



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

12-EMD-0060

APR 10 2012

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

Dear Mr. Skinnarland:

**CLASS 1 MODIFICATIONS TO THE HANFORD FACILITY RESOURCE CONSERVATION AND RECOVERY ACT PERMIT, QUARTER ENDING MARCH 31, 2012**

In accordance with Hanford Facility Resource Conservation and Recovery Act Permit (Permit) Condition I.C.3, enclosed for your notification are the Class 1 modifications for the quarter ending March 31, 2012. Enclosure 1 includes the Class 1 modification information that has been cleared for public release. Enclosure 2 includes the Class 1 modification information that contains Official Use Only information and is not for public distribution.

These modifications update information in Part III of Permit Revision 8C. The modifications pertain to the 400 Area Waste Management Unit, the Liquid Effluent Treatment Facility, and 200 Area Effluent Treatment Facility, the Integrated Disposal Facility, and the Waste Treatment and Immobilization Plant. The Class 1 modifications are being made to ensure that activities are conducted in compliance with the Permit. A record of these modifications is maintained in the Hanford Facility Operating Record.

If you have any questions, please contact me, or your staff may contact Ray J. Corey, Assistant Manager for Safety and Environment, on (509) 376-0108.

Sincerely,

  
Matt McCormick  
Manager

EMD:ACM

Enclosures

cc w/encls: See Page 2

Document transmitted contains OUO information.

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

Mr. E. R. Skinnarland  
12-EMD-0060

-2-

APR 10 2012

cc w/encls:

P. G. Harrington, ORP (CD ROM)  
Ecology NWP Library (Hardcopy)  
Environmental Portal, LMSI, A3-95 (CD ROM)  
Administrative Record, TSD: H-0-1, H-0-8, S-3-5, H6-08 (Hard Copy & CD ROM)  
HF Operating Record (J. K. Perry, MSA, H7-28) (CD ROM)

cc w/o encls:

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

Hanford Facility RCRA Permit Modification Notification Forms

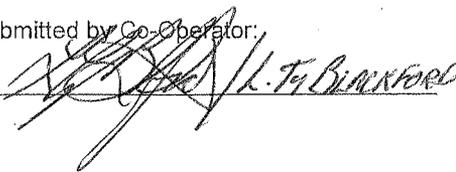
Part III, Operating Unit 16  
400 Area Waste Management Unit

Index

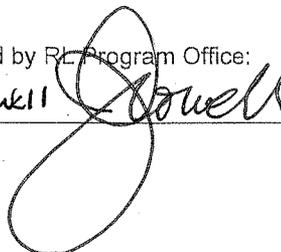
Page 2 of 3    Hanford Facility RCRA Permit III.16  
                  Conditions

Page 3 of 3    Addendum G, 400 Area Waste  
                  Management Unit Training Matrix

Submitted by Co-Operator:

 L. F. Blackford    3/22/12  
Date

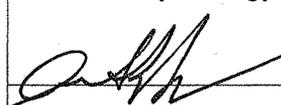
Reviewed by RL Program Office:

J. A. Dowell     3.23.12  
Date

<b>Hanford Facility RCRA Permit Modification Notification Form</b>																								
Unit: <b>400 Area Waste Management</b>	Permit Part <b>Part III, Operating Unit 16</b>																							
<p><u>Description of Modification:</u> Hanford Facility RCRA Permit III.16:</p> <p style="text-align: center;"><b>PART III, OPERATING UNIT GROUP 16 PERMIT CONDITIONS 400 Area Waste Management Unit</b></p>																								
<p><b>UNIT DESCRIPTION:</b></p> <p>The 400 Area Waste Management Unit (WMU) is in the Property Protected Area (PPA) at the Fast Flux Test Facility (FFTF), in Hanford's 400 Area. The 400 Area WMU consists of two container storage units:</p> <ul style="list-style-type: none"> <li>• Fuel Storage Facility (FSF, Building 403). The FSF is a large steel-frame, metal-sided, high bay building. Its dimensions are 34 x 27 x 12 meters (112 x 90 x 40 feet). The container storage unit is on the ground-level floor. In it are two large steel boxes that store sodium-contaminated core component pots (CCPs). The Permittees do not plan to store more mixed waste than is currently stored in the facility; however, the FSF is physically capable of storing additional mixed waste. They will store any additional wastes at the 400 Area WMU in the Interim Storage Area.</li> <li>• Interim Storage Area, 4718 (ISA). The ISA consists of 156 x 247 meters (513 x 247 feet) totally fenced area. This area is for aboveground dry cask storage of spent fuel. A concrete pad in the ISA, which measures 27 x 37 meters (90 x 120 feet), was used for dry cask storage, but will not necessarily be used for mixed waste management. The rest of the ISA surface is gravel. The ISA is generally flat. However, it is graded to drain in accordance with the general drainage plan for the FFTF PPA. Inside the ISA, there is also one building along the west fence line, and open on the side. This building, Building 432A, is authorized for mixed waste management.</li> </ul> <p>The scale map in Addendum A shows the location of each storage unit. The only mixed waste stored in these two container storage units is debris (e.g., piping, equipment, and components) contaminated with elemental sodium and sodium hydroxide (D002). This waste stream is designated as (D001, D003, and WSC2). The 400 Area WMU will not store, treat, or dispose of bulk metallic sodium or bulk sodium hydroxide.</p>																								
<p><b><u>LIST OF ADDENDA SPECIFIC TO OPERATING UNIT GROUP 16</u></b></p> <table style="width:100%; border-collapse: collapse;"> <tr><td style="width: 15%;">Addendum A</td><td>Part A Form, dated December 31, 2011</td></tr> <tr><td>Addendum B</td><td>Waste Analysis Plan, December 31, 2011</td></tr> <tr><td>Addendum C</td><td>Process Information, December 31, 2011</td></tr> <tr><td>Addendum D</td><td>Groundwater Monitoring – Reserved</td></tr> <tr><td>Addendum E</td><td>Security Requirements, dated June 30, 2009</td></tr> <tr><td>Addendum F</td><td>Preparedness and Prevention, dated June 30, 2009</td></tr> <tr><td>Addendum G</td><td>Personnel Training, dated <del>September 30, 2009</del> <u>March 31, 2012</u></td></tr> <tr><td>Addendum H</td><td>Closure Plan, dated June 30, 2009</td></tr> <tr><td>Addendum I</td><td>Inspection Requirements, dated September 30, 2009</td></tr> <tr><td>Addendum J</td><td>Contingency Plan, dated December 31, 2011</td></tr> </table>					Addendum A	Part A Form, dated December 31, 2011	Addendum B	Waste Analysis Plan, December 31, 2011	Addendum C	Process Information, December 31, 2011	Addendum D	Groundwater Monitoring – Reserved	Addendum E	Security Requirements, dated June 30, 2009	Addendum F	Preparedness and Prevention, dated June 30, 2009	Addendum G	Personnel Training, dated <del>September 30, 2009</del> <u>March 31, 2012</u>	Addendum H	Closure Plan, dated June 30, 2009	Addendum I	Inspection Requirements, dated September 30, 2009	Addendum J	Contingency Plan, dated December 31, 2011
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<p>Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1</p> <p>Enter wording of WAC 173-303-830, Appendix I Modification citation: Administrative and informational changes</p>																								
<p>Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial)</p> <p><u>Reason for denial:</u></p>			<p>Reviewed by Ecology:</p> <div style="text-align: right; font-size: 1.2em;"> </div> <p style="text-align: right; font-size: 1.2em;">3/20/12</p> <p style="text-align: right;">Date</p>																					

<sup>1</sup> Class 1 modifications requiring prior Agency approval.

<sup>2</sup> 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 <sup>1</sup>, if appropriate.

Hanford Facility RCRA Permit Modification Notification Form					
Unit: <b>400 Area Waste Management</b>			Permit Part <b>Part III, Operating Unit 16</b>		
Description of Modification: Addendum G, 400 Area Waste Management Unit Training Matrix					
<b>400 Area Waste Management Unit Training Matrix</b>					
	Training Category*				
Permit Attachment 5, Training Category	General Hanford Facility Training	Contingency Plan Training	Emergency Coordinator Training	Operations Training	
400 Area WMU DWTP implementing plan	Orientation Program	Emergency Response (Contingency Plan)	Emergency Coordinator Training	General Waste Management	Container Management
Job title/position					
Nuclear Chemical Operator	X	X			X
Environmental Compliance Officer	X	X		X	X
Building Emergency Director	X		X		
Non-Resident Waste Service Provider	X			X	
Non-Resident Sampler	X			X	
*Refer to the 400 Area WMU Dangerous Waste Training Plan (DWTP) for a complete description.					
WAC 173-303-830 Modification Class <sup>1 2</sup>			Class 1	Class 1	Class 2
Please mark the Modification Class:			X		
Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.5.b Enter wording of WAC 173-303-830, Appendix I Modification citation: Changes in the training plan/Other changes. This text change reflects a reassignment in training (not a decrease in the amount of training) and the addition of another employee classification to the training plan, therefore this modification is classified as B.5.b.					
Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial)			Reviewed by Ecology:		
Reason for denial:			 Date <u>3/20/12</u>		

<sup>1</sup> Class 1 modifications requiring prior Agency approval.

<sup>2</sup> 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, if appropriate.

**Remove and Replace the Following Sections:**

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Remove Part III Permit Conditions, dated December 31, 2011, and replace with Permit Conditions dated March 31, 2012.

Remove Addendum G, dated September 30, 2009, and replace with Addendum G, dated March 31, 2012.

1                                   **PART III, OPERATING UNIT GROUP 16 PERMIT CONDITIONS**

2   **400 Area Waste Management Unit**

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3    **UNIT DESCRIPTION:**

4    The 400 Area Waste Management Unit (WMU) is in the Property Protected Area (PPA) at the Fast Flux  
5    Test Facility (FFTF), in Hanford's 400 Area. The 400 Area WMU consists of two container storage  
6    units:

- 7    •    Fuel Storage Facility (FSF, Building 403). The FSF is a large steel-frame, metal-sided, high bay  
8        building. Its dimensions are 34 x 27 x 12 meters (112 x 90 x 40 feet). The container storage unit is  
9        on the ground-level floor. In it are two large steel boxes that store sodium-contaminated core  
10       component pots (CCPs). The Permittees do not plan to store more mixed waste than is currently  
11       stored in the facility; however, the FSF is physically capable of storing additional mixed waste. They  
12       will store any additional wastes at the 400 Area WMU in the Interim Storage Area.
- 13   •   Interim Storage Area, 4718 (ISA). The ISA consists of 156 x 247 meters (513 x 247 feet) totally  
14       fenced area. This area is for aboveground dry cask storage of spent fuel. A concrete pad in the ISA,  
15       which measures 27 x 37 meters (90 x 120 feet), was used for dry cask storage, but will not necessarily  
16       be used for mixed waste management. The rest of the ISA surface is gravel. The ISA is generally  
17       flat. However, it is graded to drain in accordance with the general drainage plan for the FFTF PPA.  
18       Inside the ISA, there is also one building along the west fence line, and open on the side. This  
19       building, Building 432A, is authorized for mixed waste management.

20   The scale map in Addendum A shows the location of each storage unit. The only mixed waste stored in  
21   these two container storage units is debris (e.g., piping, equipment, and components) contaminated with  
22   elemental sodium and sodium hydroxide (D002). This waste stream is designated as (D001, D003, and  
23   WSC2). The 400 Area WMU will not store, treat, or dispose of bulk metallic sodium or bulk sodium  
24   hydroxide.

25   **LIST OF ADDENDA SPECIFIC TO OPERATING UNIT GROUP 16**

- 26   Addendum A   Part A Form, dated December 31, 2011
- 27   Addendum B   Waste Analysis Plan, dated December 31, 2011
- 28   Addendum C   Process Information, dated December 31, 2011
- 29   Addendum D   Groundwater Monitoring – Reserved
- 30   Addendum E   Security Requirements, dated June 30, 2009
- 31   Addendum F   Preparedness and Prevention, dated June 30, 2009
- 32   Addendum G   Personnel Training, dated March 31, 2012
- 33   Addendum H   Closure Plan, dated June 30, 2009
- 34   Addendum I   Inspection Requirements, dated September 30, 2009
- 35   Addendum J   Contingency Plan, dated December 31, 2011

36   **DEFINITIONS**

37   The term "**CCP**" or **Core Component Pot** means one of 109 cylindrical containers, each containing  
38   3.75 gallons of un-reacted sodium totaling 405 gallons, currently stored as mixed waste in the FFTF Fuel  
39   Storage Facility. The CCPs were previously filled with sodium and used in the FFTF Interim Decay  
40   Storage Vessel to store spent FFTF Driver Fuel Assemblies under inert gas.

1 **ACRONYMS**

2	FFTF	Fast Flux Test Facility
3	CCP	Core Component Pot
4	PPA	Property Protected Area
5	ISA	Interim Storage Area
6	FSF	Fuel Storage Facility
7	WMU	Waste Management Unit

8 **III.16.A COMPLIANCE WITH UNIT-SPECIFIC PERMIT CONDITIONS**

9 III.16.A.1 The Permittees will comply with all conditions in this Chapter and its addenda with  
10 respect to dangerous waste management and dangerous waste management units in the  
11 400 Area WMU, in addition to conditions in Permit Parts I and II.

12 **III.16.B GENERAL WASTE MANAGEMENT**

13 III.16.B.1 The Permittees are authorized to accept, according to the waste acceptance procedure  
14 documented in Addendum B, Section B.2, mixed debris generated from demolition and  
15 decommissioning of the Fast Flux Test Facility reactor system containing or  
16 contaminated with residual elemental sodium and sodium hydroxide. The Permittee will  
17 store these wastes in the ISA.

18 III.16.B.2 The Permittees are authorized to store core component pots generated prior to the  
19 effective date of this permit in two large metal boxes in the 400 Area WMU, FSF.

20 III.16.B.3 The Permittees are authorized store mixed waste in the ISA up to a maximum capacity of  
21 19,000 gallons.

22 III.16.B.4 The Permittees will maintain the physical structure of dangerous waste management units  
23 in the 400 Area WMU as documented in the Unit Description above and Addendum C,  
24 Figures C.1 and C.2.

25 III.16.B.5 The Permittees will maintain appropriate administrative controls and work practices to  
26 ensure that only wastes specified in Permit Condition III.16.B.1, are received by the ISA  
27 for storage, and that no co-mingling or cross-contamination of the waste stream specified  
28 in Permit Condition III.16.B.1 with any other waste stream may occur.

29 **III.16.C WASTE ANALYSIS**

30 III.16.C.1 The Permittees will have an accurate and complete waste profile for the waste stream  
31 identified in Permit Condition III.16.B.1. This waste profile will be signed and dated  
32 upon approval by the 400 Area WMU authorized representative.  
33 [\[WAC 173-303-380\(1\)\(a\)\]](#)

34 III.16.C.2 The Permittees will make a copy of the waste profile required by Permit  
35 Condition III.16.C.1 available upon request. [\[WAC 173-303-815\(2\)\(b\)\(ii\)\]](#)

36 **III.16.D RECORDKEEPING AND REPORTING**

37 III.16.D.1 The Permittees will place the following into the Hanford Facility Operating Record,  
38 400 Area WMU File required by Permit Condition II.I.2. [\[WAC 173-303-380\]](#)

39 III.16.D.2 Records required by [WAC 173-303-380\(1\)\(o\)](#), incorporated by reference;

40 **III.16.E SECURITY**

41 III.16.E.1 The Permittees will post warning signs at all entrances to the FSF and the ISA specified  
42 in Addendum E, Section E.1.1. [\[WAC 173-303-310\(2\)\(a\)\]](#)

- 1 **III.16.F PREPAREDNESS AND PREVENTION**
- 2 III.16.F.1 The Permittees will comply with the Addendum F, Preparedness and Prevention  
3 requirements specific to the 400 Area WMU. [[WAC 173-303-340](#)]
- 4 **III.16.G CONTINGENCY PLAN**
- 5 III.16.G.1 The Permittees will comply with Addendum J, Contingency Plan in addition to the  
6 requirements of Permit Condition II.A when applicable. [[WAC 173-303-350](#)]
- 7 **III.16.H INSPECTIONS**
- 8 III.16.H.1 The Permittees will perform inspections of the 400 Area WMU according to  
9 Addendum I, Inspection Plan for inspecting all monitoring equipment, safety and  
10 emergency equipment, security devices, and operating and structural equipment that help  
11 prevent, detect, or respond to hazards to the public health or the environment pursuant to  
12 the requirements of WAC 173-303-320 [[WAC 173-303-320\(2\)](#)]
- 13 **III.16.I TRAINING PLAN**
- 14 III.16.I.1 The Permittees will include Addendum G unit-specific training requirements in the  
15 written training plan required by Permit Condition II.C. [[WAC 173-303-330](#)]
- 16 **III.16.J OTHER GENERAL REQUIREMENTS**
- 17 III.16.J.1 The Permittees will comply with the requirements of [WAC 173-303-395\(1\)\(a\)-\(c\)](#),  
18 incorporated by reference, for prevention of reaction of ignitable, reactive, or  
19 incompatible wastes.
- 20 III.16.J.2 Land Disposal Restriction Requirements
- 21 III.16.J.2.a The Permittees will ensure a schedule of compliance and any applicable associated work  
22 requirements are included in the land disposal restrictions report required by the  
23 HFFACO Milestone M-26, incorporated by reference by Permit Condition II.O for  
24 treatment and/or acquisition of treatment capacity for wastes which are or are expected to  
25 be stored in the 400 Area WMU container storage units.
- 26 **III.16.K CLOSURE**
- 27 III.16.K.1 The Permittees will close the 400 Area WMU Container Storage Units in accordance  
28 with Addendum H, Closure Plan. [[WAC 173-303-610\(4\)](#)]
- 29 **III.16.L POST CLOSURE**
- 30 Reserved
- 31 **III.16.M CRITICAL SYSTEMS**
- 32 Reserved
- 33 **III.16.N RESERVED**
- 34 **III.16.O CONTAINERS**
- 35 III.16.O.1 Container Management Standards
- 36 III.16.O.1.a The Permittees will ensure that all containers remain in good condition. If a container  
37 holding mixed waste is not in good condition (e.g., severe rusting or corrosion, or  
38 apparent structural defects), or if it begins to leak, the Permittee must transfer the waste  
39 from the container to a container that is in good condition or place the leaking container  
40 in an appropriate over-pack container. [[WAC 173-303-630\(2\)](#)]

- 1 III.16.O.1.b The Permittees shall ensure that all containers are constructed of carbon steel or stainless  
2 steel, or other materials compatible with metallic sodium and sodium hydroxide.  
3 [\[WAC 173-303-630\(4\)\]](#)
- 4 III.16.O.1.c The Permittees must remove spilled or leaked waste within secondary containment  
5 pursuant to [WAC 173-303-630\(7\)\(a\)\(ii\)](#), incorporated by reference.
- 6 III.16.O.1.d Requirements for the Fuel Storage Facility
- 7 III.16.O.1.e The Permittee will maintain an inert gas (argon or nitrogen) cover within each large metal  
8 box to prevent contact of the metallic sodium with the water vapor in the air and the  
9 formation of free liquids.
- 10 III.16.O.1.f The Permittees will place large boxes stored in the FSF in drip pans to ensure a base free  
11 of cracks or gaps, and ensure that the large boxes are elevated or otherwise protected  
12 from contact with accumulated liquids.
- 13 III.16.O.1.g Requirements for the Interim Storage Area
- 14 III.16.O.1.h The Permittee may store wastes in the ISA in standard metal containers (e.g., 208-liter  
15 drums), large metal boxes fabricated to accommodate the size and shape of a particular  
16 component or debris, or unique components removed from FFTF that when closed in  
17 accordance with [WAC 173-303-630\(5\)\(a\)](#) serve as a primary container.
- 18 III.16.O.1.i The Permittees will manage unique components stored in the ISA on the gravel surface  
19 with sufficient open space between components and between components and the fence  
20 line to accommodate inspections and movement of equipment.
- 21 III.16.O.1.j The Permittees will not place wastes in the open-sided structure (Building 432A) within  
22 the ISA identified in the Unit Description above.  
23

**Addendum G**

**Personnel Training**

**400 Area Waste Management Unit Training Matrix**

	Training Category*				
Permit Attachment 5, Training Category	General Hanford Facility Training	Contingency Plan Training	Emergency Coordinator Training	Operations Training	
400 Area WMU DWTP implementing plan	Orientation Program	Emergency Response (Contingency Plan)	Emergency Coordinator Training	General Waste Management	Container Management
<b>Job title/position</b>					
Nuclear Chemical Operator	X	X			X
Environmental Compliance Officer	X	X		X	X
Building Emergency Director	X		X		
Non-Resident Waste Service Provider	X			X	
Non-Resident Sampler	X			X	

\*Refer to the 400 Area WMU Dangerous Waste Training Plan (DWTP) for a complete description.

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Hanford Facility RCRA Permit Modification Notification Forms

Part III, Operating Unit 3

Liquid Effluent Treatment Facility & 200 Area Effluent Treatment Facility

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- Page 4 of 6 Addendum J, Section J.3.6
- Page 5 of 6 Addendum J, Section J.4.3
- Page 6 of 6 Addendum J, Section J.4.5

Submitted by Co-Operator:

L. Ty BLACKFORD

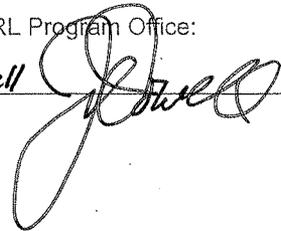


3/22/12

Date

Reviewed by RL Program Office:

J.A. Dowell



3.23.12

Date

<b>Hanford Facility RCRA Permit Modification Notification Form</b>														
Unit: <b>LERF and 200 Area ETF</b>	Permit Part <b>Part III, Operating Unit 3</b>													
<p><u>Description of Modification:</u> Hanford Facility RCRA Permit III.3:</p> <p style="text-align: center;"><b>PART III, OPERATING UNIT GROUP 3 PERMIT CONDITIONS</b> <b>Liquid Effluent Retention Facility &amp; 200 Area Effluent Treatment Facility</b></p>														
<p><b><u>Unit Description:</u></b></p> <p>The Liquid Effluent Retention Facility (LERF) and 200 Area Effluent Treatment Facility(200 Area ETF) consists of an aqueous waste treatment system that provides treatment, storage integral to the treatment process, and storage of secondary wastes from the treatment process for a variety of aqueous mixed waste. The 200 Area ETF is located in the 200 East Area. Aqueous wastes managed by the 200 Area ETF include process condensate from the LERF and 200 Area ETF and other aqueous waste generated from onsite remediation and waste management activities.</p> <p>The LERF consists of three lined surface impoundments, or basins. Aqueous waste from LERF is pumped to the 200 Area ETF for treatment in a series of process units, or systems, that remove or destroy essentially all of the dangerous waste constituents. The treated effluent is discharged to a State-Approved Land Disposal Site (SALDS) north of the 200 West Area, under the authority of a Washington State Waste Discharge Permit (Ecology 2000) and <u>200 Area ETF Delisting (40 CFR 261, Appendix IX, Table 2)</u>. Construction of the LERF began in 1990. Waste management operations began at LERF in April 1994. Construction of the 200 Area ETF began in 1992. Waste management operations began at 200 Area ETF in November of 1995.</p> <p>This Chapter provides unit-specific Permit conditions applicable to the dangerous waste management units for LERF and 200 Area ETF.</p>														
<p><b><u>List of Addenda Specific to Operating Unit Group 3</u></b></p> <p>Addendum A    Part A Form, dated June 30, 2011</p> <p>Addendum B    Waste Analysis Plan, dated <del>March 31, 2012</del> <del>June 30, 2011</del></p> <p>Addendum C    Process Information, dated December 31, 2011</p> <p>Chapter 5.0    Groundwater Monitoring (PNNL-11620 &amp; WHC-SD-EN-AP-024), dated June 30, 2008</p> <p>Addendum E    Security Requirements, dated, June 30, 2011</p> <p>Addendum F    Preparedness and Prevention, dated June 30, 2011</p> <p>Addendum G    Personnel Training, dated June 30, 2011</p> <p>Addendum H    Closure Plan, dated June 30, 2011</p> <p>Addendum I    Inspection Requirements, dated June 30, 2011</p> <p>Addendum J    Contingency Plan, dated <del>March 31, 2012</del> <del>December 31, 2011</del></p>														
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width: 55%; padding: 5px;">WAC 173-303-830 Modification Class <sup>1 2</sup></td> <td style="width: 10%; padding: 5px;">Class 1</td> <td style="width: 10%; padding: 5px;">Class 1</td> <td style="width: 10%; padding: 5px;">Class 2</td> <td style="width: 15%; padding: 5px;">Class 3</td> </tr> <tr> <td style="padding: 5px;">Please mark the Modification Class:</td> <td style="text-align: center; padding: 5px;">X</td> <td></td> <td></td> <td></td> </tr> </table>					WAC 173-303-830 Modification Class <sup>1 2</sup>	Class 1	Class 1	Class 2	Class 3	Please mark the Modification Class:	X			
WAC 173-303-830 Modification Class <sup>1 2</sup>	Class 1	Class 1	Class 2	Class 3										
Please mark the Modification Class:	X													
<p>Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1</p> <p>Enter wording of WAC 173-303-830, Appendix I Modification citation:</p> <p>Administrative and informational changes</p>														
<p>Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial)</p> <p><u>Reason for denial:</u></p>			<p>Reviewed by Ecology:</p> <p style="text-align: center;"> 3/20/12</p> <p style="text-align: right;">Date</p>											

<sup>1</sup> Class 1 modifications requiring prior Agency approval.

<sup>2</sup> 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, if appropriate.

<b>Hanford Facility RCRA Permit Modification Notification Form</b>				
Unit: <b>LERF and 200 Area ETF</b>	Permit Part <b>Part III Operating Unit 3</b>			
<p><u>Description of Modification:</u> Addendum B, Section B.1.1</p> <p><b>B.1.1 Liquid Effluent Retention Facility and Effluent Treatment Facility Description</b></p> <p>The LERF and 200 Area ETF comprise an aqueous waste treatment system located in the 200 East Area. Both LERF and 200 Area ETF may receive aqueous waste through several inlets. 200 Area ETF can receive aqueous waste through three inlets. First, 200 Area ETF can receive aqueous waste directly from the LERF. Second, aqueous waste can be transferred from the Load-in Station to 200 Area ETF. Third, aqueous waste can be transferred from containers (e.g., carboys, drums) to the 200 Area ETF through either the Secondary Waste Receiving Tanks or the Concentrate Tanks. The Load-in Station is located just east of 200 Area ETF and currently consists of <del>two 34,200 liter</del> <sup>three</sup> storage tanks and a pipeline that connects to either LERF or 200 Area ETF through fiberglass pipelines with secondary containment.</p>				
WAC 173-303-830 Modification Class <sup>1,2</sup>	Class 1	Class <sup>1</sup>	Class 2	Class 3
Please mark the Modification Class:	X			
<p>Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.2</p> <p>Enter wording of WAC 173-303-830, Appendix I Modification citation:</p> <p>Correction of typographical errors</p>				
<p>Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial)</p> <p><u>Reason for denial:</u></p>		<p>Reviewed by Ecology:</p> <div style="text-align: right; margin-top: 10px;"> </div> <div style="text-align: right; margin-top: 5px;"> <p><u>3/20/12</u> Date</p> </div>		

<sup>1</sup> Class 1 modifications requiring prior Agency approval.

<sup>2</sup> 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 <sup>1</sup>, if appropriate.

<b>Hanford Facility RCRA Permit Modification Notification Form</b>				
Unit: <b>LERF and 200 Area ETF</b>	Permit Part <b>Part III Operating Unit 3</b>			
<p><u>Description of Modification:</u> Addendum J, Section J.3.6</p> <p><b>J.3.6 Post Emergency Equipment Maintenance and Decontamination</b></p> <p>All equipment used during an incident is decontaminated (if practicable) or disposed of as spill debris. Decontaminated equipment is checked for proper operation before storage for subsequent use. Consumable and disposed materials are restocked. Fire extinguishers are <del>replaced</del>recharged.</p> <p>The BED ensures that all equipment is cleaned and fit for its intended use before operations are resumed. Depleted stocks of neutralizing and absorbing materials are replenished; protective clothing is cleaned or disposed of and restocked, etc.</p>				
WAC 173-303-830 Modification Class <sup>1 2</sup>	Class 1	Class <sup>1</sup>	Class 2	Class 3
Please mark the Modification Class:	X			
<p>Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1</p> <p>Enter wording of WAC 173-303-830, Appendix I Modification citation:</p> <p>Administrative and Informational changes <i>and -830, Appendix I, B.6.b. <sup>8WP</sup></i></p>				
Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial) <u>Reason for denial:</u>	Reviewed by Ecology:  Date <b>3/20/12</b>			
Date				

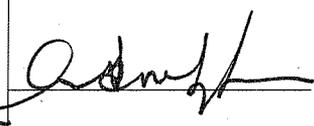
<sup>1</sup> Class 1 modifications requiring prior Agency approval.

<sup>2</sup> 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 <sup>1</sup>, if appropriate.

Hanford Facility RCRA Permit Modification Notification Form				
Unit: <b>LERF and 200 Area ETF</b>	Permit Part <b>Part III Operating Unit 3</b>			
Description of Modification: Addendum J, Section J.4.3				
<b>J.4.3 Communications Equipment/Warning Systems</b>				
TYPE	LOCATION	CAPABILITY		
Fire alarms (ETF only)	Corridors, locker rooms, process area, drum storage, and truck bay	Audible throughout ETF		
Take cover/evacuation	Throughout the ETF	Audible outside buildings and inside administrative buildings		
Public address system (ETF Only)	Throughout the ETF	Audible throughout ETF		
Portable radios	Operations and maintenance personnel	Communication to control room		
Telephone	<b>ETF-</b> control room, 2025E, 2025EA offices, MO-148, MO-269, <u>MO-251</u> , 2025EC71. <b>LERF-</b> MO-727 and 242AL71 instrument building, LERF Garage 242AL11 <b>TEDF-</b> 225E(pump house 1), 225W (pump house 2), 6653 (sample building), 6653A (pump house 3)	Internal and external communications. Allows notification of outside resources (POC, HFD, Hanford Patrol, etc.		
WAC 173-303-830 Modification Class <sup>1,2</sup>		Class 1	Class 1	Class 2
Please mark the Modification Class:		X		
Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.6.d				
Enter wording of WAC 173-303-830, Appendix I Modification citation:				
Changes in name, address, or phone number of coordinators or other persons or agencies identified in the plan				
Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial)		Reviewed by Ecology:		
Reason for denial:				
		3/20/12 Date		

<sup>1</sup> Class 1 modifications requiring prior Agency approval.

<sup>2</sup> 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, if appropriate.

Hanford Facility RCRA Permit Modification Notification Form					
Unit: <b>LERF and 200 Area ETF</b>	Permit Part <b>Part III Operating Unit 3</b>				
Description of Modification: Addendum J, Section J.4.5					
<b>J.4.5 Spill Control and Containment Supplies</b>					
<b>SPILL KITS AND SPILL CONTROL EQUIPMENT</b>					
<b>TYPE</b>	<b>LOCATION</b>			<b>CAPABILITY</b>	
Spill bags, drums, carts, etc.	4 – 2025E in process area			Support containment and cleanup of hazardous material spills	
	1 – TEDF 6653 Disposal Building				
	1 – 2025E upper level process area				
	1 – 2025E Rm 125A				
	1 – 2025ED Load-In Station CONEX				
Spill response cabinet	1 – 2025E Rm 122			Support equipment for spill response	
	2 – <u>container 90-day-storage CONEX East of 2025E building within the TSD unit boundary</u>				
	1 – TEDF 6653 Disposal Building				
	1 – MO-727 Change Trailer				
	1 – outside southeast side of 2025E				
WAC 173-303-830 Modification Class <sup>1 2</sup>		Class 1	Class 1'	Class 2	Class 3
Please mark the Modification Class:		X			
Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1					
Enter wording of WAC 173-303-830, Appendix I Modification citation: Administrative and Informational changes					
Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial)			Reviewed by Ecology:		
Reason for denial: <i>no</i>			 Date: <u>3/20/12</u>		
<i>This change reflects a mis-identification of the box in the permit. It has been managed as TSD storage prior to this modification.</i>					

<sup>1</sup> Class 1 modifications requiring prior Agency approval.

<sup>2</sup> 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', if appropriate.

**Remove and Replace the Following Sections:**

---

Remove Part III Permit Conditions, dated June 30, 2011, and December 31, 2011, and replace with Permit Conditions dated March 31, 2012.

Remove Addendum B, dated June 30, 2011, and replace with Addendum B, dated March 31, 2012.

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

---

3    **Unit Description:**

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

10   The LERF consists of three lined surface impoundments, or basins. Aqueous waste from LERF is  
11   pumped to the 200 Area ETF for treatment in a series of process units, or systems, that remove or destroy  
12   essentially all of the dangerous waste constituents. The treated effluent is discharged to a State-Approved  
13   Land Disposal Site (SALDS) north of the 200 West Area, under the authority of a Washington State  
14   Waste Discharge Permit (Ecology 2000) and [200 Area ETF Delisting \(40 CFR 261, Appendix IX,](#)  
15   Table 2). Construction of the LERF began in 1990. Waste management operations began at LERF in  
16   April 1994. Construction of the 200 Area ETF began in 1992. Waste management operations began at  
17   200 Area ETF in November of 1995.

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

20   **List of Addenda Specific to Operating Unit Group 3**

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

31   **Definitions**

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

35   **Acronyms**

36   LERF and 200 Area ETF           200-Area Liquids Processing Facility

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

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

- 1 **III.3.B GENERAL WASTE MANAGEMENT**
- 2 III.3.B.1 The Permittees are authorized to accept dangerous and/or mixed waste for treatment in  
3 dangerous waste management units that satisfies the waste acceptance criteria in Permit  
4 Addendum B according to the waste acceptance procedures in Permit Addendum B.  
5 [\[WAC 173-303-300\]](#)
- 6 III.3.B.2 The Permittees are authorized to manage dangerous and/or mixed wastes physically  
7 present in the dangerous waste management units in LERF and 200 Area ETF as of the  
8 effective date of this Permit according to the requirements of Permit Condition III.15.B.1.
- 9 III.3.B.3 The Permittees are authorized to treat and/or store dangerous/mixed waste in the  
10 dangerous waste management units in LERF and 200 Area ETF according to the  
11 following requirements:
- 12 III.3.B.3.a The Permittees are authorized to treat, and store as necessary in support of treatment,  
13 dangerous waste in the 200 Area ETF tank systems identified in Permit Addendum C,  
14 Section C.2, and Section C.4 according to the Permit Conditions of this Chapter.
- 15 III.3.B.3.b The Permittees are authorized to store and treat those dangerous and/or mixed waste  
16 identified in Permit Addendum C, Section C.3, in containers according to the  
17 requirements of this Chapter. All container management activities pursuant to this Permit  
18 Condition will take place within the container storage area or within the 200 Area ETF  
19 process area identified in Permit Addendum C, Figure C.3.
- 20 III.3.B.3.c Treatment in containers authorized by Permit Condition III.3.B.3.b is limited to decanting  
21 of free liquids, and addition of sorbents to free liquids. The Permittees will ensure that  
22 sorbents are compatible with wastes and the containers. Sorbents will be compliant with  
23 the requirements of [WAC 173-303-140\(4\)\(b\)\(iv\)](#), incorporated by reference.
- 24 III.3.B.3.d The Permittees are authorized to treat aqueous waste in LERF Basins (Basins 42, 43 and  
25 44) subject to the following requirements:
- 26 III.3.B.3.d.1 Following treatment in a LERF basin, aqueous wastes must be treated in 200 Area ETF  
27 according to Permit Conditions III.3.B.3.a through c.; [\[40 CFR 268.4\(2\)\(iii\)\]](#), incorporated  
28 by reference by [WAC 173-303-140](#)
- 29 III.3.B.3.d.2 The Permittees must ensure that for each basin, either supernatant is removed on a flow-  
30 through basis, to meet the requirement of [40 CFR 268.4\(a\)\(2\)\(ii\)](#) incorporated by  
31 reference by [WAC 173-303-140](#), or incoming waste is shown to not contain solids by  
32 either: (1) sampling results showing the waste does not contain detectable solids, or (2)  
33 filtering through a 10 micron filter; [\[WAC 173-303-815\(2\)\(b\)\(ii\)\]](#)
- 34 III.3.B.4 The Permittees will maintain the physical structure of the LERF and 200 Area ETF as  
35 documented in the applicable sections of Permit Addendum C, Section C.2.  
36 [\[WAC 173-303-630\(7\)](#), [WAC 173-303-640\(3\)](#), [WAC 173-303-640\(4\)\]](#)
- 37 III.3.B.5 The Permittees are authorized to use treated effluent for recycle/makeup water purposes  
38 at the 200 Area ETF as outlined in Permit Addendum C, Section C.2.5.5, and the letters  
39 dated [August 19, 2005, EPA Region 10 to Keith A. Klein](#); and [August 8, 2005,](#)  
40 [Department of Ecology to Keith A. Klein.](#) [\[WAC 173-303-815 \(2\)\(b\)\(ii\)\]](#)
- 41 III.3.B.6 The Permittees will maintain and operate systems for the 200 Area ETF documented in  
42 Permit Addendum C, Section C.2.5 as necessary for proper operation of the 200 Area  
43 ETF, compliance with the conditions of this Permit, and protection of human health and  
44 the environment. For purposes of this Permit Condition, the Monitor and Control System  
45 documented in Permit Addendum C, Section C.2.5.1, is considered to include all  
46 indicators, sensors, transducers, actuators and other control devices connected to but  
47 remote from the centralized monitor and control system (MCS) computer.

- 1 III.3.B.7 The Permittees must complete the following requirements prior to acceptance for  
2 treatment in 200 Area ETF aqueous waste streams with listed waste numbers subject to  
3 the requirements of the State and Federal delisting: [[WAC 173-303-815\(2\)\(b\)\(ii\)](#)]
- 4 III.3.B.7.a The Permittees will prepare a written waste processing strategy according to the  
5 requirements of the [State and Federal Delisting Actions Conditions \(1\)\(a\)\(ii\) and \(1\)\(b\)](#),  
6 incorporated by reference, and Permit Addendum B, Section B.2.2.2.
- 7 III.3.B.7.b The waste processing strategy required by Permit Condition III.3.B.7.a, must document  
8 the proposed processing configuration for the 200 Area ETF, operating conditions for  
9 each processing unit, and the expected treated effluent characteristics based on the  
10 process model and treatability envelope data required by [State and Federal Delisting](#)  
11 [Conditions \(1\)\(a\)\(ii\) and \(1\)\(b\)](#).
- 12 III.3.B.7.c The written waste processing strategy required by Permit Condition III.3.B.7.a must  
13 demonstrate that the projected treated effluent characteristics satisfy the delisting  
14 exclusion limits in [State and Federal Delisting Condition \(5\)](#) of the state and federal  
15 delisting actions, and the discharge limits of the [State Discharge Permit ST-4500](#).
- 16 III.3.B.7.d The Permittees will place a copy of the written waste processing strategy required by  
17 Permit Condition III.3.B.7.a in the Hanford Facility Operating Record, LERF and  
18 200 Area ETF file as part of the documentation of waste streams accepted for  
19 management at the 200 Area ETF.
- 20 III.3.B.8 Treatment of aqueous waste streams in the 200 Area ETF with listed waste numbers that  
21 are subject to the requirements of the state and federal delisting actions must comply with  
22 the requirements of [State and Federal Delisting Condition \(1\)\(c\)](#), incorporated by  
23 reference. [[WAC 173-303-815 \(2\)\(b\)\(ii\)](#)]
- 24 III.3.B.9 The Permittees will manage treated effluent in the final verification tanks according to  
25 the requirements of the [State and Federal Delisting Conditions \(3\) and \(5\)](#), incorporated  
26 by reference. [[WAC 173-303-815 \(2\)\(b\)\(ii\)](#)]
- 27 III.3.B.10 The Permittees will manage treated effluent from the 200 Area ETF according to the  
28 requirements of the [State Waste Discharge Permit ST 4500](#) and [State and Federal](#)  
29 [Delisting Condition \(7\)](#). [[WAC 173-303-815\(2\)\(b\)\(ii\)](#)]
- 30 III.3.B.11 The Permittees will ensure compliance with treatment standards ([40 CFR 268](#),  
31 incorporated by reference by [WAC 173-303-140](#)) applicable to treated effluent prior to  
32 discharge to the State Authorized Land Disposal Site (SALDS), the delisting criteria at  
33 [40 CFR 261, Appendix IX](#), Table 2, and the corresponding state-approved delisting  
34 (dated August 8, 2005, all incorporated by reference). Sampling and analysis necessary  
35 for these demonstrations must meet the corresponding requirements in Permit  
36 Addendum B. [[WAC 173-303-140, WAC 173-303-815 \(2\)\(b\)\(ii\)](#)]
- 37 **III.3.C WASTE ANALYSIS**
- 38 III.3.C.1 The Permittees will comply with requirements in Permit Addendum B for sampling and  
39 analysis of all dangerous and/or mixed waste required by conditions in this Chapter.  
40 [[WAC 173-303-300](#)]
- 41 III.3.C.2 The Permittees will have an accurate and complete waste profile as described in Permit  
42 Addendum B, Section B.2.1.2, for every waste stream accepted for management in LERF  
43 and 200 Area ETF dangerous waste management units. [[WAC 173-303-380 \(1\)\(a\), \(b\)](#)]
- 44 III.3.C.3 The Permittees will place a copy of each waste profile required by Permit  
45 Condition III.15.C.2 in the Hanford Facility Operating Record, LERF and 200 Area ETF  
46 file required by Permit Condition II.1.2. [[WAC 173-303-380 \(1\)\(a\), \(b\)](#)]

- 1 III.3.C.4 The Permittees will make a copy of the waste profile required by Permit  
2 Condition III.15.C.2 available upon request. [[WAC 173-303-380](#)(1)(a), (b)]
- 3 III.3.C.5 Records and results of waste analysis described in this Permit will be maintained in the  
4 Hanford Facility Operating Record, LERF and 200 Area ETF file required by Permit  
5 Condition II.I.2. [[WAC 173-303-380](#)(1)(a), (b)]
- 6 **III.3.D RECORDKEEPING AND REPORTING**
- 7 III.3.D.1 The Permittees will place the following into the Hanford Facility Operating Record,  
8 LERF and 200 Area ETF file required by Permit Condition II.I.2:
- 9 III.3.D.1.a Records required by [WAC 173-303-380](#) (1)(k), and -(o) incorporated by reference.
- 10 III.3.D.1.b Records and results of waste analysis, waste determinations (as required by [Subpart CC](#))  
11 and trial tests required by [WAC 173-303-300](#), General waste analysis, and by  
12 [40 CFR §264.1034, §264.1063, §264.1083, §265.1034, §265.1063, §265.1084, §268.4\(a\),](#)  
13 [and §268.7](#); [[WAC 173-303-310](#)(2)]
- 14 III.3.D.1.c An inspection log, summarizing inspections conducted pursuant to Permit  
15 Condition III.3.H.1; [[WAC 173-303-380](#)(1)(e)]
- 16 III.3.D.1.d Records required by the [State and Federal Delisting Condition \(6\)](#), incorporated by  
17 reference; [[WAC 173-303-815](#) (2)(b)(ii)]
- 18 **III.3.E SECURITY**
- 19 III.3.E.1 The Permittees comply with the Security requirements specific to the LERF and 200  
20 Area ETF in Addendum E and Permit Attachment 3 as required by Permit Condition II.L.  
21 [[WAC 173-303-310](#)(2)]
- 22 **III.3.F PREPAREDNESS AND PREVENTION**
- 23 III.3.F.1 The Permittees will comply with the Preparedness and Prevention requirements specific  
24 to LERF and 200 Area ETF in Addendum F. [[WAC 173-303-340](#)]
- 25 **III.3.G CONTINGENCY PLAN**
- 26 III.3.G.1 The Permittees will comply with Addendum J, Contingency Plan, in addition to the  
27 requirements of Permit Condition II.A when applicable. [[WAC 173-303-350](#)]
- 28 **III.3.H INSPECTIONS**
- 29 III.3.H.1 The Permittees will comply with Addendum I in addition to the requirements of Permit  
30 Condition II.X. [[WAC 173-303-320](#)]
- 31 **III.3.I TRAINING PLAN**
- 32 III.3.I.1 The Permittees will include the training requirements described in Addendum G of this  
33 Chapter specific to the dangerous waste management units and waste management  
34 activities at LERF and 200 Area ETF into the written training plan required by Permit  
35 Condition II.C.
- 36 **III.3.J GENERAL REQUIREMENTS**
- 37 III.3.J.1 The Permittees will comply with the requirements of [WAC 173-303-395](#)(1), incorporated  
38 by reference, for prevention of reaction of ignitable, reactive, or incompatible wastes.
- 39 **III.3.K CLOSURE**
- 40 III.3.K.1 The Permittees will close dangerous waste management units in the LERF and 200 Area  
41 ETF in accordance with Addendum H, Closure Plan, and Permit Condition II.J.  
42 [[WAC 173-303-610](#)(3)(a)]

- 1 **III.3.L POST CLOSURE – RESERVED**
- 2 **III.3.M CRITICAL SYSTEMS – RESERVED**
- 3 **III.3.N RESERVED**
- 4 **III.3.O CONTAINERS**
- 5 III.3.O.1 Container Storage and Treatment Unit Standards
- 6 III.3.O.1.a As part of or in addition to the requirements of Permit Condition III.3.B.2, the Permittees  
7 will ensure the integrity of container storage secondary containment and the chemically  
8 resistant coating described in Addendum C, Section C.3.4.1 as necessary to ensure any  
9 spills or releases to secondary containment do not migrate to the underlying concrete or  
10 soils.
- 11 III.3.O.1.a.1 Include documentation of any damage and subsequent repairs in the Hanford Facility  
12 Operating Record, LERF and 200 Area ETF file required by Permit Condition II.I.2.
- 13 III.3.O.2 Container Management Standards
- 14 III.3.O.2.a The Permittees will maintain and manage wastes in accordance with the requirements of  
15 Addendum C, Section 4.3.2, and Section 4.3.2. [[WAC 173-303-630\(2\)](#)]
- 16 III.3.O.2.b The Permittees will label containers in accordance with the requirements of  
17 Addendum C, Section C.3.2, and Section C.3.3. [[WAC 173-303-630\(3\)](#)]
- 18 III.3.O.2.c The Permittees will comply with the requirements for managing wastes in containers in  
19 [WAC 173-303-630\(5\)](#), incorporated by reference.
- 20 III.3.O.2.d The Permittees will ensure wastes are compatible with containers and with other wastes  
21 stored or treated in containers within the 200 Area ETF according to the requirements of  
22 Addendum C, Section C.3.4.3. [[WAC 173-303-630\(4\)](#), [WAC 173-303-630\(9\)](#)]
- 23 III.3.O.2.e The Permittees may treat wastes in containers via decanting of free liquids and addition  
24 of sorbents. The Permittees may not use addition of sorbents for purposes of changing  
25 the treatability group of a waste with respect to the land disposal restriction standards of  
26 [40 CFR 268](#), incorporated by reference by [WAC 173-303-140](#).
- 27 III.3.O.2.f The Permittees will remove any accumulated liquids from container storage areas in  
28 200 Area ETF according to the requirements of Addendum C, Section C.3.4.2, to ensure  
29 containers are not in contact with free liquids and to prevent overflow of the container  
30 storage area secondary containment.
- 31 III.3.O.2.g The Permittees will comply with the requirements for air emissions from containers in  
32 Addendum C, Section C.6.3.2. [[WAC 173-303-692](#)]
- 33 **III.3.P TANK SYSTEMS**
- 34 III.3.P.1 Tank System Requirements
- 35 III.3.P.1.a The Permittees will develop a schedule for conducting integrity assessments (IA). The  
36 schedule will meet the requirements of Addendum C, Section C.4.2, and consideration of  
37 the factors in [WAC 173-303-640\(2\)\(e\)](#) or [WAC 173-303-640\(3\)\(b\)](#) as applicable:
- 38 III.3.P.1.b The Permittees will maintain a copy of the schedule required by Permit  
39 Condition III.3.P.1.a, in the Hanford Facility Operating Record, LERF and 200 Area ETF  
40 file, and conduct periodic integrity assessments according to the schedule. The  
41 Permittees will document results of integrity assessments conducted according to the IA  
42 in the Hanford Facility Operating Record, LERF and 200 Area ETF file.

- 1 III.3.P.1.c For existing tank systems, if a tank system is found to be leaking, or is unfit for use, the  
2 Permittees must follow the requirements of [WAC 173-303-640\(7\)](#), incorporated by  
3 reference. [[WAC 173-303-640\(3\)\(b\)](#)]
- 4 III.3.P.2 Tank System Operating Requirements
- 5 III.3.P.2.a The Permittees will comply with the requirements of [WAC 173-303-640\(5\)\(a\)](#),  
6 incorporated by reference.
- 7 III.3.P.2.b The Permittees will comply with the requirements of Addendum C, Section C.4.5.2.  
8 [[WAC 173-303-640\(5\)\(b\)](#)]
- 9 III.3.P.2.c The Permittees will comply with the requirements of Addendum C, Section C.4.6.  
10 [[WAC 173-303-640\(5\)\(d\)](#)]
- 11 III.3.P.2.d The Permittees will comply with the requirements of [WAC 173-303-640\(7\)](#), incorporated  
12 by reference, in response to spills or leaks from tanks systems at 200 Area ETF.  
13 [[WAC 173-303-640\(5\)\(c\)](#)]
- 14 III.3.P.2.e The Permittees will ensure that the Waste Processing Strategy required by Permit  
15 Condition III.3.B.7.a, provides for the immediate treatment or blending of waste accepted  
16 for management at the 200 Area ETF such that the resulting waste or mixture is no longer  
17 reactive or ignitable when further managed in 200 Area ETF tank systems.  
18 [[WAC 173-303-640\(9\)](#)]
- 19 III.3.P.2.f The Permittees will comply with the requirements of [WAC 173-303-640\(10\)](#),  
20 incorporated by reference.
- 21 **III.3.Q SURFACE IMPOUNDMENTS**
- 22 III.3.Q.1 The Permittees will maintain the three LERF basins according to the requirements of  
23 [WAC 173-303-650 \(2\)\(f\)](#), incorporated by reference.
- 24 III.3.Q.2 The Permittees will operate the LERF basins according to the requirements of  
25 Addendum C, Section C.5.3, and Addendum I, Section I.2.2.3.1 to prevent over-topping.  
26 [[WAC 173-303-650 \(2\)\(c\)](#)]
- 27 III.3.Q.3 The Permittees will develop and maintain, and operate the LERF basins to ensure that  
28 any flow of waste into the impoundment can be immediately shut off in the event of  
29 overtopping or liner failure. [[WAC 173-303-650 \(2\)\(d\)](#)]
- 30 III.3.Q.4 The Permittees will comply with the requirements of [WAC 173-303-650 \(2\)\(g\)](#),  
31 incorporated by reference.
- 32 III.3.Q.5 The Permittees will comply with the requirements of [WAC 173-303-650 \(4\)\(b\)](#),  
33 incorporated by reference.
- 34 III.3.Q.6 The Permittees will comply with the requirements of [WAC 173-303-650 \(4\)\(c\)](#),  
35 incorporated by reference. The certification required by this Permit Condition must be  
36 provided to Ecology no later than seven calendar days after the date of the certification.  
37 A copy of the certification will be placed in the Hanford Facility Operating Record,  
38 LERF and 200 Area ETF file required by Permit Condition II.I.2. [[WAC 173-303-650](#)  
39 [\(4\)\(c\)](#)]
- 40 III.3.Q.7 The Permittees will comply with the requirements of [WAC 173-303-650\(5\)\(b\)](#),  
41 incorporated by reference, in response to events in [WAC 173-303-650\(5\)\(a\)](#), incorporated  
42 by reference.
- 43 III.3.Q.8 The Permittees will comply with the requirements of [WAC 173-303-650\(5\)\(d\)](#) for any  
44 LERF basin that has been removed from service in accordance with Permit  
45 Condition III.3.Q.7 that the Permittees will restore to service. [[WAC 173-303-650\(5\)\(d\)](#)]

- 1 III.3.Q.9 The Permittees will close any LERF basin removed from service in accordance with the  
2 requirements of Permit Condition III.3.Q.7 or a basin that cannot be repaired or that the  
3 Permittees will not to return to service. [[WAC 173-303-650\(5\)\(e\)](#)]
- 4 III.3.Q.10 The Permittees will comply with the requirements of Addendum C, Section C.5.10 with  
5 respect to management of ignitable or reactive wastes in the LERF basins.  
6 [[WAC 173-303-650\(7\)](#)]
- 7 III.3.Q.11 The Permittees can place incompatible wastes and materials in the same LERF basin only  
8 if in compliance with the requirements of [WAC 173-303-395\(1\)\(b\)](#), (c).  
9 [[WAC 173-303-650\(8\)](#)]
- 10 III.3.Q.12 The Permittees will use the action leakage rate in Addendum C, Section C.5.8, for  
11 operation of LERF basins, and comply with the requirements of  
12 [WAC 173-303-650\(10\)\(b\)](#). [[WAC 173-303-650\(10\)](#)]
- 13 III.3.Q.13 The Permittees will comply with the requirements of [WAC 173-303-650\(11\)](#),  
14 incorporated by reference.
- 15 III.3.Q.14 The Permittees will comply with the requirements of [40 CFR 264, Subpart CC](#),  
16 incorporated by reference by [WAC 173-303-692](#).
- 17 III.3.Q.15 Groundwater Monitoring
- 18 III.3.Q.15.a The Permittees will comply with the requirements of Chapter 5.0. [[WAC 173-303-645](#)]
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**B WASTE ANALYSIS PLAN**

**Metric Conversion Chart**

Into metric units

Out of metric units

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

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

## 1 **B.1 INTRODUCTION**

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

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

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

- 21 • Influent Waste Acceptance Process - determines the acceptability of a particular aqueous waste at the  
22 LERF or 200 Area ETF pursuant to applicable Permit conditions, regulatory requirements, and  
23 operating capabilities prior to acceptance of the waste at the LERF or 200 Area ETF for treatment or  
24 storage. This includes documenting that wastes accepted for treatment at ETF are within the  
25 treatability envelope required by the [Final Delisting 200 Area ETF](#), Permit Condition 1.a.i. Refer to  
26 Section B.2.
- 27 • Special Management Requirements - identifies the special management requirements for aqueous  
28 wastes managed in the LERF or 200 Area ETF. Refer to Section B.3.
- 29 • Influent Aqueous Waste Sampling and Analysis - describes influent sampling and analyses used to  
30 characterize an influent aqueous waste to ensure proper management of the waste and for compliance  
31 with the special management requirements. Also includes rationale for analyses. Refer to  
32 Section B.4.
- 33 • Treated Effluent Sampling and Analysis - describes sampling and analyses of treated effluent  
34 (i.e., treated aqueous waste) for compliance with [Washington State Waste Discharge Permit,](#)  
35 [No. ST 4500](#) (Ecology 2000); and [Final Delisting 200 Area ETF \[40 CFR 261, Appendix IX, Table 2](#)  
36 [and the corresponding State Final Delisting](#) issued pursuant to [WAC 173-303-910\(3\)](#) limits. Also  
37 includes rationale for analyses. Refer to Section B.5.
- 38 • 200 Area ETF Generated Waste Sampling and Analysis - describes the sampling and analyses used to  
39 characterize the secondary waste streams generated from the treatment process and to characterize  
40 waste generated from maintenance and operations activities. Also includes rationale for analyses.  
41 Characterization and designation of wastes generated from maintenance and operations activities are  
42 conducted pursuant to [WAC 173-303-170](#) and are not subject to the permit requirements of  
43 [WAC 173-303-800](#). These descriptions are included in this WAP for purposes of completeness, but  
44 are not enforceable conditions of this WAP or the permit. Refer to Section B.6.
- 45 • Quality Assurance and Quality Control - ensures the accuracy and precision of sampling and analysis  
46 activities. Refer to Section B.7.

1 This WAP meets the specific requirements of the following:

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

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

### 17 **B.1.1 Liquid Effluent Retention Facility and Effluent Treatment Facility Description**

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

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

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

39 200 Area ETF is designed to treat the contaminants anticipated in process condensate from the  
40 242-A Evaporator and other aqueous wastes from the Hanford Site. Section B.1.2 provides more  
41 information on the sources of these wastes.

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

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

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

- 7 • surge tank
- 8 • Filtration
- 9 • Ultraviolet light oxidation (UV/OX)
- 10 • pH adjustment
- 11 • Hydrogen peroxide decomposition
- 12 • Degasification
- 13 • Reverse osmosis (RO)
- 14 • Ion exchange
- 15 • Final pH adjustment and verification

16 The secondary treatment train uses the following:

- 17 • Secondary waste receiving
- 18 • Evaporation (with mechanical vapor recompression)
- 19 • Concentrate staging
- 20 • Thin film drying
- 21 • Container handling
- 22 • Supporting systems

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

27 The treated effluent is contained in verification tanks where the effluent is sampled to confirm that the  
28 effluent meets the delisting criteria. Under [40 CFR 261, Appendix IX](#), Table 2, the treated effluent from  
29 200 Area ETF is considered a delisted waste; that is, the treated effluent is no longer a listed dangerous  
30 waste subject to the hazardous waste management requirements of RCRA provided that the delisting  
31 criteria are satisfied and the treated effluent does not exhibit a dangerous characteristic. The treated  
32 effluent is discharged under the [Washington State Waste Discharge Permit \(No. ST 4500\)](#) as a  
33 nondangerous, delisted waste to the SALDS, located in the 600 Area, north of the 200 West Area. A  
34 portion of the treated wastewater from the Verification Tanks is recycled as service water throughout the  
35 facility; for example, it is used to dilute bulk acid and caustic to meet processing needs, thereby reducing  
36 the demand for process water.

### 37 **B.1.2 Sources of Aqueous Waste**

38 200 Area ETF was intended and designed to treat a variety of mixed wastes. However, process  
39 condensate from the 242-A Evaporator was the only mixed waste initially identified for storage and  
40 treatment in the LERF and 200 Area ETF. As cleanup activities at Hanford progress, many of the  
41 aqueous wastes generated from site remediation and waste management activities are sent to the LERF  
42 and 200 Area ETF for treatment and storage. A brief discussion of waste streams that may be managed  
43 by LERF and 200 Area ETF in the future may be found in the 200 Area ETF Delisting Petition  
44 ([DOE/RL-92-97](#)). Prior to management of any new waste streams, it may be necessary to modify this  
45 WAP through the permit modification process to ensure that adequate knowledge of such new waste  
46 streams is available prior to management of them in LERF and 200 Area ETF.

47 The 242-A process condensate is a dangerous waste because it is derived from a listed, dangerous waste  
48 stored in the Double-Shell Tank (DST) System. The DST waste is transferred to the 242-A Evaporator

1 where the waste is concentrated through an evaporation process. The concentrated slurry waste is  
2 returned to the DST System, and the evaporated portion of the waste is recondensed, collected, and  
3 transferred as process condensate to the LERF.

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

- 6 • Contaminated groundwater from pump-and-treat remediation activities such as groundwater from the  
7 200-UP-1 Operable Unit;
- 8 • Purgewater from groundwater monitoring activities;
- 9 • Water from deactivation activities, such as water from the spent fuel storage basins at deactivated  
10 reactors (e.g., N Reactor);
- 11 • Laboratory aqueous waste from unused samples and sample analyses;
- 12 • Leachate from landfills, such as the Environmental Restoration Disposal Facility;
- 13 • Any dilute waste, which may be accepted for treatment and within the scope of wastewaters that  
14 maybe delisted under terms of the revised delisting ([40 CFR 261, Appendix IX](#), Table 2).

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

## 23 **B.2 INFLUENT WASTE ACCEPTANCE PROCESS**

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

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

### 40 **B.2.1 Waste Information**

41 When an aqueous waste stream is identified for treatment or storage in the LERF or 200 Area ETF, the  
42 generator is required to characterize the waste stream according to the requirements in Section B.2.1.1  
43 and document the results of characterization on an aqueous waste profile sheet. This requirement is the  
44 first waste acceptance criterion. The LERF and 200 Area ETF personnel work with the generators to  
45 ensure that the necessary information is collected for the characterization of a waste stream (i.e., the

1 appropriate analyses or adequate knowledge), and that the information provided on the waste profile sheet  
2 is complete. The completed waste profile sheet is maintained in the Hanford Facility Operating Record,  
3 LERF and 200 Area ETF File according to Permit Condition II.I.2.

#### 4 **B.2.1.1 Waste Characterization**

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

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

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

29



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

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

24 The characterization and historical information are documented in the waste profile sheet, which is  
25 discussed in the following section and is part of the Hanford Facility Operating Record, LERF and  
26 200 Area ETF File according to Permit Condition II.I.

### 27 **B.2.1.2 Aqueous Waste Profile Sheet**

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

36 The LERF and ETF management determine whether the information on the waste profile sheet is  
37 sufficient according to the criteria above. The LERF and 200 Area ETF management use this information  
38 to evaluate the acceptability of the aqueous waste stream for storage and treatment in the LERF and  
39 200 Area ETF, and to determine if the secondary waste generated from treatment is acceptable for storage  
40 at the 200 Area ETF and has a defined path forward to final disposal.

### 41 **B.2.2 Waste Management Decision Process**

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

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

- 2 • The paperwork and/or laboratory analyses from the generator are insufficient
- 3 • Discrepancies with the regulatory and operational acceptance criteria cannot be reconciled, including:
  - 4 – An aqueous waste is not allowed under the current [Washington State Waste Discharge Permit \(No. ST 4500\)](#) or [200 Area ETF Delisting](#), and LERF and 200 Area ETF management elect not to
  - 5 pursue an amendment, or the Permit and Delisting cannot be amended (Section B.2.2.1)
  - 6
  - 7 – An aqueous waste is incompatible with LERF liner materials or with other aqueous waste in
  - 8 LERF and no other management method is available (Section B.2.2.2).
- 9 • Adequate storage or treatment capacity is not available.

### 10 **B.2.2.1 Regulatory Acceptability**

11 Each aqueous waste stream is evaluated on a case-by-case basis to determine if there are any regulatory  
12 concerns that would preclude the storage or treatment of a waste in the LERF or 200 Area ETF based on  
13 the criteria in Sections B.2.2.1.1 and B.2.2.1.2. Before an aqueous waste can be stored or treated in either  
14 the LERF or 200 Area ETF, the waste designation must be determined. Information on the waste  
15 designation of an aqueous waste is documented in the waste profile sheet. This information is used to  
16 confirm that treating or storing the aqueous waste in the LERF or 200 Area ETF is allowed under and in  
17 compliance with [WAC 173-303](#), Permit (WA7890008967), [200 Area ETF Delisting](#) in [40 CFR 261](#),  
18 [Appendix IX](#), Table 2, the corresponding State-Issued Delisting, and the [Washington State Waste](#)  
19 [Discharge Permit \(No. ST 4500\)](#) for 200 Area ETF.

#### 20 **B.2.2.1.1 Dangerous Waste Regulations, State and Federal Delisting Actions, and** 21 **Permits**

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

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

#### 32 **B.2.2.1.2 State Waste Permit Regulations/Permit**

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

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

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

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

#### 6 **B.2.2.2 Operational Acceptability**

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

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

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

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

#### 43 **B.2.2.3 Special Requirements Pertaining to Land Disposal Restrictions**

44 Containers of 200 Area ETF secondary waste are transferred to a storage or final disposal unit, as  
45 appropriate (e.g., the Central Waste Complex or to the Environmental Restoration Disposal Facility).  
46 200 Area ETF personnel provide the analytical characterization data and necessary process knowledge for  
47 the waste to be managed by the receiving staff, and the appropriate LDR documentation.

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

- 3 • Dangerous waste numbers (as applicable)
- 4 • Determination on whether the waste is restricted from land disposal according to the requirements of  
5 [40 CFR 268](#) incorporated by reference by [WAC 173-303-140](#) (i.e., the LDR status of the waste)

6 The waste tracking information associated with the transfer of waste

- 7 • Waste analysis results.

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

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

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

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

### 39 **B.2.2.3.1 Compatibility**

40 **Corrosion Control.** Because of the materials of construction used in 200 Area ETF, corrosion is  
41 generally not a concern with new aqueous waste streams. Additionally, these waste streams are managed

1 in a manner that minimizes corrosion. To ensure that a waste will not compromise the integrity of  
2 200 Area ETF tanks and process equipment, each waste stream is assessed for its corrosion potential as  
3 part of the compatibility evaluation. This assessment usually focuses on chloride and fluoride  
4 concentrations; however, the chemistry of each new waste also is evaluated for other parameters that  
5 could cause corrosion.

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

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

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

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

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

48 If it is determined that an aqueous waste stream is incompatible with other aqueous waste streams,  
49 alternate management scenarios are available. For example, another LERF basin that contains a

1 compatible aqueous waste(s) might be used, or the aqueous waste stream might be fed directly into  
2 200 Area ETF for treatment. In any case, potentially incompatible waste streams are not mixed, and all  
3 aqueous waste is managed in a way that precludes a reaction, degradation of the liner, or interference with  
4 200 Area ETF treatment process.

### 5 **B.2.3 Periodic Review Process**

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

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

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

### 20 **B.2.4 Record/Information and Decision**

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

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

32

1

**Table B.1. General Limits for Liner Compatibility**

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

2 <sup>1</sup>Analytical methods for the parameters and constituents are provided in Section B.9

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

$$\sum_{n=1}^i \left( \frac{\text{Conc}_n}{\text{LIMIT}_n} \right) \leq 1$$

6  
 7  
 8  
 9 <sup>3</sup>Ketone containing saturated alkyl group(s)

10 <sup>4</sup>Ketone containing unsaturated alkyl group(s)

11 Where 'i' is the number of organic constituents detected

12 mg/L = milligrams per liter

13 NA = not applicable

14

**Table B.2. Waste Acceptance Criteria**

General criteria category	Criteria description																				
1. Characterization	A. Each generator must provide an aqueous waste profile.																				
	B. Each generator must designate the aqueous waste stream.																				
	C. Each generator must provide analytical data and/or knowledge.																				
2. Regulatory acceptability	A. The LERF and 200 Area ETF can store and treat influent aqueous wastes with waste numbers identified in Addendum A for the LERF and 200 Area ETF, and the <a href="#">200 Area ETF Delisting, 40 CFR 261, Appendix IX</a> , Table 2.																				
	B. The aqueous waste must comply with conditions of the Discharge Permit.																				
3. Operational acceptability	A. Determine whether an aqueous waste stream is treatable, considering: <ol style="list-style-type: none"> <li>1. Whether the removal and destruction efficiencies on the constituents of concern will be adequate to meet the Discharge Permit and Delisting levels</li> <li>2. Other treatability concerns; analyses for this evaluation may include:                             <table border="0" style="margin-left: 20px;"> <tr> <td>total dissolved solids</td> <td>iron</td> </tr> <tr> <td>total organic carbon</td> <td>magnesium</td> </tr> <tr> <td>total suspended solids</td> <td>nitrate</td> </tr> <tr> <td>specific conductivity</td> <td>nitrite</td> </tr> <tr> <td>alkalinity</td> <td>phosphate</td> </tr> <tr> <td>ammonia</td> <td>potassium</td> </tr> <tr> <td>barium</td> <td>silicon</td> </tr> <tr> <td>calcium</td> <td>sodium</td> </tr> <tr> <td>chloride</td> <td>sulfate</td> </tr> <tr> <td>fluoride</td> <td>pH</td> </tr> </table> </li> </ol>	total dissolved solids	iron	total organic carbon	magnesium	total suspended solids	nitrate	specific conductivity	nitrite	alkalinity	phosphate	ammonia	potassium	barium	silicon	calcium	sodium	chloride	sulfate	fluoride	pH
	total dissolved solids	iron																			
total organic carbon	magnesium																				
total suspended solids	nitrate																				
specific conductivity	nitrite																				
alkalinity	phosphate																				
ammonia	potassium																				
barium	silicon																				
calcium	sodium																				
chloride	sulfate																				
fluoride	pH																				
B. Determine whether an aqueous waste stream is compatible, considering: <ol style="list-style-type: none"> <li>1. Whether an aqueous waste stream presents corrosion concerns with respect to ETF; analysis may include chloride and fluoride</li> <li>2. Whether an aqueous waste stream is compatible with LERF liner materials, compare characterization data to the liner compatibility limits (Table B.1).</li> <li>3. Whether an aqueous waste stream is compatible with other aqueous waste(s), <a href="#">40 CFR 264, Appendix V</a>, comparison will be used.</li> </ol>																					

1 **B.3 SPECIAL MANAGEMENT REQUIREMENTS**

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

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

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

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

- 14 • Aqueous waste streams containing sludge would not be accepted into LERF under the acceptance
- 15 criteria of treatability (Section B.2.2.1)
- 16 • No solid residue was reported from process condensate discharged to LERF in 1995

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

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

11 The conditions of the treatment exemption also require that treatment residues (i.e., aqueous wastes),  
12 which do not meet the LDR treatment standards "must be removed at least annually"  
13 [40 CFR 268.4(a)(2)(ii) incorporated by reference by [WAC 173-303-140](#)]. To address the conditions of  
14 this exemption, an influent aqueous waste is sampled and analyzed and the LDR status of the aqueous  
15 waste is established as part of the acceptance process. The LERF basins are then managed such that any  
16 aqueous waste(s), which exceeds an LDR standard is removed annually from a LERF basin, except for a  
17 heel of approximately 1 meter. A heel is required to stabilize the LERF liner. The volume of the heel is  
18 approximately 1.9 million liters.

#### 19 **B.4 INFLUENT AQUEOUS WASTE SAMPLING AND ANALYSIS**

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

##### 23 **B.4.1 Sampling Procedures**

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

##### 32 **B.4.1.1 Batch Samples**

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

43 Several sample ports are also located at 200 Area ETF, including a valve on the recirculation line at  
44 200 Area ETF surge tank, and a sample valve on a tank discharge pump line at 200 Area ETF Load-in  
45 Station. All samples are obtained at the LERF or 200 Area ETF are collected in a manner consistent with  
46 SW-846 procedures (EPA as amended).

1 **B.4.2 Analytical Rationale**

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

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

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

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

26

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

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

1 **B.5 TREATED EFFLUENT SAMPLING AND ANALYSIS**

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

6 **B.5.1 Rationale for Effluent Analysis Parameter Selection**

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

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

12 The [200 Area ETF Delisting](#) provides two testing regimes for the treated effluent. Initial verification  
 13 testing is performed when a new influent waste stream is processed through the 200 Area ETF. For each  
 14 200 Area ETF influent waste stream, the first generated verification tank must be sampled and analyzed  
 15 for all delisting constituents and conductivity. Subsequent verification sampling and analysis of all  
 16 delisting parameters is performed on every 15<sup>th</sup> tank of that 200 Area ETF influent waste stream. If the

1 concentration of any analyte is found to exceed a [Washington State Waste Discharge Permit](#)  
2 [\(No. ST 4500\)](#), enforcement limit or a Delisting criterion, the contents of the verification tank are  
3 reprocessed and/or re-analyzed. The next verification tank generated is also sampled for all delisting  
4 constituents. If the concentration of any analyte exceeds an early warning value, an early warning value  
5 report is prepared and submitted to Ecology.

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

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

### 9 **B.5.2.1 Effluent Sampling Method and Location**

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

### 14 **B.5.2.2 Analyses of Effluent**

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

### 19 **B.5.2.3 Frequency of Sampling**

20 Treated effluent is tested for all parameters listed in Table B.4 on a frequency satisfying the permit  
21 conditions of the [Washington State Waste Discharge Permit \(No. ST 4500\)](#), and the [200 Area ETF](#)  
22 [Delisting](#). This effluent must meet the [Washington State Waste Discharge Permit \(No. ST 4500\)](#), and  
23 [200 Area ETF Delisting](#) limits associated with these parameters. Grab samples are collected from each  
24 verification tank.

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

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

## 34 **B.6 EFFLUENT TREATMENT FACILITY GENERATED WASTE SAMPLING AND** 35 **ANALYSIS**

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

- 39 • Secondary waste generated from the treatment process, including the following waste forms:
  - 40 – dry powder waste
  - 41 – concentrate tanks slurry
  - 42 – sludge removed from process tanks
- 43 • Waste generated by operations and maintenance activities

- 1 • Miscellaneous waste generated within 200 Area ETF.

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

#### 4 **B.6.1 Secondary Waste Generated from Treatment Processes**

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

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

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

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

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

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

##### 25 **B.6.1.1 Special Requirements Pertaining to Land Disposal Restrictions**

26 Containers of 200 Area ETF secondary waste are transferred to a storage or final disposal unit, as  
27 appropriate (e.g., the Central Waste Complex or to the Environmental Restoration Disposal Facility).  
28 200 Area ETF personnel provide the analytical characterization data and necessary knowledge for the  
29 waste to be managed by the receiving staff, and for the appropriate LDR documentation.

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

- 32 • Dangerous waste numbers (as applicable)
- 33 • Determination on whether the waste is restricted from land disposal according to the requirements of  
34 [40 CFR 268](#) incorporated by reference by [WAC 173-303-140](#) (i.e., the LDR status of the waste)

35 The waste tracking information associated with the transfer of waste

- 36 • Waste analysis results.

##### 37 **B.6.1.2 Sampling Methods**

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

43 Concentrate tank waste samples are collected from recirculation lines, which provide mixing in the tank  
44 during pH adjustment and prevent caking. The protocol for concentrate tank sampling prescribes opening

1 a sample port in the recirculation line to collect samples directly into sample containers. The sample port  
 2 line is flushed before collecting a grab sample. The VOC sampling typically is performed first for grab  
 3 samples. Each VOC sample container will be filled such that cavitation at the sample valve is minimized  
 4 and the container has no headspace. The remainder of the containers for the other parameters will be  
 5 filled next.

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

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

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

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

1 <sup>1</sup>Parameters required by the current conditions of the [200 Area ETF Delisting, 40 CFR 261, Appendix IX](#), Table 2, 70 FR 44496 (EPA 2005)

3 <sup>2</sup>Parameters required by the current conditions of the [State Waste Discharge Permit, No. ST 4500](#)

4 <sup>3</sup>Metals reported as total concentrations

5 X = Rationale for measuring this parameter in treated effluent

6 M = Monitor only; no limit defined

7 PCBs = polychlorinated biphenyls

### 8 **B.6.1.3 Sampling Frequency**

9 When designation or identification of applicable LDR treatment standards of the 200 Area ETF secondary  
 10 waste cannot be based on influent characterization data or knowledge as described in Section B.6.1.1,  
 11 200 Area ETF secondary waste is sampled on a batch basis. A batch is defined as any volume of aqueous  
 12 waste that is being treated under consistent and constant process conditions.

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

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

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

### 7 **B.6.2 Operations and Maintenance Waste Generated at the 200 Area Effluent** 8 **Treatment Facility**

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

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

25 These waste streams are stored at 200 Area ETF before being transferred for final treatment, storage, or  
26 disposal as appropriate. This waste is characterized and designated using knowledge (from previously  
27 determined influent aqueous waste composition information); analytical data; and material safety data  
28 sheets (MSDS) of the chemical products present in the waste or used (the data sheets are maintained at  
29 200 Area ETF). Sampling of these waste streams is not anticipated; however, if an unidentified or  
30 unlabeled waste is discovered, that waste is sampled. This 'unknown' waste is sampled and analyzed for  
31 the parameters in Table B.5 as appropriate, and will be designated according to Washington state  
32 regulatory requirements. The specific analytical methods for these analyses are provided in Section B.9.

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

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

44 A discarded chemical product waste stream could be generated if process chemicals, cleaning agents, or  
45 maintenance products become contaminated or are otherwise rendered unusable. In all cases, these

- 1 materials are appropriately containerized and designated. Sampling is performed, as appropriate, for
- 2 waste designation.
- 3

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

<u>Parameter</u> <sup>1</sup>	<u>Rationale</u>
<ul style="list-style-type: none"> <li>Total solids or percent water<sup>2</sup></li> <li>Volatile organic compounds<sup>3</sup></li> <li>Semivolatile organic compounds<sup>3</sup></li> <li>Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver)</li> <li>Cation and anions of concern</li> <li>pH</li> </ul>	<ul style="list-style-type: none"> <li>Calculate dry weight concentrations</li> <li>LDR - verify treatment standards</li> <li>LDR - verify treatment standards</li> <li>Waste designation</li> <li>LDR - verify treatment standards</li> <li>Address receiving TSD unit waste acceptance requirements</li> <li>Waste designation</li> </ul>
<p>1 For influent and concentrate tank samples, the total sample (solid plus liquid) is analyzed and the analytical result is expressed on a dry weight basis. The result for toxicity characteristic metal and organic is divided by a factor of 20 and compared to the toxicity characteristic (TC) constituent limits [WAC 173-303-090(8)]. If the TC limit is met or exceeded, the waste is designated accordingly. All measured parameters are compared against the corresponding treatment standards.</p>	
<p>2 Total solids or percent water are not determined for unknown waste and dry powder waste samples and are analyzed in maintenance waste and sludge samples, as appropriate ( i.e., percent water might not be required for such routine maintenance waste as aerosol cans, fluorescent tubes, waste oils, batteries, etc., or sludge that has dried).</p>	
<p>3 VOC and/or SVOC analysis of secondary waste is required unless influent characterization data and knowledge indicate that the constituent will not be in the final secondary waste at or above the LDR.</p>	
LDR = land disposal restrictions	
TSD = treatment, storage, and/or disposal	

**B.7 QUALITY ASSURANCE/QUALITY CONTROL**

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

**B.7.1 Project Management**

The following sections address project administrative functions and approaches.

**B.7.1.1 Project Organization**

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

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

### 1 **B.7.1.2 Special Training**

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

### 7 **B.7.1.3 Documentation and Records**

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

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

### 16 **B.7.2 Data Quality Parameters and Criteria**

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

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

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

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

#### 32 **B.7.2.1 Precision**

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

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

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

1 **B.7.2.2 Accuracy**

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

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

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

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

14 **B.7.2.3 Representativeness**

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

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

26 **B.7.2.4 Completeness**

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

33 **B.7.2.5 Comparability**

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

39 **B.7.2.6 Sensitivity and Detection Levels**

40 Sensitivity is the measure of the concentration at which an analytical method can positively identify and  
41 report analytical results. Sensitivity represents the maximum value for a detection level that will  
42 reasonably assure the results are below the established limits. The analytical method selected by  
43 LERF/200 Area ETF should have a detection level for each constituent that is below the sensitivity. The  
44 preferred detection level is the practical quantitation limit (PQL), which is lowest concentration that can

1 be reliably measured during routine laboratory conditions. If the method PQL cannot meet the sensitivity  
2 for some constituents, the minimum concentration or attribute that can be measured by a method (method  
3 detection limit) or by an instrument (instrument detection limit) may be used. The sensitivity levels,  
4 specified in Table B.6, are derived from the delisting limits, water discharge limits, and uncertainty  
5 values, which are based on the required precision and accuracy for each constituent.

### 6 **B.7.3 Data Generation and Acquisition**

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

#### 8 **B.7.3.1 Sampling Method**

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

16 The following protocol applies to all sampling methods:

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

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

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

#### 37 **B.7.3.2 Sample Handling, Custody, and Shipping**

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

##### 40 **B.7.3.2.1 Chain-of-Custody**

41 Evidence of collection, shipment, receipt at the laboratory, and laboratory custody until disposal will be  
42 documented using a chain-of-custody form. The chain-of-custody form will, as a minimum identify

1 sample identification number, sampling date and time, sampling location, sample bottle type and number,  
2 analyses to be performed, and preservation method.

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

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

#### 12 **B.7.3.2.2 Sample Preservation, Containers, and Holding Time**

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

#### 15 **B.7.3.3 Instrument Calibration and Preventive Maintenance**

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

#### 23 **B.7.4 Assessment and Oversight**

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

##### 27 **B.7.4.1 Assessments and Response**

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

##### 33 **B.7.4.2 Reports to Management**

34 Results of performance assessments, including any issues identified, are provided to the LERF and  
35 200 Area ETF Facility Manager in a written report. The Facility Manager is responsible to correct all  
36 findings from the report.

#### 37 **B.7.5 Verification and Validation of Analytical Data**

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

##### 40 **B.7.5.1 Data Verification**

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

- 44 • The data package contains the required technical information

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

#### 5 **B.7.5.2 Data Validation**

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

9 The following are included in data validation:

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

#### 19 **B.8 REFERENCES**

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- 31 EPA, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods, SW-846* (Third Edition, as  
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33 Washington, D.C.
- 34 EPA, 1994, *Liquid Effluent Retention Facility (LERF) Land Disposal Restrictions Treatment*  
35 *Exemption-Regulatory Interpretation EPA/Ecology ID No: WA7890008967*, letter from  
36 U.S. Environmental Protection Agency, Region 10 to J. Hennig, U.S. Department of Energy,  
37 December 6, 1994.
- 38 EPA, 2005, [200 Area ETF Delisting](#) [Exclusion], issued to U.S. Department of Energy, [40 CFR 261](#),  
39 [Appendix IX](#), Table 2 ([70 FR 44496](#), August 3, 2005), U.S. Environmental Protection Agency,  
40 Washington, D.C.
- 41

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

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

Parameter	Analytical Method <sup>1</sup>	Method PQL Sensitivity <sup>2</sup>	Accuracy/Precision for Method <sup>3</sup> (percent)	Sample container <sup>4</sup> /Preservative <sup>4</sup> / Holding time <sup>5</sup>
<b>VOLATILE ORGANIC COMPOUNDS</b>				
Acetone	SW-846 8260	40	60-120 / 20	<u>Sample container</u> 3 x 40-mL amber glass with septum <u>Preservative</u> HCl to pH<2; 4°C <u>Holding time</u> 14 days
Acetonitrile		820	60-120 / 20	
Benzene		5	60-120 / 20	
1-Butanol		1600	60-120 / 20	
Carbon Disulfide		1500	60-120 / 20	
Carbon tetrachloride		5	60-120 / 20	
Chloroform		5	50-130 / 20	
Methylene chloride		5	50-150 / 20	
Tetrachloroethylene		5	65-140 / 20	
Tetrahydrofuran		100	60-120 / 20	
<b>SEMIVOLATILE ORGANIC COMPOUNDS</b>				
Acetophenone	SW-846 8270	10	70-110 / 25	<u>Sample container</u> 4 x 1-liter amber glass <u>Preservative</u> 4°C <u>Holding time</u> 7 days for extraction; 40 days for analysis after extraction
Carbazole		110	50-120 / 25	
p-Chloroaniline		76	50-120 / 25	
Chrysene		350	50-120 / 25	
Cresol (o, p, m)		760	50-120 / 25	
Di-n-octyl phthalate		300	50-120 / 25	
Diphenylamine		350	50-120 / 25	
Hexachlorobenzene		2	50-120 / 25	
Hexachlorocyclopentadiene		110	50-120 / 25	
Isophorone		2600	50-120 / 25	
Lindane (gamma-BHC)		1.9	50-120 / 25	
N-nitrosodimethylamine		12	50-120 / 25	
Pyridine		15	50-120 / 25	
Tributyl phosphate		76	50-120 / 25	
2,4,6-Trichlorophenol		230	50-120 / 25	

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

Parameter	Analytical Method <sup>1</sup>	Method PQL Sensitivity <sup>2</sup>	Accuracy/Precision for Method <sup>3</sup> (percent)	Sample container <sup>4</sup> / Preservative <sup>4</sup> / Holding time <sup>5</sup>	
<b>POLYCHLORINATED BIPHENYLS (PCBs)</b>					
Aroclor-1016	SW-846 8082	0.4	50-110 / 25	<u>Sample container</u> 4 x 1-liter amber glass <u>Preservative</u> 4°C <u>Holding time</u> 7 days for extraction; 40 days for analysis after extraction	
Aroclor-1221		0.4	50-110 / 25		
Aroclor-1232		0.4	50-110 / 25		
Aroclor-1242		0.4	50-110 / 25		
Aroclor-1248		0.4	50-110 / 25		
Aroclor-1254		0.4	50-110 / 25		
Aroclor-1260		0.4	50-110 / 25		
<b>TOTAL METALS</b>					
Arsenic	EPA-600 200.8	11	70-130 / 20	<u>Sample container</u> 1 x 0.5-liter plastic/glass <u>Preservative</u> 1:1 HNO <sub>3</sub> to pH<2 <u>Holding time</u> 180 days; mercury 28 days	
Cadmium		5	70-130 / 20		
Chromium		20	70-130 / 20		
Copper		70	70-130 / 20		
Lead		10	70-130 / 20		
Mercury		2	70-130 / 20		
Selenium		20	70-130 / 20		
Barium		SW-846 6010/ EPA-600 200.7	1200		75 - 125 / 20
Beryllium			34		75 - 125 / 20
Calcium			200		75 - 125 / 20
Iron			100		75 - 125 / 20
Magnesium			400		75 - 125 / 20
Nickel			340		75 - 125 / 20
Potassium			10,000		75 - 125 / 20
Silicon			580		75 - 125 / 20
Silver			83		75 - 125 / 20
Sodium	2500		75 - 125 / 20		
Vanadium	120	75 - 125 / 20			
Zinc	5100	75 - 125 / 20			

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

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

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

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

- 1 <sup>1</sup>SW-846 or EPA-600 methods are presented unless otherwise noted. Other methods might be substituted if the applicable PQL
- 2 can be met.
- 3 <sup>2</sup>ST-4500 required method PQL or Delisting Exclusion condition 2 report sensitivity/detection level, whichever is lower. Units
- 4 are parts per billion unless otherwise noted.
- 5 <sup>3</sup>Accuracy/precision used to confirm or re-establish MDL
- 6 <sup>4</sup>Sample bottle, volumes, and preservatives could be adjusted, as applicable, for safety reasons
- 7 <sup>5</sup>Holding time = time between sampling and analysis
- 8 <sup>7</sup>pH monitored in influent aqueous waste only
- 9 L = liter
- 10 mL = milliliter
- 11 NA = not applicable
- 12 ND = not determined
- 13 MDL = method detection level
- 14 PQL = practical quantitation limit
- 15 RL = reporting limit
- 16

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

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

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

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

- 1 <sup>1</sup> Sample bottle, volumes, and preservatives could be adjusted, as applicable, for safety reasons
- 2 <sup>2</sup> Holding time equals time between sampling and analysis
- 3 <sup>3</sup> Extraction procedure, as applicable; extract analyzed by referenced methods [[WAC 173-303-110\(3\)\(c\)](#)]
- 4 g = grams
- 5 NA = not applicable
- 6 PQL = practical quantitation limit
- 7 mL = milliliter
- 8 ND = not determined
- 9 TCLP = toxicity characteristic leaching procedure
- 10

Hanford Facility RCRA Permit Modification Notification Forms

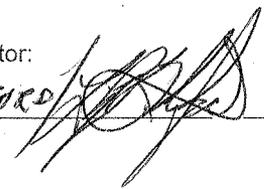
Part III, Operating Unit 11

Integrated Disposal Facility

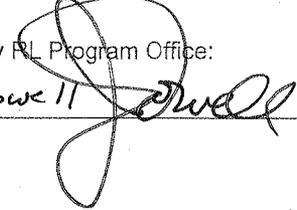
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Submitted by Co-Operator:

L. Ty Blackford  3/22/12  
Date

Reviewed by RL Program Office:

J. A. Dowell  3.23.12  
Date

**Hanford Facility RCRA Permit Modification Notification Form**

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III, Operating Unit 11</b>
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Description of Modification:  
Hanford Facility RCRA Permit III.11:

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

This document sets forth the operating conditions for the Integrated Disposal Facility (IDF).

**III.11.A COMPLIANCE WITH APPROVED PERMIT**

The Permittees shall comply with all requirements set forth in the Integrated Disposal Facility (IDF) Permit conditions, the Appendices specified in Permit Condition III.11.A and the Amendments specified in Permit Conditions III.11.B through III.11.I. All subsections, figures, and tables included in these portions are enforceable unless stated otherwise:

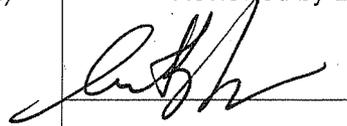
OPERATING UNIT 11:

- Chapter 1.0 Part A Form, dated October 1, 2008
- Chapter 3.0 Waste Analysis Plan, dated April 9, 2006
- Chapter 4.0 Process Information, dated December 31, 2008
- Appendix 4A Design Report (as applicable to critical systems), dated March 31, 2008
- Appendix 4B Construction Quality Assurance Plan, dated April 9, 2006
- Appendix 4C Response Action Plan, dated April 9, 2006
- Appendix 4D Technical specifications document (RPP-18-489 Rev 0), dated December 31, 2006
- Chapter 5.0 Ground Water Monitoring, dated June 30, 2010
- Chapter 6.0 Procedure to Prevent Hazards dated December 31, 2008
- Addendum J.1 Contingency Plan – Pre-Active Life, dated March 31, 2012~~December 31, 2011~~
- Addendum J.2 Contingency Plan – Active Life, dated March 31, 2012~~December 31, 2011~~
- Chapter 8.0 Personnel Training, dated November 21, 2007
- Chapter 11.0 Closure and Post Closure Requirements, dated December 31, 2008

General and Standard Hanford Facility RCRA Permit, WA7 89000 8967 (Permit) conditions (Part I and Part II Conditions) applicable to the IDF are identified in Permit Attachment 3 (Permit Applicability Matrix).

WAC 173-303-830 Modification Class <sup>1 2</sup>	Class 1	Class 1	Class 2	Class 3
Please mark the Modification Class:	X			

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

Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial) Reason for denial:	Reviewed by Ecology:  Date: 3/20/12
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**Hanford Facility RCRA Permit Modification Notification Form**

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
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Description of Modification:  
Addendum J.1, Table J.1

Table J.1      Hanford Facility Documents Containing Contingency Plan Requirements of  
WAC 173-303-350(3)

Requirement	Permit Attachment 4, Hanford Emergency Management Plan (DOE/RL-94-02):	Building Emergency Plan <sup>1</sup> (HNF-IP-0263-IDF)	Addendum J
-350(3)(e) - A list of all emergency equipment at the facility (such as fire extinguishing systems, spill control equipment, communications and alarm systems, and decontamination equipment), where this equipment is required. This list must be kept up to date. In addition, the plan must include the location and a physical description of each item on the list, and a brief outline of its capabilities.	X Hanford Fire Department: Appendix C	X Section 9.0	X Section J.4

WAC 173-303-830 Modification Class <sup>1 2</sup>	Class 1	Class 1	Class 2	Class 3
Please mark the Modification Class:	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1  
 Enter wording of WAC 173-303-830, Appendix I Modification citation:  
 Administrative and Informational changes. Relates to changes on modification form page <sup>13 ACP</sup> ~~25~~ of 25.

Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial) Reason for denial:	Reviewed by Ecology:  Date: 3/20/12
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**Hanford Facility RCRA Permit Modification Notification Form**

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
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Description of Modification:  
Addendum J.1, Section J.3, last paragraph

The BED/BW must assess each incident to determine the response necessary to protect the personnel, facility, and the environment. If assistance from Hanford Patrol, Hanford Fire Department, or ambulance units is required, the Hanford Emergency Response Number (911 from site office phones/373-0911 from cellular phones) must be used to contact the POC and request the desired assistance. To request other resources or assistance from outside the IDF, the POC business number is used (373-3800).

WAC 173-303-830 Modification Class <sup>1 2</sup> Please mark the Modification Class:	Class 1	Class 1	Class 2	Class 3
	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.6.d  
 Enter wording of WAC 173-303-830, Appendix I Modification citation:  
 Changes in name, address, or phone number of coordinators or other persons or agencies identified in the plan

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

Reviewed by Ecology:  
 3/20/12  
 Date

**Hanford Facility RCRA Permit Modification Notification Form**

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
--	--

Description of Modification:  
Addendum J.1, Section J.3.1.1

**J.3.1.1 Evacuation**

If an evacuation is ordered or the evacuation siren sounds in the area of the IDF, personnel will proceed to the staging area.

The BED/BW or staging area manager directs the evacuation; however, to ensure that evacuations can be conducted promptly and safely, all personnel must be familiar with the evacuation procedure.

Area evacuations are rapid or controlled and the differences between them are pointed out in the following steps. When possible, these steps must be performed concurrently.

AREA EVACUATION PROCEDURE
Halt any operations or work and place equipment and structures in a safe condition. Use emergency shutdown procedures for rapid evacuation.
Use whatever means are available (portable radios, bullhorns, runners, etc.) to pass the evacuation information to personnel.
Evacuate personnel to the staging area; group personnel as follows: potentially contaminated protective clothing, keys immediately available for vehicles, and those needing rides. Assist personnel that are temporary/permanently disabled.
Conduct personnel accountability. If unable to account for personal, report personnel accountability results to the Hanford Emergency Operations Center (Hanford-EOC) ( <del>373-3876, 373-1786, 376-8612, 376-4712</del> ).
Inform IC of any potentially affected personnel (i.e., injured, contaminated, exposed, etc.) once the IC arrives at the ICP.
Relay pertinent evacuation information (routes, destination etc.) to drivers.
Dispatch vehicles as soon as the vehicles are loaded.
Report status to the Hanford-EOC, request additional transportation if required, and report if any personnel remain who are performing late shutdown duties.

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

Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.6.d  
 Enter wording of WAC 173-303-830, Appendix I Modification citation:  
 Changes in name, address, or phone number of coordinators or other persons or agencies identified in the plan. This change eliminates redundancy. The deleted phone number information is provided elsewhere in Section J.3.

Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial) Reason for denial:	Reviewed by Ecology:  Date: 3/20/12
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**Hanford Facility RCRA Permit Modification Notification Form**

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
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Description of Modification:  
Addendum J.1, Section J.3.2

**J.3.2 Response to Facility Operations Emergencies**

Depending on the severity of the event, the BED/BW reviews the site-wide and IDF emergency response procedure(s) and, as required, categorizes and/or classifies the event. If necessary, the BED/BW initiates area protective actions and Hanford Site Emergency Response Organization activation. The steps identified in the following description of actions do not have to be performed in sequence because of the unanticipated sequence of incident events. ~~Attachment A provides a list of procedures.~~

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

Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1  
 Enter wording of WAC 173-303-830, Appendix I Modification citation:  
 Administrative and Informational changes. The 'Attachment A' referenced (and struck out) is not an attachment to the permit.

Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial) Reason for denial:	Reviewed by Ecology:  Date: 3/20/12
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**Hanford Facility RCRA Permit Modification Notification Form**

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
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Description of Modification:  
Addendum J.1, Section J.3.2.4

**J.3.2.4 Fire and/or Explosion**

In the event of a fire, the discoverer activates a fire alarm (pull box); calls 911 (373-3800 if using a cellular phone) or verifies that 911 has been called. ~~Automatic initiation of a fire alarm (through the smoke detectors and sprinkler systems) also is possible.~~

WAC 173-303-830 Modification Class <sup>1 2</sup>	Class 1	Class 1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: -830(4)(d)  
 Enter wording of WAC 173-303-830, Appendix I Modification citation:  
 Request approval as Class 1 prime. Sentence was mistakenly included in the permit. This emergency equipment is considered inappropriate and impractical for a landfill.

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

Reviewed by Ecology:

 3/20/12  
Date

**Hanford Facility RCRA Permit Modification Notification Form**

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
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Description of Modification:  
Addendum J.1, Section J.3.2.4

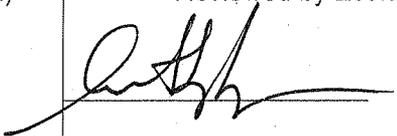
**J.3.2.4 Fire and/or Explosion**

In the event of a fire, the discoverer activates a fire alarm (pull box); calls 911 (~~373-3800 if using a cellular phone~~) ~~from site office phones/373-0911 from cellular phones~~ or verifies that the Hanford Emergency Response Number 911 has been called. Automatic initiation of a fire alarm (through the smoke detectors and sprinkler systems) also is possible.

WAC 173-303-830 Modification Class <sup>1 2</sup>	Class 1	Class 1	Class 2	Class 3
Please mark the Modification Class:	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.6.d  
 Enter wording of WAC 173-303-830, Appendix I Modification citation:  
 Changes in name, address, or phone number of coordinators or other persons or agencies identified in the plan

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

Reviewed by Ecology:  
  
 Date: 3/20/12

Hanford Facility RCRA Permit Modification Notification Form

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
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Description of Modification:  
Addendum J.1, Section J.3.2.4

**J.3.2.4 Fire and/or Explosion**

In the event of a fire, the discoverer activates a fire alarm (pull box); calls 911 (373-3800 if using a cellular phone) or verifies that 911 has been called. Automatic initiation of a fire alarm (through the smoke detectors and sprinkler systems) also is possible.

- Unless otherwise instructed, personnel shall evacuate the area/building by the nearest safe exit and proceed to the designated staging area for accountability.
- On actuation of the fire alarm, ONLY if time permits, personnel should shut down equipment, and secure waste, and lock up classified materials (or hand carry them out). The alarm automatically signals the Hanford Fire Department.
- The BED/BW proceeds directly to the ICP, obtains all necessary information pertaining to the incident, and sends a representative to meet Hanford Fire Department.
- The BED/BW provides a formal turnover to the IC when the IC arrives at the ICP.
- The BED/BW informs the Hanford Site Emergency Response Organization as to the extent of the emergency (including estimates of dangerous waste and mixed waste quantities released to the environment).
- If operations are stopped in response to the fire, the BED/BW ensures that systems are monitored for leaks, pressure buildup, gas generation, and ruptures.
- Hanford Fire Department firefighters extinguish the fire as necessary.

WAC 173-303-830 Modification Class <sup>1 2</sup> Please mark the Modification Class:	Class 1	Class 1	Class 2	Class 3
	X			

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

Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial) Reason for denial:	Reviewed by Ecology:  3/20/12 Date
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**Hanford Facility RCRA Permit Modification Notification Form**

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
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Description of Modification:  
Addendum J.1, Section J.3.2.5

**J.3.2.5 Hazardous Material, Dangerous and/or Mixed Waste Spill**

Spills can result from many sources including process leaks, container spills or leaks, damaged packages or shipments, or personnel error. Spills of mixed waste are complicated by the need to deal with the extra hazards posed by the presence of Atomic Energy Act materials.

WAC 173-303-830 Modification Class <sup>1 2</sup> Please mark the Modification Class:	Class 1	Class 1	Class 2	Class 3
	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.2  
 Enter wording of WAC 173-303-830, Appendix I Modification citation:  
 Correction of typographical errors.

