-P0008



PLAN AT EL 0'-0"



KEY PLAN
NOT TO SCALE

NOTES:

1. REFER TO DRAWING 24590-LAB-P1-60-P0010 SECTION 'A' FOR CONVERSIONS FROM LAB FACILITY ELEVATIONS TO SITE ELEVATIONS. LAB FACILITY ELEVATION 0'-0" = SITE ELEVATION 877'-0" MSL.
2. FOR SITE REFERENCE SEE PLOT PLAN DRAWING 24590-BOF-P1-80-00001.
3. FOR LEGEND SEE DRAWING 24590-LAB-P1-80-P0007
4. CONTENTS OF THIS DOCUMENT ARE HAZARDOUS WASTE PERMIT AFFECTING.
5. ALL OPERATING AREAS ARE DESIGNATED C2/W2 UNLESS NOTED OTHERWISE.
6. FOR ROOM NUMBERS AND DESCRIPTION, SEE DRAWINGS 24590-LAB-A5-A101-05200001, 24590-LAB-A5-A101-05200002.
7. DELETED
8. DELETED
9. REMOVABLE SIDING PANELS FOR EQUIPMENT REPLACEMENT CSV-FAN-00003/CSV-ASD-00010.
10. REVISE DRUM SKID TO CORRECT OVERLAP IN ROOM A-0160.

REVISE FAN/ASD EQUIPMENT AND LOCATIONS IN ROOM A-0160.

REVISE CS PUMP PIT/PIPING PIT COVERS.

RELOCATE FOLLOWING EQUIPMENT/LABELS:

LVE-XFMR-00032	LTE-PNL-00032
LVE-PNL-00052	LTE-XFMR-00012
LPE-XFMR-00040	LTE-PNL-00013
LPE-PNL-00040	LVE-XFMR-00011
LTE-XFMR-00024	LVE-PNL-00011
LTE-PNL-00021	LTE-XFMR-00023
LVE-PNL-00021	LTE-PNL-00021
RLD-LDB-00003	LVE-XFMR-00031
RLD-LDB-00007	LVE-PNL-00031
RLD-LDB-00007	ASX-PMP-00001A
RLD-LDB-00008	ASX-PMP-00001B
RLD-LDB-00011	ASX-PMP-00001C
LTE-XFMR-00032	ASX-PMP-00001D
ASX-RK-00001	ASX-RK-00002
ASX-ENCL-00022	DOW-SHD-00002
CSV-ASD-00052	

ADD FOLLOWING EQUIPMENT/LABELS:

SCW-SKID-00004A	DOW-BFP-00002
SCW-SKID-00004B	DOW-BFP-00001
SCW-SKID-00005	DOW-WFA-00001
CSV-RK-00042	RPJ-RY-S102
RPJ-RY-S101	RPJ-RY-S112
RPJ-RY-S103	RPJ-ENCL-00117
RPJ-RY-S103	RPJ-RY-S106
RPJ-RY-S104	RPJ-RY-S110
RPJ-RY-S107	RPJ-RY-S111
RPJ-RY-S108	

DELETE FOLLOWING EQUIPMENT/LABELS:

DOW-SKID-00001	CSV-ENCL-00025
SCW-PMP-00029	FMJ-ENCL-00002
ASX-CHB-00001	
FGN-001	
RLD-SKID-00004/00006/00008 (TOTAL 3)	
CS FILTER (TYP) (TOTAL 4)	

REMOVE HOLD 1

REVISE CABINETS IN ROOM A-0148.

UPDATE HEPA FILTER LABELS TO REFLECT FIVE DIGIT NUMERICAL COMPONENT NUMBER. PREVIOUS ISSUE REFLECTED A INCORRECT FOUR DIGIT NUMBER

INCORPORATED DCN 24590-LAB-PN-60-00010.

11. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON-PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE PERMIT CODE FOR THE DANGEROUS WASTE PERMIT. TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.

REFERENCE DRAWINGS

DWG NO	TITLE
24590-BOF-P1-80-00001	BFF - WTP PLOT PLAN
24590-LAB-P1-60-P0007	ANALYTICAL LABORATORY GENERAL ARRANGEMENT PLAN AT EL 0'-0" & 12'-0" & SECTIONS E, F, F', G-G'
24590-LAB-P1-60-00008	ANALYTICAL LABORATORY GENERAL ARRANGEMENT PLAN AT EL 0'-0"
24590-LAB-P1-80-P0010	ANALYTICAL LABORATORY GENERAL ARRANGEMENT SECTIONS A-A, B-B, C-C & D-D
24590-LAB-P1-60-P0011	ANALYTICAL LABORATORY GENERAL ARRANGEMENT PLAN AT ROOF
24590-LAB-P1-60-00012	ANALYTICAL LABORATORY GENERAL ARRANGEMENT PARTIAL PLANS AT EL 0'-0"
24590-LAB-A5-A101-05200001	ANALYTICAL LABORATORY ARCHITECTURAL ROOF FINISH SCHEDULE
11590-LAB-A5-A101-05200002	ANALYTICAL LABORATORY ARCHITECTURAL ROOM FINISH SCHEDULE