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

Reviewed by Ecology:

 3/20/12  
Date

<b>Hanford Facility RCRA Permit Modification Notification Form</b>				
Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>			
<p><u>Description of Modification:</u> Addendum J.1, Section J.3.2.5</p> <p><b>J.3.2.5 Hazardous Material, Dangerous and/or Mixed Waste Spill</b></p> <p>Spills can result from many sources including process leaks, container spills or leaks, damaged packages or shipments, or personnel error. Spills of mixed waste are complicated by the need to deal with the extra hazards posed by the presence of Atomic Energy Act materials.</p> <ul style="list-style-type: none"> <li>• The discoverer notifies the BED/BW and initiates SWIMS response:                             <ul style="list-style-type: none"> <li>- <u>Stops work</u></li> <li>- <u>Warns others in the vicinity</u></li> <li>- <u>Isolates the area</u></li> <li>- <u>Minimizes the exposure to the hazards</u></li> <li>- <u>Requests the BED/BW Secure ventilation.</u></li> </ul> </li> <li>• The BED/BW determines if emergency conditions exist requiring response from the Hanford Fire Department based on classification of the spill and injured personnel, and evaluates need to perform additional protective actions.</li> <li>• If the Hanford Fire Department resources are not needed, the spill is mitigated with resources identified in Section J.4.5 and proper notifications are made.</li> <li>• If the Hanford Fire Department resources are needed, the BED/BW calls 911 (<del>373-3800 if using a cellular phone</del>) from site office phones/373-0911 from cellular phones.</li> <li>• The BED/BW sends a representative to meet the Hanford Fire Department.</li> </ul>				
WAC 173-303-830 Modification Class <sup>1 2</sup> Please mark the Modification Class:	Class 1 X	Class 1	Class 2	Class 3
<p>Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.6.d</p> <p>Enter wording of WAC 173-303-830, Appendix I Modification citation:</p> <p>Changes in name, address, or phone number of coordinators or other persons or agencies identified in the plan</p>				
<p>Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial)</p> <p><u>Reason for denial:</u></p>		<p>Reviewed by Ecology:</p> <div style="text-align: right; font-size: 1.2em;">  </div> <p style="text-align: right; font-size: 1.2em;">3/20/12</p> <p style="text-align: right;">Date</p>		

<b>Hanford Facility RCRA Permit Modification Notification Form</b>				
Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>			
<p><u>Description of Modification:</u> Addendum J.1, Section J.4</p> <p><b>J.4 EMERGENCY EQUIPMENT</b></p> <p>Hanford Site emergency resources and equipment are described and listed in Permit Attachment 4, <i>Hanford Emergency Management Plan</i> (DOE/RL-94-02), Appendix C. Emergency resources and equipment for the IDF are presented in this section.</p>				
WAC 173-303-830 Modification Class <sup>1 2</sup> Please mark the Modification Class:	Class 1 X	Class '1	Class 2	Class 3
<p>Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1</p> <p>Enter wording of WAC 173-303-830, Appendix I Modification citation: Administrative and Informational changes</p>				
<p>Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial)</p> <p><u>Reason for denial:</u></p>	<p>Reviewed by Ecology:</p> <div style="text-align: right;">    <span style="font-size: 1.2em; vertical-align: middle;">3/20/12</span>                       Date                 </div>			

**Hanford Facility RCRA Permit Modification Notification Form**

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
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Description of Modification:  
Addendum J.2, Contents

**Addendum J.2** **Pre-Active Life Contingency Plan**

J.0	CONTINGENCY PLAN.....	J.1
J.1	BUILDING EVACUATION ROUTING .....	J.3
J.2	BUILDING EMERGENCY DIRECTOR.....	J.3
J.3	IMPLEMENTATION OF THE PLAN.....	J.3
J.3.1	Protective Actions Responses .....	J.4
J.3.2	Response to Facility Operations Emergencies .....	J.5
J.3.3	Major Process Disruption/Loss of Plant Control .....	J.5
J.3.4	Pressure Release.....	J.5
J.3.5	Fire and/or Explosion.....	J.5
J.3.6	Prevention of Recurrence or Spread of Fires, Explosions, or Releases .....	J.7
J.3.7	Termination of Event, Incident Recovery, Restart of Operations .....	J.7
J.3.8	Incompatible Waste.....	J.8
J.3.9	Post Emergency Equipment Maintenance and Decontamination .....	J.8
J.4	EMERGENCY EQUIPMENT.....	J.8
J.4.1	Fixed Emergency Equipment.....	J.8
J.4.2	Portable Emergency Equipment.....	J.8
J.4.3	Communications Equipment/Warning Systems.....	J.8
J.4.4	Personal Protective Equipment .....	J.9
J.4.5	Spill Control and Containment Supplies.....	J.9
J.4.6	Incident Command Post .....	J.9
J.4.7	Coordination Agreements .....	J.9
J.5	REQUIRED REPORTS .....	J.9
J.6	PLAN LOCATION AND AMENDMENTS .....	J.9
J.7	FACILITY/BUILDING EMERGENCY RESPONSE ORGANIZATION .....	J.10
J.7.1	Building Emergency Director .....	J.10

WAC 173-303-830 Modification Class <sup>1 2</sup>	Class 1	Class 1	Class 2	Class 3
Please mark the Modification Class:	X			

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

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

Reviewed by Ecology:  
  
 Date: 3/20/12

### Hanford Facility RCRA Permit Modification Notification Form

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
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Description of Modification:  
Addendum J.2, Table J.1

Table J.1      Hanford Facility Documents Containing Contingency Plan Requirements of  
WAC 173-303-350(3)

Requirement	Permit Attachment 4, Hanford Emergency Management Plan (DOE/RL-94-02):	Building Emergency Plan <sup>1</sup> (HNF-IP-0263-IDF)	Addendum J
-350(3)(e) - A list of all emergency equipment at the facility (such as fire extinguishing systems, spill control equipment, communications and alarm systems, and decontamination equipment), where this equipment is required. This list must be kept up to date. In addition, the plan must include the location and a physical description of each item on the list, and a brief outline of its capabilities.	X Hanford Fire Department: Appendix C	X Section 9.0	X Section J.4

WAC 173-303-830 Modification Class <sup>1 2</sup>	Class 1	Class 1	Class 2	Class 3
Please mark the Modification Class:	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1  
 Enter wording of WAC 173-303-830, Appendix I Modification citation:  
 Administrative and Informational changes. Relates to changes on modification form page 25 of 25.

Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial) Reason for denial:	Reviewed by Ecology: <div style="text-align: right; font-size: 1.2em;">  </div> Date: <span style="font-size: 1.2em;">3/20/12</span>
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**Hanford Facility RCRA Permit Modification Notification Form**

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
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Description of Modification:  
Addendum J.2, Section J.3

**J.3 IMPLEMENTATION OF THE PLAN**

In accordance with WAC 173-303-360(2)(b), the BED ensures that trained personnel identify the character, source, amount, and areal extent of the release, fire, or explosion to the extent possible. Identification of waste can be made by activities that can include, but are not limited to, visual inspection of dangerous/mixed waste, sampling activities in the field, reference to inventory records, or by consulting with facility personnel. Samples of materials involved in an emergency might be taken by qualified personnel and analyzed as appropriate. These activities must be performed with a sense of immediacy and shall include available information.

The BED shall use the following guidelines to determine if an event has met the requirements of WAC 173-303-360(2)(d):

1. The event involved an unplanned spill, release, fire, or explosion,  

AND
2. a. The unplanned spill or release involved a dangerous waste, or the material involved became a dangerous waste as a result of the event (e.g., product that is not recoverable.),  

OR
2. b. The unplanned fire or explosion occurred at the IDF or transportation activity subject to RCRA contingency planning requirements,  

AND
3. Time-urgent response from an emergency services organization was required to mitigate the event or a threat to human health or the environment exists.

As soon as possible, after stabilizing event conditions, the BED shall determine, in consultation with the ~~CH2M HILL Plateau Remediation Company~~ site contractor environmental single point-of-contact, if notification to the Washington State Department of Ecology (Ecology) is needed to meet WAC-173-303-360(2)(d) reporting requirements. If all of the conditions under 1, 2, and 3 are met, notifications are to be made to Ecology. Additional information is found in Permit Attachment 4, *Hanford Emergency Management Plan* (DOE/RL-94-02), Section 4.2.

WAC 173-303-830 Modification Class <sup>1 2</sup>	Class 1	Class 1	Class 2	Class 3
Please mark the Modification Class:	X			

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

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

Reviewed by Ecology:

 3/20/12  
Date

### Hanford Facility RCRA Permit Modification Notification Form

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
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Description of Modification:  
 Addendum J.2, Section J.3, last paragraph

The BED must assess each incident to determine the response necessary to protect the personnel, facility, and the environment. If assistance from Hanford Patrol, Hanford Fire Department, or ambulance units is required, the Hanford Emergency Response Number (911 from site office phones/373-0911 from cellular phones) must be used to contact the POC and request the desired assistance. To request other resources or assistance from outside the IDF, the POC business number is used (373-3800).

WAC 173-303-830 Modification Class <sup>1 2</sup> Please mark the Modification Class:	Class 1	Class 1	Class 2	Class 3
	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.6.d  
 Enter wording of WAC 173-303-830, Appendix I Modification citation:  
 Changes in name, address, or phone number of coordinators or other persons or agencies identified in the plan

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

Reviewed by Ecology:  
  
3/20/12  
 Date

**Hanford Facility RCRA Permit Modification Notification Form**

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
--	--

Description of Modification:  
Addendum J.2, Section J.3.1.1

**J.3.1.1 Evacuation**

If an evacuation is ordered or the evacuation siren sounds in the area of the IDF, personnel will proceed to the staging area.

The BED or staging area manager directs the evacuation; however, to ensure that evacuations can be conducted promptly and safely, all personnel must be familiar with the evacuation procedure.

Area evacuations are rapid or controlled and the differences between them are pointed out in the following steps. When possible, these steps must be performed concurrently.

AREA EVACUATION PROCEDURE
Halt any operations or work and place equipment and structures in a safe condition. Use emergency shutdown procedures for rapid evacuation.
Use whatever means are available (portable radios, bullhorns, runners, etc.) to pass the evacuation information to personnel.
Evacuate personnel to the staging area; group personnel as follows: potentially contaminated protective clothing, keys immediately available for vehicles, and those needing rides. Assist personnel that are temporary/permanently disabled.
Conduct personnel accountability. If unable to account for personal, report personnel accountability results to the Hanford Emergency Operations Center (Hanford-EOC) ( <del>373-3876, 373-1786, 376-8612, 376-4712</del> ).
Inform IC of any potentially affected personnel (i.e., injured, contaminated, exposed, etc.) once the IC arrives at the ICP.
Relay pertinent evacuation information (routes, destination etc.) to drivers.
Dispatch vehicles as soon as the vehicles are loaded.
Report status to the Hanford-EOC, request additional transportation if required, and report if any personnel remain who are performing late shutdown duties.

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

Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.6.d  
 Enter wording of WAC 173-303-830, Appendix I Modification citation:  
 Changes in name, address, or phone number of coordinators or other persons or agencies identified in the plan. This change eliminates redundancy. The deleted phone number information is provided elsewhere in Section J.3.

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

Reviewed by Ecology:  
  
 Date: 3/20/12

**Hanford Facility RCRA Permit Modification Notification Form**

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
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Description of Modification:  
Addendum J.2, Section J.3.2

**J.3.2 Response to Facility Operations Emergencies**

Depending on the severity of the event, the BED reviews the site wide and IDF emergency response procedure(s) and, as required, categorizes and/or classifies the event. If necessary, the BED initiates area protective actions and Hanford Site Emergency Response Organization activation. The steps identified in the following description of actions do not have to be performed in sequence because of the unanticipated sequence of incident events. Attachment A provides a list of procedures.

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

Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1  
 Enter wording of WAC 173-303-830, Appendix I Modification citation:  
 Administrative and Informational changes. The 'Attachment A' referenced (and struck out) is not an attachment to the permit.

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

Reviewed by Ecology:

 3/20/12  
Date

### Hanford Facility RCRA Permit Modification Notification Form

Unit:  
**Integrated Disposal Facility**

Permit Part  
**Part III Operating Unit 11**

Description of Modification:

Addendum J.2, Section J.3 (Section numbering)

**J.3.2.1 Loss of Utilities**

The only loss of utilities is electrical.....

**J.3.2.2 J.3.3 Major Process Disruption/Loss of Plant Control**

N/A

**J.3.2.3 J.3.4 Pressure Release**

N/A

**J.3.2.4 J.3.5 Fire and/or Explosion**

In the event of a fire, the discoverer .....

**J.3.2.5 J.3.5.1 Hazardous Material, Dangerous and/or Mixed Waste Spill**

Spills can result from many sources including process.....

**J.3.2.6 J.3.5.2 Damaged or Unacceptable Shipments**

During the course of receiving dangerous.....

**J.3.3 J.3.6 Prevention of Recurrence or Spread of Fires, Explosions, or Releases**

The BED, as part of the ICP, takes.....

**J.3.4 J.3.7 Termination of Event, Incident Recovery, Restart of Operations**

Permit Attachment 4, *Hanford Emergency Management Plan*, (DOE/RL-94-02).....

**J.3.4.1 J.3.7.1 Termination of Event**

For events where the Hanford Emergency Operations Center.....

**J.3.4.2 J.3.7.2 Incident Recovery and Restart of Operations**

A recovery plan is developed when necessary in accordance.....

**J.3.5 J.3.8 Incompatible Waste**

After an event, the BED or the onsite recovery.....

**J.3.6 J.3.9 Post Emergency Equipment Maintenance and Decontamination**

All equipment used during an incident is decontaminated.....

WAC 173-303-830 Modification Class <sup>1 2</sup>

Please mark the Modification Class:

Class 1	Class 1	Class 2	Class 3
X			

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

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

Administrative and Informational changes

Modification Approved:  Yes  No (state reason for denial)

Reason for denial: *NR*

*Renumbering of sections only* <sup>AWP</sup>

Reviewed by Ecology:

*[Signature]* 3/20/12  
Date

**Hanford Facility RCRA Permit Modification Notification Form**

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
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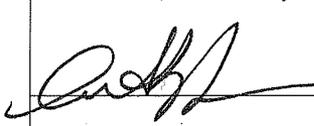
Description of Modification:  
Addendum J.2, Section J.3.5

**J.3.5 Fire and/or Explosion**

In the event of a fire, the discoverer activates a fire alarm (pull box); calls 911 (373-3800 if using a cellular phone) or verifies that 911 has been called. ~~Automatic initiation of a fire alarm (through the smoke detectors and sprinkler systems) also is possible.~~

WAC 173-303-830 Modification Class <sup>1 2</sup>	Class 1	Class 1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: -830(4)(d)  
 Enter wording of WAC 173-303-830, Appendix I Modification citation:  
 Request approval as Class 1 prime. Sentence was mistakenly included in the permit. This emergency equipment is considered inappropriate and impractical for a landfill.

Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial) <u>Reason for denial:</u>	Reviewed by Ecology:  3/20/12 Date
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**Hanford Facility RCRA Permit Modification Notification Form**

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
--	--

Description of Modification:  
Addendum J.2, Section J.3.5

**J.3.5 Fire and/or Explosion**

In the event of a fire, the discoverer activates a fire alarm (pull box); calls 911 from site office phones/373-0911 from cellular phones(373-3800 if using a cellular phone) or verifies that the Hanford Emergency Response Number 911 has been called. Automatic initiation of a fire alarm (through the smoke detectors and sprinkler systems) also is possible.

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

Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.6.d  
 Enter wording of WAC 173-303-830, Appendix I Modification citation:  
 Changes in name, address, or phone number of coordinators or other persons or agencies identified in the plan

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

Reviewed by Ecology:  
  
 Date: 3/20/12

<b>Hanford Facility RCRA Permit Modification Notification Form</b>				
Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>			
<p>Description of Modification: Addendum J.2, Section J.3.5</p> <p><b>J.3.5 Fire and/or Explosion</b></p> <p>In the event of a fire, the discoverer activates a fire alarm (pull box); calls 911 (373-3800 if using a cellular phone) or verifies that 911 has been called. Automatic initiation of a fire alarm (through the smoke detectors and sprinkler systems) also is possible.</p> <ul style="list-style-type: none"> <li>• Unless otherwise instructed, personnel shall evacuate the area/building by the nearest safe exit and proceed to the designated staging area for accountability.</li> <li>• On actuation of the fire alarm, ONLY if time permits, personnel should shut down equipment <u>and</u> secure waste, <del>and lock up classified materials (or hand carry them out)</del>. The alarm automatically signals the Hanford Fire Department.</li> </ul>				
WAC 173-303-830 Modification Class <sup>1 2</sup>	Class 1	Class 1	Class 2	Class 3
Please mark the Modification Class:	X			
<p>Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1</p> <p>Enter wording of WAC 173-303-830, Appendix I Modification citation: Administrative and Informational changes</p>				
<p>Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial)</p> <p>Reason for denial:</p>		<p>Reviewed by Ecology:</p> <div style="text-align: right; margin-top: 20px;"> </div> <div style="text-align: right; margin-top: 10px;"> <p>3/20/12</p> <p>Date</p> </div>		

<b>Hanford Facility RCRA Permit Modification Notification Form</b>				
Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>			
<p>Description of Modification: Addendum J.2, Section J.3.5.1</p> <p><b>J.3.5.1 Hazardous Material, Dangerous and/or Mixed Waste Spill</b></p> <p>Spills can result from many sources including process leaks, container spills or leaks, damaged packages or shipments, or personnel error. Spills of mixed waste are complicated by the need to deal with the extra hazards posed by the presence of radioactive materials.</p> <ul style="list-style-type: none"> <li>• The discoverer notifies the BED and initiates SWIMS response:                             <ul style="list-style-type: none"> <li>– Stops work</li> <li>– Warns others in the vicinity</li> <li>– Isolates the area</li> <li>– Minimizes the exposure to the hazards</li> <li>– Requests the BED Secure ventilation</li> </ul> </li> <li>• The BED determines if emergency conditions exist requiring response from the Hanford Fire Department based on classification of the spill and injured personnel, and evaluates need to perform additional protective actions.</li> <li>• If the Hanford Fire Department resources are not needed, the spill is mitigated with resources identified in Section J.4.5 and proper notifications are made.</li> <li>• If the Hanford Fire Department resources are needed, the BED calls 911 <u>from site office phones/373-0911 from cellular phones(373-3800 if using a cellular phone).</u></li> </ul>				
WAC 173-303-830 Modification Class <sup>1 2</sup>	Class 1	Class 1	Class 2	Class 3
Please mark the Modification Class:	X			
<p>Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.6.d</p> <p>Enter wording of WAC 173-303-830, Appendix I Modification citation:</p> <p>Changes in name, address, or phone number of coordinators or other persons or agencies identified in the plan</p>				
<p>Modification Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (state reason for denial)</p> <p><u>Reason for denial:</u></p>			<p>Reviewed by Ecology:</p> <div style="text-align: right; margin-top: 20px;"> </div> <div style="text-align: right; margin-top: 10px;"> <p><b>3/20/12</b></p> <p>Date</p> </div>	

**Hanford Facility RCRA Permit Modification Notification Form**

Unit: <b>Integrated Disposal Facility</b>	Permit Part <b>Part III Operating Unit 11</b>
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Description of Modification:  
Addendum J.2, Section J.4

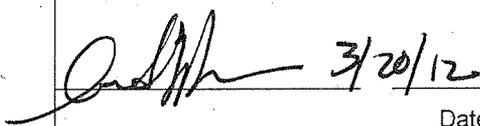
**J.4 EMERGENCY EQUIPMENT**

Hanford Site emergency resources and equipment are described and listed in Permit Attachment 4, *Hanford Emergency Management Plan*, (DOE/RL-94-02), Appendix C. Emergency resources and equipment for the IDF is presented in this section.

WAC 173-303-830 Modification Class <sup>1 2</sup> Please mark the Modification Class:	Class 1	Class 1	Class 2	Class 3
	X			

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

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

Reviewed by Ecology:  
  
 Date

**Remove and Replace the Following Sections:**

---

Remove Part III Permit Conditions, dated December 31, 2011, and replace with Permit Conditions dated March 31, 2012.

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

---

3 This document sets forth the operating conditions for the Integrated Disposal Facility (IDF).

4 **III.11.A           COMPLIANCE WITH APPROVED PERMIT**

5 The Permittees shall comply with all requirements set forth in the Integrated Disposal Facility (IDF)  
6 Permit conditions, the Appendices specified in Permit Condition III.11.A and the Amendments specified  
7 in Permit Conditions III.11.B through III.11.I. All subsections, figures, and tables included in these  
8 portions are enforceable unless stated otherwise:

9 **OPERATING UNIT 11:**

- 10 Chapter 1.0     Part A Form, dated October 1, 2008
- 11 Chapter 3.0     Waste Analysis Plan, dated April 9, 2006
- 12 Chapter 4.0     Process Information, dated December 31, 2008
- 13 Appendix 4A    Design Report (as applicable to critical systems), dated March 31, 2008
- 14 Appendix 4B    Construction Quality Assurance Plan, dated April 9, 2006
- 15 Appendix 4C    Response Action Plan, dated April 9, 2006
- 16 Appendix 4D    Technical specifications document (RPP-18-489 Rev 0), dated December 31, 2006
- 17 Chapter 5.0     Ground Water Monitoring, dated June 30, 2010
- 18 Chapter 6.0     Procedure to Prevent Hazards dated December 31, 2008
- 19 Addendum J.1   Contingency Plan – Pre-Active Life, dated March 31, 2012
- 20 Addendum J.2   Contingency Plan – Active Life, dated March 31, 2012
- 21 Chapter 8.0     Personnel Training, dated November 21, 2007
- 22 Chapter 11.0    Closure and Post Closure Requirements, dated December 31, 2008
- 23 General and Standard Hanford Facility RCRA Permit, WA7 89000 8967 (Permit) conditions (Part I and  
24 Part II Conditions) applicable to the IDF are identified in Permit Attachment 3 (Permit Applicability  
25 Matrix).

26 **III.11.B           AMENDMENTS TO THE APPROVED PERMIT**

- 27 III.11.B.1       Portions of Permit Attachment 4, *Hanford Emergency Management Plan* that are not  
28 made enforceable by inclusion in the applicability matrix for that document, are not made  
29 enforceable by reference in this document.
- 30 III.11.B.2       Permittees must comply with all applicable portions of the Permit. The facility and unit-  
31 specific recordkeeping requirements are distinguished in the General Information Portion  
32 of the Permit, and are tied to the Permit conditions.
- 33 III.11.B.3       The scope of this Permit is restricted to the landfill construction and operation as  
34 necessary to dispose of: 1) immobilized low activity waste from the WTP, and 2) the  
35 Demonstration Bulk Vitrification System and IDF operational waste as identified in  
36 Chapter 4.0. Future expansion of the RCRA trench, or disposal of other wastes not  
37 specified in this Permit, is prohibited unless authorized via modification of this Permit.

- 1 III.11.B.4 In accordance with [WAC 173-303-806](#)(11)(d), this Permit shall be reviewed every five  
2 (5) years after the effective date and modified, as necessary, in accordance with  
3 [WAC 173-303-830](#)(3).
- 4 III.11.B.5 Inspection Requirements – Pre-Active Life Period and Active Life Period
- 5 III.11.B.5.a The Permittees will conduct inspections of the IDF according to the following  
6 requirements:
- 7 III.11.B.5.a.1 Prior to the start of the active life of the IDF as defined in [WAC 173-303-040](#), according  
8 to Chapter 6.0, Table 6.2.
- 9 III.11.B.5.a.2 Following the start of the active life of the IDF as defined in [WAC 173-303-040](#),  
10 according to Chapter 6.0, Table 6.2A.
- 11 III.11.B.5.b The Permittees will remedy any problems revealed by inspections conducted pursuant to  
12 Permit Condition III.11.B.5.a on a schedule, which prevents hazards to the public health  
13 and the environment and as agreed to in writing, by Ecology. Where a hazard is  
14 imminent or has already occurred, remedial action must be taken immediately.
- 15 III.11.B.5.c Reserved
- 16 III.11.B.5.d Rainwater Management
- 17 III.11.B.5.e Prior to the start of the active life of the IDF, the Permittees will manage the discharge of  
18 such water in accordance with the pollution prevention and best management practices  
19 required by State Waste Discharge Permit Number ST 4511.
- 20 III.11.B.5.e.1 Management of Liquids Collected in the Leachate Collection and Removal System  
21 (LCRS), Leak Detection System (LDS), and Secondary Leak Detection System (SLDS)  
22 prior to the start of the active life of the IDF.
- 23 III.11.B.5.e.2 Permittees shall manage the liquid in the LCRS system in a manner that does not allow  
24 the fluid head to exceed 30.5 cm above the flat 50-foot by 50-foot LCRS sump HDPE  
25 bottom liner, and the LCRS sump trough, except for storms that exceed the 25-year,  
26 24-hour storm event [[WAC 173-303-665](#)(2)(h)(ii)(B)]. Liquid with a depth greater than  
27 30.5 cm above the LCRS liner will be removed at the earliest practicable time after  
28 detection (not to exceed 5 working days).
- 29 III.11.B.5.e.3 Accumulated liquid of pumpable quantities in the LDS and SLDS will be managed in a  
30 manner that does not allow the fluid head to exceed 30.5 cm above the LDS liner or  
31 SLDS liner [[WAC 173-303-665](#)(2)(h)(i)(C)(iii)]. Liquid with a depth greater than 30.5  
32 cm above a liner will be removed at the earliest practicable time after detection (not to  
33 exceed 5 working days).
- 34 III.11.B.5.e.4 The Permittees will use a flow meter to check if the amount of actual liquid pumped  
35 corresponds to the amount accumulated in the leachate collection tank to verify the  
36 proper function of the leachate collection and removal sump pumps with each use. The  
37 Permittees will document in the IDF portion of the facility operating record appropriate  
38 quality assurance/quality control requirements for selection and operation of the flow  
39 meter based on the required verification. In addition, the Permittees will evaluate the  
40 leachate transfer lines for freeze and thaw damage when ambient conditions may cause  
41 such damage to occur. The Permittees will document the methods and criteria used for  
42 purposes of this evaluation, along with an appropriate justification.
- 43 III.11.B.5.e.5 The Permittee will inspect for liquids after significant rainfall events.
- 44 III.11.B.5.e.6 The Permittee will annually verify monitoring gauges and instruments are in current  
45 calibration; calibration will be performed annually or more frequently at intervals  
46 suggested by the manufacturer (refer to Chapter 4.0, §4.3.7.4)

- 1 III.11.B.5.f The Permittees will monitor liquids in the Leachate Collection and Removal System and  
2 Leak Detection System to ensure the action leakage rate (Chapter 4.0, Appendix 4A) is  
3 not exceeded. The Leachate Collection and Removal System will be inspected per  
4 Permit Condition III.11.B.5.c.
- 5 III.11.B.5.g Soil Stabilization
- 6 Prior to the first placement of waste in the IDF, the Permittee will apply soil stabilization  
7 materials as needed to prevent soil erosion in and around the landfill.
- 8 **III.11.C DESIGN REQUIREMENTS**
- 9 III.11.C.1 IDF is designed in accordance with [WAC 173-303-665](#) and [WAC 173-303-640](#) as  
10 described in Chapter 4.0. Design changes impacting IDF critical systems shall be  
11 performed in accordance with Permit Conditions III.11.D.1.d.i and III.11.D.1.d.ii.
- 12 III.11.C.1.a IDF Critical Systems include the following: The leachate collection and removal system  
13 (LCRS), leachate collection tank (LCT), leak detection system (LDS), liner system (LS),  
14 and closure cap. H-2 Drawings for the LCRS, LCT, LDS, and LS are identified in  
15 Appendix 4A, Section 3 of this Permit. Drawings for the closure cap will be provided  
16 pursuant to Permit Condition III.11.C.1.b.
- 17 The Permittees shall construct and operate the IDF in accordance with all specifications  
18 contained in RPP-18489 Rev 0. Critical systems, as defined in the definitions section of  
19 the Site-Wide RCRA Permit, are identified in Appendix 4A, Section 1 of this Permit.
- 20 III.11.C.1.b Landfill Cap
- 21 At final closure of the landfill, the Permittees shall cover the landfill with a final cover  
22 (closure cap) designed and constructed [[WAC 173-303-665\(6\)](#), [WAC 173-303-806\(4\)\(h\)](#)]  
23 to: Provide long-term minimization of migration of liquids through the closed landfill;  
24 Function with minimum maintenance; Promote drainage and minimize erosion or  
25 abrasion of the cover; Accommodate settling and subsidence so that the cover's integrity  
26 is maintained; and have a permeability less than or equal to the permeability of any  
27 bottom liner system or natural sub soils present.
- 28 III.11.C.1.c Compliance Schedule
- 29 Proposed conceptualized final cover design is presented in Chapter 11, Closure and  
30 Financial Assurance. Six months prior to start of construction of IDF landfill final cover  
31 (but no later than 6 months prior to acceptance of the last shipment of waste at the IDF),  
32 the Permittees shall submit IDF landfill final cover design, specifications and CQA plan  
33 to Ecology for review and approval. No construction of the final cover may proceed until  
34 Ecology approval of the final design is given, through a permit modification.
- 35 III.11.C.1.d The Permittees shall notify Ecology at least sixty (60) calendar days prior to the date it  
36 expects to begin closure of the IDF landfill in accordance with [WAC 173-303-610\(c\)](#).
- 37 III.11.C.2 Design Reports
- 38 III.11.C.2.a New Tank Design Assessment Report
- 39 Permittees shall generate a written report in accordance with [WAC 173-303-640\(3\)\(a\)](#),  
40 providing the results of the leachate collection tank system design assessment. The report  
41 shall be reviewed and certified by an Independent Qualified Registered Professional  
42 Engineer (IQRPE)<sup>1</sup> in accordance with [WAC-173-303-810\(13\)\(a\)](#).

1 [1] "Independent qualified registered professional engineer," as used here and elsewhere  
2 with respect to Operating Unit 11, means a person who is licensed by the state of  
3 Washington, or a state which has reciprocity with the state of Washington as defined in  
4 RCW 18.43.100, and who is not an employee of the owner or operator of the facility for  
5 which construction or modification certification is required. A qualified professional  
6 engineer is an engineer with expertise in the specific area for which a certification is  
7 given.

8 III.11.C.2.b Compliance Schedule

9 Permittees shall submit the leachate collection tank design assessment report to Ecology  
10 along with the IQRPE certification, prior to construction of any part of the tank system  
11 including ancillary equipment.

12 **III.11.D CONSTRUCTION REQUIREMENTS**

13 III.11.D.1 Construction Quality Assurance

14 III.11.D.1.a Ecology shall provide field oversight during construction of critical systems. In cases  
15 where an Engineering Change Notice (ECN) and/or Non Conformance Report (NCR) are  
16 required, Ecology and the Permittees shall follow steps for processing changes to the  
17 approved design per Permit Conditions III.11.D.1.d.i and III.11.D.1.d.ii.

18 III.11.D.1.b Permittees shall implement the Construction Quality Assurance Plan (CQA plan)  
19 (Appendix 4B of the permit) during construction of IDF.

20 III.11.D.1.b.1 The Permittees will not receive waste in the IDF until the owner or operator has  
21 submitted to Ecology by certified mail or hand delivery a certification signed by the CQA  
22 officer that the approved CQA plan has been successfully carried out and that the unit  
23 meets the requirements of [WAC 173-303-665](#)(2)(h) or (j); and the procedure in  
24 [WAC 173-303-810](#)(14)(a) has been completed. Documentation supporting the CQA  
25 officer's certification shall be furnished to Ecology upon request.

26 III.11.D.1.c Construction inspection reports

27 Permittees shall submit a report documenting the results of the leachate tank installation  
28 inspection. This report must be prepared by an independent, qualified installation  
29 inspector or a professional independent, qualified, registered, professional engineer either  
30 of whom is trained and experienced in the proper installation of tank systems or  
31 components. The Permittees will remedy all discrepancies before the tank system is  
32 placed in use. This report shall be submitted to Ecology 90 days prior to IDF operation  
33 and be included in the IDF Operating Record. [[WAC 173-303-640](#)(3)(h)].

34 III.11.D.1.d ECN/NCR Process for Critical Systems

35 Portions of the following conditions for processing engineering change notices and  
36 non-conformance reporting were extracted from and supersede Site Wide General Permit  
37 Condition II.L.

38 III.11.D.1.d.1 Engineering Change Notice for Critical Systems

39 During construction of the IDF, the Permittees shall formally document changes to the  
40 approved designs, plans, and specifications, identified in Appendices 4A, 4B, 4C, and 4D  
41 of this permit, with an Engineering Change Notice (ECN). The Permittees shall maintain  
42 all ECNs in the IDF unit-specific Operating Record and shall make them available to  
43 Ecology upon request or during the course of an inspection. The Permittees shall provide  
44 to Ecology copies of proposed ECNs affecting any critical system within five (5) working  
45 days of initiating the ECN. Identification of critical systems is included in Permit  
46 Condition III.11.C.1 and Appendix 4A of this permit. Within five (5) working days,

1 Ecology will review a proposed ECN modifying a critical system and inform the  
2 Permittees whether the proposed ECN, when issued, will require a Class 1, 2, or 3 Permit  
3 modification.

4 III.11.D.1.d.2 Non-conformance Reporting for Critical Systems

5 III.11.D.1.d.2.a During construction of the IDF, the Permittees shall formally document with a  
6 Nonconformance Report (NCR), any work completed which does not meet or exceed the  
7 standards of the approved design, plans and specifications, identified in Appendices 4A,  
8 4B, 4C and 4D of this Permit. The Permittees shall maintain all NCRs in the IDF unit-  
9 specific Operating Record and shall make them available to Ecology upon request, or  
10 during the course of an inspection.

11 III.11.D.1.d.2.b The Permittees shall provide copies of NCRs affecting any critical or regulated system to  
12 Ecology within five (5) working days after identification of the nonconformance.  
13 Identification of critical systems is included in Permit Condition III.11.C.1 and  
14 Appendix 4A of this permit. Ecology will review a NCR affecting a critical system and  
15 notify the Permittees within five (5) working days, in writing, whether a Permit  
16 modification is required for any nonconformance, and whether prior approval is required  
17 from Ecology before work proceeds, which affects the nonconforming item.

18 III.11.D.1.d.2.c As-Built Drawings

19 Upon completing construction of IDF, the Permittees shall produce as-built drawings of  
20 the project, which incorporate the design and construction modifications resulting from  
21 all project ECNs and NCRs, as well as modifications made pursuant to  
22 [WAC 173-303-830](#). The Permittees shall place the drawings into the Operating Record  
23 within twelve (12) months of completing construction.

24 III.11.D.2 The Permittees shall not reduce the minimum frequency of destructive testing less than  
25 one test per 500 feet of seam, without prior approval in writing from Ecology

26 **III.11.E GROUND WATER AND GROUND WATER MONITORING**

27 Ground water shall be monitored in accordance with [WAC 173-303](#) and the provisions  
28 contained in the Ecology-approved facility ground water monitoring plan (Chapter 5.0).  
29 All wells used to monitor the ground water beneath the unit shall be constructed in  
30 accordance with the provisions of [WAC 173-160](#).

31 III.11.E.1 Ground Water Monitoring Program

32 III.11.E.1.a Prior to initial waste placement in the IDF landfill, the Permittees shall sample all ground  
33 water monitoring wells in the IDF network twice quarterly for one first year to determine  
34 baseline conditions. For the first sampling event (and only the first), samples for each  
35 well will include all constituents in 40 CFR 264 Appendix IX. Thereafter, sampling will  
36 include only those constituents as specified in Chapter 5.0, Table 5-2: chromium (filtered  
37 and unfiltered the first year to compare results), specific conductance, TOC, TOX, and  
38 pH. Other constituents to be monitored but not statistically compared include alkalinity,  
39 anions, ICP metals, and turbidity. These will provide important information on  
40 hydrogeologic characteristics of the aquifer and may provide indications of encroaching  
41 contaminants from other facilities not associated with IDF.

- 1 III.11.E.1.b After the baseline monitoring is completed, and data is analyzed, the Permittees and  
2 Ecology shall assess revisions to Chapter 5.0, Table 5-2. Subsequent samples will be  
3 collected annually and will include constituents listed in Table 5-2 as approved by  
4 Ecology. All data analysis will employ Ecology approved statistical methods pursuant to  
5 [WAC 173-303-645](#). Changes to Chapter 5.0 will be subject to the permit modification  
6 procedures under [WAC 173-303-830](#).
- 7 III.11.E.1.c All constituents used as tracers to assess performance of the facility through computer  
8 modeling should be sampled at least annually to validate modeling results. Groundwater  
9 monitoring data and analytes to be monitored will be reviewed periodically as defined in  
10 Chapter 5.0 of this Permit.
- 11 III.11.E.1.d Upon Ecology approval of the leachate monitoring plan, leachate monitoring and  
12 groundwater monitoring activities should be coordinated as approved by Ecology to form  
13 an effective and efficient means of monitoring the performance of the IDF facility.
- 14 III.11.E.1.e Groundwater monitoring data shall be reported to Ecology annually by July 30.
- 15 **III.11.F LEACHATE COLLECTION COMPONENT MANAGEMENT**
- 16 Permittees shall design, construct, and operate all leachate collection systems to minimize  
17 clogging during the active life and post closure period
- 18 III.11.F.1 Leachate Collection and Removal System (LCRS)
- 19 III.11.F.1.a At least 120 days prior to initial waste placement in the IDF, the Permittees shall submit a  
20 Leachate monitoring plan to Ecology for review, approval, and incorporation into the  
21 permit. Upon approval by Ecology, this plan will be incorporated into the Permit as a  
22 class 1' modification. The Permittees shall not accept waste into the IDF until the  
23 requirements of the leachate monitoring plan have been incorporated into this permit.
- 24 III.11.F.1.b Leachate in the LCRS (primary sump) shall be sampled and analyzed monthly for the  
25 first year of operation of the facility and quarterly thereafter (pursuant to  
26 [WAC 173-303-200](#)). Additionally, leachate shall be sampled and analyzed to meet waste  
27 acceptance criteria at the receiving treatment storage and disposal facility.
- 28 III.11.F.1.c Permittees shall manage the leachate in the LCRS system in a manner that does not allow  
29 the fluid head to exceed 30.5 cm above the flat 50-foot by 50-foot LCRS sump HDPE  
30 bottom liner except for rare storm events as discussed in Chapter 4.0, §4.3.6.1 and the  
31 LCRS sump trough [([WAC 173-303-665\(2\)\(h\)\(ii\)\(B\)](#)). Liquid with a depth greater than  
32 30.5 cm above the SLDS liner will be removed at the earliest practicable time after  
33 detection (not to exceed 5 working days).
- 34 III.11.F.1.d After initial waste placement, Permittees shall manage all leachate from the permitted  
35 cell as dangerous waste (designated with Dangerous Waste Number F039) in accordance  
36 with [WAC 173-303](#).
- 37 III.11.F.2 Monitoring and Management of Leak Detection System (LDS/ secondary sump)
- 38 III.11.F.2.a Permittees shall manage the leachate in the LDS system in a manner that does not allow  
39 the fluid head to exceed 30.5 cm above the LDS liner ([WAC 173-303-665\(2\)\(h\)\(ii\)\(B\)](#)).
- 40 III.11.F.2.b Permittees shall monitor and record leachate removal for comparison to the Action  
41 Leakage Rate (ALR) as described in Appendix 4C, Response Action Plan. If the leachate  
42 flow rate in the LDS exceeds the ALR, the Permittees shall implement the Ecology  
43 approved response action plan (Appendix 4C).
- 44 III.11.F.2.c Leachate from the LDS (secondary sump) shall be sampled semi-annually if a pumpable  
45 quantity of leachate is available for sampling.

- 1 III.11.F.2.d Accumulated liquid of pumpable quantities in the LDS will be managed in a manner that  
2 does not allow the fluid head to exceed 30.5 cm above the LDS liner  
3 [[WAC 173-303-665\(2\)\(h\)\(i\)\(C\)\(iii\)](#)]. Liquid with a depth greater than 30.5 cm above the  
4 LDS liner will be removed at the earliest practicable time after detection (not to exceed  
5 5 working days).
- 6 III.11.F.3 Monitoring and Management of the Secondary Leak Detection System (SLDS)
- 7 III.11.F.3.a At least 180 days prior to initial waste placement, the, the Permittees shall submit to  
8 Ecology for approval a sub-surface liquids monitoring and operations plan (SLMOP) for  
9 the SLDS to include the following: monitoring frequency, pressure transducer  
10 configuration, liquid collection and storage processes, sampling and analysis and  
11 response actions. The SLMOP shall be approved by Ecology prior to placement of waste  
12 in the IDF, and incorporated into the Permit as a Class 1' modification.
- 13 III.11.F.3.b Permittees shall monitor and manage the SLDS (tertiary sump) pursuant to the approved  
14 sub-surface liquids monitoring and operations plan.
- 15 III.11.F.3.c Accumulated liquid of pumpable quantities in the SLDS will be managed in a manner  
16 that does not allow the fluid head to exceed 30.5 cm above the SLDS liner  
17 [[WAC 173-303-665\(2\)\(h\)\(i\)\(C\)\(iii\)](#)]. Liquid with a depth greater than 30.5 cm above the  
18 SLDS liner will be removed at the earliest practicable time after detection (not to exceed  
19 5 working days).
- 20 III.11.F.3.d After initial waste placement, Permittees shall manage all leachate from the permitted  
21 cell as dangerous waste in accordance with [WAC 173-303](#).
- 22 **III.11.G CONSTRUCTION WATER MANAGEMENT**
- 23 III.11.G.1 During construction, it is anticipated that liquids will accumulate on top of all liners and  
24 sumps. Permittees shall manage the construction wastewater in accordance with State  
25 Waste Discharge Permit ST 4511.
- 26 III.11.G.2 Liquid accumulation within the LCRS, LDS, and SLDS prior to initial waste placement  
27 will be considered construction wastewater (i.e., not leachate).
- 28 **III.11.H LANDFILL LINER INTEGRITY MANAGEMENT & LANDFILL OPERATIONS**
- 29 III.11.H.1 Permittees shall design, construct, and operate the landfill in a manner to protect the  
30 liners from becoming damaged. Temperature: Waste packages with elevated  
31 temperatures shall be evaluated and managed in a manner to maintain the primary (upper)  
32 liner below the design basis temperature for the liner (e.g.,160 F). Weight: Waste, fill  
33 material and closure cover shall be placed in a manner that does not exceed the allowable  
34 load bearing capacity of the liner (weight per area 13,000 lb/ft<sup>2</sup>). Puncture: At least  
35 3 feet of clean backfill material shall be placed as an operations layer over the leachate  
36 collection and removal system to protect the system from puncture damage.
- 37 III.11.H.1.a All equipment used for construction and operations inside of the IDF shall meet the  
38 weight limitation as specified in Permit Condition III.H.1. Only equipment that can be  
39 adequately supported by the operations layer as specified in Permit Condition III.H.1  
40 (e.g., will not have the potential to puncture the liner) shall be used inside of the IDF. All  
41 equipment used for construction and operations outside of the IDF shall not damage the  
42 berms. Changes to any equipment will follow the process established by condition II.R  
43 of the site wide permit. Within 120 days from the effective date for the permit, a process  
44 for demonstrating compliance with this condition shall be submitted for review by  
45 Ecology. This process will be incorporated into appropriate IDF operating procedures  
46 prior to IDF operations.

1 III.11.H.2 The Permittees shall construct berms and ditches to prevent run-on and run-off in  
2 accordance with the requirements of Section 4.3.8 of this permit. Before the first  
3 placement of waste in the IDF, the Permittees shall submit to Ecology a final grading and  
4 topographical map on a scale sufficient to identify berms and ditches used to control run-  
5 on and run-off. Upon approval, Ecology will incorporate these maps into the permit as a  
6 Class 1' modification.

7 III.11.H.3 The Permittees shall operate the RCRA IDF Cell (Cell1) in accordance with  
8 [WAC 173-303-665\(2\)](#) and the operating practices described in Chapters 3.0, 4.0, 6.0, 7.0,  
9 8.0 and Appendix 4A, §1, subsection 7, except as otherwise specified in this Permit.

10 III.11.H.4 The Permittees shall maintain a permanent and accurate record of the three-dimensional  
11 location of each waste type, based on grid coordinates, within the RCRA IDF Cell (Cell1)  
12 in accordance with [WAC 173-303-665\(5\)](#).

### 13 III.11.1 WASTE ACCEPTANCE CRITERIA

14 The only acceptable waste form approved for disposal at the RCRA cell of IDF are IDF  
15 operational waste, Immobilized Low Activity Waste (ILAW) in glass form from the  
16 Waste Treatment Plant (WTP) Low Activity Waste (LAW) Vitrification facility and  
17 ILAW from the Bulk Vitrification Research Demonstration and Development facility (up  
18 to 50 boxes). Specifics about waste acceptance criteria for each of these wastes are  
19 detailed below.

20 No other waste forms may be disposed at the RCRA cell of IDF unless authorized via a  
21 Final Permit modification decision. Requests for Permit modifications must be  
22 accompanied by an analysis adequate for Ecology to comply with SEPA, as well as by a  
23 risk assessment and groundwater modeling to show the environmental impact. Permit  
24 Condition III.11.I.5 outlines the process by which waste sources in the IDF are modeled  
25 in an ongoing risk budget and a ground water impact analysis.

26 III.11.I.1 Six months prior to IDF operations Permittees shall submit to Ecology for review,  
27 approval, and incorporation into the permit, all waste acceptance criteria to address, at a  
28 minimum, the following: physical/chemical criteria, liquids and liquid containing waste,  
29 land disposal restriction treatment standards and prohibitions, compatibility of waste with  
30 liner, gas generation, packaging, handling of packages, minimization of subsidence.

31 III.11.I.1.a All containers/packages shall meet void space requirements pursuant to  
32 [WAC 173-303-665\(12\)](#).

33 III.11.I.1.b Compliance Schedule

34 III.11.I.1.b.1 Six months prior to IDF operations, the Permittees shall submit to Ecology for review,  
35 approval, and incorporation into the permit any necessary modifications to the IDF Waste  
36 Acceptance Plan (Appendix 3A of the permit application, DOE/RL-2003-12, Rev 1).

37 III.11.I.2 ILAW Waste Acceptance Criteria

38 The only ILAW forms acceptable for disposal at IDF are: (1) approved glass canisters  
39 that are produced in accordance with the terms, conditions, and requirements of the WTP  
40 portion of the Permit, and (2) the 50 bulk vitrification test boxes as specified in the  
41 DBVS test plans.

42 To assure protection of human health and the environment, it is necessary that the  
43 appropriate quality of glass be disposed at IDF. The LDR Treatment Standard for eight  
44 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver), when  
45 associated with High Level Waste, is HLVT (40 CFR 268). Because these metals are  
46 constituents in the Hanford Tanks Waste, the LDR standard for ILAW disposed to IDF is  
47 HLVT.

1 For any ILAW glass form(s) that DOE intends to dispose of in IDF, DOE will provide to  
2 Ecology for review, an ILAW Waste Form Technical Requirements Document  
3 (IWTRD). The IWTRD will contain:

4 III.11.1.2.a WTP ILAW Waste Acceptance Criteria

5 III.11.1.2.a.1 A description of each specific glass formulation that DOE intends to use including a basis  
6 for why each specific formulation is proposed for use, which specific tank wastes the  
7 glass formulation is proposed for use with, the characteristics of the glass that are key to  
8 satisfactory performance (e.g., VHT, PCT, and TCLP and/or other approved performance  
9 testing methodologies that the parties agree are appropriate and necessary), the range in  
10 key characteristics anticipated if the specific glass formulation is produced on a  
11 production basis with tank waste, and the factors that DOE must protect against in  
12 producing the glass to ensure the intended glass characteristics will exist in the actual  
13 ILAW.

14 III.11.1.2.a.2 A performance assessment that provides a reasonable basis for assurance that each glass  
15 formulation will, once disposed of in IDF in combination with the other waste volumes  
16 and waste forms planned for disposal at the entire Integrated Disposal Facility, be  
17 adequately protective of human health and the environment; and will not violate or be  
18 projected to violate all applicable state and federal laws, regulations and environmental  
19 standards.

20 Within 60 days of a request by Ecology, the Permittees shall provide a separate model  
21 run using Ecology's assumptions and model input.

22 III.11.1.2.a.3 A description of production processes including management controls and quality  
23 assurance/quality control requirements that assure that glass produced for each  
24 formulation will perform in a reasonably similar manner to the waste form assumed in the  
25 performance assessment for that formulation.

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

31 The initial IWTRD contained glass formulation data as required by Permit  
32 Condition III.11.1.2.a.1, and was submitted on December 18, 2006 (AR Accession #  
33 0906020182). The performance assessment required by Permit Condition III.11.1.2.a.2,  
34 and the quality assurance/quality control requirements process required by Permit  
35 Condition III.11.1.2.a.3 shall be submitted for Ecology review as soon as possible after  
36 issuance of the Final Tank Closure and Waste Management EIS and receipt of underlying  
37 codes and data packages, and at least 180 days prior to the date DOE expects to receive  
38 waste at IDF. At a minimum, the Permittees shall submit updates to the IWTRD to  
39 Ecology every five years or more frequently with the next one due December 31, 2012, if  
40 any of the following conditions exist:

- 41 • The Permittees submits a permit modification request allowing additional waste  
42 forms to be disposed of at IDF,
- 43 • The WTP or other vitrification facility change their glass formulations from those  
44 previously included in the IWTRD
- 45 • An unanticipated event or condition occurs that Ecology determines would warrant  
46 an update to the IWTRD.

- 1 III.11.I.2.a.4 The Permittees shall not dispose of any WTP ILAW not described and evaluated in the  
2 IWTRD.
- 3 III.11.I.3 ILAW Waste Acceptance Criteria Verification
- 4 III.11.I.3.a Six months prior to disposing of ILAW in the IDF, the Permittees will submit an ILAW  
5 verification plan to Ecology for review and approval. This plan will be coordinated with  
6 WTP, Ecology, and the Permittees personnel. This plan will outline the specifics of  
7 verifying ILAW waste acceptance through WTP operating parameters, and/or glass  
8 sampling. The Plan will include physical sampling requirements for batches, glass  
9 formulations, and/or feed envelopes.
- 10 III.11.I.4 Demonstration Bulk Vitrification System (DBVS) Bulk Vitrification Waste Acceptance  
11 Criteria
- 12 III.11.I.4.a Bulk Vitrification waste forms that are acceptable to be disposed of at IDF are up to  
13 50 boxes of vitrified glass produced pursuant to the DBVS RD&D Permit from  
14 processing Hanford Tank S-109 tank waste.
- 15 III.11.I.4.b If Bulk Vitrification is selected as a technology to supplement the Waste Treatment Plant,  
16 the IDF portion of the Permit will need to be modified to accept Bulk Vitrification Full  
17 Scale production waste forms. This modification will need to be accompanied by  
18 appropriate TPA changes (per M-062 requirements) and adequate risk assessment  
19 information sufficient for the Department of Ecology to meet its SEPA obligations.
- 20 III.11.I.4.c DBVS Waste Acceptance Verification will occur on 100% of the waste packages.  
21 Pursuant to the DBVS RD&D Permit, a detailed campaign test report will be produced  
22 and submitted to Ecology detailing results of all testing performed on each waste package  
23 that is produced. IDF personnel shall review these reports to verify that the waste  
24 packages meet IDF Waste Acceptance Criteria.
- 25 III.11.I.4.d The Permittees shall not dispose of any waste forms that do not comply with all  
26 appropriate and applicable treatment standards, including all applicable Land Disposal  
27 Restrictions (LDR).
- 28 III.11.I.5 Modeling – Risk Budget Tool
- 29 III.11.I.5.a The Permittees must create and maintain a modeling - risk budget tool, which models the  
30 future impacts of the planned IDF waste forms (including input from analyses performed  
31 as specified in Permit Conditions III.11.I.2.a through III.11.I.2.a.ii) and their impact to  
32 underlying vadose and ground water. This software tool will be submitted for Ecology  
33 review as soon as possible after issuance of Final Tank Closure and Waste Management  
34 EIS and receipt of underlying codes and data packages, and at least 180 days prior to the  
35 date DOE expects to receive waste at IDF. The risk budget tool shall be updated at least  
36 every 5 years. The model will be updated more frequently if needed, to support permit  
37 modifications or SEPA Threshold Determinations whenever a new waste stream or  
38 significant expansion is being proposed for the IDF. This risk budget tool shall be  
39 conducted in manner that is consistent with state and federal requirements, and represents  
40 a risk analysis of all waste previously disposed of in the entire IDF (both cell 1 and cell 2)  
41 and those wastes expected to be disposed of in the future for the entire IDF to determine  
42 cumulative impacts. The groundwater impact should be modeled to evaluate fate and  
43 transport in the groundwater aquifer(s) and should be compared against various  
44 performance standards including but not limited to drinking water standards ([40 CFR 141](#)  
45 and [40 CFR 143](#)). Ecology will review modeling assumptions, input parameters, and  
46 results and will provide comments to the Permittees. Ecology comments shall be  
47 dispositioned through the Review Comment Record (RCR) process and will be reflected  
48 in further modeling to modify the IDF ILAW waste acceptance criteria as appropriate.

- 1 III.11.I.5.a.1 The modeling-risk budget tool will include a sensitivity analysis reflecting parameters  
2 and changes to parameters as requested by Ecology.
- 3 III.11.I.5.a.2 If these modeling efforts indicate results within 75% of a performance standard  
4 [including but not limited to federal drinking water standards (40 CFR 141 and  
5 40 CFR 143)], Ecology and the Permittees will meet to discuss mitigation measures or  
6 modified waste acceptance criteria for specific waste forms.
- 7 III.11.I.5.a.3 When considering all the waste forms to be disposed of in IDF, the Permittees shall not  
8 dispose of any waste that will result (through forward looking modeling or in real  
9 groundwater concentrations data) in a violation of any state or federal regulatory limit,  
10 specifically including but not limited to drinking water standards for any constituent as  
11 defined in 40 CFR 141 and 40 CFR 143.
- 12 III.11.I.6 The Permittees shall not dispose of any waste that is not in compliance with state and  
13 federal requirements as identified in Chapter 13.0.
- 14 III.11.I.6.a In accordance with DOE's authority under the Atomic Energy Act of 1954, as amended  
15 and other applicable law, prior to disposing of any mixed immobilized low-activity waste  
16 (ILAW) in the IDF, DOE will certify to the State of Washington that it has determined  
17 that such ILAW is not high-level waste and meets the criteria and requirements outlined  
18 in DOE's consultation with the U.S. Nuclear Regulatory Commission beginning in 1993  
19 (Letter from R.M. Bernero, USNRC to J. Lytle, USDOE, dated March 2, 1993; Letter  
20 from J. Kinzer, USDOE, to C. J. Paperiello, USNRC, Classification of Hanford Low-  
21 Activity Tank Waste Fraction, dated March 7, 1996; and Letter from C.J. Paperiello,  
22 USNRC, to J. Kinzer, USDOE, Classification of Hanford Low-Activity Tank Waste  
23 Fraction, dated June 9, 1997). While the requirement to provide such certification is an  
24 enforceable obligation of this permit, the provision of such certification does not convey,  
25 or purport to convey, authority to Ecology to regulate the radioactive hazards of the waste  
26 under this permit.
- 27 III.11.I.7 IDF Operational Waste Acceptance Criteria
- 28 III.11.I.7.a IDF operational activities (including decontamination, cleanup, and maintenance) will  
29 generate a small amount of waste. Waste that can meet IDF waste acceptance without  
30 treatment will be disposed of at the IDF. All other IDF operational waste will be  
31 managed pursuant to [WAC 173-303-200](#).
- 32

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Quarter Ending 12/31/2011

24590-HLW-PCN-ENV-11-006

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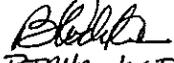
**Hanford Facility RCRA Permit Modification Notification Form**  
**Part III, Operating Unit 10**  
**Waste Treatment and Immobilization Plant**

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Index

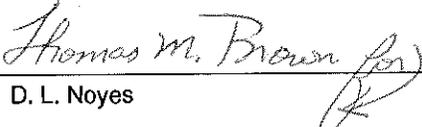
Page 2 of 3: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant  
Update Piping and Instrumentation Diagrams (P&ID) for the HLW Radioactive Liquid Waste Disposal System  
(RLD) in Appendix 10.2.

Submitted by Co-Operator:

  
BT Allen for D. Busche  
D. M. Busche

9/23/11  
Date

Reviewed by ORP Program Office:

  
Thomas M. Brown for  
D. L. Noyes

10/19/2011  
Date

Quarter Ending 12/31/2011

24590-HLW-PCN-ENV-11-006

### Hanford Facility RCRA Permit Modification Notification Form

Unit: <b>Waste Treatment and Immobilization Plant</b>	Permit Part: <b>Part III, Operating Unit 10</b>
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Description of Modification:

The purpose of this Class 1 modification is to update the P&IDs for the HLW RLD System in Appendix 10.2 of the DWP. Nine P&IDs incorporated into the DWP are being replaced with 15 P&IDs as indicated in the Table below. The additional drawings are the result of converting source drawings into multiple sheets in an effort to provide clearer representation of the RLD system, including additional details for instrumentation and logic controls.

The following source P&IDs are submitted to replace the P&IDs currently in Appendix 10.2:

Appendix 10.2			
Replace:	24590-HLW-M6-RLD-00001 Rev 3	With:	24590-HLW-M6-RLD-00001001 Rev 0
			24590-HLW-M6-RLD-00001002 Rev 0
			24590-HLW-M6-RLD-00001003 Rev 0
			24590-HLW-M6-RLD-00002001 Rev 0
			24590-HLW-M6-RLD-00002002 Rev 0
			24590-HLW-M6-RLD-00002003 Rev 0
			24590-HLW-M6-RLD-00002004 Rev 0
	24590-HLW-M6-RLD-00002 Rev 3		24590-HLW-M6-RLD-00003001 Rev 0
	24590-HLW-M6-RLD-00003 Rev 5		24590-HLW-M6-RLD-00004001 Rev 0
	24590-HLW-M6-RLD-00004 Rev 5		24590-HLW-M6-RLD-00004002 Rev 0
	24590-HLW-M6-RLD-00008 Rev 5		24590-HLW-M6-RLD-00008002 Rev 0
	24590-HLW-M6-RLD-00015 Rev 4		24590-HLW-M6-RLD-00015001 Rev 0
	24590-HLW-M6-RLD-00016 Rev 4		24590-HLW-M6-RLD-00016001 Rev 0
	24590-HLW-M6-RLD-20003 Rev 5		24590-HLW-M6-RLD-20003001 Rev 0
	24590-HLW-M6-RLD-20005 Rev 6		24590-HLW-M6-RLD-20005001 Rev 0

This modification requests Ecology approval and incorporation into the permit the specific changes to these P&IDs that are indicated by revision notes and clouds. The referenced P&IDs include changes provided in applicable design change forms (e.g., DCN, SCN, SDDR, FCN, FCR, etc.) since the issuance of the last revision of the drawing. The change documents were submitted to Ecology in accordance with Condition III.10.C.9.h.

The following types of changes apply to the RLD P&IDs:

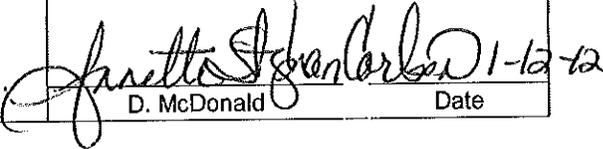
- Drawing converted from a single sheet to multi-sheet drawings
- Modified, deleted, and added notes and references
- Expanded instruments and logic controls information
- Incorporated change notices as specified in Revision History

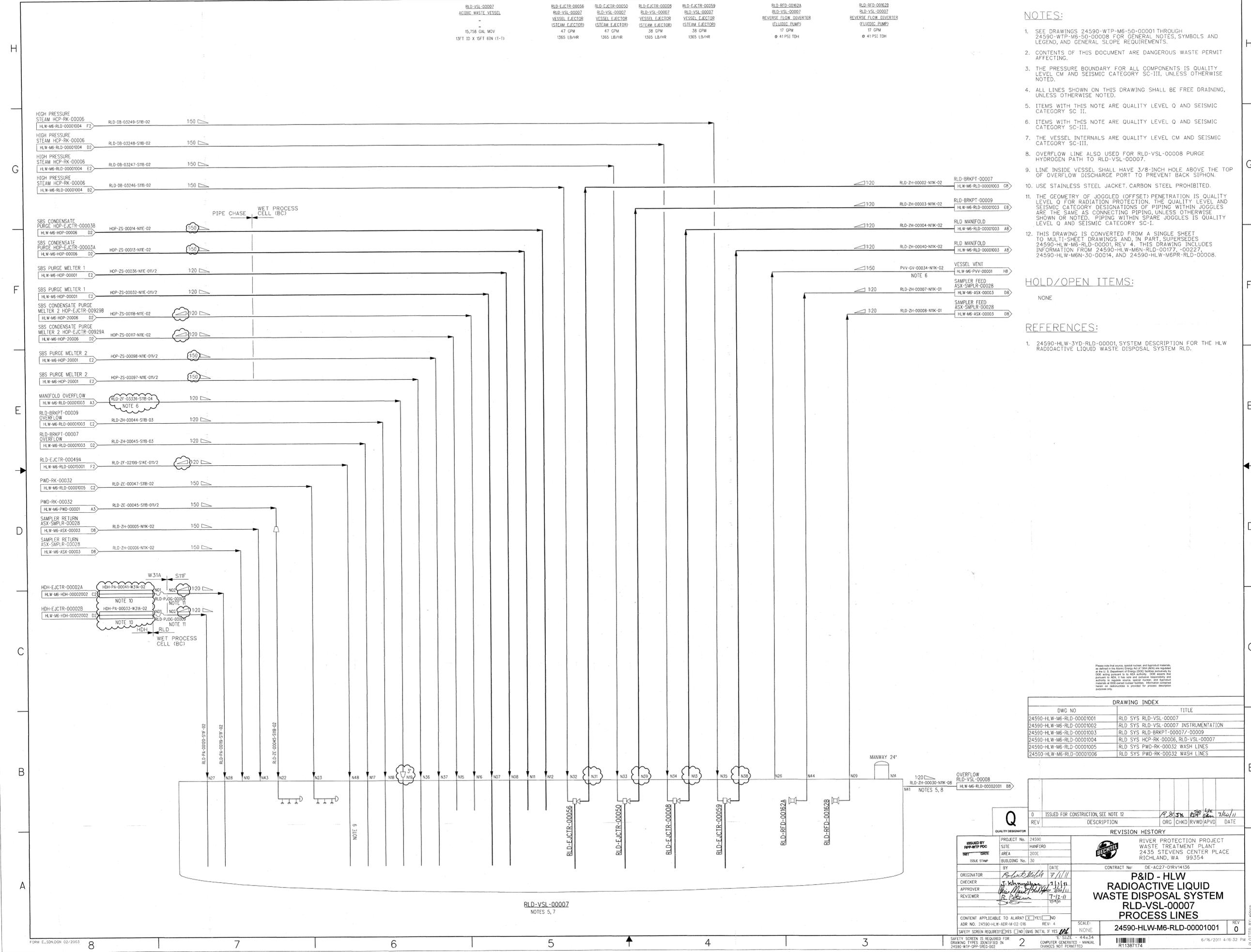
This modification requests Ecology approval and incorporation of the following outstanding change document(s) into the permit. Although not yet incorporated into the revised documents included in this PCN, the listed outstanding change document(s) are intended to be incorporated into the permit:

- 24590-HLW-M6LN-RLD-00012 affecting P&IDs 24590-HLW-M6-RLD-20003001 and -20005001

Quarter Ending 12/31/2011

24590-HLW-PCN-ENV-11-006

WAC 173-303-830 Modification Class:	Class 1	Class <sup>1</sup> 1	Class 2	Class 3
Please mark the Modification Class:	X			
Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1 and A3				
Enter wording of WAC 173-303-830, Appendix I Modification citation:				
A.1. Administrative and informational changes				
A.3. Equipment replacement or upgrading with functionally equivalent components (e.g., pipes, valves, pumps, conveyors, controls)				
Modification Approved/Concur:	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	Denied (state reason below)
Reason for denial:	Reviewed by Ecology:  D. McDonald Date			



NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
- ITEMS WITH THIS NOTE ARE QUALITY LEVEL Q AND SEISMIC CATEGORY SC-II.
- ITEMS WITH THIS NOTE ARE QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III.
- THE VESSEL INTERNALS ARE QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III.
- OVERFLOW LINE ALSO USED FOR RLD-VSL-00008 PURGE HYDROGEN PATH TO RLD-VSL-00007.
- LINE INSIDE VESSEL SHALL HAVE 3/8-INCH HOLE ABOVE THE TOP OF OVERFLOW DISCHARGE PORT TO PREVENT BACK SIPHON.
- USE STAINLESS STEEL JACKET, CARBON STEEL PROHIBITED.
- THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-RLD-00001, REV. 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-RLD-00177, -00227, 24590-HLW-M6N-30-00014, AND 24590-HLW-M6PR-RLD-00008.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-HLW-3YD-RLD-00001, SYSTEM DESCRIPTION FOR THE HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM RLD.

DWG NO	RLD SYS	TITLE
24590-HLW-M6-RLD-00001001	RLD SYS RLD-VSL-00007	
24590-HLW-M6-RLD-00001002	RLD SYS RLD-VSL-00007	INSTRUMENTATION
24590-HLW-M6-RLD-00001003	RLD SYS RLD-BRKPT-00007/-00009	
24590-HLW-M6-RLD-00001004	RLD SYS HCP-RK-00006, RLD-VSL-00007	
24590-HLW-M6-RLD-00001005	RLD SYS PWD-RK-00032	WASH LINES
24590-HLW-M6-RLD-00001006	RLD SYS PWD-RK-00032	WASH LINES

ISSUED FOR CONSTRUCTION, SEE NOTE 12		DATE	7/10/11
REV	DESCRIPTION	ORG	CHKD
0			

ISSUED BY	PROJECT No.	DATE
PPM-WTP POC	24590	7/11/11

ORIGINATOR	CHECKER	APPROVER	REVIEWER
<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>

CONTRACT No.	DE-AC27-01RV14136
RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354	
P&ID - HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM RLD-VSL-00007 PROCESS LINES	
SCALE:	NONE
24590-HLW-M6-RLD-00001001	REV: 0

RLD-VSL-00007  
NOTES 5, 7

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NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
- HIGH HIGH LEVEL (RLO-LSHH-3152A) CLOSURES THE VALVES LISTED IN THE TABLE 1.
- OPENING VALVE RLD-YV-3232 IS INHIBITED ON HLW RLD-VSL-00007 HI LEVEL.
- THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-RLD-00001, REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-30-00026, -00007, 24590-HLW-M6LN-RLD-00006, 24590-HLW-M6N-RLD-00229, AND -00269.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-HLW-3YD-RLD-00001, SYSTEM DESCRIPTION FOR THE HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM RLD.

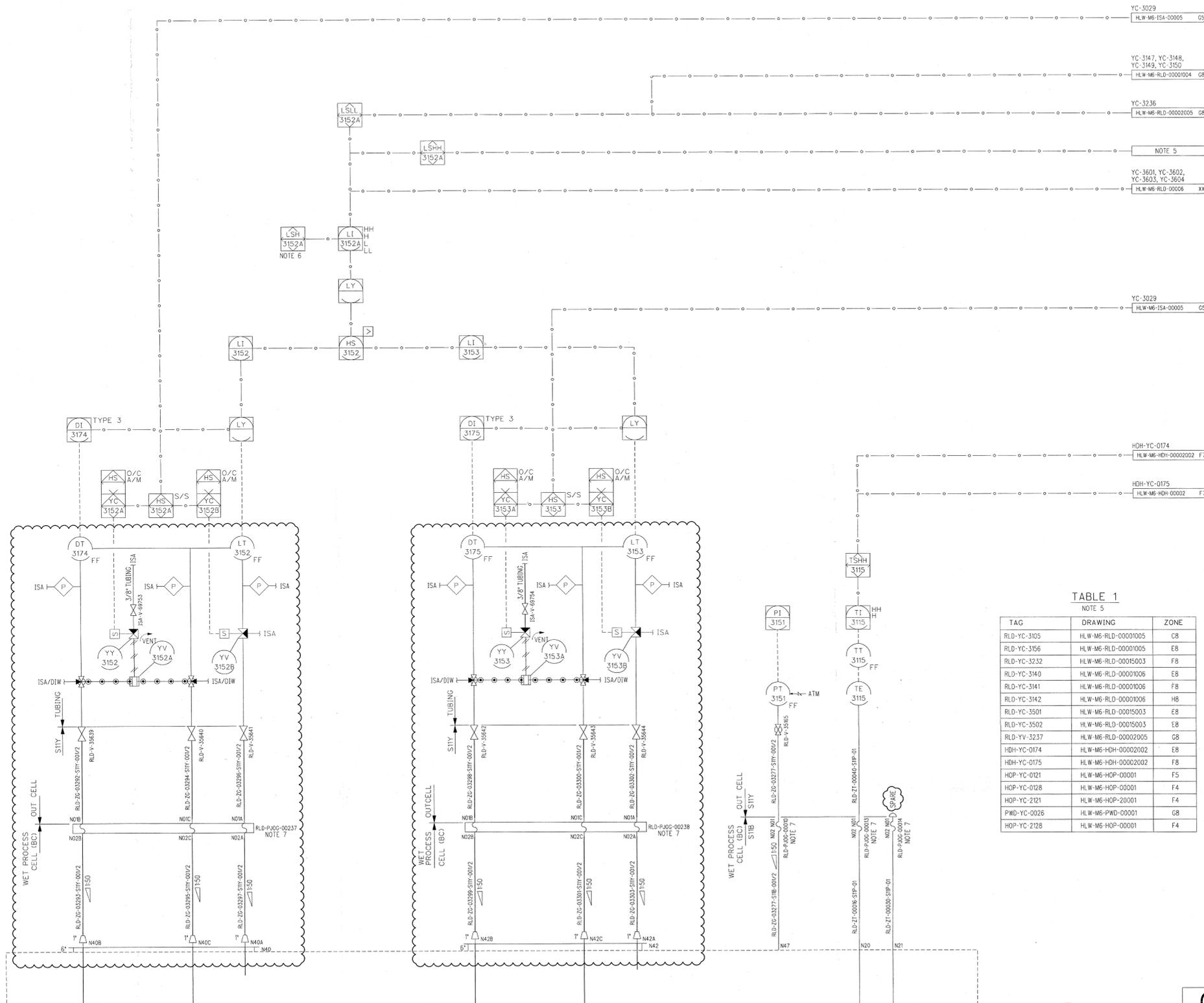


TABLE 1  
NOTE 5

TAG	DRAWING	ZONE
RLD-YC-3105	HLW-M6-RLD-00001005	C8
RLD-YC-3156	HLW-M6-RLD-00001005	E8
RLD-YC-3232	HLW-M6-RLD-00001003	F8
RLD-YC-3140	HLW-M6-RLD-00001006	E8
RLD-YC-3141	HLW-M6-RLD-00001006	F8
RLD-YC-3142	HLW-M6-RLD-00001006	H8
RLD-YC-3501	HLW-M6-RLD-00001003	E8
RLD-YC-3502	HLW-M6-RLD-00001003	E8
RLD-YC-3237	HLW-M6-RLD-00002005	G8
HDH-YC-0174	HLW-M6-HDH-00002002	E8
HDH-YC-0175	HLW-M6-HDH-00002002	F8
HOP-YC-0121	HLW-M6-HOP-00001	F5
HOP-YC-0128	HLW-M6-HOP-00001	F4
HOP-YC-2121	HLW-M6-HOP-20001	F4
PWD-YC-0026	HLW-M6-PWD-00001	G8
HOP-YC-2128	HLW-M6-HOP-00001	F4

Please note that some 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) under authority of 10 CFR, 830.401 through 830.404. DOE retains the authority to regulate these special nuclear and byproduct materials at DOE-owned nuclear facilities. Information contained herein is reproduction as provided by general exception permission.

<p>ISSUED FOR CONSTRUCTION, SEE NOTE 8</p> <p>REV 0 DESCRIPTION: RLO-ZC-03277-S11F-00012, RLO-V-35642, RLO-V-35643, RLO-V-35644, RLO-V-35645, RLO-V-35646, RLO-V-35647, RLO-V-35648, RLO-V-35649, RLO-V-35650, RLO-V-35651, RLO-V-35652, RLO-V-35653, RLO-V-35654, RLO-V-35655, RLO-V-35656, RLO-V-35657, RLO-V-35658, RLO-V-35659, RLO-V-35660, RLO-V-35661, RLO-V-35662, RLO-V-35663, RLO-V-35664, RLO-V-35665, RLO-V-35666, RLO-V-35667, RLO-V-35668, RLO-V-35669, RLO-V-35670, RLO-V-35671, RLO-V-35672, RLO-V-35673, RLO-V-35674, RLO-V-35675, RLO-V-35676, RLO-V-35677, RLO-V-35678, RLO-V-35679, RLO-V-35680, RLO-V-35681, RLO-V-35682, RLO-V-35683, RLO-V-35684, RLO-V-35685, RLO-V-35686, RLO-V-35687, RLO-V-35688, RLO-V-35689, RLO-V-35690, RLO-V-35691, RLO-V-35692, RLO-V-35693, RLO-V-35694, RLO-V-35695, RLO-V-35696, RLO-V-35697, RLO-V-35698, RLO-V-35699, RLO-V-35700, RLO-V-35701, RLO-V-35702, RLO-V-35703, RLO-V-35704, RLO-V-35705, RLO-V-35706, RLO-V-35707, RLO-V-35708, RLO-V-35709, RLO-V-35710, RLO-V-35711, 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RLD-VSL-00008  
PLANT WASH AND  
DRAINS VESSEL  
10628 GAL MOV  
15FT ID X 9FT SUN (1-1)

PLANT WASH  
PND-RK-00032  
HLW-M6-RLD-00002006 B2 RLD-ZE-20123-S1B-02 1:50

PLANT WASH  
PND-RK-00032  
HLW-M6-PWD-0000001 A5 RLD-ZE-00122-S1B-01V/2 RLD-ZE-00122-S1B-02 1:50

RLD-BRKPT-00004  
OVERFLOW  
HLW-M6-RLD-00002004 D2 RLD-ZF-03351-S1B-03 1:20

MANIFOLD DRAIN  
HLW-M6-RLD-00002004 B2 RLD-ZF-00049-S1B-03 1:20

RLD-EJCTR-00178  
HLW-M6-RLD-20005 C2 RLD-ZF-04070-S1AE-01V/2 1:20

RLD-EJCTR-00052B  
HLW-M6-RLD-00015001 C2 RLD-ZF-02194-S1AE-01V/2 1:20

RLD-EJCTR-00052A  
HLW-M6-RLD-00015001 B2 RLD-ZF-02193-S1AE-01V/2 1:20

MANIFOLD OVERFLOW  
HLW-M6-RLD-00002004 B2 RLD-ZF-03443-S1B-03 1:20 NOTE 6

SUSPECT ACTIVE  
EFFLUENT NLD-TK-00006  
HLW-M6-NLD-00002 D2 NLD-ZR-0594-S1C-02 RLD-ZF-00094-S1B-02 1:50

MANIFOLD DRAIN  
HLW-M6-RLD-00002001 D2 RLD-ZF-00112-S1B-03 1:20

PLANT WASH & DRAINS  
HLW-M6-RLD-00016001 A2 RLD-ZF-00093-S1B-02 1:20

PLANT WASH & DRAINS  
HLW-M6-RLD-00044001 D2 RLD-ZF-03360-S1B-02 1:20

PLANT WASH MANIFOLD  
HLW-M6-RLD-00003003 A3 RLD-ZF-00084-S1B-03 1:20

SUSPECT ACTIVE PCW  
HLW-M6-PCW-00004001 E2 PCW-WS-20007-S1IC-02

SUSPECT ACTIVE  
EFFLUENT PCW SYSTEM  
HLW-M6-PCW-00003001 D2 PCW-WS-03802-S1IC-02

AIR PURGE  
HLW-M6-RLD-00007 A6 RLD-GQ-00001-S1B-00V/2 1:50 NOTE 5

DRAIN HEADER  
HLW-M6-RLD-00005 H2 RLD-ZF-03359-S1B-04 1:50

HFP-EJCTR-00002  
HLW-M6-HFP-00002003 G2 HFP-ZF-00003-S1AE-02 1:20 NOTE 6

HFP-EJCTR-00001  
HLW-M6-HFP-00003004 G2 HFP-ZF-00004-S1AE-02 1:20 NOTE 6

HFP-EJCTR-00004  
HLW-M6-HFP-20002003 G2 HFP-ZF-00010-S1AE-02 1:20 NOTE 6

HFP-EJCTR-00005  
HLW-M6-HFP-20001004 G2 HFP-ZF-00009-S1AE-02 1:20

HRH-SUMP-00001  
HLW-M6-RLD-00004002 G2 RLD-ZF-03421-S1B-01V/2 1:50

HDH-SUMP-00004  
HLW-M6-RLD-00008 E2 RLD-ZF-03340-S1B-01V/2 1:20

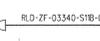
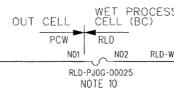
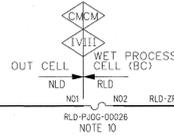
HFP-SUMP-00002  
HLW-M6-RLD-00008 F2 RLD-ZF-03321-S1AE-01V/2 1:20

DRAIN TRANSFER  
TUNNEL SUMPS  
HLW-M6-RLD-00017 D2 RLD-ZF-03353-S1B-02 1:20

MANIFOLD DRAIN  
HLW-M6-RLD-20003 B2 RLD-ZF-04095-S1B-02 1:20

MANIFOLD DRAIN  
HLW-M6-RLD-20003 E2 RLD-ZF-04077-S1B-03 1:20 RLD-ZF-04077-S1B-04

RLD-VSL-00007  
OVERFLOW  
HLW-M6-RLD-00001001 B2 RLD-ZH-00030-N1K-08 1:20 NOTE 9



NOTE 7  
RLD-VSL-00008  
NOTE 5

NOTES:

- 1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS SHOWN ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. ITEMS WITH THIS NOTE ARE QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
6. ITEMS WITH THIS NOTE ARE QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III.
7. THE VESSEL INTERNALS ARE QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III.
8. LINE INSIDE VESSEL SHALL HAVE 3/8 INCH HOLE ABOVE TOP OF OVERFLOW DISCHARGE PORT TO PREVENT BACK SIPHON.
9. ACIDIC WASTE VESSEL OVERFLOW LINE ALSO USED FOR VESSEL RLD-VSL-00008 PURGE HYDROGEN PATH TO VESSEL RLD-VSL-00007.
10. THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
11. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-RLD-00002 REV. 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-RLD-00195, -00227, -00246, -00249, 24590-HLW-M6LN-RLD-00004, -00007, AND 24590-HLW-M6PR-RLD-00010.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 1. 24590-HLW-3YD-RLD-00001 SYSTEM DESCRIPTION FOR THE HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM, RLD.

Please note the source, model number and material, as defined in the source description and material specifications. The Department of Energy (DOE) requires that DOE users be aware of the source, model number and material to be used in the design and construction of the system. The user is responsible for ensuring that the source, model number and material used in the design and construction of the system are consistent with the source, model number and material specified in the source description and material specifications.

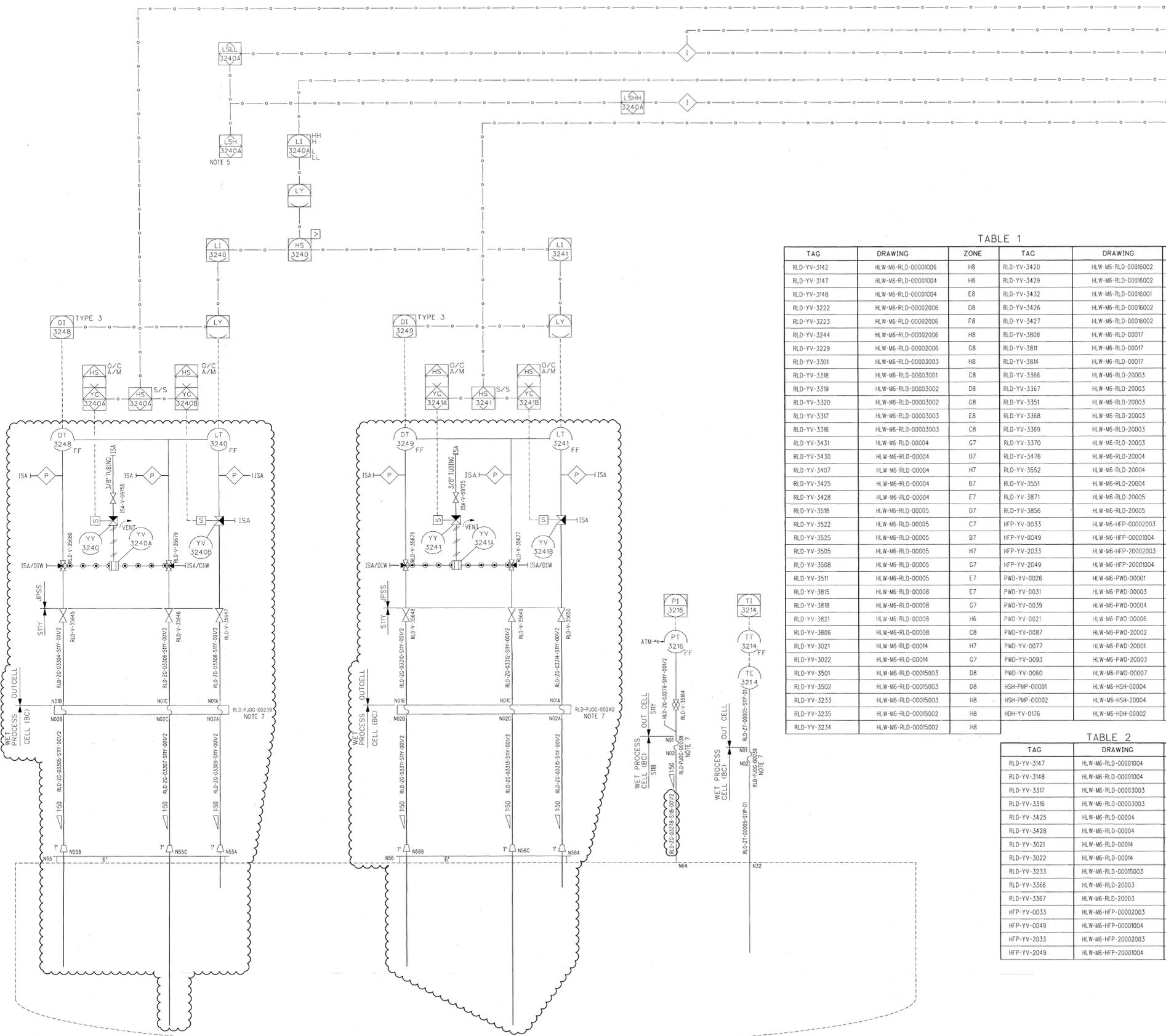
DRAWING INDEX table with columns for DWG NO, RLD SYSTEM, and TITLE. Includes entries for RLD-VSL-00008 PROCESS LINES, RLD-VSL-00008 PROCESS LINES, RLD-VSL-00008 INSTRUMENTATION, RLD-BRKPT-00004, RLD-RK-00042, and PND-RK-00032.

REVISION HISTORY table with columns for REV, DESCRIPTION, ORG, CHKD, RWD, DATE. Includes revision 1 issued for construction on 7/20/11.

Project information block including ISSUED BY (RPP-WTP PDC), PROJECT No. (24590), SITE (HANFORD), AREA (200E), BUILDING No. (30), CONTRACT No. (DE-AC27-01RV14136), and P&ID - HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM RLD-VSL-00008 PROCESS LINES.



H  
G  
F  
E  
D  
C  
B  
A



NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
- HIGH LEVEL IN RLD-VSL-00008 PREVENTS VALVES LISTED IN TABLE 2 FROM OPENING.
- HIGH HIGH LEVEL (RLD-LSHH-3240A) CLOSES THE VALVES LISTED IN TABLE 1.
- THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND IN PART SUPERSEDES 24590-HLW-M6-RD-00002 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-RD-00191, -00230, -00264 24590-HLW-M6N-30-00007, -00026. AND 24590-HLW-M6PR-RD-00010.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-HLW-3YD-RD-00001, SYSTEM DESCRIPTION FOR THE HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYTEM RLD.

TABLE 1

TAG	DRAWING	ZONE	TAG	DRAWING	ZONE
RLD-YV-3142	HLW-M6-RD-00001006	H8	RLD-YV-3420	HLW-M6-RD-00016002	H8
RLD-YV-3147	HLW-M6-RD-00001004	H8	RLD-YV-3429	HLW-M6-RD-00016002	F8
RLD-YV-3148	HLW-M6-RD-00001004	E8	RLD-YV-3432	HLW-M6-RD-00016001	F8
RLD-YV-3222	HLW-M6-RD-00002006	D8	RLD-YV-3426	HLW-M6-RD-00016002	D8
RLD-YV-3223	HLW-M6-RD-00002006	F8	RLD-YV-3427	HLW-M6-RD-00016002	C8
RLD-YV-3244	HLW-M6-RD-00002006	H8	RLD-YV-3808	HLW-M6-RD-00017	G8
RLD-YV-3229	HLW-M6-RD-00002006	G8	RLD-YV-3811	HLW-M6-RD-00017	G6
RLD-YV-3301	HLW-M6-RD-00003003	H8	RLD-YV-3814	HLW-M6-RD-00017	G4
RLD-YV-3318	HLW-M6-RD-00003001	C8	RLD-YV-3366	HLW-M6-RD-20003	G7
RLD-YV-3319	HLW-M6-RD-00003002	D8	RLD-YV-3367	HLW-M6-RD-20003	F7
RLD-YV-3320	HLW-M6-RD-00003002	G8	RLD-YV-3351	HLW-M6-RD-20003	H7
RLD-YV-3317	HLW-M6-RD-00003003	E8	RLD-YV-3368	HLW-M6-RD-20003	C7
RLD-YV-3316	HLW-M6-RD-00003003	C8	RLD-YV-3369	HLW-M6-RD-20003	B7
RLD-YV-3431	HLW-M6-RD-00004	C7	RLD-YV-3370	HLW-M6-RD-20003	D7
RLD-YV-3430	HLW-M6-RD-00004	D7	RLD-YV-3476	HLW-M6-RD-20004	G7
RLD-YV-3407	HLW-M6-RD-00004	H7	RLD-YV-3552	HLW-M6-RD-20004	F7
RLD-YV-3425	HLW-M6-RD-00004	B7	RLD-YV-3551	HLW-M6-RD-20004	E7
RLD-YV-3428	HLW-M6-RD-00004	E7	RLD-YV-3871	HLW-M6-RD-20005	H8
RLD-YV-3518	HLW-M6-RD-00005	D7	RLD-YV-3856	HLW-M6-RD-20005	E8
RLD-YV-3522	HLW-M6-RD-00005	C7	HFP-YV-0033	HLW-M6-HFP-00002003	G8
RLD-YV-3525	HLW-M6-RD-00005	B7	HFP-YV-0049	HLW-M6-HFP-00001004	H8
RLD-YV-3505	HLW-M6-RD-00005	H7	HFP-YV-2033	HLW-M6-HFP-20002003	G8
RLD-YV-3508	HLW-M6-RD-00005	G7	HFP-YV-2049	HLW-M6-HFP-20001004	H8
RLD-YV-3511	HLW-M6-RD-00005	E7	PWD-YV-0026	HLW-M6-PWD-00001	G8
RLD-YV-3815	HLW-M6-RD-00008	E7	PWD-YV-0031	HLW-M6-PWD-00003	G7
RLD-YV-3818	HLW-M6-RD-00008	C7	PWD-YV-0039	HLW-M6-PWD-00004	F6
RLD-YV-3821	HLW-M6-RD-00008	H6	PWD-YV-0021	HLW-M6-PWD-00006	F7
RLD-YV-3806	HLW-M6-RD-00008	C8	PWD-YV-0087	HLW-M6-PWD-20002	G7
RLD-YV-3021	HLW-M6-RD-00014	H7	PWD-YV-0077	HLW-M6-PWD-20001	F6
RLD-YV-3022	HLW-M6-RD-00014	C7	PWD-YV-0093	HLW-M6-PWD-20003	F7
RLD-YV-3501	HLW-M6-RD-00015003	D8	PWD-YV-0060	HLW-M6-PWD-00007	F7
RLD-YV-3502	HLW-M6-RD-00015003	D8	SHH-PMP-00001	HLW-M6-HSH-00004	D5
RLD-YV-3233	HLW-M6-RD-00015003	H8	HSH-PMP-00002	HLW-M6-HSH-20004	D5
RLD-YV-3235	HLW-M6-RD-00015002	H8	HDH-YV-0176	HLW-M6-HDH-00002	E7
RLD-YV-3234	HLW-M6-RD-00015002	H8			

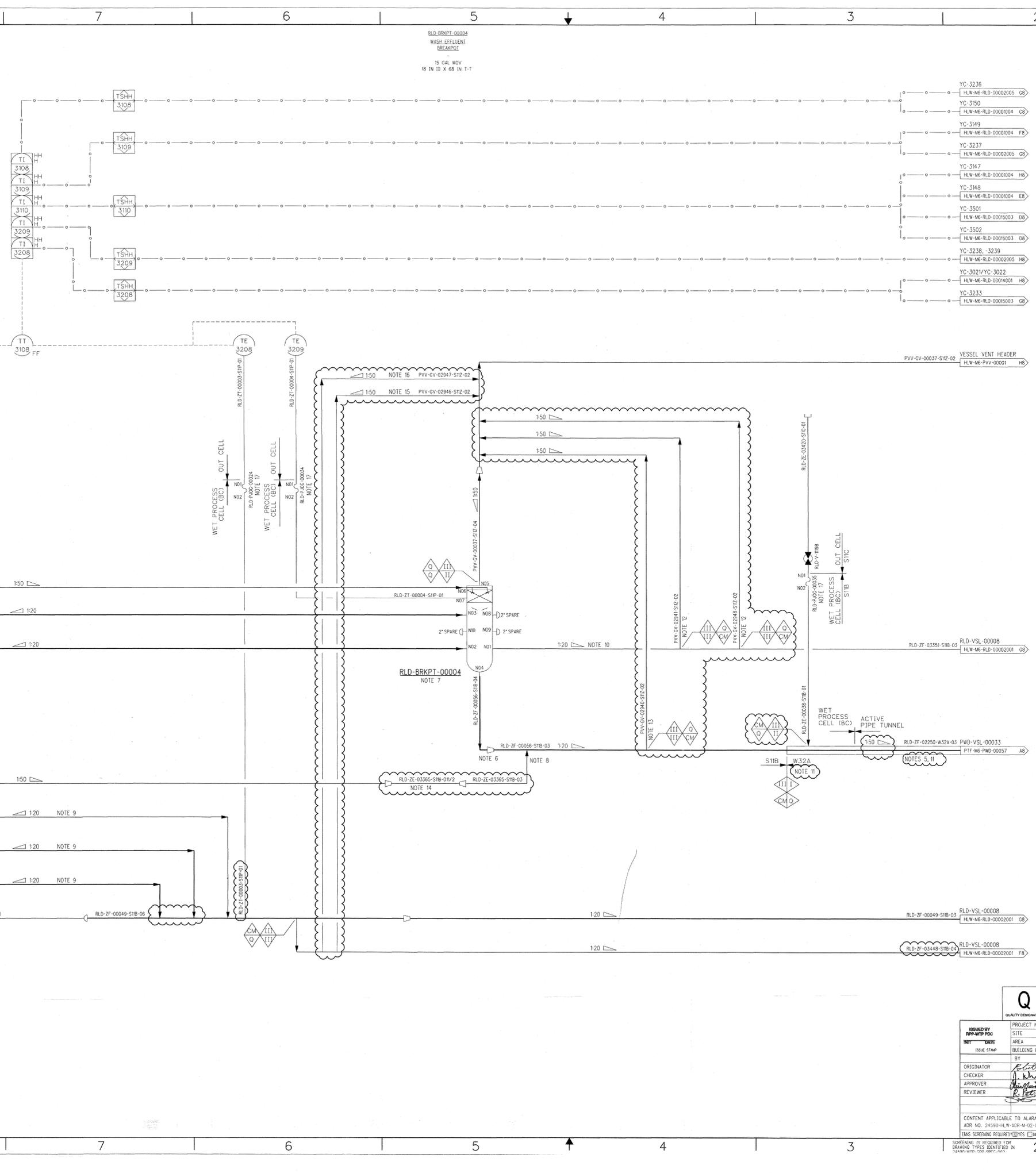
TABLE 2

TAG	DRAWING	ZONE
RLD-YV-3147	HLW-M6-RD-00001004	H8
RLD-YV-3148	HLW-M6-RD-00001004	E8
RLD-YV-3317	HLW-M6-RD-00003003	E8
RLD-YV-3316	HLW-M6-RD-00003003	C8
RLD-YV-3425	HLW-M6-RD-00004	B7
RLD-YV-3428	HLW-M6-RD-00004	E7
RLD-YV-3021	HLW-M6-RD-00014	H7
RLD-YV-3022	HLW-M6-RD-00014	C7
RLD-YV-3233	HLW-M6-RD-00015003	H8
RLD-YV-3366	HLW-M6-RD-20003	C7
RLD-YV-3367	HLW-M6-RD-20003	F7
HFP-YV-0033	HLW-M6-HFP-00002003	G8
HFP-YV-0049	HLW-M6-HFP-00001004	H8
HFP-YV-2033	HLW-M6-HFP-20002003	G8
HFP-YV-2049	HLW-M6-HFP-20001004	H8

Please refer to the drawing title block for the project name and drawing number. All drawings are the property of the company and are not to be reproduced without the written permission of the company. The company is not responsible for any errors or omissions in this drawing. The user of this drawing is responsible for its proper use and interpretation.

ISSUED FOR CONSTRUCTION. SEE NOTE 8	REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE										
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ISSUED BY		PROJECT NO.	DATE														
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ISSUED BY		AREA	DATE														
RF	RF	200E	7/26/11														
<table border="1"> <thead> <tr> <th colspan="2">ISSUED BY</th> <th>BUILDING NO.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>RF</td> <td>RF</td> <td>200A</td> <td>7/26/11</td> </tr> </tbody> </table>								ISSUED BY		BUILDING NO.	DATE	RF	RF	200A	7/26/11		
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RF	RF	200A	7/26/11														
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ORIGINATOR	CHECKER	APPROVER	REVIEWER	DATE													
RF	RF	RF	RF	7/26/11													
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CONTENT APPLICABLE TO ALARA?		YES	NO														
ADR NO. 24590-HLW-ADR-M-02-016	REV. 4	<input checked="" type="checkbox"/>	<input type="checkbox"/>														
<table border="1"> <thead> <tr> <th colspan="2">SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002</th> <th>YES</th> <th>NO</th> </tr> </thead> <tbody> <tr> <td>MANUAL</td> <td>COMPUTER GENERATED</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </tbody> </table>								SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002		YES	NO	MANUAL	COMPUTER GENERATED	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002		YES	NO														
MANUAL	COMPUTER GENERATED	<input checked="" type="checkbox"/>	<input type="checkbox"/>														
<table border="1"> <thead> <tr> <th colspan="2">REVISION HISTORY</th> <th>CONTRACT NO.</th> </tr> </thead> <tbody> <tr> <td colspan="2"> <table border="1"> <thead> <tr> <th>REV</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>ISSUED FOR CONSTRUCTION. SEE NOTE 8</td> </tr> </tbody> </table> </td> <td>DE-AC27-01RV14136</td> </tr> </tbody> </table>								REVISION HISTORY		CONTRACT NO.	<table border="1"> <thead> <tr> <th>REV</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>ISSUED FOR CONSTRUCTION. SEE NOTE 8</td> </tr> </tbody> </table>		REV	DESCRIPTION	0	ISSUED FOR CONSTRUCTION. SEE NOTE 8	DE-AC27-01RV14136
REVISION HISTORY		CONTRACT NO.															
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REV	DESCRIPTION																
0	ISSUED FOR CONSTRUCTION. SEE NOTE 8																
<table border="1"> <thead> <tr> <th colspan="2">RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354</th> </tr> </thead> <tbody> <tr> <td colspan="2"> <table border="1"> <thead> <tr> <th colspan="2">P&amp;ID - HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM RLD-VSL-00008 INSTRUMENTATION</th> </tr> </thead> <tbody> <tr> <td>SCALE: NONE</td> <td>24590-HLW-M6-RD-00002003</td> </tr> </tbody> </table> </td> </tr> </tbody> </table>								RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354		<table border="1"> <thead> <tr> <th colspan="2">P&amp;ID - HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM RLD-VSL-00008 INSTRUMENTATION</th> </tr> </thead> <tbody> <tr> <td>SCALE: NONE</td> <td>24590-HLW-M6-RD-00002003</td> </tr> </tbody> </table>		P&ID - HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM RLD-VSL-00008 INSTRUMENTATION		SCALE: NONE	24590-HLW-M6-RD-00002003		
RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354																	
<table border="1"> <thead> <tr> <th colspan="2">P&amp;ID - HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM RLD-VSL-00008 INSTRUMENTATION</th> </tr> </thead> <tbody> <tr> <td>SCALE: NONE</td> <td>24590-HLW-M6-RD-00002003</td> </tr> </tbody> </table>		P&ID - HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM RLD-VSL-00008 INSTRUMENTATION		SCALE: NONE	24590-HLW-M6-RD-00002003												
P&ID - HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM RLD-VSL-00008 INSTRUMENTATION																	
SCALE: NONE	24590-HLW-M6-RD-00002003																

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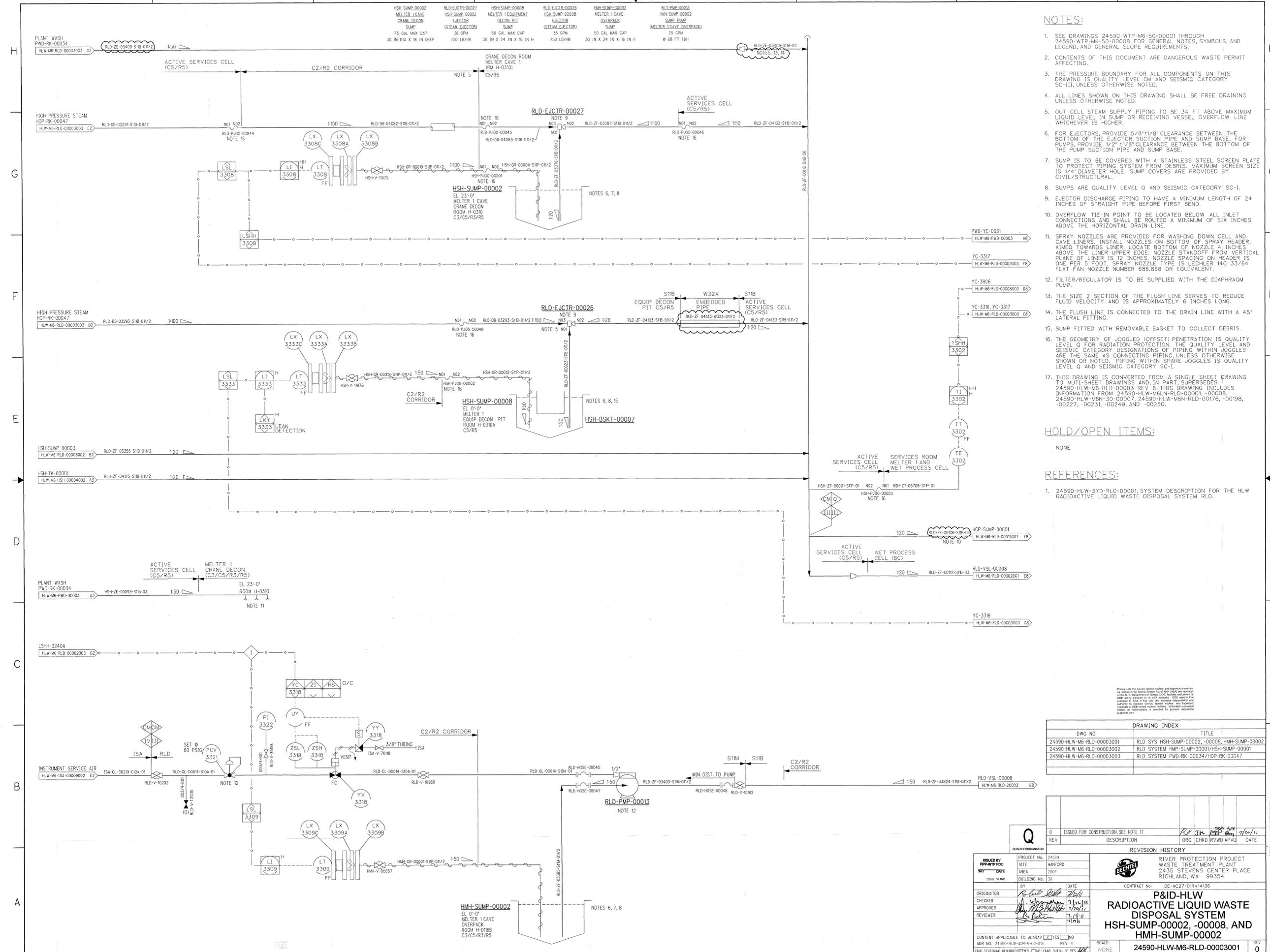


- NOTES:**
- SEE DRAWINGS 24590-WTP-M6-SD-00001 THROUGH 24590-WTP-M6-SD-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
  - CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
  - THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
  - ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
  - A 24' LONG FLANGED SPOOL PIECE (S1C SPECIFICATION) IS REQ'D FOR THE INNER PIPE IN THE ACTIVE PIPE TUNNEL. SPOOL PIECE SHALL BE REMOVED AND PIPING IS TO BE RESTORED TO DOUBLE CONTAINED PIPING AFTER THE STARTUP PHASE IS COMPLETE.
  - REDUCER IN BREAKPOT DRAIN LINE SHALL BE LOCATED DOWNSTREAM OF THE FIRST HORIZONTAL BEND.
  - ITEMS WITH THIS NOTE ARE QUALITY LEVEL Q AND SEISMIC CATEGORY SC-II.
  - LOCATE FLUSH INLET MINIMUM 20 FEET BELOW BREAKPOT. OUTLET AND IS CONNECTED TO THE DRAIN LINE WITH A 45° LATERAL FITTING.
  - HIGH POINT OF EJECTOR DISCHARGE PIPING SHALL BE A MINIMUM OF 34 FEET ABOVE RLD-VSL-00008 OVERFLOW NOZZLE.
  - OVERFLOW LINE IS LOCATED LOWER THAN ALL INCOMING LINES TO THE MANIFOLD/BREAKPOT.
  - THE PRESSURE BOUNDARY FOR THE INNER AND OUTER PIPE OF THE DOUBLE CONTAINMENT LINES ARE QUALITY LEVEL Q. THE INNER PIPE IS SEISMIC CATEGORY SC-I. THE OUTER PIPE IS SEISMIC CATEGORY SC-II.
  - VENT LINE PVV-GV-02941-S1Z-02 TIES INTO THE BREAKPOT OVERFLOW LINE AT A TEE LOCATED ABOVE THE THIRD VERTICAL DROP. VENT LINE PVV-GV-02948-S1Z-02 TIES INTO THE OVERFLOW LINE AT A TEE LOCATED ABOVE THE LAST VERTICAL DROP INTO THE VESSEL.
  - THE VENT LINE TIES INTO THE BREAKPOT DRAIN LINE AT A TEE LOCATED AT THE END OF THE FIRST HORIZONTAL RUN.
  - THE SIZE 1.5 SECTION IS A MINIMUM OF 40 FEET LONG AND THE SIZE 3 SECTION IS A MINIMUM OF 2 FT LONG.
  - VENT LINE PVV-GV-02946-S1Z-02 TIES INTO THE MANIFOLD OVERFLOW LINE AT A TEE LOCATED ABOVE THE LAST VERTICAL DROP INTO THE VESSEL.
  - VENT LINE PVV-GV-02947-S1Z-02 TIES INTO THE MANIFOLD OVERFLOW LINE AT A TEE LOCATED ABOVE THE THIRD VERTICAL DROP.
  - THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
  - THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND IN PART SUPERSEDES 24590-HLW-M6-RLD-00002 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-RLD-00197, -00203, -00208, -00227, -00230, AND 24590-HLW-M6PR-RLD-00010.