REV	DESCRIPTION	DWN	CHKD	ENGR	APVD	DATE
2	ISSUED FOR PERMITTING USE	DWN	CHK	ENG	APV	7/28/94
1	ISSUED FOR PERMITTING USE	DWN	CHK	ENG	APV	7/28/94
0	ISSUED FOR PERMITTING USE	CAC	RLH	ENG	APV	12-29-93

REVISION HISTORY

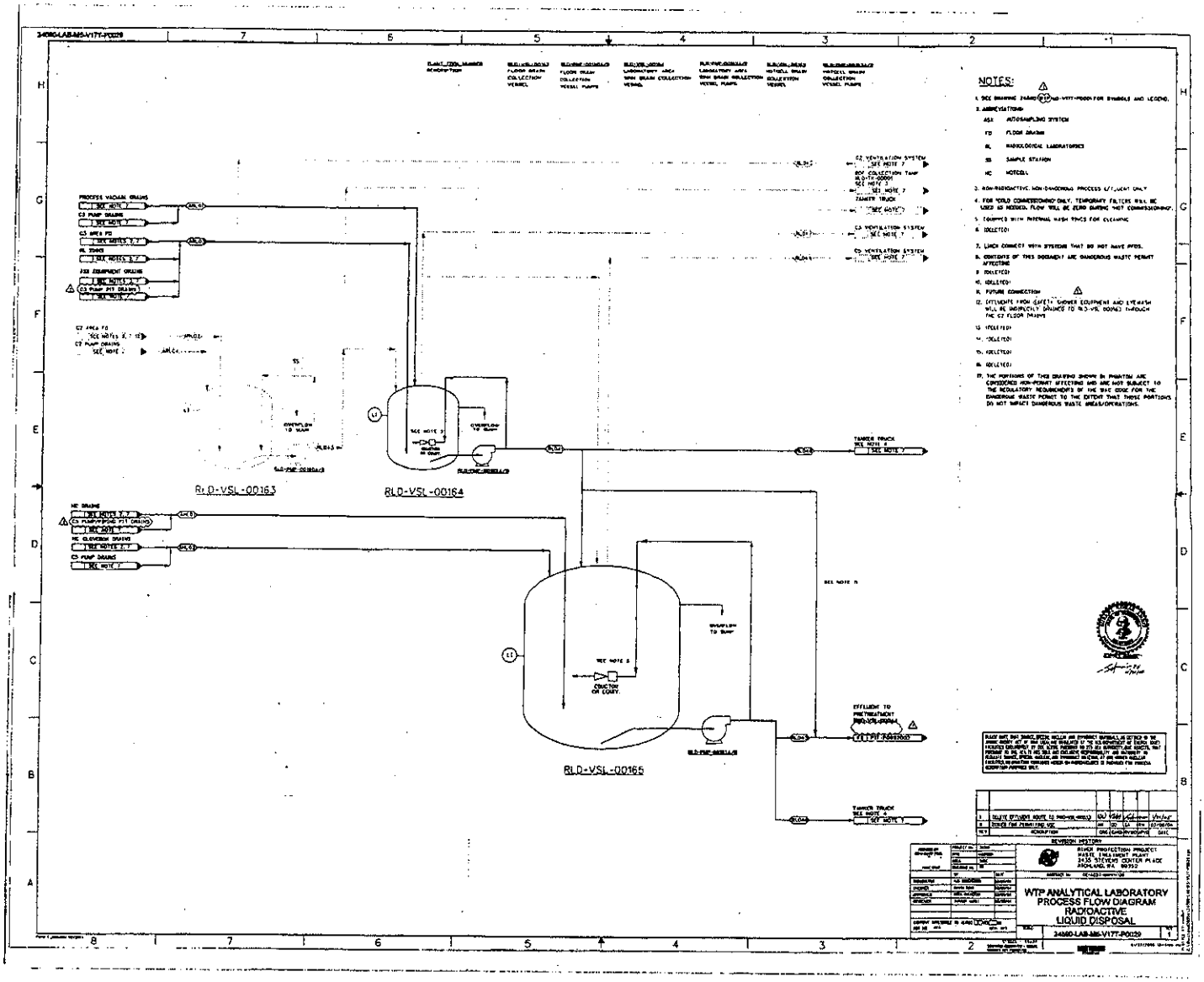
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

ANALYTICAL LABORATORY GENERAL ARRANGEMENT PLAN AT EL 0'-0"

SCALE: 1/8"=1'-0"

24590-LAB-P1-60-P0008

REV 2


NOTES:
RLD-VSL-00163
RLD-VSL-00164
RLD-VSL-00165
WTP ANALYTICAL LABORATORY
PROCESS FLOW DIAGRAM
RADIOACTIVE
LIQUID DISPOSAL
24590-LAB-M6-V177-P0029

R10484958

ISSUED BY
RPP-WTP PDC

Document title: **System Description for the Radioactive Liquid Waste Disposal System for the Analytical Laboratory**

Contract number: DE-AC27-01RV14136

Department: Process Engineering

Author(s): Aja A. Holland

Principal author signature: Aja A Holland

Document number: 24590-LAB-3YD-RLD-00001, Rev 2

Checked by: Douglas M. Perkins

Checker signature:

Date of issue: 15 February 2005

Issue status: Approved

Approved by: Kris R. Walvekar

Approver's position: Area Project Engineer

Approver signature: krwalvekar

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

Content applicable to ALARA? ☒ **Yes** ☐ **No**

ADR No. 24590-LAB-ADR-M-03-013 **Rev** ~~2~~ 1 AAH 2/14/05

River Protection Project
Waste Treatment Plant
2435 Stevens Center Place
Richland, WA 99352
United States of America
Tel: 509 371 2000

History Sheet

Rev	Date	Reason for revision	Revised by
0	7 January 2004	Issued for design. Complete revision.	A Marcheson
1	12 February 2004	Minor revision. Revision bars are shown.	A Marcheson
2	15 February 2005	Revised per the Guide for System Descriptions. Incorporated changes from 24590-LAB-3YN-RLD-00001 and 24590-LAB-3YN-RLD-00002 as applicable.	A Holland

Contents

Acronyms and Abbreviations vi

System and Area Locators viii

Glossary ix

1 Introduction 1

2 Scope 1

3 Functions 1

3.1 Collect Liquid Effluents 1

3.2 Store Liquid Effluents 2

3.3 Mix Liquid Effluents 2

3.4 Transfer Collected Effluents 2

3.5 Confine and Contain Collected Effluents 2

3.6 Flush System Components 2

3.7 Report System Conditions 2

3.8 Sample Sump and Vessel Contents 3

4 Requirements 3

4.1 Services Provided 3

4.1.1 Characteristics of the Collected Effluents 3

4.1.2 Storage 4

4.1.3 Mixing 4

4.1.4 Transfers 4

4.1.5 Availability Factors 5

4.2 Design Life 6

4.3 Containment and Confinement 6

4.3.1 Preventing a Release 7

4.3.2 Mitigation of a Release 8

4.4 Access Control 11

5 Design Standardization 11

6 Description 11

6.1 Process Description 12

6.1.1 Floor Drain Collection Vessel (RLD-VSL-00163) 12

6.1.2 Laboratory Area Sink Drain Collection Vessel (RLD-VSL-00164) 12

6.1.3 Hotcell Drain Collection Vessel (RLD-VSL-00165) 13

6.2 Equipment Description 15

6.2.1 Floor Drain Collection Vessel (RLD-VSL-00163) and associated pumps 15

6.2.2 Laboratory Area Sink Drain Collection Vessel (RLD-VSL-00164) and associated pumps 15

6.2.3 Hotcell Drain Collection Vessel (RLD-VSL-00165) and associated pumps 16

6.2.4 Cells 16
6.2.5 Pits 17
6.2.6 Piping and Materials 18
6.2.7 Special Secondary Containment Features 19
6.2.8 Leak Detection 19

6.3 Mechanical Handling Description 19

6.4 Electrical Description 19

6.5 Instrumentation and Controls 20

6.6 Special Features 20

7 Operations 24

7.1 Routine Normal Operations 24
7.1.1 Transfer Operations 24
7.1.2 Transfer Operations to Tanker Truck 25
7.1.3 Sampling Operations for RLD-VSL-00163 26
7.1.4 Agitation Operations for RLD-VSL-00164/165 27
7.1.5 Flushing Operations for Transfer Lines 28

7.2 Non-Routine Normal Operations 29
7.2.1 Washing RLD-VSL-00163 29
7.2.2 Washing RLD-VSL-00164 and RLD-VSL-00165 29
7.2.3 Rigorous Mixing and Solid Suspension 29

7.3 Off-Normal Operations 29
7.3.1 Vessel Overflow 29
7.3.2 Loss of Vessel Integrity 30
7.3.3 Loss of Level Indicator 30
7.3.4 Cell Sump Level Alarm 30
7.3.5 Pit Sump Level Alarm 30
7.3.6 High-Level Alarm 30
7.3.7 Low-Level Alarm 31
7.3.8 Loss of Ventilation 31
7.3.9 Leak Detection 31
7.3.10 Post-Fire Recovery 31

7.4 Operating Trips, Alarms, and Setpoint Control 31

8 Maintenance 40

9 Interfacing Systems 40

10 Applicable Documents 42

10.1 Project Documents 42
10.1.1 Authorization Basis Documents 42
10.1.2 Design Criteria Database Source Documents 42
10.1.3 Process Flow Diagrams 42
10.1.4 Calculations 42
10.1.5 Piping and Instrumentation Diagrams 43
10.1.6 General Arrangement 43
10.1.7 Studies/Reports 44
10.1.8 Equipment Drawings 44
10.1.9 Specifications 45
10.1.10 Miscellaneous Documents 45

10.2 Codes and Standards/Regulations 46
10.3 Other Documents 46

Appendices

Appendix A : Sequence Diagrams for Normal Operations ..... A-i
Appendix B : Test Acceptance Criteria ..... B-i

Tables

Table 6-1 Major Process Instrumentation 20
Table 6-2 Equipment Design Documents 22
Table 7-1 Operating Trips, Alarms, and Setpoint Control 32
Table 9-1 System Interfaces 41

Figures

Figure A-1 Simplified Process Flow Diagram 23
Figure 7-1 State Diagrams for RLD-VSL-00163 37
Figure 7-2 State Diagrams for RLD-VSL-00164 38
Figure 7-3 State Diagrams for RLD-VSL-00165 39
Figure A-1 Transfer Operations A-2
Figure A-2 Sampling Operations A-3
Figure A-3 Agitation Operations A-4
Figure A-4 Flushing Operations A-5