- HOLD/OPEN ITEMS:**
- NONE
- REFERENCES:**
- 24590-HLW-3YD-RLD-00001, SYSTEM DESCRIPTION FOR THE HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM RLD.

Please note that special, special number, and special materials, as well as the design of any equipment, shall be approved by the U.S. Department of Energy (DOE) before any equipment is fabricated. The design of any equipment, shall be approved by DOE before any equipment is fabricated. The design of any equipment, shall be approved by DOE before any equipment is fabricated. The design of any equipment, shall be approved by DOE before any equipment is fabricated.

<b>ISSUED FOR CONSTRUCTION</b> SEE NOTE 18 REV: 1 DESCRIPTION: RLD-BRKPT-00004 ORG: CHKO RVWD: APVD DATE: 7/20/11		<b>REVISION HISTORY</b> 1. RLD-BRKPT-00004 2. RLD-BRKPT-00004 3. RLD-BRKPT-00004 4. RLD-BRKPT-00004 5. RLD-BRKPT-00004 6. RLD-BRKPT-00004 7. RLD-BRKPT-00004 8. RLD-BRKPT-00004 9. RLD-BRKPT-00004 10. RLD-BRKPT-00004 11. RLD-BRKPT-00004 12. RLD-BRKPT-00004 13. RLD-BRKPT-00004 14. RLD-BRKPT-00004 15. RLD-BRKPT-00004 16. RLD-BRKPT-00004 17. RLD-BRKPT-00004 18. RLD-BRKPT-00004 19. RLD-BRKPT-00004 20. RLD-BRKPT-00004
<b>PROJECT No.</b> 24590 <b>SITE</b> HANFORD <b>AREA</b> 200E <b>BUILDING No.</b> 30	<b>CONTRACT No.</b> DE-AC27-01RV1436 <b>ORIGINATOR</b> R. L. B. [Signature] <b>CHECKER</b> J. Khanna [Signature] <b>APPROVER</b> [Signature] <b>REVIEWER</b> [Signature]	<b>RIVER PROTECTION PROJECT</b> <b>WASTE TREATMENT PLANT</b> <b>2435 STEVENS CENTER PLACE</b> <b>RICHLAND, WA 99354</b> <b>P&amp;ID - HLW</b> <b>RADIOACTIVE LIQUID WASTE</b> <b>DISPOSAL SYSTEM</b> <b>RLD-BRKPT-00004</b>
<b>CONTENT APPLICABLE TO ALARA?</b> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> <b>ADR NO.</b> 24590-HLW-ADR-M-02-016 <b>EMIS SCREENING REQUIRED?</b> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> <b>SCALE:</b> NONE <b>DATE:</b> 7/20/11	<b>PROJECT No.</b> 24590 <b>SITE</b> HANFORD <b>AREA</b> 200E <b>BUILDING No.</b> 30 <b>CONTRACT No.</b> DE-AC27-01RV1436 <b>ORIGINATOR</b> R. L. B. [Signature] <b>CHECKER</b> J. Khanna [Signature] <b>APPROVER</b> [Signature] <b>REVIEWER</b> [Signature]	<b>SCALE:</b> NONE <b>DATE:</b> 7/20/11 <b>PROJECT No.</b> 24590 <b>SITE</b> HANFORD <b>AREA</b> 200E <b>BUILDING No.</b> 30 <b>CONTRACT No.</b> DE-AC27-01RV1436 <b>ORIGINATOR</b> R. L. B. [Signature] <b>CHECKER</b> J. Khanna [Signature] <b>APPROVER</b> [Signature] <b>REVIEWER</b> [Signature]



- NOTES:**
- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS, AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
  - CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
  - THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
  - ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING UNLESS OTHERWISE NOTED.
  - OUT CELL STEAM SUPPLY PIPING TO BE 34 FT ABOVE MAXIMUM LIQUID LEVEL IN SUMP OR RECEIVING VESSEL OVERFLOW LINE WHICHEVER IS HIGHER.
  - FOR EJECTORS, PROVIDE 5/8" X 1/8" CLEARANCE BETWEEN THE BOTTOM OF THE EJECTOR SUCTION PIPE AND SUMP BASE. FOR PUMPS, PROVIDE 1/2" X 1/8" CLEARANCE BETWEEN THE BOTTOM OF THE PUMP SUCTION PIPE AND SUMP BASE.
  - SUMP IS TO BE COVERED WITH A STAINLESS STEEL SCREEN PLATE TO PROTECT PIPING SYSTEM FROM DEBRIS. MAXIMUM SCREEN SIZE IS 1/4" DIAMETER HOLE. SUMP COVERS ARE PROVIDED BY CIVIL/STRUCTURAL.
  - SUMPS ARE QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
  - EJECTOR DISCHARGE PIPING TO HAVE A MINIMUM LENGTH OF 24 INCHES OF STRAIGHT PIPE BEFORE FIRST BEND.
  - OVERFLOW TIE-IN POINT TO BE LOCATED BELOW ALL INLET CONNECTIONS AND SHALL BE ROUTED A MINIMUM OF SIX INCHES ABOVE THE HORIZONTAL DRAIN LINE.
  - SPRAY NOZZLES ARE PROVIDED FOR WASHING DOWN CELL AND CAVE LINERS. INSTALL NOZZLES ON BOTTOM OF SPRAY HEADER, AIMED TOWARDS LINER. LOCATE BOTTOM OF NOZZLE 4 INCHES ABOVE THE LINER UPPER EDGE. NOZZLE STANDOFF FROM VERTICAL PLANE OF LINER IS 12 INCHES. NOZZLE SPACING ON HEADER IS ONE PER 5 FOOT. SPRAY NOZZLE TYPE IS LECHLER 140 33/64 FLAT FAN NOZZLE NUMBER 686.868 OR EQUIVALENT.
  - FILTER/REGULATOR IS TO BE SUPPLIED WITH THE DIAPHRAGM PUMP.
  - THE SIZE 2 SECTION OF THE FLUSH LINE SERVES TO REDUCE FLUID VELOCITY AND IS APPROXIMATELY 6 INCHES LONG.
  - THE FLUSH LINE IS CONNECTED TO THE DRAIN LINE WITH A 45° LATERAL FITTING.
  - SUMP FITTING WITH REMOVABLE BASKET TO COLLECT DEBRIS.
  - THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
  - THIS DRAWING IS CONVERTED FROM A SINGLE SHEET DRAWING TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-RD-00003 REV 6. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6LN-RD-00001, -00008, 24590-HLW-M6N-30-00007, 24590-HLW-M6N-RD-00176, -00198, -00227, -00231, -00249, AND -00250.

- HOLD/OPEN ITEMS:**
- NONE
- REFERENCES:**
- 24590-HLW-3YD-RD-00001, SYSTEM DESCRIPTION FOR THE HLW RADIOACTIVE LIQUID WASTE DISPOSAL RLD.

Please refer to the specific drawing number and revision number. In order to be in compliance with the Atomic Energy Act of 1954 (AEA) and related laws, the Department of Energy (DOE) requires that all drawings be submitted to DOE for review and approval. DOE approval does not constitute a warranty of accuracy or completeness. The user of this drawing is responsible for ensuring that the drawing is used in accordance with the applicable laws and regulations. Information contained herein is not to be distributed outside the project area without the express written permission of the project manager.

DWG NO	TITLE
24590-HLW-M6-RD-00003001	RLD SYS HSH-SUMP-00002, -00008, HMH-SUMP-00002
24590-HLW-M6-RD-00003002	RLD SYSTEM HMP-SUMP-00001/HSH-SUMP-00001
24590-HLW-M6-RD-00003003	RLD SYSTEM PWD-RK-00034/HOP-RK-00047

REV	DATE	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0		ISSUED FOR CONSTRUCTION, SEE NOTE 17					7/20/11

ISSUED BY	PROJECT No.	DATE
PPW-WTP POC	24590	7/14/11
CHECKER	SITE	7/14/11
APPROVER	AREA	7/14/11
REVIEWER	BUILDING No.	7/14/11

**QUALITY DESIGNATOR**

**REVISION HISTORY**

**PROJECT INFORMATION**

PROJECT No: 24590  
 SITE: HANFORD  
 AREA: 200E  
 BUILDING No: 30

**CONTRACT No: DE-AC27-01RV14136**

**RIVER PROTECTION PROJECT  
 WASTE TREATMENT PLANT  
 2435 STEVENS CENTER PLACE  
 RICHLAND, WA 99354**

**P&ID-HLW  
 RADIOACTIVE LIQUID WASTE  
 DISPOSAL SYSTEM  
 HSH-SUMP-00002, -00008, AND  
 HMH-SUMP-00002**

24590-HLW-M6-RD-00003001

SCALE: NONE

DATE: 7/8/2011 2:15:26 PM

FORM E-SONDION 02/2009

- HPH-SUMP-00002  
CRANE DECON  
AREA  
SUMP  
75 GAL MAX CAP  
30 IN DIA X 18 IN DEEP
- HPH-SUMP-00005  
CANISTER HANDLING  
CAVE  
SUMP  
75 GAL MAX CAP  
30 IN DIA X 18 IN DEEP
- RLD-EJCTR-00029  
EJECTOR  
(STEAM EJECTOR)  
1 1/2 IN
- RLD-PMP-00189  
SUMP PUMP  
CRANE DECON  
25 GPM  
25 GPM  
Ø 68 FT TDH

NOTES:

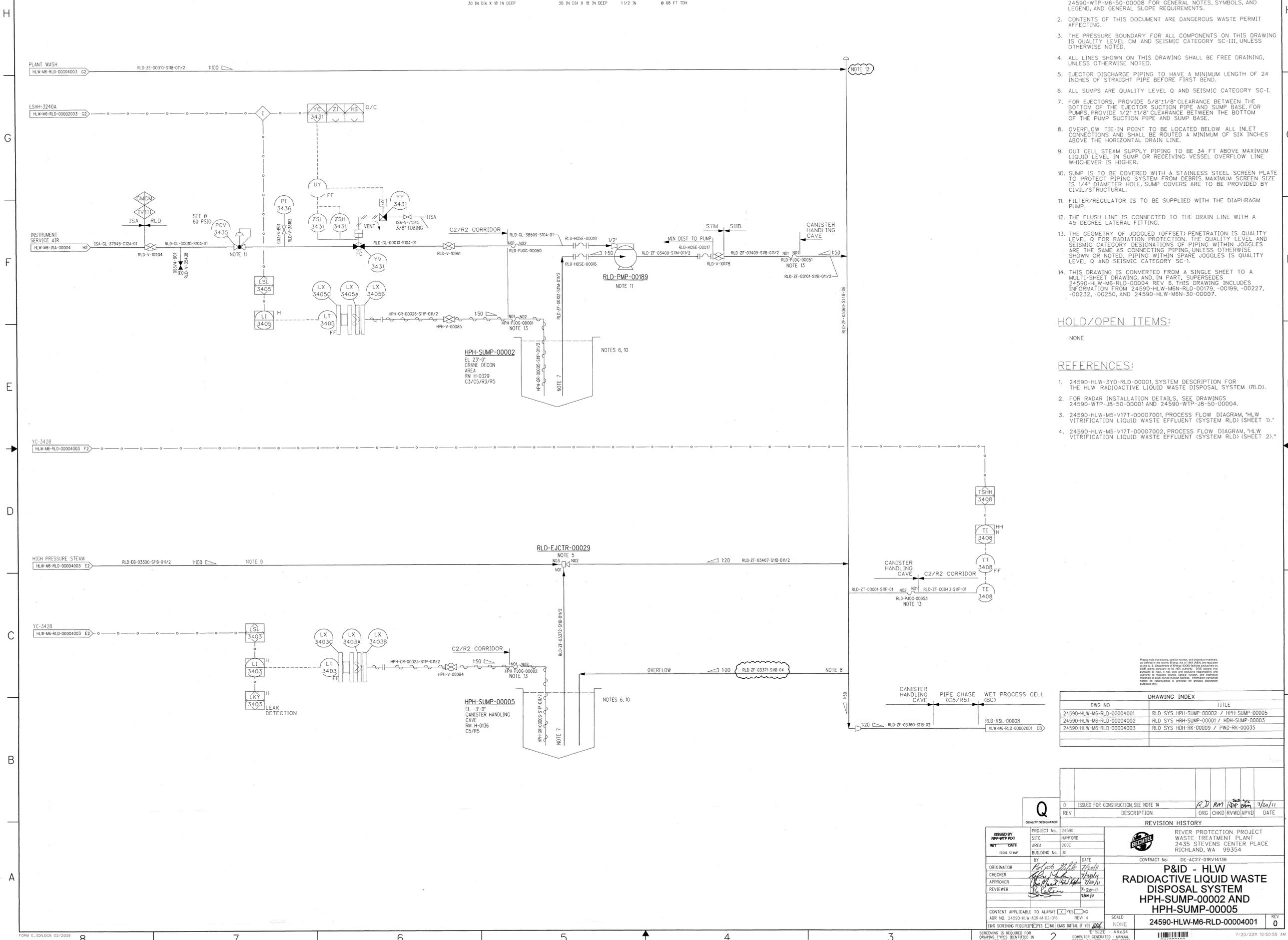
- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS, AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
- EJECTOR DISCHARGE PIPING TO HAVE A MINIMUM LENGTH OF 24 INCHES OF STRAIGHT PIPE BEFORE FIRST BEND.
- ALL SUMPS ARE QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
- FOR EJECTORS, PROVIDE 5/8" X 1/8" CLEARANCE BETWEEN THE BOTTOM OF THE EJECTOR SUCTION PIPE AND SUMP BASE. FOR PUMPS, PROVIDE 1/2" X 1/8" CLEARANCE BETWEEN THE BOTTOM OF THE PUMP SUCTION PIPE AND SUMP BASE.
- OVERFLOW TIE-IN POINT TO BE LOCATED BELOW ALL INLET CONNECTIONS AND SHALL BE ROUTED A MINIMUM OF SIX INCHES ABOVE THE HORIZONTAL DRAIN LINE.
- OUT CELL STEAM SUPPLY PIPING TO BE 34 FT ABOVE MAXIMUM LIQUID LEVEL IN SUMP OR RECEIVING VESSEL OVERFLOW LINE WHICHEVER IS HIGHER.
- SUMP IS TO BE COVERED WITH A STAINLESS STEEL SCREEN PLATE TO PROTECT PIPING SYSTEM FROM DEBRIS. MAXIMUM SCREEN SIZE IS 1/4" DIAMETER HOLE. SUMP COVERS ARE TO BE PROVIDED BY CIVIL/STRUCTURAL.
- FILTER/REGULATOR IS TO BE SUPPLIED WITH THE DIAPHRAGM PUMP.
- THE FLUSH LINE IS CONNECTED TO THE DRAIN LINE WITH A 45 DEGREE LATERAL FITTING.
- THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-1.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWING, AND, IN PART, SUPERSEDES 24590-HLW-M6-RD-00004 REV 6. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6-RD-00179, -00199, -00227, -00232, -00250, AND 24590-HLW-M6N-30-00007.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-HLW-3YD-RD-00001, SYSTEM DESCRIPTION FOR THE HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM (RLD).
- FOR RADAR INSTALLATION DETAILS, SEE DRAWINGS 24590-WTP-J8-50-00001 AND 24590-WTP-J8-50-00004.
- 24590-HLW-M5-V177-00007001, PROCESS FLOW DIAGRAM, "HLW VITRIFICATION LIQUID WASTE EFFLUENT (SYSTEM RLD) (SHEET 1)."
- 24590-HLW-M5-V177-00007002, PROCESS FLOW DIAGRAM, "HLW VITRIFICATION LIQUID WASTE EFFLUENT (SYSTEM RLD) (SHEET 2)."



Please note that source, special number, and product materials, as well as the design and construction of the system are subject to the U.S. Department of Energy (DOE) license and approval. DOE retains the authority to regulate source, special number, and product materials at DOE-owned nuclear facilities. Information contained herein is not intended to be used for process description purposes only.

DWG NO	DRAWING INDEX	TITLE
24590-HLW-M6-RD-00004001	RLD SYS HPH-SUMP-00002 / HPH-SUMP-00005	
24590-HLW-M6-RD-00004002	RLD SYS HPH-SUMP-00001 / HDH-SUMP-00003	
24590-HLW-M6-RD-00004003	RLD SYS HDH-RK-00009 / PWD-RK-00035	

<p>ISSUED FOR CONSTRUCTION SEE NOTE 14</p>		<p>7/26/11</p>
REV	DESCRIPTION	DATE
0		

REVISION HISTORY	
BY	DATE
CHKD	DATE
APVD	DATE

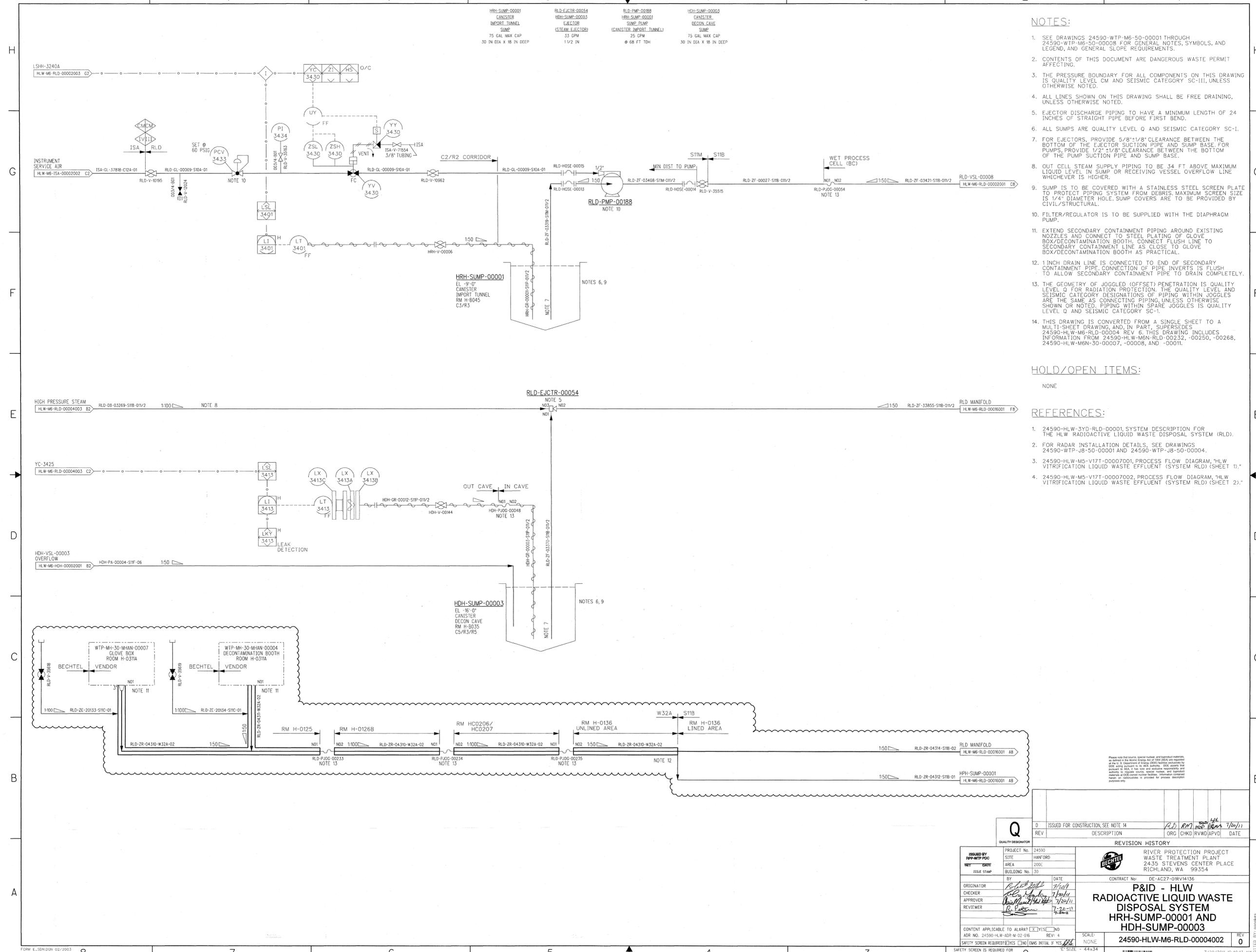
PROJECT No.	24590	CONTRACT No.	DE-AC27-01RV14136
SITE	HANFORD		
AREA	20CE		
BUILDING No.	30		
ORIGINATOR	7/26/11		
CHECKER	7/26/11		
APPROVER	7/26/11		
REVIEWER	7-26-11		

ISSUED BY	PROJECT No.	24590	CONTRACT No.	DE-AC27-01RV14136
DATE	SITE	HANFORD		
ISSUE	AREA	20CE		
	BUILDING No.	30		
	ORIGINATOR	7/26/11		
	CHECKER	7/26/11		
	APPROVER	7/26/11		
	REVIEWER	7-26-11		

CONTENT APPLICABLE TO ALARA?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	SCALE	NONE
SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	DATE	7/26/11
DATE	7/26/11	SCALE	NONE
DATE	7/26/11	SCALE	NONE



- NOTES:**
- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS, AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
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  - FOR EJECTORS, PROVIDE 5/8"X1/8" CLEARANCE BETWEEN THE BOTTOM OF THE EJECTOR SUCTION PIPE AND SUMP BASE. FOR PUMPS, PROVIDE 1/2" X 1/8" CLEARANCE BETWEEN THE BOTTOM OF THE PUMP SUCTION PIPE AND SUMP BASE.
  - OUT CELL STEAM SUPPLY PIPING TO BE 34 FT ABOVE MAXIMUM LIQUID LEVEL IN SUMP OR RECEIVING VESSEL OVERFLOW LINE WHICHEVER IS HIGHER.
  - SUMP IS TO BE COVERED WITH A STAINLESS STEEL SCREEN PLATE TO PROTECT PIPING SYSTEM FROM DEBRIS. MAXIMUM SCREEN SIZE IS 1/4" DIAMETER HOLE. SUMP COVERS ARE TO BE PROVIDED BY CIVIL/STRUCTURAL.
  - FILTER/REGULATOR IS TO BE SUPPLIED WITH THE DIAPHRAGM PUMP.
  - EXTEND SECONDARY CONTAINMENT PIPING AROUND EXISTING NOZZLES AND CONNECT TO STEEL PLATING OF GLOVE BOX/DECONTAMINATION BOOTH. CONNECT FLUSH LINE TO SECONDARY CONTAINMENT LINE AS CLOSE TO GLOVE BOX/DECONTAMINATION BOOTH AS PRACTICAL.
  - 1 INCH DRAIN LINE IS CONNECTED TO END OF SECONDARY CONTAINMENT PIPE CONNECTION OF PIPE INVERTS IS FLUSH TO ALLOW SECONDARY CONTAINMENT PIPE TO DRAIN COMPLETELY.
  - THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-1.
  - THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWING, AND, IN PART, SUPERSEDES 24590-HLW-M6-RD-00004 REV 6. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-RD-00232, -00250, -00268, 24590-HLW-M6N-30-00007, -00008, AND -00011.

**HOLD/OPEN ITEMS:**

NONE

**REFERENCES:**

- 24590-HLW-3YD-RD-00001, SYSTEM DESCRIPTION FOR THE HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM (RLD).
- FOR RADAR INSTALLATION DETAILS, SEE DRAWINGS 24590-WTP-J8-50-00001 AND 24590-WTP-J8-50-00004.
- 24590-HLW-M5-V17T-00007001, PROCESS FLOW DIAGRAM, "HLW VITRIFICATION LIQUID WASTE EFFLUENT (SYSTEM RLD) (SHEET 1)."
- 24590-HLW-M5-V17T-00007002, PROCESS FLOW DIAGRAM, "HLW VITRIFICATION LIQUID WASTE EFFLUENT (SYSTEM RLD) (SHEET 2)."

Please note that certain critical nuclear and hazardous materials as defined in the Atomic Energy Act of 1954 (AEA) are regulated by the U.S. Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC). The design, construction, operation, and maintenance of this system shall be in accordance with the requirements of the AEA, NRC, and DOE. The design, construction, operation, and maintenance of this system shall be in accordance with the requirements of the AEA, NRC, and DOE. The design, construction, operation, and maintenance of this system shall be in accordance with the requirements of the AEA, NRC, and DOE.

REV	DESCRIPTION	ORG	CHKD	RVND	APVCD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 14	RD	RD	RD	RD	7/20/11

ISSUED BY		DATE	
RD	RD	7/20/11	7/20/11

PROJECT No.		SITE	
24590	HANFORD	RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354	

ORIGINATOR		DATE	
RD	RD	7/20/11	7/20/11

CONTRACT No.		SCALE	
DE-AC27-01RV14136	24590-HLW-M6-RD-00004002	NONE	44x34

CONTENT APPLICABLE TO ALARA?		REVISION	
<input checked="" type="checkbox"/>	NO	REV: 4	24590-HLW-M6-RD-00004002

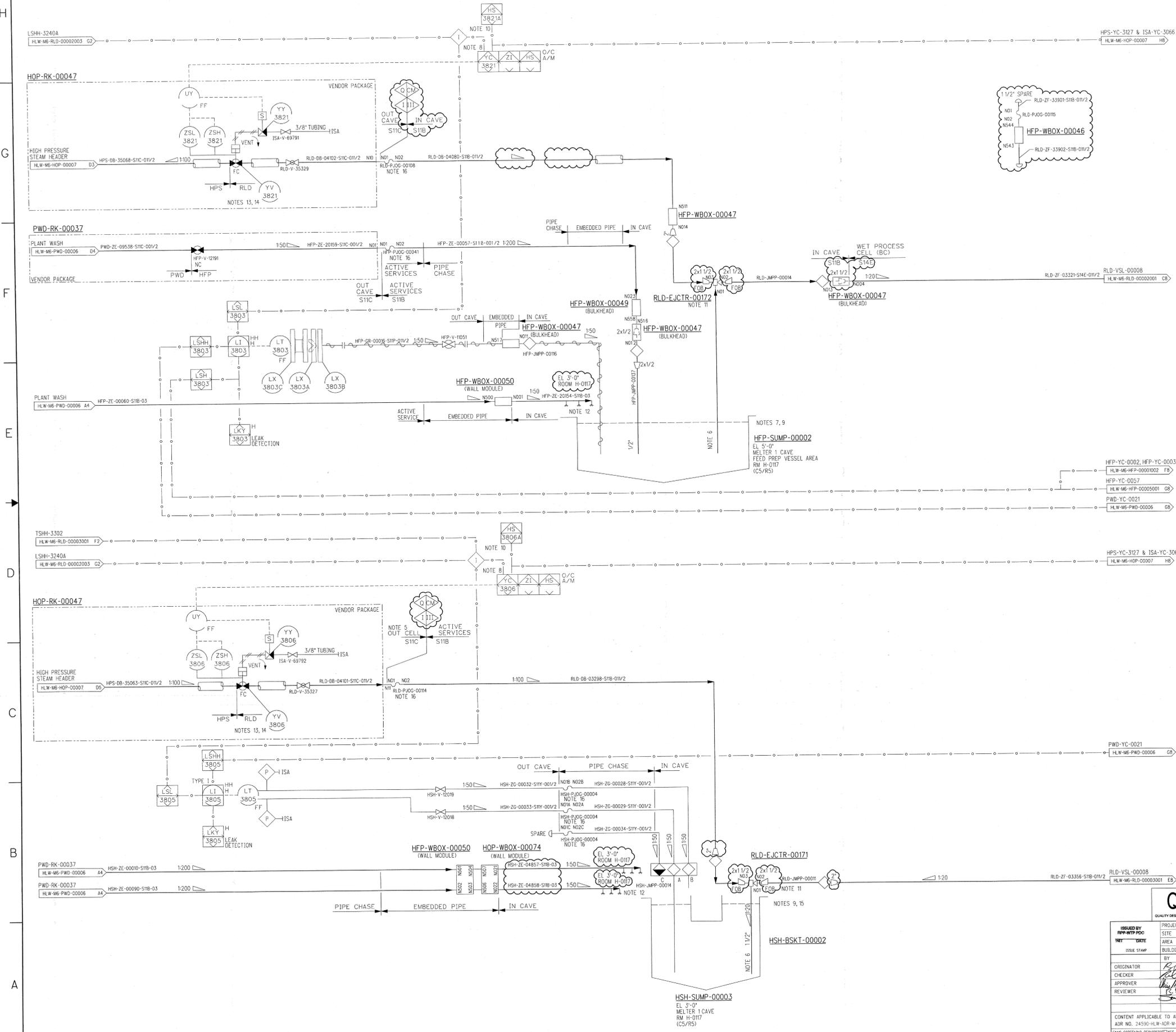
HFP-SUMP-00002 MELTER 1 CAVE FEED PREP VESSEL AREA SUMP 50 GAL MAX CAP 30 IN BY 24 IN BY 16 IN H 1 1/2 IN

RLD-EJCTR-00172 MELTER 1 CAVE EJECTOR (STEAM EJECTOR) 25 GPM 1 1/2 IN

HSH-SUMP-00003 MELTER 1 CAVE SUMP 50 GAL MAX CAP 30 IN BY 24 IN BY 16 IN H 1 1/2 IN

RLD-EJCTR-00171 HSH-SUMP-00003 EJECTOR (STEAM EJECTOR) 25 GPM 1 1/2 IN

- NOTES:**
- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
  - CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
  - THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
  - ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING UNLESS OTHERWISE NOTED.
  - OUT CELL STEAM SUPPLY PIPING MUST BE A MINIMUM OF 34" ABOVE THE SUMP LIQUID LEVEL.
  - PROVIDE 5/8" ± 1/8" CLEARANCE BETWEEN BOTTOM OF EJECTOR SUCTION PIPE AND SUMP LINER.
  - SUMP COVERED WITH STAINLESS STEEL SCREEN PLATE TO PROTECT PIPING SYSTEM FROM DEBRIS. MAXIMUM SCREEN SIZE IS 1/4" DIAMETER HOLE. SUMP AND SUMP COVERS ARE PROVIDED BY CIVIL/STRUCTURAL.
  - OPENING VALVE IS INHIBITED ON RLD-VSL-00008 HI LEVEL.
  - ALL SUMPS ARE QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
  - TO START TRANSFER VIA RLD-EJCTR-00172 OR -00171, THE OPERATOR PLACES ICN/HMI HANDSWITCH RLD-HS-3821A (3806A) IN START POSITION. THE VALVES SEQUENCE AS FOLLOWS: ISA-YV-3066 OPENS, RLD-YV-3821 (3806) OPENS, ISA-YV-3066 CLOSES, HPS-YV-3127 OPENS. THE TRANSFER IS TERMINATED BY OPERATOR ACTION OR BY PROCESS CONDITIONS: LO LEVEL IN HFP-SUMP-00002 OR HSH-SUMP-00003, HI HI LVL IN VESSEL RLD-VSL-00008, HI HI MANIFOLD TEMP RLD-TSHH-3302 (FOR YV-3806 ONLY), OR STEAM RACK ERROR. THE VALVES SEQUENCE AS FOLLOWS: ISA-YV-3066 OPENS, HPS-YV-3127 CLOSES, RLD-YV-3821 (3806) CLOSES, ISA-YV-3066 CLOSES.
  - EJECTOR DISCHARGE PIPING HAS A MINIMUM LENGTH OF 24 INCHES OF STRAIGHT PIPE BEFORE FIRST BEND.
  - SPRAY NOZZLES ARE PROVIDED FOR WASHING DOWN CELL AND CAVE LINERS. INSTALL NOZZLES ON BOTTOM OF SPRAY HEADER, AIMED TOWARDS LINER. LOCATE BOTTOM OF NOZZLE 4 INCHES ABOVE THE LINER UPPER EDGE. NOZZLE STANDBOFF FROM VERTICAL PLANE OF LINER IS 12 INCHES. NOZZLE SPACING ON HEADER IS ONE PER 5 FOOT. SPRAY NOZZLE TYPE IS LECHLER 140 33/64 FLAT FAN NOZZLE NUMBER 686.868 OR EQUIVALENT.
  - SLOW OPENING VALVE REQUIRED.
  - LOCATE ACTUATED VALVE AT HIGH POINT IN LINE ABOVE RACK HEADER.
  - SUMP FITTED WITH REMOVABLE BASKET TO COLLECT DEBRIS.
  - THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
  - THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND IN PART SUPERSEDES 24590-HLW-M6-RLD-00008 REV 6. THIS DRAWING INCLUDES INFORMATION FROM DCNS 24590-HLW-M6N-RLD-00213, -00030, -00234, -00250, 24590-HLW-M6LN-RLD-00004, -00005, -00008, 24590-HLW-M6N-30-00007, -00024 AND 24590-HLW-M6LN-30-00003.



- HOLD/OPEN ITEMS:**
- NONE
- REFERENCES:**
- 24590-HLW-3YD-RLD-00001 SYSTEM DESCRIPTION FOR HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM RLD

REV	DESCRIPTION	ORG	CHKD	REV'D	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 17	RD	RM	RS	HH	7/26/11

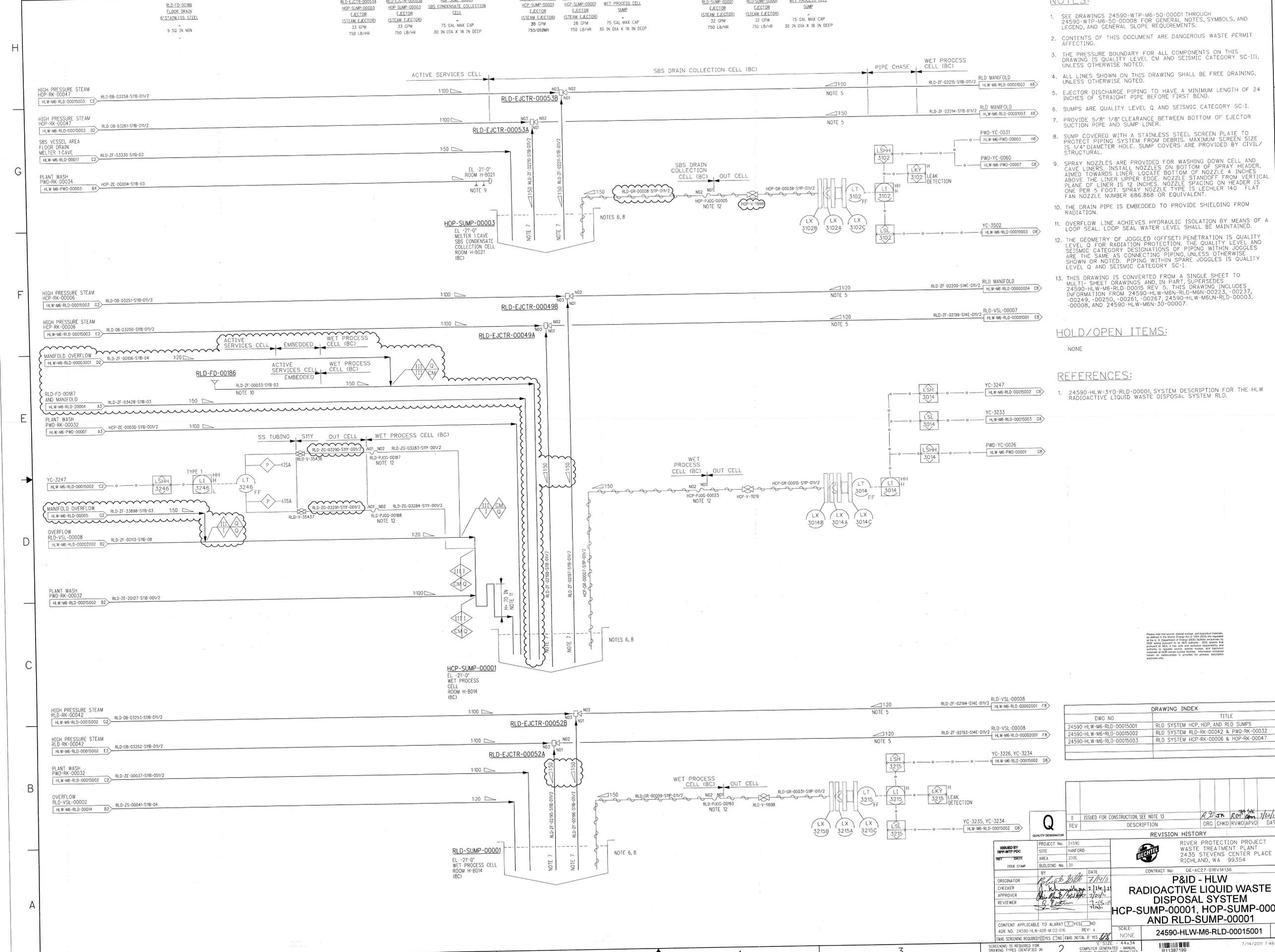
ISSUED BY		DATE	
PROJECT NO.	24590	DATE	7/26/11
SITE	HANFORD	CHECKER	7/26/11
AREA	200E	APPROVER	7/26/11
BUILDING NO.	30	REVIEWER	7-26-11

REVISION HISTORY	
PROJECT NO.	24590
SITE	HANFORD
AREA	200E
BUILDING NO.	30
CONTRACT NO.	DE-AC27-01RV14136

P&ID - HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM HFP-SUMP-00002 AND HSH-SUMP-00003	
CONTRACT NO.	DE-AC27-01RV14136
PROJECT NO.	24590
SITE	HANFORD
AREA	200E
BUILDING NO.	30
CONTRACT NO.	DE-AC27-01RV14136
PROJECT NO.	24590
SITE	HANFORD
AREA	200E
BUILDING NO.	30
CONTRACT NO.	DE-AC27-01RV14136
PROJECT NO.	24590
SITE	HANFORD
AREA	200E
BUILDING NO.	30
CONTRACT NO.	DE-AC27-01RV14136



- NOTES:**
- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS, AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
  - CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
  - THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
  - ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
  - EJECTOR DISCHARGE PIPING TO HAVE A MINIMUM LENGTH OF 24 INCHES OF STRAIGHT PIPE BEFORE FIRST BEND.
  - SUMPS ARE QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
  - PROVIDE 5/8" 1/8" CLEARANCE BETWEEN BOTTOM OF EJECTOR SUCTION PIPE AND SUMP LINER.
  - SUMP COVERED WITH A STAINLESS STEEL SCREEN PLATE TO PROTECT PIPING SYSTEM FROM DEBRIS. MAXIMUM SCREEN SIZE IS 1/4" DIAMETER HOLE. SUMP COVERS ARE PROVIDED BY CIVIL/STRUCTURAL.
  - SPRAY NOZZLES ARE PROVIDED FOR WASHING DOWN CELL AND CAVE LINERS. INSTALL NOZZLES ON BOTTOM OF SPRAY HEADER, AIMED TOWARDS LINER. LOCATE BOTTOM OF NOZZLE 4 INCHES ABOVE THE LINER UPPER EDGE. NOZZLE STANDING OFF FROM VERTICAL PLANE OF LINER IS 12 INCHES. NOZZLE SPACING ON HEADER IS ONE PER 5 FOOT. SPRAY NOZZLE TYPE IS LECHLER 140 FLAT FAN NOZZLE NUMBER 686.868 OR EQUIVALENT.
  - THE DRAIN PIPE IS EMBEDDED TO PROVIDE SHIELDING FROM RADIATION.
  - OVERFLOW LINE ACHIEVES HYDRAULIC ISOLATION BY MEANS OF A LOOP SEAL. LOOP SEAL WATER LEVEL SHALL BE MAINTAINED.
  - THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
  - THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTIPLE SHEET DRAWINGS AND, IN PART, SUPERSEDES INFORMATION FROM 24590-HLW-M6-RD-00015 REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-RD-M6N-00223, -00237, -00249, -00250, -00261, -00267, 24590-HLW-M6N-RD-00003, -00008, AND 24590-HLW-M6N-30-00007.

- HOLD/OPEN ITEMS:**
- NONE
- REFERENCES:**
- 24590-HLW-3YD-RD-00001, SYSTEM DESCRIPTION FOR THE HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM RLD.

**DRAWING INDEX**

DWG NO	TITLE
24590-HLW-M6-RD-00015001	RLD SYSTEM HCP, HOP, AND RLD SUMPS
24590-HLW-M6-RD-00015002	RLD SYSTEM RLD-RK-00042 & PWD-RK-00032
24590-HLW-M6-RD-00015003	RLD SYSTEM HCP-RK-00006 & HOP-RK-00047

**REVISION HISTORY**

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 13					1/20/11

**QUALITY DESIGNATOR**

ISSUED BY: HCP-WTP-PCC  
DATE: 7/14/11

ORIGINATOR: [Signature]  
CHECKER: [Signature]  
APPROVER: [Signature]  
REVIEWER: [Signature]

PROJECT No: 24590  
SITE: HANFORD  
AREA: 200E  
BUILDING No: 30

CONTRACT No: DE-AC27-01RV14136

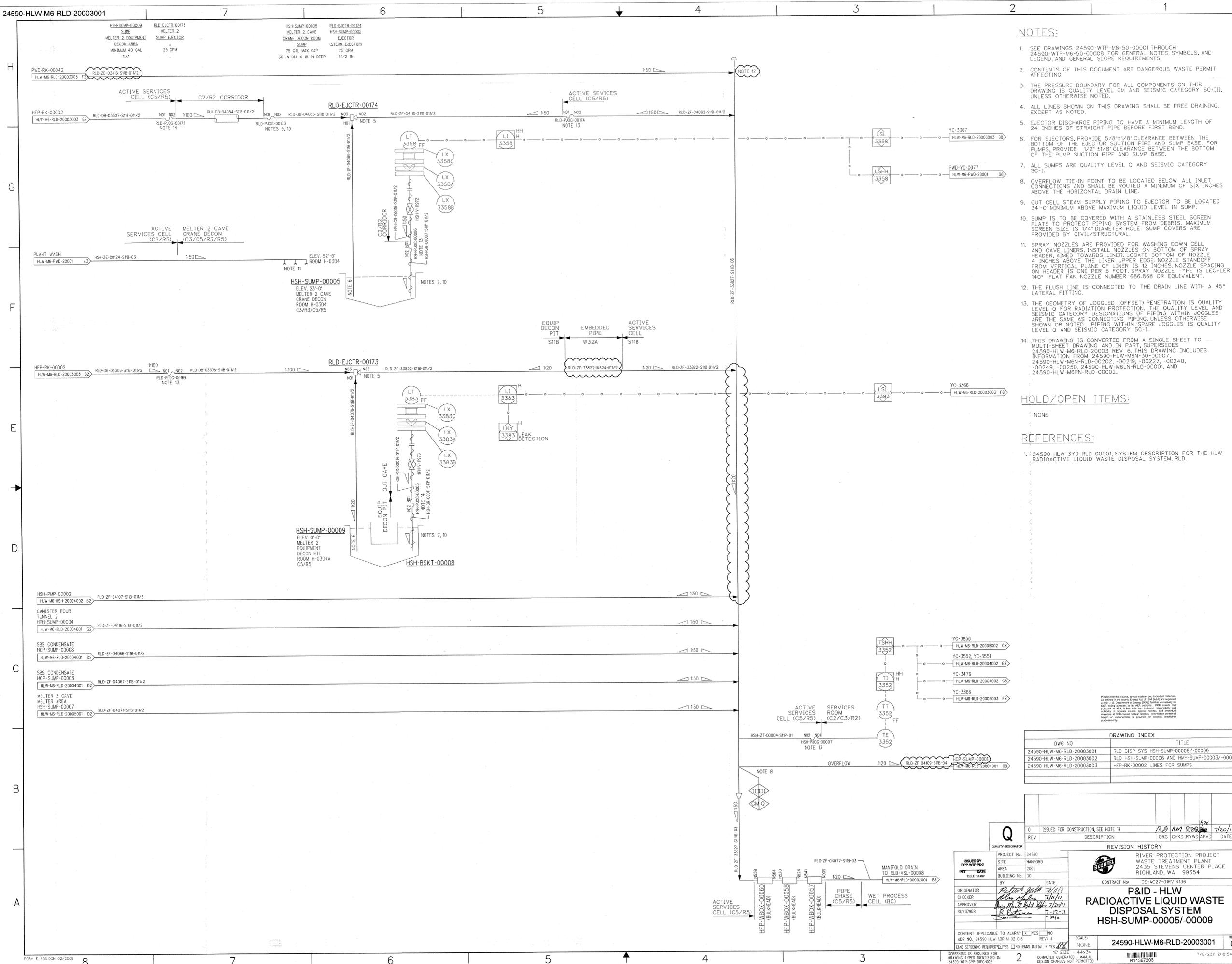
**P&ID - HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM HCP-SUMP-00001, HOP-SUMP-00003 AND RLD-SUMP-00001**

SCALE: NONE

24590-HLW-M6-RD-00015001

7/14/2011 7:48:07 AM





NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS, AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT AS NOTED.
- EJECTOR DISCHARGE PIPING TO HAVE A MINIMUM LENGTH OF 24 INCHES OF STRAIGHT PIPE BEFORE FIRST BEND.
- FOR EJECTORS, PROVIDE 5/8" X 1/8" CLEARANCE BETWEEN THE BOTTOM OF THE EJECTOR SUCTION PIPE AND SUMP BASE. FOR PUMPS, PROVIDE 1/2" X 1/8" CLEARANCE BETWEEN THE BOTTOM OF THE PUMP SUCTION PIPE AND SUMP BASE.
- ALL SUMPS ARE QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
- OVERFLOW TIE-IN POINT TO BE LOCATED BELOW ALL INLET CONNECTIONS AND SHALL BE ROUTED A MINIMUM OF SIX INCHES ABOVE THE HORIZONTAL DRAIN LINE.
- OUT CELL STEAM SUPPLY PIPING TO EJECTOR TO BE LOCATED 34'-0" MINIMUM ABOVE MAXIMUM LIQUID LEVEL IN SUMP.
- SUMP IS TO BE COVERED WITH A STAINLESS STEEL SCREEN PLATE TO PROTECT PIPING SYSTEM FROM DEBRIS. MAXIMUM SCREEN SIZE IS 1/4" DIAMETER HOLE. SUMP COVERS ARE PROVIDED BY CIVIL/STRUCTURAL.
- SPRAY NOZZLES ARE PROVIDED FOR WASHING DOWN CELL AND CAVE LINERS. INSTALL NOZZLES ON BOTTOM OF SPRAY HEADER, AIMED TOWARDS LINER. LOCATE BOTTOM OF NOZZLE 4 INCHES ABOVE THE LINER UPPER EDGE. NOZZLE SPACING FROM VERTICAL PLANE OF LINER IS 12 INCHES. NOZZLE SPACING ON HEADER IS ONE PER 5 FOOT. SPRAY NOZZLE TYPE IS LECHLER 140" FLAT FAN NOZZLE NUMBER 686.868 OR EQUIVALENT.
- THE FLUSH LINE IS CONNECTED TO THE DRAIN LINE WITH A 45° LATERAL FITTING.
- THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-HLW-M6-RD-20003 REV 6. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-30-00007, 24590-HLW-M6N-RD-00202, -00219, -00227, -00240, -00249, -00250, 24590-HLW-M6LN-RD-00001, AND 24590-HLW-M6PN-RD-00002.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-HLW-3YD-RD-00001, SYSTEM DESCRIPTION FOR THE HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM, RLD.

DWG NO	TITLE
24590-HLW-M6-RD-20003001	RLD DISP SYS HSH-SUMP-00005/-00009
24590-HLW-M6-RD-20003002	RLD HSH-SUMP-00008 AND HSH-SUMP-00003/-00004
24590-HLW-M6-RD-20003003	HFP-RK-00002 LINES FOR SUMPS

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 14					7/20/11

**REVISION HISTORY**

ISSUED BY	PROJECT No.	24590
CHECKER	SITE	HANFORD
DATE	AREA	200E
ISSUE STAMP	BUILDING No.	30
BY	DATE	
ORIGINATOR	DATE	
APPROVER	DATE	
REVIEWER	DATE	

CONTRACT No. DE-AC27-09RV14136

**RIVER PROTECTION PROJECT  
WASTE TREATMENT PLANT  
2435 STEVENS CENTER PLACE  
RICHLAND, WA 99354**

**P&ID - HLW  
RADIOACTIVE LIQUID WASTE  
DISPOSAL SYSTEM  
HSH-SUMP-00005/00009**

SCALE: NONE

24590-HLW-M6-RD-20003001

7/8/2011 2:58:54 PM

H

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F

E

D

C

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A

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G

F

E

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C

B

A

HFP-SUMP-00005 MELTER 2 CAVE FEED PREP VESSEL AREA SUMP 50 GAL MAX CAP 30 IN X 24 IN X 16 IN	HSH-SUMP-00007 MELTER 2 CAVE MELTER AREA SUMP 50 GAL MAX CAP 30 IN X 24 IN X 16 IN	RLD-EJCTR-00178 EJECTOR (STEAM EJECTOR) 25 GPM 1 1/2 IN	RLD-EJCTR-00179 EJECTOR (STEAM EJECTOR) 25 GPM 1 1/2 IN
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NOTES:

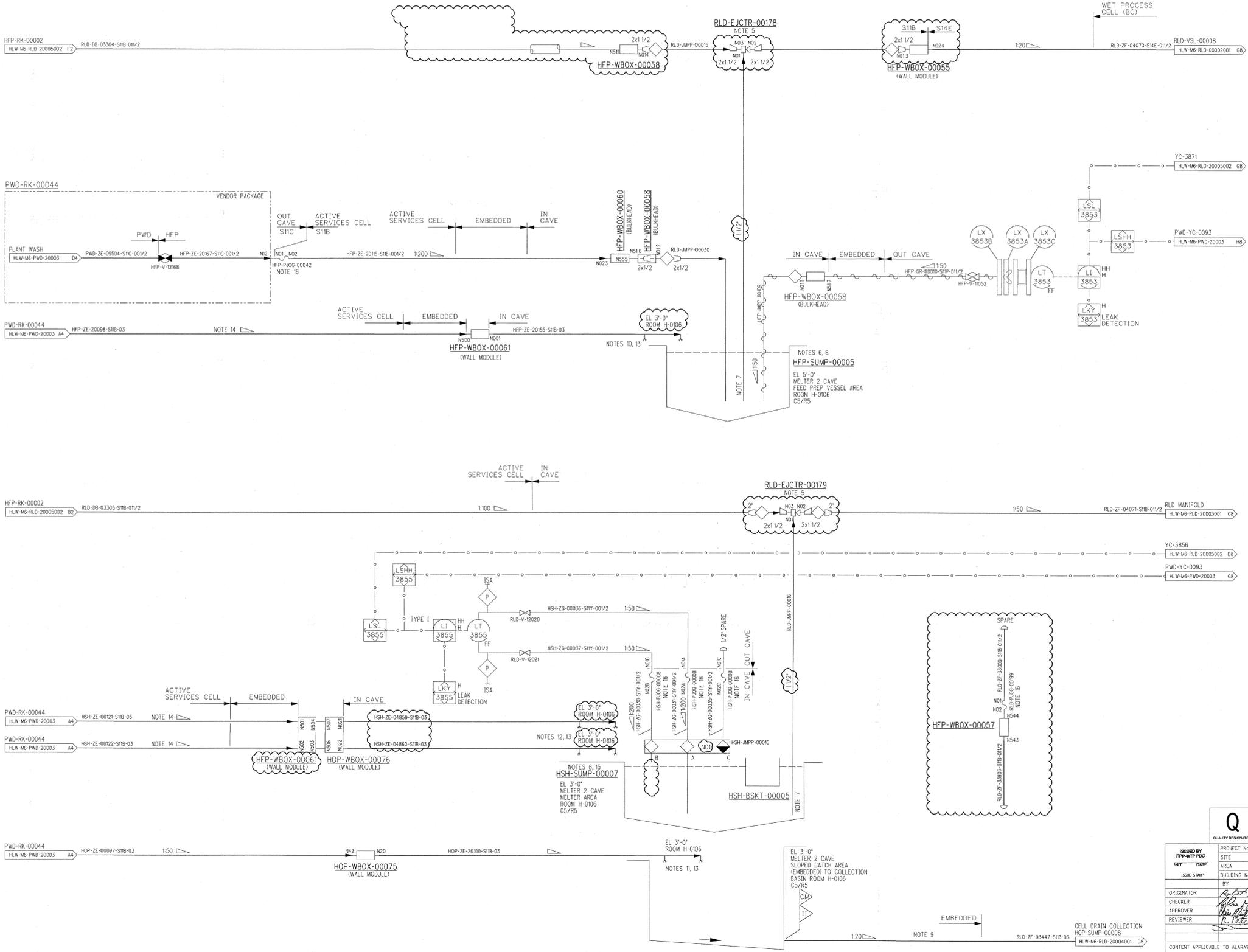
- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS, AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
- EJECTOR DISCHARGE PIPING TO HAVE A MINIMUM LENGTH OF 24 INCHES OF STRAIGHT PIPE BEFORE FIRST BEND.
- ALL SUMPS ARE QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
- PROVIDE 5/8" X 1/8" CLEARANCE BETWEEN BOTTOM OF EJECTOR SUCTION PIPE AND SUMP LINER.
- SUMP COVERED WITH A STAINLESS STEEL SCREEN PLATE TO PROTECT PIPING SYSTEM FROM DEBRIS. MAXIMUM SCREEN SIZE IS 1/4" DIAMETER HOLE. SUMP COVERS ARE PROVIDED BY CSA.
- THE DRAIN PIPE IS EMBEDDED TO PROVIDE SHIELDING FROM RADIATION. SLOPE THE EMBEDDED PIPE AT 1:20 UNLESS CONSTRAINED BY PHYSICAL LIMITATIONS. IF CONSTRAINED BY PHYSICAL LIMITATIONS THE SLOPE MAY BE REDUCED TO 1:50.
- ONE SPRAY RING HEADER IS PROVIDED TO WASH THE MELTER 2 CAVE FEED PREPARATION VESSEL AREA LINER. REFER TO NOTE 13 FOR DETAILS.
- ONE SPRAY RING HEADER IS PROVIDED TO WASH THE MELTER 2 CAVE SBS VESSEL AREA LINER. REFER TO NOTE 13 FOR DETAILS.
- TWO SPRAY RING HEADERS ARE PROVIDED TO WASH THE MELTER 2 CAVE AREA LINER. REFER TO NOTE 13 FOR DETAILS.
- SPRAY NOZZLES ARE PROVIDED FOR WASHING DOWN CELL AND CAVE LINERS. INSTALL NOZZLES ON BOTTOM OF SPRAY HEADER, AIMED TOWARDS LINER. LOCATE BOTTOM OF NOZZLE 4 INCHES ABOVE THE LINER UPPER EDGE. NOZZLE STANDOFF FROM VERTICAL PLANE OF LINER IS 12 INCHES. NOZZLE SPACING ON HEADER IS ONE PER 5 FOOT. SPRAY NOZZLE TYPE IS LEICHLER 140" FLAT FAN NOZZLE NUMBER 686.868 OR EQUIVALENT.
- LINE IS SELF DRAINING.
- SUMP FITTED WITH REMOVABLE BASKET TO COLLECT DEBRIS.
- THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTISHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-RD-20005000 REV 7. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6LN-RD-00004, -00005, -00007, -00008, 24590-HLW-M6LN-RD-00030, -00225, -00242, -00250, 24590-HLW-M6PR-RD-00012, 24590-HLW-M6LN-30-00003, 24590-HLW-M6LN-30-00007, -00024, AND 24590-HLW-M6PR-30-00002.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-HLW-3YD-RD-00001, SYSTEM DESCRIPTION FOR THE HLW RADIOACTIVE LIQUID WASTE DISPOSAL RLD.



Person who has created, revised, or approved this drawing is responsible for the accuracy of the information shown. The user of this drawing is responsible for the accuracy of the information shown. The user of this drawing is responsible for the accuracy of the information shown.

DWG NO	TITLE
24590-HLW-M6-RD-20005001	RLD SYSTEM MELTER 2 SUMPS
24590-HLW-M6-RD-20005002	RLD SYSTEM HFP-RK-00002 LINES FOR SUMPS

REV	DESCRIPTION	ORG	CHKD	REVW	APVD	DATE
0	ISSUED FOR CONSTRUCTION SEE NOTE 17					7/20/11

ISSUED BY	PROJECT No.	DATE
RFP-WTP PDC	24590	7/19/11
CHECKER	SITE	7/19/11
APPROVER	AREA	7/19/11
REVIEWER	BUILDING No.	7/19/11

CONTENT APPLICABLE TO ALARA?	YES	NO	SCALE	REVISION HISTORY
ADR NO. 24590-HLW-ADR-M-02-016	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NONE	24590-HLW-M6-RD-20005001
EMS SCREENING REQUIRED?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		

Quarter Ending 12/31/2011

24590-PTF-PCN-ENV-10-030

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**Hanford Facility RCRA Permit Modification Notification Form**  
**Part III, Operating Unit 10**  
**Waste Treatment and Immobilization Plant**

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Index

Page 2 of 3: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant  
Replace Mechanical Data Sheets for the PTF Waste Feed Evaporation Process (FEP) and Treated LAW  
Evaporation Process (TLP) condensers and reboilers in Appendix 8.6 of the Dangerous Waste Permit (DWP).

Submitted by Co-Operator:

Donna Busche

D. M. Busche

9/20/11

Date

Reviewed by ORP Program Office:

D. L. Noyes

D. L. Noyes

10/4/2011

Date

Quarter Ending 12/31/2011

24590-PTF-PCN-ENV-10-030

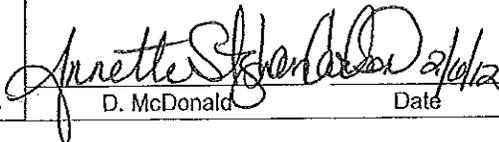
<b>Hanford Facility RCRA Permit Modification Notification Form</b>			
Unit:		Permit Part:	
<b>Waste Treatment and Immobilization Plant</b>		<b>Part III, Operating Unit 10</b>	
<b>Description of Modification:</b>			
The purpose of this Class 1 prime modification is to update and replace the Mechanical Data Sheets for the PTF FEP and TLP condensers and reboilers in Appendix 8.6 of the DWP.			
<b>Appendix 8.6</b>			
Replace:	24590-PTF-MED-FEP-P0003, Rev. 0	With:	24590-PTF-MED-FEP-00003, Rev. 3
	24590-PTF-MED-FEP-P0004, Rev. 0		24590-PTF-MED-FEP-00004, Rev. 3
	24590-PTF-MED-FEP-P0005, Rev. 0		24590-PTF-MED-FEP-00005, Rev. 3
	24590-PTF-MED-FEP-P0006, Rev. 0		24590-PTF-MED-FEP-00006, Rev. 3
	24590-PTF-MED-FEP-P0007, Rev. 0		24590-PTF-MED-FEP-00007, Rev. 3
	24590-PTF-MED-FEP-P0008, Rev. 0		24590-PTF-MED-FEP-00008, Rev. 3
	24590-PTF-MED-FEP-P0009, Rev. 0		24590-PTF-MED-FEP-00009, Rev. 3
	24590-PTF-MED-FEP-P0010, Rev. 0		24590-PTF-MED-FEP-00010, Rev. 4
	24590-PTF-MED-TLP-P0001, Rev. 0		24590-PTF-MED-TLP-00001, Rev. 3
	24590-PTF-MED-TLP-P0004, Rev. 0		24590-PTF-MED-TLP-00004, Rev. 3
<p>This modification requests Ecology approval and incorporation into the permit the specific changes to these data sheets that are indicated by revision notes and clouds. The referenced data sheets include changes provided in applicable document change forms (e.g., DCN, SCN, SDDR, FCN, FCR, etc.) that were submitted to Ecology in accordance with Condition III.10.C.9.h. In addition, the data sheets include changes associated with the resolution to comments on change documents since the issuance of the last revision of the permitted documents.</p> <p>Significant changes are summarized below.</p> <ul style="list-style-type: none"> <li>• Updated information based on additional vendor design data, equipment qualification data, and revised temperature and relative humidity data for PTF rooms (summarized in 24590-PTF-U0N-W16T-00003)</li> <li>• Revised manufacturer name for all data sheets (except 24590-PTF-MED-FEP-00009, Rev. 3; 24590-PTF-MED-FEP-00010, Rev. 4; and 24590-PTF-MED-TLP-00004, Rev. 3)</li> <li>• Updated General Data such as quality level, seismic category, flow type, heat exchanger duty, and/or heat exchanger area</li> <li>• Updated Thermal/Hydraulic Data such as fluid quantities, temperatures, specific gravities, thermal conductivities, inlet pressures, and/or pressure drops</li> <li>• Updated Mechanical Data such as design temperatures, corrosion allowances, shell diameters, total number of tubes, and/or overall dimensions</li> <li>• Updated Material Data such as the materials of construction for shell, shell cover, channel/bonnet, tube, bolting, and/or forgings (shell side and channel)</li> <li>• Updated Construction Data such as cross baffle type, tube support type, operating weight, and shell weight for all data sheets (except 24590-PTF-MED-FEP-00009, Rev. 3; 24590-PTF-MED-FEP-00010, Rev. 4; and 24590-PTF-MED-TLP-00004, Rev. 3)</li> <li>• Updated Notes</li> <li>• Added Equipment Qualification Datasheet as Attachment 1</li> <li>• Added Calculations as Attachment 2</li> </ul>			

Quarter Ending 12/31/2011

24590-PTF-PCN-ENV-10-030

This modification requests Ecology approval and incorporation of the following list of outstanding change documents into the permit. Although not yet incorporated into the revised documents attached to this PCN, this list of outstanding DCNs are intended to be incorporated into this modification:

- 24590-WTP-SDDR-MS-10-00050

WAC 173-303-830 Modification Class:	Class 1	Class <sup>1</sup> 1	Class 2	Class 3
Please mark the Modification Class:		X		
Enter relevant WAC 173-303-830, Appendix I Modification citation number:		NA		
Enter wording of WAC 173-303-830, Appendix I Modification citation:				
In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class <sup>1</sup> 1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."				
Modification Approved/Concur:	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Denied (state reason below)	Reviewed by Ecology:	
Reason for denial:			 D. McDonald Date	



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
**24590-PTF-ME-FEP-COND-00001A**

Data Sheet No.  
**24590-PTF-MED-FEP-00003**

Project:	<b>RPP-WTP</b>	Description:	<b>Waste Feed Evaporator Primary Condenser</b>
Project No:	<b>24590</b>	P&ID:	<b>24590-PTF-M6-FEP-00003002</b>
Site:	<b>Hanford</b>	Process Data:	<b>24590-QL-POA-MEVV-00001-04-04</b>
Process flow diagram:	<b>24590-PTF-M5-V17T-00004002</b>	Manufacturer Name:	<b>Framatome ANP / UST&amp;D</b>

**ISSUED BY  
RPP WTP PDC**

Quality Level	<b>Q (See Note 10)</b>	TEMA (Class/Type)	<b>B</b>
Seismic Category	<b>SC-I</b>	Flow Type (Counter current, etc)	<b>8 PASS</b>
Design Code	<b>ASME VIII Div 1</b>	Heat Exchanger Duty Btu/hr	<b>17,165,333</b>
Code Stamp	<b>Yes</b>	Heat Exchanger Area ft <sup>2</sup>	<b>3795</b>
NB Registration	<b>Yes</b>	ΔT (LMTD/Corrected LMTD) °F	<b>18</b>

	Shell Side		Tube Side	
	In	Steam Out	In	Cooling Water Out
Fluid Name				
Fluid Quantities: Total lbm/hr	<b>16,579</b>		<b>948,613</b>	
Condensable Vapor (In/Out)	<b>16537</b>	<b>103</b>	<b>0</b>	<b>N/A</b>
Liquid	<b>0</b>	<b>16,434</b>	<b>948,613</b>	<b>948,613</b>
Noncondensable	<b>42.7</b>	<b>42.7</b>	<b>0</b>	
Temperature (In/Out) °F	<b>105.1</b>	<b>105.1</b>	<b>75</b>	<b>93</b>
Specific Gravity	<b>0.003</b>	<b>N/A</b>	<b>62.18</b>	<b>N/A</b>
Viscosity Cp	<b>0.004</b>	<b>N/A</b>	<b>0.818</b>	<b>N/A</b>
Molecular Weight	<b>18.02</b>	<b>18.02</b>	<b>N/A</b>	<b>N/A</b>
Molecular Weight, Noncondensable	<b>29</b>	<b>29</b>	<b>N/A</b>	<b>N/A</b>
Specific Heat Btu/lbm-°F	<b>N/A</b>	<b>N/A</b>	<b>1.0</b>	<b>N/A</b>
Thermal Conductivity Btu/hr-ft-°F	<b>N/A</b>	<b>N/A</b>	<b>0.355</b>	<b>N/A</b>
Latent Heat Btu/lbm @ °F	<b>1121.1</b>	<b>78.6</b>	<b>43.07</b>	<b>61.05</b>
Inlet pressure psia	<b>1.11</b>		<b>59.7</b>	
Tube side Velocity ft/s	<b>N/A</b>		<b>7.14</b>	
Pressure Drop (Allowed) psi	<b>0.093</b>		<b>22.6</b>	
Fouling Resistance (Min) hr-ft <sup>2</sup> -°F/Btu	<b>0.0015</b>		<b>0.001</b>	

	Shell Side		Tube Side	
	Design Pressure (Max/Min) psig	<b>50</b>	<b>Full vacuum</b>	<b>100</b>
Design Temperature (Max/Min) °F	<b>150</b>	<b>49</b>	<b>150</b>	<b>49</b>
Corrosion Allowance inch	<b>0.04</b>		<b>0.04</b>	
Erosion Allowance inch	<b>N/A</b>		<b>N/A</b>	
Shell OD/ID inch	<b>57 ID</b>		Overall Dimensions (H x W x L) inch	<b>115 3/4 x 72 3/4 x 282 13/16</b>
Total Number of Tubes	<b>1152</b>		Tube OD inch	<b>1</b>

Shell	<b>SA 240 316 SS (max. carbon 0.030%)</b>	Shell Cover	<b>SA 240 316 SS (max. carbon 0.030%)</b>
Channel/Bonnet	<b>SA 240 316 SS (max. carbon 0.030%)</b>	Channel Cover	<b>SA 240 316 SS (max. carbon 0.030%)</b>
Tube	<b>SA 213 316 SML SS (max. carbon 0.030%)</b>	Floating Head Cover	<b>N/A</b>
Stationary Tube Sheet	<b>SA 240 316 SS (max. carbon 0.030%)</b>	Floating Tube Sheet	<b>N/A</b>
Shell Side Gaskets	<b>N/A</b>	Tube Side Gaskets	<b>SA 240 316 SS Spiral Wound w/PTFE Filler</b>
Partition Seals	<b>N/A</b>	Baffles/Supports	<b>SA 240 316 SS Max Carbon 0.030%</b>
Insulation	<b>N/A</b>	Forgings (Shell side)	<b>N/A</b>
Bolting	<b>SA-193 Gr B8M</b>	Forgings (Channel)	<b>N/A</b>

R11042817



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
24590-PTF-ME-FEP-COND-00001A

Data Sheet No.  
24590-PTF-MED-FEP-00003

**Construction Data** (To be determined by the supplier when not specified by the buyer)

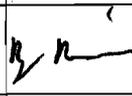
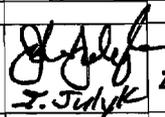
Cross Baffle Type	(4)	% Baffle Cut (Dia.)	29.5%	Spacing (c/c) inch	15 11-5/8"
Bypass Seal Arrangement	N/A	Longitudinal Seal Type	N/A	Expansion Joint Type	(5)
Inlet Nozzle pV <sup>2</sup>	By Others	Bundle Entrance pV <sup>2</sup>	By Others	Bundle Exit pV <sup>2</sup>	By Others
Tube Support Type	Baffle & Axi-Grid	U-bend Support Type	N/A	Weight of Bundle lbf	16,000 (Tubes only)
Operating Weight lbf	46,500	Full of Water lbf	74,500	Weight of Shell lbf	17,000 (6)

**Notes**

- (1) All welds are continuous to avoid crevices, weld surface finish is descaled as laid.
- (2) All welded construction on Process side only.
- (3) Tube to tubesheet joint shall be strength welded.
- (4) Double segmental with Axi-Grid.
- (5) Inherent steam Bustle Construction.
- (6) Dry Weight Less Tubes.
- (7) Deleted.
- (8) For nozzle loads, see 24590-PTF-3PS-MEVV-T0001.
- (9) Deleted.
- (10) Vendor will provide Item at BNI quality level Q specification, which corresponds with vendor quality level QL-2.
- (11) Equipment cyclic data is from document 24590-QL-POA-MEVV-00001-04-03.
- (12) Final Vendor Design Process information is from document 24590-QL-POA-MEVV-00001-02-00056.
- (13) Empty weight of vessel is 34,500 lbs.
- (14) Content of this document are Dangerous Waste Permit Affecting. 
- (15) The physical design parameters shall be determined by the seller based on TEMA and HEI standards.
- (16) 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.

3

Safety screening/evaluation required?  Yes  No If yes per 24590-WTP-GPP-SREG-002, E&NS signature required below.

Rev	Description	By	Checked	EN&S	Approved	Date
3	Updated to reflect WSGM analysis, 24590-PTF-U0N-W16T-00003 and incorporate DOE AEA note (16).	 D. Tate		 S. Woolfolk	 J. Julyk	2/19/09
2	Incorporated Vendor Design Changes and Equipment Qualification data.	R. Rickenbach	C. Knauss	S. Woolfolk	J. Julyk	07/22/2008
1	Incorporated Vendor Design	E. Le	R. Nowak	N/A	J. Julyk	04/04/2005
0	Issued for Procurement	E. Le	S. Shah	N/A	J. Julyk	04/30/2003



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00003 Rev.: 3

Attachment 1, Page 3 of 21

Equipment Identification			
Component Tag Number	24590-PTF-ME-FEP-COND-00001A	Safety Classification	<input checked="" type="checkbox"/> SC <input type="checkbox"/> SS <input type="checkbox"/> APC <input type="checkbox"/> SDC <input type="checkbox"/> SDS <input type="checkbox"/> RRC Note 11 $\triangle$ 3
Manufacturer / Supplier	UST&D		
Requisition Number	24590-QL-POA-MEVV-00001		
Model	N/A	Seismic Category	<input checked="" type="checkbox"/> SC-I <input type="checkbox"/> SC-II <input type="checkbox"/> SC-III <input type="checkbox"/> SC-IV Note 11 $\triangle$ 3
Description (Include descriptive text [e.g., location, elevation])	Waste Feed Evaporator Primary Condensor, Room P-0304, elevation 56'-0"		
Safety Function(s)	Detect and divert (recycle) contaminated process condensate to the waste feed evaporator separator vessel following a separator carryover event. (ref. 1) $\triangle$ 3 Prevent post seismic disruption of H2 vessel purge air pathways, spread of contamination into C3 areas from PVP blowback. (ref. 1) $\triangle$ 3 Confinement (ref. 1) $\triangle$ 3		
Seismic Safety Function	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Room Number(s): P-0304	
Maintenance Accessible	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Method of Maintenance Access: <input type="checkbox"/> Remote <input checked="" type="checkbox"/> Hands On <input type="checkbox"/> None	
Seismic Operability Requirements:	$\triangle$ 3 <input type="checkbox"/> During Seismic Event $\triangle$ 3 <input type="checkbox"/> After Seismic Event		
ITS Equipment Type:	<input checked="" type="checkbox"/> Passive Mechanical <input type="checkbox"/> Active Mechanical <input type="checkbox"/> Electrical		

Equipment Environmental Qualification (EEQ)					
Environment <input type="checkbox"/> Mild <input checked="" type="checkbox"/> Harsh	Hi Rad Service <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Design Life (yrs) <input checked="" type="checkbox"/> 40 <input type="checkbox"/> Other _____			
Contamination Class: <u>C3</u>					
Radiation Class: <u>R3</u>					
Parameter Type/Units	Parameter Value	Time Duration (number)	Time Units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Normal</b>					
Normal High Temperature (°F)	95	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal Low Temperature (°F)	59	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal High Relative Humidity (%RH)	100	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Relative Humidity (%RH)	10	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal High Pressure (in.-w.g.)	0	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Pressure (in.-w.g.)	-0.4	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Radiation Dose Rate (mR/hr)	10	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Vibration Magnitude (g)	N/A	N/A	N/A	N/A	Note 1
Vibration Frequency (Hz)	N/A	N/A	N/A	N/A	Note 1
Additional Normal Information:	See Note 2 for pressurc units.				



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00003 Rev.: 3

Attachment 1, Page 4 of 21

## Equipment Environmental Qualification (EEQ) (continued)

Parameter Type/Units	Parameter Value	Time Duration (number)	Time units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Abnormal</b>					
Abnormal High Temperature (°F)	△ 117	8	hr/yr	24590-PTF-U0D-W16T-00001, Note 6 △	Note 1
Abnormal Low Temperature (°F)	59	8	hr/yr	24590-WTP-DB-ENG-01-001, Notes 6 & 9	Note 1
Abnormal High Relative Humidity (%RH)	100	24	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Relative Humidity (%RH)	2	22	hr/yr	24590-PTF-U0D-W16T-00001, Note 10 △	Note 1
Abnormal High Pressure (in.-w.g.)	4	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Pressure (in.-w.g.)	-7.3	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Radiation Dose Rate (mR/hr)	10, Note 3	△ 0	△ hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Wet Sprinkler System Present	YES	△ 2	△ hr	24590-PTF-U0D-W16T-00001	Note 1
Additional Abnormal Information	See Note 2 for pressure units.				
<b>Design Basis Events (DBE)</b>					
DBE High Temperature (°F)	131	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6 & 10 △	Note 1
DBE Low Temperature (°F)	40	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
DBE High Relative Humidity (%RH)	100	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Relative Humidity (%RH)	8	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE High Pressure (in.-w.g.)	4	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Pressure (in.-w.g.)	-7.3	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Radiation Dose Rate (mR/hr)	10, Note 3	△ 0	△ hrs	24590-PTF-U0D-W16T-00001	Note 1
Flood Height (ft)	0.67	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
Submergence (ft)	0, Note 4	△ 1000	hrs	24590-PTF-U0D-W16T-00001 24590-QL-POA-MEUVV-00001-01-00825	Note 1
Chemical/Spray Exposure	Yes	△ 12.5	hrs	24590-PTF-U0D-W16T-00001	Note 1
Additional DBE Information	See Note 2 for pressure units.				



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00003 Rev.: 3

Attachment 1, Page 5 of 21

DBE Chemical Exposure Details	
DBE Chemical Types/Concentrations	2M Sodium Hydroxide $\triangle 3$ Antifoam Agent 2M Nitric Acid $\triangle 3$

Interfaces (Electrical)	
Power Supply Voltage (VAC, VDC)	N/A
Power Supply Frequency (Hz)	N/A
Power Connection Method	N/A
I/O Signals to/from Equipment	N/A
I/O Connection Method	N/A

Interfaces (Mechanical)	
Mounting Configuration (orientation)	TBD
Mounting Method (bolts, welds, etc.)	Anchor Bolts, FEP-SKID-00001A, 24590-PTF-DB-S13T-00050 $\triangle 3$
Auxiliary Devices	N/A

Equipment Seismic Qualification (ESQ)				
Parameter	Title	Reference/Document Number	Version / Revision	Remarks
WTP Seismic Design Specification (BUYER)	Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks	24590-WTP-3PS-SS90-T0001	002	N/A
Specified Seismic Load (BUYER)	Seismic Analysis of Pretreatment Building - WSGM In-Structure Response Spectre (ISRS) $\triangle 3$	24590-PTF-S0C-S15T-00057 $\triangle 3$	00A $\triangle 3$	Calculation is not included in MR, see attached figures 37, 38 and 121 per CCN 185267. $\triangle 3$
Design Seismic Load (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Method (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Report Number (SELLER)	Note 1	Note 1	Note 1	Note 1
Submittal Number (BUYER)	TBD	TBD	TBD	N/A



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00003 Rev.: 3

Attachment 1, Page 6 of 21

## Notes and Additional Information

### Notes

1. Data to be provided by SELLER through the submittal process as required on the G-321E.
2. Where pressure is given in inches of water column (in-w.c.) in the source document, it is generally assumed that this is in reference to atmospheric pressure and is therefore equivalent to inches of water gage (in-w.g.).
3. Abnormal and DBE Radiation dose rates are set equal to normal and do not contribute to the total integrated dose.
4. Submergence depth is the difference between the lowest point on the equipment and the flood depth above the floor. The submergence depth is set to zero if the lowest section of the equipment is above the flood depth.
5. Environmental data from reference 3 is for room environment only.
6. For application of AISC N690, the normal temperatures are not used. Abnormal temperatures shall be applied as Normal Operation Temperature,  $T_0$ , with seismic effects,  $E_s$ . The Design basis event temperature shall be applied as a Thermal Load generated by a postulated accident,  $T_A$ , without seismic effects,  $E_s$  or  $E_0$ .
7. Deleted.  $\triangle 3$
8. The equipment qualification will be documented in accordance with the requirements in Appendix D of Engineering Specification for Environmental Qualification of Mechanical Equipment, document number 24590-WTP-3PS-G000-T0015 for the passive and active safety functions.
9. Abnormal low temperature, as calculated in reference 3, is based on a Loss of Heating Accident (LOHA) which occurs when steam supply to the building is lost. Since the evaporators are run on steam, this would cause the evaporators to go off-line. Abnormal low temperature will be based on reference 4 at 59°F.
10. Parameter value used on data sheet has been previously established and determined more conservative than values  $\triangle 3$  derived from the reference document noted.
11. For commercial reasons, safety and seismic classification may be higher than elsewhere documented, and therefore  $\triangle 3$  conservative.

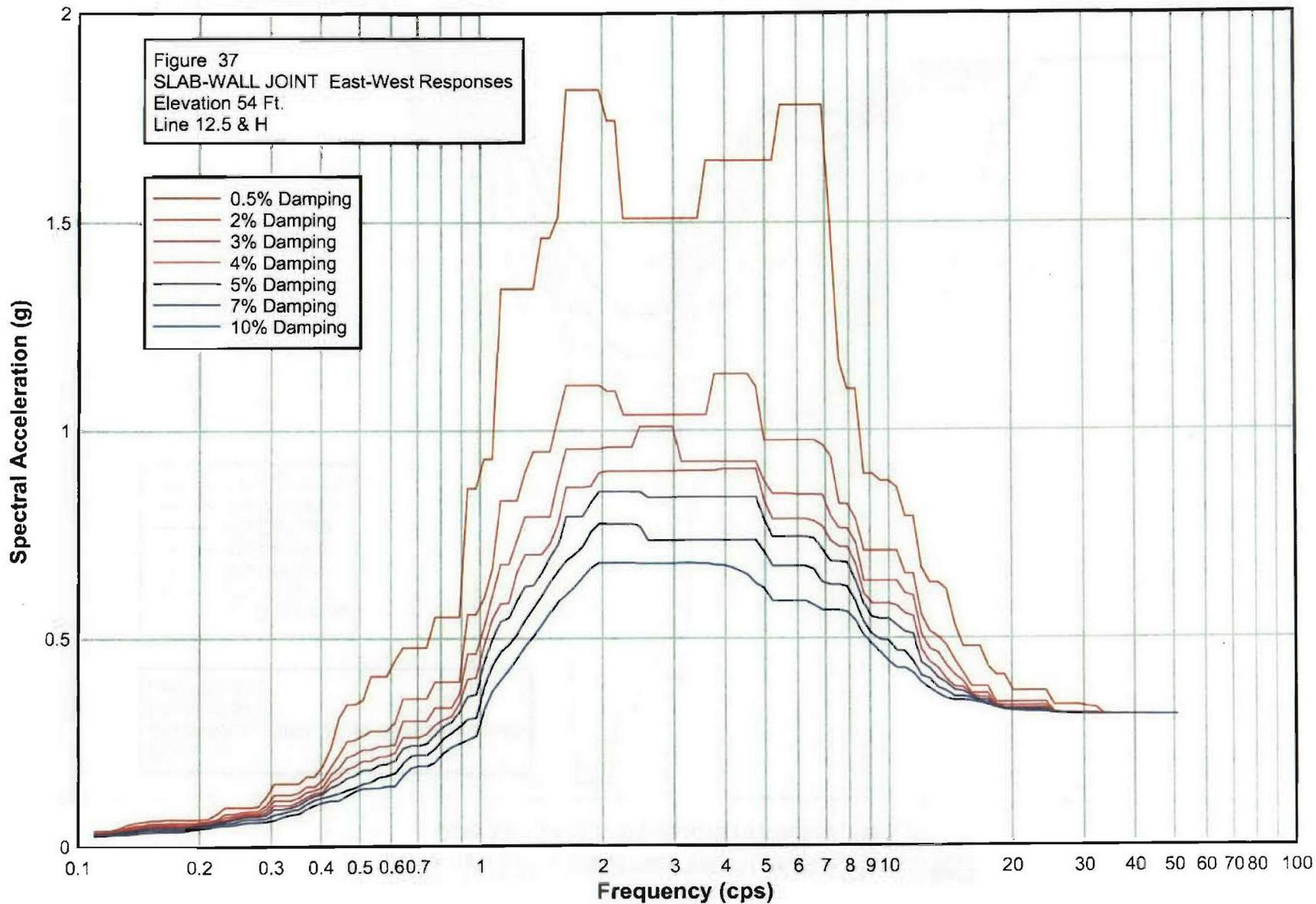
### Reference

1. 24590-WTP-PSAR-ESH-01-002-02, Rev. 04A, Preliminary documented safety analysis to support construction  $\triangle 3$  authorization; PT facility specific information.
2. CCN #096661, FEP and CNP Evaporator Vent Problems with New PVP Isolation Valve.
3. 24590-PTF-U0D-W16T-00001, Rev. 0, PTF Room Environment Datasheet.
4. 24590-WTP-DB-ENG-01-001, Rev. 1M, Basis Of Design.  $\triangle 3$
5. 24590-PTF-U0N-W16T-00001, Add data for room P-0427. Incorporate additional steam break analysis.  $\triangle 3$
6. 24590-PTF-U0N-W16T-00003, Revised temperature & relative humidity data for PTF rooms.  $\triangle 3$

3

# RPP-WTP Pretreatment Facility ISRS

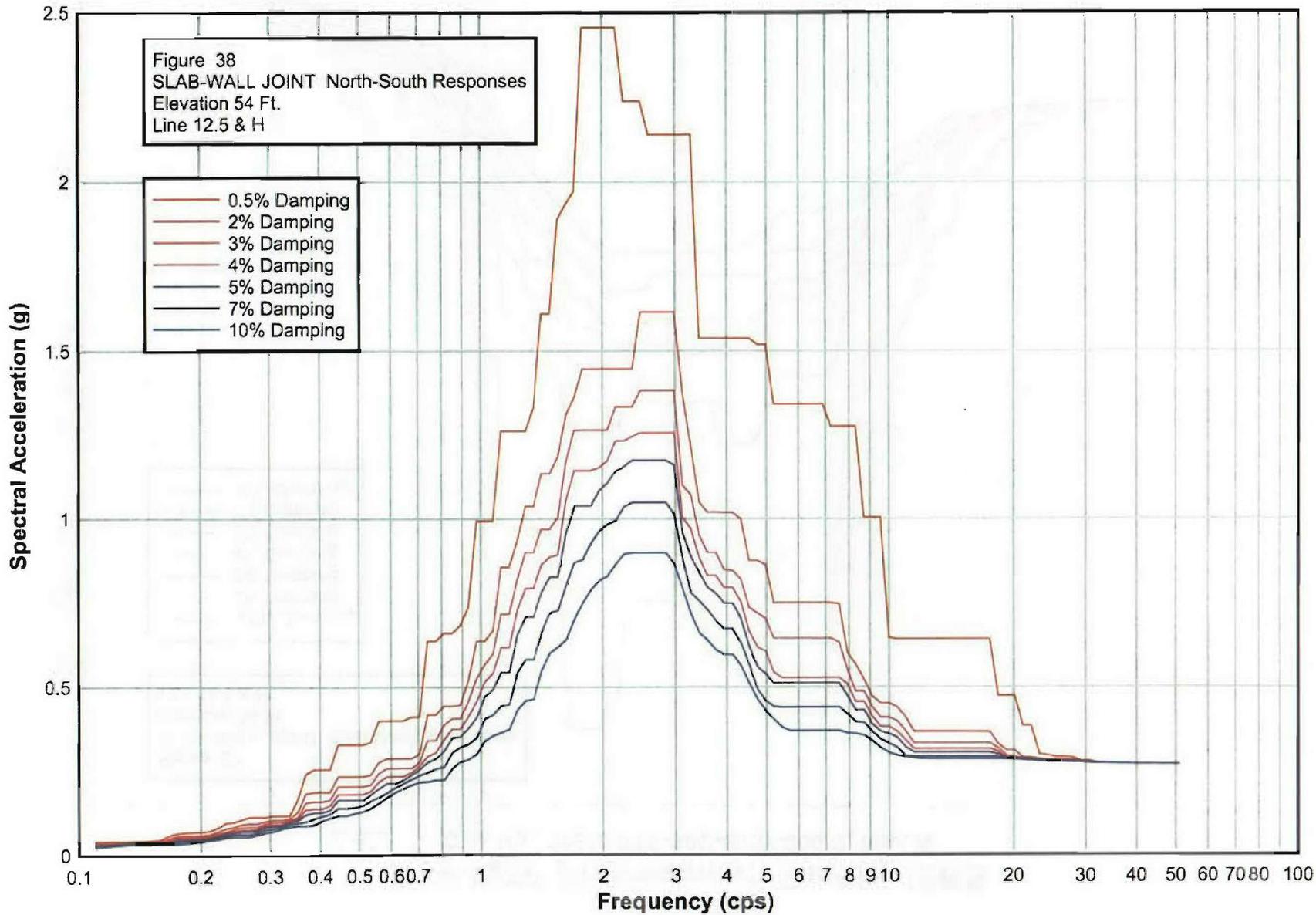
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



3

# RPP-WTP Pretreatment Facility ISRS

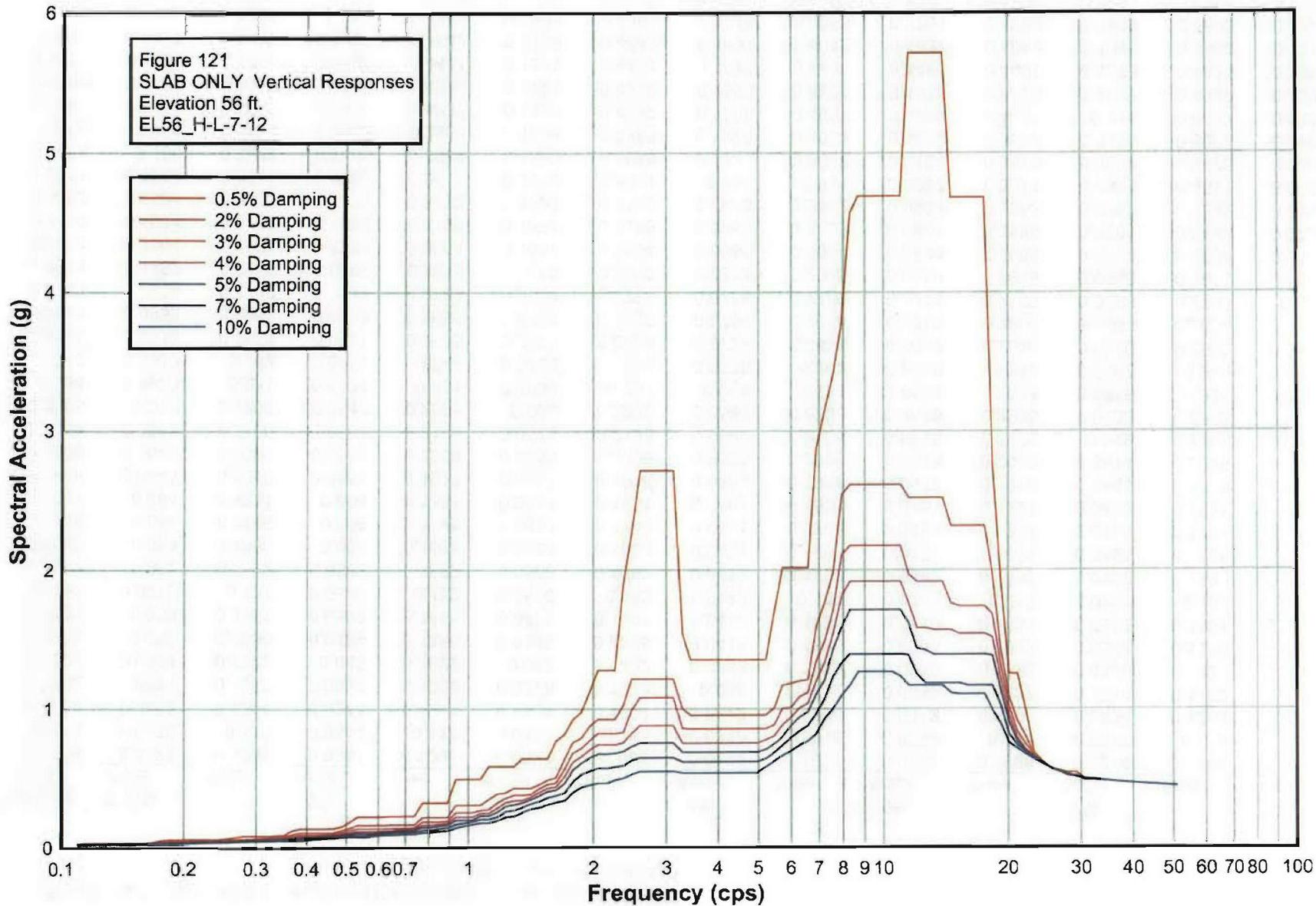
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



3

# RPP-WTP Pretreatment Facility ISRS

Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0375	0.1098	0.0344	0.1098	0.0327	0.1098	0.0312	0.1098	0.0298	0.1098	0.0274	0.1098	0.0252
0.115	0.0375	0.115	0.0344	0.115	0.0327	0.115	0.0312	0.115	0.0299	0.115	0.0277	0.115	0.0258
0.1204	0.0375	0.1204	0.0344	0.1204	0.0331	0.1204	0.0322	0.1204	0.0312	0.1204	0.0294	0.1204	0.0269
0.1262	0.0431	0.1262	0.0397	0.1262	0.0378	0.1262	0.036	0.1262	0.0343	0.1262	0.0314	0.1262	0.0278
0.1322	0.0504	0.1322	0.045	0.1322	0.042	0.1322	0.0393	0.1322	0.0369	0.1322	0.0328	0.1322	0.0281
0.1385	0.056	0.1385	0.0489	0.1385	0.0449	0.1385	0.0414	0.1385	0.0384	0.1385	0.0344	0.1385	0.0303
0.1451	0.058	0.1451	0.0509	0.1451	0.0475	0.1451	0.0445	0.1451	0.0419	0.1451	0.0375	0.1451	0.0325
0.152	0.0616	0.152	0.0546	0.152	0.0506	0.152	0.0472	0.152	0.0442	0.152	0.0391	0.152	0.0338
0.1592	0.062	0.1592	0.0546	0.1592	0.0506	0.1592	0.0472	0.1592	0.0442	0.1592	0.0396	0.1592	0.0351
0.1668	0.064	0.1668	0.056	0.1668	0.0517	0.1668	0.0481	0.1668	0.0451	0.1668	0.0403	0.1668	0.0356
0.1748	0.064	0.1748	0.056	0.1748	0.0517	0.1748	0.0481	0.1748	0.0451	0.1748	0.0403	0.1748	0.0356
0.1831	0.064	0.1831	0.056	0.1831	0.0517	0.1831	0.0481	0.1831	0.0451	0.1831	0.0403	0.1831	0.0368
0.1918	0.0641	0.1918	0.0561	0.1918	0.0517	0.1918	0.0495	0.1918	0.0477	0.1918	0.0445	0.1918	0.0404
0.2009	0.0642	0.2009	0.0583	0.2009	0.0558	0.2009	0.0535	0.2009	0.0513	0.2009	0.0474	0.2009	0.0424
0.2105	0.0665	0.2105	0.0603	0.2105	0.0575	0.2105	0.0549	0.2105	0.0525	0.2105	0.049	0.2105	0.0448
0.2205	0.078	0.2205	0.0647	0.2205	0.062	0.2205	0.0595	0.2205	0.0573	0.2205	0.0533	0.2205	0.0484
0.231	0.0933	0.231	0.0774	0.231	0.0694	0.231	0.063	0.231	0.0598	0.231	0.0556	0.231	0.0503
0.242	0.0933	0.242	0.0774	0.242	0.0723	0.242	0.0678	0.242	0.0638	0.242	0.0567	0.242	0.0513
0.2535	0.0933	0.2535	0.0817	0.2535	0.0771	0.2535	0.0729	0.2535	0.0692	0.2535	0.0628	0.2535	0.0553
0.2656	0.0933	0.2656	0.0839	0.2656	0.0794	0.2656	0.0754	0.2656	0.0718	0.2656	0.0653	0.2656	0.0575
0.2783	0.0954	0.2783	0.0847	0.2783	0.0794	0.2783	0.0754	0.2783	0.0718	0.2783	0.0653	0.2783	0.058
0.2915	0.1187	0.2915	0.0987	0.2915	0.089	0.2915	0.0813	0.2915	0.0753	0.2915	0.0668	0.2915	0.0592
0.3054	0.1504	0.3054	0.1235	0.3054	0.1097	0.3054	0.0985	0.3054	0.0894	0.3054	0.0758	0.3054	0.0633
0.3199	0.1504	0.3199	0.1235	0.3199	0.1097	0.3199	0.0985	0.3199	0.0894	0.3199	0.0801	0.3199	0.0706
0.3352	0.1504	0.3352	0.1235	0.3352	0.1097	0.3352	0.0985	0.3352	0.0931	0.3352	0.0857	0.3352	0.0762
0.3511	0.1504	0.3511	0.1289	0.3511	0.1172	0.3511	0.107	0.3511	0.0997	0.3511	0.0894	0.3511	0.0786
0.3678	0.168	0.3678	0.1438	0.3678	0.1303	0.3678	0.1186	0.3678	0.1121	0.3678	0.1017	0.3678	0.0898
0.3853	0.168	0.3853	0.1438	0.3853	0.1346	0.3853	0.1279	0.3853	0.1219	0.3853	0.1115	0.3853	0.0992
0.4037	0.194	0.4037	0.1598	0.4037	0.1426	0.4037	0.1306	0.4037	0.1259	0.4037	0.117	0.4037	0.1054
0.4229	0.2368	0.4229	0.1906	0.4229	0.1721	0.4229	0.1558	0.4229	0.1416	0.4229	0.1217	0.4229	0.1092
0.4431	0.3088	0.4431	0.2193	0.4431	0.1881	0.4431	0.1671	0.4431	0.1496	0.4431	0.1273	0.4431	0.1097
0.4642	0.3417	0.4642	0.2524	0.4642	0.2138	0.4642	0.1852	0.4642	0.1637	0.4642	0.1345	0.4642	0.1211
0.4863	0.3417	0.4863	0.256	0.4863	0.2208	0.4863	0.1928	0.4863	0.1701	0.4863	0.1409	0.4863	0.1323
0.5094	0.3522	0.5094	0.2656	0.5094	0.2325	0.5094	0.2054	0.5094	0.1831	0.5094	0.1497	0.5094	0.1391

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.4096	0.5337	0.2771	0.5337	0.2325	0.5337	0.2054	0.5337	0.1831	0.5337	0.1539	0.5337	0.1396
0.5591	0.4096	0.5591	0.2771	0.5591	0.2398	0.5591	0.2148	0.5591	0.1949	0.5591	0.1654	0.5591	0.1396
0.5857	0.4096	0.5857	0.2771	0.5857	0.2404	0.5857	0.2159	0.5857	0.1975	0.5857	0.1686	0.5857	0.1441
0.6136	0.4475	0.6136	0.2969	0.6136	0.2444	0.6136	0.2234	0.6136	0.2051	0.6136	0.1751	0.6136	0.1441
0.6428	0.478	0.6428	0.3547	0.6428	0.3006	0.6428	0.2612	0.6428	0.2347	0.6428	0.1988	0.6428	0.168
0.6734	0.478	0.6734	0.3547	0.6734	0.3006	0.6734	0.2612	0.6734	0.2413	0.6734	0.2165	0.6734	0.1872
0.7055	0.478	0.7055	0.3547	0.7055	0.3006	0.7055	0.2612	0.7055	0.2413	0.7055	0.2186	0.7055	0.1922
0.7391	0.478	0.7391	0.3547	0.7391	0.3006	0.7391	0.2692	0.7391	0.2463	0.7391	0.2186	0.7391	0.1922
0.7743	0.5518	0.7743	0.3958	0.7743	0.3332	0.7743	0.2918	0.7743	0.268	0.7743	0.2351	0.7743	0.2018
0.8111	0.5518	0.8111	0.3958	0.8111	0.3332	0.8111	0.3035	0.8111	0.2874	0.8111	0.2587	0.8111	0.2236
0.8497	0.5518	0.8497	0.3958	0.8497	0.3332	0.8497	0.3117	0.8497	0.2984	0.8497	0.2723	0.8497	0.2373
0.8902	0.5518	0.8902	0.3958	0.8902	0.3656	0.8902	0.3431	0.8902	0.3226	0.8902	0.2873	0.8902	0.2462
0.9326	0.8605	0.9326	0.5585	0.9326	0.4629	0.9326	0.4023	0.9326	0.3602	0.9326	0.3049	0.9326	0.2549
0.977	0.8605	0.977	0.5585	0.977	0.4629	0.977	0.4045	0.977	0.3644	0.977	0.3083	0.977	0.2637
1.0235	0.9315	1.0235	0.5965	1.0235	0.5261	1.0235	0.4814	1.0235	0.4436	1.0235	0.3837	1.0235	0.3277
1.0723	0.9315	1.0723	0.6685	1.0723	0.603	1.0723	0.5467	1.0723	0.4995	1.0723	0.4355	1.0723	0.3729
1.1233	1.3398	1.1233	0.8315	1.1233	0.6788	1.1233	0.5837	1.1233	0.5408	1.1233	0.4681	1.1233	0.3987
1.1768	1.3398	1.1768	0.8315	1.1768	0.6788	1.1768	0.5855	1.1768	0.5505	1.1768	0.4858	1.1768	0.4238
1.2328	1.3398	1.2328	0.8315	1.2328	0.7369	1.2328	0.6596	1.2328	0.5925	1.2328	0.5105	1.2328	0.452
1.2916	1.3398	1.2916	0.9002	1.2916	0.7926	1.2916	0.7024	1.2916	0.6263	1.2916	0.5455	1.2916	0.4806
1.353	1.3398	1.353	0.9485	1.353	0.7926	1.353	0.7024	1.353	0.6282	1.353	0.574	1.353	0.5058
1.4175	1.4626	1.4175	0.9485	1.4175	0.7926	1.4175	0.7024	1.4175	0.6579	1.4175	0.6026	1.4175	0.5321
1.485	1.4626	1.485	0.9485	1.485	0.7926	1.485	0.7282	1.485	0.6958	1.485	0.636	1.485	0.5624
1.5557	1.5113	1.5557	1.0297	1.5557	0.8797	1.5557	0.7754	1.5557	0.726	1.5557	0.6634	1.5557	0.5886
1.6298	1.8158	1.6298	1.1086	1.6298	0.9552	1.6298	0.8627	1.6298	0.7931	1.6298	0.6875	1.6298	0.6064
1.7074	1.8158	1.7074	1.1086	1.7074	0.9552	1.7074	0.8627	1.7074	0.7931	1.7074	0.7024	1.7074	0.6246
1.7887	1.8158	1.7887	1.1086	1.7887	0.9552	1.7887	0.8627	1.7887	0.7931	1.7887	0.7213	1.7887	0.6476
1.8738	1.8158	1.8738	1.1086	1.8738	0.9552	1.8738	0.8651	1.8738	0.8263	1.8738	0.7567	1.8738	0.6698
1.963	1.8158	1.963	1.1086	1.963	0.9552	1.963	0.8972	1.963	0.8525	1.963	0.7755	1.963	0.683
2.0565	1.7414	2.0565	1.0948	2.0565	0.9593	2.0565	0.9017	2.0565	0.8525	2.0565	0.7755	2.0565	0.683
2.1544	1.7414	2.1544	1.0948	2.1544	0.9593	2.1544	0.9017	2.1544	0.8525	2.1544	0.7755	2.1544	0.683
2.257	1.5091	2.257	1.0367	2.257	0.9593	2.257	0.9017	2.257	0.8525	2.257	0.7755	2.257	0.683
2.3645	1.5091	2.3645	1.0367	2.3645	0.9593	2.3645	0.9017	2.3645	0.8525	2.3645	0.7755	2.3645	0.683
2.4771	1.5091	2.4771	1.0367	2.4771	1.009	2.4771	0.9017	2.4771	0.852	2.4771	0.7697	2.4771	0.6811
2.595	1.5091	2.595	1.0367	2.595	1.009	2.595	0.9017	2.595	0.8387	2.595	0.7357	2.595	0.6811