Acronyms and Abbreviations

AC	Alternating Current
ALARA	As Low As Reasonably Achievable
APC	Additional Protection Control
ASME	American Society of Mechanical Engineers
BNI	Bechtel National, Inc.
BOD	*Basis of Design*
CCTV	Closed Circuit Television
C&I	Controls and Instrumentation
DOE	*U.S. Department of Energy*
EPA	Environmental Protection Agency
HEPA	High-Efficiency Particulate Air
HVAC	Heating, Ventilation, and Air Conditioning
ICD	Interface Control Document
ISM	Integrated Safety Management
ITS	Important to Safety
MAR	Material at Risk
ORD	*Operations Requirements Document*
ORP	Office of River Protection
P&ID	Piping and Instrumentation Diagram
PSAR	*Preliminary Safety Analysis Report*
Rad Lab	*Radiological Laboratory*
S&AP	*Analytical Laboratory Design Requirements: WTP Sampling and Analysis Plan*
SDC	Safety Design Class
SDS	Safety Design Significant
SED	*Safety Envelope Document: Lab Facility Specific Information*
SIPD	Standards Identification Process Database
SL	Severity Level
SS	Safety Significant
TEDF	(200 Area) Treated Effluent Disposal Facility
TME	Tank Mixing Eductor
WAC	Washington Administrative Code

WTP	Hanford Tank Waste Treatment and Immobilization Plant

System and Area Locators

AHL	Analytical Hotcell Laboratory Equipment System
ARL	Analytical Radiological Laboratory Equipment System
ASX	Autosampling System
BOF	Balance of Facilities
C2V	C2 Ventilation System
C3V	C3 Ventilation System
C5V	C5 Ventilation System
DIW	Demineralized Water System
DOW	Domestic (Potable) Water System
FPW	Fire Protection Water System
HLW	High-Level Waste
LAB	(WTP) Analytical Laboratory
LAW	Low-Activity Waste
LIH	Laboratory In-cell Handling System
LVE	Low Voltage Electrical (480/208/120V) System
NLD	Non-Radioactive Liquid Waste Disposal System
PCJ	Process Control System
PSA	Plant Service Air System
PTF	Pretreatment Facility
PVA	Plant Vacuum Air System
PWD	Plant Wash and Disposal System
RLD	Radioactive Liquid Waste Disposal System
UPE	Uninterruptible Power Electrical System
WTJ	Waste Tracking and Inventory System

Glossary

Batch volume	Volume of transferred process liquid/slurry received into a vessel during a specified time cycle.
Cold commissioning	Period of testing and commissioning of equipment/systems before the introduction of radioactive material.
Non-Routine	Infrequent normal operations that are performed within the bounds of normal parameters and specifications.
Normal operations	Frequent or infrequent activities/sequences that are performed within the bounds of normal parameters and specifications.
Off-normal operations	Predetermined activities/sequences, based on postulated scenarios, which are considered recovery actions from an out-of-specification or upset condition to return the plant to normal operations.
Operating volume	Sum of the heel volume, batch volume, vessel internals volume, and contingency volume.
Permissive	An interlock that allows a device to change state or a sequence to start. Once a device has changed state or a sequence has started, permissives have no further effect on the device or sequence.
Routine	Frequent normal operations that are performed within the bounds of normal parameters and specifications.
Setpoint control	Type of primary control dedicated to maintaining a process variable or variables at or near some desired value.
State	The condition of an equipment entity (e.g., pump, vessel, column) at a given time.
Trip	An interlock that does not allow a device to change state or a sequence to continue. Once a device has changed state or a sequence has started, trips may continue to have an effect on the device or sequence.
Classification	**Typical Type of Control**
C1 Radiological Controlled Area	General Employee Radiological Training. (24590-WTP-GPP-SRAD-007)
C2 Radiological Buffer Area	Equipment and personnel are confirmed to be uncontaminated before exit to the uncontrolled (C1) area is permitted. C2 areas may not be ventilated directly to the atmosphere. Thermoluminescence detector and Radworker I training are required for entry. (24590-WTP-GPP-SRAD-007)
C3 Contamination Area	Work in a contaminated area requires protective clothing (usually a single set of coveralls, canvas booties, rubber shoe covers, appropriate gloves, and head covering). Thermoluminescence detector and Radworker II training are required for entry. Respiratory protection may be required for specific tasks, but would not normally exceed the requirements for a full-face particulate respirator. The interface

	between a contamination area and the surrounding buffer area should be an actual barrier such as a half-wall. (24590-WTP-GPP-SRAD-007)
C5 Airborne Radioactivity Area	Access to C5 areas is normally prohibited. When access is required, personal protective equipment would include high-integrity clothing (plastic suit) and respirators. Exiting into a contaminated area (C5→ C4,C3) would require removing the outer layer of protective clothing. Airborne Radioactivity Areas are normally accessed through a permanent or temporary containment "tent" with filtered exhaust; because entry requires the use of respirators, no personnel may perform routine or periodic work in a high-contamination area. (24590-WTP-GPP-SRAD-007)

1 Introduction

This system description covers the Radioactive Liquid Waste Disposal System (RLD) for the Analytical Laboratory (LAB). The Hanford Tank Waste Treatment and Immobilization Plant (WTP) LAB RLD collects liquid effluent from the radiological laboratories (rad labs), hotcells, and other LAB areas for eventual transfer to other facilities for final disposition.