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%	2%	3%	4%	5%	7%	10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
2.7186	1.5091	2.7186	1.0367	2.7186	1.009	2.7186	0.9017
2.848	1.5091	2.848	1.0367	2.848	1.009	2.848	0.9017
2.9836	1.5091	2.9836	1.0367	2.9836	1.009	2.9836	0.9017
3.1257	1.5091	3.1257	1.0367	3.1257	0.9237	3.1257	0.9017
3.2745	1.5091	3.2745	1.0367	3.2745	0.9237	3.2745	0.9017
3.4305	1.5091	3.4305	1.0367	3.4305	0.9237	3.4305	0.9017
3.5938	1.6472	3.5938	1.0367	3.5938	0.9237	3.5938	0.9017
3.7649	1.6472	3.7649	1.1356	3.7649	0.9237	3.7649	0.9017
3.9442	1.6472	3.9442	1.1356	3.9442	0.9237	3.9442	0.906
4.132	1.6472	4.132	1.1356	4.132	0.9237	4.132	0.906
4.3288	1.6472	4.3288	1.1356	4.3288	0.9237	4.3288	0.906
4.5349	1.6472	4.5349	1.1356	4.5349	0.9237	4.5349	0.906
4.7508	1.6472	4.7508	1.1048	4.7508	0.9237	4.7508	0.906
4.977	1.6472	4.977	0.9746	4.977	0.8757	4.977	0.829
5.214	1.6472	5.214	0.9746	5.214	0.8463	5.214	0.785
5.4623	1.7798	5.4623	0.9746	5.4623	0.8463	5.4623	0.785
5.7224	1.7798	5.7224	0.9746	5.7224	0.8463	5.7224	0.785
5.9948	1.7798	5.9948	0.9746	5.9948	0.8438	5.9948	0.785
6.2803	1.7798	6.2803	0.9746	6.2803	0.8438	6.2803	0.785
6.5793	1.7798	6.5793	0.9746	6.5793	0.8438	6.5793	0.7804
6.8926	1.7798	6.8926	0.963	6.8926	0.8429	6.8926	0.7674
7.2208	1.4914	7.2208	0.935	7.2208	0.7922	7.2208	0.7331
7.5646	1.168	7.5646	0.822	7.5646	0.7632	7.5646	0.7188
7.9248	1.0987	7.9248	0.8201	7.9248	0.7623	7.9248	0.7176
8.3022	1.0987	8.3022	0.7845	8.3022	0.7283	8.3022	0.6777
8.6975	0.8935	8.6975	0.7092	8.6975	0.6368	8.6975	0.6061
9.1116	0.8935	9.1116	0.7092	9.1116	0.6368	9.1116	0.5827
9.5455	0.8763	9.5455	0.7092	9.5455	0.6368	9.5455	0.5827
10	0.8763	10	0.7092	10	0.6368	10	0.5827
10.4762	0.8603	10.4762	0.7092	10.4762	0.6368	10.4762	0.5774
10.975	0.791	10.975	0.6543	10.975	0.6067	10.975	0.5582
11.4976	0.791	11.4976	0.6543	11.4976	0.6014	11.4976	0.5519
12.045	0.6677	12.045	0.5543	12.045	0.5086	12.045	0.4716
12.6186	0.6325	12.6186	0.5145	12.6186	0.4727	12.6186	0.4409
13.2194	0.6325	13.2194	0.5025	13.2194	0.4639	13.2194	0.4269

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.6152	13.8489	0.4815	13.8489	0.433	13.8489	0.3995	13.8489	0.3896	13.8489	0.3705	13.8489	0.3527
14.5083	0.5318	14.5083	0.4455	14.5083	0.4096	14.5083	0.381	14.5083	0.3726	14.5083	0.3575	14.5083	0.3484
15.1991	0.4787	15.1991	0.4141	15.1991	0.3936	15.1991	0.3795	15.1991	0.3697	15.1991	0.3575	15.1991	0.3484
15.9228	0.4787	15.9228	0.3815	15.9228	0.3644	15.9228	0.3609	15.9228	0.358	15.9228	0.3528	15.9228	0.3467
16.681	0.4787	16.681	0.3815	16.681	0.3644	16.681	0.3544	16.681	0.3483	16.681	0.3439	16.681	0.3416
17.4753	0.4307	17.4753	0.3815	17.4753	0.3644	17.4753	0.3544	17.4753	0.3483	17.4753	0.3418	17.4753	0.337
18.3074	0.4095	18.3074	0.3431	18.3074	0.3367	18.3074	0.3354	18.3074	0.3336	18.3074	0.3315	18.3074	0.3305
19.1791	0.4095	19.1791	0.3431	19.1791	0.3349	19.1791	0.3293	19.1791	0.3262	19.1791	0.3251	19.1791	0.325
20.0923	0.3708	20.0923	0.3431	20.0923	0.3349	20.0923	0.3293	20.0923	0.3262	20.0923	0.3243	20.0923	0.323
21.049	0.3708	21.049	0.3431	21.049	0.3349	21.049	0.3293	21.049	0.3262	21.049	0.3236	21.049	0.3215
22.0513	0.3708	22.0513	0.3431	22.0513	0.3349	22.0513	0.3293	22.0513	0.3262	22.0513	0.323	22.0513	0.3199
23.1013	0.3708	23.1013	0.3431	23.1013	0.3349	23.1013	0.3293	23.1013	0.3262	23.1013	0.323	23.1013	0.3199
24.2013	0.3708	24.2013	0.3431	24.2013	0.3349	24.2013	0.3293	24.2013	0.3255	24.2013	0.3206	24.2013	0.3186
25.3536	0.3358	25.3536	0.3197	25.3536	0.3192	25.3536	0.3187	25.3536	0.3181	25.3536	0.317	25.3536	0.3164
26.5609	0.3358	26.5609	0.3169	26.5609	0.3159	26.5609	0.3158	26.5609	0.3158	26.5609	0.3155	26.5609	0.3148
27.8256	0.3358	27.8256	0.3169	27.8256	0.3159	27.8256	0.3153	27.8256	0.3149	27.8256	0.3143	27.8256	0.3137
29.1505	0.3358	29.1505	0.3165	29.1505	0.3153	29.1505	0.3142	29.1505	0.3137	29.1505	0.3132	29.1505	0.313
30.5386	0.3312	30.5386	0.3165	30.5386	0.3153	30.5386	0.3142	30.5386	0.3133	30.5386	0.3131	30.5386	0.313
31.9927	0.3297	31.9927	0.3163	31.9927	0.3146	31.9927	0.3138	31.9927	0.3132	31.9927	0.3131	31.9927	0.313
33.516	0.3144	33.516	0.3134	33.516	0.3133	33.516	0.3132	33.516	0.3132	33.516	0.3131	33.516	0.313
35.1119	0.3135	35.1119	0.3134	35.1119	0.3133	35.1119	0.3132	35.1119	0.3132	35.1119	0.3131	35.1119	0.313
36.7838	0.3134	36.7838	0.3133	36.7838	0.3132	36.7838	0.3132	36.7838	0.3132	36.7838	0.3131	36.7838	0.313
38.5353	0.3132	38.5353	0.3132	38.5353	0.3131	38.5353	0.3131	38.5353	0.3131	38.5353	0.3131	38.5353	0.313
40.3702	0.3131	40.3702	0.3131	40.3702	0.3131	40.3702	0.313	40.3702	0.313	40.3702	0.313	40.3702	0.3129
42.2924	0.313	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129
44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128
46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127
48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126
50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125



PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.3356	0.5337	0.2387	0.5337	0.2081	0.5337	0.19	0.5337	0.1796	0.5337	0.1614	0.5337	0.1401
0.5591	0.3997	0.5591	0.2762	0.5591	0.244	0.5591	0.2179	0.5591	0.1971	0.5591	0.1724	0.5591	0.1556
0.5857	0.3997	0.5857	0.2863	0.5857	0.2573	0.5857	0.2332	0.5857	0.2128	0.5857	0.1853	0.5857	0.1724
0.6136	0.3997	0.6136	0.2863	0.6136	0.2573	0.6136	0.2332	0.6136	0.2128	0.6136	0.1998	0.6136	0.1858
0.6428	0.3997	0.6428	0.2863	0.6428	0.2573	0.6428	0.2332	0.6428	0.2219	0.6428	0.2115	0.6428	0.1969
0.6734	0.411	0.6734	0.2863	0.6734	0.2574	0.6734	0.2449	0.6734	0.2378	0.6734	0.2244	0.6734	0.2072
0.7055	0.411	0.7055	0.301	0.7055	0.2757	0.7055	0.2638	0.7055	0.2534	0.7055	0.2357	0.7055	0.2156
0.7391	0.6367	0.7391	0.4169	0.7391	0.3404	0.7391	0.2927	0.7391	0.2746	0.7391	0.2445	0.7391	0.217
0.7743	0.6367	0.7743	0.4169	0.7743	0.3404	0.7743	0.3038	0.7743	0.2858	0.7743	0.2555	0.7743	0.2218
0.8111	0.6596	0.8111	0.4428	0.8111	0.386	0.8111	0.3422	0.8111	0.3081	0.8111	0.2598	0.8111	0.2218
0.8497	0.6596	0.8497	0.4428	0.8497	0.4051	0.8497	0.3738	0.8497	0.347	0.8497	0.3034	0.8497	0.256
0.8902	0.6828	0.8902	0.4451	0.8902	0.4051	0.8902	0.3738	0.8902	0.3511	0.8902	0.3194	0.8902	0.2761
0.9326	0.737	0.9326	0.5191	0.9326	0.4567	0.9326	0.411	0.9326	0.3766	0.9326	0.328	0.9326	0.2821
0.977	0.9914	0.977	0.6358	0.977	0.525	0.977	0.4553	0.977	0.408	0.977	0.3484	0.977	0.2994
1.0235	0.9914	1.0235	0.6358	1.0235	0.5662	1.0235	0.5139	1.0235	0.4702	1.0235	0.4041	1.0235	0.3384
1.0723	0.9914	1.0723	0.6668	1.0723	0.5976	1.0723	0.5399	1.0723	0.4914	1.0723	0.4166	1.0723	0.3541
1.1233	1.2606	1.1233	0.8561	1.1233	0.7168	1.1233	0.6174	1.1233	0.5433	1.1233	0.4431	1.1233	0.3633
1.1768	1.2606	1.1768	0.8561	1.1768	0.7168	1.1768	0.6174	1.1768	0.5433	1.1768	0.4467	1.1768	0.3729
1.2328	1.2606	1.2328	0.935	1.2328	0.8202	1.2328	0.7293	1.2328	0.6556	1.2328	0.5433	1.2328	0.4321
1.2916	1.2606	1.2916	1.0351	1.2916	0.8991	1.2916	0.793	1.2916	0.708	1.2916	0.5814	1.2916	0.4586
1.353	1.3319	1.353	1.0351	1.353	0.8991	1.353	0.793	1.353	0.708	1.353	0.5814	1.353	0.4631
1.4175	1.6092	1.4175	1.1325	1.4175	0.9683	1.4175	0.8621	1.4175	0.7817	1.4175	0.6627	1.4175	0.5486
1.485	1.6092	1.485	1.1325	1.485	0.9683	1.485	0.885	1.485	0.8264	1.485	0.7199	1.485	0.6006
1.5557	1.8872	1.5557	1.1818	1.5557	1.0008	1.5557	0.892	1.5557	0.8264	1.5557	0.7265	1.5557	0.6185
1.6298	1.9322	1.6298	1.3084	1.6298	1.1683	1.6298	1.0534	1.6298	0.9565	1.6298	0.8016	1.6298	0.6401
1.7074	1.9702	1.7074	1.3601	1.7074	1.2627	1.7074	1.1415	1.7074	1.0371	1.7074	0.8692	1.7074	0.7006
1.7887	2.4552	1.7887	1.4456	1.7887	1.2629	1.7887	1.1415	1.7887	1.0371	1.7887	0.8773	1.7887	0.7486
1.8738	2.4552	1.8738	1.4456	1.8738	1.2629	1.8738	1.1415	1.8738	1.0371	1.8738	0.9259	1.8738	0.788
1.963	2.4552	1.963	1.4456	1.963	1.2629	1.963	1.1498	1.963	1.0818	1.963	0.9626	1.963	0.8157
2.0565	2.4552	2.0565	1.4456	2.0565	1.2629	2.0565	1.1701	2.0565	1.1049	2.0565	0.9829	2.0565	0.8288
2.1544	2.4552	2.1544	1.4456	2.1544	1.3316	2.1544	1.2297	2.1544	1.1411	2.1544	0.9932	2.1544	0.8645
2.257	2.2367	2.257	1.4456	2.257	1.3316	2.257	1.2297	2.257	1.1534	2.257	1.0344	2.257	0.8939
2.3645	2.2367	2.3645	1.4456	2.3645	1.3316	2.3645	1.2422	2.3645	1.1724	2.3645	1.0471	2.3645	0.898
2.4771	2.2367	2.4771	1.6143	2.4771	1.3804	2.4771	1.2551	2.4771	1.1724	2.4771	1.0471	2.4771	0.898
2.595	2.138	2.595	1.6143	2.595	1.3804	2.595	1.2551	2.595	1.1724	2.595	1.0471	2.595	0.898

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
2.7186	2.138	2.7186	1.6143	2.7186	1.3804	2.7186	1.2551	2.7186	1.1724	2.7186	1.0471	2.7186	0.898
2.848	2.138	2.848	1.6143	2.848	1.3804	2.848	1.2551	2.848	1.1724	2.848	1.0471	2.848	0.898
2.9836	2.138	2.9836	1.6143	2.9836	1.3804	2.9836	1.2551	2.9836	1.1568	2.9836	1.0114	2.9836	0.8645
3.1257	2.138	3.1257	1.3773	3.1257	1.0982	3.1257	1.0035	3.1257	0.9573	3.1257	0.8829	3.1257	0.7931
3.2745	2.138	3.2745	1.2119	3.2745	1.0686	3.2745	0.9673	3.2745	0.886	3.2745	0.778	3.2745	0.7168
3.4305	1.5368	3.4305	1.0471	3.4305	0.9495	3.4305	0.8824	3.4305	0.8379	3.4305	0.7547	3.4305	0.6598
3.5938	1.5368	3.5938	1.0165	3.5938	0.898	3.5938	0.8299	3.5938	0.7946	3.5938	0.7273	3.5938	0.6376
3.7649	1.5368	3.7649	1.0165	3.7649	0.898	3.7649	0.8299	3.7649	0.7769	3.7649	0.6958	3.7649	0.6089
3.9442	1.5368	3.9442	1.0165	3.9442	0.8472	3.9442	0.7941	3.9442	0.7477	3.9442	0.6723	3.9442	0.5955
4.132	1.5368	4.132	1.0165	4.132	0.845	4.132	0.7941	4.132	0.7477	4.132	0.6723	4.132	0.5955
4.3288	1.5368	4.3288	0.9973	4.3288	0.8194	4.3288	0.7522	4.3288	0.7017	4.3288	0.6303	4.3288	0.5622
4.5349	1.5368	4.5349	0.8745	4.5349	0.7347	4.5349	0.6652	4.5349	0.6197	4.5349	0.5656	4.5349	0.5097
4.7508	1.518	4.7508	0.8745	4.7508	0.7183	4.7508	0.6169	4.7508	0.5587	4.7508	0.4909	4.7508	0.4618
4.977	1.518	4.977	0.8614	4.977	0.7025	4.977	0.6052	4.977	0.5367	4.977	0.4572	4.977	0.4284
5.214	1.3404	5.214	0.7497	5.214	0.6443	5.214	0.5421	5.214	0.5109	5.214	0.4398	5.214	0.4021
5.4623	1.3404	5.4623	0.7497	5.4623	0.6443	5.4623	0.5254	5.4623	0.5109	5.4623	0.438	5.4623	0.3783
5.7224	1.3404	5.7224	0.7497	5.7224	0.6443	5.7224	0.5254	5.7224	0.5109	5.7224	0.438	5.7224	0.3681
5.9948	1.3404	5.9948	0.7497	5.9948	0.6443	5.9948	0.5254	5.9948	0.5109	5.9948	0.438	5.9948	0.3681
6.2803	1.3404	6.2803	0.7497	6.2803	0.6443	6.2803	0.5254	6.2803	0.5109	6.2803	0.438	6.2803	0.3681
6.5793	1.3404	6.5793	0.7497	6.5793	0.6443	6.5793	0.5254	6.5793	0.5109	6.5793	0.438	6.5793	0.3681
6.8926	1.3404	6.8926	0.7497	6.8926	0.6443	6.8926	0.5254	6.8926	0.5109	6.8926	0.438	6.8926	0.3681
7.2208	1.274	7.2208	0.7497	7.2208	0.6443	7.2208	0.5254	7.2208	0.5109	7.2208	0.438	7.2208	0.3681
7.5646	1.274	7.5646	0.7455	7.5646	0.6309	7.5646	0.5254	7.5646	0.5092	7.5646	0.438	7.5646	0.3681
7.9248	1.274	7.9248	0.6003	7.9248	0.5494	7.9248	0.5064	7.9248	0.471	7.9248	0.4168	7.9248	0.3609
8.3022	1.274	8.3022	0.5659	8.3022	0.4849	8.3022	0.454	8.3022	0.4288	8.3022	0.394	8.3022	0.3594
8.6975	1.0027	8.6975	0.521	8.6975	0.4849	8.6975	0.454	8.6975	0.4288	8.6975	0.3913	8.6975	0.3536
9.1116	1.0027	9.1116	0.4701	9.1116	0.4386	9.1116	0.4105	9.1116	0.3865	9.1116	0.3654	9.1116	0.3376
9.5455	1.0027	9.5455	0.4494	9.5455	0.4069	9.5455	0.3794	9.5455	0.3652	9.5455	0.3418	9.5455	0.3167
10	0.6463	10	0.4494	10	0.4069	10	0.3794	10	0.3585	10	0.3293	10	0.3015
10.4762	0.6411	10.4762	0.4371	10.4762	0.3959	10.4762	0.3648	10.4762	0.347	10.4762	0.3169	10.4762	0.2936
10.975	0.6411	10.975	0.4085	10.975	0.3668	10.975	0.3387	10.975	0.3179	10.975	0.2923	10.975	0.2891
11.4976	0.6411	11.4976	0.3647	11.4976	0.3304	11.4976	0.3133	11.4976	0.3024	11.4976	0.2893	11.4976	0.2857
12.045	0.6411	12.045	0.3647	12.045	0.3304	12.045	0.3133	12.045	0.3024	12.045	0.2893	12.045	0.2839
12.6186	0.6411	12.6186	0.3647	12.6186	0.3304	12.6186	0.3133	12.6186	0.3024	12.6186	0.2893	12.6186	0.2831
13.2194	0.6411	13.2194	0.3647	13.2194	0.3304	13.2194	0.3133	13.2194	0.3024	13.2194	0.2893	13.2194	0.2831

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.6411	13.8489	0.3647	13.8489	0.3304	13.8489	0.3133	13.8489	0.3024	13.8489	0.2893	13.8489	0.2831
14.5083	0.6411	14.5083	0.3647	14.5083	0.3304	14.5083	0.3133	14.5083	0.3024	14.5083	0.2893	14.5083	0.2831
15.1991	0.6411	15.1991	0.3647	15.1991	0.3304	15.1991	0.3133	15.1991	0.3024	15.1991	0.2893	15.1991	0.2831
15.9228	0.6411	15.9228	0.3647	15.9228	0.3304	15.9228	0.3133	15.9228	0.3024	15.9228	0.2893	15.9228	0.2831
16.681	0.6411	16.681	0.3647	16.681	0.3304	16.681	0.3133	16.681	0.3024	16.681	0.2893	16.681	0.2831
17.4753	0.6411	17.4753	0.3647	17.4753	0.3304	17.4753	0.3133	17.4753	0.3024	17.4753	0.2893	17.4753	0.2831
18.3074	0.4714	18.3074	0.3284	18.3074	0.3152	18.3074	0.3052	18.3074	0.298	18.3074	0.2893	18.3074	0.2831
19.1791	0.4714	19.1791	0.3088	19.1791	0.2936	19.1791	0.2872	19.1791	0.2851	19.1791	0.2842	19.1791	0.2825
20.0923	0.4714	20.0923	0.3088	20.0923	0.2886	20.0923	0.2865	20.0923	0.2851	20.0923	0.2833	20.0923	0.2814
21.049	0.3824	21.049	0.2877	21.049	0.2842	21.049	0.2843	21.049	0.2836	21.049	0.2819	21.049	0.2801
22.0513	0.3824	22.0513	0.2873	22.0513	0.2834	22.0513	0.2816	22.0513	0.2806	22.0513	0.2795	22.0513	0.2783
23.1013	0.2973	23.1013	0.2832	23.1013	0.2814	23.1013	0.2802	23.1013	0.2793	23.1013	0.2779	23.1013	0.2765
24.2013	0.2947	24.2013	0.2805	24.2013	0.2788	24.2013	0.2776	24.2013	0.2768	24.2013	0.2763	24.2013	0.2756
25.3536	0.288	25.3536	0.2805	25.3536	0.2788	25.3536	0.2776	25.3536	0.2768	25.3536	0.2757	25.3536	0.2749
26.5609	0.288	26.5609	0.2805	26.5609	0.2788	26.5609	0.2776	26.5609	0.2768	26.5609	0.2757	26.5609	0.2747
27.8256	0.2867	27.8256	0.28	27.8256	0.2782	27.8256	0.2771	27.8256	0.2762	27.8256	0.2751	27.8256	0.2741
29.1505	0.2773	29.1505	0.2753	29.1505	0.2749	29.1505	0.2745	29.1505	0.2742	29.1505	0.2738	29.1505	0.2732
30.5386	0.2773	30.5386	0.2727	30.5386	0.2726	30.5386	0.2725	30.5386	0.2724	30.5386	0.2723	30.5386	0.2721
31.9927	0.2707	31.9927	0.271	31.9927	0.271	31.9927	0.2711	31.9927	0.2711	31.9927	0.2712	31.9927	0.2712
33.516	0.2707	33.516	0.2707	33.516	0.2706	33.516	0.2706	33.516	0.2706	33.516	0.2706	33.516	0.2706
35.1119	0.27	35.1119	0.27	35.1119	0.27	35.1119	0.2701	35.1119	0.2701	35.1119	0.2701	35.1119	0.2701
36.7838	0.2695	36.7838	0.2696	36.7838	0.2696	36.7838	0.2696	36.7838	0.2697	36.7838	0.2697	36.7838	0.2697
38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693
40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269
42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2688
44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685
46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683
48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681
50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679



PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.2226	0.5337	0.1617	0.5337	0.1354	0.5337	0.1157	0.5337	0.1031	0.5337	0.0875	0.5337	0.0759
0.5591	0.2226	0.5591	0.1617	0.5591	0.1354	0.5591	0.1157	0.5591	0.1031	0.5591	0.0895	0.5591	0.0761
0.5857	0.2226	0.5857	0.1617	0.5857	0.1354	0.5857	0.1157	0.5857	0.1035	0.5857	0.0957	0.5857	0.0843
0.6136	0.2226	0.6136	0.1617	0.6136	0.1354	0.6136	0.1191	0.6136	0.1123	0.6136	0.1013	0.6136	0.0887
0.6428	0.2271	0.6428	0.1635	0.6428	0.1368	0.6428	0.1191	0.6428	0.114	0.6428	0.1049	0.6428	0.0922
0.6734	0.2271	0.6734	0.1635	0.6734	0.1397	0.6734	0.1298	0.6734	0.1217	0.6734	0.1087	0.6734	0.0942
0.7055	0.2271	0.7055	0.1635	0.7055	0.1397	0.7055	0.1298	0.7055	0.1217	0.7055	0.1112	0.7055	0.0976
0.7391	0.2271	0.7391	0.1635	0.7391	0.1428	0.7391	0.1342	0.7391	0.1258	0.7391	0.1112	0.7391	0.0976
0.7743	0.3199	0.7743	0.2154	0.7743	0.1823	0.7743	0.1597	0.7743	0.1436	0.7743	0.1227	0.7743	0.1045
0.8111	0.3199	0.8111	0.2154	0.8111	0.1823	0.8111	0.1597	0.8111	0.1436	0.8111	0.1227	0.8111	0.1072
0.8497	0.3199	0.8497	0.2154	0.8497	0.1823	0.8497	0.1667	0.8497	0.1542	0.8497	0.1343	0.8497	0.1151
0.8902	0.3199	0.8902	0.2154	0.8902	0.1899	0.8902	0.1741	0.8902	0.1611	0.8902	0.1408	0.8902	0.1199
0.9326	0.4905	0.9326	0.3017	0.9326	0.2482	0.9326	0.2168	0.9326	0.1947	0.9326	0.1653	0.9326	0.1387
0.977	0.4905	0.977	0.3017	0.977	0.2482	0.977	0.2168	0.977	0.1947	0.977	0.1738	0.977	0.1524
1.0235	0.4905	1.0235	0.3017	1.0235	0.2482	1.0235	0.2168	1.0235	0.1947	1.0235	0.1823	1.0235	0.1634
1.0723	0.4905	1.0723	0.3017	1.0723	0.2637	1.0723	0.2423	1.0723	0.2253	1.0723	0.1992	1.0723	0.1725
1.1233	0.5817	1.1233	0.3433	1.1233	0.2704	1.1233	0.2423	1.1233	0.2253	1.1233	0.1992	1.1233	0.1725
1.1768	0.5817	1.1768	0.3818	1.1768	0.3175	1.1768	0.2803	1.1768	0.2507	1.1768	0.2165	1.1768	0.1887
1.2328	0.5817	1.2328	0.3891	1.2328	0.3511	1.2328	0.3196	1.2328	0.293	1.2328	0.2534	1.2328	0.2151
1.2916	0.5817	1.2916	0.4229	1.2916	0.3735	1.2916	0.3328	1.2916	0.3047	1.2916	0.2628	1.2916	0.2219
1.353	0.6371	1.353	0.4229	1.353	0.3735	1.353	0.3371	1.353	0.3183	1.353	0.2864	1.353	0.2496
1.4175	0.6371	1.4175	0.4229	1.4175	0.3787	1.4175	0.3589	1.4175	0.341	1.4175	0.3097	1.4175	0.2727
1.485	0.6371	1.485	0.4494	1.485	0.4202	1.485	0.3933	1.485	0.3686	1.485	0.3278	1.485	0.2853
1.5557	0.6371	1.5557	0.4814	1.5557	0.4509	1.5557	0.4238	1.5557	0.3991	1.5557	0.3558	1.5557	0.3055
1.6298	0.7646	1.6298	0.499	1.6298	0.46	1.6298	0.4334	1.6298	0.4095	1.6298	0.3689	1.6298	0.3214
1.7074	0.8139	1.7074	0.632	1.7074	0.5602	1.7074	0.5042	1.7074	0.458	1.7074	0.3899	1.7074	0.3341
1.7887	0.9195	1.7887	0.7556	1.7887	0.6777	1.7887	0.6117	1.7887	0.5549	1.7887	0.4736	1.7887	0.3952
1.8738	0.9711	1.8738	0.7836	1.8738	0.7098	1.8738	0.6502	1.8738	0.6034	1.8738	0.5221	1.8738	0.4298
1.963	1.1224	1.963	0.8714	1.963	0.7675	1.963	0.7007	1.963	0.6427	1.963	0.5486	1.963	0.4456
2.0565	1.2768	2.0565	0.9218	2.0565	0.8205	2.0565	0.7381	2.0565	0.6713	2.0565	0.567	2.0565	0.4588
2.1544	1.2768	2.1544	0.9218	2.1544	0.8205	2.1544	0.7381	2.1544	0.6713	2.1544	0.567	2.1544	0.4588
2.257	1.2768	2.257	0.9218	2.257	0.8205	2.257	0.7381	2.257	0.6756	2.257	0.5786	2.257	0.4821
2.3645	1.8982	2.3645	1.0227	2.3645	0.8284	2.3645	0.7528	2.3645	0.6902	2.3645	0.5876	2.3645	0.4962
2.4771	2.2619	2.4771	1.215	2.4771	0.9875	2.4771	0.8191	2.4771	0.7265	2.4771	0.6267	2.4771	0.5235
2.595	2.7147	2.595	1.215	2.595	1.0799	2.595	0.8772	2.595	0.7512	2.595	0.6435	2.595	0.5443

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%	2%	3%	4%	5%	7%	10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
2.7186	2.7147	2.7186	1.215	2.7186	1.0799	2.7186	0.8772
2.848	2.7147	2.848	1.215	2.848	1.0799	2.848	0.8772
2.9836	2.7147	2.9836	1.215	2.9836	1.0799	2.9836	0.8772
3.1257	2.7147	3.1257	1.215	3.1257	1.0799	3.1257	0.8772
3.2745	1.5417	3.2745	0.9998	3.2745	0.8571	3.2745	0.7497
3.4305	1.3529	3.4305	0.9515	3.4305	0.8527	3.4305	0.7497
3.5938	1.3529	3.5938	0.9515	3.5938	0.8527	3.5938	0.7497
3.7649	1.3529	3.7649	0.9515	3.7649	0.8527	3.7649	0.7497
3.9442	1.3529	3.9442	0.9515	3.9442	0.8527	3.9442	0.7497
4.132	1.3529	4.132	0.9515	4.132	0.8527	4.132	0.7497
4.3288	1.3529	4.3288	0.9515	4.3288	0.8527	4.3288	0.7497
4.5349	1.3529	4.5349	0.9515	4.5349	0.8527	4.5349	0.7497
4.7508	1.3529	4.7508	0.9515	4.7508	0.8527	4.7508	0.7497
4.977	1.3529	4.977	0.9515	4.977	0.8527	4.977	0.7497
5.214	1.3529	5.214	0.9515	5.214	0.8527	5.214	0.7717
5.4623	1.7018	5.4623	1.0022	5.4623	0.8819	5.4623	0.7998
5.7224	2.0139	5.7224	1.1678	5.7224	0.9985	5.7224	0.8801
5.9948	2.0139	5.9948	1.1824	5.9948	1.0061	5.9948	0.9321
6.2803	2.0139	6.2803	1.1985	6.2803	1.0822	6.2803	1.0006
6.5793	2.0139	6.5793	1.2079	6.5793	1.1156	6.5793	1.0368
6.8926	2.8655	6.8926	1.5914	6.8926	1.338	6.8926	1.1976
7.2208	3.1519	7.2208	1.7665	7.2208	1.4894	7.2208	1.3335
7.5646	3.4088	7.5646	1.9808	7.5646	1.7109	7.5646	1.5432
7.9248	3.7732	7.9248	2.5319	7.9248	2.1034	7.9248	1.8073
8.3022	4.5641	8.3022	2.6088	8.3022	2.171	8.3022	1.915
8.6975	4.6879	8.6975	2.6088	8.6975	2.171	8.6975	1.915
9.1116	4.6879	9.1116	2.6088	9.1116	2.171	9.1116	1.915
9.5455	4.6879	9.5455	2.6088	9.5455	2.171	9.5455	1.915
10	4.6879	10	2.6088	10	2.171	10	1.915
10.4762	4.6879	10.4762	2.6088	10.4762	2.171	10.4762	1.915
10.975	4.6879	10.975	2.6088	10.975	2.171	10.975	1.915
11.4976	5.7083	11.4976	2.5137	11.4976	1.9646	11.4976	1.756
12.045	5.7083	12.045	2.5137	12.045	1.9119	12.045	1.5798
12.6186	5.7083	12.6186	2.5137	12.6186	1.9119	12.6186	1.5798
13.2194	5.7083	13.2194	2.5137	13.2194	1.9119	13.2194	1.5659

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
13.8489	5.7083	13.8489	2.5137	13.8489	1.9119	13.8489	1.5659	13.8489	1.387	13.8489	1.1818	13.8489	1.1653	
14.5083	4.6777	14.5083	2.3117	14.5083	1.7577	14.5083	1.5659	14.5083	1.387	14.5083	1.1818	14.5083	1.1114	
15.1991	4.6777	15.1991	2.3117	15.1991	1.7366	15.1991	1.537	15.1991	1.387	15.1991	1.1818	15.1991	1.1032	
15.9228	4.6777	15.9228	2.3117	15.9228	1.7366	15.9228	1.537	15.9228	1.387	15.9228	1.1644	15.9228	1.1032	
16.681	4.6777	16.681	2.3117	16.681	1.7366	16.681	1.537	16.681	1.387	16.681	1.1644	16.681	1.1032	
17.4753	4.6777	17.4753	2.3117	17.4753	1.7366	17.4753	1.537	17.4753	1.387	17.4753	1.1644	17.4753	1.1032	
18.3074	2.7677	18.3074	1.962	18.3074	1.6751	18.3074	1.512	18.3074	1.3789	18.3074	1.1644	18.3074	0.9852	
19.1791	1.9267	19.1791	1.4264	19.1791	1.3108	19.1791	1.2176	19.1791	1.1358	19.1791	1.0227	19.1791	0.8897	
20.0923	1.2493	20.0923	1.0816	20.0923	1.0133	20.0923	0.9536	20.0923	0.9008	20.0923	0.8109	20.0923	0.7479	
21.049	1.2493	21.049	0.9073	21.049	0.828	21.049	0.7844	21.049	0.7563	21.049	0.7314	21.049	0.706	
22.0513	0.993	22.0513	0.7974	22.0513	0.7401	22.0513	0.6995	22.0513	0.6943	22.0513	0.6838	22.0513	0.668	
23.1013	0.6779	23.1013	0.6627	23.1013	0.6574	23.1013	0.6529	23.1013	0.6489	23.1013	0.6416	23.1013	0.6313	
24.2013	0.6151	24.2013	0.6095	24.2013	0.6076	24.2013	0.6061	24.2013	0.6047	24.2013	0.6017	24.2013	0.5969	
25.3536	0.5629	25.3536	0.5604	25.3536	0.5634	25.3536	0.5654	25.3536	0.5667	25.3536	0.5677	25.3536	0.5671	
26.5609	0.5491	26.5609	0.542	26.5609	0.5413	26.5609	0.5411	26.5609	0.5413	26.5609	0.5421	26.5609	0.5428	
27.8256	0.5375	27.8256	0.5118	27.8256	0.5123	27.8256	0.5158	27.8256	0.5181	27.8256	0.5209	27.8256	0.5232	
29.1505	0.5375	29.1505	0.5118	29.1505	0.5069	29.1505	0.5051	29.1505	0.5048	29.1505	0.5057	29.1505	0.5077	
30.5386	0.4891	30.5386	0.4832	30.5386	0.4826	30.5386	0.4854	30.5386	0.4884	30.5386	0.4922	30.5386	0.4954	
31.9927	0.4891	31.9927	0.4832	31.9927	0.4826	31.9927	0.4828	31.9927	0.4834	31.9927	0.4847	31.9927	0.4867	
33.516	0.4797	33.516	0.4786	33.516	0.4785	33.516	0.4785	33.516	0.4787	33.516	0.4791	33.516	0.48	
35.1119	0.4732	35.1119	0.4733	35.1119	0.4733	35.1119	0.4733	35.1119	0.4734	35.1119	0.4736	35.1119	0.474	
36.7838	0.4677	36.7838	0.4679	36.7838	0.4679	36.7838	0.468	36.7838	0.4681	36.7838	0.4683	36.7838	0.4686	
38.5353	0.4628	38.5353	0.4629	38.5353	0.463	38.5353	0.4631	38.5353	0.4632	38.5353	0.4633	38.5353	0.4636	
40.3702	0.4584	40.3702	0.4585	40.3702	0.4585	40.3702	0.4586	40.3702	0.4586	40.3702	0.4588	40.3702	0.459	
42.2924	0.4543	42.2924	0.4544	42.2924	0.4544	42.2924	0.4545	42.2924	0.4545	42.2924	0.4547	42.2924	0.4548	
44.3062	0.4505	44.3062	0.4506	44.3062	0.4507	44.3062	0.4507	44.3062	0.4507	44.3062	0.4509	44.3062	0.451	
46.4159	0.4471	46.4159	0.4471	46.4159	0.4472	46.4159	0.4472	46.4159	0.4472	46.4159	0.4473	46.4159	0.4475	
48.626	0.4439	48.626	0.4439	48.626	0.4439	48.626	0.4439	48.626	0.444	48.626	0.444	48.626	0.4442	
50.9414	0.4408	50.9414	0.4408	50.9414	0.4408	50.9414	0.4408	50.9414	0.4409	50.9414	0.4409	50.9414	0.4411	



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
**24590-PTF-ME-FEP-COND-00001B**

Data Sheet No.  
**24590-PTF-MED-FEP-00004**

Project:	<b>RPP-WTP</b>	Description:	<b>Waste Feed Evaporator Primary Condenser</b>
Project No:	<b>24590</b>	P&ID:	<b>24590-PTF-M6-FEP-00005001</b>
Site:	<b>Hanford</b>	Process Data Sh#:	<b>24590-QL-POA-MEVV-00001-04-04</b>
Process flow diagram:	<b>24590-PTF-M5-V17T-00004002</b>	Manufacturer Name:	<b>Framatome ANP / UST&amp;D</b>

**ISSUED BY  
RPP-WTP PDC**



**General Data**

Quality Level	<b>Q (See Note 10)</b>	TEMA (Class/Type)	<b>B</b>
Seismic Category	<b>SC-I</b>	Flow Type (Counter current, etc)	<b>8 PASS</b>
Design Code	<b>ASME VIII Div 1</b>	Heat Exchanger Duty Btu/hr	<b>17,165,333</b>
Code Stamp	<b>Yes</b>	Heat Exchanger Area ft <sup>2</sup>	<b>3795</b>
NB Registration	<b>Yes</b>	ΔT (LMTD/Corrected LMTD) °F	<b>18</b>

**Thermal/Hydraulic Data**

	Shell Side		Tube Side	
	In	Out	In	Out
Fluid Name	<b>Steam</b>		<b>Cooling Water</b>	
Fluid Quantities: Total lbm/hr	<b>16,579</b>		<b>948,613</b>	
Condensable Vapor (In/Out)	<b>16537</b>	<b>103</b>	<b>0</b>	<b>N/A</b>
Liquid	<b>0</b>	<b>16,434</b>	<b>948,613</b>	<b>948,613</b>
Noncondensable	<b>42.7</b>	<b>42.7</b>	<b>0</b>	
Temperature (In/Out) °F	<b>105.1</b>	<b>105.1</b>	<b>75</b>	<b>93</b>
Specific Gravity	<b>0.003</b>	<b>N/A</b>	<b>62.18</b>	<b>N/A</b>
Viscosity Cp	<b>0.004</b>	<b>N/A</b>	<b>0.818</b>	<b>N/A</b>
Molecular Weight	<b>18.02</b>	<b>18.02</b>	<b>N/A</b>	<b>N/A</b>
Molecular Weight, Noncondensable	<b>29</b>	<b>29</b>	<b>N/A</b>	<b>N/A</b>
Specific Heat Btu/lbm-°F	<b>N/A</b>	<b>N/A</b>	<b>1.0</b>	<b>N/A</b>
Thermal Conductivity Btu/hr-ft-°F	<b>N/A</b>	<b>N/A</b>	<b>0.355</b>	<b>N/A</b>
Latent Heat Btu/lbm @ °F	<b>1121.1</b>	<b>78.6</b>	<b>43.07</b>	<b>61.05</b>
Inlet pressure psia	<b>1.11</b>		<b>59.7</b>	
Tube side Velocity ft/s	<b>N/A</b>		<b>7.14</b>	
Pressure Drop (Allowed) psi	<b>0.093</b>		<b>22.6</b>	
Fouling Resistance (Min) hr-ft <sup>2</sup> -°F/Btu	<b>0.0015</b>		<b>0.001</b>	

**Mechanical Data**

	Shell Side		Tube Side	
Design Pressure (Max/Min) psig	<b>50</b>	<b>Full vacuum</b>	<b>100</b>	<b>Full vacuum</b>
Design Temperature (Max/Min) °F	<b>150</b>	<b>49</b>	<b>150</b>	<b>49</b>
Corrosion Allowance inch	<b>0.04</b>		<b>0.04</b>	
Erosion Allowance inch	<b>N/A</b>		<b>N/A</b>	
Shell OD/ID inch	<b>57 ID</b>		Overall Dimensions (H x W x L) inch	<b>115 3/4 x 72 3/4 x 282 13/16</b>
Total Number of Tubes	<b>1152</b>		Tube OD inch	<b>1</b>

**Material Data**

Shell	<b>SA 240 316 SS (max. carbon 0.030%)</b>	Shell Cover	<b>SA 240 316 SS (max. carbon 0.030%)</b>
Channel/Bonnet	<b>SA 240 316 SS (max. carbon 0.030%)</b>	Channel Cover	<b>SA 240 316 SS (max. carbon 0.030%)</b>
Tube	<b>SA 213 316 SML SS (max. carbon 0.030%)</b>	Floating Head Cover	<b>N/A</b>
Stationary Tube Sheet	<b>SA 240 316 SS (max. carbon 0.030%)</b>	Floating Tube Sheet	<b>N/A</b>
Shell Side Gaskets	<b>N/A</b>	Tube Side Gaskets	<b>SA 240 316 SS Spiral Wound w/PTFE Filler</b>
Partition Seals	<b>N/A</b>	Baffles/Supports	<b>SA 240 316 SS Max Carbon 0.030%</b>
Insulation	<b>N/A</b>	Forgings (Shell side)	<b>N/A</b>
Bolting	<b>SA-193 Gr B8M</b>	Forgings (Channel)	<b>N/A</b>



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
24590-PTF-ME-FEP-COND-00001B

Data Sheet No.  
24590-PTF-MED-FEP-00004

**Construction Data** (To be determined by the supplier when not specified by the buyer)

Cross Baffle Type	(4)	% Baffle Cut (Dia.)	29.5%	Spacing (c/c) inch	15 11-5/8"
Bypass Seal Arrangement	N/A	Longitudinal Seal Type	N/A	Expansion Joint Type	(5)
Inlet Nozzle pV <sup>2</sup>	By Others	Bundle Entrance pV <sup>2</sup>	By Others	Bundle Exit pV <sup>2</sup>	By Others
Tube Support Type	Baffle & Axi-Grid	U-bend Support Type	N/A	Weight of Bundle lbf	16,000 (Tubes only)
Operating Weight lbf	46,500	Full of Water lbf	74,500	Weight of Shell lbf	17,000 (6)

**Notes**

- (1) All welds are continuous to avoid crevices, weld surface finish is descaled as laid.
- (2) Tube to tubesheet joint shall be strength welded.
- (3) All welded construction on Process side only.
- (4) Double segmental with Axi-Grid.
- (5) Inherent steam Bustle Construction.
- (6) Dry Weight Less Tubes.
- (7) Deleted.
- (8) For nozzles, see 24590-PTF-3PS-MEVV-T0001.
- (9) Deleted.
- (10) Vendor will provide item at BNI quality level Q specification, which corresponds with vendor quality level QL-2.
- (11) Equipment Cyclic Data is from document 24590-QL-POA-MEVV-00001-04-03.
- (12) Vendor Design Process information is from document 24590-QL-POA-MEVV-00001-02-00056.
- (13) Empty weight is 34,500 lbs.
- (14) Contents of this document are Dangerous Waste Permit Affecting. <sup>3</sup>
- (15) The physical design parameters shall be determined by the seller based on TEMA and HEI standards.
- (16) Please note 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) 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.

Safety screening / evaluation required?  Yes  No If yes per 24590-WTP-GPP-SREG-002, E&NS signature required below.

Rev	Description	By	Checked	EN&S	Approved	Date
3	Updated to reflect WSGM analysis, 24590-PTF-U0N-W16T-00003 and incorporate DOE AEA note (16).	D. Tate	[Signature]	Burt Ball	J. Julyk	2/19/09
2	Incorporated Vendor Design Changes and Equipment Qualification data	R. Rickenbach	C. Knauss	S. Woolfolk	J. Julyk	07/22/2008
1	Incorporated Vendor Design	E. Le	R. Nowak	N/A	J. Julyk	04/04/2005
0	Issued for Procurement	E. Le	S. Shah	N/A	J. Julyk	04/30/2003



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00004 Rev.: 3

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Equipment Identification			
Component Tag Number	24590-PTF-ME-FEP-COND-00001B	Safety Classification	<input checked="" type="checkbox"/> SC <input type="checkbox"/> SS <input type="checkbox"/> APC <input type="checkbox"/> SDC <input type="checkbox"/> SDS <input type="checkbox"/> RRC Note 10 $\triangle 3$
Manufacturer / Supplier	UST&D		
Requisition Number	24590-QL-POA-MEVV-00001		
Model	N/A	Seismic Category	<input checked="" type="checkbox"/> SC-I <input type="checkbox"/> SC-II <input type="checkbox"/> SC-III <input type="checkbox"/> SC-IV Note 10 $\triangle 3$
Description (Include descriptive text [e.g., location, elevation])	Waste Feed Evaporator Primary Condensor, Room P-0304, elevation 56'-0"		
Safety Function(s)	Detect and divert (recycle) contaminated process condensate to the waste feed evaporator separator vessel following a separator carryover event. (ref. 1) $\triangle 3$ Prevent post seismic disruption of H2 vessel purge air pathways, spread of contamination into C3 areas from PVP blowback. (ref. 1) $\triangle 3$ Confinement (ref. 1) $\triangle 3$		
Seismic Safety Function	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Room Number(s): P-0304	
Maintenance Accessible	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Method of Maintenance Access: <input type="checkbox"/> Remote <input checked="" type="checkbox"/> Hands On <input type="checkbox"/> None	
Seismic Operability Requirements: $\triangle 3$ <input type="checkbox"/> During Seismic Event $\triangle 3$ <input type="checkbox"/> After Seismic Event			
ITS Equipment Type: <input checked="" type="checkbox"/> Passive Mechanical <input type="checkbox"/> Active Mechanical <input type="checkbox"/> Electrical			

Equipment Environmental Qualification (EEQ)					
Environment	<input type="checkbox"/> Mild <input checked="" type="checkbox"/> Harsh	Hi Rad Service	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Design Life (yrs)	<input checked="" type="checkbox"/> 40 <input type="checkbox"/> Other _____
Contamination Class:	<u>C3</u>				
Radiation Class:	<u>R3</u>				
Parameter Type/Units	Parameter Value	Time Duration (number)	Time Units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Normal</b>					
Normal High Temperature (°F)	95	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal Low Temperature (°F)	59	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal High Relative Humidity (%RH)	100	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Relative Humidity (%RH)	10	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal High Pressure (in.-w.g.)	0	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Pressure (in.-w.g.)	-0.4	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Radiation Dose Rate (mR/hr)	10	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Vibration Magnitude (g)	N/A	N/A	N/A	N/A	Note 1
Vibration Frequency (Hz)	N/A	N/A	N/A	N/A	Note 1
Additional Normal Information:		See Note 2 for pressure units.			



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00004 Rev.: 3

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## Equipment Environmental Qualification (EEQ) (continued)

Parameter Type/Units	Parameter Value	Time Duration (number)	Time units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Abnormal</b>					
Abnormal High Temperature (°F)	△ <sub>3</sub> 117	8	hr/yr	24590-PTF-U0D-W16T-00001, Note 6 △ <sub>3</sub>	Note 1
Abnormal Low Temperature (°F)	59	8	hr/yr	24590-WTP-DB-ENG-01-001, Notes 6 & 8	Note 1
Abnormal High Relative Humidity (%RH)	100	24	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Relative Humidity (%RH)	2	22	hr/yr	24590-PTF-U0D-W16T-00001, Note 9 △ <sub>3</sub>	Note 1
Abnormal High Pressure (in.-w.g.)	4	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Pressure (in.-w.g.)	-7.3	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Radiation Dose Rate (mR/hr)	10, Note 3	△ <sub>3</sub> 0	△ <sub>3</sub> hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Wet Sprinkler System Present	YES	△ <sub>3</sub> 2	△ <sub>3</sub> hr	24590-PTF-U0D-W16T-00001	Note 1
Additional Abnormal Information	See Note 2 for pressure units.				
<b>Design Basis Events (DBE)</b>					
DBE High Temperature (°F)	131	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6 & 9 △ <sub>3</sub>	Note 1
DBE Low Temperature (°F)	40	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
DBE High Relative Humidity (%RH)	100	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Relative Humidity (%RH)	8	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE High Pressure (in.-w.g.)	4	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Pressure (in.-w.g.)	-7.3	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Radiation Dose Rate (mR/hr)	10, Note 3	△ <sub>3</sub> 0	△ <sub>3</sub> hrs	24590-PTF-U0D-W16T-00001	Note 1
Flood Height (ft)	0.67	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
Submergence (ft)	0, Note 4	1000	hrs	24590-PTF-U0D-W16T-00001 24590-QL-POA-MEVV-00001-01-00825 △ <sub>3</sub>	Note 1
Chemical/Spray Exposure	Yes	12.5	hrs	24590-PTF-U0D-W16T-00001	Note 1
Additional DBE Information	See Note 2 for pressure units.				



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00004 Rev.: 3

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DBE Chemical Exposure Details	
DBE Chemical Types/Concentrations	2M Sodium Hydroxide $\triangle 3$ Antifoam Agent 2M Nitric Acid $\triangle 3$

Interfaces (Electrical)	
Power Supply Voltage (VAC, VDC)	N/A
Power Supply Frequency (Hz)	N/A
Power Connection Method	N/A
I/O Signals to/from Equipment	N/A
I/O Connection Method	N/A

Interfaces (Mechanical)	
Mounting Configuration (orientation)	TBD
Mounting Method (bolts, welds, etc.)	Anchor Bolts, FEP-SKID-00001B, 24590-PTF-DB-S13T-00051 $\triangle 3$
Auxiliary Devices	N/A

Equipment Seismic Qualification (ESQ)				
Parameter	Title	Reference/Document Number	Version / Revision	Remarks
WTP Seismic Design Specification (BUYER)	Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks	24590-WTP-3PS-SS90-T0001	002	N/A
Specified Seismic Load (BUYER)	Seismic Analysis of Pretreatment Building - WSGM In-Structure Response Spectre (ISRS) $\triangle 3$	24590-PTF-S0C-S15T-00057 $\triangle 3$	00A $\triangle 3$	Calculation is not included in MR, see attached figures 37, 38 and 121 per CCN 185267. $\triangle 3$
Design Seismic Load (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Method (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Report Number (SELLER)	Note 1	Note 1	Note 1	Note 1
Submittal Number (BUYER)	TBD	TBD	TBD	N/A



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00004 Rev.: 3

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## Notes and Additional Information

### Notes

1. Data to be provided by SELLER through the submittal process as required on the G-321E.
2. Where pressure is given in inches of water column (in-w.c.) in the source document, it is generally assumed that this is in reference to atmospheric pressure and is therefore equivalent to inches of water gage (in-w.g.).
3. Abnormal and DBE Radiation dose rates are set equal to normal and do not contribute to the Total Integrated Dose.
4. Submergence depth is the difference between the lowest point on the equipment and the flood depth above the floor. The submergence depth is set to zero if the lowest section of the equipment is above the flood depth.
5. Environmental data from reference 3 is for room environment only.
6. For application of AISC N690, the normal temperatures are not used. Abnormal temperatures shall be applied as Normal Operation Temperature,  $T_O$ , with seismic effects,  $E_S$ . The Design basis event temperature shall be applied as a Thermal Load generated by a postulated accident,  $T_A$ , without seismic effects,  $E_S$  or  $E_o$ .
7. The equipment qualification will be documented in accordance with the requirements in Appendix D of Engineering Specification for Environmental Qualification of Mechanical Equipment, document number 24590-WTP-3PS-G000-T0015 for the passive and active safety functions.
8. Abnormal low temperature, as calculated in reference 3, is based on a Loss of Heating Accident (LOHA) which occurs when steam supply to the building is lost. Since the evaporators are run on steam, this would cause the evaporators to go off-line. Abnormal low temperature will be based on reference 4 at 59°F.
9. Parameter value used on data sheet has been previously established and determined more conservative than values  $\triangle 3$  derived from the reference document noted.
10. For commercial reasons, safety and seismic classification may be higher than elsewhere documented, and therefore  $\triangle 3$  conservative.

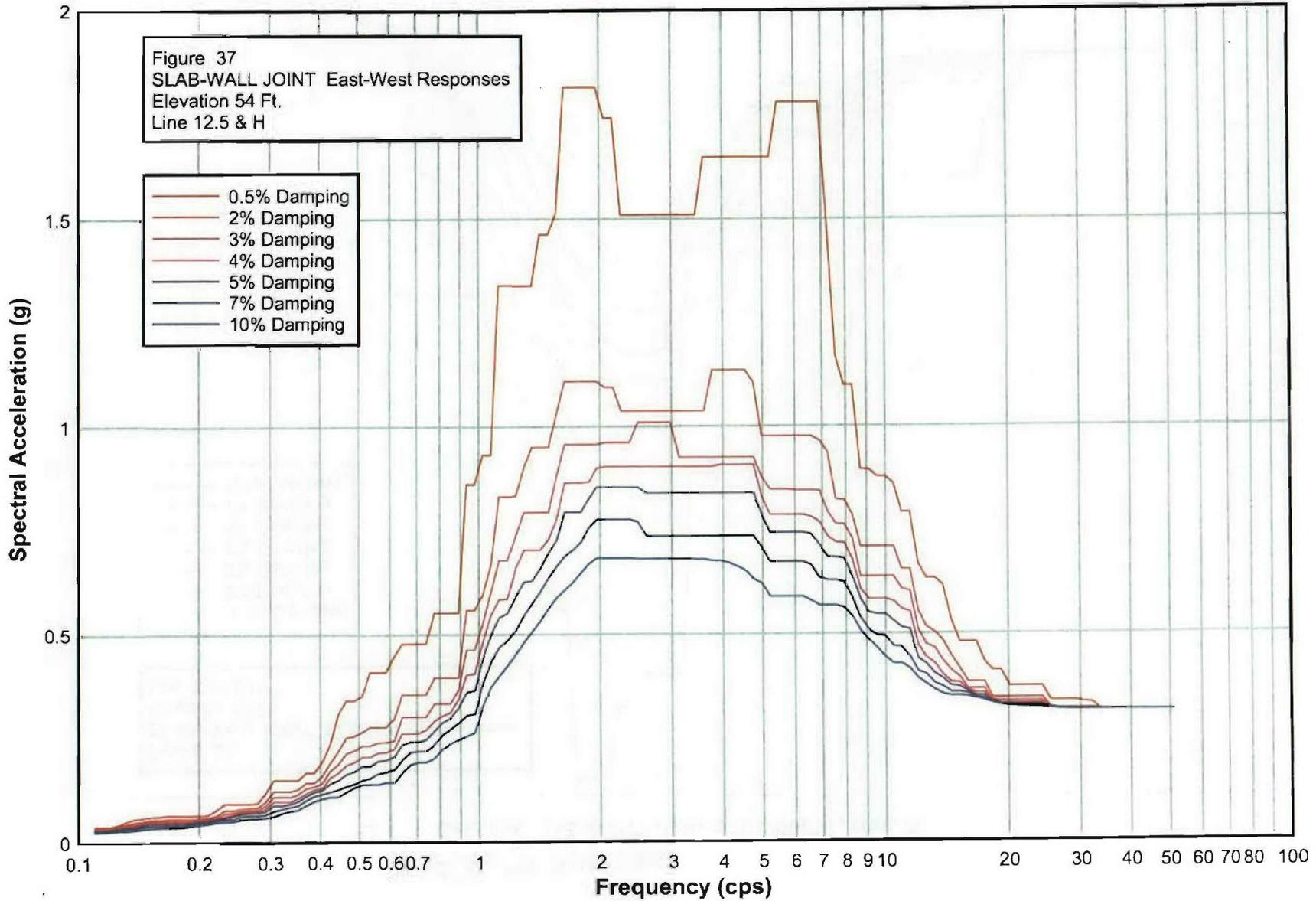
### Reference

1. 24590-WTP-PSAR-ESH-01-002-02, Rev. 04A, Preliminary documented safety analysis to support construction  $\triangle 3$  authorization; PT facility specific information.
2. CCN #096661, FEP and CNP Evaporator Vent Problems with New PVP Isolation Valve.
3. 24590-PTF-U0D-W16T-00001, Rev. 0, PTF Room Environment Datasheet.
4. 24590-WTP-DB-ENG-01-001, Rev. 1M, Basis Of Design.  $\triangle 3$
5. 24590-PTF-U0N-W16T-00001, Add data for room P-0427. Incorporate additional steam break analysis.  $\triangle 3$
6. 24590-PTF-U0N-W16T-00003, Revised temperature & relative humidity data for PTF rooms.  $\triangle 3$

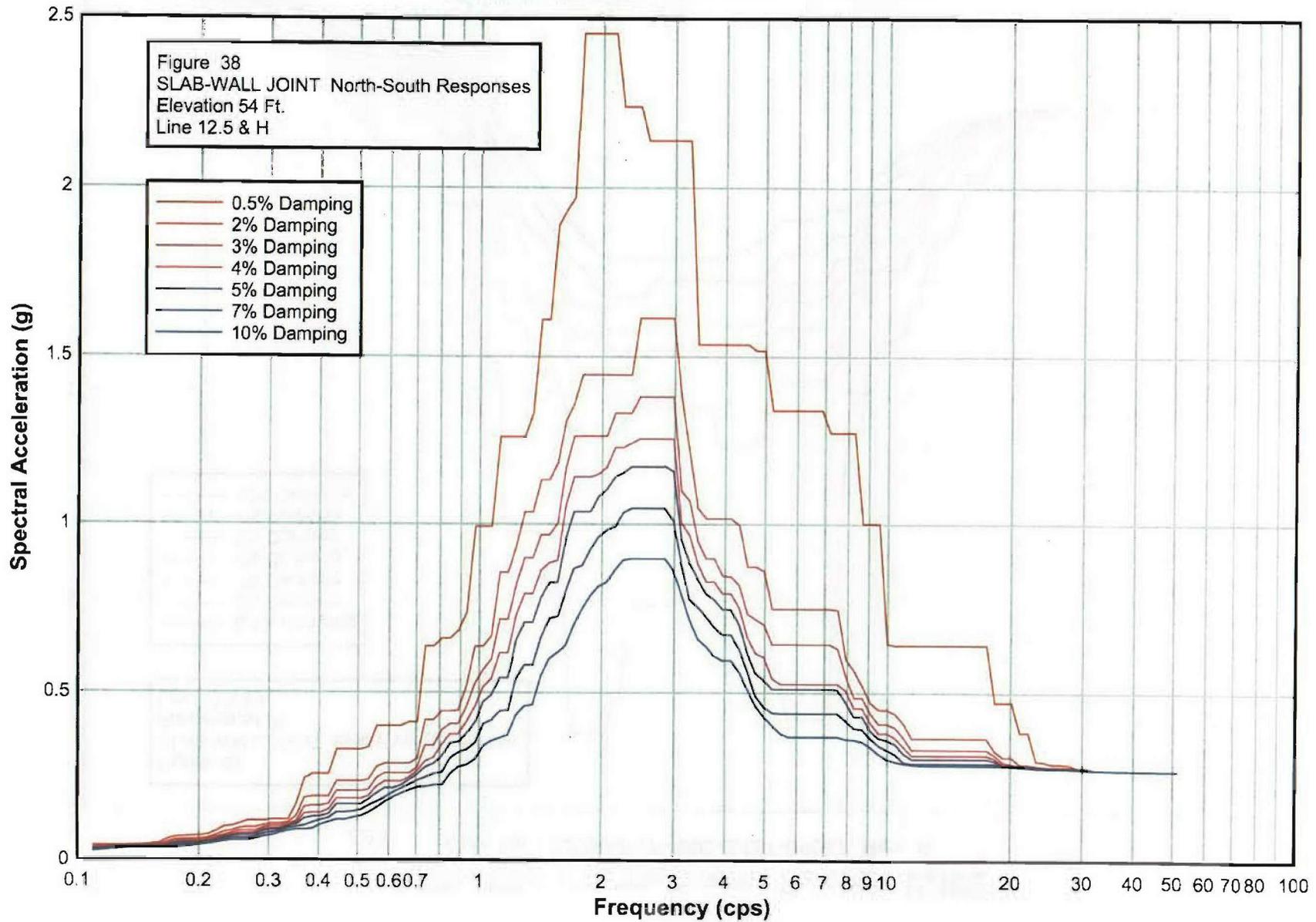
# RPP-WTP Pretreatment Facility ISRS

3

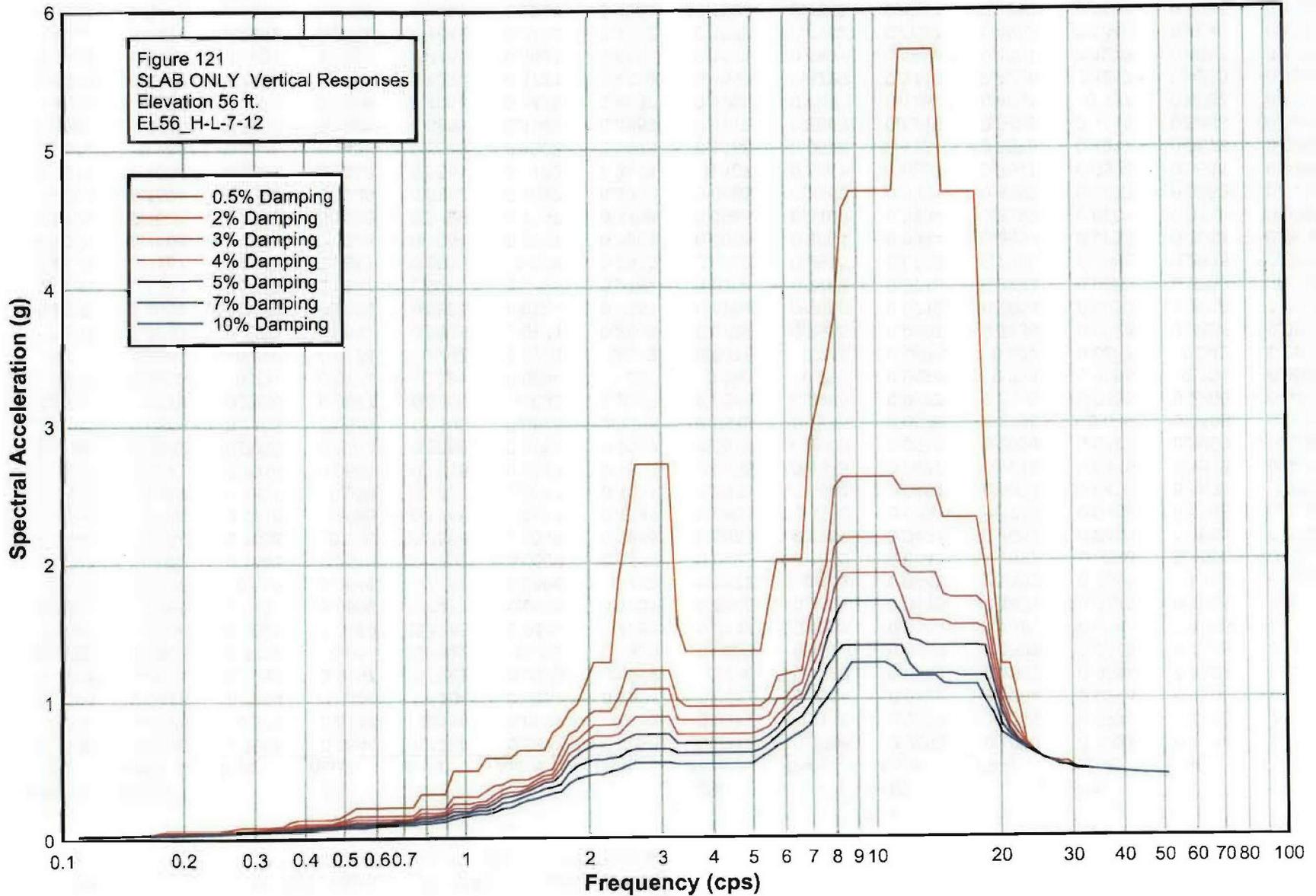
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



3 **RPP-WTP Pretreatment Facility ISRS**  
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



3 **RPP-WTP Pretreatment Facility ISRS**  
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0375	0.1098	0.0344	0.1098	0.0327	0.1098	0.0312	0.1098	0.0298	0.1098	0.0274	0.1098	0.0252
0.115	0.0375	0.115	0.0344	0.115	0.0327	0.115	0.0312	0.115	0.0299	0.115	0.0277	0.115	0.0258
0.1204	0.0375	0.1204	0.0344	0.1204	0.0331	0.1204	0.0322	0.1204	0.0312	0.1204	0.0294	0.1204	0.0269
0.1262	0.0431	0.1262	0.0397	0.1262	0.0378	0.1262	0.036	0.1262	0.0343	0.1262	0.0314	0.1262	0.0278
0.1322	0.0504	0.1322	0.045	0.1322	0.042	0.1322	0.0393	0.1322	0.0369	0.1322	0.0328	0.1322	0.0281
0.1385	0.056	0.1385	0.0489	0.1385	0.0449	0.1385	0.0414	0.1385	0.0384	0.1385	0.0344	0.1385	0.0303
0.1451	0.058	0.1451	0.0509	0.1451	0.0475	0.1451	0.0445	0.1451	0.0419	0.1451	0.0375	0.1451	0.0325
0.152	0.0616	0.152	0.0546	0.152	0.0506	0.152	0.0472	0.152	0.0442	0.152	0.0391	0.152	0.0338
0.1592	0.062	0.1592	0.0546	0.1592	0.0506	0.1592	0.0472	0.1592	0.0442	0.1592	0.0396	0.1592	0.0351
0.1668	0.064	0.1668	0.056	0.1668	0.0517	0.1668	0.0481	0.1668	0.0451	0.1668	0.0403	0.1668	0.0356
0.1748	0.064	0.1748	0.056	0.1748	0.0517	0.1748	0.0481	0.1748	0.0451	0.1748	0.0403	0.1748	0.0356
0.1831	0.064	0.1831	0.056	0.1831	0.0517	0.1831	0.0481	0.1831	0.0451	0.1831	0.0403	0.1831	0.0368
0.1918	0.0641	0.1918	0.0561	0.1918	0.0517	0.1918	0.0495	0.1918	0.0477	0.1918	0.0445	0.1918	0.0404
0.2009	0.0642	0.2009	0.0583	0.2009	0.0558	0.2009	0.0535	0.2009	0.0513	0.2009	0.0474	0.2009	0.0424
0.2105	0.0665	0.2105	0.0603	0.2105	0.0575	0.2105	0.0549	0.2105	0.0525	0.2105	0.049	0.2105	0.0448
0.2205	0.078	0.2205	0.0647	0.2205	0.062	0.2205	0.0595	0.2205	0.0573	0.2205	0.0533	0.2205	0.0484
0.231	0.0933	0.231	0.0774	0.231	0.0694	0.231	0.063	0.231	0.0598	0.231	0.0556	0.231	0.0503
0.242	0.0933	0.242	0.0774	0.242	0.0723	0.242	0.0678	0.242	0.0638	0.242	0.0567	0.242	0.0513
0.2535	0.0933	0.2535	0.0817	0.2535	0.0771	0.2535	0.0729	0.2535	0.0692	0.2535	0.0628	0.2535	0.0553
0.2656	0.0933	0.2656	0.0839	0.2656	0.0794	0.2656	0.0754	0.2656	0.0718	0.2656	0.0653	0.2656	0.0575
0.2783	0.0954	0.2783	0.0847	0.2783	0.0794	0.2783	0.0754	0.2783	0.0718	0.2783	0.0653	0.2783	0.058
0.2915	0.1187	0.2915	0.0987	0.2915	0.089	0.2915	0.0813	0.2915	0.0753	0.2915	0.0668	0.2915	0.0592
0.3054	0.1504	0.3054	0.1235	0.3054	0.1097	0.3054	0.0985	0.3054	0.0894	0.3054	0.0758	0.3054	0.0633
0.3199	0.1504	0.3199	0.1235	0.3199	0.1097	0.3199	0.0985	0.3199	0.0894	0.3199	0.0801	0.3199	0.0706
0.3352	0.1504	0.3352	0.1235	0.3352	0.1097	0.3352	0.0985	0.3352	0.0931	0.3352	0.0857	0.3352	0.0762
0.3511	0.1504	0.3511	0.1289	0.3511	0.1172	0.3511	0.107	0.3511	0.0997	0.3511	0.0894	0.3511	0.0786
0.3678	0.168	0.3678	0.1438	0.3678	0.1303	0.3678	0.1186	0.3678	0.1121	0.3678	0.1017	0.3678	0.0898
0.3853	0.168	0.3853	0.1438	0.3853	0.1346	0.3853	0.1279	0.3853	0.1219	0.3853	0.1115	0.3853	0.0992
0.4037	0.194	0.4037	0.1598	0.4037	0.1426	0.4037	0.1306	0.4037	0.1259	0.4037	0.117	0.4037	0.1054
0.4229	0.2368	0.4229	0.1906	0.4229	0.1721	0.4229	0.1558	0.4229	0.1416	0.4229	0.1217	0.4229	0.1092
0.4431	0.3088	0.4431	0.2193	0.4431	0.1881	0.4431	0.1671	0.4431	0.1496	0.4431	0.1273	0.4431	0.1097
0.4642	0.3417	0.4642	0.2524	0.4642	0.2138	0.4642	0.1852	0.4642	0.1637	0.4642	0.1345	0.4642	0.1211
0.4863	0.3417	0.4863	0.256	0.4863	0.2208	0.4863	0.1928	0.4863	0.1701	0.4863	0.1409	0.4863	0.1323
0.5094	0.3522	0.5094	0.2656	0.5094	0.2325	0.5094	0.2054	0.5094	0.1831	0.5094	0.1497	0.5094	0.1391

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.4096	0.5337	0.2771	0.5337	0.2325	0.5337	0.2054	0.5337	0.1831	0.5337	0.1539	0.5337	0.1396
0.5591	0.4096	0.5591	0.2771	0.5591	0.2398	0.5591	0.2148	0.5591	0.1949	0.5591	0.1654	0.5591	0.1396
0.5857	0.4096	0.5857	0.2771	0.5857	0.2404	0.5857	0.2159	0.5857	0.1975	0.5857	0.1686	0.5857	0.1441
0.6136	0.4475	0.6136	0.2969	0.6136	0.2444	0.6136	0.2234	0.6136	0.2051	0.6136	0.1751	0.6136	0.1441
0.6428	0.478	0.6428	0.3547	0.6428	0.3006	0.6428	0.2612	0.6428	0.2347	0.6428	0.1988	0.6428	0.168
0.6734	0.478	0.6734	0.3547	0.6734	0.3006	0.6734	0.2612	0.6734	0.2413	0.6734	0.2165	0.6734	0.1872
0.7055	0.478	0.7055	0.3547	0.7055	0.3006	0.7055	0.2612	0.7055	0.2413	0.7055	0.2186	0.7055	0.1922
0.7391	0.478	0.7391	0.3547	0.7391	0.3006	0.7391	0.2692	0.7391	0.2463	0.7391	0.2186	0.7391	0.1922
0.7743	0.5518	0.7743	0.3958	0.7743	0.3332	0.7743	0.2918	0.7743	0.268	0.7743	0.2351	0.7743	0.2018
0.8111	0.5518	0.8111	0.3958	0.8111	0.3332	0.8111	0.3035	0.8111	0.2874	0.8111	0.2587	0.8111	0.2236
0.8497	0.5518	0.8497	0.3958	0.8497	0.3332	0.8497	0.3117	0.8497	0.2984	0.8497	0.2723	0.8497	0.2373
0.8902	0.5518	0.8902	0.3958	0.8902	0.3656	0.8902	0.3431	0.8902	0.3226	0.8902	0.2873	0.8902	0.2462
0.9326	0.8605	0.9326	0.5585	0.9326	0.4629	0.9326	0.4023	0.9326	0.3602	0.9326	0.3049	0.9326	0.2549
0.977	0.8605	0.977	0.5585	0.977	0.4629	0.977	0.4045	0.977	0.3644	0.977	0.3083	0.977	0.2637
1.0235	0.9315	1.0235	0.5965	1.0235	0.5261	1.0235	0.4814	1.0235	0.4436	1.0235	0.3837	1.0235	0.3277
1.0723	0.9315	1.0723	0.6685	1.0723	0.603	1.0723	0.5467	1.0723	0.4995	1.0723	0.4355	1.0723	0.3729
1.1233	1.3398	1.1233	0.8315	1.1233	0.6788	1.1233	0.5837	1.1233	0.5408	1.1233	0.4681	1.1233	0.3987
1.1768	1.3398	1.1768	0.8315	1.1768	0.6788	1.1768	0.5855	1.1768	0.5505	1.1768	0.4858	1.1768	0.4238
1.2328	1.3398	1.2328	0.8315	1.2328	0.7369	1.2328	0.6596	1.2328	0.5925	1.2328	0.5105	1.2328	0.452
1.2916	1.3398	1.2916	0.9002	1.2916	0.7926	1.2916	0.7024	1.2916	0.6263	1.2916	0.5455	1.2916	0.4806
1.353	1.3398	1.353	0.9485	1.353	0.7926	1.353	0.7024	1.353	0.6282	1.353	0.574	1.353	0.5058
1.4175	1.4626	1.4175	0.9485	1.4175	0.7926	1.4175	0.7024	1.4175	0.6579	1.4175	0.6026	1.4175	0.5321
1.485	1.4626	1.485	0.9485	1.485	0.7926	1.485	0.7282	1.485	0.6958	1.485	0.636	1.485	0.5624
1.5557	1.5113	1.5557	1.0297	1.5557	0.8797	1.5557	0.7754	1.5557	0.726	1.5557	0.6634	1.5557	0.5886
1.6298	1.8158	1.6298	1.1086	1.6298	0.9552	1.6298	0.8627	1.6298	0.7931	1.6298	0.6875	1.6298	0.6064
1.7074	1.8158	1.7074	1.1086	1.7074	0.9552	1.7074	0.8627	1.7074	0.7931	1.7074	0.7024	1.7074	0.6246
1.7887	1.8158	1.7887	1.1086	1.7887	0.9552	1.7887	0.8627	1.7887	0.7931	1.7887	0.7213	1.7887	0.6476
1.8738	1.8158	1.8738	1.1086	1.8738	0.9552	1.8738	0.8651	1.8738	0.8263	1.8738	0.7567	1.8738	0.6698
1.963	1.8158	1.963	1.1086	1.963	0.9552	1.963	0.8972	1.963	0.8525	1.963	0.7755	1.963	0.683
2.0565	1.7414	2.0565	1.0948	2.0565	0.9593	2.0565	0.9017	2.0565	0.8525	2.0565	0.7755	2.0565	0.683
2.1544	1.7414	2.1544	1.0948	2.1544	0.9593	2.1544	0.9017	2.1544	0.8525	2.1544	0.7755	2.1544	0.683
2.257	1.5091	2.257	1.0367	2.257	0.9593	2.257	0.9017	2.257	0.8525	2.257	0.7755	2.257	0.683
2.3645	1.5091	2.3645	1.0367	2.3645	0.9593	2.3645	0.9017	2.3645	0.8525	2.3645	0.7755	2.3645	0.683
2.4771	1.5091	2.4771	1.0367	2.4771	1.009	2.4771	0.9017	2.4771	0.852	2.4771	0.7697	2.4771	0.6811
2.595	1.5091	2.595	1.0367	2.595	1.009	2.595	0.9017	2.595	0.8387	2.595	0.7357	2.595	0.6811

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
2.7186	1.5091	2.7186	1.0367	2.7186	1.009	2.7186	0.9017	2.7186	0.8387	2.7186	0.7357	2.7186	0.6811	
2.848	1.5091	2.848	1.0367	2.848	1.009	2.848	0.9017	2.848	0.8387	2.848	0.7357	2.848	0.6811	
2.9836	1.5091	2.9836	1.0367	2.9836	1.009	2.9836	0.9017	2.9836	0.8387	2.9836	0.7357	2.9836	0.6811	
3.1257	1.5091	3.1257	1.0367	3.1257	0.9237	3.1257	0.9017	3.1257	0.8387	3.1257	0.7357	3.1257	0.6811	
3.2745	1.5091	3.2745	1.0367	3.2745	0.9237	3.2745	0.9017	3.2745	0.8387	3.2745	0.7357	3.2745	0.6811	
3.4305	1.5091	3.4305	1.0367	3.4305	0.9237	3.4305	0.9017	3.4305	0.8387	3.4305	0.7357	3.4305	0.6801	
3.5938	1.6472	3.5938	1.0367	3.5938	0.9237	3.5938	0.9017	3.5938	0.8387	3.5938	0.7357	3.5938	0.6801	
3.7649	1.6472	3.7649	1.1356	3.7649	0.9237	3.7649	0.9017	3.7649	0.8387	3.7649	0.7357	3.7649	0.6766	
3.9442	1.6472	3.9442	1.1356	3.9442	0.9237	3.9442	0.906	3.9442	0.8387	3.9442	0.7357	3.9442	0.6759	
4.132	1.6472	4.132	1.1356	4.132	0.9237	4.132	0.906	4.132	0.8387	4.132	0.7357	4.132	0.6712	
4.3288	1.6472	4.3288	1.1356	4.3288	0.9237	4.3288	0.906	4.3288	0.8387	4.3288	0.7357	4.3288	0.6626	
4.5349	1.6472	4.5349	1.1356	4.5349	0.9237	4.5349	0.906	4.5349	0.8387	4.5349	0.7357	4.5349	0.6525	
4.7508	1.6472	4.7508	1.1048	4.7508	0.9237	4.7508	0.906	4.7508	0.8387	4.7508	0.7357	4.7508	0.6316	
4.977	1.6472	4.977	0.9746	4.977	0.8757	4.977	0.829	4.977	0.7851	4.977	0.7083	4.977	0.6206	
5.214	1.6472	5.214	0.9746	5.214	0.8463	5.214	0.785	5.214	0.7434	5.214	0.6732	5.214	0.5898	
5.4623	1.7798	5.4623	0.9746	5.4623	0.8463	5.4623	0.785	5.4623	0.7434	5.4623	0.6732	5.4623	0.5898	
5.7224	1.7798	5.7224	0.9746	5.7224	0.8463	5.7224	0.785	5.7224	0.7434	5.7224	0.6732	5.7224	0.5898	
5.9948	1.7798	5.9948	0.9746	5.9948	0.8438	5.9948	0.785	5.9948	0.7434	5.9948	0.6732	5.9948	0.5898	
6.2803	1.7798	6.2803	0.9746	6.2803	0.8438	6.2803	0.785	6.2803	0.7434	6.2803	0.6732	6.2803	0.5898	
6.5793	1.7798	6.5793	0.9746	6.5793	0.8438	6.5793	0.7804	6.5793	0.7393	6.5793	0.6657	6.5793	0.5795	
6.8926	1.7798	6.8926	0.963	6.8926	0.8429	6.8926	0.7674	6.8926	0.7128	6.8926	0.6345	6.8926	0.5677	
7.2208	1.4914	7.2208	0.935	7.2208	0.7922	7.2208	0.7331	7.2208	0.6844	7.2208	0.6283	7.2208	0.5677	
7.5646	1.168	7.5646	0.822	7.5646	0.7632	7.5646	0.7188	7.5646	0.6833	7.5646	0.6283	7.5646	0.5677	
7.9248	1.0987	7.9248	0.8201	7.9248	0.7623	7.9248	0.7176	7.9248	0.6811	7.9248	0.6237	7.9248	0.5627	
8.3022	1.0987	8.3022	0.7845	8.3022	0.7283	8.3022	0.6777	8.3022	0.6364	8.3022	0.5884	8.3022	0.5417	
8.6975	0.8935	8.6975	0.7092	8.6975	0.6368	8.6975	0.6061	8.6975	0.5819	8.6975	0.5373	8.6975	0.5059	
9.1116	0.8935	9.1116	0.7092	9.1116	0.6368	9.1116	0.5827	9.1116	0.5505	9.1116	0.5085	9.1116	0.4846	
9.5455	0.8763	9.5455	0.7092	9.5455	0.6368	9.5455	0.5827	9.5455	0.5459	9.5455	0.4951	9.5455	0.4643	
10	0.8763	10	0.7092	10	0.6368	10	0.5827	10	0.5459	10	0.4934	10	0.4429	
10.4762	0.8603	10.4762	0.7092	10.4762	0.6368	10.4762	0.5774	10.4762	0.5297	10.4762	0.4688	10.4762	0.4271	
10.975	0.791	10.975	0.6543	10.975	0.6067	10.975	0.5582	10.975	0.5137	10.975	0.4674	10.975	0.4271	
11.4976	0.791	11.4976	0.6543	11.4976	0.6014	11.4976	0.5519	11.4976	0.5094	11.4976	0.4435	11.4976	0.4142	
12.045	0.6677	12.045	0.5543	12.045	0.5086	12.045	0.4716	12.045	0.4394	12.045	0.4081	12.045	0.3915	
12.6186	0.6325	12.6186	0.5145	12.6186	0.4727	12.6186	0.4409	12.6186	0.4251	12.6186	0.4004	12.6186	0.3774	
13.2194	0.6325	13.2194	0.5025	13.2194	0.4639	13.2194	0.4269	13.2194	0.4021	13.2194	0.379	13.2194	0.3634	

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%	2%	3%	4%	5%	7%	10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
13.8489	0.6152	13.8489	0.4815	13.8489	0.433	13.8489	0.3995
14.5083	0.5318	14.5083	0.4455	14.5083	0.4096	14.5083	0.381
15.1991	0.4787	15.1991	0.4141	15.1991	0.3936	15.1991	0.3795
15.9228	0.4787	15.9228	0.3815	15.9228	0.3644	15.9228	0.3609
16.681	0.4787	16.681	0.3815	16.681	0.3644	16.681	0.3544
17.4753	0.4307	17.4753	0.3815	17.4753	0.3644	17.4753	0.3544
18.3074	0.4095	18.3074	0.3431	18.3074	0.3367	18.3074	0.3354
19.1791	0.4095	19.1791	0.3431	19.1791	0.3349	19.1791	0.3293
20.0923	0.3708	20.0923	0.3431	20.0923	0.3349	20.0923	0.3293
21.049	0.3708	21.049	0.3431	21.049	0.3349	21.049	0.3293
22.0513	0.3708	22.0513	0.3431	22.0513	0.3349	22.0513	0.3293
23.1013	0.3708	23.1013	0.3431	23.1013	0.3349	23.1013	0.3293
24.2013	0.3708	24.2013	0.3431	24.2013	0.3349	24.2013	0.3293
25.3536	0.3358	25.3536	0.3197	25.3536	0.3192	25.3536	0.3187
26.5609	0.3358	26.5609	0.3169	26.5609	0.3159	26.5609	0.3158
27.8256	0.3358	27.8256	0.3169	27.8256	0.3159	27.8256	0.3153
29.1505	0.3358	29.1505	0.3165	29.1505	0.3153	29.1505	0.3142
30.5386	0.3312	30.5386	0.3165	30.5386	0.3153	30.5386	0.3142
31.9927	0.3297	31.9927	0.3163	31.9927	0.3146	31.9927	0.3138
33.516	0.3144	33.516	0.3134	33.516	0.3133	33.516	0.3132
35.1119	0.3135	35.1119	0.3134	35.1119	0.3133	35.1119	0.3132
36.7838	0.3134	36.7838	0.3133	36.7838	0.3132	36.7838	0.3132
38.5353	0.3132	38.5353	0.3132	38.5353	0.3131	38.5353	0.3131
40.3702	0.3131	40.3702	0.3131	40.3702	0.3131	40.3702	0.313
42.2924	0.313	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129
44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128
46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127
48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126
50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	
0.1098	0.0405	0.1098	0.0365	0.1098	0.0342	0.1098	0.0322	0.1098	0.0303	0.1098	0.0272	0.1098	0.0235	
0.115	0.0405	0.115	0.0365	0.115	0.0342	0.115	0.0322	0.115	0.0303	0.115	0.0272	0.115	0.0259	
0.1204	0.0405	0.1204	0.0365	0.1204	0.0342	0.1204	0.0322	0.1204	0.031	0.1204	0.0297	0.1204	0.028	
0.1262	0.0405	0.1262	0.0365	0.1262	0.0352	0.1262	0.0342	0.1262	0.0334	0.1262	0.0318	0.1262	0.0297	
0.1322	0.0405	0.1322	0.0382	0.1322	0.037	0.1322	0.0359	0.1322	0.0349	0.1322	0.0333	0.1322	0.0316	
0.1385	0.0411	0.1385	0.0392	0.1385	0.0382	0.1385	0.0372	0.1385	0.0363	0.1385	0.0348	0.1385	0.0328	
0.1451	0.0417	0.1451	0.0398	0.1451	0.0387	0.1451	0.0377	0.1451	0.0368	0.1451	0.0352	0.1451	0.0332	
0.152	0.0439	0.152	0.0401	0.152	0.0387	0.152	0.0377	0.152	0.0368	0.152	0.0352	0.152	0.0332	
0.1592	0.0462	0.1592	0.0416	0.1592	0.0396	0.1592	0.0377	0.1592	0.0368	0.1592	0.0352	0.1592	0.0332	
0.1668	0.0584	0.1668	0.0506	0.1668	0.0463	0.1668	0.0426	0.1668	0.0395	0.1668	0.0352	0.1668	0.0332	
0.1748	0.0645	0.1748	0.0566	0.1748	0.0522	0.1748	0.0484	0.1748	0.045	0.1748	0.0394	0.1748	0.0332	
0.1831	0.0668	0.1831	0.0583	0.1831	0.0541	0.1831	0.0504	0.1831	0.0471	0.1831	0.0415	0.1831	0.0354	
0.1918	0.0678	0.1918	0.0586	0.1918	0.0543	0.1918	0.0507	0.1918	0.0474	0.1918	0.0418	0.1918	0.038	
0.2009	0.0697	0.2009	0.0596	0.2009	0.0543	0.2009	0.0514	0.2009	0.0487	0.2009	0.0438	0.2009	0.0411	
0.2105	0.0722	0.2105	0.062	0.2105	0.0582	0.2105	0.0547	0.2105	0.0516	0.2105	0.0482	0.2105	0.0446	
0.2205	0.0819	0.2205	0.0709	0.2205	0.0651	0.2205	0.06	0.2205	0.0574	0.2205	0.0531	0.2205	0.0475	
0.231	0.0959	0.231	0.0792	0.231	0.0703	0.231	0.0665	0.231	0.063	0.231	0.0578	0.231	0.0525	
0.242	0.0984	0.242	0.0845	0.242	0.0774	0.242	0.0721	0.242	0.0681	0.242	0.0618	0.242	0.0551	
0.2535	0.1059	0.2535	0.0913	0.2535	0.0833	0.2535	0.0763	0.2535	0.0702	0.2535	0.0618	0.2535	0.0551	
0.2656	0.1138	0.2656	0.0944	0.2656	0.084	0.2656	0.0763	0.2656	0.0702	0.2656	0.0618	0.2656	0.0551	
0.2783	0.1138	0.2783	0.0944	0.2783	0.084	0.2783	0.0779	0.2783	0.074	0.2783	0.0677	0.2783	0.0611	
0.2915	0.1138	0.2915	0.1008	0.2915	0.0946	0.2915	0.0892	0.2915	0.0843	0.2915	0.0764	0.2915	0.0677	
0.3054	0.1179	0.3054	0.1056	0.3054	0.0987	0.3054	0.0926	0.3054	0.0872	0.3054	0.0785	0.3054	0.0706	
0.3199	0.1179	0.3199	0.1056	0.3199	0.0987	0.3199	0.0926	0.3199	0.0894	0.3199	0.0844	0.3199	0.0786	
0.3352	0.1179	0.3352	0.1098	0.3352	0.1056	0.3352	0.1017	0.3352	0.0982	0.3352	0.0921	0.3352	0.0848	
0.3511	0.1654	0.3511	0.129	0.3511	0.1133	0.3511	0.1075	0.3511	0.1035	0.3511	0.0964	0.3511	0.088	
0.3678	0.2415	0.3678	0.1832	0.3678	0.1565	0.3678	0.1364	0.3678	0.1213	0.3678	0.1006	0.3678	0.088	
0.3853	0.2549	0.3853	0.187	0.3853	0.1595	0.3853	0.1387	0.3853	0.1269	0.3853	0.1092	0.3853	0.091	
0.4037	0.2549	0.4037	0.187	0.4037	0.1595	0.4037	0.1387	0.4037	0.1279	0.4037	0.1163	0.4037	0.1034	
0.4229	0.2549	0.4229	0.187	0.4229	0.1651	0.4229	0.1485	0.4229	0.1344	0.4229	0.1233	0.4229	0.1111	
0.4431	0.3288	0.4431	0.2339	0.4431	0.2038	0.4431	0.1813	0.4431	0.1641	0.4431	0.1399	0.4431	0.1181	
0.4642	0.3288	0.4642	0.2339	0.4642	0.2038	0.4642	0.1813	0.4642	0.1641	0.4642	0.1399	0.4642	0.1181	
0.4863	0.3288	0.4863	0.2339	0.4863	0.2038	0.4863	0.1813	0.4863	0.1641	0.4863	0.1421	0.4863	0.1246	
0.5094	0.3288	0.5094	0.2339	0.5094	0.2038	0.5094	0.1813	0.5094	0.1641	0.5094	0.1472	0.5094	0.1295	

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.3356	0.5337	0.2387	0.5337	0.2081	0.5337	0.19	0.5337	0.1796	0.5337	0.1614	0.5337	0.1401
0.5591	0.3997	0.5591	0.2762	0.5591	0.244	0.5591	0.2179	0.5591	0.1971	0.5591	0.1724	0.5591	0.1556
0.5857	0.3997	0.5857	0.2863	0.5857	0.2573	0.5857	0.2332	0.5857	0.2128	0.5857	0.1853	0.5857	0.1724
0.6136	0.3997	0.6136	0.2863	0.6136	0.2573	0.6136	0.2332	0.6136	0.2128	0.6136	0.1998	0.6136	0.1858
0.6428	0.3997	0.6428	0.2863	0.6428	0.2573	0.6428	0.2332	0.6428	0.2219	0.6428	0.2115	0.6428	0.1969
0.6734	0.411	0.6734	0.2863	0.6734	0.2574	0.6734	0.2449	0.6734	0.2378	0.6734	0.2244	0.6734	0.2072
0.7055	0.411	0.7055	0.301	0.7055	0.2757	0.7055	0.2638	0.7055	0.2534	0.7055	0.2357	0.7055	0.2156
0.7391	0.6367	0.7391	0.4169	0.7391	0.3404	0.7391	0.2927	0.7391	0.2746	0.7391	0.2445	0.7391	0.217
0.7743	0.6367	0.7743	0.4169	0.7743	0.3404	0.7743	0.3038	0.7743	0.2858	0.7743	0.2555	0.7743	0.2218
0.8111	0.6596	0.8111	0.4428	0.8111	0.386	0.8111	0.3422	0.8111	0.3081	0.8111	0.2598	0.8111	0.2218
0.8497	0.6596	0.8497	0.4428	0.8497	0.4051	0.8497	0.3738	0.8497	0.347	0.8497	0.3034	0.8497	0.256
0.8902	0.6828	0.8902	0.4451	0.8902	0.4051	0.8902	0.3738	0.8902	0.3511	0.8902	0.3194	0.8902	0.2761
0.9326	0.737	0.9326	0.5191	0.9326	0.4567	0.9326	0.411	0.9326	0.3766	0.9326	0.328	0.9326	0.2821
0.977	0.9914	0.977	0.6358	0.977	0.525	0.977	0.4553	0.977	0.408	0.977	0.3484	0.977	0.2994
1.0235	0.9914	1.0235	0.6358	1.0235	0.5662	1.0235	0.5139	1.0235	0.4702	1.0235	0.4041	1.0235	0.3384
1.0723	0.9914	1.0723	0.6668	1.0723	0.5976	1.0723	0.5399	1.0723	0.4914	1.0723	0.4166	1.0723	0.3541
1.1233	1.2606	1.1233	0.8561	1.1233	0.7168	1.1233	0.6174	1.1233	0.5433	1.1233	0.4431	1.1233	0.3633
1.1768	1.2606	1.1768	0.8561	1.1768	0.7168	1.1768	0.6174	1.1768	0.5433	1.1768	0.4467	1.1768	0.3729
1.2328	1.2606	1.2328	0.935	1.2328	0.8202	1.2328	0.7293	1.2328	0.6556	1.2328	0.5433	1.2328	0.4321
1.2916	1.2606	1.2916	1.0351	1.2916	0.8991	1.2916	0.793	1.2916	0.708	1.2916	0.5814	1.2916	0.4586
1.353	1.3319	1.353	1.0351	1.353	0.8991	1.353	0.793	1.353	0.708	1.353	0.5814	1.353	0.4631
1.4175	1.6092	1.4175	1.1325	1.4175	0.9683	1.4175	0.8621	1.4175	0.7817	1.4175	0.6627	1.4175	0.5486
1.485	1.6092	1.485	1.1325	1.485	0.9683	1.485	0.885	1.485	0.8264	1.485	0.7199	1.485	0.6006
1.5557	1.8872	1.5557	1.1818	1.5557	1.0008	1.5557	0.892	1.5557	0.8264	1.5557	0.7265	1.5557	0.6185
1.6298	1.9322	1.6298	1.3084	1.6298	1.1683	1.6298	1.0534	1.6298	0.9565	1.6298	0.8016	1.6298	0.6401
1.7074	1.9702	1.7074	1.3601	1.7074	1.2627	1.7074	1.1415	1.7074	1.0371	1.7074	0.8692	1.7074	0.7006
1.7887	2.4552	1.7887	1.4456	1.7887	1.2629	1.7887	1.1415	1.7887	1.0371	1.7887	0.8773	1.7887	0.7486
1.8738	2.4552	1.8738	1.4456	1.8738	1.2629	1.8738	1.1415	1.8738	1.0371	1.8738	0.9259	1.8738	0.788
1.963	2.4552	1.963	1.4456	1.963	1.2629	1.963	1.1498	1.963	1.0818	1.963	0.9626	1.963	0.8157
2.0565	2.4552	2.0565	1.4456	2.0565	1.2629	2.0565	1.1701	2.0565	1.1049	2.0565	0.9829	2.0565	0.8288
2.1544	2.4552	2.1544	1.4456	2.1544	1.3316	2.1544	1.2297	2.1544	1.1411	2.1544	0.9932	2.1544	0.8645
2.257	2.2367	2.257	1.4456	2.257	1.3316	2.257	1.2297	2.257	1.1534	2.257	1.0344	2.257	0.8939
2.3645	2.2367	2.3645	1.4456	2.3645	1.3316	2.3645	1.2422	2.3645	1.1724	2.3645	1.0471	2.3645	0.898
2.4771	2.2367	2.4771	1.6143	2.4771	1.3804	2.4771	1.2551	2.4771	1.1724	2.4771	1.0471	2.4771	0.898
2.595	2.138	2.595	1.6143	2.595	1.3804	2.595	1.2551	2.595	1.1724	2.595	1.0471	2.595	0.898

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
2.7186	2.138	2.7186	1.6143	2.7186	1.3804	2.7186	1.2551	2.7186	1.1724	2.7186	1.0471	2.7186	0.898
2.848	2.138	2.848	1.6143	2.848	1.3804	2.848	1.2551	2.848	1.1724	2.848	1.0471	2.848	0.898
2.9836	2.138	2.9836	1.6143	2.9836	1.3804	2.9836	1.2551	2.9836	1.1568	2.9836	1.0114	2.9836	0.8645
3.1257	2.138	3.1257	1.3773	3.1257	1.0982	3.1257	1.0035	3.1257	0.9573	3.1257	0.8829	3.1257	0.7931
3.2745	2.138	3.2745	1.2119	3.2745	1.0686	3.2745	0.9673	3.2745	0.886	3.2745	0.778	3.2745	0.7168
3.4305	1.5368	3.4305	1.0471	3.4305	0.9495	3.4305	0.8824	3.4305	0.8379	3.4305	0.7547	3.4305	0.6598
3.5938	1.5368	3.5938	1.0165	3.5938	0.898	3.5938	0.8299	3.5938	0.7946	3.5938	0.7273	3.5938	0.6376
3.7649	1.5368	3.7649	1.0165	3.7649	0.898	3.7649	0.8299	3.7649	0.7769	3.7649	0.6958	3.7649	0.6089
3.9442	1.5368	3.9442	1.0165	3.9442	0.8472	3.9442	0.7941	3.9442	0.7477	3.9442	0.6723	3.9442	0.5955
4.132	1.5368	4.132	1.0165	4.132	0.845	4.132	0.7941	4.132	0.7477	4.132	0.6723	4.132	0.5955
4.3288	1.5368	4.3288	0.9973	4.3288	0.8194	4.3288	0.7522	4.3288	0.7017	4.3288	0.6303	4.3288	0.5622
4.5349	1.5368	4.5349	0.8745	4.5349	0.7347	4.5349	0.6652	4.5349	0.6197	4.5349	0.5656	4.5349	0.5097
4.7508	1.518	4.7508	0.8745	4.7508	0.7183	4.7508	0.6169	4.7508	0.5587	4.7508	0.4909	4.7508	0.4618
4.977	1.518	4.977	0.8614	4.977	0.7025	4.977	0.6052	4.977	0.5367	4.977	0.4572	4.977	0.4284
5.214	1.3404	5.214	0.7497	5.214	0.6443	5.214	0.5421	5.214	0.5109	5.214	0.4398	5.214	0.4021
5.4623	1.3404	5.4623	0.7497	5.4623	0.6443	5.4623	0.5254	5.4623	0.5109	5.4623	0.438	5.4623	0.3783
5.7224	1.3404	5.7224	0.7497	5.7224	0.6443	5.7224	0.5254	5.7224	0.5109	5.7224	0.438	5.7224	0.3681
5.9948	1.3404	5.9948	0.7497	5.9948	0.6443	5.9948	0.5254	5.9948	0.5109	5.9948	0.438	5.9948	0.3681
6.2803	1.3404	6.2803	0.7497	6.2803	0.6443	6.2803	0.5254	6.2803	0.5109	6.2803	0.438	6.2803	0.3681
6.5793	1.3404	6.5793	0.7497	6.5793	0.6443	6.5793	0.5254	6.5793	0.5109	6.5793	0.438	6.5793	0.3681
6.8926	1.3404	6.8926	0.7497	6.8926	0.6443	6.8926	0.5254	6.8926	0.5109	6.8926	0.438	6.8926	0.3681
7.2208	1.274	7.2208	0.7497	7.2208	0.6443	7.2208	0.5254	7.2208	0.5109	7.2208	0.438	7.2208	0.3681
7.5646	1.274	7.5646	0.7455	7.5646	0.6309	7.5646	0.5254	7.5646	0.5092	7.5646	0.438	7.5646	0.3681
7.9248	1.274	7.9248	0.6003	7.9248	0.5494	7.9248	0.5064	7.9248	0.471	7.9248	0.4168	7.9248	0.3609
8.3022	1.274	8.3022	0.5659	8.3022	0.4849	8.3022	0.454	8.3022	0.4288	8.3022	0.394	8.3022	0.3594
8.6975	1.0027	8.6975	0.521	8.6975	0.4849	8.6975	0.454	8.6975	0.4288	8.6975	0.3913	8.6975	0.3536
9.1116	1.0027	9.1116	0.4701	9.1116	0.4386	9.1116	0.4105	9.1116	0.3865	9.1116	0.3654	9.1116	0.3376
9.5455	1.0027	9.5455	0.4494	9.5455	0.4069	9.5455	0.3794	9.5455	0.3652	9.5455	0.3418	9.5455	0.3167
10	0.6463	10	0.4494	10	0.4069	10	0.3794	10	0.3585	10	0.3293	10	0.3015
10.4762	0.6411	10.4762	0.4371	10.4762	0.3959	10.4762	0.3648	10.4762	0.347	10.4762	0.3169	10.4762	0.2936
10.975	0.6411	10.975	0.4085	10.975	0.3668	10.975	0.3387	10.975	0.3179	10.975	0.2923	10.975	0.2891
11.4976	0.6411	11.4976	0.3647	11.4976	0.3304	11.4976	0.3133	11.4976	0.3024	11.4976	0.2893	11.4976	0.2857
12.045	0.6411	12.045	0.3647	12.045	0.3304	12.045	0.3133	12.045	0.3024	12.045	0.2893	12.045	0.2839
12.6186	0.6411	12.6186	0.3647	12.6186	0.3304	12.6186	0.3133	12.6186	0.3024	12.6186	0.2893	12.6186	0.2831
13.2194	0.6411	13.2194	0.3647	13.2194	0.3304	13.2194	0.3133	13.2194	0.3024	13.2194	0.2893	13.2194	0.2831