2 Scope

The RLD encompasses all vessels, instrumentation, pumps, valves, mixers, transfer pump pits, piping pits, and cells associated with the collection and transfer of liquid effluent generated from laboratory systems in the LAB.

During normal operations, the liquid effluent is transferred to the Pretreatment Facility (PTF) or balance of facilities (BOF) for further processing. During cold commissioning, the liquid effluent is held temporarily before transfer to other facilities via tanker truck. When the PTF transfer line becomes available during the latter portions of cold commissioning, effluent transfers may be performed via the tanker truck or the PTF transfer line. The boundary limits between RLD and other systems are as follows:

- The boundary with the Plant Wash and Disposal System (PWD) in the PTF is at the battery limit 5 ft outside the LAB facility.
- Equipment connections are bounded by the nozzle appendages on the RLD vessels.
- The boundary with the sources of influent drains is at the collection points.
- Boundary limits for ventilation lines to C5, C3, and C2 ventilation systems (C5V, C3V, C2V) are at the nozzle appendages 2 ft above grade.
- Boundary limits with the air supply for pit inbleeds are at the HEPA filter for the ductwork.
- The boundary with the Non-Radioactive Liquid Waste Disposal System (NLD) in BOF is at the battery limit 5 ft outside the LAB facility.
- The boundary with the demineralized water system (DIW) is at valves DIW-V-11032 (C2), RLD-YV-6216 (C3), and DIW-V-35083.

3 Functions

The following sections describe specific system functions.

3.1 Collect Liquid Effluents

During routine and non-routine operations, the system collects effluent from the following major sources:

- C2 Area Floor Drains
- Leakage from the C2 pump drains
- Process Vacuum Drain
- C3 Area Floor Drains
- C3 Rad Lab Sinks
- ASX Equipment Drains.

- Effluent from leakage and/or maintenance of the C3 pumps and associated piping collected by the C3 pump drains or the C3 pump pit drains.
- Cell sumps
- Hotcell Drains
- Hotcell Glovebox Drains
- Maintenance Decontamination Booth
- Effluent from leakage and/or maintenance of the C5 pumps and associated piping collected by the C5 pump drains or the C5 pump pit and piping pit drains.

3.2 Store Liquid Effluents

The system stores the collected effluents. The storage function provides for the control of transfers to efficiently minimize the use of services and utilities, and to minimize the generation of secondary wastes (e.g. flush water).

3.3 Mix Liquid Effluents

The system mixes the collected effluents for sampling and/or to prevent accumulation of solids.

3.4 Transfer Collected Effluents

The system transfers the collected effluents:
- Between LAB RLD Vessels (RLD-VSL-00163/164/165)
- To the NLD storage tank (NLD-TK-00001) in BOF
- To a tanker truck during cold commissioning
- To the plant wash vessel in Pretreatment (PWD-VSL-00044).

3.5 Confine and Contain Collected Effluents

The confinement and containment features of the system protect workers and the public from undue risk of releases.

3.6 Flush System Components

The system flushes components to complete a transfer, to protect against corrosion, to unplug a pipe, or to decontaminate.

3.7 Report System Conditions

The system reports conditions for the purpose of monitoring and control. Some examples are:
- Level monitoring within vessels for general process control
- Pressure monitoring of pump suction and discharge for pump performance measurement
- Detection of leaks from vessels, pumps, pipes, and sumps.
- Temperature monitoring on the pump discharge for general process monitoring.

3.8 Sample Sump and Vessel Contents

The system has provisions to sample the contents of the C2 vessel to verify that the contents can be transferred to BOF NLD.

4 Requirements

System requirements are derived from the following top-level project documents and derivations such as the *Analytical Laboratory Design Requirements: WTP Sampling and Analysis Plan* (S&AP) and calculations. The top-level documents are:

- DOE / BNI Contract
- *Operations Requirements Document* (ORD)
- *Basis of Design* (BOD)
- *Safety Envelope Document; Lab Facility Specific Information* (SED)

The information within this section has been arranged to convey the context of each requirement in terms of services provided, design life, containment, confinement, and access control.

4.1 Services Provided

The system shall provide the following services:

- **Effluent Handling.** The system shall support chemical and radioactive waste handling. [Section 6.2.4, BOD]
- **Analytical Support.** The system shall support the analysis of material transferred to the waste feed receipt vessels. [Section 6.6.1, BOD] The system shall support analytical activities required to support WTP operations defined by section C.7, Facility Specification, of the contract. Supported analytical activities include those that support process control and limited technology development. [Section 6.2.4, BOD] The system shall be capable of supporting the analysis of samples taken to support environmental compliance and waste form qualification. [Standard 3(c)(18), *DOE / BNI Contract*] [Section C.7(a)(9), *DOE / BNI Contract*] The system shall be capable of supporting WTP commissioning activities. [Section 6.2.4, BOD] The system shall be capable of supporting WTP decommissioning activities. [Section 6.2.4, BOD]
- **Lab Maintenance.** The system shall support the routine maintenance of laboratory systems. [Section 6.2.4, BOD]