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.6411	13.8489	0.3647	13.8489	0.3304	13.8489	0.3133	13.8489	0.3024	13.8489	0.2893	13.8489	0.2831
14.5083	0.6411	14.5083	0.3647	14.5083	0.3304	14.5083	0.3133	14.5083	0.3024	14.5083	0.2893	14.5083	0.2831
15.1991	0.6411	15.1991	0.3647	15.1991	0.3304	15.1991	0.3133	15.1991	0.3024	15.1991	0.2893	15.1991	0.2831
15.9228	0.6411	15.9228	0.3647	15.9228	0.3304	15.9228	0.3133	15.9228	0.3024	15.9228	0.2893	15.9228	0.2831
16.681	0.6411	16.681	0.3647	16.681	0.3304	16.681	0.3133	16.681	0.3024	16.681	0.2893	16.681	0.2831
17.4753	0.6411	17.4753	0.3647	17.4753	0.3304	17.4753	0.3133	17.4753	0.3024	17.4753	0.2893	17.4753	0.2831
18.3074	0.4714	18.3074	0.3284	18.3074	0.3152	18.3074	0.3052	18.3074	0.298	18.3074	0.2893	18.3074	0.2831
19.1791	0.4714	19.1791	0.3088	19.1791	0.2936	19.1791	0.2872	19.1791	0.2851	19.1791	0.2842	19.1791	0.2825
20.0923	0.4714	20.0923	0.3088	20.0923	0.2886	20.0923	0.2865	20.0923	0.2851	20.0923	0.2833	20.0923	0.2814
21.049	0.3824	21.049	0.2877	21.049	0.2842	21.049	0.2843	21.049	0.2836	21.049	0.2819	21.049	0.2801
22.0513	0.3824	22.0513	0.2873	22.0513	0.2834	22.0513	0.2816	22.0513	0.2806	22.0513	0.2795	22.0513	0.2783
23.1013	0.2973	23.1013	0.2832	23.1013	0.2814	23.1013	0.2802	23.1013	0.2793	23.1013	0.2779	23.1013	0.2765
24.2013	0.2947	24.2013	0.2805	24.2013	0.2788	24.2013	0.2776	24.2013	0.2768	24.2013	0.2763	24.2013	0.2756
25.3536	0.288	25.3536	0.2805	25.3536	0.2788	25.3536	0.2776	25.3536	0.2768	25.3536	0.2757	25.3536	0.2749
26.5609	0.288	26.5609	0.2805	26.5609	0.2788	26.5609	0.2776	26.5609	0.2768	26.5609	0.2757	26.5609	0.2747
27.8256	0.2867	27.8256	0.28	27.8256	0.2782	27.8256	0.2771	27.8256	0.2762	27.8256	0.2751	27.8256	0.2741
29.1505	0.2773	29.1505	0.2753	29.1505	0.2749	29.1505	0.2745	29.1505	0.2742	29.1505	0.2738	29.1505	0.2732
30.5386	0.2773	30.5386	0.2727	30.5386	0.2726	30.5386	0.2725	30.5386	0.2724	30.5386	0.2723	30.5386	0.2721
31.9927	0.2707	31.9927	0.271	31.9927	0.271	31.9927	0.2711	31.9927	0.2711	31.9927	0.2712	31.9927	0.2712
33.516	0.2707	33.516	0.2707	33.516	0.2706	33.516	0.2706	33.516	0.2706	33.516	0.2706	33.516	0.2706
35.1119	0.27	35.1119	0.27	35.1119	0.27	35.1119	0.2701	35.1119	0.2701	35.1119	0.2701	35.1119	0.2701
36.7838	0.2695	36.7838	0.2696	36.7838	0.2696	36.7838	0.2696	36.7838	0.2697	36.7838	0.2697	36.7838	0.2697
38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693
40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269
42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2688
44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685
46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683
48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681
50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0291	0.1098	0.0261	0.1098	0.0245	0.1098	0.023	0.1098	0.0222	0.1098	0.0215	0.1098	0.0207
0.115	0.0309	0.115	0.0261	0.115	0.0245	0.115	0.0235	0.115	0.0231	0.115	0.0224	0.115	0.0216
0.1204	0.0313	0.1204	0.0263	0.1204	0.0247	0.1204	0.0242	0.1204	0.0238	0.1204	0.0231	0.1204	0.0222
0.1262	0.0313	0.1262	0.027	0.1262	0.0258	0.1262	0.0247	0.1262	0.0243	0.1262	0.0235	0.1262	0.0225
0.1322	0.0313	0.1322	0.0271	0.1322	0.0258	0.1322	0.0248	0.1322	0.0244	0.1322	0.0236	0.1322	0.0226
0.1385	0.0313	0.1385	0.0277	0.1385	0.0266	0.1385	0.0255	0.1385	0.0246	0.1385	0.0236	0.1385	0.0227
0.1451	0.0316	0.1451	0.0295	0.1451	0.0282	0.1451	0.027	0.1451	0.0259	0.1451	0.0239	0.1451	0.0227
0.152	0.032	0.152	0.0299	0.152	0.0286	0.152	0.0273	0.152	0.0262	0.152	0.0241	0.152	0.0227
0.1592	0.0331	0.1592	0.0311	0.1592	0.03	0.1592	0.0289	0.1592	0.0279	0.1592	0.0265	0.1592	0.0247
0.1668	0.0367	0.1668	0.0324	0.1668	0.0313	0.1668	0.0304	0.1668	0.0296	0.1668	0.0281	0.1668	0.0261
0.1748	0.0507	0.1748	0.0427	0.1748	0.0386	0.1748	0.0351	0.1748	0.0322	0.1748	0.0288	0.1748	0.0268
0.1831	0.0586	0.1831	0.0493	0.1831	0.0442	0.1831	0.0399	0.1831	0.0362	0.1831	0.0306	0.1831	0.027
0.1918	0.0586	0.1918	0.0493	0.1918	0.0442	0.1918	0.0399	0.1918	0.0362	0.1918	0.0306	0.1918	0.0277
0.2009	0.0586	0.2009	0.0493	0.2009	0.0442	0.2009	0.0399	0.2009	0.0362	0.2009	0.0329	0.2009	0.03
0.2105	0.0586	0.2105	0.0493	0.2105	0.0442	0.2105	0.0403	0.2105	0.0388	0.2105	0.0361	0.2105	0.0326
0.2205	0.0586	0.2205	0.0493	0.2205	0.0455	0.2205	0.0429	0.2205	0.0408	0.2205	0.0378	0.2205	0.0339
0.231	0.0586	0.231	0.0493	0.231	0.0459	0.231	0.044	0.231	0.0422	0.231	0.039	0.231	0.0354
0.242	0.0586	0.242	0.051	0.242	0.0487	0.242	0.0465	0.242	0.0446	0.242	0.0411	0.242	0.0371
0.2535	0.065	0.2535	0.0574	0.2535	0.053	0.2535	0.049	0.2535	0.0454	0.2535	0.0412	0.2535	0.0387
0.2656	0.0732	0.2656	0.0587	0.2656	0.0536	0.2656	0.0492	0.2656	0.0454	0.2656	0.0437	0.2656	0.0417
0.2783	0.0817	0.2783	0.0599	0.2783	0.0536	0.2783	0.0508	0.2783	0.0495	0.2783	0.0471	0.2783	0.044
0.2915	0.0817	0.2915	0.0619	0.2915	0.0581	0.2915	0.0547	0.2915	0.052	0.2915	0.0488	0.2915	0.0449
0.3054	0.0817	0.3054	0.0666	0.3054	0.0624	0.3054	0.0586	0.3054	0.0552	0.3054	0.0499	0.3054	0.0461
0.3199	0.0817	0.3199	0.0702	0.3199	0.0661	0.3199	0.0623	0.3199	0.0591	0.3199	0.0538	0.3199	0.0475
0.3352	0.0875	0.3352	0.0769	0.3352	0.071	0.3352	0.0665	0.3352	0.0631	0.3352	0.0572	0.3352	0.0503
0.3511	0.091	0.3511	0.0809	0.3511	0.0752	0.3511	0.0701	0.3511	0.0656	0.3511	0.0579	0.3511	0.0508
0.3678	0.1221	0.3678	0.0953	0.3678	0.0824	0.3678	0.0723	0.3678	0.0656	0.3678	0.0579	0.3678	0.0508
0.3853	0.1364	0.3853	0.106	0.3853	0.0922	0.3853	0.0811	0.3853	0.0723	0.3853	0.0594	0.3853	0.0508
0.4037	0.1364	0.4037	0.106	0.4037	0.0922	0.4037	0.0825	0.4037	0.0766	0.4037	0.0667	0.4037	0.0573
0.4229	0.1364	0.4229	0.106	0.4229	0.0922	0.4229	0.0853	0.4229	0.0801	0.4229	0.0716	0.4229	0.0615
0.4431	0.1364	0.4431	0.106	0.4431	0.094	0.4431	0.0891	0.4431	0.0844	0.4431	0.076	0.4431	0.0659
0.4642	0.1377	0.4642	0.106	0.4642	0.0979	0.4642	0.0921	0.4642	0.0866	0.4642	0.0772	0.4642	0.0681
0.4863	0.1482	0.4863	0.1245	0.4863	0.1116	0.4863	0.1006	0.4863	0.0911	0.4863	0.0833	0.4863	0.0743
0.5094	0.1823	0.5094	0.1391	0.5094	0.1225	0.5094	0.1091	0.5094	0.0984	0.5094	0.0875	0.5094	0.0759

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.2226	0.5337	0.1617	0.5337	0.1354	0.5337	0.1157	0.5337	0.1031	0.5337	0.0875	0.5337	0.0759
0.5591	0.2226	0.5591	0.1617	0.5591	0.1354	0.5591	0.1157	0.5591	0.1031	0.5591	0.0895	0.5591	0.0761
0.5857	0.2226	0.5857	0.1617	0.5857	0.1354	0.5857	0.1157	0.5857	0.1035	0.5857	0.0957	0.5857	0.0843
0.6136	0.2226	0.6136	0.1617	0.6136	0.1354	0.6136	0.1191	0.6136	0.1123	0.6136	0.1013	0.6136	0.0887
0.6428	0.2271	0.6428	0.1635	0.6428	0.1368	0.6428	0.1191	0.6428	0.114	0.6428	0.1049	0.6428	0.0922
0.6734	0.2271	0.6734	0.1635	0.6734	0.1397	0.6734	0.1298	0.6734	0.1217	0.6734	0.1087	0.6734	0.0942
0.7055	0.2271	0.7055	0.1635	0.7055	0.1397	0.7055	0.1298	0.7055	0.1217	0.7055	0.1112	0.7055	0.0976
0.7391	0.2271	0.7391	0.1635	0.7391	0.1428	0.7391	0.1342	0.7391	0.1258	0.7391	0.1112	0.7391	0.0976
0.7743	0.3199	0.7743	0.2154	0.7743	0.1823	0.7743	0.1597	0.7743	0.1436	0.7743	0.1227	0.7743	0.1045
0.8111	0.3199	0.8111	0.2154	0.8111	0.1823	0.8111	0.1597	0.8111	0.1436	0.8111	0.1227	0.8111	0.1072
0.8497	0.3199	0.8497	0.2154	0.8497	0.1823	0.8497	0.1667	0.8497	0.1542	0.8497	0.1343	0.8497	0.1151
0.8902	0.3199	0.8902	0.2154	0.8902	0.1899	0.8902	0.1741	0.8902	0.1611	0.8902	0.1408	0.8902	0.1199
0.9326	0.4905	0.9326	0.3017	0.9326	0.2482	0.9326	0.2168	0.9326	0.1947	0.9326	0.1653	0.9326	0.1387
0.977	0.4905	0.977	0.3017	0.977	0.2482	0.977	0.2168	0.977	0.1947	0.977	0.1738	0.977	0.1524
1.0235	0.4905	1.0235	0.3017	1.0235	0.2482	1.0235	0.2168	1.0235	0.1947	1.0235	0.1823	1.0235	0.1634
1.0723	0.4905	1.0723	0.3017	1.0723	0.2637	1.0723	0.2423	1.0723	0.2253	1.0723	0.1992	1.0723	0.1725
1.1233	0.5817	1.1233	0.3433	1.1233	0.2704	1.1233	0.2423	1.1233	0.2253	1.1233	0.1992	1.1233	0.1725
1.1768	0.5817	1.1768	0.3818	1.1768	0.3175	1.1768	0.2803	1.1768	0.2507	1.1768	0.2165	1.1768	0.1887
1.2328	0.5817	1.2328	0.3891	1.2328	0.3511	1.2328	0.3196	1.2328	0.293	1.2328	0.2534	1.2328	0.2151
1.2916	0.5817	1.2916	0.4229	1.2916	0.3735	1.2916	0.3328	1.2916	0.3047	1.2916	0.2628	1.2916	0.2219
1.353	0.6371	1.353	0.4229	1.353	0.3735	1.353	0.3371	1.353	0.3183	1.353	0.2864	1.353	0.2496
1.4175	0.6371	1.4175	0.4229	1.4175	0.3787	1.4175	0.3589	1.4175	0.341	1.4175	0.3097	1.4175	0.2727
1.485	0.6371	1.485	0.4494	1.485	0.4202	1.485	0.3933	1.485	0.3686	1.485	0.3278	1.485	0.2853
1.5557	0.6371	1.5557	0.4814	1.5557	0.4509	1.5557	0.4238	1.5557	0.3991	1.5557	0.3558	1.5557	0.3055
1.6298	0.7646	1.6298	0.499	1.6298	0.46	1.6298	0.4334	1.6298	0.4095	1.6298	0.3689	1.6298	0.3214
1.7074	0.8139	1.7074	0.632	1.7074	0.5602	1.7074	0.5042	1.7074	0.458	1.7074	0.3899	1.7074	0.3341
1.7887	0.9195	1.7887	0.7556	1.7887	0.6777	1.7887	0.6117	1.7887	0.5549	1.7887	0.4736	1.7887	0.3952
1.8738	0.9711	1.8738	0.7836	1.8738	0.7098	1.8738	0.6502	1.8738	0.6034	1.8738	0.5221	1.8738	0.4298
1.963	1.1224	1.963	0.8714	1.963	0.7675	1.963	0.7007	1.963	0.6427	1.963	0.5486	1.963	0.4456
2.0565	1.2768	2.0565	0.9218	2.0565	0.8205	2.0565	0.7381	2.0565	0.6713	2.0565	0.567	2.0565	0.4588
2.1544	1.2768	2.1544	0.9218	2.1544	0.8205	2.1544	0.7381	2.1544	0.6713	2.1544	0.567	2.1544	0.4588
2.257	1.2768	2.257	0.9218	2.257	0.8205	2.257	0.7381	2.257	0.6756	2.257	0.5786	2.257	0.4821
2.3645	1.8982	2.3645	1.0227	2.3645	0.8284	2.3645	0.7528	2.3645	0.6902	2.3645	0.5876	2.3645	0.4962
2.4771	2.2619	2.4771	1.215	2.4771	0.9875	2.4771	0.8191	2.4771	0.7265	2.4771	0.6267	2.4771	0.5235
2.595	2.7147	2.595	1.215	2.595	1.0799	2.595	0.8772	2.595	0.7512	2.595	0.6435	2.595	0.5443

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
2.7186	2.7147	2.7186	1.215	2.7186	1.0799	2.7186	0.8772	2.7186	0.7512	2.7186	0.6435	2.7186	0.5443	
2.848	2.7147	2.848	1.215	2.848	1.0799	2.848	0.8772	2.848	0.7512	2.848	0.6435	2.848	0.5443	
2.9836	2.7147	2.9836	1.215	2.9836	1.0799	2.9836	0.8772	2.9836	0.7512	2.9836	0.6435	2.9836	0.5443	
3.1257	2.7147	3.1257	1.215	3.1257	1.0799	3.1257	0.8772	3.1257	0.7512	3.1257	0.6435	3.1257	0.5443	
3.2745	1.5417	3.2745	0.9998	3.2745	0.8571	3.2745	0.7497	3.2745	0.6847	3.2745	0.6146	3.2745	0.5331	
3.4305	1.3529	3.4305	0.9515	3.4305	0.8527	3.4305	0.7497	3.4305	0.6847	3.4305	0.6146	3.4305	0.5331	
3.5938	1.3529	3.5938	0.9515	3.5938	0.8527	3.5938	0.7497	3.5938	0.6847	3.5938	0.6146	3.5938	0.5331	
3.7649	1.3529	3.7649	0.9515	3.7649	0.8527	3.7649	0.7497	3.7649	0.6847	3.7649	0.6146	3.7649	0.5331	
3.9442	1.3529	3.9442	0.9515	3.9442	0.8527	3.9442	0.7497	3.9442	0.6847	3.9442	0.6146	3.9442	0.5331	
4.132	1.3529	4.132	0.9515	4.132	0.8527	4.132	0.7497	4.132	0.6847	4.132	0.6146	4.132	0.5331	
4.3288	1.3529	4.3288	0.9515	4.3288	0.8527	4.3288	0.7497	4.3288	0.6847	4.3288	0.6146	4.3288	0.5331	
4.5349	1.3529	4.5349	0.9515	4.5349	0.8527	4.5349	0.7497	4.5349	0.6847	4.5349	0.6146	4.5349	0.5331	
4.7508	1.3529	4.7508	0.9515	4.7508	0.8527	4.7508	0.7497	4.7508	0.6847	4.7508	0.6146	4.7508	0.5331	
4.977	1.3529	4.977	0.9515	4.977	0.8527	4.977	0.7497	4.977	0.6847	4.977	0.6146	4.977	0.5331	
5.214	1.3529	5.214	0.9515	5.214	0.8527	5.214	0.7717	5.214	0.7023	5.214	0.6348	5.214	0.5762	
5.4623	1.7018	5.4623	1.0022	5.4623	0.8819	5.4623	0.7998	5.4623	0.7428	5.4623	0.6773	5.4623	0.6164	
5.7224	2.0139	5.7224	1.1678	5.7224	0.9985	5.7224	0.8801	5.7224	0.7914	5.7224	0.7294	5.7224	0.6583	
5.9948	2.0139	5.9948	1.1824	5.9948	1.0061	5.9948	0.9321	5.9948	0.8745	5.9948	0.7841	5.9948	0.6883	
6.2803	2.0139	6.2803	1.1985	6.2803	1.0822	6.2803	1.0006	6.2803	0.934	6.2803	0.8328	6.2803	0.7285	
6.5793	2.0139	6.5793	1.2079	6.5793	1.1156	6.5793	1.0368	6.5793	0.9732	6.5793	0.8722	6.5793	0.7624	
6.8926	2.8655	6.8926	1.5914	6.8926	1.338	6.8926	1.1976	6.8926	1.1027	6.8926	0.9588	6.8926	0.8114	
7.2208	3.1519	7.2208	1.7665	7.2208	1.4894	7.2208	1.3335	7.2208	1.2072	7.2208	1.0657	7.2208	0.9233	
7.5646	3.4088	7.5646	1.9808	7.5646	1.7109	7.5646	1.5432	7.5646	1.4299	7.5646	1.2268	7.5646	0.9962	
7.9248	3.7732	7.9248	2.5319	7.9248	2.1034	7.9248	1.8073	7.9248	1.5814	7.9248	1.3219	7.9248	1.0918	
8.3022	4.5641	8.3022	2.6088	8.3022	2.171	8.3022	1.915	8.3022	1.7123	8.3022	1.3901	8.3022	1.1675	
8.6975	4.6879	8.6975	2.6088	8.6975	2.171	8.6975	1.915	8.6975	1.7123	8.6975	1.3901	8.6975	1.2638	
9.1116	4.6879	9.1116	2.6088	9.1116	2.171	9.1116	1.915	9.1116	1.7123	9.1116	1.3901	9.1116	1.2638	
9.5455	4.6879	9.5455	2.6088	9.5455	2.171	9.5455	1.915	9.5455	1.7123	9.5455	1.3901	9.5455	1.2638	
10	4.6879	10	2.6088	10	2.171	10	1.915	10	1.7123	10	1.3901	10	1.2638	
10.4762	4.6879	10.4762	2.6088	10.4762	2.171	10.4762	1.915	10.4762	1.7123	10.4762	1.3901	10.4762	1.2638	
10.975	4.6879	10.975	2.6088	10.975	2.171	10.975	1.915	10.975	1.7123	10.975	1.3901	10.975	1.2305	
11.4976	5.7083	11.4976	2.5137	11.4976	1.9646	11.4976	1.756	11.4976	1.6138	11.4976	1.3836	11.4976	1.1653	
12.045	5.7083	12.045	2.5137	12.045	1.9119	12.045	1.5798	12.045	1.4346	12.045	1.2479	12.045	1.1653	
12.6186	5.7083	12.6186	2.5137	12.6186	1.9119	12.6186	1.5798	12.6186	1.4189	12.6186	1.1818	12.6186	1.1653	
13.2194	5.7083	13.2194	2.5137	13.2194	1.9119	13.2194	1.5659	13.2194	1.387	13.2194	1.1818	13.2194	1.1653	

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping Freq.	0.50% Accel.	2% Freq.	2% Accel.	3% Freq.	3% Accel.	4% Freq.	4% Accel.	5% Freq.	5% Accel.	7% Freq.	7% Accel.	10% Freq.	10% Accel.
13.8489	5.7083	13.8489	2.5137	13.8489	1.9119	13.8489	1.5659	13.8489	1.387	13.8489	1.1818	13.8489	1.1653
14.5083	4.6777	14.5083	2.3117	14.5083	1.7577	14.5083	1.5659	14.5083	1.387	14.5083	1.1818	14.5083	1.1114
15.1991	4.6777	15.1991	2.3117	15.1991	1.7366	15.1991	1.537	15.1991	1.387	15.1991	1.1818	15.1991	1.1032
15.9228	4.6777	15.9228	2.3117	15.9228	1.7366	15.9228	1.537	15.9228	1.387	15.9228	1.1644	15.9228	1.1032
16.681	4.6777	16.681	2.3117	16.681	1.7366	16.681	1.537	16.681	1.387	16.681	1.1644	16.681	1.1032
17.4753	4.6777	17.4753	2.3117	17.4753	1.7366	17.4753	1.537	17.4753	1.387	17.4753	1.1644	17.4753	1.1032
18.3074	2.7677	18.3074	1.962	18.3074	1.6751	18.3074	1.512	18.3074	1.3789	18.3074	1.1644	18.3074	0.9852
19.1791	1.9267	19.1791	1.4264	19.1791	1.3108	19.1791	1.2176	19.1791	1.1358	19.1791	1.0227	19.1791	0.8897
20.0923	1.2493	20.0923	1.0816	20.0923	1.0133	20.0923	0.9536	20.0923	0.9008	20.0923	0.8109	20.0923	0.7479
21.049	1.2493	21.049	0.9073	21.049	0.828	21.049	0.7844	21.049	0.7563	21.049	0.7314	21.049	0.706
22.0513	0.993	22.0513	0.7974	22.0513	0.7401	22.0513	0.6995	22.0513	0.6943	22.0513	0.6838	22.0513	0.668
23.1013	0.6779	23.1013	0.6627	23.1013	0.6574	23.1013	0.6529	23.1013	0.6489	23.1013	0.6416	23.1013	0.6313
24.2013	0.6151	24.2013	0.6095	24.2013	0.6076	24.2013	0.6061	24.2013	0.6047	24.2013	0.6017	24.2013	0.5969
25.3536	0.5629	25.3536	0.5604	25.3536	0.5634	25.3536	0.5654	25.3536	0.5667	25.3536	0.5677	25.3536	0.5671
26.5609	0.5491	26.5609	0.542	26.5609	0.5413	26.5609	0.5411	26.5609	0.5413	26.5609	0.5421	26.5609	0.5428
27.8256	0.5375	27.8256	0.5118	27.8256	0.5123	27.8256	0.5158	27.8256	0.5181	27.8256	0.5209	27.8256	0.5232
29.1505	0.5375	29.1505	0.5118	29.1505	0.5069	29.1505	0.5051	29.1505	0.5048	29.1505	0.5057	29.1505	0.5077
30.5386	0.4891	30.5386	0.4832	30.5386	0.4826	30.5386	0.4854	30.5386	0.4884	30.5386	0.4922	30.5386	0.4954
31.9927	0.4891	31.9927	0.4832	31.9927	0.4826	31.9927	0.4828	31.9927	0.4834	31.9927	0.4847	31.9927	0.4867
33.516	0.4797	33.516	0.4786	33.516	0.4785	33.516	0.4785	33.516	0.4787	33.516	0.4791	33.516	0.48
35.1119	0.4732	35.1119	0.4733	35.1119	0.4733	35.1119	0.4733	35.1119	0.4734	35.1119	0.4736	35.1119	0.474
36.7838	0.4677	36.7838	0.4679	36.7838	0.4679	36.7838	0.468	36.7838	0.4681	36.7838	0.4683	36.7838	0.4686
38.5353	0.4628	38.5353	0.4629	38.5353	0.463	38.5353	0.4631	38.5353	0.4632	38.5353	0.4633	38.5353	0.4636
40.3702	0.4584	40.3702	0.4585	40.3702	0.4585	40.3702	0.4586	40.3702	0.4586	40.3702	0.4588	40.3702	0.459
42.2924	0.4543	42.2924	0.4544	42.2924	0.4544	42.2924	0.4545	42.2924	0.4545	42.2924	0.4547	42.2924	0.4548
44.3062	0.4505	44.3062	0.4506	44.3062	0.4507	44.3062	0.4507	44.3062	0.4507	44.3062	0.4509	44.3062	0.451
46.4159	0.4471	46.4159	0.4471	46.4159	0.4472	46.4159	0.4472	46.4159	0.4472	46.4159	0.4473	46.4159	0.4475
48.626	0.4439	48.626	0.4439	48.626	0.4439	48.626	0.4439	48.626	0.444	48.626	0.444	48.626	0.4442
50.9414	0.4408	50.9414	0.4408	50.9414	0.4408	50.9414	0.4408	50.9414	0.4409	50.9414	0.4409	50.9414	0.4411



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
**24590-PTF-ME-FEP-COND-00002A**

Data Sheet No.  
**24590-PTF-MED-FEP-00005**

Project:	<b>RPP-WTP</b>	Description:	<b>Waste Feed Evaporator Intercondenser</b>
Project No:	<b>24590</b>	P&ID:	<b>24590-PTF-M6-FEP-00003002</b>
Site:	<b>Hanford</b>	Process Data:	<b>24590-QL-POA-MEVV-00001-04-04</b>
Process flow diagram:	<b>24590-PTF-M5-V17T-00004002</b>	Manufacturer Name:	<b>Framatome ANP / GRAHAM MANUFACTURING</b>

**General Data**

Quality Level	<b>Q (See Note 9)</b>	TEMA (Class/Type)	<b>B</b>
Seismic Category	<b>SC-I</b>	Flow Type (Counter current, etc)	<b>N/A</b>
Design Code	<b>ASME VIII Div 1</b>	Heat Exchanger Duty	<b>436,064 Btu/hr</b>
Code Stamp	<b>Yes</b>	Heat Exchanger Area	<b>50.7 ft<sup>2</sup></b>
NB Registration	<b>Yes</b>	ΔT (LMTD/Corrected LMTD)	<b>59.8 °F</b>

**Thermal/Hydraulic Data**

	Shell Side		Tube Side	
	In	Steam Out	In	Cooling Water Out
Fluid Name				
Fluid Quantities: Total	<b>448.3</b>		<b>32,500</b>	
Condensable Vapor (In/Out)	<b>404.6</b>	<b>6.4</b>	<b>N/A</b>	<b>N/A</b>
Liquid	<b>N/A</b>	<b>398.2</b>	<b>32,500</b>	<b>32,500</b>
Noncondensable	<b>43.7</b>	<b>43.7</b>	<b>N/A</b>	<b>N/A</b>
Temperature (In/Out)	<b>226 °F</b>	<b>90</b>	<b>75.0</b>	<b>88.5</b>
Specific Gravity	<b>N/A</b>	<b>N/A</b>	<b>1.00</b>	<b>0.998</b>
Viscosity	<b>N/A Cp</b>	<b>N/A</b>	<b>2.209</b>	<b>1.875</b>
Molecular Weight, Vapor	<b>18.02</b>	<b>18.02</b>	<b>N/A</b>	<b>N/A</b>
Molecular Weight, Noncondensable	<b>29</b>	<b>29</b>	<b>N/A</b>	<b>N/A</b>
Specific Heat	<b>N/A Btu/lbm-°F</b>	<b>N/A</b>	<b>1.000</b>	<b>0.999</b>
Thermal Conductivity	<b>N/A Btu/hr-ft-°F</b>	<b>N/A</b>	<b>0.350</b>	<b>0.357</b>
Latent Heat	<b>N/A Btu/lbm @ °F</b>		<b>N/A</b>	
Inlet pressure	<b>200 Torr psia</b>		<b>59.7 psia</b>	
Tube side Velocity	<b>N/A ft/s</b>		<b>3.2</b>	
Pressure Drop (Allowed)	<b>10 mm Hg psi</b>		<b>1.2 psi</b>	
Fouling Resistance (Min)	<b>0.0020 hr-ft<sup>2</sup>-°F/Btu</b>			

**Mechanical Data**

	Shell Side		Tube Side	
Design Pressure (Max/Min)	<b>50 psig</b>	<b>Full vacuum</b>	<b>100</b>	<b>Full vacuum</b>
Design Temperature (Max/Min)	<b>378 °F</b>	<b>0</b>	<b>150</b>	<b>0</b>
Corrosion Allowance	<b>0.04 inch</b>		<b>0.04</b>	
Erosion Allowance	<b>N/A inch</b>		<b>N/A</b>	
Shell OD/ID	<b>8 5/8 OD inch</b>		Overall Dimensions (H x W x L)	<b>20 X 12 5/8 X 85 inch</b>
Total Number of Tubes	<b>43</b>		Tube OD	<b>0.750 inch</b>

**Material Data**

Shell	<b>SA 240 316 SS (Max Carbon 0.030%)</b>	Shell Cover	<b>SA 240 316 SS (Max Carbon 0.030%)</b>
Channel/Bonnet	<b>SA 240 316 SS (Max Carbon 0.030%)</b>	Channel Cover	<b>SA 240 316 SS (Max Carbon 0.030%)</b>
Tube	<b>SA 213 316 SML SS (Max Carbon 0.030%)</b>	Floating Head Cover	<b>N/A</b>
Stationary Tube Sheet	<b>316 SS (Max Carbon 0.030%)</b>	Floating Tube Sheet	<b>N/A</b>
Shell Side Gaskets	<b>N/A</b>	Tube Side Gaskets	<b>A 240 316 SS Spiral Wound w/PTFE Filler</b>
Partition Seals	<b>N/A</b>	Baffles/Supports	<b>SA 240 316 SS (Max Carbon 0.030%)</b>
Insulation	<b>N/A</b>	Forgings (Shell side)	<b>SA 182 F316L</b>
Bolting	<b>SA193B8M &amp; SA 194 2HM</b>	Forgings (Channel)	<b>SA 182 F316L</b>





**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
24590-PTF-ME-FEP-COND-00002A

Data Sheet No.  
24590-PTF-MED-FEP-00005

**Construction Data** (To be determined by the supplier when not specified by the buyer)

Cross Baffle Type	<b>Up &amp; Over</b>	% Baffle Cut (Dia.)	---	Spacing (c/c) inch	---
Bypass Seal Arrangement	<b>N/A</b>	Longitudinal Seal Type	<b>N/A</b>	Expansion Joint Type	<b>N/A</b>
Inlet Nozzle $\rho V^2$	---	Bundle Entrance $\rho V^2$	---	Bundle Exit $\rho V^2$	---
Tube Support Type	<b>Vertical Cut</b>	U-bend Support Type	<b>N/A</b>	Weight of Bundle lbf	*
Operating Weight lbf	<b>600</b>	Full of Water lbf	<b>680</b>	Weight of Shell lbf	<b>540</b>

**Notes**

\* To be determined by Seller.

- (1) All welds are continuous to avoid crevices, weld surface finish is descaled as laid.
- (2) Tube to tubesheet joint shall be strength welded.
- (3) Graham size 8x6 BEM.
- (4) Deleted.
- (5) Deleted.
- (6) Deleted.
- (7) Deleted.
- (8) For nozzle loads, see 24590-PTF-3PS-MEVV-00001.
- (9) Vendor will provide item at BNI quality level Q specification, which corresponds with vendor quality level QL-2.
- (10) Equipment cyclic data is from document 24590-QL-POA-MEVV-00001-04-03.
- (11) Final Vendor Design Process information is from document 24590-QL-POA-MEVV-00001-02-00056.
- (12) Contents of this document are Dangerous Waste Permit Affecting. <sup>3</sup>
- (13) The physical design parameters shall be determined by the seller based on TEMA and HEI standards.
- (14) Please note 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) 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.

Safety screening / evaluation required?  Yes  No If yes per 24590-WTP-GPP-SREG-002, E&NS signature required below.

Rev	Description	By	Checked	EN&S	Approved	Date
3	Updated to reflect WSGM analysis, 24590-PTF-U0N-W16T-00003 and incorporate DOE AEA note (14). OTHER DATA UPDATED.	D. Tate	R. Rickenbach	Hall	J. Julyk	2/19/09
2	Incorporated Vendor Design Changes and Equipment Qualification data	R. Rickenbach	C. Knauss	S. Woolfolk	J. Julyk	07/22/2008
1	Incorporated Vendor Design	E. Le	R. Nowak	N/A	J. Julyk	04/04/2005
0	Issued for Procurement	E. Le	S. Shah	N/A	J. Julyk	04/30/2003



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00005 Rev.: 3

Attachment 1, Page 3 of 21

Equipment Identification			
Component Tag Number	24590-PTF-ME-FEP-COND-00002A	Safety Classification	<input checked="" type="checkbox"/> SC <input type="checkbox"/> SS <input type="checkbox"/> APC <input type="checkbox"/> SDC <input type="checkbox"/> SDS <input type="checkbox"/> RRC Note 10 $\triangle$ 3
Manufacturer / Supplier	GRAHAM / AREVA FS $\triangle$ 3		
Requisition Number	24590-QL-POA-MEVV-00001		
Model	N/A	Seismic Category	<input checked="" type="checkbox"/> SC-I <input type="checkbox"/> SC-II <input type="checkbox"/> SC-III <input type="checkbox"/> SC-IV Note 10 $\triangle$ 3
Description (Include descriptive text [e.g., location, elevation])	Waste Feed Evaporator Inter-Condensator, Room P-0304, elevation 56'-0"		
Safety Function(s)	Prevent post seismic disruption of H2 vessel purge air pathways, spread of contamination into C3 areas from PVP blowback. (ref. 1) $\triangle$ 3  Confinement (ref. 1) $\triangle$ 3		
Seismic Safety Function	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Room Number(s): P-0304	
Maintenance Accessible	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Method of Maintenance Access: <input type="checkbox"/> Remote <input checked="" type="checkbox"/> Hands On <input type="checkbox"/> None	
Seismic Operability Requirements: $\triangle$ 3 <input type="checkbox"/> During Seismic Event $\triangle$ 3 <input type="checkbox"/> After Seismic Event			
ITS Equipment Type: <input checked="" type="checkbox"/> Passive Mechanical <input type="checkbox"/> Active Mechanical <input type="checkbox"/> Electrical			

Equipment Environmental Qualification (EEQ)					
Environment	<input type="checkbox"/> Mild <input checked="" type="checkbox"/> Harsh		Hi Rad Service	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Contamination Class:	C3		Design Life (yrs)	<input checked="" type="checkbox"/> 40 <input type="checkbox"/> Other _____	
Radiation Class:	R3				
Parameter Type/Units	Parameter Value	Time Duration (number)	Time Units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Normal</b>					
Normal High Temperature (°F)	95	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal Low Temperature (°F)	59	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal High Relative Humidity (%RH)	100	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Relative Humidity (%RH)	10	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal High Pressure (in.-w.g.)	0	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Pressure (in.-w.g.)	-0.4	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Radiation Dose Rate (mR/hr)	10	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Vibration Magnitude (g)	N/A	N/A	N/A	N/A	Note 1
Vibration Frequency (Hz)	N/A	N/A	N/A	N/A	Note 1
Additional Normal Information:		See Note 2 for pressure units.			



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00005 Rev.: 3

Attachment 1, Page 4 of 21

**Equipment Environmental Qualification (EEQ) (continued)**

Parameter Type/Units	Parameter Value	Time Duration (number)	Time units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Abnormal</b>					
Abnormal High Temperature (°F)	3 117	8	hr/yr	24590-PTF-U0D-W16T-00001, Note 6	3 Note 1
Abnormal Low Temperature (°F)	59	8	hr/yr	24590-WTP-DB-ENG-01-001, Notes 6 & 8	Note 1
Abnormal High Relative Humidity (%RH)	100	24	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Relative Humidity (%RH)	2	22	hr/yr	24590-PTF-U0D-W16T-00001, Note 9	3 Note 1
Abnormal High Pressure (in.-w.g.)	4	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Pressure (in.-w.g.)	-7.3	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Radiation Dose Rate (mR/hr)	10, Note 3	3 0	3 hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Wet Sprinkler System Present	YES	3 2	3 hr	24590-PTF-U0D-W16T-00001	Note 1
Additional Abnormal Information	See Note 2 for pressure units.				
<b>Design Basis Events (DBE)</b>					
DBE High Temperature (°F)	131	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6 & 9	3 Note 1
DBE Low Temperature (°F)	40	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
DBE High Relative Humidity (%RH)	100	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Relative Humidity (%RH)	8	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE High Pressure (in.-w.g.)	4	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Pressure (in.-w.g.)	-7.3	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Radiation Dose Rate (mR/hr)	10, Note 3	3 0	3 hrs	24590-PTF-U0D-W16T-00001	Note 1
Flood Height (ft)	0.67	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
Submergence (ft)	0, Note 4	1000	hrs	24590-PTF-U0D-W16T-00001 24590-QL-POA-MEVV-00001-01-00825	3 Note 1
Chemical/Spray Exposure	Yes	12.5	hrs	24590-PTF-U0D-W16T-00001	Note 1
Additional DBE Information	See Note 2 for pressure units.				



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00005 Rev.: 3

Attachment I, Page 5 of 21

DBE Chemical Exposure Details	
DBE Chemical Types/Concentrations	2M Sodium Hydroxide $\triangle 3$ Antifoam Agent 2M Nitric Acid $\triangle 3$

Interfaces (Electrical)	
Power Supply Voltage (VAC, VDC)	N/A
Power Supply Frequency (Hz)	N/A
Power Connection Method	N/A
I/O Signals to/from Equipment	N/A
I/O Connection Method	N/A

Interfaces (Mechanical)	
Mounting Configuration (orientation)	TBD
Mounting Method (bolts, welds, etc.)	Anchor Bolts, FEP-SKID-00001A, 24590-PTF-DB-S13T-00050 $\triangle 3$
Auxiliary Devices	N/A

Equipment Seismic Qualification (ESQ)				
Parameter	Title	Reference/Document Number	Version / Revision	Remarks
WTP Seismic Design Specification (BUYER)	Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks	24590-WTP-3PS-SS90-T0001	002	N/A
Specified Seismic Load (BUYER)	Seismic Analysis of Pretreatment Building - WSGM In-Structure Response Spectre (ISRS) $\triangle 3$	24590-PTF-S0C-S15T-00057 $\triangle 3$	00A $\triangle 3$	Calculation is not included in MR, see attached figures 37, 38 and 121 per CCN 185267. $\triangle 3$
Design Seismic Load (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Method (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Report Number (SELLER)	Note 1	Note 1	Note 1	Note 1
Submittal Number (BUYER)	TBD	TBD	TBD	N/A



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00005 Rev.: 3

Attachment 1, Page 6 of 21

## Notes and Additional Information

### Notes

1. Data to be provided by SELLER through the submittal process as required on the G-321E.
2. Where pressure is given in inches of water column (in-w.c.) in the source document, it is generally assumed that this is in reference to atmospheric pressure and is therefore equivalent to inches of water gage (in-w.g.).
3. Abnormal and DBE radiation dose rates are set equal to normal and do not contribute to the total integrated dose.  $\triangle 3$
4. Submergence depth is the difference between the lowest point on the equipment and the flood depth above the floor. The submergence depth is set to zero if the lowest section of the equipment is above the flood depth.
5. Environmental data from reference 3 is for room environment only.
6. For application of AISC N690, the normal temperatures are not used. Abnormal temperatures shall be applied as Normal Operation Temperature,  $T_O$ , with seismic effects,  $E_S$ . The Design basis event temperature shall be applied as a Thermal Load generated by a postulated accident,  $T_A$ , without seismic effects,  $E_S$  or  $E_O$ .
7. The equipment qualification will be documented in accordance with the requirements in Appendix D of Engineering Specification for Environmental Qualification of Mechanical Equipment, document number 24590-WTP-3PS-G000-T0015 for the passive and active safety functions.
8. Abnormal low temperature, as calculated in reference 3, is based on a Loss of Heating Accident (LOHA) which occurs when steam supply to the building is lost. Since the evaporators are run on steam, this would cause the evaporators to go off-line. Abnormal low temperature will be based on reference 4 at 59°F.
9. Parameter value used on data sheet has been previously established and determined more conservative than values  $\triangle 3$  derived from the reference document noted.
10. For commercial reasons, safety and seismic classification may be higher than elsewhere documented, and therefore  $\triangle 3$  conservative.

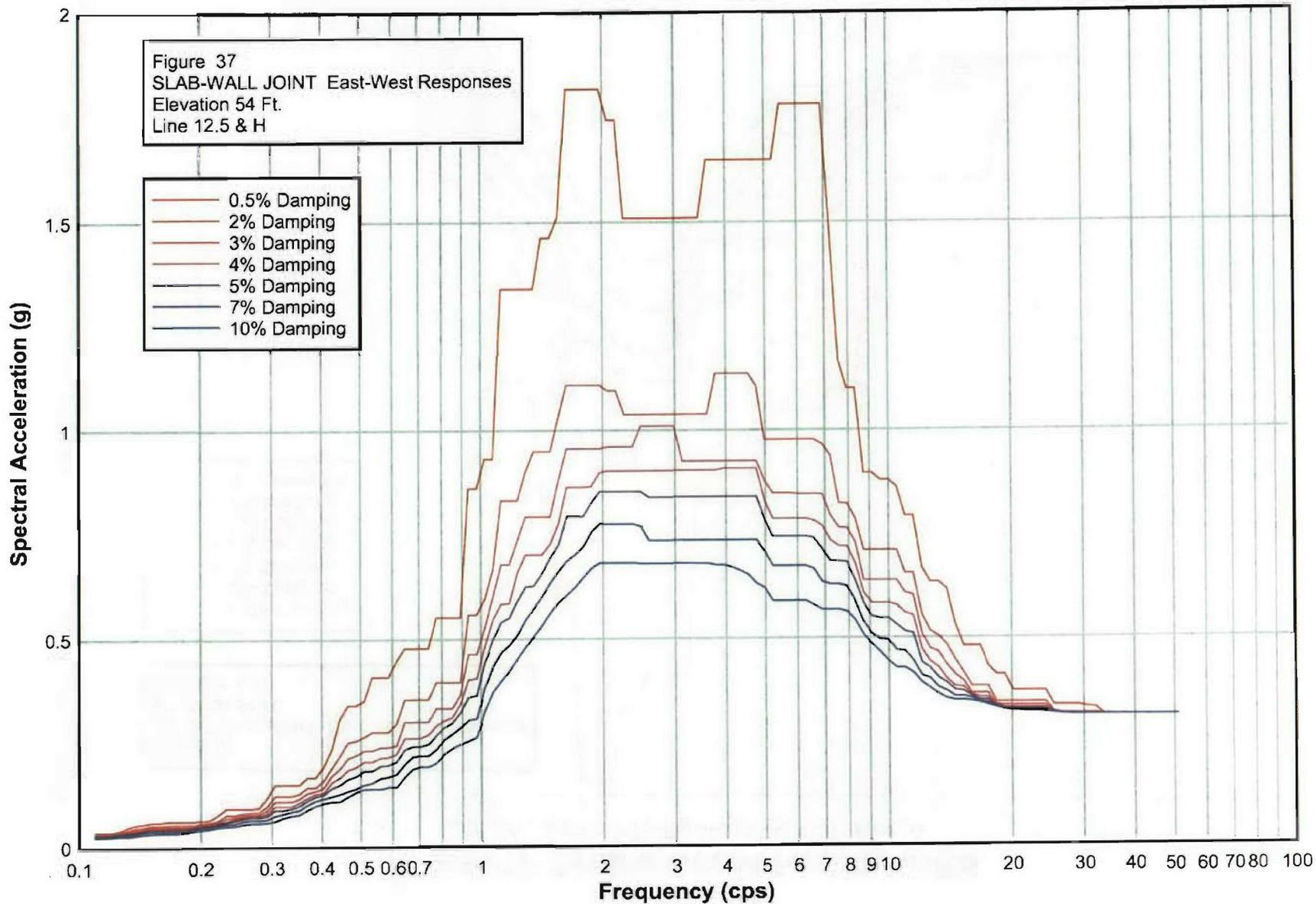
### Reference

1. 24590-WTP-PSAR-ESH-01-002-02, Rev. 04A, Preliminary documented safety analysis to support construction  $\triangle 3$  authorization; PT facility specific information.
2. CCN #096661, FEP and CNP Evaporator Vent Problems with New PVP Isolation Valve.
3. 24590-PTF-U0D-W16T-00001, Rev. 0, PTF Room Environment Datasheet.
4. 24590-WTP-DB-ENG-01-001, Rev. 1M, Basis Of Design.  $\triangle 3$
5. 24590-PTF-U0N-W16T-00001, Add data for room P-0427. Incorporate additional steam break analysis.  $\triangle 3$
6. 24590-PTF-U0N-W16T-00003, Revised temperature & relative humidity data for PTF rooms.  $\triangle 3$

3

# RPP-WTP Pretreatment Facility ISRS

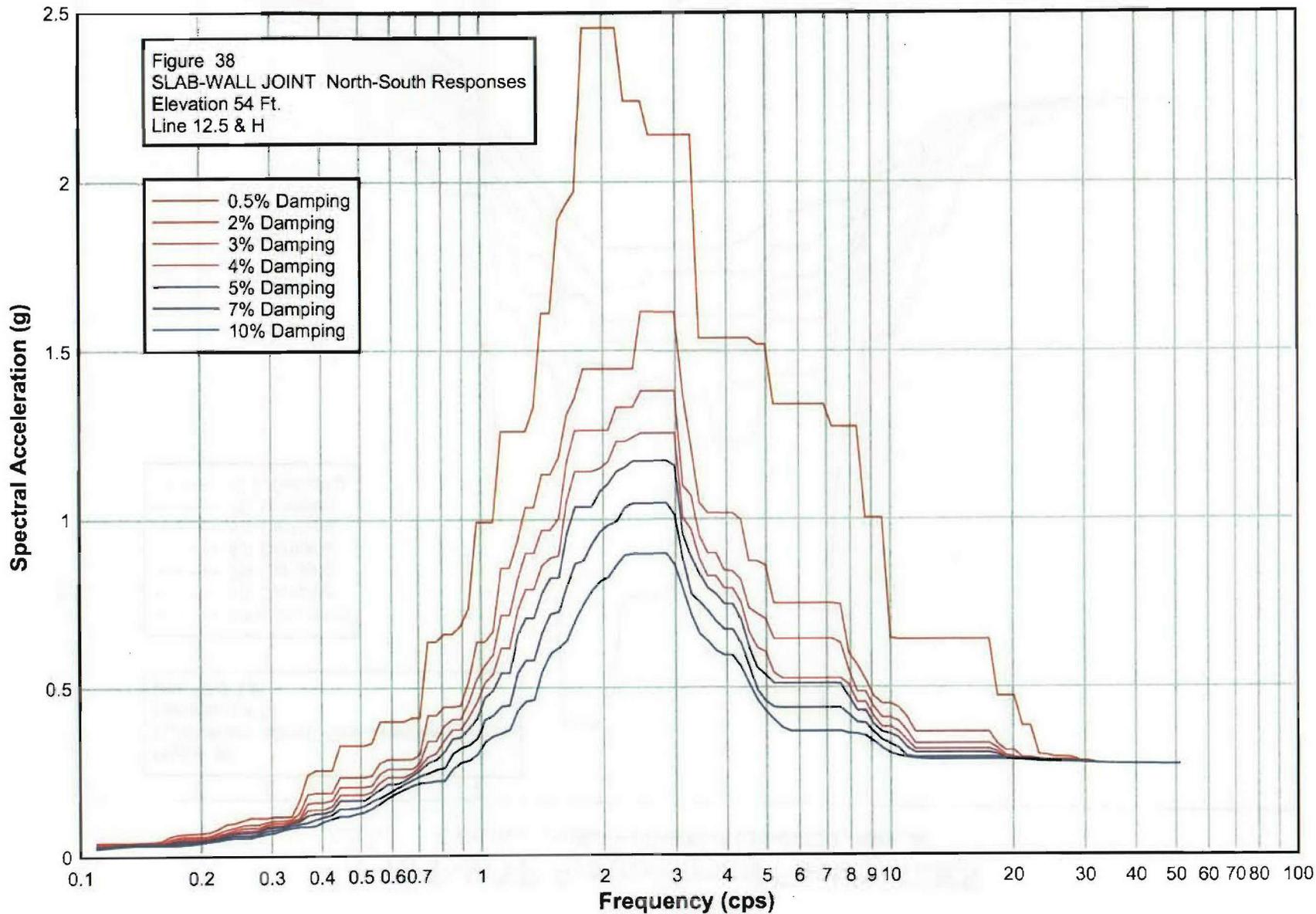
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



3

# RPP-WTP Pretreatment Facility ISRS

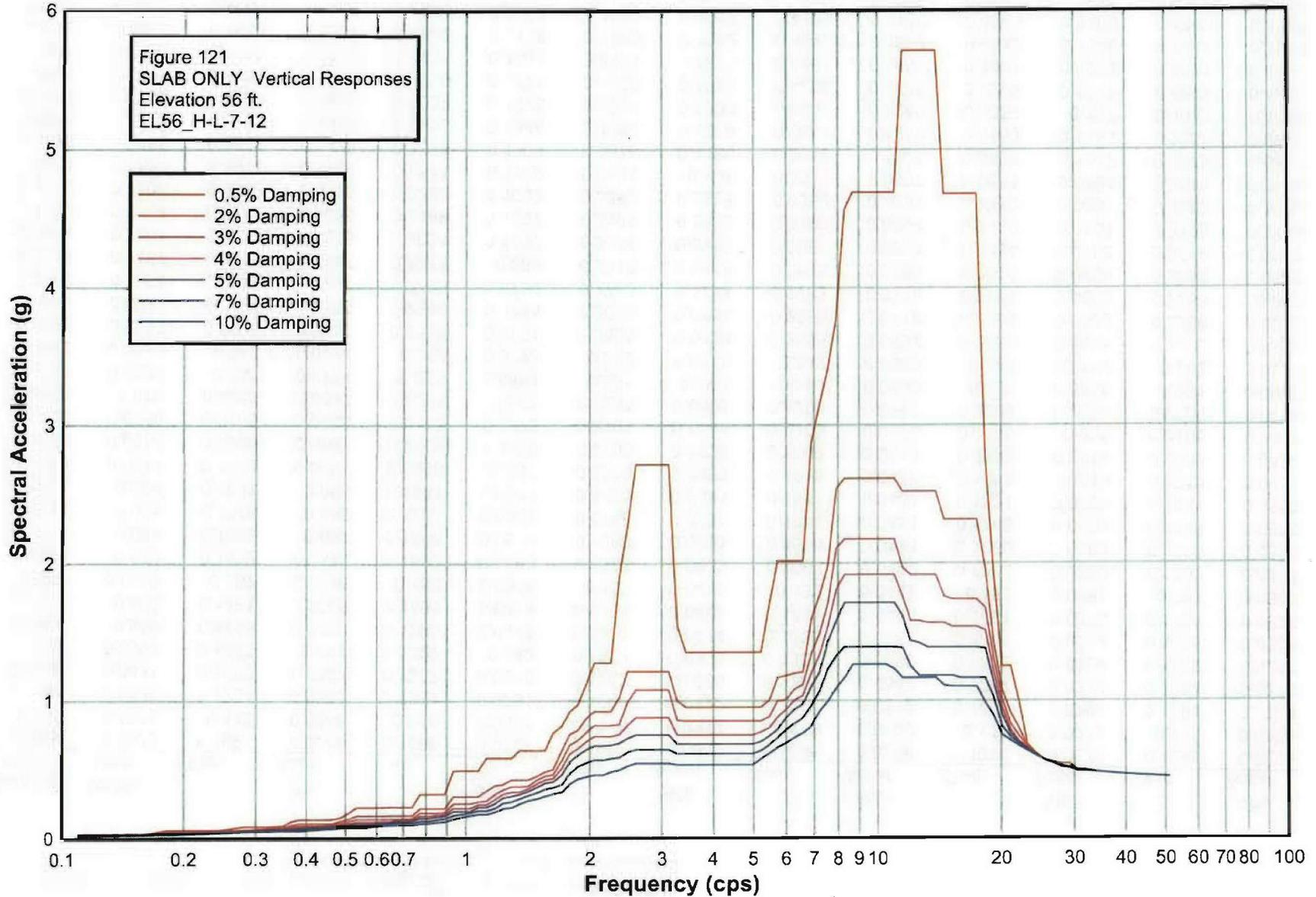
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



3

# RPP-WTP Pretreatment Facility ISRS

Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0375	0.1098	0.0344	0.1098	0.0327	0.1098	0.0312	0.1098	0.0298	0.1098	0.0274	0.1098	0.0252
0.115	0.0375	0.115	0.0344	0.115	0.0327	0.115	0.0312	0.115	0.0299	0.115	0.0277	0.115	0.0258
0.1204	0.0375	0.1204	0.0344	0.1204	0.0331	0.1204	0.0322	0.1204	0.0312	0.1204	0.0294	0.1204	0.0269
0.1262	0.0431	0.1262	0.0397	0.1262	0.0378	0.1262	0.036	0.1262	0.0343	0.1262	0.0314	0.1262	0.0278
0.1322	0.0504	0.1322	0.045	0.1322	0.042	0.1322	0.0393	0.1322	0.0369	0.1322	0.0328	0.1322	0.0281
0.1385	0.056	0.1385	0.0489	0.1385	0.0449	0.1385	0.0414	0.1385	0.0384	0.1385	0.0344	0.1385	0.0303
0.1451	0.058	0.1451	0.0509	0.1451	0.0475	0.1451	0.0445	0.1451	0.0419	0.1451	0.0375	0.1451	0.0325
0.152	0.0616	0.152	0.0546	0.152	0.0506	0.152	0.0472	0.152	0.0442	0.152	0.0391	0.152	0.0338
0.1592	0.062	0.1592	0.0546	0.1592	0.0506	0.1592	0.0472	0.1592	0.0442	0.1592	0.0396	0.1592	0.0351
0.1668	0.064	0.1668	0.056	0.1668	0.0517	0.1668	0.0481	0.1668	0.0451	0.1668	0.0403	0.1668	0.0356
0.1748	0.064	0.1748	0.056	0.1748	0.0517	0.1748	0.0481	0.1748	0.0451	0.1748	0.0403	0.1748	0.0356
0.1831	0.064	0.1831	0.056	0.1831	0.0517	0.1831	0.0481	0.1831	0.0451	0.1831	0.0403	0.1831	0.0368
0.1918	0.0641	0.1918	0.0561	0.1918	0.0517	0.1918	0.0495	0.1918	0.0477	0.1918	0.0445	0.1918	0.0404
0.2009	0.0642	0.2009	0.0583	0.2009	0.0558	0.2009	0.0535	0.2009	0.0513	0.2009	0.0474	0.2009	0.0424
0.2105	0.0665	0.2105	0.0603	0.2105	0.0575	0.2105	0.0549	0.2105	0.0525	0.2105	0.049	0.2105	0.0448
0.2205	0.078	0.2205	0.0647	0.2205	0.062	0.2205	0.0595	0.2205	0.0573	0.2205	0.0533	0.2205	0.0484
0.231	0.0933	0.231	0.0774	0.231	0.0694	0.231	0.063	0.231	0.0598	0.231	0.0556	0.231	0.0503
0.242	0.0933	0.242	0.0774	0.242	0.0723	0.242	0.0678	0.242	0.0638	0.242	0.0567	0.242	0.0513
0.2535	0.0933	0.2535	0.0817	0.2535	0.0771	0.2535	0.0729	0.2535	0.0692	0.2535	0.0628	0.2535	0.0575
0.2656	0.0933	0.2656	0.0839	0.2656	0.0794	0.2656	0.0754	0.2656	0.0718	0.2656	0.0653	0.2656	0.0575
0.2783	0.0954	0.2783	0.0847	0.2783	0.0794	0.2783	0.0754	0.2783	0.0718	0.2783	0.0653	0.2783	0.058
0.2915	0.1187	0.2915	0.0987	0.2915	0.089	0.2915	0.0813	0.2915	0.0753	0.2915	0.0668	0.2915	0.0592
0.3054	0.1504	0.3054	0.1235	0.3054	0.1097	0.3054	0.0985	0.3054	0.0894	0.3054	0.0758	0.3054	0.0633
0.3199	0.1504	0.3199	0.1235	0.3199	0.1097	0.3199	0.0985	0.3199	0.0894	0.3199	0.0801	0.3199	0.0706
0.3352	0.1504	0.3352	0.1235	0.3352	0.1097	0.3352	0.0985	0.3352	0.0931	0.3352	0.0857	0.3352	0.0762
0.3511	0.1504	0.3511	0.1289	0.3511	0.1172	0.3511	0.107	0.3511	0.0997	0.3511	0.0894	0.3511	0.0786
0.3678	0.168	0.3678	0.1438	0.3678	0.1303	0.3678	0.1186	0.3678	0.1121	0.3678	0.1017	0.3678	0.0898
0.3853	0.168	0.3853	0.1438	0.3853	0.1346	0.3853	0.1279	0.3853	0.1219	0.3853	0.1115	0.3853	0.0992
0.4037	0.194	0.4037	0.1598	0.4037	0.1426	0.4037	0.1306	0.4037	0.1259	0.4037	0.117	0.4037	0.1054
0.4229	0.2368	0.4229	0.1906	0.4229	0.1721	0.4229	0.1558	0.4229	0.1416	0.4229	0.1217	0.4229	0.1092
0.4431	0.3088	0.4431	0.2193	0.4431	0.1881	0.4431	0.1671	0.4431	0.1496	0.4431	0.1273	0.4431	0.1097
0.4642	0.3417	0.4642	0.2524	0.4642	0.2138	0.4642	0.1852	0.4642	0.1637	0.4642	0.1345	0.4642	0.1211
0.4863	0.3417	0.4863	0.256	0.4863	0.2208	0.4863	0.1928	0.4863	0.1701	0.4863	0.1409	0.4863	0.1323
0.5094	0.3522	0.5094	0.2656	0.5094	0.2325	0.5094	0.2054	0.5094	0.1831	0.5094	0.1497	0.5094	0.1391

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.4096	0.5337	0.2771	0.5337	0.2325	0.5337	0.2054	0.5337	0.1831	0.5337	0.1539	0.5337	0.1396
0.5591	0.4096	0.5591	0.2771	0.5591	0.2398	0.5591	0.2148	0.5591	0.1949	0.5591	0.1654	0.5591	0.1396
0.5857	0.4096	0.5857	0.2771	0.5857	0.2404	0.5857	0.2159	0.5857	0.1975	0.5857	0.1686	0.5857	0.1441
0.6136	0.4475	0.6136	0.2969	0.6136	0.2444	0.6136	0.2234	0.6136	0.2051	0.6136	0.1751	0.6136	0.1441
0.6428	0.478	0.6428	0.3547	0.6428	0.3006	0.6428	0.2612	0.6428	0.2347	0.6428	0.1988	0.6428	0.168
0.6734	0.478	0.6734	0.3547	0.6734	0.3006	0.6734	0.2612	0.6734	0.2413	0.6734	0.2165	0.6734	0.1872
0.7055	0.478	0.7055	0.3547	0.7055	0.3006	0.7055	0.2612	0.7055	0.2413	0.7055	0.2186	0.7055	0.1922
0.7391	0.478	0.7391	0.3547	0.7391	0.3006	0.7391	0.2692	0.7391	0.2463	0.7391	0.2186	0.7391	0.1922
0.7743	0.5518	0.7743	0.3958	0.7743	0.3332	0.7743	0.2918	0.7743	0.268	0.7743	0.2351	0.7743	0.2018
0.8111	0.5518	0.8111	0.3958	0.8111	0.3332	0.8111	0.3035	0.8111	0.2874	0.8111	0.2587	0.8111	0.2236
0.8497	0.5518	0.8497	0.3958	0.8497	0.3332	0.8497	0.3117	0.8497	0.2984	0.8497	0.2723	0.8497	0.2373
0.8902	0.5518	0.8902	0.3958	0.8902	0.3656	0.8902	0.3431	0.8902	0.3226	0.8902	0.2873	0.8902	0.2462
0.9326	0.8605	0.9326	0.5585	0.9326	0.4629	0.9326	0.4023	0.9326	0.3602	0.9326	0.3049	0.9326	0.2549
0.977	0.8605	0.977	0.5585	0.977	0.4629	0.977	0.4045	0.977	0.3644	0.977	0.3083	0.977	0.2637
1.0235	0.9315	1.0235	0.5965	1.0235	0.5261	1.0235	0.4814	1.0235	0.4436	1.0235	0.3837	1.0235	0.3277
1.0723	0.9315	1.0723	0.6685	1.0723	0.603	1.0723	0.5467	1.0723	0.4995	1.0723	0.4355	1.0723	0.3729
1.1233	1.3398	1.1233	0.8315	1.1233	0.6788	1.1233	0.5837	1.1233	0.5408	1.1233	0.4681	1.1233	0.3987
1.1768	1.3398	1.1768	0.8315	1.1768	0.6788	1.1768	0.5855	1.1768	0.5505	1.1768	0.4858	1.1768	0.4238
1.2328	1.3398	1.2328	0.8315	1.2328	0.7369	1.2328	0.6596	1.2328	0.5925	1.2328	0.5105	1.2328	0.452
1.2916	1.3398	1.2916	0.9002	1.2916	0.7926	1.2916	0.7024	1.2916	0.6263	1.2916	0.5455	1.2916	0.4806
1.353	1.3398	1.353	0.9485	1.353	0.7926	1.353	0.7024	1.353	0.6282	1.353	0.574	1.353	0.5058
1.4175	1.4626	1.4175	0.9485	1.4175	0.7926	1.4175	0.7024	1.4175	0.6579	1.4175	0.6026	1.4175	0.5321
1.485	1.4626	1.485	0.9485	1.485	0.7926	1.485	0.7282	1.485	0.6958	1.485	0.636	1.485	0.5624
1.5557	1.5113	1.5557	1.0297	1.5557	0.8797	1.5557	0.7754	1.5557	0.726	1.5557	0.6634	1.5557	0.5886
1.6298	1.8158	1.6298	1.1086	1.6298	0.9552	1.6298	0.8627	1.6298	0.7931	1.6298	0.6875	1.6298	0.6064
1.7074	1.8158	1.7074	1.1086	1.7074	0.9552	1.7074	0.8627	1.7074	0.7931	1.7074	0.7024	1.7074	0.6246
1.7887	1.8158	1.7887	1.1086	1.7887	0.9552	1.7887	0.8627	1.7887	0.7931	1.7887	0.7213	1.7887	0.6476
1.8738	1.8158	1.8738	1.1086	1.8738	0.9552	1.8738	0.8651	1.8738	0.8263	1.8738	0.7567	1.8738	0.6698
1.963	1.8158	1.963	1.1086	1.963	0.9552	1.963	0.8972	1.963	0.8525	1.963	0.7755	1.963	0.683
2.0565	1.7414	2.0565	1.0948	2.0565	0.9593	2.0565	0.9017	2.0565	0.8525	2.0565	0.7755	2.0565	0.683
2.1544	1.7414	2.1544	1.0948	2.1544	0.9593	2.1544	0.9017	2.1544	0.8525	2.1544	0.7755	2.1544	0.683
2.257	1.5091	2.257	1.0367	2.257	0.9593	2.257	0.9017	2.257	0.8525	2.257	0.7755	2.257	0.683
2.3645	1.5091	2.3645	1.0367	2.3645	0.9593	2.3645	0.9017	2.3645	0.8525	2.3645	0.7755	2.3645	0.683
2.4771	1.5091	2.4771	1.0367	2.4771	1.009	2.4771	0.9017	2.4771	0.852	2.4771	0.7697	2.4771	0.6811
2.595	1.5091	2.595	1.0367	2.595	1.009	2.595	0.9017	2.595	0.8387	2.595	0.7357	2.595	0.6811

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
2.7186	1.5091	2.7186	1.0367	2.7186	1.009	2.7186	0.9017	2.7186	0.8387	2.7186	0.7357	2.7186	0.6811
2.848	1.5091	2.848	1.0367	2.848	1.009	2.848	0.9017	2.848	0.8387	2.848	0.7357	2.848	0.6811
2.9836	1.5091	2.9836	1.0367	2.9836	1.009	2.9836	0.9017	2.9836	0.8387	2.9836	0.7357	2.9836	0.6811
3.1257	1.5091	3.1257	1.0367	3.1257	0.9237	3.1257	0.9017	3.1257	0.8387	3.1257	0.7357	3.1257	0.6811
3.2745	1.5091	3.2745	1.0367	3.2745	0.9237	3.2745	0.9017	3.2745	0.8387	3.2745	0.7357	3.2745	0.6811
3.4305	1.5091	3.4305	1.0367	3.4305	0.9237	3.4305	0.9017	3.4305	0.8387	3.4305	0.7357	3.4305	0.6801
3.5938	1.6472	3.5938	1.0367	3.5938	0.9237	3.5938	0.9017	3.5938	0.8387	3.5938	0.7357	3.5938	0.6801
3.7649	1.6472	3.7649	1.1356	3.7649	0.9237	3.7649	0.9017	3.7649	0.8387	3.7649	0.7357	3.7649	0.6766
3.9442	1.6472	3.9442	1.1356	3.9442	0.9237	3.9442	0.906	3.9442	0.8387	3.9442	0.7357	3.9442	0.6759
4.132	1.6472	4.132	1.1356	4.132	0.9237	4.132	0.906	4.132	0.8387	4.132	0.7357	4.132	0.6712
4.3288	1.6472	4.3288	1.1356	4.3288	0.9237	4.3288	0.906	4.3288	0.8387	4.3288	0.7357	4.3288	0.6626
4.5349	1.6472	4.5349	1.1356	4.5349	0.9237	4.5349	0.906	4.5349	0.8387	4.5349	0.7357	4.5349	0.6525
4.7508	1.6472	4.7508	1.1048	4.7508	0.9237	4.7508	0.906	4.7508	0.8387	4.7508	0.7357	4.7508	0.6316
4.977	1.6472	4.977	0.9746	4.977	0.8757	4.977	0.829	4.977	0.7851	4.977	0.7083	4.977	0.6206
5.214	1.6472	5.214	0.9746	5.214	0.8463	5.214	0.785	5.214	0.7434	5.214	0.6732	5.214	0.5898
5.4623	1.7798	5.4623	0.9746	5.4623	0.8463	5.4623	0.785	5.4623	0.7434	5.4623	0.6732	5.4623	0.5898
5.7224	1.7798	5.7224	0.9746	5.7224	0.8463	5.7224	0.785	5.7224	0.7434	5.7224	0.6732	5.7224	0.5898
5.9948	1.7798	5.9948	0.9746	5.9948	0.8438	5.9948	0.785	5.9948	0.7434	5.9948	0.6732	5.9948	0.5898
6.2803	1.7798	6.2803	0.9746	6.2803	0.8438	6.2803	0.785	6.2803	0.7434	6.2803	0.6732	6.2803	0.5898
6.5793	1.7798	6.5793	0.9746	6.5793	0.8438	6.5793	0.7804	6.5793	0.7393	6.5793	0.6657	6.5793	0.5795
6.8926	1.7798	6.8926	0.963	6.8926	0.8429	6.8926	0.7674	6.8926	0.7128	6.8926	0.6345	6.8926	0.5677
7.2208	1.4914	7.2208	0.935	7.2208	0.7922	7.2208	0.7331	7.2208	0.6844	7.2208	0.6283	7.2208	0.5677
7.5646	1.168	7.5646	0.822	7.5646	0.7632	7.5646	0.7188	7.5646	0.6833	7.5646	0.6283	7.5646	0.5677
7.9248	1.0987	7.9248	0.8201	7.9248	0.7623	7.9248	0.7176	7.9248	0.6811	7.9248	0.6237	7.9248	0.5627
8.3022	1.0987	8.3022	0.7845	8.3022	0.7283	8.3022	0.6777	8.3022	0.6364	8.3022	0.5884	8.3022	0.5417
8.6975	0.8935	8.6975	0.7092	8.6975	0.6368	8.6975	0.6061	8.6975	0.5819	8.6975	0.5373	8.6975	0.5059
9.1116	0.8935	9.1116	0.7092	9.1116	0.6368	9.1116	0.5827	9.1116	0.5505	9.1116	0.5085	9.1116	0.4846
9.5455	0.8763	9.5455	0.7092	9.5455	0.6368	9.5455	0.5827	9.5455	0.5459	9.5455	0.4951	9.5455	0.4643
10	0.8763	10	0.7092	10	0.6368	10	0.5827	10	0.5459	10	0.4934	10	0.4429
10.4762	0.8603	10.4762	0.7092	10.4762	0.6368	10.4762	0.5774	10.4762	0.5297	10.4762	0.4688	10.4762	0.4271
10.975	0.791	10.975	0.6543	10.975	0.6067	10.975	0.5582	10.975	0.5137	10.975	0.4674	10.975	0.4271
11.4976	0.791	11.4976	0.6543	11.4976	0.6014	11.4976	0.5519	11.4976	0.5094	11.4976	0.4435	11.4976	0.4142
12.045	0.6677	12.045	0.5543	12.045	0.5086	12.045	0.4716	12.045	0.4394	12.045	0.4081	12.045	0.3915
12.6186	0.6325	12.6186	0.5145	12.6186	0.4727	12.6186	0.4409	12.6186	0.4251	12.6186	0.4004	12.6186	0.3774
13.2194	0.6325	13.2194	0.5025	13.2194	0.4639	13.2194	0.4269	13.2194	0.4021	13.2194	0.379	13.2194	0.3634

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 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.6152	13.8489	0.4815	13.8489	0.433	13.8489	0.3995	13.8489	0.3896	13.8489	0.3705	13.8489	0.3527
14.5083	0.5318	14.5083	0.4455	14.5083	0.4096	14.5083	0.381	14.5083	0.3726	14.5083	0.3575	14.5083	0.3484
15.1991	0.4787	15.1991	0.4141	15.1991	0.3936	15.1991	0.3795	15.1991	0.3697	15.1991	0.3575	15.1991	0.3484
15.9228	0.4787	15.9228	0.3815	15.9228	0.3644	15.9228	0.3609	15.9228	0.358	15.9228	0.3528	15.9228	0.3467
16.681	0.4787	16.681	0.3815	16.681	0.3644	16.681	0.3544	16.681	0.3483	16.681	0.3439	16.681	0.3416
17.4753	0.4307	17.4753	0.3815	17.4753	0.3644	17.4753	0.3544	17.4753	0.3483	17.4753	0.3418	17.4753	0.337
18.3074	0.4095	18.3074	0.3431	18.3074	0.3367	18.3074	0.3354	18.3074	0.3336	18.3074	0.3315	18.3074	0.3305
19.1791	0.4095	19.1791	0.3431	19.1791	0.3349	19.1791	0.3293	19.1791	0.3262	19.1791	0.3251	19.1791	0.325
20.0923	0.3708	20.0923	0.3431	20.0923	0.3349	20.0923	0.3293	20.0923	0.3262	20.0923	0.3243	20.0923	0.323
21.049	0.3708	21.049	0.3431	21.049	0.3349	21.049	0.3293	21.049	0.3262	21.049	0.3236	21.049	0.3215
22.0513	0.3708	22.0513	0.3431	22.0513	0.3349	22.0513	0.3293	22.0513	0.3262	22.0513	0.323	22.0513	0.3199
23.1013	0.3708	23.1013	0.3431	23.1013	0.3349	23.1013	0.3293	23.1013	0.3262	23.1013	0.323	23.1013	0.3199
24.2013	0.3708	24.2013	0.3431	24.2013	0.3349	24.2013	0.3293	24.2013	0.3255	24.2013	0.3206	24.2013	0.3186
25.3536	0.3358	25.3536	0.3197	25.3536	0.3192	25.3536	0.3187	25.3536	0.3181	25.3536	0.317	25.3536	0.3164
26.5609	0.3358	26.5609	0.3169	26.5609	0.3159	26.5609	0.3158	26.5609	0.3158	26.5609	0.3155	26.5609	0.3148
27.8256	0.3358	27.8256	0.3169	27.8256	0.3159	27.8256	0.3153	27.8256	0.3149	27.8256	0.3143	27.8256	0.3137
29.1505	0.3358	29.1505	0.3165	29.1505	0.3153	29.1505	0.3142	29.1505	0.3137	29.1505	0.3132	29.1505	0.313
30.5386	0.3312	30.5386	0.3165	30.5386	0.3153	30.5386	0.3142	30.5386	0.3133	30.5386	0.3131	30.5386	0.313
31.9927	0.3297	31.9927	0.3163	31.9927	0.3146	31.9927	0.3138	31.9927	0.3132	31.9927	0.3131	31.9927	0.313
33.516	0.3144	33.516	0.3134	33.516	0.3133	33.516	0.3132	33.516	0.3132	33.516	0.3131	33.516	0.313
35.1119	0.3135	35.1119	0.3134	35.1119	0.3133	35.1119	0.3132	35.1119	0.3132	35.1119	0.3131	35.1119	0.313
36.7838	0.3134	36.7838	0.3133	36.7838	0.3132	36.7838	0.3132	36.7838	0.3132	36.7838	0.3131	36.7838	0.313
38.5353	0.3132	38.5353	0.3132	38.5353	0.3131	38.5353	0.3131	38.5353	0.3131	38.5353	0.3131	38.5353	0.313
40.3702	0.3131	40.3702	0.3131	40.3702	0.3131	40.3702	0.313	40.3702	0.313	40.3702	0.313	40.3702	0.3129
42.2924	0.313	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129
44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128
46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127
48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126
50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0405	0.1098	0.0365	0.1098	0.0342	0.1098	0.0322	0.1098	0.0303	0.1098	0.0272	0.1098	0.0235
0.115	0.0405	0.115	0.0365	0.115	0.0342	0.115	0.0322	0.115	0.0303	0.115	0.0272	0.115	0.0259
0.1204	0.0405	0.1204	0.0365	0.1204	0.0342	0.1204	0.0322	0.1204	0.031	0.1204	0.0297	0.1204	0.028
0.1262	0.0405	0.1262	0.0365	0.1262	0.0352	0.1262	0.0342	0.1262	0.0334	0.1262	0.0318	0.1262	0.0297
0.1322	0.0405	0.1322	0.0382	0.1322	0.037	0.1322	0.0359	0.1322	0.0349	0.1322	0.0333	0.1322	0.0316
0.1385	0.0411	0.1385	0.0392	0.1385	0.0382	0.1385	0.0372	0.1385	0.0363	0.1385	0.0348	0.1385	0.0328
0.1451	0.0417	0.1451	0.0398	0.1451	0.0387	0.1451	0.0377	0.1451	0.0368	0.1451	0.0352	0.1451	0.0332
0.152	0.0439	0.152	0.0401	0.152	0.0387	0.152	0.0377	0.152	0.0368	0.152	0.0352	0.152	0.0332
0.1592	0.0462	0.1592	0.0416	0.1592	0.0396	0.1592	0.0377	0.1592	0.0368	0.1592	0.0352	0.1592	0.0332
0.1668	0.0584	0.1668	0.0506	0.1668	0.0463	0.1668	0.0426	0.1668	0.0395	0.1668	0.0352	0.1668	0.0332
0.1748	0.0645	0.1748	0.0566	0.1748	0.0522	0.1748	0.0484	0.1748	0.045	0.1748	0.0394	0.1748	0.0332
0.1831	0.0668	0.1831	0.0583	0.1831	0.0541	0.1831	0.0504	0.1831	0.0471	0.1831	0.0415	0.1831	0.0354
0.1918	0.0678	0.1918	0.0586	0.1918	0.0543	0.1918	0.0507	0.1918	0.0474	0.1918	0.0418	0.1918	0.038
0.2009	0.0697	0.2009	0.0596	0.2009	0.0543	0.2009	0.0514	0.2009	0.0487	0.2009	0.0438	0.2009	0.0411
0.2105	0.0722	0.2105	0.062	0.2105	0.0582	0.2105	0.0547	0.2105	0.0516	0.2105	0.0482	0.2105	0.0446
0.2205	0.0819	0.2205	0.0709	0.2205	0.0651	0.2205	0.06	0.2205	0.0574	0.2205	0.0531	0.2205	0.0475
0.231	0.0959	0.231	0.0792	0.231	0.0703	0.231	0.0665	0.231	0.063	0.231	0.0578	0.231	0.0525
0.242	0.0984	0.242	0.0845	0.242	0.0774	0.242	0.0721	0.242	0.0681	0.242	0.0618	0.242	0.0551
0.2535	0.1059	0.2535	0.0913	0.2535	0.0833	0.2535	0.0763	0.2535	0.0702	0.2535	0.0618	0.2535	0.0551
0.2656	0.1138	0.2656	0.0944	0.2656	0.084	0.2656	0.0763	0.2656	0.0702	0.2656	0.0618	0.2656	0.0551
0.2783	0.1138	0.2783	0.0944	0.2783	0.084	0.2783	0.0779	0.2783	0.074	0.2783	0.0677	0.2783	0.0611
0.2915	0.1138	0.2915	0.1008	0.2915	0.0946	0.2915	0.0892	0.2915	0.0843	0.2915	0.0764	0.2915	0.0677
0.3054	0.1179	0.3054	0.1056	0.3054	0.0987	0.3054	0.0926	0.3054	0.0872	0.3054	0.0785	0.3054	0.0706
0.3199	0.1179	0.3199	0.1056	0.3199	0.0987	0.3199	0.0926	0.3199	0.0894	0.3199	0.0844	0.3199	0.0786
0.3352	0.1179	0.3352	0.1098	0.3352	0.1056	0.3352	0.1017	0.3352	0.0982	0.3352	0.0921	0.3352	0.0848
0.3511	0.1654	0.3511	0.129	0.3511	0.1133	0.3511	0.1075	0.3511	0.1035	0.3511	0.0964	0.3511	0.088
0.3678	0.2415	0.3678	0.1832	0.3678	0.1565	0.3678	0.1364	0.3678	0.1213	0.3678	0.1006	0.3678	0.088
0.3853	0.2549	0.3853	0.187	0.3853	0.1595	0.3853	0.1387	0.3853	0.1269	0.3853	0.1092	0.3853	0.091
0.4037	0.2549	0.4037	0.187	0.4037	0.1595	0.4037	0.1387	0.4037	0.1279	0.4037	0.1163	0.4037	0.1034
0.4229	0.2549	0.4229	0.187	0.4229	0.1651	0.4229	0.1485	0.4229	0.1344	0.4229	0.1233	0.4229	0.1111
0.4431	0.3288	0.4431	0.2339	0.4431	0.2038	0.4431	0.1813	0.4431	0.1641	0.4431	0.1399	0.4431	0.1181
0.4642	0.3288	0.4642	0.2339	0.4642	0.2038	0.4642	0.1813	0.4642	0.1641	0.4642	0.1399	0.4642	0.1181
0.4863	0.3288	0.4863	0.2339	0.4863	0.2038	0.4863	0.1813	0.4863	0.1641	0.4863	0.1421	0.4863	0.1246
0.5094	0.3288	0.5094	0.2339	0.5094	0.2038	0.5094	0.1813	0.5094	0.1641	0.5094	0.1472	0.5094	0.1295

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.3356	0.5337	0.2387	0.5337	0.2081	0.5337	0.19	0.5337	0.1796	0.5337	0.1614	0.5337	0.1401
0.5591	0.3997	0.5591	0.2762	0.5591	0.244	0.5591	0.2179	0.5591	0.1971	0.5591	0.1724	0.5591	0.1556
0.5857	0.3997	0.5857	0.2863	0.5857	0.2573	0.5857	0.2332	0.5857	0.2128	0.5857	0.1853	0.5857	0.1724
0.6136	0.3997	0.6136	0.2863	0.6136	0.2573	0.6136	0.2332	0.6136	0.2128	0.6136	0.1998	0.6136	0.1858
0.6428	0.3997	0.6428	0.2863	0.6428	0.2573	0.6428	0.2332	0.6428	0.2219	0.6428	0.2115	0.6428	0.1969
0.6734	0.411	0.6734	0.2863	0.6734	0.2574	0.6734	0.2449	0.6734	0.2378	0.6734	0.2244	0.6734	0.2072
0.7055	0.411	0.7055	0.301	0.7055	0.2757	0.7055	0.2638	0.7055	0.2534	0.7055	0.2357	0.7055	0.2156
0.7391	0.6367	0.7391	0.4169	0.7391	0.3404	0.7391	0.2927	0.7391	0.2746	0.7391	0.2445	0.7391	0.217
0.7743	0.6367	0.7743	0.4169	0.7743	0.3404	0.7743	0.3038	0.7743	0.2858	0.7743	0.2555	0.7743	0.2218
0.8111	0.6596	0.8111	0.4428	0.8111	0.386	0.8111	0.3422	0.8111	0.3081	0.8111	0.2598	0.8111	0.2218
0.8497	0.6596	0.8497	0.4428	0.8497	0.4051	0.8497	0.3738	0.8497	0.347	0.8497	0.3034	0.8497	0.256
0.8902	0.6828	0.8902	0.4451	0.8902	0.4051	0.8902	0.3738	0.8902	0.3511	0.8902	0.3194	0.8902	0.2761
0.9326	0.737	0.9326	0.5191	0.9326	0.4567	0.9326	0.411	0.9326	0.3766	0.9326	0.328	0.9326	0.2821
0.977	0.9914	0.977	0.6358	0.977	0.525	0.977	0.4553	0.977	0.408	0.977	0.3484	0.977	0.2994
1.0235	0.9914	1.0235	0.6358	1.0235	0.5662	1.0235	0.5139	1.0235	0.4702	1.0235	0.4041	1.0235	0.3384
1.0723	0.9914	1.0723	0.6668	1.0723	0.5976	1.0723	0.5399	1.0723	0.4914	1.0723	0.4166	1.0723	0.3541
1.1233	1.2606	1.1233	0.8561	1.1233	0.7168	1.1233	0.6174	1.1233	0.5433	1.1233	0.4431	1.1233	0.3633
1.1768	1.2606	1.1768	0.8561	1.1768	0.7168	1.1768	0.6174	1.1768	0.5433	1.1768	0.4467	1.1768	0.3729
1.2328	1.2606	1.2328	0.935	1.2328	0.8202	1.2328	0.7293	1.2328	0.6556	1.2328	0.5433	1.2328	0.4321
1.2916	1.2606	1.2916	1.0351	1.2916	0.8991	1.2916	0.793	1.2916	0.708	1.2916	0.5814	1.2916	0.4586
1.353	1.3319	1.353	1.0351	1.353	0.8991	1.353	0.793	1.353	0.708	1.353	0.5814	1.353	0.4631
1.4175	1.6092	1.4175	1.1325	1.4175	0.9683	1.4175	0.8621	1.4175	0.7817	1.4175	0.6627	1.4175	0.5486
1.485	1.6092	1.485	1.1325	1.485	0.9683	1.485	0.885	1.485	0.8264	1.485	0.7199	1.485	0.6006
1.5557	1.8872	1.5557	1.1818	1.5557	1.0008	1.5557	0.892	1.5557	0.8264	1.5557	0.7265	1.5557	0.6185
1.6298	1.9322	1.6298	1.3084	1.6298	1.1683	1.6298	1.0534	1.6298	0.9565	1.6298	0.8016	1.6298	0.6401
1.7074	1.9702	1.7074	1.3601	1.7074	1.2627	1.7074	1.1415	1.7074	1.0371	1.7074	0.8692	1.7074	0.7006
1.7887	2.4552	1.7887	1.4456	1.7887	1.2629	1.7887	1.1415	1.7887	1.0371	1.7887	0.8773	1.7887	0.7486
1.8738	2.4552	1.8738	1.4456	1.8738	1.2629	1.8738	1.1415	1.8738	1.0371	1.8738	0.9259	1.8738	0.788
1.963	2.4552	1.963	1.4456	1.963	1.2629	1.963	1.1498	1.963	1.0818	1.963	0.9626	1.963	0.8157
2.0565	2.4552	2.0565	1.4456	2.0565	1.2629	2.0565	1.1701	2.0565	1.1049	2.0565	0.9829	2.0565	0.8288
2.1544	2.4552	2.1544	1.4456	2.1544	1.3316	2.1544	1.2297	2.1544	1.1411	2.1544	0.9932	2.1544	0.8645
2.257	2.2367	2.257	1.4456	2.257	1.3316	2.257	1.2297	2.257	1.1534	2.257	1.0344	2.257	0.8939
2.3645	2.2367	2.3645	1.4456	2.3645	1.3316	2.3645	1.2422	2.3645	1.1724	2.3645	1.0471	2.3645	0.898
2.4771	2.2367	2.4771	1.6143	2.4771	1.3804	2.4771	1.2551	2.4771	1.1724	2.4771	1.0471	2.4771	0.898
2.595	2.138	2.595	1.6143	2.595	1.3804	2.595	1.2551	2.595	1.1724	2.595	1.0471	2.595	0.898

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
2.7186	2.138	2.7186	1.6143	2.7186	1.3804	2.7186	1.2551	2.7186	1.1724	2.7186	1.0471	2.7186	0.898	
2.848	2.138	2.848	1.6143	2.848	1.3804	2.848	1.2551	2.848	1.1724	2.848	1.0471	2.848	0.898	
2.9836	2.138	2.9836	1.6143	2.9836	1.3804	2.9836	1.2551	2.9836	1.1568	2.9836	1.0114	2.9836	0.8645	
3.1257	2.138	3.1257	1.3773	3.1257	1.0982	3.1257	1.0035	3.1257	0.9573	3.1257	0.8829	3.1257	0.7931	
3.2745	2.138	3.2745	1.2119	3.2745	1.0686	3.2745	0.9673	3.2745	0.886	3.2745	0.778	3.2745	0.7168	
3.4305	1.5368	3.4305	1.0471	3.4305	0.9495	3.4305	0.8824	3.4305	0.8379	3.4305	0.7547	3.4305	0.6598	
3.5938	1.5368	3.5938	1.0165	3.5938	0.898	3.5938	0.8299	3.5938	0.7946	3.5938	0.7273	3.5938	0.6376	
3.7649	1.5368	3.7649	1.0165	3.7649	0.898	3.7649	0.8299	3.7649	0.7769	3.7649	0.6958	3.7649	0.6089	
3.9442	1.5368	3.9442	1.0165	3.9442	0.8472	3.9442	0.7941	3.9442	0.7477	3.9442	0.6723	3.9442	0.5955	
4.132	1.5368	4.132	1.0165	4.132	0.845	4.132	0.7941	4.132	0.7477	4.132	0.6723	4.132	0.5955	
4.3288	1.5368	4.3288	0.9973	4.3288	0.8194	4.3288	0.7522	4.3288	0.7017	4.3288	0.6303	4.3288	0.5622	
4.5349	1.5368	4.5349	0.8745	4.5349	0.7347	4.5349	0.6652	4.5349	0.6197	4.5349	0.5656	4.5349	0.5097	
4.7508	1.518	4.7508	0.8745	4.7508	0.7183	4.7508	0.6169	4.7508	0.5587	4.7508	0.4909	4.7508	0.4618	
4.977	1.518	4.977	0.8614	4.977	0.7025	4.977	0.6052	4.977	0.5367	4.977	0.4572	4.977	0.4284	
5.214	1.3404	5.214	0.7497	5.214	0.6443	5.214	0.5421	5.214	0.5109	5.214	0.4398	5.214	0.4021	
5.4623	1.3404	5.4623	0.7497	5.4623	0.6443	5.4623	0.5254	5.4623	0.5109	5.4623	0.438	5.4623	0.3783	
5.7224	1.3404	5.7224	0.7497	5.7224	0.6443	5.7224	0.5254	5.7224	0.5109	5.7224	0.438	5.7224	0.3681	
5.9948	1.3404	5.9948	0.7497	5.9948	0.6443	5.9948	0.5254	5.9948	0.5109	5.9948	0.438	5.9948	0.3681	
6.2803	1.3404	6.2803	0.7497	6.2803	0.6443	6.2803	0.5254	6.2803	0.5109	6.2803	0.438	6.2803	0.3681	
6.5793	1.3404	6.5793	0.7497	6.5793	0.6443	6.5793	0.5254	6.5793	0.5109	6.5793	0.438	6.5793	0.3681	
6.8926	1.3404	6.8926	0.7497	6.8926	0.6443	6.8926	0.5254	6.8926	0.5109	6.8926	0.438	6.8926	0.3681	
7.2208	1.274	7.2208	0.7497	7.2208	0.6443	7.2208	0.5254	7.2208	0.5109	7.2208	0.438	7.2208	0.3681	
7.5646	1.274	7.5646	0.7455	7.5646	0.6309	7.5646	0.5254	7.5646	0.5092	7.5646	0.438	7.5646	0.3681	
7.9248	1.274	7.9248	0.6003	7.9248	0.5494	7.9248	0.5064	7.9248	0.471	7.9248	0.4168	7.9248	0.3609	
8.3022	1.274	8.3022	0.5659	8.3022	0.4849	8.3022	0.454	8.3022	0.4288	8.3022	0.394	8.3022	0.3594	
8.6975	1.0027	8.6975	0.521	8.6975	0.4849	8.6975	0.454	8.6975	0.4288	8.6975	0.3913	8.6975	0.3536	
9.1116	1.0027	9.1116	0.4701	9.1116	0.4386	9.1116	0.4105	9.1116	0.3865	9.1116	0.3654	9.1116	0.3376	
9.5455	1.0027	9.5455	0.4494	9.5455	0.4069	9.5455	0.3794	9.5455	0.3652	9.5455	0.3418	9.5455	0.3167	
10	0.6463	10	0.4494	10	0.4069	10	0.3794	10	0.3585	10	0.3293	10	0.3015	
10.4762	0.6411	10.4762	0.4371	10.4762	0.3959	10.4762	0.3648	10.4762	0.347	10.4762	0.3169	10.4762	0.2936	
10.975	0.6411	10.975	0.4085	10.975	0.3668	10.975	0.3387	10.975	0.3179	10.975	0.2923	10.975	0.2891	
11.4976	0.6411	11.4976	0.3647	11.4976	0.3304	11.4976	0.3133	11.4976	0.3024	11.4976	0.2893	11.4976	0.2857	
12.045	0.6411	12.045	0.3647	12.045	0.3304	12.045	0.3133	12.045	0.3024	12.045	0.2893	12.045	0.2839	
12.6186	0.6411	12.6186	0.3647	12.6186	0.3304	12.6186	0.3133	12.6186	0.3024	12.6186	0.2893	12.6186	0.2831	
13.2194	0.6411	13.2194	0.3647	13.2194	0.3304	13.2194	0.3133	13.2194	0.3024	13.2194	0.2893	13.2194	0.2831	

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.6411	13.8489	0.3647	13.8489	0.3304	13.8489	0.3133	13.8489	0.3024	13.8489	0.2893	13.8489	0.2831
14.5083	0.6411	14.5083	0.3647	14.5083	0.3304	14.5083	0.3133	14.5083	0.3024	14.5083	0.2893	14.5083	0.2831
15.1991	0.6411	15.1991	0.3647	15.1991	0.3304	15.1991	0.3133	15.1991	0.3024	15.1991	0.2893	15.1991	0.2831
15.9228	0.6411	15.9228	0.3647	15.9228	0.3304	15.9228	0.3133	15.9228	0.3024	15.9228	0.2893	15.9228	0.2831
16.681	0.6411	16.681	0.3647	16.681	0.3304	16.681	0.3133	16.681	0.3024	16.681	0.2893	16.681	0.2831
17.4753	0.6411	17.4753	0.3647	17.4753	0.3304	17.4753	0.3133	17.4753	0.3024	17.4753	0.2893	17.4753	0.2831
18.3074	0.4714	18.3074	0.3284	18.3074	0.3152	18.3074	0.3052	18.3074	0.298	18.3074	0.2893	18.3074	0.2831
19.1791	0.4714	19.1791	0.3088	19.1791	0.2936	19.1791	0.2872	19.1791	0.2851	19.1791	0.2842	19.1791	0.2825
20.0923	0.4714	20.0923	0.3088	20.0923	0.2886	20.0923	0.2865	20.0923	0.2851	20.0923	0.2833	20.0923	0.2814
21.049	0.3824	21.049	0.2877	21.049	0.2842	21.049	0.2843	21.049	0.2836	21.049	0.2819	21.049	0.2801
22.0513	0.3824	22.0513	0.2873	22.0513	0.2834	22.0513	0.2816	22.0513	0.2806	22.0513	0.2795	22.0513	0.2783
23.1013	0.2973	23.1013	0.2832	23.1013	0.2814	23.1013	0.2802	23.1013	0.2793	23.1013	0.2779	23.1013	0.2765
24.2013	0.2947	24.2013	0.2805	24.2013	0.2788	24.2013	0.2776	24.2013	0.2768	24.2013	0.2763	24.2013	0.2756
25.3536	0.288	25.3536	0.2805	25.3536	0.2788	25.3536	0.2776	25.3536	0.2768	25.3536	0.2757	25.3536	0.2749
26.5609	0.288	26.5609	0.2805	26.5609	0.2788	26.5609	0.2776	26.5609	0.2768	26.5609	0.2757	26.5609	0.2747
27.8256	0.2867	27.8256	0.28	27.8256	0.2782	27.8256	0.2771	27.8256	0.2762	27.8256	0.2751	27.8256	0.2741
29.1505	0.2773	29.1505	0.2753	29.1505	0.2749	29.1505	0.2745	29.1505	0.2742	29.1505	0.2738	29.1505	0.2732
30.5386	0.2773	30.5386	0.2727	30.5386	0.2726	30.5386	0.2725	30.5386	0.2724	30.5386	0.2723	30.5386	0.2721
31.9927	0.2707	31.9927	0.271	31.9927	0.271	31.9927	0.2711	31.9927	0.2711	31.9927	0.2712	31.9927	0.2712
33.516	0.2707	33.516	0.2707	33.516	0.2706	33.516	0.2706	33.516	0.2706	33.516	0.2706	33.516	0.2706
35.1119	0.27	35.1119	0.27	35.1119	0.27	35.1119	0.2701	35.1119	0.2701	35.1119	0.2701	35.1119	0.2701
36.7838	0.2695	36.7838	0.2696	36.7838	0.2696	36.7838	0.2696	36.7838	0.2697	36.7838	0.2697	36.7838	0.2697
38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693
40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269
42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2688
44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685
46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683
48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681
50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0291	0.1098	0.0261	0.1098	0.0245	0.1098	0.023	0.1098	0.0222	0.1098	0.0215	0.1098	0.0207
0.115	0.0309	0.115	0.0261	0.115	0.0245	0.115	0.0235	0.115	0.0231	0.115	0.0224	0.115	0.0216
0.1204	0.0313	0.1204	0.0263	0.1204	0.0247	0.1204	0.0242	0.1204	0.0238	0.1204	0.0231	0.1204	0.0222
0.1262	0.0313	0.1262	0.027	0.1262	0.0258	0.1262	0.0247	0.1262	0.0243	0.1262	0.0235	0.1262	0.0225
0.1322	0.0313	0.1322	0.0271	0.1322	0.0258	0.1322	0.0248	0.1322	0.0244	0.1322	0.0236	0.1322	0.0226
0.1385	0.0313	0.1385	0.0277	0.1385	0.0266	0.1385	0.0255	0.1385	0.0246	0.1385	0.0236	0.1385	0.0227
0.1451	0.0316	0.1451	0.0295	0.1451	0.0282	0.1451	0.027	0.1451	0.0259	0.1451	0.0239	0.1451	0.0227
0.152	0.032	0.152	0.0299	0.152	0.0286	0.152	0.0273	0.152	0.0262	0.152	0.0241	0.152	0.0227
0.1592	0.0331	0.1592	0.0311	0.1592	0.03	0.1592	0.0289	0.1592	0.0279	0.1592	0.0265	0.1592	0.0247
0.1668	0.0367	0.1668	0.0324	0.1668	0.0313	0.1668	0.0304	0.1668	0.0296	0.1668	0.0281	0.1668	0.0261
0.1748	0.0507	0.1748	0.0427	0.1748	0.0386	0.1748	0.0351	0.1748	0.0322	0.1748	0.0288	0.1748	0.0268
0.1831	0.0586	0.1831	0.0493	0.1831	0.0442	0.1831	0.0399	0.1831	0.0362	0.1831	0.0306	0.1831	0.027
0.1918	0.0586	0.1918	0.0493	0.1918	0.0442	0.1918	0.0399	0.1918	0.0362	0.1918	0.0306	0.1918	0.0277
0.2009	0.0586	0.2009	0.0493	0.2009	0.0442	0.2009	0.0399	0.2009	0.0362	0.2009	0.0329	0.2009	0.03
0.2105	0.0586	0.2105	0.0493	0.2105	0.0442	0.2105	0.0403	0.2105	0.0388	0.2105	0.0361	0.2105	0.0326
0.2205	0.0586	0.2205	0.0493	0.2205	0.0455	0.2205	0.0429	0.2205	0.0408	0.2205	0.0378	0.2205	0.0339
0.231	0.0586	0.231	0.0493	0.231	0.0459	0.231	0.044	0.231	0.0422	0.231	0.039	0.231	0.0354
0.242	0.0586	0.242	0.051	0.242	0.0487	0.242	0.0465	0.242	0.0446	0.242	0.0411	0.242	0.0371
0.2535	0.065	0.2535	0.0574	0.2535	0.053	0.2535	0.049	0.2535	0.0454	0.2535	0.0412	0.2535	0.0387
0.2656	0.0732	0.2656	0.0587	0.2656	0.0536	0.2656	0.0492	0.2656	0.0454	0.2656	0.0437	0.2656	0.0417
0.2783	0.0817	0.2783	0.0599	0.2783	0.0536	0.2783	0.0508	0.2783	0.0495	0.2783	0.0471	0.2783	0.044
0.2915	0.0817	0.2915	0.0619	0.2915	0.0581	0.2915	0.0547	0.2915	0.052	0.2915	0.0488	0.2915	0.0449
0.3054	0.0817	0.3054	0.0666	0.3054	0.0624	0.3054	0.0586	0.3054	0.0552	0.3054	0.0499	0.3054	0.0461
0.3199	0.0817	0.3199	0.0702	0.3199	0.0661	0.3199	0.0623	0.3199	0.0591	0.3199	0.0538	0.3199	0.0475
0.3352	0.0875	0.3352	0.0769	0.3352	0.071	0.3352	0.0665	0.3352	0.0631	0.3352	0.0572	0.3352	0.0503
0.3511	0.091	0.3511	0.0809	0.3511	0.0752	0.3511	0.0701	0.3511	0.0656	0.3511	0.0579	0.3511	0.0508
0.3678	0.1221	0.3678	0.0953	0.3678	0.0824	0.3678	0.0723	0.3678	0.0656	0.3678	0.0579	0.3678	0.0508
0.3853	0.1364	0.3853	0.106	0.3853	0.0922	0.3853	0.0811	0.3853	0.0723	0.3853	0.0594	0.3853	0.0508
0.4037	0.1364	0.4037	0.106	0.4037	0.0922	0.4037	0.0825	0.4037	0.0766	0.4037	0.0667	0.4037	0.0573
0.4229	0.1364	0.4229	0.106	0.4229	0.0922	0.4229	0.0853	0.4229	0.0801	0.4229	0.0716	0.4229	0.0615
0.4431	0.1364	0.4431	0.106	0.4431	0.094	0.4431	0.0891	0.4431	0.0844	0.4431	0.076	0.4431	0.0659
0.4642	0.1377	0.4642	0.106	0.4642	0.0979	0.4642	0.0921	0.4642	0.0866	0.4642	0.0772	0.4642	0.0681
0.4863	0.1482	0.4863	0.1245	0.4863	0.1116	0.4863	0.1006	0.4863	0.0911	0.4863	0.0833	0.4863	0.0743
0.5094	0.1823	0.5094	0.1391	0.5094	0.1225	0.5094	0.1091	0.5094	0.0984	0.5094	0.0875	0.5094	0.0759