4.1.1 Characteristics of the Collected Effluents

The characteristics of the collected effluents are as follows:

- **Compliance with Disposal Criteria.** Wastes generated as a result of sampling in other systems shall comply with all safety and disposal criteria. [Section 14.14, ORD]
- **Collected Inventory.** The inventory from the collection of hotcell effluents shall be controlled administratively. [Section 3.3.3.7, SED]
- **Organic Constituents.** The only organics present in the collected effluents are those that were originally present in the samples. [Section 5.5.4.7, SED]
- **Other effluents.** The system shall provide a disposal route for excess sample and secondary waste. [Section 14.14, ORD]

4.1.2 Storage

- **Objective**. The system shall provide retention of spent samples to accommodate controlled transfers to the pretreatment facility (PTF) for treatment as required. [Section 6.2.4, BOD]
- **Space**. The system shall provide space for the collection of liquid waste. [Section 10.6.2, ORD]

4.1.3 Mixing

Requirements for the mixing of collected effluents are as follows:

- **Suspend Solids**. The system shall re-suspend settled solids and maintain suspension of solids within vessels [Section 6.6.3, BOD]
- **Assist Sampling**. The system shall mix the contents of the vessels for sampling [Section 6.6.3, BOD]
- **Agitation Types**. The types of agitation systems to be considered are mechanical agitators, mechanical pump recirculation, and pulse-jet mixers (lift and discharge under pressure or by gravity). [Section 6.6.3, BOD]
- **Selection Criteria.** Criteria to be applied in the selection of the agitation method or methods include the following: [Section 6.6.3, BOD]
  - Safety
  - Ability to fulfill process duty (for example, the degree of mixing, mixing time, and physical properties of the components)
  - Optimized overall lifetime costs
  - High availability/achievable utilization
  - Cell volume and height restrictions
  - Minimum maintenance
  - ALARA dose
  - Waste qualification (homogeneity).

4.1.4 Transfers

Requirements for the transfer of collected effluents are as follows:

- **Export.** The system shall provide for the export of liquid waste from the LAB. [Section 10.6.2, ORD]
- **Determination of Mass Balance**. The capability to determine mass balances during transfers shall be provided. [Section 7.1, ORD]
- **External Interfaces.** The system shall be designed to dispose of liquid effluent in accordance with ICD requirements. [Section C.7(a)(6), *DOE / BNI Contract*]
- **Use of Services and Utilities**. The system shall include process and facility design features that will efficiently minimize the use of services and utilities, and the generation of secondary wastes consistent with the constraints specified in the Contract. Achievement of this requirement is demonstrated through design reviews and DOE oversight of: [Section C.7(a)(15), *DOE / BNI Contract*].
  - Services and utilities including: ICD 1, Raw Water; ICD 2, Potable Water; ICD 11, Electricity. [Section C.7(a)(15)(i), DOE / BNI Contract]
  - Generation of secondary wastes, including: Radioactive Solid Wastes, Dangerous Wastes, Non-Radioactive, Non-Dangerous Liquid Effluents; Radioactive, Dangerous Liquid Effluents. [Section C.7(a)(15)(ii), DOE / BNI Contract]
- **Capacity of the Receiving Vessel.** At the point where the recycled stream re-enters the process, there shall be sufficient capacity in either the sending or receiving vessel, or the unit operation to

allow the recycle to take place without adversely affecting WTP throughput. As far as practical, de-coupling of the source and destination of the recycle shall be provided. The volumes of recycles should be minimized. [Section 6.6.4, BOD]

- **Compatibility with the Contents of the Receiving Vessel.** The recycle shall be compatible with the return point liquid chemical and physical properties. In this case, consideration needs to be given to avoiding adverse chemical reactions, precipitation, or heat generation. [Section 6.6.4, BOD]
- **Sampling for Transfers.** For recycles where there is a risk that composition of the recycle liquid may be outside the normal operating envelope, a means of sampling and monitoring shall be provided to determine the acceptability of the recycle being carried out. In such cases, alternative processing routes must be available to the operators. [Section 6.6.4, BOD]
- **Buildup in the Receiving Vessel.** The recycles must not allow the buildup of non-active and active compounds (to unacceptable levels) through repeated recycling. The buildup of compounds and the impact of this buildup shall be evaluated before a process recycle route is specified. [Section 6.6.4, BOD]

4.1.5 Availability Factors

The following requirements pertain to system features that affect the availability of the system:

- **Flushing.** Piping systems shall have provisions for flushing to unplug process piping. Where appropriate, this shall also include vapor handling vessels, exhaust duct systems, seal pots, and seal loops. Periodic flushing may be required since partial pluggages may develop over time, slowing down transfers. [Section 14.3, ORD]
- **Clean Out Ports.** Mechanical cleanout (clean out ports) or redundancy shall be provided for high risk process piping to unplug systems where flushing has not been successful. [Section 14.3, ORD]
- **Flushing of Process Vessels.** Process vessels shall generally be equipped with interior perimeter spray rings, or equivalent, for decontamination or flushing. [Section 14.2, ORD]
- **Standardization.** Standardized equipment shall be used between plants as much as practical, in order to improve operator familiarity, reduce maintenance training, minimize spare parts inventories, reduce maintenance procedures, and reduce design effort. [Section 7.2, ORD]
- **Use of Bulges.** Equipment requiring maintenance (for example, process isolation valves, pumps, and instruments) that comes into contact with radioactive process fluids (gaseous and liquid) shall be located in stainless steel bulges. [Section 10.4, ORD] [Section 11.3.2.7, BOD] Maintainable equipment components, such as drive motors, shall be located out of high radiation cave, cell, and bulge areas to the extent practical. [Section 7.1, ORD]
- **Bulge Location.** Bulges shall be contained in a shielded area (R5) with adjacent galleries or corridors of lower radiation level (R2) areas. [Section 11.3.2.7, BOD] [Section 10.4, ORD]
- **Bulge Decontamination.** Washrings shall be provided for wash-down of all areas of the bulge. In some cases decontamination will not be able to be completely performed due to long-term buildup of contamination, failures of equipment that prevent decontamination, and inability of decontamination fluids to reach portions of contaminated equipment. [Section 11.3.2.7, BOD] [Section 10.4, ORD]
- **Bulge Shielding.** Depending on the duty of the equipment, the bulges may be shielded. [Section 11.3.2.7, BOD] The system shall have adequate provision for shielding to allow access to the bulge internals. [Section 10.4, ORD]
- **Remote Replacement of Equipment.** The system shall accommodate tools or flasks for the remote removal and replacement of valves, pumps, and instrumentation. [Section 10.4, ORD]
- **Hoists.** Hoists shall be provided for lifting equipment in and out of the bulges. [Section 10.4, ORD]

- **Access ports.** Access ports shall be provided to allow inspection of bulge internals using closed circuit television (CCTV) or fiber optics without the need to remove bulge shielding. [Section 10.4, ORD]

4.2 Design Life

Requirements related to design life of the system are as follows:

- **Operating Life.** The system shall be designed to have a 40 year operating life. [Section C.7(a)(1), *DOE / BNI Contract*]
- **Piping Slope.** Process piping shall be designed to be free-draining without traps/seals, unless there are traps/seals that will allow operator action for drainage. Floor drains are not considered process piping and may contain plumbing traps. [Section 7.1, ORD] [Section 14.3, ORD]
- **Vacuum Break.** A means of breaking a vacuum in a transfer line shall be provided as required to allow gravity liquid draining. [Section 7.1, ORD]

4.3 Containment and Confinement

General requirements for the containment and confinement of hazardous materials are as follows:

- **Use of Confinement Systems.** The facility shall be designed to retain the radioactive and hazardous material through a conservatively designed confinement system for normal operations, anticipated operational occurrences, and accident conditions. [Safety Criterion 4.2-1, *Safety Requirements Document Volume II*]
    - **Exposure Standards.** The confinement system shall protect the worker and public from undue risk of releases such that the radiological and chemical exposure standards of Safety Criteria 2.0–1 and/or 2.0–2 are not exceeded. [Safety Criterion 4.2-1, *Safety Requirements Document Volume II*]
      Environmental emissions. Environmental emissions of radioactive effluents and doses to the public, including air and liquid effluents and wastes, shall be ALARA and compliant with prescribed limits, and ensure mitigation of the extent of radiation exposure and environmental impact due to accidents. Equipment shall be designed, installed, and operated to monitor and maintain control over radioactive materials in air and liquid effluents produced during normal operations and accidents. The system of radiation protection practices for design, installation, and operation of radioactive air and liquid effluent equipment, including monitoring systems, shall ensure environmental radiation and doses to the public are ALARA and in compliance with prescribed limits. Computer codes or procedures used to determine the total effective dose equivalent from environmental radiation emissions shall be EPA approved. [Safety Criterion 5.1-2, *Safety Requirements Document Volume II*]
      Confinement. During abnormal conditions, including NPH events, the concrete walls, floors, and ceiling of the hotcells, the hotcell through-wall devices (including shield windows, service embeds, gloveboxes, hotcell monorail airlocks, and trolley containment troughs), and the waste drum transfer port system must provide confinement of radioactive materials. The concrete structures must limit structural cracking and have negligible air infiltration. The C5 effluent vessel cell and the hotcell drain collection tank pump and valve pits must provide confinement for spilled material including dispersible particulates.
      The C5 effluent vessel cell and associated pipe and pump pits in conjunction with the cell in-bleed HEPA filters must ensure materials remain confined to the C5 effluent vessel cell.
    - The exterior jacket on the transfer line from the C3 vessel cell to the C5 vessel cell must ensure materials remain confined to the C5 cell

- The exterior jacket on the drain lines from the hotcell gloveboxes (located outside the hotcells) must ensure materials remain confined to the C5 cell and gloveboxes
- The exterior jacket and the flange on the truck side of the transfer pipe in the C5 cell must ensure materials remain confined to the C5 cell
- The exterior jacket (in the C5 cell) on the transfer pipe to the PT facility must ensure materials remain confined to the C5 cell

The above functions are safety significant. [Section 4.4.2.3, SED]