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.2226	0.5337	0.1617	0.5337	0.1354	0.5337	0.1157	0.5337	0.1031	0.5337	0.0875	0.5337	0.0759
0.5591	0.2226	0.5591	0.1617	0.5591	0.1354	0.5591	0.1157	0.5591	0.1031	0.5591	0.0895	0.5591	0.0761
0.5857	0.2226	0.5857	0.1617	0.5857	0.1354	0.5857	0.1157	0.5857	0.1035	0.5857	0.0957	0.5857	0.0843
0.6136	0.2226	0.6136	0.1617	0.6136	0.1354	0.6136	0.1191	0.6136	0.1123	0.6136	0.1013	0.6136	0.0887
0.6428	0.2271	0.6428	0.1635	0.6428	0.1368	0.6428	0.1191	0.6428	0.114	0.6428	0.1049	0.6428	0.0922
0.6734	0.2271	0.6734	0.1635	0.6734	0.1397	0.6734	0.1298	0.6734	0.1217	0.6734	0.1087	0.6734	0.0942
0.7055	0.2271	0.7055	0.1635	0.7055	0.1397	0.7055	0.1298	0.7055	0.1217	0.7055	0.1112	0.7055	0.0976
0.7391	0.2271	0.7391	0.1635	0.7391	0.1428	0.7391	0.1342	0.7391	0.1258	0.7391	0.1112	0.7391	0.0976
0.7743	0.3199	0.7743	0.2154	0.7743	0.1823	0.7743	0.1597	0.7743	0.1436	0.7743	0.1227	0.7743	0.1045
0.8111	0.3199	0.8111	0.2154	0.8111	0.1823	0.8111	0.1597	0.8111	0.1436	0.8111	0.1227	0.8111	0.1072
0.8497	0.3199	0.8497	0.2154	0.8497	0.1823	0.8497	0.1667	0.8497	0.1542	0.8497	0.1343	0.8497	0.1151
0.8902	0.3199	0.8902	0.2154	0.8902	0.1899	0.8902	0.1741	0.8902	0.1611	0.8902	0.1408	0.8902	0.1199
0.9326	0.4905	0.9326	0.3017	0.9326	0.2482	0.9326	0.2168	0.9326	0.1947	0.9326	0.1653	0.9326	0.1387
0.977	0.4905	0.977	0.3017	0.977	0.2482	0.977	0.2168	0.977	0.1947	0.977	0.1738	0.977	0.1524
1.0235	0.4905	1.0235	0.3017	1.0235	0.2482	1.0235	0.2168	1.0235	0.1947	1.0235	0.1823	1.0235	0.1634
1.0723	0.4905	1.0723	0.3017	1.0723	0.2637	1.0723	0.2423	1.0723	0.2253	1.0723	0.1992	1.0723	0.1725
1.1233	0.5817	1.1233	0.3433	1.1233	0.2704	1.1233	0.2423	1.1233	0.2253	1.1233	0.1992	1.1233	0.1725
1.1768	0.5817	1.1768	0.3818	1.1768	0.3175	1.1768	0.2803	1.1768	0.2507	1.1768	0.2165	1.1768	0.1887
1.2328	0.5817	1.2328	0.3891	1.2328	0.3511	1.2328	0.3196	1.2328	0.293	1.2328	0.2534	1.2328	0.2151
1.2916	0.5817	1.2916	0.4229	1.2916	0.3735	1.2916	0.3328	1.2916	0.3047	1.2916	0.2628	1.2916	0.2219
1.353	0.6371	1.353	0.4229	1.353	0.3735	1.353	0.3371	1.353	0.3183	1.353	0.2864	1.353	0.2496
1.4175	0.6371	1.4175	0.4229	1.4175	0.3787	1.4175	0.3589	1.4175	0.341	1.4175	0.3097	1.4175	0.2727
1.485	0.6371	1.485	0.4494	1.485	0.4202	1.485	0.3933	1.485	0.3686	1.485	0.3278	1.485	0.2853
1.5557	0.6371	1.5557	0.4814	1.5557	0.4509	1.5557	0.4238	1.5557	0.3991	1.5557	0.3558	1.5557	0.3055
1.6298	0.7646	1.6298	0.499	1.6298	0.46	1.6298	0.4334	1.6298	0.4095	1.6298	0.3689	1.6298	0.3214
1.7074	0.8139	1.7074	0.632	1.7074	0.5602	1.7074	0.5042	1.7074	0.458	1.7074	0.3899	1.7074	0.3341
1.7887	0.9195	1.7887	0.7556	1.7887	0.6777	1.7887	0.6117	1.7887	0.5549	1.7887	0.4736	1.7887	0.3952
1.8738	0.9711	1.8738	0.7836	1.8738	0.7098	1.8738	0.6502	1.8738	0.6034	1.8738	0.5221	1.8738	0.4298
1.963	1.1224	1.963	0.8714	1.963	0.7675	1.963	0.7007	1.963	0.6427	1.963	0.5486	1.963	0.4456
2.0565	1.2768	2.0565	0.9218	2.0565	0.8205	2.0565	0.7381	2.0565	0.6713	2.0565	0.567	2.0565	0.4588
2.1544	1.2768	2.1544	0.9218	2.1544	0.8205	2.1544	0.7381	2.1544	0.6713	2.1544	0.567	2.1544	0.4588
2.257	1.2768	2.257	0.9218	2.257	0.8205	2.257	0.7381	2.257	0.6756	2.257	0.5786	2.257	0.4821
2.3645	1.8982	2.3645	1.0227	2.3645	0.8284	2.3645	0.7528	2.3645	0.6902	2.3645	0.5876	2.3645	0.4962
2.4771	2.2619	2.4771	1.215	2.4771	0.9875	2.4771	0.8191	2.4771	0.7265	2.4771	0.6267	2.4771	0.5235
2.595	2.7147	2.595	1.215	2.595	1.0799	2.595	0.8772	2.595	0.7512	2.595	0.6435	2.595	0.5443

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
2.7186	2.7147	2.7186	1.215	2.7186	1.0799	2.7186	0.8772	2.7186	0.7512	2.7186	0.6435	2.7186	0.5443	
2.848	2.7147	2.848	1.215	2.848	1.0799	2.848	0.8772	2.848	0.7512	2.848	0.6435	2.848	0.5443	
2.9836	2.7147	2.9836	1.215	2.9836	1.0799	2.9836	0.8772	2.9836	0.7512	2.9836	0.6435	2.9836	0.5443	
3.1257	2.7147	3.1257	1.215	3.1257	1.0799	3.1257	0.8772	3.1257	0.7512	3.1257	0.6435	3.1257	0.5443	
3.2745	1.5417	3.2745	0.9998	3.2745	0.8571	3.2745	0.7497	3.2745	0.6847	3.2745	0.6146	3.2745	0.5331	
3.4305	1.3529	3.4305	0.9515	3.4305	0.8527	3.4305	0.7497	3.4305	0.6847	3.4305	0.6146	3.4305	0.5331	
3.5938	1.3529	3.5938	0.9515	3.5938	0.8527	3.5938	0.7497	3.5938	0.6847	3.5938	0.6146	3.5938	0.5331	
3.7649	1.3529	3.7649	0.9515	3.7649	0.8527	3.7649	0.7497	3.7649	0.6847	3.7649	0.6146	3.7649	0.5331	
3.9442	1.3529	3.9442	0.9515	3.9442	0.8527	3.9442	0.7497	3.9442	0.6847	3.9442	0.6146	3.9442	0.5331	
4.132	1.3529	4.132	0.9515	4.132	0.8527	4.132	0.7497	4.132	0.6847	4.132	0.6146	4.132	0.5331	
4.3288	1.3529	4.3288	0.9515	4.3288	0.8527	4.3288	0.7497	4.3288	0.6847	4.3288	0.6146	4.3288	0.5331	
4.5349	1.3529	4.5349	0.9515	4.5349	0.8527	4.5349	0.7497	4.5349	0.6847	4.5349	0.6146	4.5349	0.5331	
4.7508	1.3529	4.7508	0.9515	4.7508	0.8527	4.7508	0.7497	4.7508	0.6847	4.7508	0.6146	4.7508	0.5331	
4.977	1.3529	4.977	0.9515	4.977	0.8527	4.977	0.7497	4.977	0.6847	4.977	0.6146	4.977	0.5331	
5.214	1.3529	5.214	0.9515	5.214	0.8527	5.214	0.7717	5.214	0.7023	5.214	0.6348	5.214	0.5762	
5.4623	1.7018	5.4623	1.0022	5.4623	0.8819	5.4623	0.7998	5.4623	0.7428	5.4623	0.6773	5.4623	0.6164	
5.7224	2.0139	5.7224	1.1678	5.7224	0.9985	5.7224	0.8801	5.7224	0.7914	5.7224	0.7294	5.7224	0.6583	
5.9948	2.0139	5.9948	1.1824	5.9948	1.0061	5.9948	0.9321	5.9948	0.8745	5.9948	0.7841	5.9948	0.6883	
6.2803	2.0139	6.2803	1.1985	6.2803	1.0822	6.2803	1.0006	6.2803	0.934	6.2803	0.8328	6.2803	0.7285	
6.5793	2.0139	6.5793	1.2079	6.5793	1.1156	6.5793	1.0368	6.5793	0.9732	6.5793	0.8722	6.5793	0.7624	
6.8926	2.8655	6.8926	1.5914	6.8926	1.338	6.8926	1.1976	6.8926	1.1027	6.8926	0.9588	6.8926	0.8114	
7.2208	3.1519	7.2208	1.7665	7.2208	1.4894	7.2208	1.3335	7.2208	1.2072	7.2208	1.0657	7.2208	0.9233	
7.5646	3.4088	7.5646	1.9808	7.5646	1.7109	7.5646	1.5432	7.5646	1.4299	7.5646	1.2268	7.5646	0.9962	
7.9248	3.7732	7.9248	2.5319	7.9248	2.1034	7.9248	1.8073	7.9248	1.5814	7.9248	1.3219	7.9248	1.0918	
8.3022	4.5641	8.3022	2.6088	8.3022	2.171	8.3022	1.915	8.3022	1.7123	8.3022	1.3901	8.3022	1.1675	
8.6975	4.6879	8.6975	2.6088	8.6975	2.171	8.6975	1.915	8.6975	1.7123	8.6975	1.3901	8.6975	1.2638	
9.1116	4.6879	9.1116	2.6088	9.1116	2.171	9.1116	1.915	9.1116	1.7123	9.1116	1.3901	9.1116	1.2638	
9.5455	4.6879	9.5455	2.6088	9.5455	2.171	9.5455	1.915	9.5455	1.7123	9.5455	1.3901	9.5455	1.2638	
10	4.6879	10	2.6088	10	2.171	10	1.915	10	1.7123	10	1.3901	10	1.2638	
10.4762	4.6879	10.4762	2.6088	10.4762	2.171	10.4762	1.915	10.4762	1.7123	10.4762	1.3901	10.4762	1.2638	
10.975	4.6879	10.975	2.6088	10.975	2.171	10.975	1.915	10.975	1.7123	10.975	1.3901	10.975	1.2305	
11.4976	5.7083	11.4976	2.5137	11.4976	1.9646	11.4976	1.756	11.4976	1.6138	11.4976	1.3836	11.4976	1.1653	
12.045	5.7083	12.045	2.5137	12.045	1.9119	12.045	1.5798	12.045	1.4346	12.045	1.2479	12.045	1.1653	
12.6186	5.7083	12.6186	2.5137	12.6186	1.9119	12.6186	1.5798	12.6186	1.4189	12.6186	1.1818	12.6186	1.1653	
13.2194	5.7083	13.2194	2.5137	13.2194	1.9119	13.2194	1.5659	13.2194	1.387	13.2194	1.1818	13.2194	1.1653	





**MECHANICAL DATA SHEET  
SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
**24590-PTF-ME-FEP-COND-00002B**

Data Sheet No.  
**24590-PTF-MED-FEP-00006**

Project:	<b>RPP-WTP</b>	Description:	<b>Waste Feed Evaporator Inter-Condenser</b>
Project No:	<b>24590</b>	P&ID:	<b>24590-PTF-M6-FEP-00005001</b>
Site:	<b>Hanford</b>	Process Data:	<b>24590-QL-POA-MEVV-00001-04-04</b>
Process flow diagram:	<b>24590-PTF-M5-V17T-00004002</b>	Manufacturer Name:	<b>Framatome ANP / GRAHAM MANUFACTURING</b>



**General Data**

Quality Level	<b>Q (See Note 9)</b>	TEMA (Class/Type)	<b>B</b>
Seismic Category	<b>SC-I</b>	Flow Type (Counter current, etc)	<b>N/A</b>
Design Code	<b>ASME VIII Div 1</b>	Heat Exchanger Duty	Btu/hr <b>436,064</b>
Code Stamp	<b>Yes</b>	Heat Exchanger Area	ft <sup>2</sup> <b>50.7</b>
NB Registration	<b>Yes</b>	ΔT (LMTD/Corrected LMTD)	°F <b>59.8</b>

**ISSUED BY  
RPP-WTP-PDC**

**Thermal/Hydraulic Data**

	Shell Side		Tube Side	
	In	Out	In	Out
Fluid Name	<b>Steam</b>	<b>Condensate</b>	<b>Cooling Water</b>	<b>Condensate</b>
Fluid Quantities: Total	lbm/hr <b>448.3</b>		lbm/hr <b>32,500</b>	
Condensable Vapor (In/Out)	<b>404.6</b>	<b>6.4</b>	<b>N/A</b>	<b>N/A</b>
Liquid	<b>N/A</b>	<b>398.2</b>	<b>32,500</b>	<b>32,500</b>
Noncondensable	<b>43.7</b>	<b>43.7</b>	<b>N/A</b>	<b>N/A</b>
Temperature (In/Out)	°F <b>226</b>	°F <b>90</b>	°F <b>75</b>	°F <b>88.5</b>
Specific Gravity	<b>N/A</b>	<b>N/A</b>	<b>1.000</b>	<b>0.998</b>
Viscosity	Cp <b>N/A</b>	Cp <b>N/A</b>	<b>2.209</b>	<b>1.875</b>
Molecular Weight	<b>18.02</b>	<b>18.02</b>	<b>N/A</b>	<b>N/A</b>
Molecular Weight, Noncondensable	<b>29</b>	<b>29</b>	<b>N/A</b>	<b>N/A</b>
Specific Heat	Btu/lbm-°F <b>N/A</b>	Btu/lbm-°F <b>N/A</b>	<b>1.000</b>	<b>0.999</b>
Thermal Conductivity	Btu/hr-ft-°F <b>N/A</b>	Btu/hr-ft-°F <b>N/A</b>	<b>0.350</b>	<b>0.357</b>
Latent Heat	Btu/lbm @ °F <b>N/A</b>		Btu/lbm @ °F <b>N/A</b>	
Inlet pressure	psia <b>200 Torr</b>		psia <b>59.7 psia</b>	
Tube side Velocity	ft/s <b>N/A</b>		ft/s <b>3.2</b>	
Pressure Drop (Allowed)	psi <b>10 mm Hg</b>		psi <b>1.2 psi</b>	
Fouling Resistance (Min)	hr-ft <sup>2</sup> -°F/Btu <b>0.0020</b>		hr-ft <sup>2</sup> -°F/Btu <b>0.0020</b>	

**Mechanical Data**

	Shell Side		Tube Side	
	Max	Min	Max	Min
Design Pressure	psig <b>50</b>	<b>Full vacuum</b>	psig <b>100</b>	<b>Full vacuum</b>
Design Temperature	°F <b>378</b>	°F <b>0</b>	°F <b>150</b>	°F <b>0</b>
Corrosion Allowance	inch <b>0.04</b>		inch <b>0.04</b>	
Erosion Allowance	inch <b>N/A</b>		inch <b>N/A</b>	
Shell OD/ID	inch <b>8 5/8 OD</b>		Overall Dimensions (H x W x L)	inch <b>20 x 12 5/8 x 85</b>
Total Number of Tubes	<b>43</b>		Tube OD	inch <b>0.750</b>

**Material Data**

Shell	<b>SA 240 316 SS (Max Carbon 0.030%)</b>	Shell Cover	<b>SA 240 316 SS (Max Carbon 0.030%)</b>
Channel/Bonnet	<b>SA 240 316 SS (Max Carbon 0.030%)</b>	Channel Cover	<b>SA 240 316 SS (Max Carbon 0.030%)</b>
Tube	<b>SA 213 316 SS (Max Carbon 0.030%)</b>	Floating Head Cover	<b>N/A</b>
Stationary Tube Sheet	<b>SA 240 316 SS (Max Carbon 0.030%)</b>	Floating Tube Sheet	<b>N/A</b>
Shell Side Gaskets	<b>N/A</b>	Tube Side Gaskets	<b>316 SS Spiral Wound w/PTFE Filler</b>
Partition Seals	<b>N/A</b>	Baffles/Supports	<b>SA 240 316 SS (Max Carbon 0.030%)</b>
Insulation	<b>N/A</b>	Forgings (Shell side)	<b>SA 182 F316L</b>
Bolting	<b>SA-193B8M &amp; SA 194 2HM</b>	Forgings (Channel)	<b>SA 182 F316L</b>



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
24590-PTF-ME-FEP-COND-00002B

Data Sheet No.  
24590-PTF-MED-FEP-00006

**Construction Data** (To be determined by the supplier when not specified by the buyer)

Cross Baffle Type	<b>Up &amp; Over</b>	% Baffle Cut (Dia.)	---	Spacing (c/c) inch	---
Bypass Seal Arrangement	<b>N/A</b>	Longitudinal Seal Type	<b>N/A</b>	Expansion Joint Type	<b>N/A</b>
Inlet Nozzle $\rho V^2$	---	Bundle Entrance $\rho V^2$	---	Bundle Exit $\rho V^2$	---
Tube Support Type	<b>Vertical Cut</b>	U-bend Support Type	<b>N/A</b>	Weight of Bundle lbf	*
Operating Weight lbf	<b>600</b>	Full of Water lbf	<b>680</b>	Weight of Shell lbf	<b>540</b>

**Notes**

\* To be determined by the seller

- (1) All welds are continuous to avoid crevices, weld surface finish is descaled as laid.
- (2) Tube to tubesheet joint shall be strength welded.
- (3) Graham size 8x6 BEM
- (4) Deleted.
- (5) Deleted.
- (6) Deleted.
- (7) Deleted.
- (8) For nozzle loads, see 24590-PTF-3PS-MEVV-T0001.
- (9) Vendor will provide item at BNI quality level Q specification, which corresponds with vendor quality level QL-2.
- (10) Equipment cyclic data is from document 24590-QL-POA-MEVV-00001-04-03.
- (11) Final Vendor Design Process information is from document 24590-QL-POA-MEVV-00001-02-00056.
- (12) Contents of this document are Dangerous Waste Permit Affecting. <sup>3</sup>
- (13) The physical design parameters shall be determined by the seller based on TEMA and HEI standards.
- (14) 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.

**Safety screening / evaluation required?**  Yes  No *If yes per 24590-WTP-GPP-SREG-002, E&NS signature required below.*

Rev	Description	By	Checked	EN&S	Approved	Date
3	Updated to reflect WSGM analysis, 24590-PTF-U0N-W16T-00003 and incorporate DOE AEA note (14).	<i>D. Tate</i> D. Tate	<i>R. Rickenbach</i> R. Rickenbach	<i>Butt Hall</i> Butt Hall	<i>J. Julyk</i> J. Julyk	7/19/09
2	Incorporated Vendor Design Changes and Equipment Qualification data	R. Rickenbach	C. Knauss	S. Woolfolk	J. Julyk	07/22/2008
1	Incorporated Vendor Design	E. Le	R. Nowak	N/A	J. Julyk	04/04/2005
0	Issued for Procurement	E. Le	S. Shah	N/A	J. Julyk	04/30/2003



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00006 Rev.: 3

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Equipment Identification			
Component Tag Number	24590-PTF-ME-FEP-COND-00002B	Safety Classification	<input checked="" type="checkbox"/> SC <input type="checkbox"/> SS <input type="checkbox"/> APC <input type="checkbox"/> SDC <input type="checkbox"/> SDS <input type="checkbox"/> RRC Note 10 $\triangle 3$
Manufacturer / Supplier	GRAHAM / AREVA FS $\triangle 3$		
Requisition Number	24590-QL-POA-MEVV-00001		
Model	N/A	Seismic Category	<input checked="" type="checkbox"/> SC-I <input type="checkbox"/> SC-II <input type="checkbox"/> SC-III <input type="checkbox"/> SC-IV Note 10 $\triangle 3$
Description (Include descriptive text [e.g., location, elevation])	Waste Feed Evaporator Inter-Condensor, Room P-0304, elevation 56'-0"		
Safety Function(s)	Prevent post seismic disruption of H2 vessel purge air pathways, spread of contamination into C3 areas from PVP blowback. (ref. 1) $\triangle 3$ Confinement (ref. 1) $\triangle 3$		
Seismic Safety Function	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Room Number(s): P-0304	
Maintenance Accessible	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Method of Maintenance Access: <input type="checkbox"/> Remote <input checked="" type="checkbox"/> Hands On <input type="checkbox"/> None	
Seismic Operability Requirements: $\triangle 3$ <input type="checkbox"/> During Seismic Event $\triangle 3$ <input type="checkbox"/> After Seismic Event			
ITS Equipment Type: <input checked="" type="checkbox"/> Passive Mechanical <input type="checkbox"/> Active Mechanical <input type="checkbox"/> Electrical			

Equipment Environmental Qualification (EEQ)					
Environment	<input type="checkbox"/> Mild <input checked="" type="checkbox"/> Harsh	Hi Rad Service	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Design Life (yrs)	<input checked="" type="checkbox"/> 40 <input type="checkbox"/> Other _____
Contamination Class:	C3				
Radiation Class:	R3				
Parameter Type/Units	Parameter Value	Time Duration (number)	Time Units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Normal</b>					
Normal High Temperature (°F)	95	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal Low Temperature (°F)	59	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal High Relative Humidity (%RH)	100	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Relative Humidity (%RH)	10	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal High Pressure (in.-w.g.)	0	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Pressure (in.-w.g.)	-0.4	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Radiation Dose Rate (mR/hr)	10	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Vibration Magnitude (g)	N/A	N/A	N/A	N/A	Note 1
Vibration Frequency (Hz)	N/A	N/A	N/A	N/A	Note 1
Additional Normal Information:	See Note 2 for pressure units.				



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00006 Rev.: 3

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## Equipment Environmental Qualification (EEQ) (continued)

Parameter Type/Units	Parameter Value	Time Duration (number)	Time units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Abnormal</b>					
Abnormal High Temperature (°F)	△ 117	8	hr/yr	24590-PTF-U0D-W16T-00001, Note 6 △	Note 1
Abnormal Low Temperature (°F)	59	8	hr/yr	24590-WTP-DB-ENG-01-001, Notes 6 & 8	Note 1
Abnormal High Relative Humidity (%RH)	100	24	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Relative Humidity (%RH)	2	22	hr/yr	24590-PTF-U0D-W16T-00001, Note 9 △	Note 1
Abnormal High Pressure (in.-w.g.)	4	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Pressure (in.-w.g.)	-7.3	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Radiation Dose Rate (mR/hr)	10, Note 3	0	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Wet Sprinkler System Present	YES	△ 2	△ hr	24590-PTF-U0D-W16T-00001	Note 1
Additional Abnormal Information	See Note 2 for pressure units.				
<b>Design Basis Events (DBE)</b>					
DBE High Temperature (°F)	131	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6 & 9 △	Note 1
DBE Low Temperature (°F)	40	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
DBE High Relative Humidity (%RH)	100	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Relative Humidity (%RH)	8.0	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE High Pressure (in.-w.g.)	4	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Pressure (in.-w.g.)	-7.3	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Radiation Dose Rate (mR/hr)	10, Note 3	0	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Flood Height (ft)	0.67	1000	hrs	24590-PTF-U0D-W16T-00001 △	Note 1
Submergence (ft)	0, Note 4	1000	hrs	24590-PTF-U0D-W16T-00001 24590-QL-POA-MEVV-00001-01-00825 △	Note 1
Chemical/Spray Exposure	Yes	12.5	hrs	24590-PTF-U0D-W16T-00001	Note 1
Additional DBE Information	See Note 2 for pressure units.				



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00006 Rev.: 3

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DBE Chemical Exposure Details	
DBE Chemical Types/Concentrations	2M Sodium Hydroxide $\triangle_3$ Antifoam Agent 2M Nitric Acid $\triangle_3$

Interfaces (Electrical)	
Power Supply Voltage (VAC, VDC)	N/A
Power Supply Frequency (Hz)	N/A
Power Connection Method	N/A
I/O Signals to/from Equipment	N/A
I/O Connection Method	N/A

Interfaces (Mechanical)	
Mounting Configuration (orientation)	TBD
Mounting Method (bolts, welds, etc.)	Anchor Bolt, FEP-SKID-00001B, 24590-PTF-DB-S13T-00051 $\triangle_3$
Auxiliary Devices	N/A

Equipment Seismic Qualification (ESQ)				
Parameter	Title	Reference/Document Number	Version / Revision	Remarks
WTP Seismic Design Specification (BUYER)	Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks	24590-WTP-3PS-SS90-T0001	002	N/A
Specified Seismic Load (BUYER)	Seismic Analysis of Pretreatment Building - WSGM In-Structure Response Spectre (ISRS) $\triangle_3$	24590-PTF-S0C-S15T-00057 $\triangle_3$	00A $\triangle_3$	Calculation is not included in MR, see attached figures 37, 38 and 121 per CCN 185267. $\triangle_3$
Design Seismic Load (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Method (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Report Number (SELLER)	Note 1	Note 1	Note 1	Note 1
Submittal Number (BUYER)	TBD	TBD	TBD	N/A



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00006 Rev.: 3

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## Notes and Additional Information

### Notes

1. Data to be provided by SELLER through the submittal process as required on the G-321E.
2. Where pressure is given in inches of water column (in-w.c.) in the source document, it is generally assumed that this is in reference to atmospheric pressure and is therefore equivalent to inches of water gage (in-w.g.).
3. Abnormal and DBE radiation dose rates are set equal to normal and do not contribute to the total integrated dose. <sup>3</sup>
4. Submergence depth is the difference between the lowest point on the equipment and the flood depth above the floor. The submergence depth is set to zero if the lowest section of the equipment is above the flood depth.
5. Environmental data from reference 3 is for room environment only.
6. For application of AISC N690, the normal temperatures are not used. Abnormal temperatures shall be applied as Normal Operation Temperature,  $T_o$ , with seismic effects,  $E_s$ . The Design basis event temperature shall be applied as a Thermal Load generated by a postulated accident,  $T_A$ , without seismic effects,  $E_s$  or  $E_o$ .
7. The equipment qualification will be documented in accordance with the requirements in Appendix D of Engineering Specification for Environmental Qualification of Mechanical Equipment, document number 24590-WTP-3PS-G000-T0015 for the passive and active safety functions.
8. Abnormal low temperature, as calculated in reference 3, is based on a Loss of Heating Accident (LOHA) which occurs when steam supply to the building is lost. Since the evaporators are run on steam, this would cause the evaporators to go off-line. Abnormal low temperature will be based on reference 4 at 59°F.
9. Parameter value used on data sheet has been previously established and determined more conservative than values <sup>3</sup> derived from the reference document noted.
10. For commercial reasons, safety and seismic classification may be higher than elsewhere documented, and therefore <sup>3</sup> conservative.

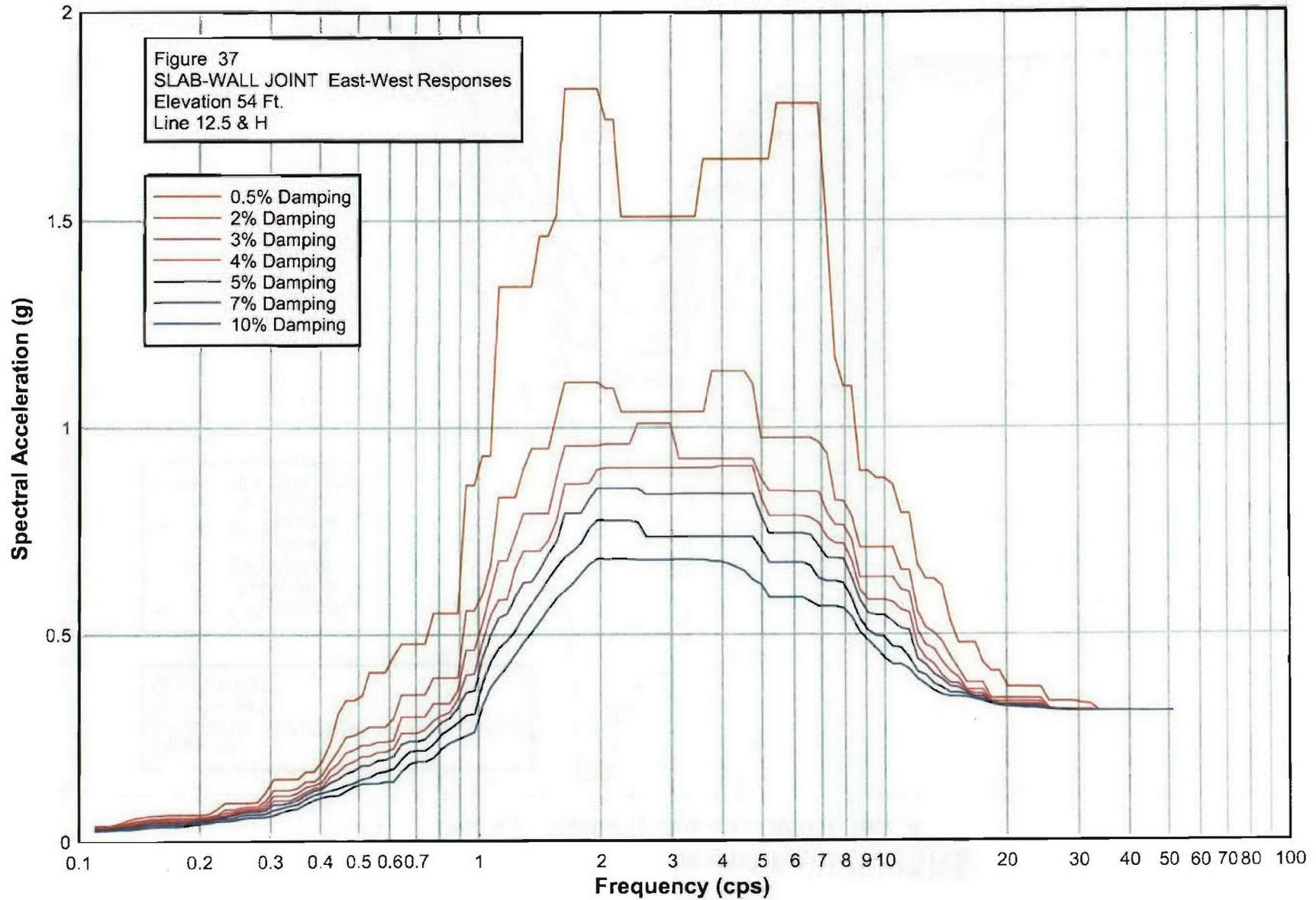
### Reference

1. 24590-WTP-PSAR-ESH-01-002-02, Rev. 04A, Preliminary documented safety analysis to support construction <sup>3</sup> authorization; PT facility specific information.
2. CCN #096661, FEP and CNP Evaporator Vent Problems with New PVP Isolation Valve.
3. 24590-PTF-U0D-W16T-00001, Rev. 0, PTF Room Environment Datasheet.
4. 24590-WTP-DB-ENG-01-001, Rev. 1M, Basis Of Design. <sup>3</sup>
5. 24590-PTF-U0N-W16T-00001, Add data for room P-0427. Incorporate additional steam break analysis. <sup>3</sup>
6. 24590-PTF-U0N-W16T-00003, Revised temperature & relative humidity data for PTF rooms. <sup>3</sup>



# RPP-WTP Pretreatment Facility ISRS

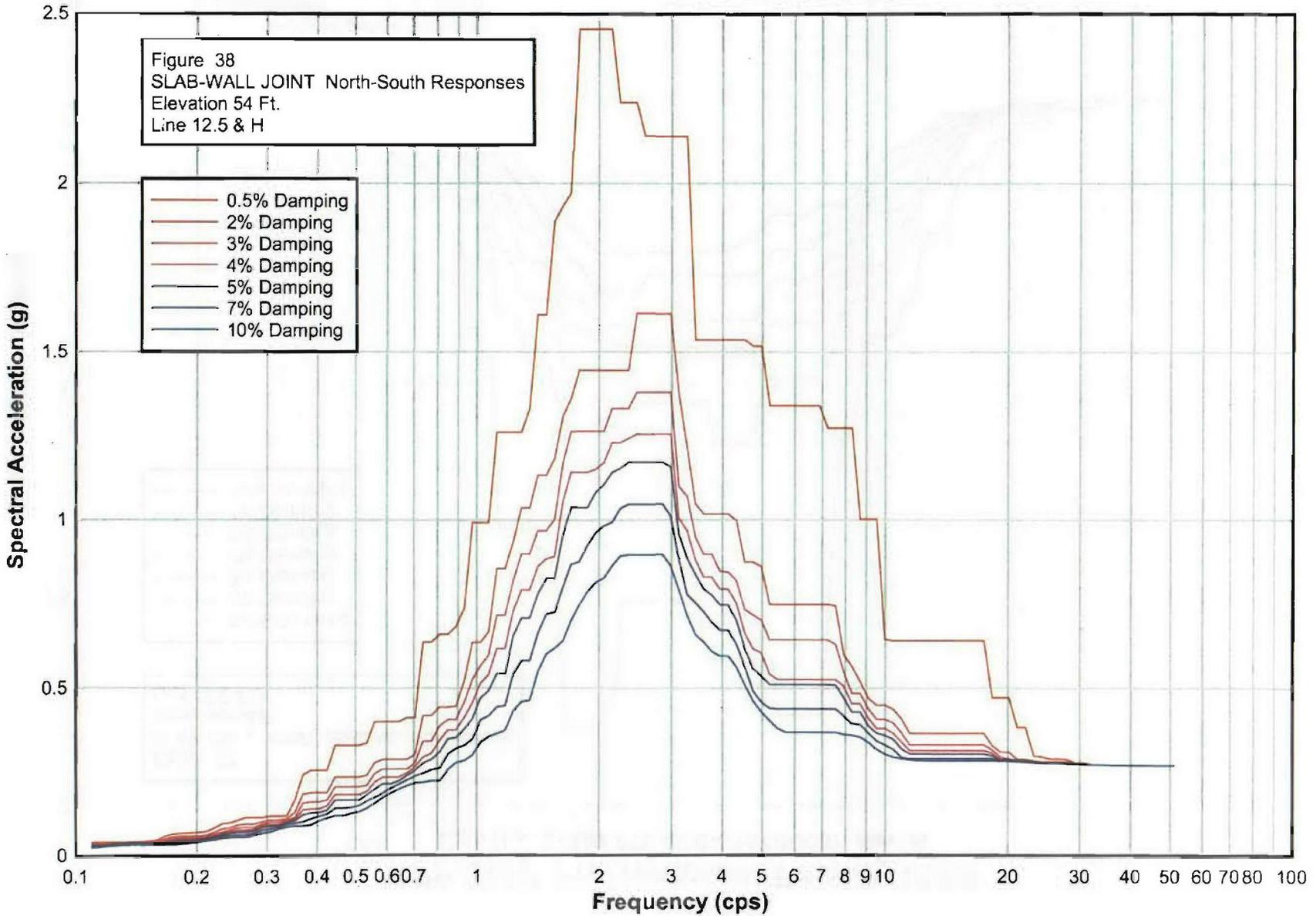
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



# RPP-WTP Pretreatment Facility ISRS

3

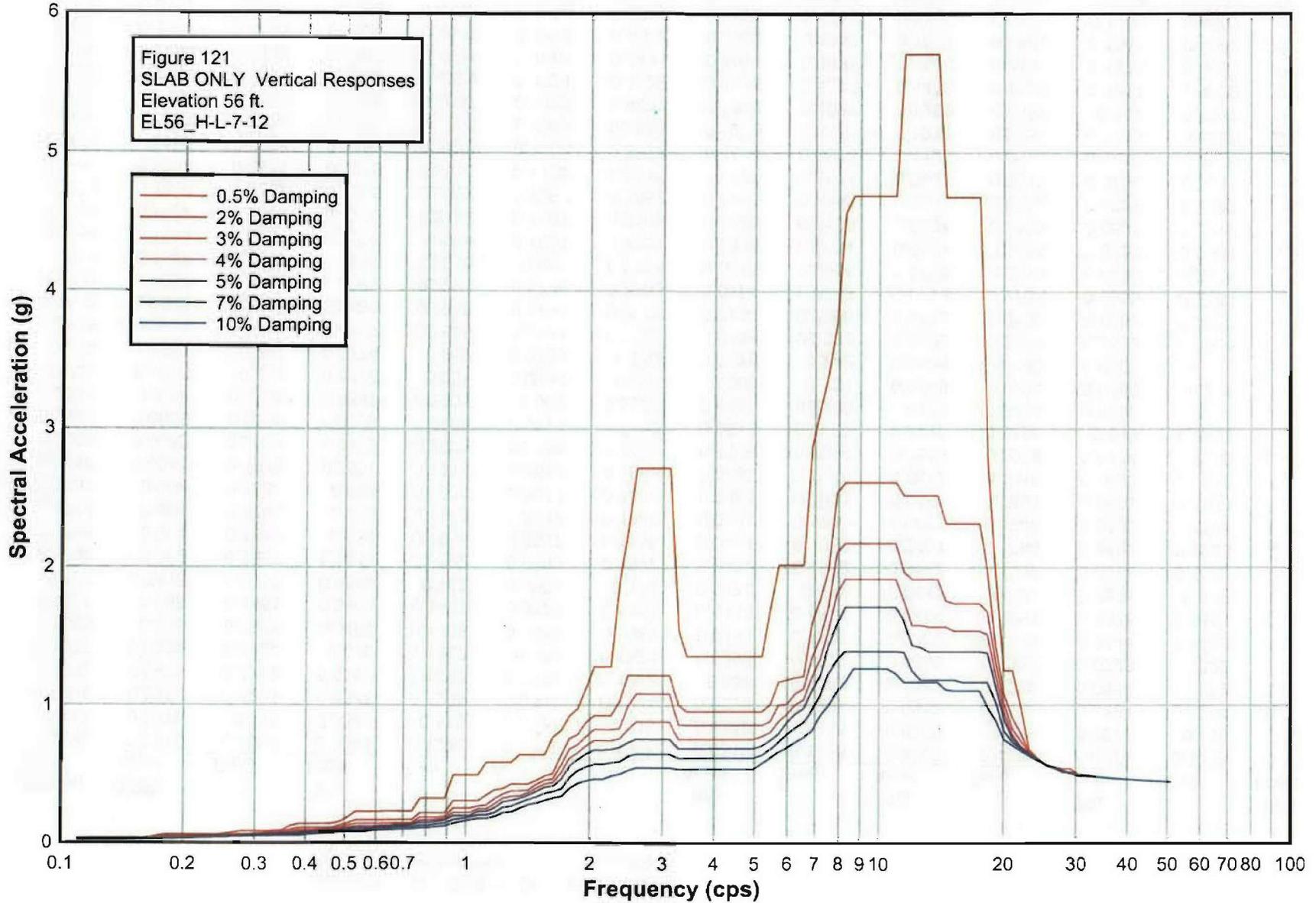
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



3

# RPP-WTP Pretreatment Facility ISRS

Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	
0.1098	0.0375	0.1098	0.0344	0.1098	0.0327	0.1098	0.0312	0.1098	0.0298	0.1098	0.0274	0.1098	0.0252	
0.115	0.0375	0.115	0.0344	0.115	0.0327	0.115	0.0312	0.115	0.0299	0.115	0.0277	0.115	0.0258	
0.1204	0.0375	0.1204	0.0344	0.1204	0.0331	0.1204	0.0322	0.1204	0.0312	0.1204	0.0294	0.1204	0.0269	
0.1262	0.0431	0.1262	0.0397	0.1262	0.0378	0.1262	0.036	0.1262	0.0343	0.1262	0.0314	0.1262	0.0278	
0.1322	0.0504	0.1322	0.045	0.1322	0.042	0.1322	0.0393	0.1322	0.0369	0.1322	0.0328	0.1322	0.0281	
0.1385	0.056	0.1385	0.0489	0.1385	0.0449	0.1385	0.0414	0.1385	0.0384	0.1385	0.0344	0.1385	0.0303	
0.1451	0.058	0.1451	0.0509	0.1451	0.0475	0.1451	0.0445	0.1451	0.0419	0.1451	0.0375	0.1451	0.0325	
0.152	0.0616	0.152	0.0546	0.152	0.0506	0.152	0.0472	0.152	0.0442	0.152	0.0391	0.152	0.0338	
0.1592	0.062	0.1592	0.0546	0.1592	0.0506	0.1592	0.0472	0.1592	0.0442	0.1592	0.0396	0.1592	0.0351	
0.1668	0.064	0.1668	0.056	0.1668	0.0517	0.1668	0.0481	0.1668	0.0451	0.1668	0.0403	0.1668	0.0356	
0.1748	0.064	0.1748	0.056	0.1748	0.0517	0.1748	0.0481	0.1748	0.0451	0.1748	0.0403	0.1748	0.0356	
0.1831	0.064	0.1831	0.056	0.1831	0.0517	0.1831	0.0481	0.1831	0.0451	0.1831	0.0403	0.1831	0.0368	
0.1918	0.0641	0.1918	0.0561	0.1918	0.0517	0.1918	0.0495	0.1918	0.0477	0.1918	0.0445	0.1918	0.0404	
0.2009	0.0642	0.2009	0.0583	0.2009	0.0558	0.2009	0.0535	0.2009	0.0513	0.2009	0.0474	0.2009	0.0424	
0.2105	0.0665	0.2105	0.0603	0.2105	0.0575	0.2105	0.0549	0.2105	0.0525	0.2105	0.049	0.2105	0.0448	
0.2205	0.078	0.2205	0.0647	0.2205	0.062	0.2205	0.0595	0.2205	0.0573	0.2205	0.0533	0.2205	0.0484	
0.231	0.0933	0.231	0.0774	0.231	0.0694	0.231	0.063	0.231	0.0598	0.231	0.0556	0.231	0.0503	
0.242	0.0933	0.242	0.0774	0.242	0.0723	0.242	0.0678	0.242	0.0638	0.242	0.0567	0.242	0.0513	
0.2535	0.0933	0.2535	0.0817	0.2535	0.0771	0.2535	0.0729	0.2535	0.0692	0.2535	0.0628	0.2535	0.0553	
0.2656	0.0933	0.2656	0.0839	0.2656	0.0794	0.2656	0.0754	0.2656	0.0718	0.2656	0.0653	0.2656	0.0575	
0.2783	0.0954	0.2783	0.0847	0.2783	0.0794	0.2783	0.0754	0.2783	0.0718	0.2783	0.0653	0.2783	0.058	
0.2915	0.1187	0.2915	0.0987	0.2915	0.089	0.2915	0.0813	0.2915	0.0753	0.2915	0.0668	0.2915	0.0592	
0.3054	0.1504	0.3054	0.1235	0.3054	0.1097	0.3054	0.0985	0.3054	0.0894	0.3054	0.0758	0.3054	0.0633	
0.3199	0.1504	0.3199	0.1235	0.3199	0.1097	0.3199	0.0985	0.3199	0.0894	0.3199	0.0801	0.3199	0.0706	
0.3352	0.1504	0.3352	0.1235	0.3352	0.1097	0.3352	0.0985	0.3352	0.0931	0.3352	0.0857	0.3352	0.0762	
0.3511	0.1504	0.3511	0.1289	0.3511	0.1172	0.3511	0.107	0.3511	0.0997	0.3511	0.0894	0.3511	0.0786	
0.3678	0.168	0.3678	0.1438	0.3678	0.1303	0.3678	0.1186	0.3678	0.1121	0.3678	0.1017	0.3678	0.0898	
0.3853	0.168	0.3853	0.1438	0.3853	0.1346	0.3853	0.1279	0.3853	0.1219	0.3853	0.1115	0.3853	0.0992	
0.4037	0.194	0.4037	0.1598	0.4037	0.1426	0.4037	0.1306	0.4037	0.1259	0.4037	0.117	0.4037	0.1054	
0.4229	0.2368	0.4229	0.1906	0.4229	0.1721	0.4229	0.1558	0.4229	0.1416	0.4229	0.1217	0.4229	0.1092	
0.4431	0.3088	0.4431	0.2193	0.4431	0.1881	0.4431	0.1671	0.4431	0.1496	0.4431	0.1273	0.4431	0.1097	
0.4642	0.3417	0.4642	0.2524	0.4642	0.2138	0.4642	0.1852	0.4642	0.1637	0.4642	0.1345	0.4642	0.1211	
0.4863	0.3417	0.4863	0.256	0.4863	0.2208	0.4863	0.1928	0.4863	0.1701	0.4863	0.1409	0.4863	0.1323	
0.5094	0.3522	0.5094	0.2656	0.5094	0.2325	0.5094	0.2054	0.5094	0.1831	0.5094	0.1497	0.5094	0.1391	

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.4096	0.5337	0.2771	0.5337	0.2325	0.5337	0.2054	0.5337	0.1831	0.5337	0.1539	0.5337	0.1396
0.5591	0.4096	0.5591	0.2771	0.5591	0.2398	0.5591	0.2148	0.5591	0.1949	0.5591	0.1654	0.5591	0.1396
0.5857	0.4096	0.5857	0.2771	0.5857	0.2404	0.5857	0.2159	0.5857	0.1975	0.5857	0.1686	0.5857	0.1441
0.6136	0.4475	0.6136	0.2969	0.6136	0.2444	0.6136	0.2234	0.6136	0.2051	0.6136	0.1751	0.6136	0.1441
0.6428	0.478	0.6428	0.3547	0.6428	0.3006	0.6428	0.2612	0.6428	0.2347	0.6428	0.1988	0.6428	0.168
0.6734	0.478	0.6734	0.3547	0.6734	0.3006	0.6734	0.2612	0.6734	0.2413	0.6734	0.2165	0.6734	0.1872
0.7055	0.478	0.7055	0.3547	0.7055	0.3006	0.7055	0.2612	0.7055	0.2413	0.7055	0.2186	0.7055	0.1922
0.7391	0.478	0.7391	0.3547	0.7391	0.3006	0.7391	0.2692	0.7391	0.2463	0.7391	0.2186	0.7391	0.1922
0.7743	0.5518	0.7743	0.3958	0.7743	0.3332	0.7743	0.2918	0.7743	0.268	0.7743	0.2351	0.7743	0.2018
0.8111	0.5518	0.8111	0.3958	0.8111	0.3332	0.8111	0.3035	0.8111	0.2874	0.8111	0.2587	0.8111	0.2236
0.8497	0.5518	0.8497	0.3958	0.8497	0.3332	0.8497	0.3117	0.8497	0.2984	0.8497	0.2723	0.8497	0.2373
0.8902	0.5518	0.8902	0.3958	0.8902	0.3656	0.8902	0.3431	0.8902	0.3226	0.8902	0.2873	0.8902	0.2462
0.9326	0.8605	0.9326	0.5585	0.9326	0.4629	0.9326	0.4023	0.9326	0.3602	0.9326	0.3049	0.9326	0.2549
0.977	0.8605	0.977	0.5585	0.977	0.4629	0.977	0.4045	0.977	0.3644	0.977	0.3083	0.977	0.2637
1.0235	0.9315	1.0235	0.5965	1.0235	0.5261	1.0235	0.4814	1.0235	0.4436	1.0235	0.3837	1.0235	0.3277
1.0723	0.9315	1.0723	0.6685	1.0723	0.603	1.0723	0.5467	1.0723	0.4995	1.0723	0.4355	1.0723	0.3729
1.1233	1.3398	1.1233	0.8315	1.1233	0.6788	1.1233	0.5837	1.1233	0.5408	1.1233	0.4681	1.1233	0.3987
1.1768	1.3398	1.1768	0.8315	1.1768	0.6788	1.1768	0.5855	1.1768	0.5505	1.1768	0.4858	1.1768	0.4238
1.2328	1.3398	1.2328	0.8315	1.2328	0.7369	1.2328	0.6596	1.2328	0.5925	1.2328	0.5105	1.2328	0.452
1.2916	1.3398	1.2916	0.9002	1.2916	0.7926	1.2916	0.7024	1.2916	0.6263	1.2916	0.5455	1.2916	0.4806
1.353	1.3398	1.353	0.9485	1.353	0.7926	1.353	0.7024	1.353	0.6282	1.353	0.574	1.353	0.5058
1.4175	1.4626	1.4175	0.9485	1.4175	0.7926	1.4175	0.7024	1.4175	0.6579	1.4175	0.6026	1.4175	0.5321
1.485	1.4626	1.485	0.9485	1.485	0.7926	1.485	0.7282	1.485	0.6958	1.485	0.636	1.485	0.5624
1.5557	1.5113	1.5557	1.0297	1.5557	0.8797	1.5557	0.7754	1.5557	0.726	1.5557	0.6634	1.5557	0.5886
1.6298	1.8158	1.6298	1.1086	1.6298	0.9552	1.6298	0.8627	1.6298	0.7931	1.6298	0.6875	1.6298	0.6064
1.7074	1.8158	1.7074	1.1086	1.7074	0.9552	1.7074	0.8627	1.7074	0.7931	1.7074	0.7024	1.7074	0.6246
1.7887	1.8158	1.7887	1.1086	1.7887	0.9552	1.7887	0.8627	1.7887	0.7931	1.7887	0.7213	1.7887	0.6476
1.8738	1.8158	1.8738	1.1086	1.8738	0.9552	1.8738	0.8651	1.8738	0.8263	1.8738	0.7567	1.8738	0.6698
1.963	1.8158	1.963	1.1086	1.963	0.9552	1.963	0.8972	1.963	0.8525	1.963	0.7755	1.963	0.683
2.0565	1.7414	2.0565	1.0948	2.0565	0.9593	2.0565	0.9017	2.0565	0.8525	2.0565	0.7755	2.0565	0.683
2.1544	1.7414	2.1544	1.0948	2.1544	0.9593	2.1544	0.9017	2.1544	0.8525	2.1544	0.7755	2.1544	0.683
2.257	1.5091	2.257	1.0367	2.257	0.9593	2.257	0.9017	2.257	0.8525	2.257	0.7755	2.257	0.683
2.3645	1.5091	2.3645	1.0367	2.3645	0.9593	2.3645	0.9017	2.3645	0.8525	2.3645	0.7755	2.3645	0.683
2.4771	1.5091	2.4771	1.0367	2.4771	1.009	2.4771	0.9017	2.4771	0.852	2.4771	0.7697	2.4771	0.6811
2.595	1.5091	2.595	1.0367	2.595	1.009	2.595	0.9017	2.595	0.8387	2.595	0.7357	2.595	0.6811

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
2.7186	1.5091	2.7186	1.0367	2.7186	1.009	2.7186	0.9017	2.7186	0.8387	2.7186	0.7357	2.7186	0.6811
2.848	1.5091	2.848	1.0367	2.848	1.009	2.848	0.9017	2.848	0.8387	2.848	0.7357	2.848	0.6811
2.9836	1.5091	2.9836	1.0367	2.9836	1.009	2.9836	0.9017	2.9836	0.8387	2.9836	0.7357	2.9836	0.6811
3.1257	1.5091	3.1257	1.0367	3.1257	0.9237	3.1257	0.9017	3.1257	0.8387	3.1257	0.7357	3.1257	0.6811
3.2745	1.5091	3.2745	1.0367	3.2745	0.9237	3.2745	0.9017	3.2745	0.8387	3.2745	0.7357	3.2745	0.6811
3.4305	1.5091	3.4305	1.0367	3.4305	0.9237	3.4305	0.9017	3.4305	0.8387	3.4305	0.7357	3.4305	0.6801
3.5938	1.6472	3.5938	1.0367	3.5938	0.9237	3.5938	0.9017	3.5938	0.8387	3.5938	0.7357	3.5938	0.6766
3.7649	1.6472	3.7649	1.1356	3.7649	0.9237	3.7649	0.9017	3.7649	0.8387	3.7649	0.7357	3.7649	0.6759
3.9442	1.6472	3.9442	1.1356	3.9442	0.9237	3.9442	0.906	3.9442	0.8387	3.9442	0.7357	3.9442	0.6712
4.132	1.6472	4.132	1.1356	4.132	0.9237	4.132	0.906	4.132	0.8387	4.132	0.7357	4.132	0.6626
4.3288	1.6472	4.3288	1.1356	4.3288	0.9237	4.3288	0.906	4.3288	0.8387	4.3288	0.7357	4.3288	0.6525
4.5349	1.6472	4.5349	1.1356	4.5349	0.9237	4.5349	0.906	4.5349	0.8387	4.5349	0.7357	4.5349	0.6316
4.7508	1.6472	4.7508	1.1048	4.7508	0.9237	4.7508	0.906	4.7508	0.8387	4.7508	0.7357	4.7508	0.6206
4.977	1.6472	4.977	0.9746	4.977	0.8757	4.977	0.829	4.977	0.7851	4.977	0.7083	4.977	0.5898
5.214	1.6472	5.214	0.9746	5.214	0.8463	5.214	0.785	5.214	0.7434	5.214	0.6732	5.214	0.5898
5.4623	1.7798	5.4623	0.9746	5.4623	0.8463	5.4623	0.785	5.4623	0.7434	5.4623	0.6732	5.4623	0.5898
5.7224	1.7798	5.7224	0.9746	5.7224	0.8463	5.7224	0.785	5.7224	0.7434	5.7224	0.6732	5.7224	0.5898
5.9948	1.7798	5.9948	0.9746	5.9948	0.8438	5.9948	0.785	5.9948	0.7434	5.9948	0.6732	5.9948	0.5898
6.2803	1.7798	6.2803	0.9746	6.2803	0.8438	6.2803	0.785	6.2803	0.7434	6.2803	0.6732	6.2803	0.5898
6.5793	1.7798	6.5793	0.9746	6.5793	0.8438	6.5793	0.7804	6.5793	0.7393	6.5793	0.6657	6.5793	0.5795
6.8926	1.7798	6.8926	0.963	6.8926	0.8429	6.8926	0.7674	6.8926	0.7128	6.8926	0.6345	6.8926	0.5677
7.2208	1.4914	7.2208	0.935	7.2208	0.7922	7.2208	0.7331	7.2208	0.6844	7.2208	0.6283	7.2208	0.5677
7.5646	1.168	7.5646	0.822	7.5646	0.7632	7.5646	0.7188	7.5646	0.6833	7.5646	0.6283	7.5646	0.5677
7.9248	1.0987	7.9248	0.8201	7.9248	0.7623	7.9248	0.7176	7.9248	0.6811	7.9248	0.6237	7.9248	0.5627
8.3022	1.0987	8.3022	0.7845	8.3022	0.7283	8.3022	0.6777	8.3022	0.6364	8.3022	0.5884	8.3022	0.5417
8.6975	0.8935	8.6975	0.7092	8.6975	0.6368	8.6975	0.6061	8.6975	0.5819	8.6975	0.5373	8.6975	0.5059
9.1116	0.8935	9.1116	0.7092	9.1116	0.6368	9.1116	0.5827	9.1116	0.5505	9.1116	0.5085	9.1116	0.4846
9.5455	0.8763	9.5455	0.7092	9.5455	0.6368	9.5455	0.5827	9.5455	0.5459	9.5455	0.4951	9.5455	0.4643
10	0.8763	10	0.7092	10	0.6368	10	0.5827	10	0.5459	10	0.4934	10	0.4429
10.4762	0.8603	10.4762	0.7092	10.4762	0.6368	10.4762	0.5774	10.4762	0.5297	10.4762	0.4688	10.4762	0.4271
10.975	0.791	10.975	0.6543	10.975	0.6067	10.975	0.5582	10.975	0.5137	10.975	0.4674	10.975	0.4271
11.4976	0.791	11.4976	0.6543	11.4976	0.6014	11.4976	0.5519	11.4976	0.5094	11.4976	0.4435	11.4976	0.4142
12.045	0.6677	12.045	0.5543	12.045	0.5086	12.045	0.4716	12.045	0.4394	12.045	0.4081	12.045	0.3915
12.6186	0.6325	12.6186	0.5145	12.6186	0.4727	12.6186	0.4409	12.6186	0.4251	12.6186	0.4004	12.6186	0.3774
13.2194	0.6325	13.2194	0.5025	13.2194	0.4639	13.2194	0.4269	13.2194	0.4021	13.2194	0.379	13.2194	0.3634

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.6152	13.8489	0.4815	13.8489	0.433	13.8489	0.3995	13.8489	0.3896	13.8489	0.3705	13.8489	0.3527
14.5083	0.5318	14.5083	0.4455	14.5083	0.4096	14.5083	0.381	14.5083	0.3726	14.5083	0.3575	14.5083	0.3484
15.1991	0.4787	15.1991	0.4141	15.1991	0.3936	15.1991	0.3795	15.1991	0.3697	15.1991	0.3575	15.1991	0.3484
15.9228	0.4787	15.9228	0.3815	15.9228	0.3644	15.9228	0.3609	15.9228	0.358	15.9228	0.3528	15.9228	0.3467
16.681	0.4787	16.681	0.3815	16.681	0.3644	16.681	0.3544	16.681	0.3483	16.681	0.3439	16.681	0.3416
17.4753	0.4307	17.4753	0.3815	17.4753	0.3644	17.4753	0.3544	17.4753	0.3483	17.4753	0.3418	17.4753	0.337
18.3074	0.4095	18.3074	0.3431	18.3074	0.3367	18.3074	0.3354	18.3074	0.3336	18.3074	0.3315	18.3074	0.3305
19.1791	0.4095	19.1791	0.3431	19.1791	0.3349	19.1791	0.3293	19.1791	0.3262	19.1791	0.3251	19.1791	0.325
20.0923	0.3708	20.0923	0.3431	20.0923	0.3349	20.0923	0.3293	20.0923	0.3262	20.0923	0.3243	20.0923	0.323
21.049	0.3708	21.049	0.3431	21.049	0.3349	21.049	0.3293	21.049	0.3262	21.049	0.3236	21.049	0.3215
22.0513	0.3708	22.0513	0.3431	22.0513	0.3349	22.0513	0.3293	22.0513	0.3262	22.0513	0.323	22.0513	0.3199
23.1013	0.3708	23.1013	0.3431	23.1013	0.3349	23.1013	0.3293	23.1013	0.3262	23.1013	0.323	23.1013	0.3199
24.2013	0.3708	24.2013	0.3431	24.2013	0.3349	24.2013	0.3293	24.2013	0.3255	24.2013	0.3206	24.2013	0.3186
25.3536	0.3358	25.3536	0.3197	25.3536	0.3192	25.3536	0.3187	25.3536	0.3181	25.3536	0.317	25.3536	0.3164
26.5609	0.3358	26.5609	0.3169	26.5609	0.3159	26.5609	0.3158	26.5609	0.3158	26.5609	0.3155	26.5609	0.3148
27.8256	0.3358	27.8256	0.3169	27.8256	0.3159	27.8256	0.3153	27.8256	0.3149	27.8256	0.3143	27.8256	0.3137
29.1505	0.3358	29.1505	0.3165	29.1505	0.3153	29.1505	0.3142	29.1505	0.3137	29.1505	0.3132	29.1505	0.313
30.5386	0.3312	30.5386	0.3165	30.5386	0.3153	30.5386	0.3142	30.5386	0.3133	30.5386	0.3131	30.5386	0.313
31.9927	0.3297	31.9927	0.3163	31.9927	0.3146	31.9927	0.3138	31.9927	0.3132	31.9927	0.3131	31.9927	0.313
33.516	0.3144	33.516	0.3134	33.516	0.3133	33.516	0.3132	33.516	0.3132	33.516	0.3131	33.516	0.313
35.1119	0.3135	35.1119	0.3134	35.1119	0.3133	35.1119	0.3132	35.1119	0.3132	35.1119	0.3131	35.1119	0.313
36.7838	0.3134	36.7838	0.3133	36.7838	0.3132	36.7838	0.3132	36.7838	0.3132	36.7838	0.3131	36.7838	0.313
38.5353	0.3132	38.5353	0.3132	38.5353	0.3131	38.5353	0.3131	38.5353	0.3131	38.5353	0.3131	38.5353	0.313
40.3702	0.3131	40.3702	0.3131	40.3702	0.3131	40.3702	0.313	40.3702	0.313	40.3702	0.313	40.3702	0.3129
42.2924	0.313	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129
44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128
46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127
48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126
50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0405	0.1098	0.0365	0.1098	0.0342	0.1098	0.0322	0.1098	0.0303	0.1098	0.0272	0.1098	0.0235
0.115	0.0405	0.115	0.0365	0.115	0.0342	0.115	0.0322	0.115	0.0303	0.115	0.0272	0.115	0.0259
0.1204	0.0405	0.1204	0.0365	0.1204	0.0342	0.1204	0.0322	0.1204	0.031	0.1204	0.0297	0.1204	0.028
0.1262	0.0405	0.1262	0.0365	0.1262	0.0352	0.1262	0.0342	0.1262	0.0334	0.1262	0.0318	0.1262	0.0297
0.1322	0.0405	0.1322	0.0382	0.1322	0.037	0.1322	0.0359	0.1322	0.0349	0.1322	0.0333	0.1322	0.0316
0.1385	0.0411	0.1385	0.0392	0.1385	0.0382	0.1385	0.0372	0.1385	0.0363	0.1385	0.0348	0.1385	0.0328
0.1451	0.0417	0.1451	0.0398	0.1451	0.0387	0.1451	0.0377	0.1451	0.0368	0.1451	0.0352	0.1451	0.0332
0.152	0.0439	0.152	0.0401	0.152	0.0387	0.152	0.0377	0.152	0.0368	0.152	0.0352	0.152	0.0332
0.1592	0.0462	0.1592	0.0416	0.1592	0.0396	0.1592	0.0377	0.1592	0.0368	0.1592	0.0352	0.1592	0.0332
0.1668	0.0584	0.1668	0.0506	0.1668	0.0463	0.1668	0.0426	0.1668	0.0395	0.1668	0.0352	0.1668	0.0332
0.1748	0.0645	0.1748	0.0566	0.1748	0.0522	0.1748	0.0484	0.1748	0.045	0.1748	0.0394	0.1748	0.0332
0.1831	0.0668	0.1831	0.0583	0.1831	0.0541	0.1831	0.0504	0.1831	0.0471	0.1831	0.0415	0.1831	0.0354
0.1918	0.0678	0.1918	0.0586	0.1918	0.0543	0.1918	0.0507	0.1918	0.0474	0.1918	0.0418	0.1918	0.038
0.2009	0.0697	0.2009	0.0596	0.2009	0.0543	0.2009	0.0514	0.2009	0.0487	0.2009	0.0438	0.2009	0.0411
0.2105	0.0722	0.2105	0.062	0.2105	0.0582	0.2105	0.0547	0.2105	0.0516	0.2105	0.0482	0.2105	0.0446
0.2205	0.0819	0.2205	0.0709	0.2205	0.0651	0.2205	0.06	0.2205	0.0574	0.2205	0.0531	0.2205	0.0475
0.231	0.0959	0.231	0.0792	0.231	0.0703	0.231	0.0665	0.231	0.063	0.231	0.0578	0.231	0.0525
0.242	0.0984	0.242	0.0845	0.242	0.0774	0.242	0.0721	0.242	0.0681	0.242	0.0618	0.242	0.0551
0.2535	0.1059	0.2535	0.0913	0.2535	0.0833	0.2535	0.0763	0.2535	0.0702	0.2535	0.0618	0.2535	0.0551
0.2656	0.1138	0.2656	0.0944	0.2656	0.084	0.2656	0.0763	0.2656	0.0702	0.2656	0.0618	0.2656	0.0551
0.2783	0.1138	0.2783	0.0944	0.2783	0.084	0.2783	0.0779	0.2783	0.074	0.2783	0.0677	0.2783	0.0611
0.2915	0.1138	0.2915	0.1008	0.2915	0.0946	0.2915	0.0892	0.2915	0.0843	0.2915	0.0764	0.2915	0.0677
0.3054	0.1179	0.3054	0.1056	0.3054	0.0987	0.3054	0.0926	0.3054	0.0872	0.3054	0.0785	0.3054	0.0706
0.3199	0.1179	0.3199	0.1056	0.3199	0.0987	0.3199	0.0926	0.3199	0.0894	0.3199	0.0844	0.3199	0.0786
0.3352	0.1179	0.3352	0.1098	0.3352	0.1056	0.3352	0.1017	0.3352	0.0982	0.3352	0.0921	0.3352	0.0848
0.3511	0.1654	0.3511	0.129	0.3511	0.1133	0.3511	0.1075	0.3511	0.1035	0.3511	0.0964	0.3511	0.088
0.3678	0.2415	0.3678	0.1832	0.3678	0.1565	0.3678	0.1364	0.3678	0.1213	0.3678	0.1006	0.3678	0.088
0.3853	0.2549	0.3853	0.187	0.3853	0.1595	0.3853	0.1387	0.3853	0.1269	0.3853	0.1092	0.3853	0.091
0.4037	0.2549	0.4037	0.187	0.4037	0.1595	0.4037	0.1387	0.4037	0.1279	0.4037	0.1163	0.4037	0.1034
0.4229	0.2549	0.4229	0.187	0.4229	0.1651	0.4229	0.1485	0.4229	0.1344	0.4229	0.1233	0.4229	0.1111
0.4431	0.3288	0.4431	0.2339	0.4431	0.2038	0.4431	0.1813	0.4431	0.1641	0.4431	0.1399	0.4431	0.1181
0.4642	0.3288	0.4642	0.2339	0.4642	0.2038	0.4642	0.1813	0.4642	0.1641	0.4642	0.1399	0.4642	0.1181
0.4863	0.3288	0.4863	0.2339	0.4863	0.2038	0.4863	0.1813	0.4863	0.1641	0.4863	0.1421	0.4863	0.1246
0.5094	0.3288	0.5094	0.2339	0.5094	0.2038	0.5094	0.1813	0.5094	0.1641	0.5094	0.1472	0.5094	0.1295

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.3356	0.5337	0.2387	0.5337	0.2081	0.5337	0.19	0.5337	0.1796	0.5337	0.1614	0.5337	0.1401
0.5591	0.3997	0.5591	0.2762	0.5591	0.244	0.5591	0.2179	0.5591	0.1971	0.5591	0.1724	0.5591	0.1556
0.5857	0.3997	0.5857	0.2863	0.5857	0.2573	0.5857	0.2332	0.5857	0.2128	0.5857	0.1853	0.5857	0.1724
0.6136	0.3997	0.6136	0.2863	0.6136	0.2573	0.6136	0.2332	0.6136	0.2128	0.6136	0.1998	0.6136	0.1858
0.6428	0.3997	0.6428	0.2863	0.6428	0.2573	0.6428	0.2332	0.6428	0.2219	0.6428	0.2115	0.6428	0.1969
0.6734	0.411	0.6734	0.2863	0.6734	0.2574	0.6734	0.2449	0.6734	0.2378	0.6734	0.2244	0.6734	0.2072
0.7055	0.411	0.7055	0.301	0.7055	0.2757	0.7055	0.2638	0.7055	0.2534	0.7055	0.2357	0.7055	0.2156
0.7391	0.6367	0.7391	0.4169	0.7391	0.3404	0.7391	0.2927	0.7391	0.2746	0.7391	0.2445	0.7391	0.217
0.7743	0.6367	0.7743	0.4169	0.7743	0.3404	0.7743	0.3038	0.7743	0.2858	0.7743	0.2555	0.7743	0.2218
0.8111	0.6596	0.8111	0.4428	0.8111	0.386	0.8111	0.3422	0.8111	0.3081	0.8111	0.2598	0.8111	0.2218
0.8497	0.6596	0.8497	0.4428	0.8497	0.4051	0.8497	0.3738	0.8497	0.347	0.8497	0.3034	0.8497	0.256
0.8902	0.6828	0.8902	0.4451	0.8902	0.4051	0.8902	0.3738	0.8902	0.3511	0.8902	0.3194	0.8902	0.2761
0.9326	0.737	0.9326	0.5191	0.9326	0.4567	0.9326	0.411	0.9326	0.3766	0.9326	0.328	0.9326	0.2821
0.977	0.9914	0.977	0.6358	0.977	0.525	0.977	0.4553	0.977	0.408	0.977	0.3484	0.977	0.2994
1.0235	0.9914	1.0235	0.6358	1.0235	0.5662	1.0235	0.5139	1.0235	0.4702	1.0235	0.4041	1.0235	0.3384
1.0723	0.9914	1.0723	0.6668	1.0723	0.5976	1.0723	0.5399	1.0723	0.4914	1.0723	0.4166	1.0723	0.3541
1.1233	1.2606	1.1233	0.8561	1.1233	0.7168	1.1233	0.6174	1.1233	0.5433	1.1233	0.4431	1.1233	0.3633
1.1768	1.2606	1.1768	0.8561	1.1768	0.7168	1.1768	0.6174	1.1768	0.5433	1.1768	0.4467	1.1768	0.3729
1.2328	1.2606	1.2328	0.935	1.2328	0.8202	1.2328	0.7293	1.2328	0.6556	1.2328	0.5433	1.2328	0.4321
1.2916	1.2606	1.2916	1.0351	1.2916	0.8991	1.2916	0.793	1.2916	0.708	1.2916	0.5814	1.2916	0.4586
1.353	1.3319	1.353	1.0351	1.353	0.8991	1.353	0.793	1.353	0.708	1.353	0.5814	1.353	0.4631
1.4175	1.6092	1.4175	1.1325	1.4175	0.9683	1.4175	0.8621	1.4175	0.7817	1.4175	0.6627	1.4175	0.5486
1.485	1.6092	1.485	1.1325	1.485	0.9683	1.485	0.885	1.485	0.8264	1.485	0.7199	1.485	0.6006
1.5557	1.8872	1.5557	1.1818	1.5557	1.0008	1.5557	0.892	1.5557	0.8264	1.5557	0.7265	1.5557	0.6185
1.6298	1.9322	1.6298	1.3084	1.6298	1.1683	1.6298	1.0534	1.6298	0.9565	1.6298	0.8016	1.6298	0.6401
1.7074	1.9702	1.7074	1.3601	1.7074	1.2627	1.7074	1.1415	1.7074	1.0371	1.7074	0.8692	1.7074	0.7006
1.7887	2.4552	1.7887	1.4456	1.7887	1.2629	1.7887	1.1415	1.7887	1.0371	1.7887	0.8773	1.7887	0.7486
1.8738	2.4552	1.8738	1.4456	1.8738	1.2629	1.8738	1.1415	1.8738	1.0371	1.8738	0.9259	1.8738	0.788
1.963	2.4552	1.963	1.4456	1.963	1.2629	1.963	1.1498	1.963	1.0818	1.963	0.9626	1.963	0.8157
2.0565	2.4552	2.0565	1.4456	2.0565	1.2629	2.0565	1.1701	2.0565	1.1049	2.0565	0.9829	2.0565	0.8288
2.1544	2.4552	2.1544	1.4456	2.1544	1.3316	2.1544	1.2297	2.1544	1.1411	2.1544	0.9932	2.1544	0.8645
2.257	2.2367	2.257	1.4456	2.257	1.3316	2.257	1.2297	2.257	1.1534	2.257	1.0344	2.257	0.8939
2.3645	2.2367	2.3645	1.4456	2.3645	1.3316	2.3645	1.2422	2.3645	1.1724	2.3645	1.0471	2.3645	0.898
2.4771	2.2367	2.4771	1.6143	2.4771	1.3804	2.4771	1.2551	2.4771	1.1724	2.4771	1.0471	2.4771	0.898
2.595	2.138	2.595	1.6143	2.595	1.3804	2.595	1.2551	2.595	1.1724	2.595	1.0471	2.595	0.898

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
2.7186	2.138	2.7186	1.6143	2.7186	1.3804	2.7186	1.2551	2.7186	1.1724	2.7186	1.0471	2.7186	0.898	
2.848	2.138	2.848	1.6143	2.848	1.3804	2.848	1.2551	2.848	1.1724	2.848	1.0471	2.848	0.898	
2.9836	2.138	2.9836	1.6143	2.9836	1.3804	2.9836	1.2551	2.9836	1.1568	2.9836	1.0114	2.9836	0.8645	
3.1257	2.138	3.1257	1.3773	3.1257	1.0982	3.1257	1.0035	3.1257	0.9573	3.1257	0.8829	3.1257	0.7931	
3.2745	2.138	3.2745	1.2119	3.2745	1.0686	3.2745	0.9673	3.2745	0.886	3.2745	0.778	3.2745	0.7168	
3.4305	1.5368	3.4305	1.0471	3.4305	0.9495	3.4305	0.8824	3.4305	0.8379	3.4305	0.7547	3.4305	0.6598	
3.5938	1.5368	3.5938	1.0165	3.5938	0.898	3.5938	0.8299	3.5938	0.7946	3.5938	0.7273	3.5938	0.6376	
3.7649	1.5368	3.7649	1.0165	3.7649	0.898	3.7649	0.8299	3.7649	0.7769	3.7649	0.6958	3.7649	0.6089	
3.9442	1.5368	3.9442	1.0165	3.9442	0.8472	3.9442	0.7941	3.9442	0.7477	3.9442	0.6723	3.9442	0.5955	
4.132	1.5368	4.132	1.0165	4.132	0.845	4.132	0.7941	4.132	0.7477	4.132	0.6723	4.132	0.5955	
4.3288	1.5368	4.3288	0.9973	4.3288	0.8194	4.3288	0.7522	4.3288	0.7017	4.3288	0.6303	4.3288	0.5622	
4.5349	1.5368	4.5349	0.8745	4.5349	0.7347	4.5349	0.6652	4.5349	0.6197	4.5349	0.5656	4.5349	0.5097	
4.7508	1.518	4.7508	0.8745	4.7508	0.7183	4.7508	0.6169	4.7508	0.5587	4.7508	0.4909	4.7508	0.4618	
4.977	1.518	4.977	0.8614	4.977	0.7025	4.977	0.6052	4.977	0.5367	4.977	0.4572	4.977	0.4284	
5.214	1.3404	5.214	0.7497	5.214	0.6443	5.214	0.5421	5.214	0.5109	5.214	0.4398	5.214	0.4021	
5.4623	1.3404	5.4623	0.7497	5.4623	0.6443	5.4623	0.5254	5.4623	0.5109	5.4623	0.438	5.4623	0.3783	
5.7224	1.3404	5.7224	0.7497	5.7224	0.6443	5.7224	0.5254	5.7224	0.5109	5.7224	0.438	5.7224	0.3681	
5.9948	1.3404	5.9948	0.7497	5.9948	0.6443	5.9948	0.5254	5.9948	0.5109	5.9948	0.438	5.9948	0.3681	
6.2803	1.3404	6.2803	0.7497	6.2803	0.6443	6.2803	0.5254	6.2803	0.5109	6.2803	0.438	6.2803	0.3681	
6.5793	1.3404	6.5793	0.7497	6.5793	0.6443	6.5793	0.5254	6.5793	0.5109	6.5793	0.438	6.5793	0.3681	
6.8926	1.3404	6.8926	0.7497	6.8926	0.6443	6.8926	0.5254	6.8926	0.5109	6.8926	0.438	6.8926	0.3681	
7.2208	1.274	7.2208	0.7497	7.2208	0.6443	7.2208	0.5254	7.2208	0.5109	7.2208	0.438	7.2208	0.3681	
7.5646	1.274	7.5646	0.7455	7.5646	0.6309	7.5646	0.5254	7.5646	0.5092	7.5646	0.438	7.5646	0.3681	
7.9248	1.274	7.9248	0.6003	7.9248	0.5494	7.9248	0.5064	7.9248	0.471	7.9248	0.4168	7.9248	0.3609	
8.3022	1.274	8.3022	0.5659	8.3022	0.4849	8.3022	0.454	8.3022	0.4288	8.3022	0.394	8.3022	0.3594	
8.6975	1.0027	8.6975	0.521	8.6975	0.4849	8.6975	0.454	8.6975	0.4288	8.6975	0.3913	8.6975	0.3536	
9.1116	1.0027	9.1116	0.4701	9.1116	0.4386	9.1116	0.4105	9.1116	0.3865	9.1116	0.3654	9.1116	0.3376	
9.5455	1.0027	9.5455	0.4494	9.5455	0.4069	9.5455	0.3794	9.5455	0.3652	9.5455	0.3418	9.5455	0.3167	
10	0.6463	10	0.4494	10	0.4069	10	0.3794	10	0.3585	10	0.3293	10	0.3015	
10.4762	0.6411	10.4762	0.4371	10.4762	0.3959	10.4762	0.3648	10.4762	0.347	10.4762	0.3169	10.4762	0.2936	
10.975	0.6411	10.975	0.4085	10.975	0.3668	10.975	0.3387	10.975	0.3179	10.975	0.2923	10.975	0.2891	
11.4976	0.6411	11.4976	0.3647	11.4976	0.3304	11.4976	0.3133	11.4976	0.3024	11.4976	0.2893	11.4976	0.2857	
12.045	0.6411	12.045	0.3647	12.045	0.3304	12.045	0.3133	12.045	0.3024	12.045	0.2893	12.045	0.2839	
12.6186	0.6411	12.6186	0.3647	12.6186	0.3304	12.6186	0.3133	12.6186	0.3024	12.6186	0.2893	12.6186	0.2831	
13.2194	0.6411	13.2194	0.3647	13.2194	0.3304	13.2194	0.3133	13.2194	0.3024	13.2194	0.2893	13.2194	0.2831	

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.6411	13.8489	0.3647	13.8489	0.3304	13.8489	0.3133	13.8489	0.3024	13.8489	0.2893	13.8489	0.2831
14.5083	0.6411	14.5083	0.3647	14.5083	0.3304	14.5083	0.3133	14.5083	0.3024	14.5083	0.2893	14.5083	0.2831
15.1991	0.6411	15.1991	0.3647	15.1991	0.3304	15.1991	0.3133	15.1991	0.3024	15.1991	0.2893	15.1991	0.2831
15.9228	0.6411	15.9228	0.3647	15.9228	0.3304	15.9228	0.3133	15.9228	0.3024	15.9228	0.2893	15.9228	0.2831
16.681	0.6411	16.681	0.3647	16.681	0.3304	16.681	0.3133	16.681	0.3024	16.681	0.2893	16.681	0.2831
17.4753	0.6411	17.4753	0.3647	17.4753	0.3304	17.4753	0.3133	17.4753	0.3024	17.4753	0.2893	17.4753	0.2831
18.3074	0.4714	18.3074	0.3284	18.3074	0.3152	18.3074	0.3052	18.3074	0.298	18.3074	0.2893	18.3074	0.2831
19.1791	0.4714	19.1791	0.3088	19.1791	0.2936	19.1791	0.2872	19.1791	0.2851	19.1791	0.2842	19.1791	0.2825
20.0923	0.4714	20.0923	0.3088	20.0923	0.2886	20.0923	0.2865	20.0923	0.2851	20.0923	0.2833	20.0923	0.2814
21.049	0.3824	21.049	0.2877	21.049	0.2842	21.049	0.2843	21.049	0.2836	21.049	0.2819	21.049	0.2801
22.0513	0.3824	22.0513	0.2873	22.0513	0.2834	22.0513	0.2816	22.0513	0.2806	22.0513	0.2795	22.0513	0.2783
23.1013	0.2973	23.1013	0.2832	23.1013	0.2814	23.1013	0.2802	23.1013	0.2793	23.1013	0.2779	23.1013	0.2765
24.2013	0.2947	24.2013	0.2805	24.2013	0.2788	24.2013	0.2776	24.2013	0.2768	24.2013	0.2763	24.2013	0.2756
25.3536	0.288	25.3536	0.2805	25.3536	0.2788	25.3536	0.2776	25.3536	0.2768	25.3536	0.2757	25.3536	0.2749
26.5609	0.288	26.5609	0.2805	26.5609	0.2788	26.5609	0.2776	26.5609	0.2768	26.5609	0.2757	26.5609	0.2747
27.8256	0.2867	27.8256	0.28	27.8256	0.2782	27.8256	0.2771	27.8256	0.2762	27.8256	0.2751	27.8256	0.2741
29.1505	0.2773	29.1505	0.2753	29.1505	0.2749	29.1505	0.2745	29.1505	0.2742	29.1505	0.2738	29.1505	0.2732
30.5386	0.2773	30.5386	0.2727	30.5386	0.2726	30.5386	0.2725	30.5386	0.2724	30.5386	0.2723	30.5386	0.2721
31.9927	0.2707	31.9927	0.271	31.9927	0.271	31.9927	0.2711	31.9927	0.2711	31.9927	0.2712	31.9927	0.2712
33.516	0.2707	33.516	0.2707	33.516	0.2706	33.516	0.2706	33.516	0.2706	33.516	0.2706	33.516	0.2706
35.1119	0.27	35.1119	0.27	35.1119	0.27	35.1119	0.2701	35.1119	0.2701	35.1119	0.2701	35.1119	0.2701
36.7838	0.2695	36.7838	0.2696	36.7838	0.2696	36.7838	0.2696	36.7838	0.2697	36.7838	0.2697	36.7838	0.2697
38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693
40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269
42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2688
44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685
46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683
48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681
50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	
0.1098	0.0291	0.1098	0.0261	0.1098	0.0245	0.1098	0.023	0.1098	0.0222	0.1098	0.0215	0.1098	0.0207	
0.115	0.0309	0.115	0.0261	0.115	0.0245	0.115	0.0235	0.115	0.0231	0.115	0.0224	0.115	0.0216	
0.1204	0.0313	0.1204	0.0263	0.1204	0.0247	0.1204	0.0242	0.1204	0.0238	0.1204	0.0231	0.1204	0.0222	
0.1262	0.0313	0.1262	0.027	0.1262	0.0258	0.1262	0.0247	0.1262	0.0243	0.1262	0.0235	0.1262	0.0225	
0.1322	0.0313	0.1322	0.0271	0.1322	0.0258	0.1322	0.0248	0.1322	0.0244	0.1322	0.0236	0.1322	0.0226	
0.1385	0.0313	0.1385	0.0277	0.1385	0.0266	0.1385	0.0255	0.1385	0.0246	0.1385	0.0236	0.1385	0.0227	
0.1451	0.0316	0.1451	0.0295	0.1451	0.0282	0.1451	0.027	0.1451	0.0259	0.1451	0.0239	0.1451	0.0227	
0.152	0.032	0.152	0.0299	0.152	0.0286	0.152	0.0273	0.152	0.0262	0.152	0.0241	0.152	0.0227	
0.1592	0.0331	0.1592	0.0311	0.1592	0.03	0.1592	0.0289	0.1592	0.0279	0.1592	0.0265	0.1592	0.0247	
0.1668	0.0367	0.1668	0.0324	0.1668	0.0313	0.1668	0.0304	0.1668	0.0296	0.1668	0.0281	0.1668	0.0261	
0.1748	0.0507	0.1748	0.0427	0.1748	0.0386	0.1748	0.0351	0.1748	0.0322	0.1748	0.0288	0.1748	0.0268	
0.1831	0.0586	0.1831	0.0493	0.1831	0.0442	0.1831	0.0399	0.1831	0.0362	0.1831	0.0306	0.1831	0.027	
0.1918	0.0586	0.1918	0.0493	0.1918	0.0442	0.1918	0.0399	0.1918	0.0362	0.1918	0.0306	0.1918	0.0277	
0.2009	0.0586	0.2009	0.0493	0.2009	0.0442	0.2009	0.0399	0.2009	0.0362	0.2009	0.0329	0.2009	0.03	
0.2105	0.0586	0.2105	0.0493	0.2105	0.0442	0.2105	0.0403	0.2105	0.0388	0.2105	0.0361	0.2105	0.0326	
0.2205	0.0586	0.2205	0.0493	0.2205	0.0455	0.2205	0.0429	0.2205	0.0408	0.2205	0.0378	0.2205	0.0339	
0.231	0.0586	0.231	0.0493	0.231	0.0459	0.231	0.044	0.231	0.0422	0.231	0.039	0.231	0.0354	
0.242	0.0586	0.242	0.051	0.242	0.0487	0.242	0.0465	0.242	0.0446	0.242	0.0411	0.242	0.0371	
0.2535	0.065	0.2535	0.0574	0.2535	0.053	0.2535	0.049	0.2535	0.0454	0.2535	0.0412	0.2535	0.0387	
0.2656	0.0732	0.2656	0.0587	0.2656	0.0536	0.2656	0.0492	0.2656	0.0454	0.2656	0.0437	0.2656	0.0417	
0.2783	0.0817	0.2783	0.0599	0.2783	0.0536	0.2783	0.0508	0.2783	0.0495	0.2783	0.0471	0.2783	0.044	
0.2915	0.0817	0.2915	0.0619	0.2915	0.0581	0.2915	0.0547	0.2915	0.052	0.2915	0.0488	0.2915	0.0449	
0.3054	0.0817	0.3054	0.0666	0.3054	0.0624	0.3054	0.0586	0.3054	0.0552	0.3054	0.0499	0.3054	0.0461	
0.3199	0.0817	0.3199	0.0702	0.3199	0.0661	0.3199	0.0623	0.3199	0.0591	0.3199	0.0538	0.3199	0.0475	
0.3352	0.0875	0.3352	0.0769	0.3352	0.071	0.3352	0.0665	0.3352	0.0631	0.3352	0.0572	0.3352	0.0503	
0.3511	0.091	0.3511	0.0809	0.3511	0.0752	0.3511	0.0701	0.3511	0.0656	0.3511	0.0579	0.3511	0.0508	
0.3678	0.1221	0.3678	0.0953	0.3678	0.0824	0.3678	0.0723	0.3678	0.0656	0.3678	0.0579	0.3678	0.0508	
0.3853	0.1364	0.3853	0.106	0.3853	0.0922	0.3853	0.0811	0.3853	0.0723	0.3853	0.0594	0.3853	0.0508	
0.4037	0.1364	0.4037	0.106	0.4037	0.0922	0.4037	0.0825	0.4037	0.0766	0.4037	0.0667	0.4037	0.0573	
0.4229	0.1364	0.4229	0.106	0.4229	0.0922	0.4229	0.0853	0.4229	0.0801	0.4229	0.0716	0.4229	0.0615	
0.4431	0.1364	0.4431	0.106	0.4431	0.094	0.4431	0.0891	0.4431	0.0844	0.4431	0.076	0.4431	0.0659	
0.4642	0.1377	0.4642	0.106	0.4642	0.0979	0.4642	0.0921	0.4642	0.0866	0.4642	0.0772	0.4642	0.0681	
0.4863	0.1482	0.4863	0.1245	0.4863	0.1116	0.4863	0.1006	0.4863	0.0911	0.4863	0.0833	0.4863	0.0743	
0.5094	0.1823	0.5094	0.1391	0.5094	0.1225	0.5094	0.1091	0.5094	0.0984	0.5094	0.0875	0.5094	0.0759	

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.2226	0.5337	0.1617	0.5337	0.1354	0.5337	0.1157	0.5337	0.1031	0.5337	0.0875	0.5337	0.0759
0.5591	0.2226	0.5591	0.1617	0.5591	0.1354	0.5591	0.1157	0.5591	0.1031	0.5591	0.0895	0.5591	0.0761
0.5857	0.2226	0.5857	0.1617	0.5857	0.1354	0.5857	0.1157	0.5857	0.1035	0.5857	0.0957	0.5857	0.0843
0.6136	0.2226	0.6136	0.1617	0.6136	0.1354	0.6136	0.1191	0.6136	0.1123	0.6136	0.1013	0.6136	0.0887
0.6428	0.2271	0.6428	0.1635	0.6428	0.1368	0.6428	0.1191	0.6428	0.114	0.6428	0.1049	0.6428	0.0922
0.6734	0.2271	0.6734	0.1635	0.6734	0.1397	0.6734	0.1298	0.6734	0.1217	0.6734	0.1087	0.6734	0.0942
0.7055	0.2271	0.7055	0.1635	0.7055	0.1397	0.7055	0.1298	0.7055	0.1217	0.7055	0.1112	0.7055	0.0976
0.7391	0.2271	0.7391	0.1635	0.7391	0.1428	0.7391	0.1342	0.7391	0.1258	0.7391	0.1112	0.7391	0.0976
0.7743	0.3199	0.7743	0.2154	0.7743	0.1823	0.7743	0.1597	0.7743	0.1436	0.7743	0.1227	0.7743	0.1045
0.8111	0.3199	0.8111	0.2154	0.8111	0.1823	0.8111	0.1597	0.8111	0.1436	0.8111	0.1227	0.8111	0.1072
0.8497	0.3199	0.8497	0.2154	0.8497	0.1823	0.8497	0.1667	0.8497	0.1542	0.8497	0.1343	0.8497	0.1151
0.8902	0.3199	0.8902	0.2154	0.8902	0.1899	0.8902	0.1741	0.8902	0.1611	0.8902	0.1408	0.8902	0.1199
0.9326	0.4905	0.9326	0.3017	0.9326	0.2482	0.9326	0.2168	0.9326	0.1947	0.9326	0.1653	0.9326	0.1387
0.977	0.4905	0.977	0.3017	0.977	0.2482	0.977	0.2168	0.977	0.1947	0.977	0.1738	0.977	0.1524
1.0235	0.4905	1.0235	0.3017	1.0235	0.2482	1.0235	0.2168	1.0235	0.1947	1.0235	0.1823	1.0235	0.1634
1.0723	0.4905	1.0723	0.3017	1.0723	0.2637	1.0723	0.2423	1.0723	0.2253	1.0723	0.1992	1.0723	0.1725
1.1233	0.5817	1.1233	0.3433	1.1233	0.2704	1.1233	0.2423	1.1233	0.2253	1.1233	0.1992	1.1233	0.1725
1.1768	0.5817	1.1768	0.3818	1.1768	0.3175	1.1768	0.2803	1.1768	0.2507	1.1768	0.2165	1.1768	0.1887
1.2328	0.5817	1.2328	0.3891	1.2328	0.3511	1.2328	0.3196	1.2328	0.293	1.2328	0.2534	1.2328	0.2151
1.2916	0.5817	1.2916	0.4229	1.2916	0.3735	1.2916	0.3328	1.2916	0.3047	1.2916	0.2628	1.2916	0.2219
1.353	0.6371	1.353	0.4229	1.353	0.3735	1.353	0.3371	1.353	0.3183	1.353	0.2864	1.353	0.2496
1.4175	0.6371	1.4175	0.4229	1.4175	0.3787	1.4175	0.3589	1.4175	0.341	1.4175	0.3097	1.4175	0.2727
1.485	0.6371	1.485	0.4494	1.485	0.4202	1.485	0.3933	1.485	0.3686	1.485	0.3278	1.485	0.2853
1.5557	0.6371	1.5557	0.4814	1.5557	0.4509	1.5557	0.4238	1.5557	0.3991	1.5557	0.3558	1.5557	0.3055
1.6298	0.7646	1.6298	0.499	1.6298	0.46	1.6298	0.4334	1.6298	0.4095	1.6298	0.3689	1.6298	0.3214
1.7074	0.8139	1.7074	0.632	1.7074	0.5602	1.7074	0.5042	1.7074	0.458	1.7074	0.3899	1.7074	0.3341
1.7887	0.9195	1.7887	0.7556	1.7887	0.6777	1.7887	0.6117	1.7887	0.5549	1.7887	0.4736	1.7887	0.3952
1.8738	0.9711	1.8738	0.7836	1.8738	0.7098	1.8738	0.6502	1.8738	0.6034	1.8738	0.5221	1.8738	0.4298
1.963	1.1224	1.963	0.8714	1.963	0.7675	1.963	0.7007	1.963	0.6427	1.963	0.5486	1.963	0.4456
2.0565	1.2768	2.0565	0.9218	2.0565	0.8205	2.0565	0.7381	2.0565	0.6713	2.0565	0.567	2.0565	0.4588
2.1544	1.2768	2.1544	0.9218	2.1544	0.8205	2.1544	0.7381	2.1544	0.6713	2.1544	0.567	2.1544	0.4588
2.257	1.2768	2.257	0.9218	2.257	0.8205	2.257	0.7381	2.257	0.6756	2.257	0.5786	2.257	0.4821
2.3645	1.8982	2.3645	1.0227	2.3645	0.8284	2.3645	0.7528	2.3645	0.6902	2.3645	0.5876	2.3645	0.4962
2.4771	2.2619	2.4771	1.215	2.4771	0.9875	2.4771	0.8191	2.4771	0.7265	2.4771	0.6267	2.4771	0.5235
2.595	2.7147	2.595	1.215	2.595	1.0799	2.595	0.8772	2.595	0.7512	2.595	0.6435	2.595	0.5443

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
2.7186	2.7147	2.7186	1.215	2.7186	1.0799	2.7186	0.8772	2.7186	0.7512	2.7186	0.6435	2.7186	0.5443	
2.848	2.7147	2.848	1.215	2.848	1.0799	2.848	0.8772	2.848	0.7512	2.848	0.6435	2.848	0.5443	
2.9836	2.7147	2.9836	1.215	2.9836	1.0799	2.9836	0.8772	2.9836	0.7512	2.9836	0.6435	2.9836	0.5443	
3.1257	2.7147	3.1257	1.215	3.1257	1.0799	3.1257	0.8772	3.1257	0.7512	3.1257	0.6435	3.1257	0.5443	
3.2745	1.5417	3.2745	0.9998	3.2745	0.8571	3.2745	0.7497	3.2745	0.6847	3.2745	0.6146	3.2745	0.5331	
3.4305	1.3529	3.4305	0.9515	3.4305	0.8527	3.4305	0.7497	3.4305	0.6847	3.4305	0.6146	3.4305	0.5331	
3.5938	1.3529	3.5938	0.9515	3.5938	0.8527	3.5938	0.7497	3.5938	0.6847	3.5938	0.6146	3.5938	0.5331	
3.7649	1.3529	3.7649	0.9515	3.7649	0.8527	3.7649	0.7497	3.7649	0.6847	3.7649	0.6146	3.7649	0.5331	
3.9442	1.3529	3.9442	0.9515	3.9442	0.8527	3.9442	0.7497	3.9442	0.6847	3.9442	0.6146	3.9442	0.5331	
4.132	1.3529	4.132	0.9515	4.132	0.8527	4.132	0.7497	4.132	0.6847	4.132	0.6146	4.132	0.5331	
4.3288	1.3529	4.3288	0.9515	4.3288	0.8527	4.3288	0.7497	4.3288	0.6847	4.3288	0.6146	4.3288	0.5331	
4.5349	1.3529	4.5349	0.9515	4.5349	0.8527	4.5349	0.7497	4.5349	0.6847	4.5349	0.6146	4.5349	0.5331	
4.7508	1.3529	4.7508	0.9515	4.7508	0.8527	4.7508	0.7497	4.7508	0.6847	4.7508	0.6146	4.7508	0.5331	
4.977	1.3529	4.977	0.9515	4.977	0.8527	4.977	0.7497	4.977	0.6847	4.977	0.6146	4.977	0.5331	
5.214	1.3529	5.214	0.9515	5.214	0.8527	5.214	0.7717	5.214	0.7023	5.214	0.6348	5.214	0.5762	
5.4623	1.7018	5.4623	1.0022	5.4623	0.8819	5.4623	0.7998	5.4623	0.7428	5.4623	0.6773	5.4623	0.6164	
5.7224	2.0139	5.7224	1.1678	5.7224	0.9985	5.7224	0.8801	5.7224	0.7914	5.7224	0.7294	5.7224	0.6583	
5.9948	2.0139	5.9948	1.1824	5.9948	1.0061	5.9948	0.9321	5.9948	0.8745	5.9948	0.7841	5.9948	0.6883	
6.2803	2.0139	6.2803	1.1985	6.2803	1.0822	6.2803	1.0006	6.2803	0.934	6.2803	0.8328	6.2803	0.7285	
6.5793	2.0139	6.5793	1.2079	6.5793	1.1156	6.5793	1.0368	6.5793	0.9732	6.5793	0.8722	6.5793	0.7624	
6.8926	2.8655	6.8926	1.5914	6.8926	1.338	6.8926	1.1976	6.8926	1.1027	6.8926	0.9588	6.8926	0.8114	
7.2208	3.1519	7.2208	1.7665	7.2208	1.4894	7.2208	1.3335	7.2208	1.2072	7.2208	1.0657	7.2208	0.9233	
7.5646	3.4088	7.5646	1.9808	7.5646	1.7109	7.5646	1.5432	7.5646	1.4299	7.5646	1.2268	7.5646	0.9962	
7.9248	3.7732	7.9248	2.5319	7.9248	2.1034	7.9248	1.8073	7.9248	1.5814	7.9248	1.3219	7.9248	1.0918	
8.3022	4.5641	8.3022	2.6088	8.3022	2.171	8.3022	1.915	8.3022	1.7123	8.3022	1.3901	8.3022	1.1675	
8.6975	4.6879	8.6975	2.6088	8.6975	2.171	8.6975	1.915	8.6975	1.7123	8.6975	1.3901	8.6975	1.2638	
9.1116	4.6879	9.1116	2.6088	9.1116	2.171	9.1116	1.915	9.1116	1.7123	9.1116	1.3901	9.1116	1.2638	
9.5455	4.6879	9.5455	2.6088	9.5455	2.171	9.5455	1.915	9.5455	1.7123	9.5455	1.3901	9.5455	1.2638	
10	4.6879	10	2.6088	10	2.171	10	1.915	10	1.7123	10	1.3901	10	1.2638	
10.4762	4.6879	10.4762	2.6088	10.4762	2.171	10.4762	1.915	10.4762	1.7123	10.4762	1.3901	10.4762	1.2638	
10.975	4.6879	10.975	2.6088	10.975	2.171	10.975	1.915	10.975	1.7123	10.975	1.3901	10.975	1.2305	
11.4976	5.7083	11.4976	2.5137	11.4976	1.9646	11.4976	1.756	11.4976	1.6138	11.4976	1.3836	11.4976	1.1653	
12.045	5.7083	12.045	2.5137	12.045	1.9119	12.045	1.5798	12.045	1.4346	12.045	1.2479	12.045	1.1653	
12.6186	5.7083	12.6186	2.5137	12.6186	1.9119	12.6186	1.5798	12.6186	1.4189	12.6186	1.1818	12.6186	1.1653	
13.2194	5.7083	13.2194	2.5137	13.2194	1.9119	13.2194	1.5659	13.2194	1.387	13.2194	1.1818	13.2194	1.1653	

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
13.8489	5.7083	13.8489	2.5137	13.8489	1.9119	13.8489	1.5659	13.8489	1.387	13.8489	1.1818	13.8489	1.1653	
14.5083	4.6777	14.5083	2.3117	14.5083	1.7577	14.5083	1.5659	14.5083	1.387	14.5083	1.1818	14.5083	1.1114	
15.1991	4.6777	15.1991	2.3117	15.1991	1.7366	15.1991	1.537	15.1991	1.387	15.1991	1.1818	15.1991	1.1032	
15.9228	4.6777	15.9228	2.3117	15.9228	1.7366	15.9228	1.537	15.9228	1.387	15.9228	1.1644	15.9228	1.1032	
16.681	4.6777	16.681	2.3117	16.681	1.7366	16.681	1.537	16.681	1.387	16.681	1.1644	16.681	1.1032	
17.4753	4.6777	17.4753	2.3117	17.4753	1.7366	17.4753	1.537	17.4753	1.387	17.4753	1.1644	17.4753	1.1032	
18.3074	2.7677	18.3074	1.962	18.3074	1.6751	18.3074	1.512	18.3074	1.3789	18.3074	1.1644	18.3074	0.9852	
19.1791	1.9267	19.1791	1.4264	19.1791	1.3108	19.1791	1.2176	19.1791	1.1358	19.1791	1.0227	19.1791	0.8897	
20.0923	1.2493	20.0923	1.0816	20.0923	1.0133	20.0923	0.9536	20.0923	0.9008	20.0923	0.8109	20.0923	0.7479	
21.049	1.2493	21.049	0.9073	21.049	0.828	21.049	0.7844	21.049	0.7563	21.049	0.7314	21.049	0.706	
22.0513	0.993	22.0513	0.7974	22.0513	0.7401	22.0513	0.6995	22.0513	0.6943	22.0513	0.6838	22.0513	0.668	
23.1013	0.6779	23.1013	0.6627	23.1013	0.6574	23.1013	0.6529	23.1013	0.6489	23.1013	0.6416	23.1013	0.6313	
24.2013	0.6151	24.2013	0.6095	24.2013	0.6076	24.2013	0.6061	24.2013	0.6047	24.2013	0.6017	24.2013	0.5969	
25.3536	0.5629	25.3536	0.5604	25.3536	0.5634	25.3536	0.5654	25.3536	0.5667	25.3536	0.5677	25.3536	0.5671	
26.5609	0.5491	26.5609	0.542	26.5609	0.5413	26.5609	0.5411	26.5609	0.5413	26.5609	0.5421	26.5609	0.5428	
27.8256	0.5375	27.8256	0.5118	27.8256	0.5123	27.8256	0.5158	27.8256	0.5181	27.8256	0.5209	27.8256	0.5232	
29.1505	0.5375	29.1505	0.5118	29.1505	0.5069	29.1505	0.5051	29.1505	0.5048	29.1505	0.5057	29.1505	0.5077	
30.5386	0.4891	30.5386	0.4832	30.5386	0.4826	30.5386	0.4854	30.5386	0.4884	30.5386	0.4922	30.5386	0.4954	
31.9927	0.4891	31.9927	0.4832	31.9927	0.4826	31.9927	0.4828	31.9927	0.4834	31.9927	0.4847	31.9927	0.4867	
33.516	0.4797	33.516	0.4786	33.516	0.4785	33.516	0.4785	33.516	0.4787	33.516	0.4791	33.516	0.48	
35.1119	0.4732	35.1119	0.4733	35.1119	0.4733	35.1119	0.4733	35.1119	0.4734	35.1119	0.4736	35.1119	0.474	
36.7838	0.4677	36.7838	0.4679	36.7838	0.4679	36.7838	0.468	36.7838	0.4681	36.7838	0.4683	36.7838	0.4686	
38.5353	0.4628	38.5353	0.4629	38.5353	0.463	38.5353	0.4631	38.5353	0.4632	38.5353	0.4633	38.5353	0.4636	
40.3702	0.4584	40.3702	0.4585	40.3702	0.4585	40.3702	0.4586	40.3702	0.4586	40.3702	0.4588	40.3702	0.459	
42.2924	0.4543	42.2924	0.4544	42.2924	0.4544	42.2924	0.4545	42.2924	0.4545	42.2924	0.4547	42.2924	0.4548	
44.3062	0.4505	44.3062	0.4506	44.3062	0.4507	44.3062	0.4507	44.3062	0.4507	44.3062	0.4509	44.3062	0.451	
46.4159	0.4471	46.4159	0.4471	46.4159	0.4472	46.4159	0.4472	46.4159	0.4472	46.4159	0.4473	46.4159	0.4475	
48.626	0.4439	48.626	0.4439	48.626	0.4439	48.626	0.4439	48.626	0.444	48.626	0.444	48.626	0.4442	
50.9414	0.4408	50.9414	0.4408	50.9414	0.4408	50.9414	0.4408	50.9414	0.4409	50.9414	0.4409	50.9414	0.4411	



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
**24590-PTF-ME-FEP-COND-00003A**

Data Sheet No.  
**24590-PTF-MED-FEP-00007**

Project:	<b>RPP-WTP</b>	Description:	<b>Waste Feed Evaporator Primary Condenser</b>
Project No:	<b>24590</b>	P&ID:	<b>24590-PTF-M6-FEP-00003002</b>
Site:	<b>Hanford</b>	Process Data: $\Delta$	<b>24590-QL-POA-MEVV-00001-04-04</b>
Process flow diagram:	<b>24590-PTF-M5-V17T-00004002</b>	Manufacturer Name:	<b>Framatome ANP / GRAHAM MANUFACTURING</b> $\Delta$

**General Data**

Quality Level	<b>Q (See Note 8)</b>	TEMA (Class/Type)	<b>B</b>
Seismic Category	<b>SC-I</b>	Flow Type (Counter current, etc)	<b>N/A</b>
Design Code	<b>ASME VIII Div 1</b>	Heat Exchanger Duty	Btu/hr <b>167,838</b>
Code Stamp	<b>Yes</b>	Heat Exchanger Area	ft <sup>2</sup> <b>14.9</b>
NB Registration	<b>Yes</b>	$\Delta T$ (LMTD/Corrected LMTD)	°F <b>111</b>

**ISSUED BY  
RPP-WTP-PDG**

**Thermal/Hydraulic Data**

	Shell Side		Tube Side	
	In	Out	In	Out
Fluid Name	<b>Steam</b>		<b>Cooling Water</b>	
Fluid Quantities: Total	<b>200.4</b>		<b>15,000</b>	
Condensable Vapor (In/Out)	<b>156.7</b>	<b>3.4</b>	<b>N/A</b>	<b>N/A</b>
Liquid	<b>N/A</b>	<b>153.3</b>	<b>15,000</b>	<b>15,000</b>
Noncondensable	<b>43.7</b>	<b>43.7</b>	<b>N/A</b>	<b>N/A</b>
Temperature (In/Out)	°F <b>248.9</b>	°F <b>120.0</b>	°F <b>75</b>	°F <b>86.2</b>
Specific Gravity	<b>N/A</b>	<b>N/A</b>	<b>1.000</b>	<b>.999</b>
Viscosity	Cp <b>N/A</b>	Cp <b>N/A</b>	<b>2.209</b>	<b>1.924</b>
Molecular Weight	<b>18.02</b>	<b>18.02</b>	<b>N/A</b>	<b>N/A</b>
Molecular Weight, Noncondensable	<b>29</b>	<b>29</b>	<b>N/A</b>	<b>N/A</b>
Specific Heat	Btu/lbm-°F <b>N/A</b>	Btu/lbm-°F <b>N/A</b>	<b>1.000</b>	<b>0.999</b>
Thermal Conductivity	Btu/hr-ft-°F <b>N/A</b>	Btu/hr-ft-°F <b>*</b>	<b>0.350</b>	<b>0.356</b>
Latent Heat	Btu/lbm @ °F <b>N/A</b>	Btu/lbm @ °F <b>N/A</b>	<b>N/A</b>	<b>N/A</b>
Inlet pressure	psia <b>810.0 Torr</b>	psia <b>59.7 psia</b>	<b>59.7 psia</b>	<b>0.8 psi</b>
Tube side Velocity	ft/s <b>N/A</b>	ft/s <b>N/A</b>	<b>3.4</b>	<b>0.8 psi</b>
Pressure Drop (Allowed)	psi <b>25 mm Hg</b>	psi <b>25 mm Hg</b>	<b>0.8 psi</b>	<b>0.8 psi</b>
Fouling Resistance (Min)	hr-ft <sup>2</sup> -°F/Btu <b>0.0020</b>	hr-ft <sup>2</sup> -°F/Btu <b>0.0020</b>	<b>0.0020</b>	<b>0.0020</b>

**Mechanical Data**

	Shell Side		Tube Side	
	psig	psig	psig	psig
Design Pressure (Max/Min)	<b>50</b>	<b>Full vacuum</b>	<b>100</b>	<b>Full vacuum</b>
Design Temperature (Max/Min)	°F <b>378</b>	°F <b>0</b>	°F <b>150</b>	°F <b>0</b>
Corrosion Allowance	inch <b>0.04</b>	inch <b>0.04</b>	inch <b>0.04</b>	inch <b>0.04</b>
Erosion Allowance	inch <b>N/A</b>	inch <b>N/A</b>	inch <b>N/A</b>	inch <b>N/A</b>
Shell OD/ID	inch <b>6 5/8 OD</b>	inch <b>6 5/8 OD</b>	Overall Dimensions (H x W x L) inch <b>18 X 11 X 69</b>	inch <b>18 X 11 X 69</b>
Total Number of Tubes	<b>19</b>	<b>19</b>	Tube OD inch <b>0.750</b>	inch <b>0.750</b>

**Material Data**

Shell	<b>SA 312, SA 182 316L SS (Max Carbon 0.030%)</b>	Shell Cover	<b>N/A</b>
Channel/Bonnet	<b>SA 312, SA 182, SA 403, 316L SS (Max Carbon 0.030%)</b>	Channel Cover	<b>316L SS (Max Carbon 0.030%)</b>
Tube	<b>SA 213 316L SS (SMLS) (Max Carbon 0.030%)</b>	Floating Head Cover	<b>N/A</b>
Stationary Tube Sheet	<b>SA 240 316L SS (Max Carbon 0.030%)</b>	Floating Tube Sheet	<b>N/A</b>
Shell Side Gaskets	<b>N/A</b>	Tube Side Gaskets	<b>316 SS Spiral Wound w/PTFE Filler</b>
Partition Seals	<b>N/A</b>	Baffles/Supports	<b>SA 240 316L (Max Carbon 0.030%)</b>
Insulation	<b>N/A</b>	Forgings (Shell side)	<b>SA 182 F316L (Max Carbon 0.030%)</b>
Bolting	<b>SA-193B8M &amp; SA 194 2HM</b>	Forgings (Channel)	<b>SA 182 F316L (Max Carbon 0.030%)</b>

R11042821



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
24590-PTF-ME-FEP-COND-00003A

Data Sheet No.  
24590-PTF-MED-FEP-00007

**Construction Data** (To be determined by the supplier when not specified by the buyer)

Cross Baffle Type	<b>Up &amp; Over</b>	% Baffle Cut (Dia.)	---	Spacing (c/c) inch	---
Bypass Seal Arrangement	<b>N/A</b>	Longitudinal Seal Type	<b>N/A</b>	Expansion Joint Type	<b>N/A</b>
Inlet Nozzle $\rho V^2$	---	Bundle Entrance $\rho V^2$	---	Bundle Exit $\rho V^2$	---
Tube Support Type	<b>Vertical Cut</b>	U-bend Support Type	<b>N/A</b>	Weight of Bundle lbf	*
Operating Weight lbf	<b>330</b>	Full of Water lbf	<b>360</b>	Weight of Shell lbf	<b>300</b>

**Notes**

\* To be determined by Seller.

- (1) All welds are continuous to avoid crevices, weld surface finish is descaled as laid.
- (2) Tube to tubesheet joint shall be strength welded.
- (3) Graham size 6x4 BEM.
- (4) Deleted.
- (5) Deleted.
- (6) Deleted.
- (7) For nozzle loads, see 24590-PTF-3PS-MEVV-T0001.
- (8) Vendor will provide item at BNI quality level Q specification, which corresponds with vendor quality level QL-2.
- (9) Final Vendor Design Process information is from document 24590-QL-POA-MEVV-00001-02-00056.
- (10) Equipment cyclic data is from document 24590-QL-POA-MEVV-00001-04-03.
- (11) Contents of this drawing are Dangerous Waste Permit Affecting.
- (12) The physical design parameters shall be determined by the seller based on TEMA and HEI standards.
- (13) 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.

3

Safety screening / evaluation required?  Yes  No If yes per 24590-WTP-GPP-SREG-002, E&NS signature required below.

Rev	Description	By	Checked	EN&S	Approved	Date
3	Updated to reflect WSGM analysis, 24590-PTF-U0N-W16T-00003, include design process cycles and incorporate DOE AEA note (13).	<i>D. Tate</i> D. Tate	<i>R. Rickenbach</i> R. Rickenbach	<i>S. Woolfolk</i> S. Woolfolk	<i>J. Julyk</i> J. Julyk	2/19/10
2	Incorporated Vendor Design Changes and Equipment Qualification data	R. Rickenbach	C. Knauss	S. Woolfolk	J. Julyk	07/22/2008
1	Incorporated Vendor Design	E. Le	R. Nowak	N/A	J. Julyk	04/04/2005
0	Issued for Procurement	E. Le	S. Shah	N/A	J. Julyk	04/30/2003



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00007 Rev.: 3

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Equipment Identification			
Component Tag Number	24590-PTF-ME-FEP-COND-00003A	Safety Classification	<input checked="" type="checkbox"/> SC <input type="checkbox"/> SS <input type="checkbox"/> APC <input type="checkbox"/> SDC <input type="checkbox"/> SDS <input type="checkbox"/> RRC Note 10 $\triangle 3$
Manufacturer / Supplier	GRAHAM / AREVA FS $\triangle 3$		
Requisition Number	24590-QL-POA-MEVV-00001		
Model	N/A	Seismic Category	<input checked="" type="checkbox"/> SC-I <input type="checkbox"/> SC-II <input type="checkbox"/> SC-III <input type="checkbox"/> SC-IV Note 10 $\triangle 3$
Description (Include descriptive text [e.g., location, elevation])	Waste Feed Evaporator After-Condensator, Room P-0304, elevation 56'-0"		
Safety Function(s)	Prevent post seismic disruption of H2 vessel purge air pathways, spread of contamination into C3 areas from PVP blowback. (ref. 1) $\triangle 3$ Confinement (ref. 1) $\triangle 3$		
Seismic Safety Function	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Room Number(s): P-0304	
Maintenance Accessible	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Method of Maintenance Access: <input type="checkbox"/> Remote <input checked="" type="checkbox"/> Hands On <input type="checkbox"/> None	
Seismic Operability Requirements: $\triangle 3$ <input type="checkbox"/> During Seismic Event $\triangle 3$ <input type="checkbox"/> After Seismic Event			
ITS Equipment Type: <input checked="" type="checkbox"/> Passive Mechanical <input type="checkbox"/> Active Mechanical <input type="checkbox"/> Electrical			

Equipment Environmental Qualification (EEQ)					
Environment	<input type="checkbox"/> Mild <input checked="" type="checkbox"/> Harsh	Hi Rad Service	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Design Life (yrs)	<input checked="" type="checkbox"/> 40 <input checked="" type="checkbox"/> Other $\triangle 3$
Contamination Class:	C3	Design life to include 7,001,950 normal process expansion cycles.			
Radiation Class:	R3				
Parameter Type/Units	Parameter Value	Time Duration (number)	Time Units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Normal</b>					
Normal High Temperature (°F)	95	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal Low Temperature (°F)	59	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal High Relative Humidity (%RH)	100	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Relative Humidity (%RH)	10	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal High Pressure (in.-w.g.)	0	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Pressure (in.-w.g.)	-0.4	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Radiation Dose Rate (mR/hr)	10	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Vibration Magnitude (g)	N/A	N/A	N/A	N/A	Note 1
Vibration Frequency (Hz)	N/A	N/A	N/A	N/A	Note 1
Additional Normal Information:		See Note 2 for pressure units.			



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00007 Rev.: 3

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## Equipment Environmental Qualification (EEQ) (continued)

Parameter Type/Units	Parameter Value	Time Duration (number)	Time units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Abnormal</b>					
Abnormal High Temperature (°F)	△ 117	8	hr/yr	24590-PTF-U0D-W16T-00001, Note 6 △ 3	Note 1
Abnormal Low Temperature (°F)	59	8	hr/yr	24590-WTP-DB-01-001, Notes 6 & 8	Note 1
Abnormal High Relative Humidity (%RH)	100	24	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Relative Humidity (%RH)	2	22	hr/yr	24590-PTF-U0D-W16T-00001, Note 9 △ 3	Note 1
Abnormal High Pressure (in.-w.g.)	4	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Pressure (in.-w.g.)	-7.3	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Radiation Dose Rate (mR/hr)	10, Note 3	△ 0	△ hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Wet Sprinkler System Present	YES	△ 2	△ hr	24590-PTF-U0D-W16T-00001	Note 1
Additional Abnormal Information	See Note 2 for pressure units.				
<b>Design Basis Events (DBE)</b>					
DBE High Temperature (°F)	131	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6 & 9 △ 3	Note 1
DBE Low Temperature (°F)	40	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
DBE High Relative Humidity (%RH)	100	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Relative Humidity (%RH)	8	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE High Pressure (in.-w.g.)	4	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Pressure (in.-w.g.)	-7.3	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Radiation Dose Rate (mR/hr)	10, Note 3	△ 0	△ hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Flood Height (ft)	0.67	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
Submergence (ft)	0, Note 4	1000	hrs	24590-PTF-U0D-W16T-00001 24590-QL-POA-MEVV-00001-01-00825 △ 3	Note 1
Chemical/Spray Exposure	Yes	12.5	hrs	24590-PTF-U0D-W16T-00001	Note 1
Additional DBE Information	See Note 2 for pressure units.				



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00007 Rev.: 3

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DBE Chemical Exposure Details	
DBE Chemical Types/Concentrations	2M Sodium Hydroxide $\triangle 3$ Antifoam Agent 2M Nitric Acid $\triangle 3$

Interfaces (Electrical)	
Power Supply Voltage (VAC, VDC)	N/A
Power Supply Frequency (Hz)	N/A
Power Connection Method	N/A
I/O Signals to/from Equipment	N/A
I/O Connection Method	N/A

Interfaces (Mechanical)	
Mounting Configuration (orientation)	TBD
Mounting Method (bolts, welds, etc.)	Anchor Bolts, FEP-SKID-00001A, 24590-PTF-DB-S13T-00050 $\triangle 3$
Auxiliary Devices	N/A

Equipment Seismic Qualification (ESQ)				
Parameter	Title	Reference/Document Number	Version / Revision	Remarks
WTP Seismic Design Specification (BUYER)	Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks	24590-WTP-3PS-SS90-T0001	002	N/A
Specified Seismic Load (BUYER)	Seismic Analysis of Pretreatment Building - WSGM In-Structure Response Spectre (ISRS) $\triangle 3$	24590-PTF-S0C-S15T-00057 $\triangle 3$	00A $\triangle 3$	Calculation is not included in MR, see attached figures 37, 38 and 121 per CCN 185267. $\triangle 3$
Design Seismic Load (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Method (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Report Number (SELLER)	Note 1	Note 1	Note 1	Note 1
Submittal Number (BUYER)	TBD	TBD	TBD	N/A



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00007 Rev.: 3

Attachment 1, Page 6 of 21

## Notes and Additional Information

### Notes

1. Data to be provided by SELLER through the submittal process as required on the G-321E.
2. Where pressure is given in inches of water column (in-w.c.) in the source document, it is generally assumed that this is in reference to atmospheric pressure and is therefore equivalent to inches of water gage (in-w.g.).
3. Abnormal and DBE radiation dose rates are set equal to normal and do not contribute to the total integrated dose.  $\triangle 3$
4. Submergence depth is the difference between the lowest point on the equipment and the flood depth above the floor. The submergence depth is set to zero if the lowest section of the equipment is above the flood depth.
5. Environmental data from reference 3 is for room environment only.
6. For application of AISC N690, the normal temperatures are not used. Abnormal temperatures shall be applied as Normal Operation Temperature,  $T_O$ , with seismic effects,  $E_S$ . The Design basis event temperature shall be applied as a Thermal Load generated by a postulated accident,  $T_A$ , without seismic effects,  $E_S$  or  $E_O$ .
7. The equipment qualification will be documented in accordance with the requirements in Appendix D of Engineering Specification for Environmental Qualification of Mechanical Equipment, document number 24590-WTP-3PS-G000-T0015 for the passive and active safety functions.
8. Abnormal low temperature, as calculated in reference 3, is based on a Loss of Heating Accident (LOHA) which occurs when steam supply to the building is lost. Since the evaporators are run on steam, this would cause the evaporators to go off-line. Abnormal low temperature will be based on reference 4 at 59°F.
9. Parameter value used on data sheet has been previously established and determined more conservative than values  $\triangle 3$  derived from the reference document noted.
10. For commercial reasons, safety and seismic classification may be higher than elsewhere documented, and therefore  $\triangle 3$  conservative.

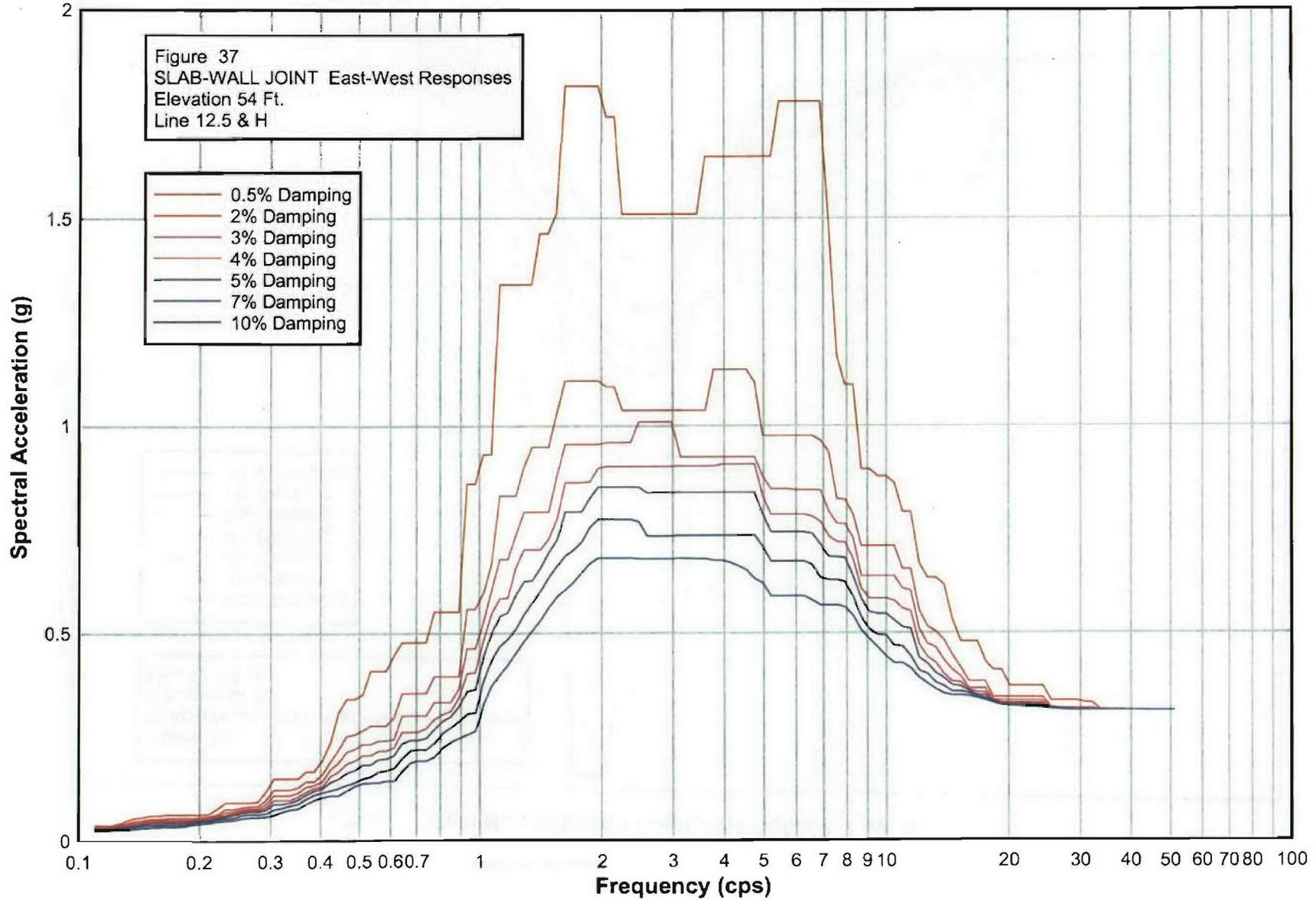
### Reference

1. 24590-WTP-PSAR-ESH-01-002-02, Rev. 04A, Preliminary documented safety analysis to support construction  $\triangle 3$  authorization; PT facility specific information.
2. CCN #096661, FEP and CNP Evaporator Vent Problems with New PVP Isolation Valve.
3. 24590-PTF-U0D-W16T-00001, Rev. 0, PTF Room Environment Datasheet.
4. 24590-WTP-DB-ENG-01-001, Rev. 1M, Basis Of Design  $\triangle 3$
5. 24590-PTF-U0N-W16T-00001, Add data for room P-0427. Incorporate additional steam break analysis.  $\triangle 3$
6. 24590-PTF-U0N-W16T-00003, Revised temperature & relative humidity data for PTF rooms.  $\triangle 3$

3

# RPP-WTP Pretreatment Facility ISRS

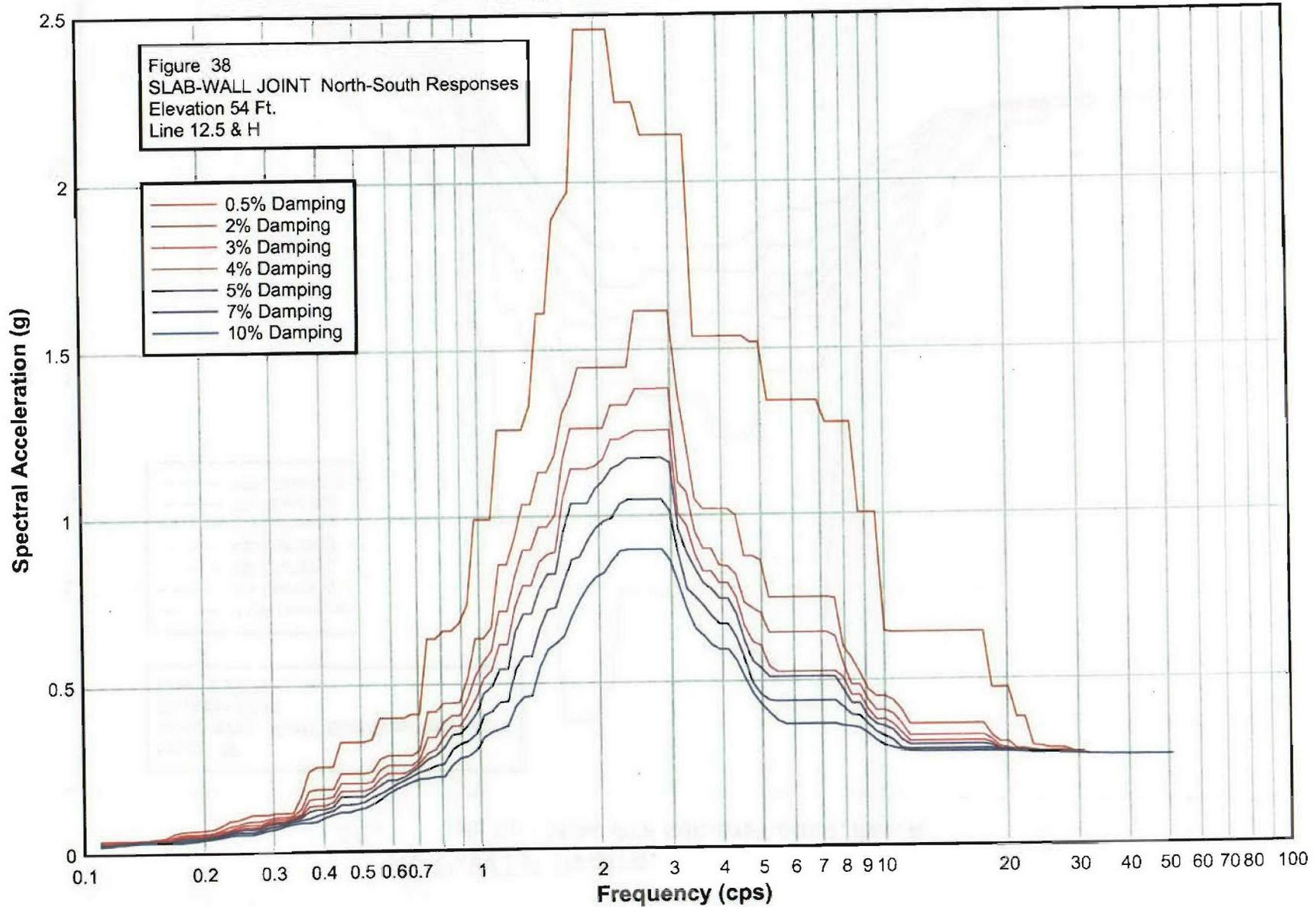
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



3

# RPP-WTP Pretreatment Facility ISRS

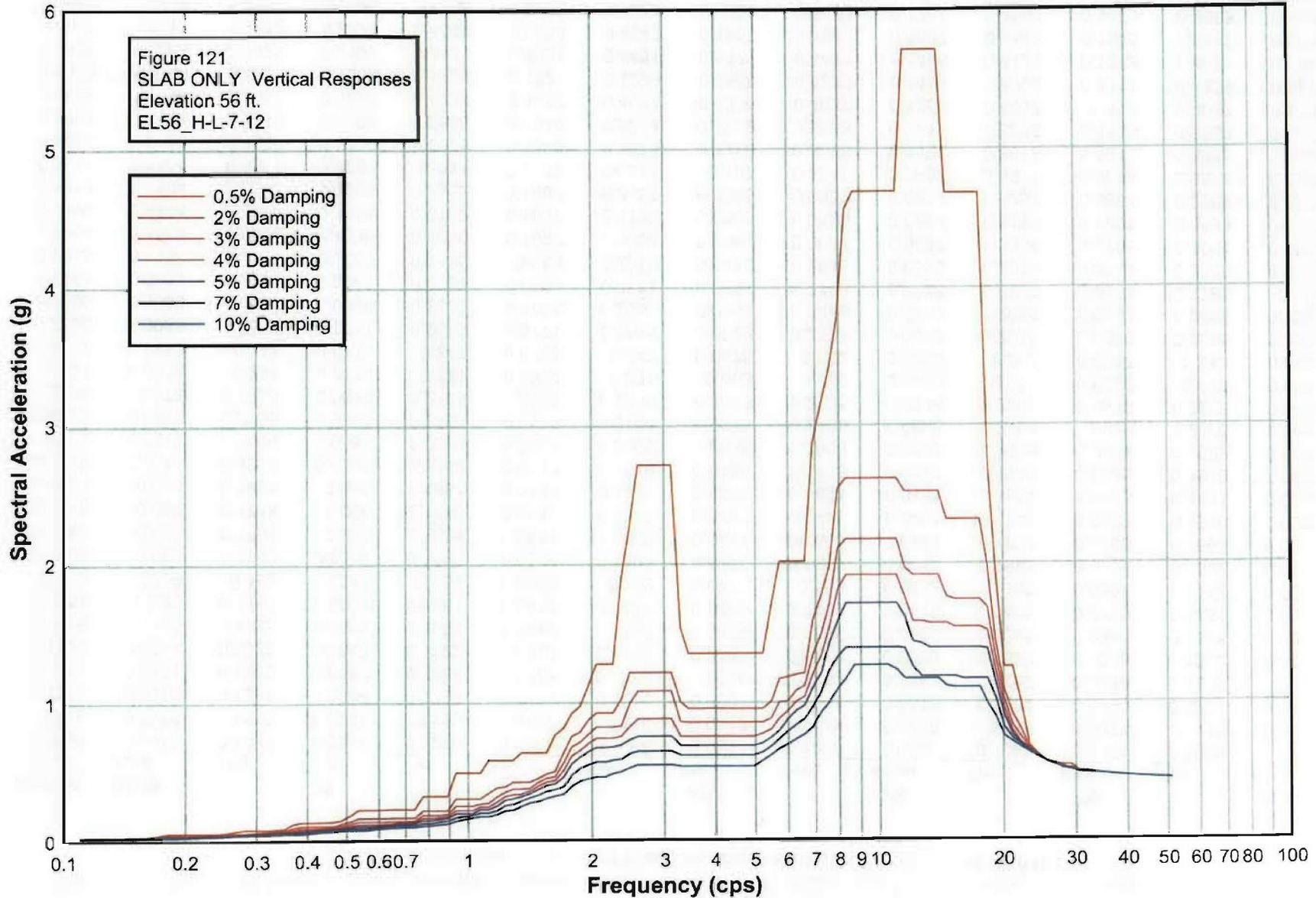
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



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# RPP-WTP Pretreatment Facility ISRS

Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0375	0.1098	0.0344	0.1098	0.0327	0.1098	0.0312	0.1098	0.0298	0.1098	0.0274	0.1098	0.0252
0.115	0.0375	0.115	0.0344	0.115	0.0327	0.115	0.0312	0.115	0.0299	0.115	0.0277	0.115	0.0258
0.1204	0.0375	0.1204	0.0344	0.1204	0.0331	0.1204	0.0322	0.1204	0.0312	0.1204	0.0294	0.1204	0.0269
0.1262	0.0431	0.1262	0.0397	0.1262	0.0378	0.1262	0.036	0.1262	0.0343	0.1262	0.0314	0.1262	0.0278
0.1322	0.0504	0.1322	0.045	0.1322	0.042	0.1322	0.0393	0.1322	0.0369	0.1322	0.0328	0.1322	0.0281
0.1385	0.056	0.1385	0.0489	0.1385	0.0449	0.1385	0.0414	0.1385	0.0384	0.1385	0.0344	0.1385	0.0303
0.1451	0.058	0.1451	0.0509	0.1451	0.0475	0.1451	0.0445	0.1451	0.0419	0.1451	0.0375	0.1451	0.0325
0.152	0.0616	0.152	0.0546	0.152	0.0506	0.152	0.0472	0.152	0.0442	0.152	0.0391	0.152	0.0338
0.1592	0.062	0.1592	0.0546	0.1592	0.0506	0.1592	0.0472	0.1592	0.0442	0.1592	0.0396	0.1592	0.0351
0.1668	0.064	0.1668	0.056	0.1668	0.0517	0.1668	0.0481	0.1668	0.0451	0.1668	0.0403	0.1668	0.0356
0.1748	0.064	0.1748	0.056	0.1748	0.0517	0.1748	0.0481	0.1748	0.0451	0.1748	0.0403	0.1748	0.0356
0.1831	0.064	0.1831	0.056	0.1831	0.0517	0.1831	0.0481	0.1831	0.0451	0.1831	0.0403	0.1831	0.0368
0.1918	0.0641	0.1918	0.0561	0.1918	0.0517	0.1918	0.0495	0.1918	0.0477	0.1918	0.0445	0.1918	0.0404
0.2009	0.0642	0.2009	0.0583	0.2009	0.0558	0.2009	0.0535	0.2009	0.0513	0.2009	0.0474	0.2009	0.0424
0.2105	0.0665	0.2105	0.0603	0.2105	0.0575	0.2105	0.0549	0.2105	0.0525	0.2105	0.049	0.2105	0.0448
0.2205	0.078	0.2205	0.0647	0.2205	0.062	0.2205	0.0595	0.2205	0.0573	0.2205	0.0533	0.2205	0.0484
0.231	0.0933	0.231	0.0774	0.231	0.0694	0.231	0.063	0.231	0.0598	0.231	0.0556	0.231	0.0503
0.242	0.0933	0.242	0.0774	0.242	0.0723	0.242	0.0678	0.242	0.0638	0.242	0.0567	0.242	0.0513
0.2535	0.0933	0.2535	0.0817	0.2535	0.0771	0.2535	0.0729	0.2535	0.0692	0.2535	0.0628	0.2535	0.0553
0.2656	0.0933	0.2656	0.0839	0.2656	0.0794	0.2656	0.0754	0.2656	0.0718	0.2656	0.0653	0.2656	0.0575
0.2783	0.0954	0.2783	0.0847	0.2783	0.0794	0.2783	0.0754	0.2783	0.0718	0.2783	0.0653	0.2783	0.058
0.2915	0.1187	0.2915	0.0987	0.2915	0.089	0.2915	0.0813	0.2915	0.0753	0.2915	0.0668	0.2915	0.0592
0.3054	0.1504	0.3054	0.1235	0.3054	0.1097	0.3054	0.0985	0.3054	0.0894	0.3054	0.0758	0.3054	0.0633
0.3199	0.1504	0.3199	0.1235	0.3199	0.1097	0.3199	0.0985	0.3199	0.0894	0.3199	0.0801	0.3199	0.0706
0.3352	0.1504	0.3352	0.1235	0.3352	0.1097	0.3352	0.0985	0.3352	0.0931	0.3352	0.0857	0.3352	0.0762
0.3511	0.1504	0.3511	0.1289	0.3511	0.1172	0.3511	0.107	0.3511	0.0997	0.3511	0.0894	0.3511	0.0786
0.3678	0.168	0.3678	0.1438	0.3678	0.1303	0.3678	0.1186	0.3678	0.1121	0.3678	0.1017	0.3678	0.0898
0.3853	0.168	0.3853	0.1438	0.3853	0.1346	0.3853	0.1279	0.3853	0.1219	0.3853	0.1115	0.3853	0.0992
0.4037	0.194	0.4037	0.1598	0.4037	0.1426	0.4037	0.1306	0.4037	0.1259	0.4037	0.117	0.4037	0.1054
0.4229	0.2368	0.4229	0.1906	0.4229	0.1721	0.4229	0.1558	0.4229	0.1416	0.4229	0.1217	0.4229	0.1092
0.4431	0.3088	0.4431	0.2193	0.4431	0.1881	0.4431	0.1671	0.4431	0.1496	0.4431	0.1273	0.4431	0.1097
0.4642	0.3417	0.4642	0.2524	0.4642	0.2138	0.4642	0.1852	0.4642	0.1637	0.4642	0.1345	0.4642	0.1211
0.4863	0.3417	0.4863	0.256	0.4863	0.2208	0.4863	0.1928	0.4863	0.1701	0.4863	0.1409	0.4863	0.1323
0.5094	0.3522	0.5094	0.2656	0.5094	0.2325	0.5094	0.2054	0.5094	0.1831	0.5094	0.1497	0.5094	0.1391



PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
2.7186	1.5091	2.7186	1.0367	2.7186	1.009	2.7186	0.9017	2.7186	0.8387	2.7186	0.7357	2.7186	0.6811	
2.848	1.5091	2.848	1.0367	2.848	1.009	2.848	0.9017	2.848	0.8387	2.848	0.7357	2.848	0.6811	
2.9836	1.5091	2.9836	1.0367	2.9836	1.009	2.9836	0.9017	2.9836	0.8387	2.9836	0.7357	2.9836	0.6811	
3.1257	1.5091	3.1257	1.0367	3.1257	0.9237	3.1257	0.9017	3.1257	0.8387	3.1257	0.7357	3.1257	0.6811	
3.2745	1.5091	3.2745	1.0367	3.2745	0.9237	3.2745	0.9017	3.2745	0.8387	3.2745	0.7357	3.2745	0.6811	
3.4305	1.5091	3.4305	1.0367	3.4305	0.9237	3.4305	0.9017	3.4305	0.8387	3.4305	0.7357	3.4305	0.6801	
3.5938	1.6472	3.5938	1.0367	3.5938	0.9237	3.5938	0.9017	3.5938	0.8387	3.5938	0.7357	3.5938	0.6801	
3.7649	1.6472	3.7649	1.1356	3.7649	0.9237	3.7649	0.9017	3.7649	0.8387	3.7649	0.7357	3.7649	0.6766	
3.9442	1.6472	3.9442	1.1356	3.9442	0.9237	3.9442	0.906	3.9442	0.8387	3.9442	0.7357	3.9442	0.6759	
4.132	1.6472	4.132	1.1356	4.132	0.9237	4.132	0.906	4.132	0.8387	4.132	0.7357	4.132	0.6712	
4.3288	1.6472	4.3288	1.1356	4.3288	0.9237	4.3288	0.906	4.3288	0.8387	4.3288	0.7357	4.3288	0.6626	
4.5349	1.6472	4.5349	1.1356	4.5349	0.9237	4.5349	0.906	4.5349	0.8387	4.5349	0.7357	4.5349	0.6525	
4.7508	1.6472	4.7508	1.1048	4.7508	0.9237	4.7508	0.906	4.7508	0.8387	4.7508	0.7357	4.7508	0.6316	
4.977	1.6472	4.977	0.9746	4.977	0.8757	4.977	0.829	4.977	0.7851	4.977	0.7083	4.977	0.6206	
5.214	1.6472	5.214	0.9746	5.214	0.8463	5.214	0.785	5.214	0.7434	5.214	0.6732	5.214	0.5898	
5.4623	1.7798	5.4623	0.9746	5.4623	0.8463	5.4623	0.785	5.4623	0.7434	5.4623	0.6732	5.4623	0.5898	
5.7224	1.7798	5.7224	0.9746	5.7224	0.8463	5.7224	0.785	5.7224	0.7434	5.7224	0.6732	5.7224	0.5898	
5.9948	1.7798	5.9948	0.9746	5.9948	0.8438	5.9948	0.785	5.9948	0.7434	5.9948	0.6732	5.9948	0.5898	
6.2803	1.7798	6.2803	0.9746	6.2803	0.8438	6.2803	0.785	6.2803	0.7434	6.2803	0.6732	6.2803	0.5898	
6.5793	1.7798	6.5793	0.9746	6.5793	0.8438	6.5793	0.7804	6.5793	0.7393	6.5793	0.6657	6.5793	0.5795	
6.8926	1.7798	6.8926	0.963	6.8926	0.8429	6.8926	0.7674	6.8926	0.7128	6.8926	0.6345	6.8926	0.5677	
7.2208	1.4914	7.2208	0.935	7.2208	0.7922	7.2208	0.7331	7.2208	0.6844	7.2208	0.6283	7.2208	0.5677	
7.5646	1.168	7.5646	0.822	7.5646	0.7632	7.5646	0.7188	7.5646	0.6833	7.5646	0.6283	7.5646	0.5677	
7.9248	1.0987	7.9248	0.8201	7.9248	0.7623	7.9248	0.7176	7.9248	0.6811	7.9248	0.6237	7.9248	0.5627	
8.3022	1.0987	8.3022	0.7845	8.3022	0.7283	8.3022	0.6777	8.3022	0.6364	8.3022	0.5884	8.3022	0.5417	
8.6975	0.8935	8.6975	0.7092	8.6975	0.6368	8.6975	0.6061	8.6975	0.5819	8.6975	0.5373	8.6975	0.5059	
9.1116	0.8935	9.1116	0.7092	9.1116	0.6368	9.1116	0.5827	9.1116	0.5505	9.1116	0.5085	9.1116	0.4846	
9.5455	0.8763	9.5455	0.7092	9.5455	0.6368	9.5455	0.5827	9.5455	0.5459	9.5455	0.4951	9.5455	0.4643	
10	0.8763	10	0.7092	10	0.6368	10	0.5827	10	0.5459	10	0.4934	10	0.4429	
10.4762	0.8603	10.4762	0.7092	10.4762	0.6368	10.4762	0.5774	10.4762	0.5297	10.4762	0.4688	10.4762	0.4271	
10.975	0.791	10.975	0.6543	10.975	0.6067	10.975	0.5582	10.975	0.5137	10.975	0.4674	10.975	0.4271	
11.4976	0.791	11.4976	0.6543	11.4976	0.6014	11.4976	0.5519	11.4976	0.5094	11.4976	0.4435	11.4976	0.4142	
12.045	0.6677	12.045	0.5543	12.045	0.5086	12.045	0.4716	12.045	0.4394	12.045	0.4081	12.045	0.3915	
12.6186	0.6325	12.6186	0.5145	12.6186	0.4727	12.6186	0.4409	12.6186	0.4251	12.6186	0.4004	12.6186	0.3774	
13.2194	0.6325	13.2194	0.5025	13.2194	0.4639	13.2194	0.4269	13.2194	0.4021	13.2194	0.379	13.2194	0.3634	

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.6152	13.8489	0.4815	13.8489	0.433	13.8489	0.3995	13.8489	0.3896	13.8489	0.3705	13.8489	0.3527
14.5083	0.5318	14.5083	0.4455	14.5083	0.4096	14.5083	0.381	14.5083	0.3726	14.5083	0.3575	14.5083	0.3484
15.1991	0.4787	15.1991	0.4141	15.1991	0.3936	15.1991	0.3795	15.1991	0.3697	15.1991	0.3575	15.1991	0.3484
15.9228	0.4787	15.9228	0.3815	15.9228	0.3644	15.9228	0.3609	15.9228	0.358	15.9228	0.3528	15.9228	0.3467
16.681	0.4787	16.681	0.3815	16.681	0.3644	16.681	0.3544	16.681	0.3483	16.681	0.3439	16.681	0.3416
17.4753	0.4307	17.4753	0.3815	17.4753	0.3644	17.4753	0.3544	17.4753	0.3483	17.4753	0.3418	17.4753	0.337
18.3074	0.4095	18.3074	0.3431	18.3074	0.3367	18.3074	0.3354	18.3074	0.3336	18.3074	0.3315	18.3074	0.3305
19.1791	0.4095	19.1791	0.3431	19.1791	0.3349	19.1791	0.3293	19.1791	0.3262	19.1791	0.3251	19.1791	0.325
20.0923	0.3708	20.0923	0.3431	20.0923	0.3349	20.0923	0.3293	20.0923	0.3262	20.0923	0.3243	20.0923	0.323
21.049	0.3708	21.049	0.3431	21.049	0.3349	21.049	0.3293	21.049	0.3262	21.049	0.3236	21.049	0.3215
22.0513	0.3708	22.0513	0.3431	22.0513	0.3349	22.0513	0.3293	22.0513	0.3262	22.0513	0.323	22.0513	0.3199
23.1013	0.3708	23.1013	0.3431	23.1013	0.3349	23.1013	0.3293	23.1013	0.3262	23.1013	0.323	23.1013	0.3199
24.2013	0.3708	24.2013	0.3431	24.2013	0.3349	24.2013	0.3293	24.2013	0.3255	24.2013	0.3206	24.2013	0.3186
25.3536	0.3358	25.3536	0.3197	25.3536	0.3192	25.3536	0.3187	25.3536	0.3181	25.3536	0.317	25.3536	0.3164
26.5609	0.3358	26.5609	0.3169	26.5609	0.3159	26.5609	0.3158	26.5609	0.3158	26.5609	0.3155	26.5609	0.3148
27.8256	0.3358	27.8256	0.3169	27.8256	0.3159	27.8256	0.3153	27.8256	0.3149	27.8256	0.3143	27.8256	0.3137
29.1505	0.3358	29.1505	0.3165	29.1505	0.3153	29.1505	0.3142	29.1505	0.3137	29.1505	0.3132	29.1505	0.313
30.5386	0.3312	30.5386	0.3165	30.5386	0.3153	30.5386	0.3142	30.5386	0.3133	30.5386	0.3131	30.5386	0.313
31.9927	0.3297	31.9927	0.3163	31.9927	0.3146	31.9927	0.3138	31.9927	0.3132	31.9927	0.3131	31.9927	0.313
33.516	0.3144	33.516	0.3134	33.516	0.3133	33.516	0.3132	33.516	0.3132	33.516	0.3131	33.516	0.313
35.1119	0.3135	35.1119	0.3134	35.1119	0.3133	35.1119	0.3132	35.1119	0.3132	35.1119	0.3131	35.1119	0.313
36.7838	0.3134	36.7838	0.3133	36.7838	0.3132	36.7838	0.3132	36.7838	0.3132	36.7838	0.3131	36.7838	0.313
38.5353	0.3132	38.5353	0.3132	38.5353	0.3131	38.5353	0.3131	38.5353	0.3131	38.5353	0.3131	38.5353	0.313
40.3702	0.3131	40.3702	0.3131	40.3702	0.3131	40.3702	0.313	40.3702	0.313	40.3702	0.313	40.3702	0.3129
42.2924	0.313	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129
44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128
46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127
48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126
50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	
0.1098	0.0405	0.1098	0.0365	0.1098	0.0342	0.1098	0.0322	0.1098	0.0303	0.1098	0.0272	0.1098	0.0235	
0.115	0.0405	0.115	0.0365	0.115	0.0342	0.115	0.0322	0.115	0.0303	0.115	0.0272	0.115	0.0259	
0.1204	0.0405	0.1204	0.0365	0.1204	0.0342	0.1204	0.0322	0.1204	0.031	0.1204	0.0297	0.1204	0.028	
0.1262	0.0405	0.1262	0.0365	0.1262	0.0352	0.1262	0.0342	0.1262	0.0334	0.1262	0.0318	0.1262	0.0297	
0.1322	0.0405	0.1322	0.0382	0.1322	0.037	0.1322	0.0359	0.1322	0.0349	0.1322	0.0333	0.1322	0.0316	
0.1385	0.0411	0.1385	0.0392	0.1385	0.0382	0.1385	0.0372	0.1385	0.0363	0.1385	0.0348	0.1385	0.0328	
0.1451	0.0417	0.1451	0.0398	0.1451	0.0387	0.1451	0.0377	0.1451	0.0368	0.1451	0.0352	0.1451	0.0332	
0.152	0.0439	0.152	0.0401	0.152	0.0387	0.152	0.0377	0.152	0.0368	0.152	0.0352	0.152	0.0332	
0.1592	0.0462	0.1592	0.0416	0.1592	0.0396	0.1592	0.0377	0.1592	0.0368	0.1592	0.0352	0.1592	0.0332	
0.1668	0.0584	0.1668	0.0506	0.1668	0.0463	0.1668	0.0426	0.1668	0.0395	0.1668	0.0352	0.1668	0.0332	
0.1748	0.0645	0.1748	0.0566	0.1748	0.0522	0.1748	0.0484	0.1748	0.045	0.1748	0.0394	0.1748	0.0332	
0.1831	0.0668	0.1831	0.0583	0.1831	0.0541	0.1831	0.0504	0.1831	0.0471	0.1831	0.0415	0.1831	0.0354	
0.1918	0.0678	0.1918	0.0586	0.1918	0.0543	0.1918	0.0507	0.1918	0.0474	0.1918	0.0418	0.1918	0.038	
0.2009	0.0697	0.2009	0.0596	0.2009	0.0543	0.2009	0.0514	0.2009	0.0487	0.2009	0.0438	0.2009	0.0411	
0.2105	0.0722	0.2105	0.062	0.2105	0.0582	0.2105	0.0547	0.2105	0.0516	0.2105	0.0482	0.2105	0.0446	
0.2205	0.0819	0.2205	0.0709	0.2205	0.0651	0.2205	0.06	0.2205	0.0574	0.2205	0.0531	0.2205	0.0475	
0.231	0.0959	0.231	0.0792	0.231	0.0703	0.231	0.0665	0.231	0.063	0.231	0.0578	0.231	0.0525	
0.242	0.0984	0.242	0.0845	0.242	0.0774	0.242	0.0721	0.242	0.0681	0.242	0.0618	0.242	0.0551	
0.2535	0.1059	0.2535	0.0913	0.2535	0.0833	0.2535	0.0763	0.2535	0.0702	0.2535	0.0618	0.2535	0.0551	
0.2656	0.1138	0.2656	0.0944	0.2656	0.084	0.2656	0.0763	0.2656	0.0702	0.2656	0.0618	0.2656	0.0551	
0.2783	0.1138	0.2783	0.0944	0.2783	0.084	0.2783	0.0779	0.2783	0.074	0.2783	0.0677	0.2783	0.0611	
0.2915	0.1138	0.2915	0.1008	0.2915	0.0946	0.2915	0.0892	0.2915	0.0843	0.2915	0.0764	0.2915	0.0677	
0.3054	0.1179	0.3054	0.1056	0.3054	0.0987	0.3054	0.0926	0.3054	0.0872	0.3054	0.0785	0.3054	0.0706	
0.3199	0.1179	0.3199	0.1056	0.3199	0.0987	0.3199	0.0926	0.3199	0.0894	0.3199	0.0844	0.3199	0.0786	
0.3352	0.1179	0.3352	0.1098	0.3352	0.1056	0.3352	0.1017	0.3352	0.0982	0.3352	0.0921	0.3352	0.0848	
0.3511	0.1654	0.3511	0.129	0.3511	0.1133	0.3511	0.1075	0.3511	0.1035	0.3511	0.0964	0.3511	0.088	
0.3678	0.2415	0.3678	0.1832	0.3678	0.1565	0.3678	0.1364	0.3678	0.1213	0.3678	0.1006	0.3678	0.088	
0.3853	0.2549	0.3853	0.187	0.3853	0.1595	0.3853	0.1387	0.3853	0.1269	0.3853	0.1092	0.3853	0.091	
0.4037	0.2549	0.4037	0.187	0.4037	0.1595	0.4037	0.1387	0.4037	0.1279	0.4037	0.1163	0.4037	0.1034	
0.4229	0.2549	0.4229	0.187	0.4229	0.1651	0.4229	0.1485	0.4229	0.1344	0.4229	0.1233	0.4229	0.1111	
0.4431	0.3288	0.4431	0.2339	0.4431	0.2038	0.4431	0.1813	0.4431	0.1641	0.4431	0.1399	0.4431	0.1181	
0.4642	0.3288	0.4642	0.2339	0.4642	0.2038	0.4642	0.1813	0.4642	0.1641	0.4642	0.1399	0.4642	0.1181	
0.4863	0.3288	0.4863	0.2339	0.4863	0.2038	0.4863	0.1813	0.4863	0.1641	0.4863	0.1421	0.4863	0.1246	
0.5094	0.3288	0.5094	0.2339	0.5094	0.2038	0.5094	0.1813	0.5094	0.1641	0.5094	0.1472	0.5094	0.1295	

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.3356	0.5337	0.2387	0.5337	0.2081	0.5337	0.19	0.5337	0.1796	0.5337	0.1614	0.5337	0.1401
0.5591	0.3997	0.5591	0.2762	0.5591	0.244	0.5591	0.2179	0.5591	0.1971	0.5591	0.1724	0.5591	0.1556
0.5857	0.3997	0.5857	0.2863	0.5857	0.2573	0.5857	0.2332	0.5857	0.2128	0.5857	0.1853	0.5857	0.1724
0.6136	0.3997	0.6136	0.2863	0.6136	0.2573	0.6136	0.2332	0.6136	0.2128	0.6136	0.1998	0.6136	0.1858
0.6428	0.3997	0.6428	0.2863	0.6428	0.2573	0.6428	0.2332	0.6428	0.2219	0.6428	0.2115	0.6428	0.1969
0.6734	0.411	0.6734	0.2863	0.6734	0.2574	0.6734	0.2449	0.6734	0.2378	0.6734	0.2244	0.6734	0.2072
0.7055	0.411	0.7055	0.301	0.7055	0.2757	0.7055	0.2638	0.7055	0.2534	0.7055	0.2357	0.7055	0.2156
0.7391	0.6367	0.7391	0.4169	0.7391	0.3404	0.7391	0.2927	0.7391	0.2746	0.7391	0.2445	0.7391	0.217
0.7743	0.6367	0.7743	0.4169	0.7743	0.3404	0.7743	0.3038	0.7743	0.2858	0.7743	0.2555	0.7743	0.2218
0.8111	0.6596	0.8111	0.4428	0.8111	0.386	0.8111	0.3422	0.8111	0.3081	0.8111	0.2598	0.8111	0.2218
0.8497	0.6596	0.8497	0.4428	0.8497	0.4051	0.8497	0.3738	0.8497	0.347	0.8497	0.3034	0.8497	0.256
0.8902	0.6828	0.8902	0.4451	0.8902	0.4051	0.8902	0.3738	0.8902	0.3511	0.8902	0.3194	0.8902	0.2761
0.9326	0.737	0.9326	0.5191	0.9326	0.4567	0.9326	0.411	0.9326	0.3766	0.9326	0.328	0.9326	0.2821
0.977	0.9914	0.977	0.6358	0.977	0.525	0.977	0.4553	0.977	0.408	0.977	0.3484	0.977	0.2994
1.0235	0.9914	1.0235	0.6358	1.0235	0.5662	1.0235	0.5139	1.0235	0.4702	1.0235	0.4041	1.0235	0.3384
1.0723	0.9914	1.0723	0.6668	1.0723	0.5976	1.0723	0.5399	1.0723	0.4914	1.0723	0.4166	1.0723	0.3541
1.1233	1.2606	1.1233	0.8561	1.1233	0.7168	1.1233	0.6174	1.1233	0.5433	1.1233	0.4431	1.1233	0.3633
1.1768	1.2606	1.1768	0.8561	1.1768	0.7168	1.1768	0.6174	1.1768	0.5433	1.1768	0.4467	1.1768	0.3729
1.2328	1.2606	1.2328	0.935	1.2328	0.8202	1.2328	0.7293	1.2328	0.6556	1.2328	0.5433	1.2328	0.4321
1.2916	1.2606	1.2916	1.0351	1.2916	0.8991	1.2916	0.793	1.2916	0.708	1.2916	0.5814	1.2916	0.4586
1.353	1.3319	1.353	1.0351	1.353	0.8991	1.353	0.793	1.353	0.708	1.353	0.5814	1.353	0.4631
1.4175	1.6092	1.4175	1.1325	1.4175	0.9683	1.4175	0.8621	1.4175	0.7817	1.4175	0.6627	1.4175	0.5486
1.485	1.6092	1.485	1.1325	1.485	0.9683	1.485	0.885	1.485	0.8264	1.485	0.7199	1.485	0.6006
1.5557	1.8872	1.5557	1.1818	1.5557	1.0008	1.5557	0.892	1.5557	0.8264	1.5557	0.7265	1.5557	0.6185
1.6298	1.9322	1.6298	1.3084	1.6298	1.1683	1.6298	1.0534	1.6298	0.9565	1.6298	0.8016	1.6298	0.6401
1.7074	1.9702	1.7074	1.3601	1.7074	1.2627	1.7074	1.1415	1.7074	1.0371	1.7074	0.8692	1.7074	0.7006
1.7887	2.4552	1.7887	1.4456	1.7887	1.2629	1.7887	1.1415	1.7887	1.0371	1.7887	0.8773	1.7887	0.7486
1.8738	2.4552	1.8738	1.4456	1.8738	1.2629	1.8738	1.1415	1.8738	1.0371	1.8738	0.9259	1.8738	0.788
1.963	2.4552	1.963	1.4456	1.963	1.2629	1.963	1.1498	1.963	1.0818	1.963	0.9626	1.963	0.8157
2.0565	2.4552	2.0565	1.4456	2.0565	1.2629	2.0565	1.1701	2.0565	1.1049	2.0565	0.9829	2.0565	0.8288
2.1544	2.4552	2.1544	1.4456	2.1544	1.3316	2.1544	1.2297	2.1544	1.1411	2.1544	0.9932	2.1544	0.8645
2.257	2.2367	2.257	1.4456	2.257	1.3316	2.257	1.2297	2.257	1.1534	2.257	1.0344	2.257	0.8939
2.3645	2.2367	2.3645	1.4456	2.3645	1.3316	2.3645	1.2422	2.3645	1.1724	2.3645	1.0471	2.3645	0.898
2.4771	2.2367	2.4771	1.6143	2.4771	1.3804	2.4771	1.2551	2.4771	1.1724	2.4771	1.0471	2.4771	0.898
2.595	2.138	2.595	1.6143	2.595	1.3804	2.595	1.2551	2.595	1.1724	2.595	1.0471	2.595	0.898

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%	2%	3%	4%	5%	7%	10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
2.7186	2.138	2.7186	1.6143	2.7186	1.3804	2.7186	1.2551
2.848	2.138	2.848	1.6143	2.848	1.3804	2.848	1.2551
2.9836	2.138	2.9836	1.6143	2.9836	1.3804	2.9836	1.2551
3.1257	2.138	3.1257	1.3773	3.1257	1.0982	3.1257	1.0035
3.2745	2.138	3.2745	1.2119	3.2745	1.0686	3.2745	0.9673
3.4305	1.5368	3.4305	1.0471	3.4305	0.9495	3.4305	0.8824
3.5938	1.5368	3.5938	1.0165	3.5938	0.898	3.5938	0.8299
3.7649	1.5368	3.7649	1.0165	3.7649	0.898	3.7649	0.8299
3.9442	1.5368	3.9442	1.0165	3.9442	0.8472	3.9442	0.7941
4.132	1.5368	4.132	1.0165	4.132	0.845	4.132	0.7941
4.3288	1.5368	4.3288	0.9973	4.3288	0.8194	4.3288	0.7522
4.5349	1.5368	4.5349	0.8745	4.5349	0.7347	4.5349	0.6652
4.7508	1.518	4.7508	0.8745	4.7508	0.7183	4.7508	0.6169
4.977	1.518	4.977	0.8614	4.977	0.7025	4.977	0.6052
5.214	1.3404	5.214	0.7497	5.214	0.6443	5.214	0.5421
5.4623	1.3404	5.4623	0.7497	5.4623	0.6443	5.4623	0.5254
5.7224	1.3404	5.7224	0.7497	5.7224	0.6443	5.7224	0.5254
5.9948	1.3404	5.9948	0.7497	5.9948	0.6443	5.9948	0.5109
6.2803	1.3404	6.2803	0.7497	6.2803	0.6443	6.2803	0.5109
6.5793	1.3404	6.5793	0.7497	6.5793	0.6443	6.5793	0.5109
6.8926	1.3404	6.8926	0.7497	6.8926	0.6443	6.8926	0.5109
7.2208	1.274	7.2208	0.7497	7.2208	0.6443	7.2208	0.5109
7.5646	1.274	7.5646	0.7455	7.5646	0.6309	7.5646	0.5092
7.9248	1.274	7.9248	0.6003	7.9248	0.5494	7.9248	0.471
8.3022	1.274	8.3022	0.5659	8.3022	0.4849	8.3022	0.454
8.6975	1.0027	8.6975	0.521	8.6975	0.4849	8.6975	0.454
9.1116	1.0027	9.1116	0.4701	9.1116	0.4386	9.1116	0.4105
9.5455	1.0027	9.5455	0.4494	9.5455	0.4069	9.5455	0.3794
10	0.6463	10	0.4494	10	0.4069	10	0.3794
10.4762	0.6411	10.4762	0.4371	10.4762	0.3959	10.4762	0.3648
10.975	0.6411	10.975	0.4085	10.975	0.3668	10.975	0.3387
11.4976	0.6411	11.4976	0.3647	11.4976	0.3304	11.4976	0.3133
12.045	0.6411	12.045	0.3647	12.045	0.3304	12.045	0.3133
12.6186	0.6411	12.6186	0.3647	12.6186	0.3304	12.6186	0.3133
13.2194	0.6411	13.2194	0.3647	13.2194	0.3304	13.2194	0.3133

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.6411	13.8489	0.3647	13.8489	0.3304	13.8489	0.3133	13.8489	0.3024	13.8489	0.2893	13.8489	0.2831
14.5083	0.6411	14.5083	0.3647	14.5083	0.3304	14.5083	0.3133	14.5083	0.3024	14.5083	0.2893	14.5083	0.2831
15.1991	0.6411	15.1991	0.3647	15.1991	0.3304	15.1991	0.3133	15.1991	0.3024	15.1991	0.2893	15.1991	0.2831
15.9228	0.6411	15.9228	0.3647	15.9228	0.3304	15.9228	0.3133	15.9228	0.3024	15.9228	0.2893	15.9228	0.2831
16.681	0.6411	16.681	0.3647	16.681	0.3304	16.681	0.3133	16.681	0.3024	16.681	0.2893	16.681	0.2831
17.4753	0.6411	17.4753	0.3647	17.4753	0.3304	17.4753	0.3133	17.4753	0.3024	17.4753	0.2893	17.4753	0.2831
18.3074	0.4714	18.3074	0.3284	18.3074	0.3152	18.3074	0.3052	18.3074	0.298	18.3074	0.2893	18.3074	0.2831
19.1791	0.4714	19.1791	0.3088	19.1791	0.2936	19.1791	0.2872	19.1791	0.2851	19.1791	0.2842	19.1791	0.2825
20.0923	0.4714	20.0923	0.3088	20.0923	0.2886	20.0923	0.2865	20.0923	0.2851	20.0923	0.2833	20.0923	0.2814
21.049	0.3824	21.049	0.2877	21.049	0.2842	21.049	0.2843	21.049	0.2836	21.049	0.2819	21.049	0.2801
22.0513	0.3824	22.0513	0.2873	22.0513	0.2834	22.0513	0.2816	22.0513	0.2806	22.0513	0.2795	22.0513	0.2783
23.1013	0.2973	23.1013	0.2832	23.1013	0.2814	23.1013	0.2802	23.1013	0.2793	23.1013	0.2779	23.1013	0.2765
24.2013	0.2947	24.2013	0.2805	24.2013	0.2788	24.2013	0.2776	24.2013	0.2768	24.2013	0.2763	24.2013	0.2756
25.3536	0.288	25.3536	0.2805	25.3536	0.2788	25.3536	0.2776	25.3536	0.2768	25.3536	0.2757	25.3536	0.2749
26.5609	0.288	26.5609	0.2805	26.5609	0.2788	26.5609	0.2776	26.5609	0.2768	26.5609	0.2757	26.5609	0.2747
27.8256	0.2867	27.8256	0.28	27.8256	0.2782	27.8256	0.2771	27.8256	0.2762	27.8256	0.2751	27.8256	0.2741
29.1505	0.2773	29.1505	0.2753	29.1505	0.2749	29.1505	0.2745	29.1505	0.2742	29.1505	0.2738	29.1505	0.2732
30.5386	0.2773	30.5386	0.2727	30.5386	0.2726	30.5386	0.2725	30.5386	0.2724	30.5386	0.2723	30.5386	0.2721
31.9927	0.2707	31.9927	0.271	31.9927	0.271	31.9927	0.2711	31.9927	0.2711	31.9927	0.2712	31.9927	0.2712
33.516	0.2707	33.516	0.2707	33.516	0.2706	33.516	0.2706	33.516	0.2706	33.516	0.2706	33.516	0.2706
35.1119	0.27	35.1119	0.27	35.1119	0.27	35.1119	0.2701	35.1119	0.2701	35.1119	0.2701	35.1119	0.2701
36.7838	0.2695	36.7838	0.2696	36.7838	0.2696	36.7838	0.2696	36.7838	0.2697	36.7838	0.2697	36.7838	0.2697
38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693
40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269
42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2688
44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685
46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683
48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681
50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	
0.1098	0.0291	0.1098	0.0261	0.1098	0.0245	0.1098	0.023	0.1098	0.0222	0.1098	0.0215	0.1098	0.0207	
0.115	0.0309	0.115	0.0261	0.115	0.0245	0.115	0.0235	0.115	0.0231	0.115	0.0224	0.115	0.0216	
0.1204	0.0313	0.1204	0.0263	0.1204	0.0247	0.1204	0.0242	0.1204	0.0238	0.1204	0.0231	0.1204	0.0222	
0.1262	0.0313	0.1262	0.027	0.1262	0.0258	0.1262	0.0247	0.1262	0.0243	0.1262	0.0235	0.1262	0.0225	
0.1322	0.0313	0.1322	0.0271	0.1322	0.0258	0.1322	0.0248	0.1322	0.0244	0.1322	0.0236	0.1322	0.0226	
0.1385	0.0313	0.1385	0.0277	0.1385	0.0266	0.1385	0.0255	0.1385	0.0246	0.1385	0.0236	0.1385	0.0227	
0.1451	0.0316	0.1451	0.0295	0.1451	0.0282	0.1451	0.027	0.1451	0.0259	0.1451	0.0239	0.1451	0.0227	
0.152	0.032	0.152	0.0299	0.152	0.0286	0.152	0.0273	0.152	0.0262	0.152	0.0241	0.152	0.0227	
0.1592	0.0331	0.1592	0.0311	0.1592	0.03	0.1592	0.0289	0.1592	0.0279	0.1592	0.0265	0.1592	0.0247	
0.1668	0.0367	0.1668	0.0324	0.1668	0.0313	0.1668	0.0304	0.1668	0.0296	0.1668	0.0281	0.1668	0.0261	
0.1748	0.0507	0.1748	0.0427	0.1748	0.0386	0.1748	0.0351	0.1748	0.0322	0.1748	0.0288	0.1748	0.0268	
0.1831	0.0586	0.1831	0.0493	0.1831	0.0442	0.1831	0.0399	0.1831	0.0362	0.1831	0.0306	0.1831	0.027	
0.1918	0.0586	0.1918	0.0493	0.1918	0.0442	0.1918	0.0399	0.1918	0.0362	0.1918	0.0306	0.1918	0.0277	
0.2009	0.0586	0.2009	0.0493	0.2009	0.0442	0.2009	0.0399	0.2009	0.0362	0.2009	0.0329	0.2009	0.03	
0.2105	0.0586	0.2105	0.0493	0.2105	0.0442	0.2105	0.0403	0.2105	0.0388	0.2105	0.0361	0.2105	0.0326	
0.2205	0.0586	0.2205	0.0493	0.2205	0.0455	0.2205	0.0429	0.2205	0.0408	0.2205	0.0378	0.2205	0.0339	
0.231	0.0586	0.231	0.0493	0.231	0.0459	0.231	0.044	0.231	0.0422	0.231	0.039	0.231	0.0354	
0.242	0.0586	0.242	0.051	0.242	0.0487	0.242	0.0465	0.242	0.0446	0.242	0.0411	0.242	0.0371	
0.2535	0.065	0.2535	0.0574	0.2535	0.053	0.2535	0.049	0.2535	0.0454	0.2535	0.0412	0.2535	0.0387	
0.2656	0.0732	0.2656	0.0587	0.2656	0.0536	0.2656	0.0492	0.2656	0.0454	0.2656	0.0437	0.2656	0.0417	
0.2783	0.0817	0.2783	0.0599	0.2783	0.0536	0.2783	0.0508	0.2783	0.0495	0.2783	0.0471	0.2783	0.044	
0.2915	0.0817	0.2915	0.0619	0.2915	0.0581	0.2915	0.0547	0.2915	0.052	0.2915	0.0488	0.2915	0.0449	
0.3054	0.0817	0.3054	0.0666	0.3054	0.0624	0.3054	0.0586	0.3054	0.0552	0.3054	0.0499	0.3054	0.0461	
0.3199	0.0817	0.3199	0.0702	0.3199	0.0661	0.3199	0.0623	0.3199	0.0591	0.3199	0.0538	0.3199	0.0475	
0.3352	0.0875	0.3352	0.0769	0.3352	0.071	0.3352	0.0665	0.3352	0.0631	0.3352	0.0572	0.3352	0.0503	
0.3511	0.091	0.3511	0.0809	0.3511	0.0752	0.3511	0.0701	0.3511	0.0656	0.3511	0.0579	0.3511	0.0508	
0.3678	0.1221	0.3678	0.0953	0.3678	0.0824	0.3678	0.0723	0.3678	0.0656	0.3678	0.0579	0.3678	0.0508	
0.3853	0.1364	0.3853	0.106	0.3853	0.0922	0.3853	0.0811	0.3853	0.0723	0.3853	0.0594	0.3853	0.0508	
0.4037	0.1364	0.4037	0.106	0.4037	0.0922	0.4037	0.0825	0.4037	0.0766	0.4037	0.0667	0.4037	0.0573	
0.4229	0.1364	0.4229	0.106	0.4229	0.0922	0.4229	0.0853	0.4229	0.0801	0.4229	0.0716	0.4229	0.0615	
0.4431	0.1364	0.4431	0.106	0.4431	0.094	0.4431	0.0891	0.4431	0.0844	0.4431	0.076	0.4431	0.0659	
0.4642	0.1377	0.4642	0.106	0.4642	0.0979	0.4642	0.0921	0.4642	0.0866	0.4642	0.0772	0.4642	0.0681	
0.4863	0.1482	0.4863	0.1245	0.4863	0.1116	0.4863	0.1006	0.4863	0.0911	0.4863	0.0833	0.4863	0.0743	
0.5094	0.1823	0.5094	0.1391	0.5094	0.1225	0.5094	0.1091	0.5094	0.0984	0.5094	0.0875	0.5094	0.0759	

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.2226	0.5337	0.1617	0.5337	0.1354	0.5337	0.1157	0.5337	0.1031	0.5337	0.0875	0.5337	0.0759
0.5591	0.2226	0.5591	0.1617	0.5591	0.1354	0.5591	0.1157	0.5591	0.1031	0.5591	0.0895	0.5591	0.0761
0.5857	0.2226	0.5857	0.1617	0.5857	0.1354	0.5857	0.1157	0.5857	0.1035	0.5857	0.0957	0.5857	0.0843
0.6136	0.2226	0.6136	0.1617	0.6136	0.1354	0.6136	0.1191	0.6136	0.1123	0.6136	0.1013	0.6136	0.0887
0.6428	0.2271	0.6428	0.1635	0.6428	0.1368	0.6428	0.1191	0.6428	0.114	0.6428	0.1049	0.6428	0.0922
0.6734	0.2271	0.6734	0.1635	0.6734	0.1397	0.6734	0.1298	0.6734	0.1217	0.6734	0.1087	0.6734	0.0942
0.7055	0.2271	0.7055	0.1635	0.7055	0.1397	0.7055	0.1298	0.7055	0.1217	0.7055	0.1112	0.7055	0.0976
0.7391	0.2271	0.7391	0.1635	0.7391	0.1428	0.7391	0.1342	0.7391	0.1258	0.7391	0.1112	0.7391	0.0976
0.7743	0.3199	0.7743	0.2154	0.7743	0.1823	0.7743	0.1597	0.7743	0.1436	0.7743	0.1227	0.7743	0.1045
0.8111	0.3199	0.8111	0.2154	0.8111	0.1823	0.8111	0.1597	0.8111	0.1436	0.8111	0.1227	0.8111	0.1072
0.8497	0.3199	0.8497	0.2154	0.8497	0.1823	0.8497	0.1667	0.8497	0.1542	0.8497	0.1343	0.8497	0.1151
0.8902	0.3199	0.8902	0.2154	0.8902	0.1899	0.8902	0.1741	0.8902	0.1611	0.8902	0.1408	0.8902	0.1199
0.9326	0.4905	0.9326	0.3017	0.9326	0.2482	0.9326	0.2168	0.9326	0.1947	0.9326	0.1653	0.9326	0.1387
0.977	0.4905	0.977	0.3017	0.977	0.2482	0.977	0.2168	0.977	0.1947	0.977	0.1738	0.977	0.1524
1.0235	0.4905	1.0235	0.3017	1.0235	0.2482	1.0235	0.2168	1.0235	0.1947	1.0235	0.1823	1.0235	0.1634
1.0723	0.4905	1.0723	0.3017	1.0723	0.2637	1.0723	0.2423	1.0723	0.2253	1.0723	0.1992	1.0723	0.1725
1.1233	0.5817	1.1233	0.3433	1.1233	0.2704	1.1233	0.2423	1.1233	0.2253	1.1233	0.1992	1.1233	0.1725
1.1768	0.5817	1.1768	0.3818	1.1768	0.3175	1.1768	0.2803	1.1768	0.2507	1.1768	0.2165	1.1768	0.1887
1.2328	0.5817	1.2328	0.3891	1.2328	0.3511	1.2328	0.3196	1.2328	0.293	1.2328	0.2534	1.2328	0.2151
1.2916	0.5817	1.2916	0.4229	1.2916	0.3735	1.2916	0.3328	1.2916	0.3047	1.2916	0.2628	1.2916	0.2219
1.353	0.6371	1.353	0.4229	1.353	0.3735	1.353	0.3371	1.353	0.3183	1.353	0.2864	1.353	0.2496
1.4175	0.6371	1.4175	0.4229	1.4175	0.3787	1.4175	0.3589	1.4175	0.341	1.4175	0.3097	1.4175	0.2727
1.485	0.6371	1.485	0.4494	1.485	0.4202	1.485	0.3933	1.485	0.3686	1.485	0.3278	1.485	0.2853
1.5557	0.6371	1.5557	0.4814	1.5557	0.4509	1.5557	0.4238	1.5557	0.3991	1.5557	0.3558	1.5557	0.3055
1.6298	0.7646	1.6298	0.499	1.6298	0.46	1.6298	0.4334	1.6298	0.4095	1.6298	0.3689	1.6298	0.3214
1.7074	0.8139	1.7074	0.632	1.7074	0.5602	1.7074	0.5042	1.7074	0.458	1.7074	0.3899	1.7074	0.3341
1.7887	0.9195	1.7887	0.7556	1.7887	0.6777	1.7887	0.6117	1.7887	0.5549	1.7887	0.4736	1.7887	0.3952
1.8738	0.9711	1.8738	0.7836	1.8738	0.7098	1.8738	0.6502	1.8738	0.6034	1.8738	0.5221	1.8738	0.4298
1.963	1.1224	1.963	0.8714	1.963	0.7675	1.963	0.7007	1.963	0.6427	1.963	0.5486	1.963	0.4456
2.0565	1.2768	2.0565	0.9218	2.0565	0.8205	2.0565	0.7381	2.0565	0.6713	2.0565	0.567	2.0565	0.4588
2.1544	1.2768	2.1544	0.9218	2.1544	0.8205	2.1544	0.7381	2.1544	0.6713	2.1544	0.567	2.1544	0.4588
2.257	1.2768	2.257	0.9218	2.257	0.8205	2.257	0.7381	2.257	0.6756	2.257	0.5786	2.257	0.4821
2.3645	1.8982	2.3645	1.0227	2.3645	0.8284	2.3645	0.7528	2.3645	0.6902	2.3645	0.5876	2.3645	0.4962
2.4771	2.2619	2.4771	1.215	2.4771	0.9875	2.4771	0.8191	2.4771	0.7265	2.4771	0.6267	2.4771	0.5235
2.595	2.7147	2.595	1.215	2.595	1.0799	2.595	0.8772	2.595	0.7512	2.595	0.6435	2.595	0.5443

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
2.7186	2.7147	2.7186	1.215	2.7186	1.0799	2.7186	0.8772	2.7186	0.7512	2.7186	0.6435	2.7186	0.5443	
2.848	2.7147	2.848	1.215	2.848	1.0799	2.848	0.8772	2.848	0.7512	2.848	0.6435	2.848	0.5443	
2.9836	2.7147	2.9836	1.215	2.9836	1.0799	2.9836	0.8772	2.9836	0.7512	2.9836	0.6435	2.9836	0.5443	
3.1257	2.7147	3.1257	1.215	3.1257	1.0799	3.1257	0.8772	3.1257	0.7512	3.1257	0.6435	3.1257	0.5443	
3.2745	1.5417	3.2745	0.9998	3.2745	0.8571	3.2745	0.7497	3.2745	0.6847	3.2745	0.6146	3.2745	0.5331	
3.4305	1.3529	3.4305	0.9515	3.4305	0.8527	3.4305	0.7497	3.4305	0.6847	3.4305	0.6146	3.4305	0.5331	
3.5938	1.3529	3.5938	0.9515	3.5938	0.8527	3.5938	0.7497	3.5938	0.6847	3.5938	0.6146	3.5938	0.5331	
3.7649	1.3529	3.7649	0.9515	3.7649	0.8527	3.7649	0.7497	3.7649	0.6847	3.7649	0.6146	3.7649	0.5331	
3.9442	1.3529	3.9442	0.9515	3.9442	0.8527	3.9442	0.7497	3.9442	0.6847	3.9442	0.6146	3.9442	0.5331	
4.132	1.3529	4.132	0.9515	4.132	0.8527	4.132	0.7497	4.132	0.6847	4.132	0.6146	4.132	0.5331	
4.3288	1.3529	4.3288	0.9515	4.3288	0.8527	4.3288	0.7497	4.3288	0.6847	4.3288	0.6146	4.3288	0.5331	
4.5349	1.3529	4.5349	0.9515	4.5349	0.8527	4.5349	0.7497	4.5349	0.6847	4.5349	0.6146	4.5349	0.5331	
4.7508	1.3529	4.7508	0.9515	4.7508	0.8527	4.7508	0.7497	4.7508	0.6847	4.7508	0.6146	4.7508	0.5331	
4.977	1.3529	4.977	0.9515	4.977	0.8527	4.977	0.7497	4.977	0.6847	4.977	0.6146	4.977	0.5331	
5.214	1.3529	5.214	0.9515	5.214	0.8527	5.214	0.7717	5.214	0.7023	5.214	0.6348	5.214	0.5762	
5.4623	1.7018	5.4623	1.0022	5.4623	0.8819	5.4623	0.7998	5.4623	0.7428	5.4623	0.6773	5.4623	0.6164	
5.7224	2.0139	5.7224	1.1678	5.7224	0.9985	5.7224	0.8801	5.7224	0.7914	5.7224	0.7294	5.7224	0.6583	
5.9948	2.0139	5.9948	1.1824	5.9948	1.0061	5.9948	0.9321	5.9948	0.8745	5.9948	0.7841	5.9948	0.6883	
6.2803	2.0139	6.2803	1.1985	6.2803	1.0822	6.2803	1.0006	6.2803	0.934	6.2803	0.8328	6.2803	0.7285	
6.5793	2.0139	6.5793	1.2079	6.5793	1.1156	6.5793	1.0368	6.5793	0.9732	6.5793	0.8722	6.5793	0.7624	
6.8926	2.8655	6.8926	1.5914	6.8926	1.338	6.8926	1.1976	6.8926	1.1027	6.8926	0.9588	6.8926	0.8114	
7.2208	3.1519	7.2208	1.7665	7.2208	1.4894	7.2208	1.3335	7.2208	1.2072	7.2208	1.0657	7.2208	0.9233	
7.5646	3.4088	7.5646	1.9808	7.5646	1.7109	7.5646	1.5432	7.5646	1.4299	7.5646	1.2268	7.5646	0.9962	
7.9248	3.7732	7.9248	2.5319	7.9248	2.1034	7.9248	1.8073	7.9248	1.5814	7.9248	1.3219	7.9248	1.0918	
8.3022	4.5641	8.3022	2.6088	8.3022	2.171	8.3022	1.915	8.3022	1.7123	8.3022	1.3901	8.3022	1.1675	
8.6975	4.6879	8.6975	2.6088	8.6975	2.171	8.6975	1.915	8.6975	1.7123	8.6975	1.3901	8.6975	1.2638	
9.1116	4.6879	9.1116	2.6088	9.1116	2.171	9.1116	1.915	9.1116	1.7123	9.1116	1.3901	9.1116	1.2638	
9.5455	4.6879	9.5455	2.6088	9.5455	2.171	9.5455	1.915	9.5455	1.7123	9.5455	1.3901	9.5455	1.2638	
10	4.6879	10	2.6088	10	2.171	10	1.915	10	1.7123	10	1.3901	10	1.2638	
10.4762	4.6879	10.4762	2.6088	10.4762	2.171	10.4762	1.915	10.4762	1.7123	10.4762	1.3901	10.4762	1.2638	
10.975	4.6879	10.975	2.6088	10.975	2.171	10.975	1.915	10.975	1.7123	10.975	1.3901	10.975	1.2305	
11.4976	5.7083	11.4976	2.5137	11.4976	1.9646	11.4976	1.756	11.4976	1.6138	11.4976	1.3836	11.4976	1.1653	
12.045	5.7083	12.045	2.5137	12.045	1.9119	12.045	1.5798	12.045	1.4346	12.045	1.2479	12.045	1.1653	
12.6186	5.7083	12.6186	2.5137	12.6186	1.9119	12.6186	1.5798	12.6186	1.4189	12.6186	1.1818	12.6186	1.1653	
13.2194	5.7083	13.2194	2.5137	13.2194	1.9119	13.2194	1.5659	13.2194	1.387	13.2194	1.1818	13.2194	1.1653	

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	5.7083	13.8489	2.5137	13.8489	1.9119	13.8489	1.5659	13.8489	1.387	13.8489	1.1818	13.8489	1.1653
14.5083	4.6777	14.5083	2.3117	14.5083	1.7577	14.5083	1.5659	14.5083	1.387	14.5083	1.1818	14.5083	1.1114
15.1991	4.6777	15.1991	2.3117	15.1991	1.7366	15.1991	1.537	15.1991	1.387	15.1991	1.1818	15.1991	1.1032
15.9228	4.6777	15.9228	2.3117	15.9228	1.7366	15.9228	1.537	15.9228	1.387	15.9228	1.1644	15.9228	1.1032
16.681	4.6777	16.681	2.3117	16.681	1.7366	16.681	1.537	16.681	1.387	16.681	1.1644	16.681	1.1032
17.4753	4.6777	17.4753	2.3117	17.4753	1.7366	17.4753	1.537	17.4753	1.387	17.4753	1.1644	17.4753	1.1032
18.3074	2.7677	18.3074	1.962	18.3074	1.6751	18.3074	1.512	18.3074	1.3789	18.3074	1.1644	18.3074	0.9852
19.1791	1.9267	19.1791	1.4264	19.1791	1.3108	19.1791	1.2176	19.1791	1.1358	19.1791	1.0227	19.1791	0.8897
20.0923	1.2493	20.0923	1.0816	20.0923	1.0133	20.0923	0.9536	20.0923	0.9008	20.0923	0.8109	20.0923	0.7479
21.049	1.2493	21.049	0.9073	21.049	0.828	21.049	0.7844	21.049	0.7563	21.049	0.7314	21.049	0.706
22.0513	0.993	22.0513	0.7974	22.0513	0.7401	22.0513	0.6995	22.0513	0.6943	22.0513	0.6838	22.0513	0.668
23.1013	0.6779	23.1013	0.6627	23.1013	0.6574	23.1013	0.6529	23.1013	0.6489	23.1013	0.6416	23.1013	0.6313
24.2013	0.6151	24.2013	0.6095	24.2013	0.6076	24.2013	0.6061	24.2013	0.6047	24.2013	0.6017	24.2013	0.5969
25.3536	0.5629	25.3536	0.5604	25.3536	0.5634	25.3536	0.5654	25.3536	0.5667	25.3536	0.5677	25.3536	0.5671
26.5609	0.5491	26.5609	0.542	26.5609	0.5413	26.5609	0.5411	26.5609	0.5413	26.5609	0.5421	26.5609	0.5428
27.8256	0.5375	27.8256	0.5118	27.8256	0.5123	27.8256	0.5158	27.8256	0.5181	27.8256	0.5209	27.8256	0.5232
29.1505	0.5375	29.1505	0.5118	29.1505	0.5069	29.1505	0.5051	29.1505	0.5048	29.1505	0.5057	29.1505	0.5077
30.5386	0.4891	30.5386	0.4832	30.5386	0.4826	30.5386	0.4854	30.5386	0.4884	30.5386	0.4922	30.5386	0.4954
31.9927	0.4891	31.9927	0.4832	31.9927	0.4826	31.9927	0.4828	31.9927	0.4834	31.9927	0.4847	31.9927	0.4867
33.516	0.4797	33.516	0.4786	33.516	0.4785	33.516	0.4785	33.516	0.4787	33.516	0.4791	33.516	0.48
35.1119	0.4732	35.1119	0.4733	35.1119	0.4733	35.1119	0.4733	35.1119	0.4734	35.1119	0.4736	35.1119	0.474
36.7838	0.4677	36.7838	0.4679	36.7838	0.4679	36.7838	0.468	36.7838	0.4681	36.7838	0.4683	36.7838	0.4686
38.5353	0.4628	38.5353	0.4629	38.5353	0.463	38.5353	0.4631	38.5353	0.4632	38.5353	0.4633	38.5353	0.4636
40.3702	0.4584	40.3702	0.4585	40.3702	0.4585	40.3702	0.4586	40.3702	0.4586	40.3702	0.4588	40.3702	0.459
42.2924	0.4543	42.2924	0.4544	42.2924	0.4544	42.2924	0.4545	42.2924	0.4545	42.2924	0.4547	42.2924	0.4548
44.3062	0.4505	44.3062	0.4506	44.3062	0.4507	44.3062	0.4507	44.3062	0.4507	44.3062	0.4509	44.3062	0.451
46.4159	0.4471	46.4159	0.4471	46.4159	0.4472	46.4159	0.4472	46.4159	0.4472	46.4159	0.4473	46.4159	0.4475
48.626	0.4439	48.626	0.4439	48.626	0.4439	48.626	0.4439	48.626	0.444	48.626	0.444	48.626	0.4442
50.9414	0.4408	50.9414	0.4408	50.9414	0.4408	50.9414	0.4408	50.9414	0.4409	50.9414	0.4409	50.9414	0.4411



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
**24590-PTF-ME-FEP-COND-00003B**

Data Sheet No.  
**24590-PTF-MED-FEP-00008**



Project:	<b>RPP-WTP</b>	Description:	<b>Waste Feed Evaporator Aftercondenser</b>
Project No:	<b>24590</b>	P&ID:	<b>24590-PTF-M6-FEP-00005001</b>
Site:	<b>Hanford</b>	Process Data:	<b>24590-QL-POA-MEVV-00001-04-04</b>
Process flow diagram:	<b>24590-PTF-M5-V17T-00004002</b>	Manufacturer Name:	<b>Framatome ANP / GRAHAM MANUFACTURING</b>

**General Data**

Quality Level	<b>Q (See Note 8)</b>	TEMA (Class/Type)	<b>B</b>	<b>ISSUED BY RPP-WTP PDC</b>
Seismic Category	<b>SC-I</b>	Flow Type (Counter current, etc)	<b>N/A</b>	
Design Code	<b>ASME VIII Div 1</b>	Heat Exchanger Duty	<b>167,838</b> Btu/hr	
Code Stamp	<b>Yes</b>	Heat Exchanger Area	<b>14.9</b> ft <sup>2</sup>	
NB Registration	<b>Yes</b>	ΔT (LMTD/Corrected LMTD)	<b>111.0</b> °F	

**Thermal/Hydraulic Data**

	Shell Side		Tube Side	
	In	Steam Out	In	Cooling Water Out
Fluid Name				
Fluid Quantities: Total	200.4		15,000	
Condensable Vapor (In/Out)	156.7	3.4	N/A	N/A
Liquid	N/A	153.3	15,000	15,000
Noncondensable	43.7	43.7	N/A	N/A
Temperature (In/Out)	248.9 °F	120.0	75	86.2
Specific Gravity	N/A	N/A	1.000	0.999
Viscosity	N/A	N/A	2.209	1.924
Molecular Weight	18.02	18.02	N/A	N/A
Molecular Weight, Noncondensable	29	29	N/A	N/A
Specific Heat	N/A	N/A	1.000	0.999
Thermal Conductivity	N/A	*	0.350	0.356
Latent Heat	N/A		N/A	
Inlet pressure	810 Torr		59.7 psia	
Tube side Velocity	N/A		3.4	
Pressure Drop (Allowed)	25 mm Hg		0.8 psi	
Fouling Resistance (Min)	0.0020			

**Mechanical Data**

	Shell Side		Tube Side	
Design Pressure (Max/Min)	50 psig	Full vacuum	100	Full vacuum
Design Temperature (Max/Min)	378 °F	0	150	0
Corrosion Allowance	0.04		0.04	
Erosion Allowance	N/A		N/A	
Shell OD/ID	6 5/8 OD		Overall Dimensions (H x W x L)	18 x 11 x 69
Total Number of Tubes	19		Tube OD	0.750

**Material Data**

Shell	<b>SA 312, SA 182 316L SS (Max Carbon 0.030%)</b>	Shell Cover	<b>N/A</b>
Channel/Bonnet	<b>SA 312, SA 182, SA 403 316L SS (Max Carbon 0.030%)</b>	Channel Cover	<b>316L SS (Max Carbon 0.030%)</b>
Tube	<b>SA 213 316L SS (SMLS) (Max Carbon 0.030%)</b>	Floating Head Cover	<b>N/A</b>
Stationary Tube Sheet	<b>SA 240 316L SS (Max Carbon 0.030%)</b>	Floating Tube Sheet	<b>N/A</b>
Shell Side Gaskets	<b>N/A</b>	Tube Side Gaskets	<b>316 SS Spiral Wound w/PTFE Filler</b>
Partition Seals	<b>N/A</b>	Baffles/Supports	<b>SA 240 316 SS Max Carbon 0.030%</b>
Insulation	<b>N/A</b>	Forgings (Shell side)	<b>SA 182 F316L (Max Carbon 0.030%)</b>
Bolting	<b>SA193B8M &amp; SA 194 2HM</b>	Forgings (Channel)	<b>SA 182 F316L (Max Carbon 0.030%)</b>



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
24590-PTF-ME-FEP-COND-00003B

Data Sheet No.  
24590-PTF-MED-FEP-00008

**Construction Data** (To be determined by the supplier when not specified by the buyer)

Cross Baffle Type	<b>Up &amp; Over</b>	% Baffle Cut (Dia.)	---	Spacing (c/c) inch	---
Bypass Seal Arrangement	<b>N/A</b>	Longitudinal Seal Type	<b>N/A</b>	Expansion Joint Type	<b>N/A</b>
Inlet Nozzle $\rho V^2$	---	Bundle Entrance $\rho V^2$	---	Bundle Exit $\rho V^2$	---
Tube Support Type	<b>Vertical Cut</b>	U-bend Support Type	<b>N/A</b>	Weight of Bundle lbf	*
Operating Weight lbf	<b>330</b>	Full of Water lbf	<b>360</b>	Weight of Shell lbf	<b>300</b>

**Notes**

\* To be determined by Seller.

- (1) All welds are continuous to avoid crevices, weld surface finish is descaled as laid.
- (2) Tube to tubesheet joint shall be strength welded.
- (3) Graham size 6x4 BEM.
- (4) Deleted.
- (5) Deleted.
- (6) Deleted.
- (7) For nozzle loads, see 24590-PTF-3PS-MEVV-T0001.
- (8) Vendor will provide item at BNI quality level Q specification, which corresponds with vendor quality level QL-2.
- (9) Final Vendor Design Process information is from document 24590-QL-POA-MEVV-00001-02-00056.
- (10) Equipment cyclic data is from document 24590-QL-POA-MEVV-00001-04-03.
- (11) Contents of this drawing are Dangerous Waste Permit Affecting.  $\triangle 3$
- (12) The physical design parameters shall be determined by the seller based on TEMA and HEI standards.
- (13) 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.

Safety screening / evaluation required?  Yes  No If yes per 24590-WTP-GPP-SREG-002, E&NS signature required below.

Rev	Description	By	Checked	EN&S	Approved	Date
3	Updated to reflect WSGM analysis, 24590-PTF-U0N-W16T-00003, include design process cycles and incorporate DOE AEA note (13). <b>OTHER DATA UPDATED.</b>	<i>D. Tate</i> D. Tate	<i>R. Rickenbach</i> R. Rickenbach	<i>Butt</i> Full	<i>J. Julyk</i> JULYK	2/19/09
2	Incorporated Vendor Design Changes and Equipment Qualification data	R. Rickenbach	C. Knauss	S. Woolfolk	J. Julyk	07/22/2008
1	Incorporated Vendor Design	E. Le	R. Nowak	N/A	J. Julyk	04/04/2005
0	Issued for Procurement	E. Le	S. Shah	N/A	J. Julyk	04/30/2003



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00008 Rev.: 3

Attachment 1, Page 3 of 21

Equipment Identification			
Component Tag Number	24590-PTF-ME-FEP-COND-00003B	Safety Classification	<input checked="" type="checkbox"/> SC <input type="checkbox"/> SS <input type="checkbox"/> APC <input type="checkbox"/> SDC <input type="checkbox"/> SDS <input type="checkbox"/> RRC Note 10 $\triangle 3$
Manufacturer / Supplier	GRAHAM / AREVA FS $\triangle 3$		
Requisition Number	24590-QL-POA-MEVV-00001		
Model	N/A	Seismic Category	<input checked="" type="checkbox"/> SC-I <input type="checkbox"/> SC-II <input type="checkbox"/> SC-III <input type="checkbox"/> SC-IV Note 10 $\triangle 3$
Description (Include descriptive text [e.g., location, elevation])	Waste Feed Evaporator After-Condensator, Room P-0304, elevation 56'-0"		
Safety Function(s)	Prevent post seismic disruption of H2 vessel purge air pathways, spread of contamination into C3 areas from PVP blowback. (ref. 1) $\triangle 3$  Confinement (ref. 1) $\triangle 3$		
Seismic Safety Function	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Room Number(s): P-0304	
Maintenance Accessible	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Method of Maintenance Access: <input type="checkbox"/> Remote <input checked="" type="checkbox"/> Hands On <input type="checkbox"/> None	
Seismic Operability Requirements: $\triangle 3$ <input type="checkbox"/> During Seismic Event $\triangle 3$ <input type="checkbox"/> After Seismic Event			
ITS Equipment Type: <input checked="" type="checkbox"/> Passive Mechanical <input type="checkbox"/> Active Mechanical <input type="checkbox"/> Electrical			

Equipment Environmental Qualification (EEQ)					
Environment	<input type="checkbox"/> Mild <input checked="" type="checkbox"/> Harsh	Hi Rad Service	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Design Life (yrs)	<input checked="" type="checkbox"/> 40 <input checked="" type="checkbox"/> Other $\triangle 3$
Contamination Class:	C3	Design life to include 7,001,950 normal process expansion cycles.			
Radiation Class:	R3				
Parameter Type/Units	Parameter Value	Time Duration (number)	Time Units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Normal</b>					
Normal High Temperature (°F)	95	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal Low Temperature (°F)	59	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal High Relative Humidity (%RH)	100	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Relative Humidity (%RH)	10	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal High Pressure (in.-w.g.)	0	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Pressure (in.-w.g.)	-0.4	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Radiation Dose Rate (mR/hr)	10	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Vibration Magnitude (g)	N/A	N/A	N/A	N/A	Note 1
Vibration Frequency (Hz)	N/A	N/A	N/A	N/A	Note 1
Additional Normal Information:		See Note 2 for pressure units.			



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00008 Rev.: 3

Attachment 1, Page 4 of 21

## Equipment Environmental Qualification (EEQ) (continued)

Parameter Type/Units	Parameter Value	Time Duration (number)	Time units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Abnormal</b>					
Abnormal High Temperature (°F)	△ <sub>3</sub> 117	8	hr/yr	24590-PTF-U0D-W16T-00001, Note 6 △ <sub>3</sub>	Note 1
Abnormal Low Temperature (°F)	59	8	hr/yr	24590-WTP-DB-ENG-01-001, Notes 6 & 8	Note 1
Abnormal High Relative Humidity (%RH)	100	24	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Relative Humidity (%RH)	2	22	hr/yr	24590-PTF-U0D-W16T-00001 Rev. 0, Note 9 △ <sub>3</sub>	Note 1
Abnormal High Pressure (in.-w.g.)	4	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Pressure (in.-w.g.)	-7.3	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Radiation Dose Rate (mR/hr)	10, Note 3	△ <sub>3</sub> 0	△ <sub>3</sub> hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Wet Sprinkler System Present	YES	△ <sub>3</sub> 2	△ <sub>3</sub> hr	24590-PTF-U0D-W16T-00001	Note 1
Additional Abnormal Information	See Note 2 for pressure units.				
<b>Design Basis Events (DBE)</b>					
DBE High Temperature (°F)	131	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6 & 9 △ <sub>3</sub>	Note 1
DBE Low Temperature (°F)	40	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
DBE High Relative Humidity (%RH)	100	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Relative Humidity (%RH)	8	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE High Pressure (in.-w.g.)	4	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Pressure (in.-w.g.)	-7.3	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Radiation Dose Rate (mR/hr)	10, Note 3	△ <sub>3</sub> 0	△ <sub>3</sub> hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Flood Height (ft)	0.67	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
Submergence (ft)	0, Note 4	1000	hrs	24590-PTF-U0D-W16T-00001 24590-QL-POA-MEVV-00001-01-00825	Note 1
Chemical/Spray Exposure	Yes	12.5	hrs	24590-PTF-U0D-W16T-00001	Note 1
Additional DBE Information	See Note 2 for pressure units.				



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00008 Rev.: 3

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DBE Chemical Exposure Details	
DBE Chemical Types/Concentrations	2M Sodium Hydroxide $\triangle 3$ Antifoam Agent 2M Nitric Acid $\triangle 3$

Interfaces (Electrical)	
Power Supply Voltage (VAC, VDC)	N/A
Power Supply Frequency (Hz)	N/A
Power Connection Method	N/A
I/O Signals to/from Equipment	N/A
I/O Connection Method	N/A

Interfaces (Mechanical)	
Mounting Configuration (orientation)	TBD
Mounting Method (bolts, welds, etc.)	Anchor Bolts, FEP-SKID-00001B, 24590-PTF-DB-S13T-00051
Auxiliary Devices	N/A

Equipment Seismic Qualification (ESQ)				
Parameter	Title	Reference/Document Number	Version / Revision	Remarks
WTP Seismic Design Specification (BUYER)	Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks	24590-WTP-3PS-SS90-T0001	002	N/A
Specified Seismic Load (BUYER)	Seismic Analysis of Pretreatment Building - WSGM In-Structure Response Spectre (ISRS) $\triangle 3$	24590-PTF-SOC-S15T-00057 $\triangle 3$	00A $\triangle 3$	Calculation is not included in MR, see attached figures 37, 38 and 121 per CCN 185267. $\triangle 3$
Design Seismic Load (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Method (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Report Number (SELLER)	Note 1	Note 1	Note 1	Note 1
Submittal Number (BUYER)	TBD	TBD	TBD	N/A



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00008 Rev.: 3

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## Notes and Additional Information

### Notes

1. Data to be provided by SELLER through the submittal process as required on the G-321E.
2. Where pressure is given in inches of water column (in-w.c.) in the source document, it is generally assumed that this is in reference to atmospheric pressure and is therefore equivalent to inches of water gage (in-w.g.).
3. Abnormal and DBE radiation dose rates are set equal to normal and do not contribute to the total integrated dose.  $\triangle 3$
4. Submergence depth is the difference between the lowest point on the equipment and the flood depth above the floor. The submergence depth is set to zero if the lowest section of the equipment is above the flood depth.
5. Environmental data from reference 3 is for room environment only.
6. For application of AISC N690, the normal temperatures are not used. Abnormal temperatures shall be applied as Normal Operation Temperature,  $T_o$ , with seismic effects,  $E_s$ . The Design basis event temperature shall be applied as a Thermal Load generated by a postulated accident,  $T_A$ , without seismic effects,  $E_s$  or  $E_o$ .
7. The equipment qualification will be documented in accordance with the requirements in Appendix D of Engineering Specification for Environmental Qualification of Mechanical Equipment, document number 24590-WTP-3PS-G000-T0015 for the passive and active safety functions.
8. Abnormal low temperature, as calculated in reference 3, is based on a Loss of Heating Accident (LOHA) which occurs when steam supply to the building is lost. Since the evaporators are run on steam, this would cause the evaporators to go off-line. Abnormal low temperature will be based on reference 4 at 59°F.
9. Parameter value used on data sheet has been previously established and determined more conservative than values  $\triangle 3$  derived from the reference document noted.
10. For commercial reasons, safety and seismic classification may be higher than elsewhere documented, and therefore  $\triangle 3$  conservative.