The hotcell drain collection vessel and demineralized water supply piping from the backflow preventer to the concrete above the C5 cell, including the backflow preventer have been designated APC. [Section 3.3.3.7, SED]

4.3.1 Preventing a Release

The determination of the appropriate codes and standards for primary containment boundaries is as follows:

- **Determination of Vessel Regulatory Requirement.** Tank systems including piping, liners, and sumps that are used to treat or store dangerous or mixed waste shall be designed to meet Washington State requirements (WAC 173–303–640). Section 14.10, Environmental Basis of Design, BOD, contains requirements for these tank and secondary containment systems. [Section 11.6.9, BOD]
- **Determination of Vessel Codes.** The C5 vessel is categorized as Additional Protection Control (APC) and therefore must be designed to ASME VIII. [Section 11.7.1, BOD]
- **Determination of Pump Codes.** Centrifugal pumps shall be specified to API–610, *Centrifugal Pumps for Petroleum, Heavy Duty Chemical, and Gas Service*, unless otherwise justified. Vertical turbine pumps, chemical metering pumps, sump pumps, and the like, are designed to appropriate industry standards. [Section 11.7.1, BOD]
- **Determination of Piping and Valve Codes.** Process piping shall be designed in accordance with ASME B31.3, *Process Piping*, unless otherwise justified. Standard plumbing piping shall be designed to *Uniform Plumbing Code* (1997) and WAC codes, as applicable. [Section 11.7.1, BOD]

4.3.1.1 Monitoring and Control to Prevent a Release

General requirements for monitoring and control to prevent a release are as follows:

- **Central Control and Monitoring.** The system shall use central control and monitoring of process systems and components that affect laboratory operations and interfaces for normal operations. [Section 6.2.4, BOD]

The following requirements pertain to the reporting of operating conditions to a control system to prevent a release:

- **Leak Testing.** Co-axial lines (pipe-in-pipe) shall have the provision to pneumatically test both primary and secondary lines for leakage. [Section 14.3, ORD]
- **Spill Prevention.** The system shall provide spill prevention controls (for example, check valves, dry-disconnect couplings). (WAC 173–303–640[5][b][i]) [Section 14.10.1.1, BOD]
- **Overfill Prevention.** The system shall provide overfill prevention controls (for example, level sensing devices, high-level alarms, automatic feed cutoff, pressure-sensing devices, or bypass to a standby tank). (WAC 173–303–640[5][b][ii]) [Section 14.10.1.1, BOD]
- **Backup Overfill Prevention.** The system shall use normal process operating controls and trips for the prevention of vessel overfill. The controls shall be backed up, where deemed necessary, by the

integrated safety management (ISM) process safety reviews, and by an independent trip system. [Section 6.6.5, BOD]

The system shall provide the following controls to prevent a release:

- **Spill and Overfill Controls.** The appropriate controls shall be used to prevent spills and overflows from tank or containment systems. (WAC 173–303–640[5][b]) [Section 14.10.1.1, BOD]
- **Fail-Safe Design.** Components and control circuits shall be designated to fail in a safe process configuration on loss of motive power or control signal. [Section 6.2.4, Basis of Design]
- **Prevention of Siphoning or Backflow.** Potential for unplanned siphoning or backflow shall be considered during design. [Section 7.1, ORD] [Section 3.3.3.7, SED]

4.3.2 Mitigation of a Release

General Requirements for the mitigation of a release are as follows:

- **Design Philosophy.** The system shall implement current WTP design philosophies for overflows, secondary containment, flushing / washdown, and shielding [Section 6.2.4, BOD].
- **Containment Design.** Piping and components shall be designed to minimize releases. [Section 3.3.3.7, SED]
- **Passive Confinement Boundary.** The system shall establish and maintain a passive confinement boundary. [Section 3.3.3.7, SED]

Specific requirements for the mitigation of a release are described in the following sections.

4.3.2.1 Cells and associated pipe and pump pits

General requirements for cells that house process piping and storage vessels are as follows:

- **Cell Structure and Quality.** The cell and cell boundaries necessary to confine the contents of the C5 vessel are classified safety significant (SS) and have been designated QL-2 and SC-III. [Section 4.4.2.3, SED]
- **Removal of Leakage.** Basemat concrete surrounding the C5 drain line sleeves shall direct leaks to the C5 vessel cell; this feature is safety significant. [Section 3.3.3.7, SED]

4.3.2.2 Cell Liners

The secondary containment liner shall be designed as follows:

- **Liner Usage.** Liners shall be provided, as required by the WAC. [Section 11.3.5.1, BOD] Liners shall be used as secondary containment for tank systems. (WAC 173–303–640[4][d][i]) [Section 14.10.1.2, BOD]
- **Liner Capacity.** Liners shall be sized to contain 100 % of the total volume of the largest tank in the respective cells or 110 % of volume up to the overflow of the largest vessel, whichever is larger. [Section 11.3.5.1, BOD]
- **Sump Equipment.** Liners shall contain sumps to allow for leak collection and detection, and may be fitted with transfer devices for emptying purposes. [Section 11.3.5.1, BOD]
- **Secondary Containment of Sumps.** The sumps that serve as part of a secondary containment system are exempted from the requirements for secondary containment. (WAC 173–303–640[1][c]) [Section 14.10.1.2, BOD]