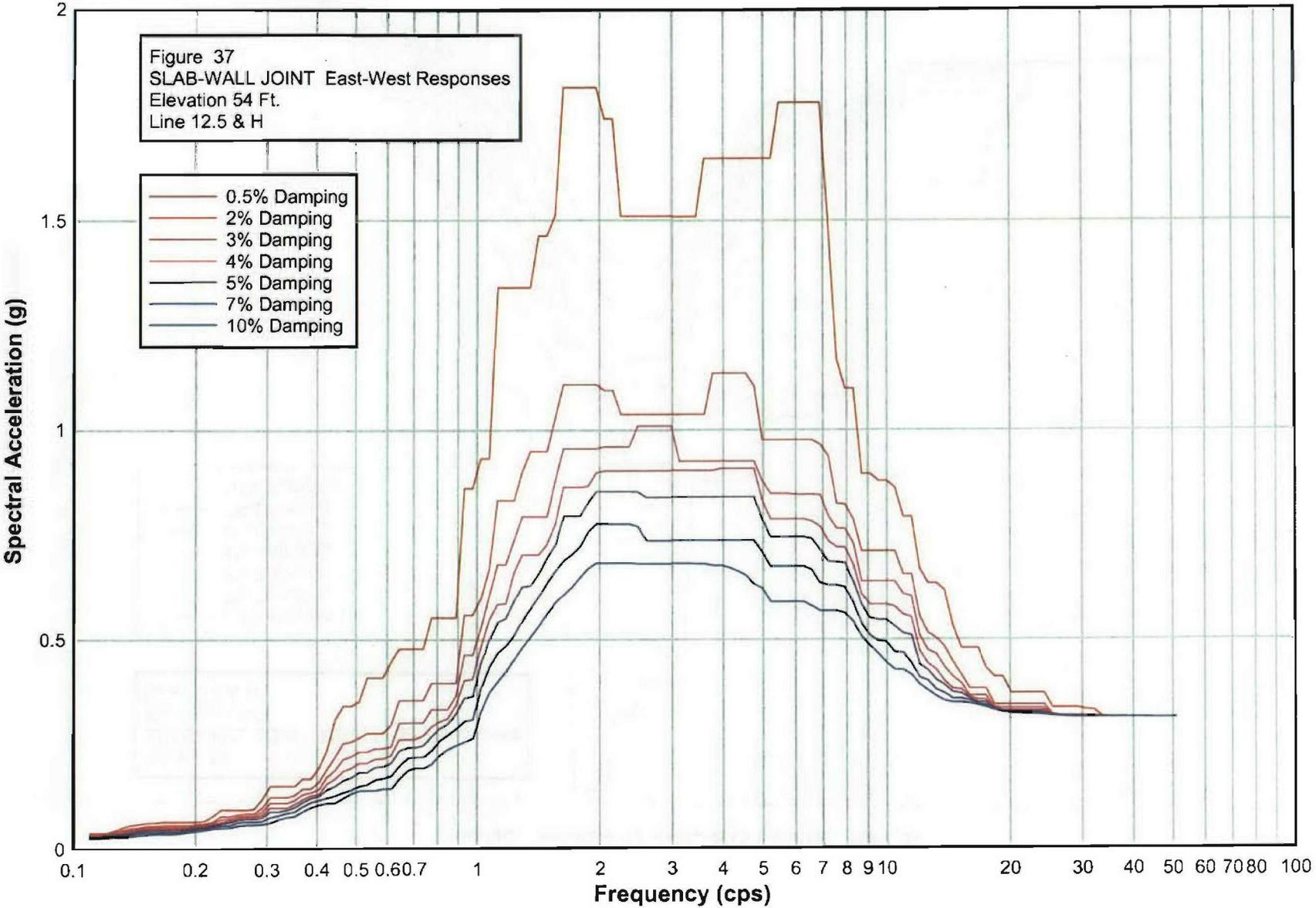
### Reference

1. 24590-WTP-PSAR-ESH-01-002-02, Rev. 04A, Preliminary documented safety analysis to support construction  $\triangle 3$  authorization; PT facility specific information.
2. CCN #096661, FEP and CNP Evaporator Vent Problems with New PVP Isolation Valve.
3. 24590-PTF-U0D-W16T-00001, Rev. 0, PTF Room Environment Datasheet.
4. 24590-WTP-DB-ENG-01-001, Rev. 1M, Basis Of Design.  $\triangle 3$
5. 24590-PTF-U0N-W16T-00001, Add data for room P-0427. Incorporate additional steam break analysis.  $\triangle 3$
6. 24590-PTF-U0N-W16T-00003, Revised temperature & relative humidity data for PTF rooms.  $\triangle 3$

3

# RPP-WTP Pretreatment Facility ISRS

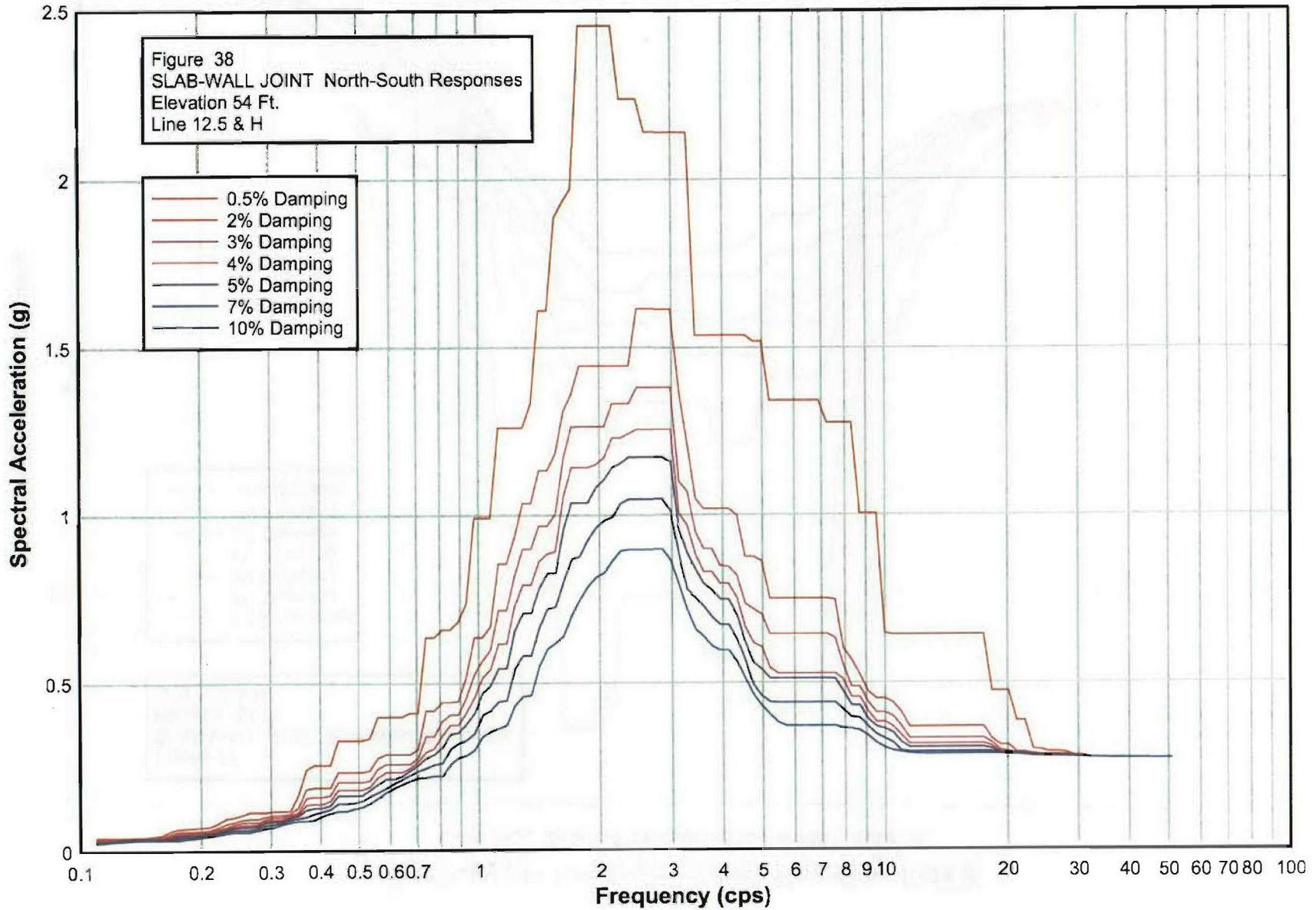
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



3

# RPP-WTP Pretreatment Facility ISRS

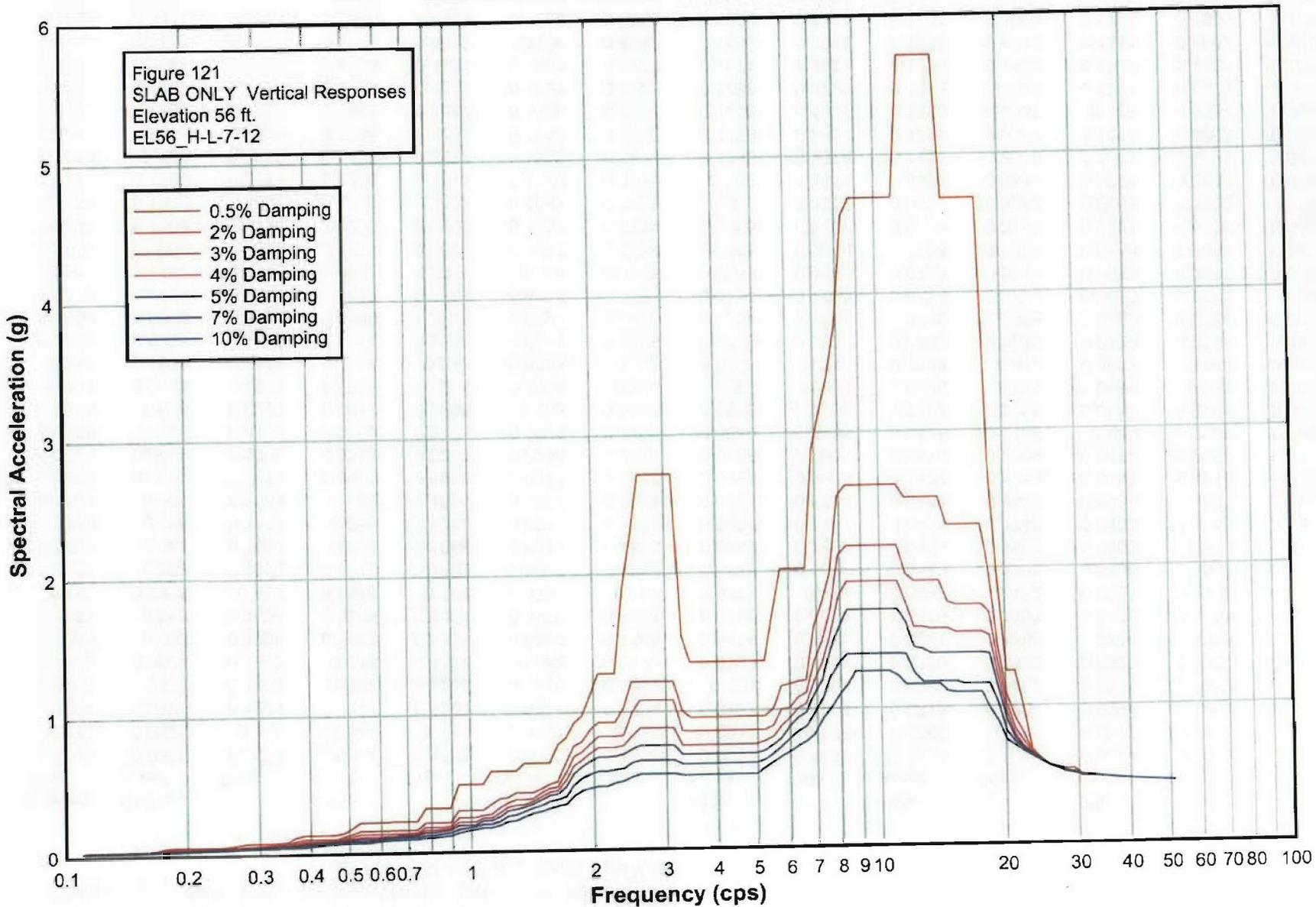
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



3

# RPP-WTP Pretreatment Facility ISRS

Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0375	0.1098	0.0344	0.1098	0.0327	0.1098	0.0312	0.1098	0.0298	0.1098	0.0274	0.1098	0.0252
0.115	0.0375	0.115	0.0344	0.115	0.0327	0.115	0.0312	0.115	0.0299	0.115	0.0277	0.115	0.0258
0.1204	0.0375	0.1204	0.0344	0.1204	0.0331	0.1204	0.0322	0.1204	0.0312	0.1204	0.0294	0.1204	0.0269
0.1262	0.0431	0.1262	0.0397	0.1262	0.0378	0.1262	0.036	0.1262	0.0343	0.1262	0.0314	0.1262	0.0278
0.1322	0.0504	0.1322	0.045	0.1322	0.042	0.1322	0.0393	0.1322	0.0369	0.1322	0.0328	0.1322	0.0281
0.1385	0.056	0.1385	0.0489	0.1385	0.0449	0.1385	0.0414	0.1385	0.0384	0.1385	0.0344	0.1385	0.0303
0.1451	0.058	0.1451	0.0509	0.1451	0.0475	0.1451	0.0445	0.1451	0.0419	0.1451	0.0375	0.1451	0.0325
0.152	0.0616	0.152	0.0546	0.152	0.0506	0.152	0.0472	0.152	0.0442	0.152	0.0391	0.152	0.0338
0.1592	0.062	0.1592	0.0546	0.1592	0.0506	0.1592	0.0472	0.1592	0.0442	0.1592	0.0396	0.1592	0.0351
0.1668	0.064	0.1668	0.056	0.1668	0.0517	0.1668	0.0481	0.1668	0.0451	0.1668	0.0403	0.1668	0.0356
0.1748	0.064	0.1748	0.056	0.1748	0.0517	0.1748	0.0481	0.1748	0.0451	0.1748	0.0403	0.1748	0.0356
0.1831	0.064	0.1831	0.056	0.1831	0.0517	0.1831	0.0481	0.1831	0.0451	0.1831	0.0403	0.1831	0.0368
0.1918	0.0641	0.1918	0.0561	0.1918	0.0517	0.1918	0.0495	0.1918	0.0477	0.1918	0.0445	0.1918	0.0404
0.2009	0.0642	0.2009	0.0583	0.2009	0.0558	0.2009	0.0535	0.2009	0.0513	0.2009	0.0474	0.2009	0.0424
0.2105	0.0665	0.2105	0.0603	0.2105	0.0575	0.2105	0.0549	0.2105	0.0525	0.2105	0.049	0.2105	0.0448
0.2205	0.078	0.2205	0.0647	0.2205	0.062	0.2205	0.0595	0.2205	0.0573	0.2205	0.0533	0.2205	0.0484
0.231	0.0933	0.231	0.0774	0.231	0.0694	0.231	0.063	0.231	0.0598	0.231	0.0556	0.231	0.0503
0.242	0.0933	0.242	0.0774	0.242	0.0723	0.242	0.0678	0.242	0.0638	0.242	0.0567	0.242	0.0513
0.2535	0.0933	0.2535	0.0817	0.2535	0.0771	0.2535	0.0729	0.2535	0.0692	0.2535	0.0628	0.2535	0.0553
0.2656	0.0933	0.2656	0.0839	0.2656	0.0794	0.2656	0.0754	0.2656	0.0718	0.2656	0.0653	0.2656	0.0575
0.2783	0.0954	0.2783	0.0847	0.2783	0.0794	0.2783	0.0754	0.2783	0.0718	0.2783	0.0653	0.2783	0.058
0.2915	0.1187	0.2915	0.0987	0.2915	0.089	0.2915	0.0813	0.2915	0.0753	0.2915	0.0668	0.2915	0.0592
0.3054	0.1504	0.3054	0.1235	0.3054	0.1097	0.3054	0.0985	0.3054	0.0894	0.3054	0.0758	0.3054	0.0633
0.3199	0.1504	0.3199	0.1235	0.3199	0.1097	0.3199	0.0985	0.3199	0.0894	0.3199	0.0801	0.3199	0.0706
0.3352	0.1504	0.3352	0.1235	0.3352	0.1097	0.3352	0.0985	0.3352	0.0931	0.3352	0.0857	0.3352	0.0762
0.3511	0.1504	0.3511	0.1289	0.3511	0.1172	0.3511	0.107	0.3511	0.0997	0.3511	0.0894	0.3511	0.0786
0.3678	0.168	0.3678	0.1438	0.3678	0.1303	0.3678	0.1186	0.3678	0.1121	0.3678	0.1017	0.3678	0.0898
0.3853	0.168	0.3853	0.1438	0.3853	0.1346	0.3853	0.1279	0.3853	0.1219	0.3853	0.1115	0.3853	0.0992
0.4037	0.194	0.4037	0.1598	0.4037	0.1426	0.4037	0.1306	0.4037	0.1259	0.4037	0.117	0.4037	0.1054
0.4229	0.2368	0.4229	0.1906	0.4229	0.1721	0.4229	0.1558	0.4229	0.1416	0.4229	0.1217	0.4229	0.1092
0.4431	0.3088	0.4431	0.2193	0.4431	0.1881	0.4431	0.1671	0.4431	0.1496	0.4431	0.1273	0.4431	0.1097
0.4642	0.3417	0.4642	0.2524	0.4642	0.2138	0.4642	0.1852	0.4642	0.1637	0.4642	0.1345	0.4642	0.1211
0.4863	0.3417	0.4863	0.256	0.4863	0.2208	0.4863	0.1928	0.4863	0.1701	0.4863	0.1409	0.4863	0.1323
0.5094	0.3522	0.5094	0.2656	0.5094	0.2325	0.5094	0.2054	0.5094	0.1831	0.5094	0.1497	0.5094	0.1391

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.4096	0.5337	0.2771	0.5337	0.2325	0.5337	0.2054	0.5337	0.1831	0.5337	0.1539	0.5337	0.1396
0.5591	0.4096	0.5591	0.2771	0.5591	0.2398	0.5591	0.2148	0.5591	0.1949	0.5591	0.1654	0.5591	0.1396
0.5857	0.4096	0.5857	0.2771	0.5857	0.2404	0.5857	0.2159	0.5857	0.1975	0.5857	0.1686	0.5857	0.1441
0.6136	0.4475	0.6136	0.2969	0.6136	0.2444	0.6136	0.2234	0.6136	0.2051	0.6136	0.1751	0.6136	0.1441
0.6428	0.478	0.6428	0.3547	0.6428	0.3006	0.6428	0.2612	0.6428	0.2347	0.6428	0.1988	0.6428	0.168
0.6734	0.478	0.6734	0.3547	0.6734	0.3006	0.6734	0.2612	0.6734	0.2413	0.6734	0.2165	0.6734	0.1872
0.7055	0.478	0.7055	0.3547	0.7055	0.3006	0.7055	0.2612	0.7055	0.2413	0.7055	0.2186	0.7055	0.1922
0.7391	0.478	0.7391	0.3547	0.7391	0.3006	0.7391	0.2692	0.7391	0.2463	0.7391	0.2186	0.7391	0.1922
0.7743	0.5518	0.7743	0.3958	0.7743	0.3332	0.7743	0.2918	0.7743	0.268	0.7743	0.2351	0.7743	0.2018
0.8111	0.5518	0.8111	0.3958	0.8111	0.3332	0.8111	0.3035	0.8111	0.2874	0.8111	0.2587	0.8111	0.2236
0.8497	0.5518	0.8497	0.3958	0.8497	0.3332	0.8497	0.3117	0.8497	0.2984	0.8497	0.2723	0.8497	0.2373
0.8902	0.5518	0.8902	0.3958	0.8902	0.3656	0.8902	0.3431	0.8902	0.3226	0.8902	0.2873	0.8902	0.2462
0.9326	0.8605	0.9326	0.5585	0.9326	0.4629	0.9326	0.4023	0.9326	0.3602	0.9326	0.3049	0.9326	0.2549
0.977	0.8605	0.977	0.5585	0.977	0.4629	0.977	0.4045	0.977	0.3644	0.977	0.3083	0.977	0.2637
1.0235	0.9315	1.0235	0.5965	1.0235	0.5261	1.0235	0.4814	1.0235	0.4436	1.0235	0.3837	1.0235	0.3277
1.0723	0.9315	1.0723	0.6685	1.0723	0.603	1.0723	0.5467	1.0723	0.4995	1.0723	0.4355	1.0723	0.3729
1.1233	1.3398	1.1233	0.8315	1.1233	0.6788	1.1233	0.5837	1.1233	0.5408	1.1233	0.4681	1.1233	0.3987
1.1768	1.3398	1.1768	0.8315	1.1768	0.6788	1.1768	0.5855	1.1768	0.5505	1.1768	0.4858	1.1768	0.4238
1.2328	1.3398	1.2328	0.8315	1.2328	0.7369	1.2328	0.6596	1.2328	0.5925	1.2328	0.5105	1.2328	0.452
1.2916	1.3398	1.2916	0.9002	1.2916	0.7926	1.2916	0.7024	1.2916	0.6263	1.2916	0.5455	1.2916	0.4806
1.353	1.3398	1.353	0.9485	1.353	0.7926	1.353	0.7024	1.353	0.6282	1.353	0.574	1.353	0.5058
1.4175	1.4626	1.4175	0.9485	1.4175	0.7926	1.4175	0.7024	1.4175	0.6579	1.4175	0.6026	1.4175	0.5321
1.485	1.4626	1.485	0.9485	1.485	0.7926	1.485	0.7282	1.485	0.6958	1.485	0.636	1.485	0.5624
1.5557	1.5113	1.5557	1.0297	1.5557	0.8797	1.5557	0.7754	1.5557	0.726	1.5557	0.6634	1.5557	0.5886
1.6298	1.8158	1.6298	1.1086	1.6298	0.9552	1.6298	0.8627	1.6298	0.7931	1.6298	0.6875	1.6298	0.6064
1.7074	1.8158	1.7074	1.1086	1.7074	0.9552	1.7074	0.8627	1.7074	0.7931	1.7074	0.7024	1.7074	0.6246
1.7887	1.8158	1.7887	1.1086	1.7887	0.9552	1.7887	0.8627	1.7887	0.7931	1.7887	0.7213	1.7887	0.6476
1.8738	1.8158	1.8738	1.1086	1.8738	0.9552	1.8738	0.8651	1.8738	0.8263	1.8738	0.7567	1.8738	0.6698
1.963	1.8158	1.963	1.1086	1.963	0.9552	1.963	0.8972	1.963	0.8525	1.963	0.7755	1.963	0.683
2.0565	1.7414	2.0565	1.0948	2.0565	0.9593	2.0565	0.9017	2.0565	0.8525	2.0565	0.7755	2.0565	0.683
2.1544	1.7414	2.1544	1.0948	2.1544	0.9593	2.1544	0.9017	2.1544	0.8525	2.1544	0.7755	2.1544	0.683
2.257	1.5091	2.257	1.0367	2.257	0.9593	2.257	0.9017	2.257	0.8525	2.257	0.7755	2.257	0.683
2.3645	1.5091	2.3645	1.0367	2.3645	0.9593	2.3645	0.9017	2.3645	0.8525	2.3645	0.7755	2.3645	0.683
2.4771	1.5091	2.4771	1.0367	2.4771	1.009	2.4771	0.9017	2.4771	0.852	2.4771	0.7697	2.4771	0.6811
2.595	1.5091	2.595	1.0367	2.595	1.009	2.595	0.9017	2.595	0.8387	2.595	0.7357	2.595	0.6811

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
2.7186	1.5091	2.7186	1.0367	2.7186	1.009	2.7186	0.9017	2.7186	0.8387	2.7186	0.7357	2.7186	0.6811
2.848	1.5091	2.848	1.0367	2.848	1.009	2.848	0.9017	2.848	0.8387	2.848	0.7357	2.848	0.6811
2.9836	1.5091	2.9836	1.0367	2.9836	1.009	2.9836	0.9017	2.9836	0.8387	2.9836	0.7357	2.9836	0.6811
3.1257	1.5091	3.1257	1.0367	3.1257	0.9237	3.1257	0.9017	3.1257	0.8387	3.1257	0.7357	3.1257	0.6811
3.2745	1.5091	3.2745	1.0367	3.2745	0.9237	3.2745	0.9017	3.2745	0.8387	3.2745	0.7357	3.2745	0.6811
3.4305	1.5091	3.4305	1.0367	3.4305	0.9237	3.4305	0.9017	3.4305	0.8387	3.4305	0.7357	3.4305	0.6801
3.5938	1.6472	3.5938	1.0367	3.5938	0.9237	3.5938	0.9017	3.5938	0.8387	3.5938	0.7357	3.5938	0.6801
3.7649	1.6472	3.7649	1.1356	3.7649	0.9237	3.7649	0.9017	3.7649	0.8387	3.7649	0.7357	3.7649	0.6766
3.9442	1.6472	3.9442	1.1356	3.9442	0.9237	3.9442	0.906	3.9442	0.8387	3.9442	0.7357	3.9442	0.6759
4.132	1.6472	4.132	1.1356	4.132	0.9237	4.132	0.906	4.132	0.8387	4.132	0.7357	4.132	0.6712
4.3288	1.6472	4.3288	1.1356	4.3288	0.9237	4.3288	0.906	4.3288	0.8387	4.3288	0.7357	4.3288	0.6626
4.5349	1.6472	4.5349	1.1356	4.5349	0.9237	4.5349	0.906	4.5349	0.8387	4.5349	0.7357	4.5349	0.6525
4.7508	1.6472	4.7508	1.1048	4.7508	0.9237	4.7508	0.906	4.7508	0.8387	4.7508	0.7357	4.7508	0.6316
4.977	1.6472	4.977	0.9746	4.977	0.8757	4.977	0.829	4.977	0.7851	4.977	0.7083	4.977	0.6206
5.214	1.6472	5.214	0.9746	5.214	0.8463	5.214	0.785	5.214	0.7434	5.214	0.6732	5.214	0.5898
5.4623	1.7798	5.4623	0.9746	5.4623	0.8463	5.4623	0.785	5.4623	0.7434	5.4623	0.6732	5.4623	0.5898
5.7224	1.7798	5.7224	0.9746	5.7224	0.8463	5.7224	0.785	5.7224	0.7434	5.7224	0.6732	5.7224	0.5898
5.9948	1.7798	5.9948	0.9746	5.9948	0.8438	5.9948	0.785	5.9948	0.7434	5.9948	0.6732	5.9948	0.5898
6.2803	1.7798	6.2803	0.9746	6.2803	0.8438	6.2803	0.785	6.2803	0.7434	6.2803	0.6732	6.2803	0.5898
6.5793	1.7798	6.5793	0.9746	6.5793	0.8438	6.5793	0.7804	6.5793	0.7393	6.5793	0.6657	6.5793	0.5795
6.8926	1.7798	6.8926	0.963	6.8926	0.8429	6.8926	0.7674	6.8926	0.7128	6.8926	0.6345	6.8926	0.5677
7.2208	1.4914	7.2208	0.935	7.2208	0.7922	7.2208	0.7331	7.2208	0.6844	7.2208	0.6283	7.2208	0.5677
7.5646	1.168	7.5646	0.822	7.5646	0.7632	7.5646	0.7188	7.5646	0.6833	7.5646	0.6283	7.5646	0.5677
7.9248	1.0987	7.9248	0.8201	7.9248	0.7623	7.9248	0.7176	7.9248	0.6811	7.9248	0.6237	7.9248	0.5627
8.3022	1.0987	8.3022	0.7845	8.3022	0.7283	8.3022	0.6777	8.3022	0.6364	8.3022	0.5884	8.3022	0.5417
8.6975	0.8935	8.6975	0.7092	8.6975	0.6368	8.6975	0.6061	8.6975	0.5819	8.6975	0.5373	8.6975	0.5059
9.1116	0.8935	9.1116	0.7092	9.1116	0.6368	9.1116	0.5827	9.1116	0.5505	9.1116	0.5085	9.1116	0.4846
9.5455	0.8763	9.5455	0.7092	9.5455	0.6368	9.5455	0.5827	9.5455	0.5459	9.5455	0.4951	9.5455	0.4643
10	0.8763	10	0.7092	10	0.6368	10	0.5827	10	0.5459	10	0.4934	10	0.4429
10.4762	0.8603	10.4762	0.7092	10.4762	0.6368	10.4762	0.5774	10.4762	0.5297	10.4762	0.4688	10.4762	0.4271
10.975	0.791	10.975	0.6543	10.975	0.6067	10.975	0.5582	10.975	0.5137	10.975	0.4674	10.975	0.4271
11.4976	0.791	11.4976	0.6543	11.4976	0.6014	11.4976	0.5519	11.4976	0.5094	11.4976	0.4435	11.4976	0.4142
12.045	0.6677	12.045	0.5543	12.045	0.5086	12.045	0.4716	12.045	0.4394	12.045	0.4081	12.045	0.3915
12.6186	0.6325	12.6186	0.5145	12.6186	0.4727	12.6186	0.4409	12.6186	0.4251	12.6186	0.4004	12.6186	0.3774
13.2194	0.6325	13.2194	0.5025	13.2194	0.4639	13.2194	0.4269	13.2194	0.4021	13.2194	0.379	13.2194	0.3634

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%	2%	3%	4%	5%	7%	10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
13.8489	0.6152	13.8489	0.4815	13.8489	0.433	13.8489	0.3995
14.5083	0.5318	14.5083	0.4455	14.5083	0.4096	14.5083	0.381
15.1991	0.4787	15.1991	0.4141	15.1991	0.3936	15.1991	0.3795
15.9228	0.4787	15.9228	0.3815	15.9228	0.3644	15.9228	0.3609
16.681	0.4787	16.681	0.3815	16.681	0.3644	16.681	0.3544
17.4753	0.4307	17.4753	0.3815	17.4753	0.3644	17.4753	0.3544
18.3074	0.4095	18.3074	0.3431	18.3074	0.3367	18.3074	0.3354
19.1791	0.4095	19.1791	0.3431	19.1791	0.3349	19.1791	0.3293
20.0923	0.3708	20.0923	0.3431	20.0923	0.3349	20.0923	0.3293
21.049	0.3708	21.049	0.3431	21.049	0.3349	21.049	0.3293
22.0513	0.3708	22.0513	0.3431	22.0513	0.3349	22.0513	0.3293
23.1013	0.3708	23.1013	0.3431	23.1013	0.3349	23.1013	0.3293
24.2013	0.3708	24.2013	0.3431	24.2013	0.3349	24.2013	0.3293
25.3536	0.3358	25.3536	0.3197	25.3536	0.3192	25.3536	0.3187
26.5609	0.3358	26.5609	0.3169	26.5609	0.3159	26.5609	0.3158
27.8256	0.3358	27.8256	0.3169	27.8256	0.3159	27.8256	0.3153
29.1505	0.3358	29.1505	0.3165	29.1505	0.3153	29.1505	0.3142
30.5386	0.3312	30.5386	0.3165	30.5386	0.3153	30.5386	0.3142
31.9927	0.3297	31.9927	0.3163	31.9927	0.3146	31.9927	0.3138
33.516	0.3144	33.516	0.3134	33.516	0.3133	33.516	0.3132
35.1119	0.3135	35.1119	0.3134	35.1119	0.3133	35.1119	0.3132
36.7838	0.3134	36.7838	0.3133	36.7838	0.3132	36.7838	0.3132
38.5353	0.3132	38.5353	0.3132	38.5353	0.3131	38.5353	0.3131
40.3702	0.3131	40.3702	0.3131	40.3702	0.3131	40.3702	0.313
42.2924	0.313	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129
44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128
46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127
48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126
50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	
0.1098	0.0405	0.1098	0.0365	0.1098	0.0342	0.1098	0.0322	0.1098	0.0303	0.1098	0.0272	0.1098	0.0235	
0.115	0.0405	0.115	0.0365	0.115	0.0342	0.115	0.0322	0.115	0.0303	0.115	0.0272	0.115	0.0259	
0.1204	0.0405	0.1204	0.0365	0.1204	0.0342	0.1204	0.0322	0.1204	0.031	0.1204	0.0297	0.1204	0.028	
0.1262	0.0405	0.1262	0.0365	0.1262	0.0352	0.1262	0.0342	0.1262	0.0334	0.1262	0.0318	0.1262	0.0297	
0.1322	0.0405	0.1322	0.0382	0.1322	0.037	0.1322	0.0359	0.1322	0.0349	0.1322	0.0333	0.1322	0.0316	
0.1385	0.0411	0.1385	0.0392	0.1385	0.0382	0.1385	0.0372	0.1385	0.0363	0.1385	0.0348	0.1385	0.0328	
0.1451	0.0417	0.1451	0.0398	0.1451	0.0387	0.1451	0.0377	0.1451	0.0368	0.1451	0.0352	0.1451	0.0332	
0.152	0.0439	0.152	0.0401	0.152	0.0387	0.152	0.0377	0.152	0.0368	0.152	0.0352	0.152	0.0332	
0.1592	0.0462	0.1592	0.0416	0.1592	0.0396	0.1592	0.0377	0.1592	0.0368	0.1592	0.0352	0.1592	0.0332	
0.1668	0.0584	0.1668	0.0506	0.1668	0.0463	0.1668	0.0426	0.1668	0.0395	0.1668	0.0352	0.1668	0.0332	
0.1748	0.0645	0.1748	0.0566	0.1748	0.0522	0.1748	0.0484	0.1748	0.045	0.1748	0.0394	0.1748	0.0332	
0.1831	0.0668	0.1831	0.0583	0.1831	0.0541	0.1831	0.0504	0.1831	0.0471	0.1831	0.0415	0.1831	0.0354	
0.1918	0.0678	0.1918	0.0586	0.1918	0.0543	0.1918	0.0507	0.1918	0.0474	0.1918	0.0418	0.1918	0.038	
0.2009	0.0697	0.2009	0.0596	0.2009	0.0543	0.2009	0.0514	0.2009	0.0487	0.2009	0.0438	0.2009	0.0411	
0.2105	0.0722	0.2105	0.062	0.2105	0.0582	0.2105	0.0547	0.2105	0.0516	0.2105	0.0482	0.2105	0.0446	
0.2205	0.0819	0.2205	0.0709	0.2205	0.0651	0.2205	0.06	0.2205	0.0574	0.2205	0.0531	0.2205	0.0475	
0.231	0.0959	0.231	0.0792	0.231	0.0703	0.231	0.0665	0.231	0.063	0.231	0.0578	0.231	0.0525	
0.242	0.0984	0.242	0.0845	0.242	0.0774	0.242	0.0721	0.242	0.0681	0.242	0.0618	0.242	0.0551	
0.2535	0.1059	0.2535	0.0913	0.2535	0.0833	0.2535	0.0763	0.2535	0.0702	0.2535	0.0618	0.2535	0.0551	
0.2656	0.1138	0.2656	0.0944	0.2656	0.084	0.2656	0.0763	0.2656	0.0702	0.2656	0.0618	0.2656	0.0551	
0.2783	0.1138	0.2783	0.0944	0.2783	0.084	0.2783	0.0779	0.2783	0.074	0.2783	0.0677	0.2783	0.0611	
0.2915	0.1138	0.2915	0.1008	0.2915	0.0946	0.2915	0.0892	0.2915	0.0843	0.2915	0.0764	0.2915	0.0677	
0.3054	0.1179	0.3054	0.1056	0.3054	0.0987	0.3054	0.0926	0.3054	0.0872	0.3054	0.0785	0.3054	0.0706	
0.3199	0.1179	0.3199	0.1056	0.3199	0.0987	0.3199	0.0926	0.3199	0.0894	0.3199	0.0844	0.3199	0.0786	
0.3352	0.1179	0.3352	0.1098	0.3352	0.1056	0.3352	0.1017	0.3352	0.0982	0.3352	0.0921	0.3352	0.0848	
0.3511	0.1654	0.3511	0.129	0.3511	0.1133	0.3511	0.1075	0.3511	0.1035	0.3511	0.0964	0.3511	0.088	
0.3678	0.2415	0.3678	0.1832	0.3678	0.1565	0.3678	0.1364	0.3678	0.1213	0.3678	0.1006	0.3678	0.088	
0.3853	0.2549	0.3853	0.187	0.3853	0.1595	0.3853	0.1387	0.3853	0.1269	0.3853	0.1092	0.3853	0.091	
0.4037	0.2549	0.4037	0.187	0.4037	0.1595	0.4037	0.1387	0.4037	0.1279	0.4037	0.1163	0.4037	0.1034	
0.4229	0.2549	0.4229	0.187	0.4229	0.1651	0.4229	0.1485	0.4229	0.1344	0.4229	0.1233	0.4229	0.1111	
0.4431	0.3288	0.4431	0.2339	0.4431	0.2038	0.4431	0.1813	0.4431	0.1641	0.4431	0.1399	0.4431	0.1181	
0.4642	0.3288	0.4642	0.2339	0.4642	0.2038	0.4642	0.1813	0.4642	0.1641	0.4642	0.1399	0.4642	0.1181	
0.4863	0.3288	0.4863	0.2339	0.4863	0.2038	0.4863	0.1813	0.4863	0.1641	0.4863	0.1421	0.4863	0.1246	
0.5094	0.3288	0.5094	0.2339	0.5094	0.2038	0.5094	0.1813	0.5094	0.1641	0.5094	0.1472	0.5094	0.1295	

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.3356	0.5337	0.2387	0.5337	0.2081	0.5337	0.19	0.5337	0.1796	0.5337	0.1614	0.5337	0.1401
0.5591	0.3997	0.5591	0.2762	0.5591	0.244	0.5591	0.2179	0.5591	0.1971	0.5591	0.1724	0.5591	0.1556
0.5857	0.3997	0.5857	0.2863	0.5857	0.2573	0.5857	0.2332	0.5857	0.2128	0.5857	0.1853	0.5857	0.1724
0.6136	0.3997	0.6136	0.2863	0.6136	0.2573	0.6136	0.2332	0.6136	0.2128	0.6136	0.1998	0.6136	0.1858
0.6428	0.3997	0.6428	0.2863	0.6428	0.2573	0.6428	0.2332	0.6428	0.2219	0.6428	0.2115	0.6428	0.1969
0.6734	0.411	0.6734	0.2863	0.6734	0.2574	0.6734	0.2449	0.6734	0.2378	0.6734	0.2244	0.6734	0.2072
0.7055	0.411	0.7055	0.301	0.7055	0.2757	0.7055	0.2638	0.7055	0.2534	0.7055	0.2357	0.7055	0.2156
0.7391	0.6367	0.7391	0.4169	0.7391	0.3404	0.7391	0.2927	0.7391	0.2746	0.7391	0.2445	0.7391	0.217
0.7743	0.6367	0.7743	0.4169	0.7743	0.3404	0.7743	0.3038	0.7743	0.2858	0.7743	0.2555	0.7743	0.2218
0.8111	0.6596	0.8111	0.4428	0.8111	0.386	0.8111	0.3422	0.8111	0.3081	0.8111	0.2598	0.8111	0.2218
0.8497	0.6596	0.8497	0.4428	0.8497	0.4051	0.8497	0.3738	0.8497	0.347	0.8497	0.3034	0.8497	0.256
0.8902	0.6828	0.8902	0.4451	0.8902	0.4051	0.8902	0.3738	0.8902	0.3511	0.8902	0.3194	0.8902	0.2761
0.9326	0.737	0.9326	0.5191	0.9326	0.4567	0.9326	0.411	0.9326	0.3766	0.9326	0.328	0.9326	0.2821
0.977	0.9914	0.977	0.6358	0.977	0.525	0.977	0.4553	0.977	0.408	0.977	0.3484	0.977	0.2994
1.0235	0.9914	1.0235	0.6358	1.0235	0.5662	1.0235	0.5139	1.0235	0.4702	1.0235	0.4041	1.0235	0.3384
1.0723	0.9914	1.0723	0.6668	1.0723	0.5976	1.0723	0.5399	1.0723	0.4914	1.0723	0.4166	1.0723	0.3541
1.1233	1.2606	1.1233	0.8561	1.1233	0.7168	1.1233	0.6174	1.1233	0.5433	1.1233	0.4431	1.1233	0.3633
1.1768	1.2606	1.1768	0.8561	1.1768	0.7168	1.1768	0.6174	1.1768	0.5433	1.1768	0.4467	1.1768	0.3729
1.2328	1.2606	1.2328	0.935	1.2328	0.8202	1.2328	0.7293	1.2328	0.6556	1.2328	0.5433	1.2328	0.4321
1.2916	1.2606	1.2916	1.0351	1.2916	0.8991	1.2916	0.793	1.2916	0.708	1.2916	0.5814	1.2916	0.4586
1.353	1.3319	1.353	1.0351	1.353	0.8991	1.353	0.793	1.353	0.708	1.353	0.5814	1.353	0.4631
1.4175	1.6092	1.4175	1.1325	1.4175	0.9683	1.4175	0.8621	1.4175	0.7817	1.4175	0.6627	1.4175	0.5486
1.485	1.6092	1.485	1.1325	1.485	0.9683	1.485	0.885	1.485	0.8264	1.485	0.7199	1.485	0.6006
1.5557	1.8872	1.5557	1.1818	1.5557	1.0008	1.5557	0.892	1.5557	0.8264	1.5557	0.7265	1.5557	0.6185
1.6298	1.9322	1.6298	1.3084	1.6298	1.1683	1.6298	1.0534	1.6298	0.9565	1.6298	0.8016	1.6298	0.6401
1.7074	1.9702	1.7074	1.3601	1.7074	1.2627	1.7074	1.1415	1.7074	1.0371	1.7074	0.8692	1.7074	0.7006
1.7887	2.4552	1.7887	1.4456	1.7887	1.2629	1.7887	1.1415	1.7887	1.0371	1.7887	0.8773	1.7887	0.7486
1.8738	2.4552	1.8738	1.4456	1.8738	1.2629	1.8738	1.1415	1.8738	1.0371	1.8738	0.9259	1.8738	0.788
1.963	2.4552	1.963	1.4456	1.963	1.2629	1.963	1.1498	1.963	1.0818	1.963	0.9626	1.963	0.8157
2.0565	2.4552	2.0565	1.4456	2.0565	1.2629	2.0565	1.1701	2.0565	1.1049	2.0565	0.9829	2.0565	0.8288
2.1544	2.4552	2.1544	1.4456	2.1544	1.3316	2.1544	1.2297	2.1544	1.1411	2.1544	0.9932	2.1544	0.8645
2.257	2.2367	2.257	1.4456	2.257	1.3316	2.257	1.2297	2.257	1.1534	2.257	1.0344	2.257	0.8939
2.3645	2.2367	2.3645	1.4456	2.3645	1.3316	2.3645	1.2422	2.3645	1.1724	2.3645	1.0471	2.3645	0.898
2.4771	2.2367	2.4771	1.6143	2.4771	1.3804	2.4771	1.2551	2.4771	1.1724	2.4771	1.0471	2.4771	0.898
2.595	2.138	2.595	1.6143	2.595	1.3804	2.595	1.2551	2.595	1.1724	2.595	1.0471	2.595	0.898

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
2.7186	2.138	2.7186	1.6143	2.7186	1.3804	2.7186	1.2551	2.7186	1.1724	2.7186	1.0471	2.7186	0.898
2.848	2.138	2.848	1.6143	2.848	1.3804	2.848	1.2551	2.848	1.1724	2.848	1.0471	2.848	0.898
2.9836	2.138	2.9836	1.6143	2.9836	1.3804	2.9836	1.2551	2.9836	1.1568	2.9836	1.0114	2.9836	0.8645
3.1257	2.138	3.1257	1.3773	3.1257	1.0982	3.1257	1.0035	3.1257	0.9573	3.1257	0.8829	3.1257	0.7931
3.2745	2.138	3.2745	1.2119	3.2745	1.0686	3.2745	0.9673	3.2745	0.886	3.2745	0.778	3.2745	0.7168
3.4305	1.5368	3.4305	1.0471	3.4305	0.9495	3.4305	0.8824	3.4305	0.8379	3.4305	0.7547	3.4305	0.6598
3.5938	1.5368	3.5938	1.0165	3.5938	0.898	3.5938	0.8299	3.5938	0.7946	3.5938	0.7273	3.5938	0.6376
3.7649	1.5368	3.7649	1.0165	3.7649	0.898	3.7649	0.8299	3.7649	0.7769	3.7649	0.6958	3.7649	0.6089
3.9442	1.5368	3.9442	1.0165	3.9442	0.8472	3.9442	0.7941	3.9442	0.7477	3.9442	0.6723	3.9442	0.5955
4.132	1.5368	4.132	1.0165	4.132	0.845	4.132	0.7941	4.132	0.7477	4.132	0.6723	4.132	0.5955
4.3288	1.5368	4.3288	0.9973	4.3288	0.8194	4.3288	0.7522	4.3288	0.7017	4.3288	0.6303	4.3288	0.5622
4.5349	1.5368	4.5349	0.8745	4.5349	0.7347	4.5349	0.6652	4.5349	0.6197	4.5349	0.5656	4.5349	0.5097
4.7508	1.518	4.7508	0.8745	4.7508	0.7183	4.7508	0.6169	4.7508	0.5587	4.7508	0.4909	4.7508	0.4618
4.977	1.518	4.977	0.8614	4.977	0.7025	4.977	0.6052	4.977	0.5367	4.977	0.4572	4.977	0.4284
5.214	1.3404	5.214	0.7497	5.214	0.6443	5.214	0.5421	5.214	0.5109	5.214	0.4398	5.214	0.4021
5.4623	1.3404	5.4623	0.7497	5.4623	0.6443	5.4623	0.5254	5.4623	0.5109	5.4623	0.438	5.4623	0.3783
5.7224	1.3404	5.7224	0.7497	5.7224	0.6443	5.7224	0.5254	5.7224	0.5109	5.7224	0.438	5.7224	0.3681
5.9948	1.3404	5.9948	0.7497	5.9948	0.6443	5.9948	0.5254	5.9948	0.5109	5.9948	0.438	5.9948	0.3681
6.2803	1.3404	6.2803	0.7497	6.2803	0.6443	6.2803	0.5254	6.2803	0.5109	6.2803	0.438	6.2803	0.3681
6.5793	1.3404	6.5793	0.7497	6.5793	0.6443	6.5793	0.5254	6.5793	0.5109	6.5793	0.438	6.5793	0.3681
6.8926	1.3404	6.8926	0.7497	6.8926	0.6443	6.8926	0.5254	6.8926	0.5109	6.8926	0.438	6.8926	0.3681
7.2208	1.274	7.2208	0.7497	7.2208	0.6443	7.2208	0.5254	7.2208	0.5109	7.2208	0.438	7.2208	0.3681
7.5646	1.274	7.5646	0.7455	7.5646	0.6309	7.5646	0.5254	7.5646	0.5092	7.5646	0.438	7.5646	0.3681
7.9248	1.274	7.9248	0.6003	7.9248	0.5494	7.9248	0.5064	7.9248	0.471	7.9248	0.4168	7.9248	0.3609
8.3022	1.274	8.3022	0.5659	8.3022	0.4849	8.3022	0.454	8.3022	0.4288	8.3022	0.394	8.3022	0.3594
8.6975	1.0027	8.6975	0.521	8.6975	0.4849	8.6975	0.454	8.6975	0.4288	8.6975	0.3913	8.6975	0.3536
9.1116	1.0027	9.1116	0.4701	9.1116	0.4386	9.1116	0.4105	9.1116	0.3865	9.1116	0.3654	9.1116	0.3376
9.5455	1.0027	9.5455	0.4494	9.5455	0.4069	9.5455	0.3794	9.5455	0.3652	9.5455	0.3418	9.5455	0.3167
10	0.6463	10	0.4494	10	0.4069	10	0.3794	10	0.3585	10	0.3293	10	0.3015
10.4762	0.6411	10.4762	0.4371	10.4762	0.3959	10.4762	0.3648	10.4762	0.347	10.4762	0.3169	10.4762	0.2936
10.975	0.6411	10.975	0.4085	10.975	0.3668	10.975	0.3387	10.975	0.3179	10.975	0.2923	10.975	0.2891
11.4976	0.6411	11.4976	0.3647	11.4976	0.3304	11.4976	0.3133	11.4976	0.3024	11.4976	0.2893	11.4976	0.2857
12.045	0.6411	12.045	0.3647	12.045	0.3304	12.045	0.3133	12.045	0.3024	12.045	0.2893	12.045	0.2839
12.6186	0.6411	12.6186	0.3647	12.6186	0.3304	12.6186	0.3133	12.6186	0.3024	12.6186	0.2893	12.6186	0.2831
13.2194	0.6411	13.2194	0.3647	13.2194	0.3304	13.2194	0.3133	13.2194	0.3024	13.2194	0.2893	13.2194	0.2831

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.6411	13.8489	0.3647	13.8489	0.3304	13.8489	0.3133	13.8489	0.3024	13.8489	0.2893	13.8489	0.2831
14.5083	0.6411	14.5083	0.3647	14.5083	0.3304	14.5083	0.3133	14.5083	0.3024	14.5083	0.2893	14.5083	0.2831
15.1991	0.6411	15.1991	0.3647	15.1991	0.3304	15.1991	0.3133	15.1991	0.3024	15.1991	0.2893	15.1991	0.2831
15.9228	0.6411	15.9228	0.3647	15.9228	0.3304	15.9228	0.3133	15.9228	0.3024	15.9228	0.2893	15.9228	0.2831
16.681	0.6411	16.681	0.3647	16.681	0.3304	16.681	0.3133	16.681	0.3024	16.681	0.2893	16.681	0.2831
17.4753	0.6411	17.4753	0.3647	17.4753	0.3304	17.4753	0.3133	17.4753	0.3024	17.4753	0.2893	17.4753	0.2831
18.3074	0.4714	18.3074	0.3284	18.3074	0.3152	18.3074	0.3052	18.3074	0.298	18.3074	0.2893	18.3074	0.2831
19.1791	0.4714	19.1791	0.3088	19.1791	0.2936	19.1791	0.2872	19.1791	0.2851	19.1791	0.2842	19.1791	0.2825
20.0923	0.4714	20.0923	0.3088	20.0923	0.2886	20.0923	0.2865	20.0923	0.2851	20.0923	0.2833	20.0923	0.2814
21.049	0.3824	21.049	0.2877	21.049	0.2842	21.049	0.2843	21.049	0.2836	21.049	0.2819	21.049	0.2801
22.0513	0.3824	22.0513	0.2873	22.0513	0.2834	22.0513	0.2816	22.0513	0.2806	22.0513	0.2795	22.0513	0.2783
23.1013	0.2973	23.1013	0.2832	23.1013	0.2814	23.1013	0.2802	23.1013	0.2793	23.1013	0.2779	23.1013	0.2765
24.2013	0.2947	24.2013	0.2805	24.2013	0.2788	24.2013	0.2776	24.2013	0.2768	24.2013	0.2763	24.2013	0.2756
25.3536	0.288	25.3536	0.2805	25.3536	0.2788	25.3536	0.2776	25.3536	0.2768	25.3536	0.2757	25.3536	0.2749
26.5609	0.288	26.5609	0.2805	26.5609	0.2788	26.5609	0.2776	26.5609	0.2768	26.5609	0.2757	26.5609	0.2747
27.8256	0.2867	27.8256	0.28	27.8256	0.2782	27.8256	0.2771	27.8256	0.2762	27.8256	0.2751	27.8256	0.2741
29.1505	0.2773	29.1505	0.2753	29.1505	0.2749	29.1505	0.2745	29.1505	0.2742	29.1505	0.2738	29.1505	0.2732
30.5386	0.2773	30.5386	0.2727	30.5386	0.2726	30.5386	0.2725	30.5386	0.2724	30.5386	0.2723	30.5386	0.2721
31.9927	0.2707	31.9927	0.271	31.9927	0.271	31.9927	0.2711	31.9927	0.2711	31.9927	0.2712	31.9927	0.2712
33.516	0.2707	33.516	0.2707	33.516	0.2706	33.516	0.2706	33.516	0.2706	33.516	0.2706	33.516	0.2706
35.1119	0.27	35.1119	0.27	35.1119	0.27	35.1119	0.2701	35.1119	0.2701	35.1119	0.2701	35.1119	0.2701
36.7838	0.2695	36.7838	0.2696	36.7838	0.2696	36.7838	0.2696	36.7838	0.2697	36.7838	0.2697	36.7838	0.2697
38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693
40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269
42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2688
44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685
46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683
48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681
50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	
0.1098	0.0291	0.1098	0.0261	0.1098	0.0245	0.1098	0.023	0.1098	0.0222	0.1098	0.0215	0.1098	0.0207	
0.115	0.0309	0.115	0.0261	0.115	0.0245	0.115	0.0235	0.115	0.0231	0.115	0.0224	0.115	0.0216	
0.1204	0.0313	0.1204	0.0263	0.1204	0.0247	0.1204	0.0242	0.1204	0.0238	0.1204	0.0231	0.1204	0.0222	
0.1262	0.0313	0.1262	0.027	0.1262	0.0258	0.1262	0.0247	0.1262	0.0243	0.1262	0.0235	0.1262	0.0225	
0.1322	0.0313	0.1322	0.0271	0.1322	0.0258	0.1322	0.0248	0.1322	0.0244	0.1322	0.0236	0.1322	0.0226	
0.1385	0.0313	0.1385	0.0277	0.1385	0.0266	0.1385	0.0255	0.1385	0.0246	0.1385	0.0236	0.1385	0.0227	
0.1451	0.0316	0.1451	0.0295	0.1451	0.0282	0.1451	0.027	0.1451	0.0259	0.1451	0.0239	0.1451	0.0227	
0.152	0.032	0.152	0.0299	0.152	0.0286	0.152	0.0273	0.152	0.0262	0.152	0.0241	0.152	0.0227	
0.1592	0.0331	0.1592	0.0311	0.1592	0.03	0.1592	0.0289	0.1592	0.0279	0.1592	0.0265	0.1592	0.0247	
0.1668	0.0367	0.1668	0.0324	0.1668	0.0313	0.1668	0.0304	0.1668	0.0296	0.1668	0.0281	0.1668	0.0261	
0.1748	0.0507	0.1748	0.0427	0.1748	0.0386	0.1748	0.0351	0.1748	0.0322	0.1748	0.0288	0.1748	0.0268	
0.1831	0.0586	0.1831	0.0493	0.1831	0.0442	0.1831	0.0399	0.1831	0.0362	0.1831	0.0306	0.1831	0.027	
0.1918	0.0586	0.1918	0.0493	0.1918	0.0442	0.1918	0.0399	0.1918	0.0362	0.1918	0.0306	0.1918	0.0277	
0.2009	0.0586	0.2009	0.0493	0.2009	0.0442	0.2009	0.0399	0.2009	0.0362	0.2009	0.0329	0.2009	0.03	
0.2105	0.0586	0.2105	0.0493	0.2105	0.0442	0.2105	0.0403	0.2105	0.0388	0.2105	0.0361	0.2105	0.0326	
0.2205	0.0586	0.2205	0.0493	0.2205	0.0455	0.2205	0.0429	0.2205	0.0408	0.2205	0.0378	0.2205	0.0339	
0.231	0.0586	0.231	0.0493	0.231	0.0459	0.231	0.044	0.231	0.0422	0.231	0.039	0.231	0.0354	
0.242	0.0586	0.242	0.051	0.242	0.0487	0.242	0.0465	0.242	0.0446	0.242	0.0411	0.242	0.0371	
0.2535	0.065	0.2535	0.0574	0.2535	0.053	0.2535	0.049	0.2535	0.0454	0.2535	0.0412	0.2535	0.0387	
0.2656	0.0732	0.2656	0.0587	0.2656	0.0536	0.2656	0.0492	0.2656	0.0454	0.2656	0.0437	0.2656	0.0417	
0.2783	0.0817	0.2783	0.0599	0.2783	0.0536	0.2783	0.0508	0.2783	0.0495	0.2783	0.0471	0.2783	0.044	
0.2915	0.0817	0.2915	0.0619	0.2915	0.0581	0.2915	0.0547	0.2915	0.052	0.2915	0.0488	0.2915	0.0449	
0.3054	0.0817	0.3054	0.0666	0.3054	0.0624	0.3054	0.0586	0.3054	0.0552	0.3054	0.0499	0.3054	0.0461	
0.3199	0.0817	0.3199	0.0702	0.3199	0.0661	0.3199	0.0623	0.3199	0.0591	0.3199	0.0538	0.3199	0.0475	
0.3352	0.0875	0.3352	0.0769	0.3352	0.071	0.3352	0.0665	0.3352	0.0631	0.3352	0.0572	0.3352	0.0503	
0.3511	0.091	0.3511	0.0809	0.3511	0.0752	0.3511	0.0701	0.3511	0.0656	0.3511	0.0579	0.3511	0.0508	
0.3678	0.1221	0.3678	0.0953	0.3678	0.0824	0.3678	0.0723	0.3678	0.0656	0.3678	0.0579	0.3678	0.0508	
0.3853	0.1364	0.3853	0.106	0.3853	0.0922	0.3853	0.0811	0.3853	0.0723	0.3853	0.0594	0.3853	0.0508	
0.4037	0.1364	0.4037	0.106	0.4037	0.0922	0.4037	0.0825	0.4037	0.0766	0.4037	0.0667	0.4037	0.0573	
0.4229	0.1364	0.4229	0.106	0.4229	0.0922	0.4229	0.0853	0.4229	0.0801	0.4229	0.0716	0.4229	0.0615	
0.4431	0.1364	0.4431	0.106	0.4431	0.094	0.4431	0.0891	0.4431	0.0844	0.4431	0.076	0.4431	0.0659	
0.4642	0.1377	0.4642	0.106	0.4642	0.0979	0.4642	0.0921	0.4642	0.0866	0.4642	0.0772	0.4642	0.0681	
0.4863	0.1482	0.4863	0.1245	0.4863	0.1116	0.4863	0.1006	0.4863	0.0911	0.4863	0.0833	0.4863	0.0743	
0.5094	0.1823	0.5094	0.1391	0.5094	0.1225	0.5094	0.1091	0.5094	0.0984	0.5094	0.0875	0.5094	0.0759	

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.2226	0.5337	0.1617	0.5337	0.1354	0.5337	0.1157	0.5337	0.1031	0.5337	0.0875	0.5337	0.0759
0.5591	0.2226	0.5591	0.1617	0.5591	0.1354	0.5591	0.1157	0.5591	0.1031	0.5591	0.0895	0.5591	0.0761
0.5857	0.2226	0.5857	0.1617	0.5857	0.1354	0.5857	0.1157	0.5857	0.1035	0.5857	0.0957	0.5857	0.0843
0.6136	0.2226	0.6136	0.1617	0.6136	0.1354	0.6136	0.1191	0.6136	0.1123	0.6136	0.1013	0.6136	0.0887
0.6428	0.2271	0.6428	0.1635	0.6428	0.1368	0.6428	0.1191	0.6428	0.114	0.6428	0.1049	0.6428	0.0922
0.6734	0.2271	0.6734	0.1635	0.6734	0.1397	0.6734	0.1298	0.6734	0.1217	0.6734	0.1087	0.6734	0.0942
0.7055	0.2271	0.7055	0.1635	0.7055	0.1397	0.7055	0.1298	0.7055	0.1217	0.7055	0.1112	0.7055	0.0976
0.7391	0.2271	0.7391	0.1635	0.7391	0.1428	0.7391	0.1342	0.7391	0.1258	0.7391	0.1112	0.7391	0.0976
0.7743	0.3199	0.7743	0.2154	0.7743	0.1823	0.7743	0.1597	0.7743	0.1436	0.7743	0.1227	0.7743	0.1045
0.8111	0.3199	0.8111	0.2154	0.8111	0.1823	0.8111	0.1597	0.8111	0.1436	0.8111	0.1227	0.8111	0.1072
0.8497	0.3199	0.8497	0.2154	0.8497	0.1823	0.8497	0.1667	0.8497	0.1542	0.8497	0.1343	0.8497	0.1151
0.8902	0.3199	0.8902	0.2154	0.8902	0.1899	0.8902	0.1741	0.8902	0.1611	0.8902	0.1408	0.8902	0.1199
0.9326	0.4905	0.9326	0.3017	0.9326	0.2482	0.9326	0.2168	0.9326	0.1947	0.9326	0.1653	0.9326	0.1387
0.977	0.4905	0.977	0.3017	0.977	0.2482	0.977	0.2168	0.977	0.1947	0.977	0.1738	0.977	0.1524
1.0235	0.4905	1.0235	0.3017	1.0235	0.2482	1.0235	0.2168	1.0235	0.1947	1.0235	0.1823	1.0235	0.1634
1.0723	0.4905	1.0723	0.3017	1.0723	0.2637	1.0723	0.2423	1.0723	0.2253	1.0723	0.1992	1.0723	0.1725
1.1233	0.5817	1.1233	0.3433	1.1233	0.2704	1.1233	0.2423	1.1233	0.2253	1.1233	0.1992	1.1233	0.1725
1.1768	0.5817	1.1768	0.3818	1.1768	0.3175	1.1768	0.2803	1.1768	0.2507	1.1768	0.2165	1.1768	0.1887
1.2328	0.5817	1.2328	0.3891	1.2328	0.3511	1.2328	0.3196	1.2328	0.293	1.2328	0.2534	1.2328	0.2151
1.2916	0.5817	1.2916	0.4229	1.2916	0.3735	1.2916	0.3328	1.2916	0.3047	1.2916	0.2628	1.2916	0.2219
1.353	0.6371	1.353	0.4229	1.353	0.3735	1.353	0.3371	1.353	0.3183	1.353	0.2864	1.353	0.2496
1.4175	0.6371	1.4175	0.4229	1.4175	0.3787	1.4175	0.3589	1.4175	0.341	1.4175	0.3097	1.4175	0.2727
1.485	0.6371	1.485	0.4494	1.485	0.4202	1.485	0.3933	1.485	0.3686	1.485	0.3278	1.485	0.2853
1.5557	0.6371	1.5557	0.4814	1.5557	0.4509	1.5557	0.4238	1.5557	0.3991	1.5557	0.3558	1.5557	0.3055
1.6298	0.7646	1.6298	0.499	1.6298	0.46	1.6298	0.4334	1.6298	0.4095	1.6298	0.3689	1.6298	0.3214
1.7074	0.8139	1.7074	0.632	1.7074	0.5602	1.7074	0.5042	1.7074	0.458	1.7074	0.3899	1.7074	0.3341
1.7887	0.9195	1.7887	0.7556	1.7887	0.6777	1.7887	0.6117	1.7887	0.5549	1.7887	0.4736	1.7887	0.3952
1.8738	0.9711	1.8738	0.7836	1.8738	0.7098	1.8738	0.6502	1.8738	0.6034	1.8738	0.5221	1.8738	0.4298
1.963	1.1224	1.963	0.8714	1.963	0.7675	1.963	0.7007	1.963	0.6427	1.963	0.5486	1.963	0.4456
2.0565	1.2768	2.0565	0.9218	2.0565	0.8205	2.0565	0.7381	2.0565	0.6713	2.0565	0.567	2.0565	0.4588
2.1544	1.2768	2.1544	0.9218	2.1544	0.8205	2.1544	0.7381	2.1544	0.6713	2.1544	0.567	2.1544	0.4588
2.257	1.2768	2.257	0.9218	2.257	0.8205	2.257	0.7381	2.257	0.6756	2.257	0.5786	2.257	0.4821
2.3645	1.8982	2.3645	1.0227	2.3645	0.8284	2.3645	0.7528	2.3645	0.6902	2.3645	0.5876	2.3645	0.4962
2.4771	2.2619	2.4771	1.215	2.4771	0.9875	2.4771	0.8191	2.4771	0.7265	2.4771	0.6267	2.4771	0.5235
2.595	2.7147	2.595	1.215	2.595	1.0799	2.595	0.8772	2.595	0.7512	2.595	0.6435	2.595	0.5443

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
2.7186	2.7147	2.7186	1.215	2.7186	1.0799	2.7186	0.8772	2.7186	0.7512	2.7186	0.6435	2.7186	0.5443	
2.848	2.7147	2.848	1.215	2.848	1.0799	2.848	0.8772	2.848	0.7512	2.848	0.6435	2.848	0.5443	
2.9836	2.7147	2.9836	1.215	2.9836	1.0799	2.9836	0.8772	2.9836	0.7512	2.9836	0.6435	2.9836	0.5443	
3.1257	2.7147	3.1257	1.215	3.1257	1.0799	3.1257	0.8772	3.1257	0.7512	3.1257	0.6435	3.1257	0.5443	
3.2745	1.5417	3.2745	0.9998	3.2745	0.8571	3.2745	0.7497	3.2745	0.6847	3.2745	0.6146	3.2745	0.5331	
3.4305	1.3529	3.4305	0.9515	3.4305	0.8527	3.4305	0.7497	3.4305	0.6847	3.4305	0.6146	3.4305	0.5331	
3.5938	1.3529	3.5938	0.9515	3.5938	0.8527	3.5938	0.7497	3.5938	0.6847	3.5938	0.6146	3.5938	0.5331	
3.7649	1.3529	3.7649	0.9515	3.7649	0.8527	3.7649	0.7497	3.7649	0.6847	3.7649	0.6146	3.7649	0.5331	
3.9442	1.3529	3.9442	0.9515	3.9442	0.8527	3.9442	0.7497	3.9442	0.6847	3.9442	0.6146	3.9442	0.5331	
4.132	1.3529	4.132	0.9515	4.132	0.8527	4.132	0.7497	4.132	0.6847	4.132	0.6146	4.132	0.5331	
4.3288	1.3529	4.3288	0.9515	4.3288	0.8527	4.3288	0.7497	4.3288	0.6847	4.3288	0.6146	4.3288	0.5331	
4.5349	1.3529	4.5349	0.9515	4.5349	0.8527	4.5349	0.7497	4.5349	0.6847	4.5349	0.6146	4.5349	0.5331	
4.7508	1.3529	4.7508	0.9515	4.7508	0.8527	4.7508	0.7497	4.7508	0.6847	4.7508	0.6146	4.7508	0.5331	
4.977	1.3529	4.977	0.9515	4.977	0.8527	4.977	0.7497	4.977	0.6847	4.977	0.6146	4.977	0.5331	
5.214	1.3529	5.214	0.9515	5.214	0.8527	5.214	0.7717	5.214	0.7023	5.214	0.6348	5.214	0.5762	
5.4623	1.7018	5.4623	1.0022	5.4623	0.8819	5.4623	0.7998	5.4623	0.7428	5.4623	0.6773	5.4623	0.6164	
5.7224	2.0139	5.7224	1.1678	5.7224	0.9985	5.7224	0.8801	5.7224	0.7914	5.7224	0.7294	5.7224	0.6583	
5.9948	2.0139	5.9948	1.1824	5.9948	1.0061	5.9948	0.9321	5.9948	0.8745	5.9948	0.7841	5.9948	0.6883	
6.2803	2.0139	6.2803	1.1985	6.2803	1.0822	6.2803	1.0006	6.2803	0.934	6.2803	0.8328	6.2803	0.7285	
6.5793	2.0139	6.5793	1.2079	6.5793	1.1156	6.5793	1.0368	6.5793	0.9732	6.5793	0.8722	6.5793	0.7624	
6.8926	2.8655	6.8926	1.5914	6.8926	1.338	6.8926	1.1976	6.8926	1.1027	6.8926	0.9588	6.8926	0.8114	
7.2208	3.1519	7.2208	1.7665	7.2208	1.4894	7.2208	1.3335	7.2208	1.2072	7.2208	1.0657	7.2208	0.9233	
7.5646	3.4088	7.5646	1.9808	7.5646	1.7109	7.5646	1.5432	7.5646	1.4299	7.5646	1.2268	7.5646	0.9962	
7.9248	3.7732	7.9248	2.5319	7.9248	2.1034	7.9248	1.8073	7.9248	1.5814	7.9248	1.3219	7.9248	1.0918	
8.3022	4.5641	8.3022	2.6088	8.3022	2.171	8.3022	1.915	8.3022	1.7123	8.3022	1.3901	8.3022	1.1675	
8.6975	4.6879	8.6975	2.6088	8.6975	2.171	8.6975	1.915	8.6975	1.7123	8.6975	1.3901	8.6975	1.2638	
9.1116	4.6879	9.1116	2.6088	9.1116	2.171	9.1116	1.915	9.1116	1.7123	9.1116	1.3901	9.1116	1.2638	
9.5455	4.6879	9.5455	2.6088	9.5455	2.171	9.5455	1.915	9.5455	1.7123	9.5455	1.3901	9.5455	1.2638	
10	4.6879	10	2.6088	10	2.171	10	1.915	10	1.7123	10	1.3901	10	1.2638	
10.4762	4.6879	10.4762	2.6088	10.4762	2.171	10.4762	1.915	10.4762	1.7123	10.4762	1.3901	10.4762	1.2638	
10.975	4.6879	10.975	2.6088	10.975	2.171	10.975	1.915	10.975	1.7123	10.975	1.3901	10.975	1.2305	
11.4976	5.7083	11.4976	2.5137	11.4976	1.9646	11.4976	1.756	11.4976	1.6138	11.4976	1.3836	11.4976	1.1653	
12.045	5.7083	12.045	2.5137	12.045	1.9119	12.045	1.5798	12.045	1.4346	12.045	1.2479	12.045	1.1653	
12.6186	5.7083	12.6186	2.5137	12.6186	1.9119	12.6186	1.5798	12.6186	1.4189	12.6186	1.1818	12.6186	1.1653	
13.2194	5.7083	13.2194	2.5137	13.2194	1.9119	13.2194	1.5659	13.2194	1.387	13.2194	1.1818	13.2194	1.1653	

PTWW121.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 121 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_H-L-7-12

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
13.8489	5.7083	13.8489	2.5137	13.8489	1.9119	13.8489	1.5659	13.8489	1.387	13.8489	1.1818	13.8489	1.1653	
14.5083	4.6777	14.5083	2.3117	14.5083	1.7577	14.5083	1.5659	14.5083	1.387	14.5083	1.1818	14.5083	1.1114	
15.1991	4.6777	15.1991	2.3117	15.1991	1.7366	15.1991	1.537	15.1991	1.387	15.1991	1.1818	15.1991	1.1032	
15.9228	4.6777	15.9228	2.3117	15.9228	1.7366	15.9228	1.537	15.9228	1.387	15.9228	1.1644	15.9228	1.1032	
16.681	4.6777	16.681	2.3117	16.681	1.7366	16.681	1.537	16.681	1.387	16.681	1.1644	16.681	1.1032	
17.4753	4.6777	17.4753	2.3117	17.4753	1.7366	17.4753	1.537	17.4753	1.387	17.4753	1.1644	17.4753	1.1032	
18.3074	2.7677	18.3074	1.962	18.3074	1.6751	18.3074	1.512	18.3074	1.3789	18.3074	1.1644	18.3074	0.9852	
19.1791	1.9267	19.1791	1.4264	19.1791	1.3108	19.1791	1.2176	19.1791	1.1358	19.1791	1.0227	19.1791	0.8897	
20.0923	1.2493	20.0923	1.0816	20.0923	1.0133	20.0923	0.9536	20.0923	0.9008	20.0923	0.8109	20.0923	0.7479	
21.049	1.2493	21.049	0.9073	21.049	0.828	21.049	0.7844	21.049	0.7563	21.049	0.7314	21.049	0.706	
22.0513	0.993	22.0513	0.7974	22.0513	0.7401	22.0513	0.6995	22.0513	0.6943	22.0513	0.6838	22.0513	0.668	
23.1013	0.6779	23.1013	0.6627	23.1013	0.6574	23.1013	0.6529	23.1013	0.6489	23.1013	0.6416	23.1013	0.6313	
24.2013	0.6151	24.2013	0.6095	24.2013	0.6076	24.2013	0.6061	24.2013	0.6047	24.2013	0.6017	24.2013	0.5969	
25.3536	0.5629	25.3536	0.5604	25.3536	0.5634	25.3536	0.5654	25.3536	0.5667	25.3536	0.5677	25.3536	0.5671	
26.5609	0.5491	26.5609	0.542	26.5609	0.5413	26.5609	0.5411	26.5609	0.5413	26.5609	0.5421	26.5609	0.5428	
27.8256	0.5375	27.8256	0.5118	27.8256	0.5123	27.8256	0.5158	27.8256	0.5181	27.8256	0.5209	27.8256	0.5232	
29.1505	0.5375	29.1505	0.5118	29.1505	0.5069	29.1505	0.5051	29.1505	0.5048	29.1505	0.5057	29.1505	0.5077	
30.5386	0.4891	30.5386	0.4832	30.5386	0.4826	30.5386	0.4854	30.5386	0.4884	30.5386	0.4922	30.5386	0.4954	
31.9927	0.4891	31.9927	0.4832	31.9927	0.4826	31.9927	0.4828	31.9927	0.4834	31.9927	0.4847	31.9927	0.4867	
33.516	0.4797	33.516	0.4786	33.516	0.4785	33.516	0.4785	33.516	0.4787	33.516	0.4791	33.516	0.48	
35.1119	0.4732	35.1119	0.4733	35.1119	0.4733	35.1119	0.4733	35.1119	0.4734	35.1119	0.4736	35.1119	0.474	
36.7838	0.4677	36.7838	0.4679	36.7838	0.4679	36.7838	0.468	36.7838	0.4681	36.7838	0.4683	36.7838	0.4686	
38.5353	0.4628	38.5353	0.4629	38.5353	0.463	38.5353	0.4631	38.5353	0.4632	38.5353	0.4633	38.5353	0.4636	
40.3702	0.4584	40.3702	0.4585	40.3702	0.4585	40.3702	0.4586	40.3702	0.4586	40.3702	0.4588	40.3702	0.459	
42.2924	0.4543	42.2924	0.4544	42.2924	0.4544	42.2924	0.4545	42.2924	0.4545	42.2924	0.4547	42.2924	0.4548	
44.3062	0.4505	44.3062	0.4506	44.3062	0.4507	44.3062	0.4507	44.3062	0.4507	44.3062	0.4509	44.3062	0.451	
46.4159	0.4471	46.4159	0.4471	46.4159	0.4472	46.4159	0.4472	46.4159	0.4472	46.4159	0.4473	46.4159	0.4475	
48.626	0.4439	48.626	0.4439	48.626	0.4439	48.626	0.4439	48.626	0.444	48.626	0.444	48.626	0.4442	
50.9414	0.4408	50.9414	0.4408	50.9414	0.4408	50.9414	0.4408	50.9414	0.4409	50.9414	0.4409	50.9414	0.4411	



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
**24590-PTF-MB-FEP-RBLR-00001A**

Data Sheet No.  
**24590-PTF-MED-FEP-00009**

Project:	<b>RPP-WTP</b>	Description:	<b>Waste Feed Evaporator Reboiler</b>
Project No:	<b>24590</b>	P&ID:	<b>24590-PTF-M6-FEP-00002002</b>
Site:	<b>Hanford</b>	Process Calc:	<b>24590-PTF-MEC-FEP-00001</b>
Process flow diagram:	<b>24590-PTF-M5-V17T-00004002</b>	Manufacturer Name:	<b>Framatome ANP / Northwest Copper Works, INC.</b>

**General Data**

Quality Level	<b>Q (See Note 8)</b>	TEMA (Class/Type)	<b>B</b>
Seismic Category	<b>SC-I</b>	Flow Type (Counter current, etc)	<b>2 - pass tubeside</b>
Design Code	<b>ASME VIII Div 1</b>	Heat Exchanger Duty Btu/hr	<b>17,800,000</b>
Code Stamp	<b>Yes</b>	Heat Exchanger Area ft <sup>2</sup>	<b>2224</b>
NB Registration	<b>Yes</b>	ΔT (LMTD/Corrected LMTD) °F	<b>96.5</b>

**Thermal/Hydraulic Data**

	Shell Side		Tube Side	
Fluid Name	<b>Steam</b>		<b>Waste Feed Recirculation</b>	
Fluid Quantities: Total lbm/hr	<b>18,314</b> <sup>3</sup>		<b>6,524,607</b>	
Condensable Vapor (In/Out)	<b>18,313</b>	<b>3.0</b>	<b>N/A</b>	<b>N/A</b>
Liquid	<b>N/A</b>	<b>18,310</b>	<b>6,524,607</b>	<b>6,524,607</b>
Noncondensable	<b>1.0</b>	<b>1.0</b>	<b>N/A</b>	<b>N/A</b>
Temperature (In/Out) °F	* <sup>3</sup>	* <sup>3</sup>	* <sup>3</sup>	* <sup>3</sup>
Density lbm/ft <sup>3</sup>	* <sup>3</sup>	* <sup>3</sup>	* <sup>3</sup>	<b>1.19</b>
Viscosity Cp	* <sup>3</sup>	* <sup>3</sup>	* <sup>3</sup>	<b>12</b>
Molecular Weight	* <sup>3</sup>	* <sup>3</sup>	* <sup>3</sup>	* <sup>3</sup>
Molecular Weight, Noncondensable	* <sup>3</sup>	* <sup>3</sup>	* <sup>3</sup>	* <sup>3</sup>
Specific Heat Btu/lbm-°F	* <sup>3</sup>	* <sup>3</sup>	* <sup>3</sup>	* <sup>3</sup>
Thermal Conductivity Btu/hr-ft-°F	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
Latent Heat Btu/lbm @ °F	<b>N/A</b>		<b>N/A</b>	
Inlet pressure psia	<b>14.4</b>		<b>N/A</b>	
Tube side Velocity ft/s	<b>N/A</b>		<b>6.0</b>	
Pressure Drop (Allowed) psi	<b>N/A</b>		<b>N/A</b>	
Fouling Resistance (Min) hr-ft <sup>2</sup> -°F/Btu	<b>0.0015</b>		<b>0.007</b>	

**Mechanical Design Data**

	Shell Side		Tube Side	
Design Pressure (Max/Min) psig	<b>50</b>	<b>Full Vacuum</b>	<b>50</b>	<b>Full Vacuum</b>
Design Temperature (Max/Min) °F	<b>275</b>	<b>49</b>	<b>175</b>	<b>49</b>
Corrosion Allowance inch	<b>0.040</b>		<b>0.040</b>	
Erosion Allowance inch	<b>N/A</b>		<b>N/A</b>	
Shell OD / ID inch	<b>60 ID</b>		Overall Dimensions (H x W x L) inch	<b>72 x 72 x 180</b>
Total No. of Tubes	<b>800</b>		Tube OD inch	<b>1.5</b>

**Material Data**

Shell	<b>SA 240 304 SS (max carbon 0.030%)</b>	Shell Cover	<b>SA 240 304 SS (max carbon 0.030%)</b>
Channel/Bonnet	<b>SB 582 UNS N06030 (Alloy G-30)</b>	Channel Cover	<b>SB 582 UNS N06030 (Alloy G-30)</b>
Tube	<b>SB 622 UNS N06030 (Alloy G-30 SMLS)</b>	Floating Head Cover	<b>N/A</b>
Stationary Tube Sheet	<b>SB 582 UNS N06030 (Alloy G-30)</b>	Floating Tube Sheet	<b>N/A</b>
Shell Side Gaskets	<b>N/A</b>	Tube Side Gaskets	<b>N/A</b>
Partition Seals	<b>N/A</b>	Baffles/Supports	<b>SA 240 304 SS (max carbon 0.030%)</b>
Insulation	<b>N/A</b>	Forgings (Shell Side)	<b>N/A</b>
Bolting	<b>N/A</b>	Forgings (Channel)	<b>N/A</b>

R11042823

ISSUED BY  
**RPP-WTP PDC**



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
24590-PTF-MB-FEP-RBLR-00001A

Data Sheet No.  
24590-PTF-MED-FEP-00009

**Construction Data** (To be determined by the supplier when not specified by the buyer)

Cross Baffle Type	*	% Baffle Cut (Dia.)	*	Spacing (c/c)	inch	*
Bypass Seal Arrangement	*	Longitudinal Seal Type	*	Expansion Joint Type		*
Inlet Nozzle $\rho V^2$	*	Bundle Entrance $\rho V^2$	*	Bundle Exit $\rho V^2$		*
Tube Support Type	*	U-bend Support Type	*	Weight of Bundle	lbf	*
Operating Weight	lbf	Full of Water	lbf	Weight of Shell	lbf	*

**Notes**

\* To be determined / verified by Vendor. 3

\*\* Deleted. 3

(1) All welds are continuous to avoid crevices, weld surface finish is descaled as laid.

(2) All welded construction.

(3) Tube to tubesheet joint shall be strength welded.

(4) Contents of this document are Dangerous Waste Permit Affecting.

(5) Not Used.

(6) Not Used.

(7) For nozzles loads, see 24590-PTF-3PS-MEVV-T0001.

3 (8) Vendor will provide item at BNI quality level Q specification, which corresponds with vendor quality level QL-2.

(9) Vendor design information is from document 24590-QL-POA-MEVV-00001-02-00056.

(10) For equipment cyclic data, see 24590-PTF-3PS-MEVV-T0001.

(11) The physical design parameters shall be determined by the seller based on TEMA and HEI standards.

3 (12) 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.

Safety screening / evaluation required?  Yes  No If yes per 24590-WTP-GPP-SREG-002, E&NS signature required below.

Rev.	Description	By	Checked	EN&S	Approved	Date
3	Updated to reflect WSGM analysis, 24590-PTF-UON-W16T-00003 and incorporate DOE AEA note (12). <b>* INDICATES VALVES TO BE UPDATED. OTHER DATA UPDATED</b>	D. Tate	R. Rickenbach	S. Woolfolk	J. Julyk	2/19/09
2	Incorporated Vendor Design and Equipment Qualification data	R. Rickenbach	C. Knauss	S. Woolfolk	J. Julyk	07/22/2008
1	Incorporated Vendor Design	E. Le	R. Nowak	N/A	J. Julyk	04/04/2005
0	Issued for Procurement	E. Le	S. Shah	N/A	J. Julyk	04/30/2003



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00009 Rev.: 3

Attachment 1, Page 3 of 21

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Equipment Identification			
Component Tag Number	24590-PTF-MB-FEP-RBLR-00001A	Safety Classification	<input checked="" type="checkbox"/> SC <input type="checkbox"/> SS <input type="checkbox"/> APC <input type="checkbox"/> SDC <input type="checkbox"/> SDS <input type="checkbox"/> RRC Note 12 <span style="border: 1px solid black; padding: 2px;">3</span>
Manufacturer / Supplier	Northwest Copper Works / Areva FS <span style="border: 1px solid black; padding: 2px;">3</span>		
Requisition Number	24590-QL-POA-MEVV-00001		
Model	N/A	Seismic Category	<input checked="" type="checkbox"/> SC-I <input type="checkbox"/> SC-II <input type="checkbox"/> SC-III <input type="checkbox"/> SC-IV Note 12 <span style="border: 1px solid black; padding: 2px;">3</span>
Description (Include descriptive text [e.g., location, elevation])	Waste Feed Evaporator Reboiler, Room P-0123, elevation 0'-0"		
Safety Function(s)	Confinement (ref. 1) <span style="border: 1px solid black; padding: 2px;">3</span>		
Seismic Safety Function	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Room Number(s): P-0123	
Maintenance Accessible	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Method of Maintenance Access: <input checked="" type="checkbox"/> Remote <input type="checkbox"/> Hands On <input type="checkbox"/> None	
Seismic Operability Requirements:	<input checked="" type="checkbox"/> <span style="border: 1px solid black; padding: 2px;">3</span> During Seismic Event <input type="checkbox"/> <span style="border: 1px solid black; padding: 2px;">3</span> After Seismic Event		
ITS Equipment Type:	<input checked="" type="checkbox"/> Passive Mechanical <input type="checkbox"/> Active Mechanical <input type="checkbox"/> Electrical		

Equipment Environmental Qualification (EEQ)					
Environment	<input type="checkbox"/> Mild <input checked="" type="checkbox"/> Harsh		Hi Rad Service	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Contamination Class:	C5		Design Life (yrs)	<input checked="" type="checkbox"/> 40 <input type="checkbox"/> Other _____	
Radiation Class:	R5				
Parameter Type/Units	Parameter Value	Time Duration (number)	Time Units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Normal</b>					
Normal High Temperature (°F)	113	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal Low Temperature (°F)	59	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal High Relative Humidity (%RH)	100	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Relative Humidity (%RH)	5	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal High Pressure (in.-w.g.)	0	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Pressure (in.-w.g.)	-1.4	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Radiation Dose Rate (mR/hr)	<span style="border: 1px solid black; padding: 2px;">3</span> Note 9	40	yrs	Note 9	Note 1
Vibration Magnitude (g)	N/A	N/A	N/A	N/A	Note 1
Vibration Frequency (Hz)	N/A	N/A	N/A	N/A	Note 1
Additional Normal Information:	See note 2 for pressure units.				



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00009 Rev.: 3

Attachment 1, Page 4 of 21

△3

## Equipment Environmental Qualification (EEQ) (continued)

Parameter Type/Units	Parameter Value	Time Duration (number)	Time units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Abnormal</b>					
Abnormal High Temperature (°F)	△3 131	8	hr/yr	24590-PTF-U0D-W16T-00001, Note 6 △3	Note 1
Abnormal Low Temperature (°F)	59	8	hr/yr	24590-WTP-DB-01-001, Notes 6 & 10	Note 1
Abnormal High Relative Humidity (%RH)	100	24	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Relative Humidity (%RH)	2	22	hr/yr	24590-PTF-U0D-W16T-00001, Note 11 △3	Note 1
Abnormal High Pressure (in.-w.g.)	4	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Pressure (in.-w.g.)	-7.3	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Radiation Dose Rate (mR/hr)	△3 Notes 3&9	△3 0	△3 hr/yr	Note 9	Note 1
Wet Sprinkler System Present	No	N/A △3	N/A △3	24590-PTF-U0D-W16T-00001	Note 1
Additional Abnormal Information	See note 2 for pressure units.				
<b>Design Basis Events (DBE)</b>					
DBE High Temperature (°F)	148	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6 & 11 △3	Note 1
DBE Low Temperature (°F)	40	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
DBE High Relative Humidity (%RH)	100	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Relative Humidity (%RH)	2	1000	hrs	24590-PTF-U0D-W16T-00001, Note 11 △3	Note 1
DBE High Pressure (in.-w.g.)	4	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Pressure (in.-w.g.)	-7.3	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Radiation Dose Rate (mR/hr)	△3 Notes 3&9	△3 0	△3 hr/yr	Note 9	Note 1
Flood Height (ft)	2.08	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
Submergence (ft)	0, Note 4	1000 △3	hrs	24590-PTF-U0D-W16T-00001 24590-QL-POA-MEVV-00001-01-00907	Note 1
Chemical/Spray Exposure	Yes	△3 1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
Additional DBE Information	See note 2 for pressure units.				



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00009 Rev.: 3

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DBE Chemical Exposure Details <span style="float: right;">△3</span>	
DBE Chemical Types/Concentrations	2M Sodium Hydroxide △3 0.25M Sodium Hydroxide △3 0.1M Sodium Hydroxide △3 Antifoam Agent 2M Nitric Acid △3 Recovered Nitric Acid △3

Interfaces (Electrical)	
Power Supply Voltage (VAC, VDC)	N/A
Power Supply Frequency (Hz)	N/A
Power Connection Method	N/A
I/O Signals to/from Equipment	N/A
I/O Connection Method	N/A

Interfaces (Mechanical)	
Mounting Configuration (orientation)	TBD
Mounting Method (bolts, welds, etc.)	Welded, 24590-PTF-DD-S13T-00026
Auxiliary Devices	N/A

Equipment Seismic Qualification (ESQ)				
Parameter	Title	Reference/Document Number	Version / Revision	Remarks
WTP Seismic Design Specification (BUYER)	Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks	24590-WTP-3PS-SS90-T0001	002	N/A
Specified Seismic Load (BUYER)	Seismic Analysis of Pretreatment Building - WSGM In-Structure Response Spectre (ISRS) △3	24590-PTF-S0C-S15T-00057 △3	00A △3	Calculation is not included in MR, see attached figures 21E, 22E and 24E per CCN 185267. △3
Design Seismic Load (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Method (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Report Number (SELLER)	Note 1	Note 1	Note 1	Note 1
Submittal Number (BUYER)	TBD	TBD	TBD	N/A



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00009 Rev.: 3

Attachment 1, Page 6 of 21

3

## Notes and Additional Information

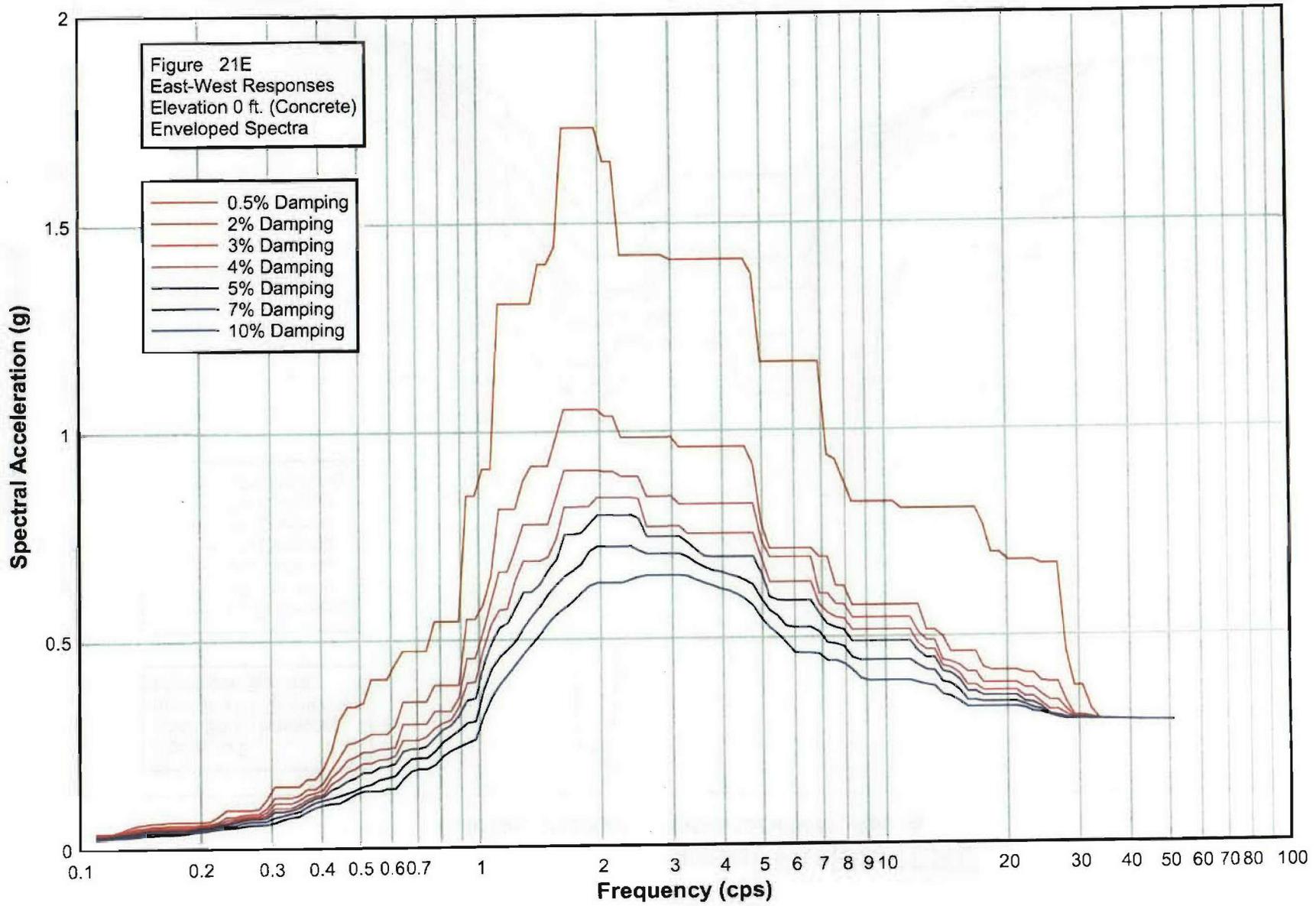
### Notes

1. Data to be provided by SELLER through the submittal process as required on the G-321E.
2. Where pressure is given in inches of water column (in-w.c.) in the source document, it is generally assumed that this is in reference to atmospheric pressure and is therefore equivalent to inches of water gage (in-w.g.).
3. Abnormal and DBE radiation dose rates are set equal to normal and do not contribute to the total integrated dose.  $\triangle 3$
4. Submergence depth is the difference between the lowest point on the equipment and the flood depth above the floor. The submergence depth is set to zero if the lowest section of the equipment is above the flood depth.
5. Environmental data from reference 3 is for room environment only.
6. For application of AISC N690, the normal temperatures are not used. Abnormal temperatures shall be applied as Normal Operation Temperature,  $T_O$ , with seismic effects,  $E_s$ . The Design basis event temperature shall be applied as a Thermal Load generated by a postulated accident,  $T_A$ , without seismic effects,  $E_s$  or  $E_o$ .
7. The equipment qualification will be documented in accordance with the requirements in Appendix D of Engineering Specification for Environmental Qualification of Mechanical Equipment, document number 24590-WTP-3PS-G000-T0015 for the passive and active safety functions.
8. Deleted.  $\triangle 3$
9. Beta radiation dose is  $1.39 \text{ E}+07 \text{ mRad/hr}$  based on the ratio of Strontium-90 from reference 7  $\triangle 3$  as compared to the Strontium and Beta dose given in reference 8.  $\triangle 3$  Gamma dose rate is not to exceed  $2.0 \text{ E}+06 \text{ mRad/hr}$  per CCN 175006.
10. Abnormal low temperature, as calculated in reference 3, is based on a Loss of Heating Accident (LOHA) which occurs when steam supply to the building is lost. Since the evaporators are run on steam, this would cause the evaporators to go off-line. Abnormal low temperature will be based on reference 4 at  $59^\circ\text{F}$ .
11. Parameter value used on data sheet has been previously established and determined more conservative than values  $\triangle 3$  derived from the reference document noted.
12. For commercial reasons, safety and seismic classification may be higher than elsewhere documented, and therefore  $\triangle 3$  conservative.

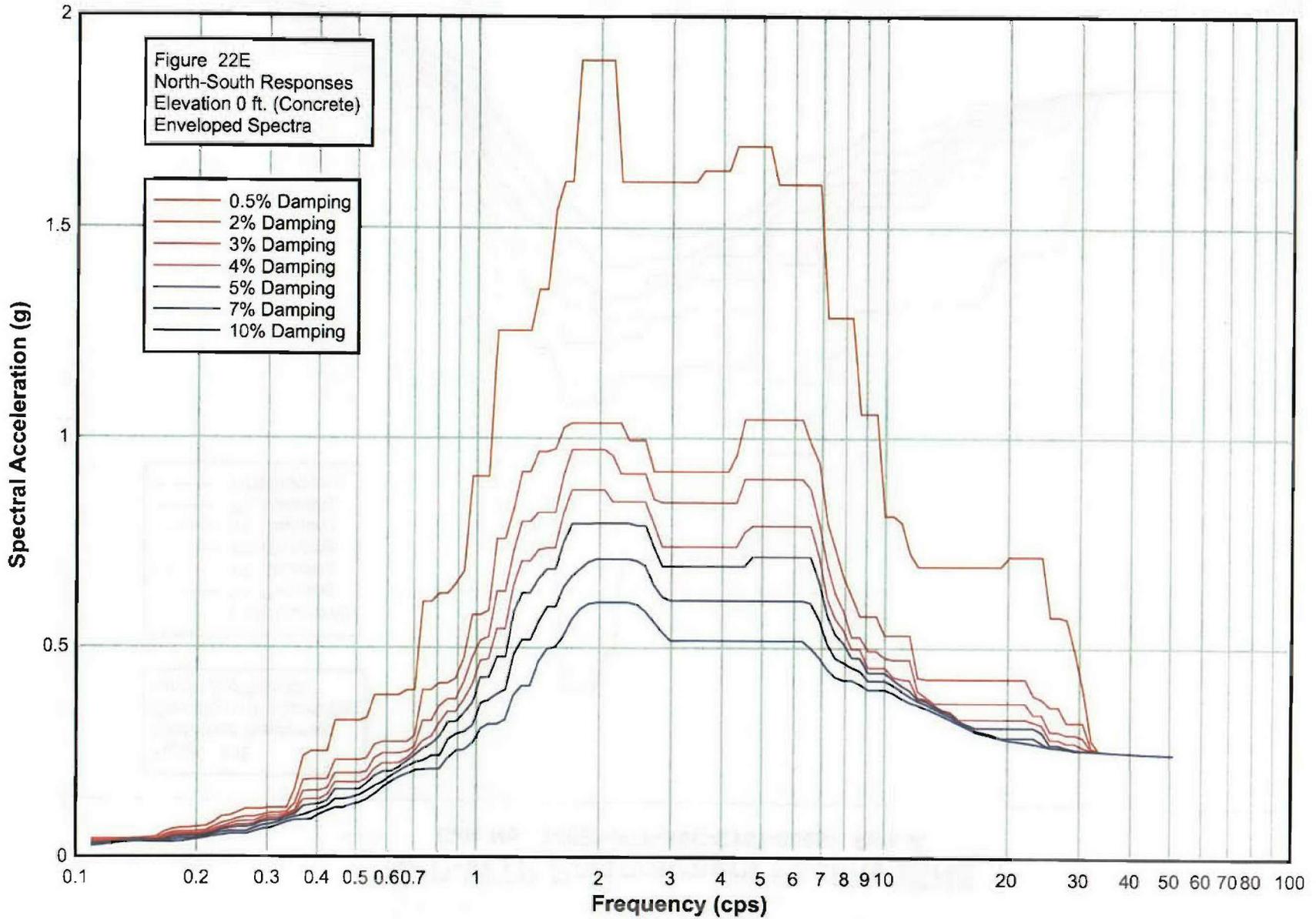
### Reference

1. 24590-WTP-PSAR-ESH-01-002-02, Rev. 04A, Preliminary documented safety analysis to support construction  $\triangle 3$  authorization; PT facility specific information.
2. CCN #096661, FEP and CNP Evaporator Vent Problems with New PVP Isolation Valve.
3. 24590-PTF-U0D-W16T-00001, Rev. 0, PTF Room Environment Datasheet.
4. 24590-WTP-DB-ENG-01-001, Rev. 1M, Basis Of Design.  $\triangle 3$
5. 24590-PTF-U0N-W16T-00001, Add data for room p-0427. Incorporate additional steam break analysis.  $\triangle 3$
6. 24590-PTF-U0N-W16T-00003, Revised temperature & relative humidity data for PTF rooms.  $\triangle 3$
7. 24590-WTP-Z0C-50-00008, Rev. B, Comparison of Source Terms for use in Shielding Calculations.  $\triangle 3$
8. 24590-LAB-Z0C-80-00001, Rev. D, Beta and Gamma Dose Rate Determinations from Laboratory Sample Bottles.  $\triangle 3$

3 **RPP-WTP Pretreatment Facility ISRS**  
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A

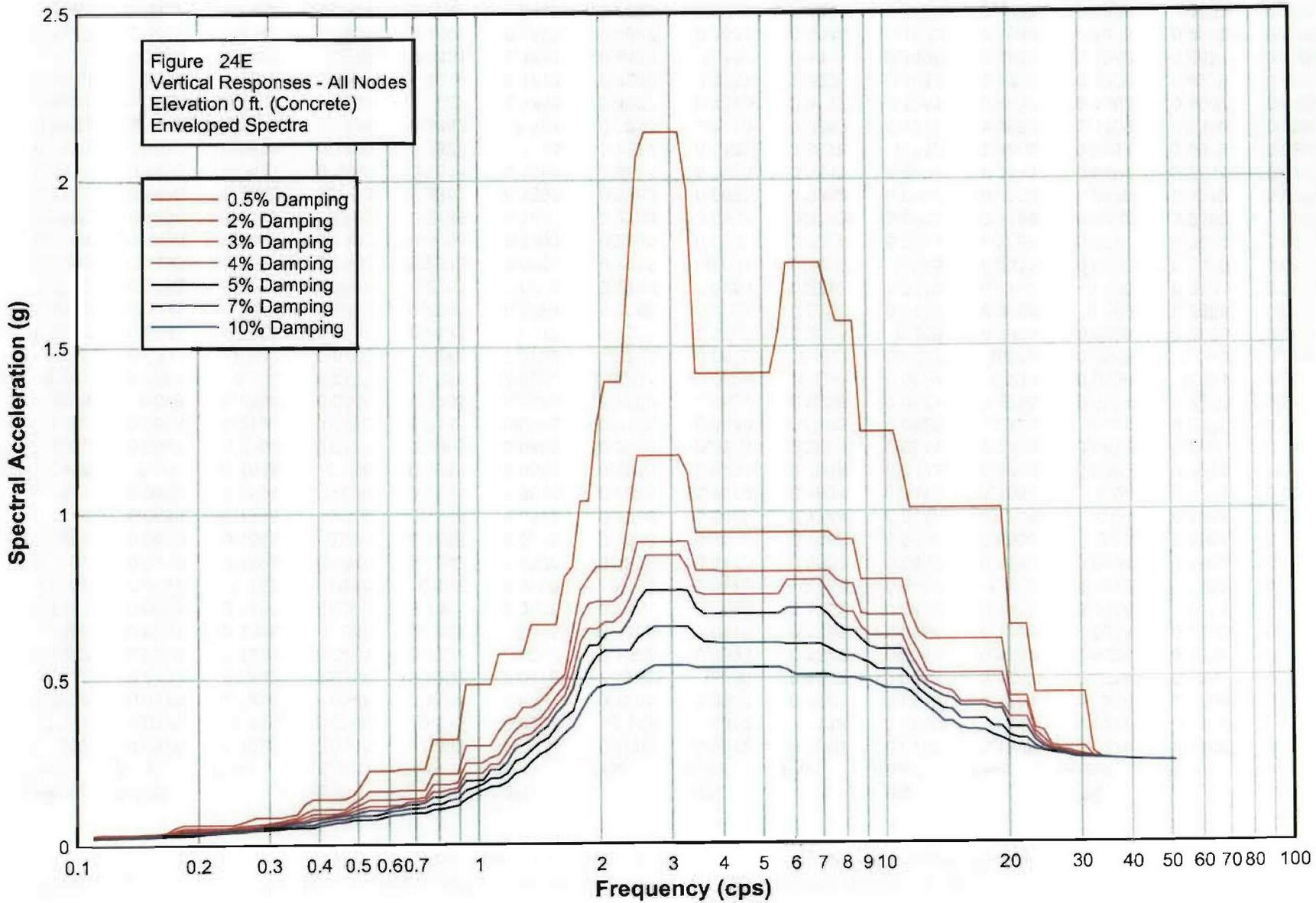


3 **RPP-WTP Pretreatment Facility ISRS**  
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



# RPP-WTP Pretreatment Facility ISRS

Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0375	0.1098	0.0345	0.1098	0.0327	0.1098	0.0312	0.1098	0.0298	0.1098	0.0274	0.1098	0.0252
0.115	0.0375	0.115	0.0345	0.115	0.0327	0.115	0.0312	0.115	0.0299	0.115	0.0277	0.115	0.0259
0.1204	0.0375	0.1204	0.0345	0.1204	0.0331	0.1204	0.0322	0.1204	0.0312	0.1204	0.0294	0.1204	0.0268
0.1262	0.0431	0.1262	0.0397	0.1262	0.0378	0.1262	0.036	0.1262	0.0343	0.1262	0.0314	0.1262	0.0277
0.1322	0.0505	0.1322	0.0451	0.1322	0.042	0.1322	0.0393	0.1322	0.0369	0.1322	0.0328	0.1322	0.0281
0.1385	0.0561	0.1385	0.049	0.1385	0.045	0.1385	0.0415	0.1385	0.0384	0.1385	0.0344	0.1385	0.0303
0.1451	0.0582	0.1451	0.0509	0.1451	0.0475	0.1451	0.0444	0.1451	0.0419	0.1451	0.0374	0.1451	0.0325
0.152	0.0617	0.152	0.0546	0.152	0.0507	0.152	0.0472	0.152	0.0442	0.152	0.0392	0.152	0.0336
0.1592	0.0619	0.1592	0.0546	0.1592	0.0507	0.1592	0.0472	0.1592	0.0442	0.1592	0.0394	0.1592	0.0347
0.1668	0.0639	0.1668	0.056	0.1668	0.0516	0.1668	0.0479	0.1668	0.0448	0.1668	0.04	0.1668	0.0353
0.1748	0.0639	0.1748	0.056	0.1748	0.0516	0.1748	0.0479	0.1748	0.0448	0.1748	0.04	0.1748	0.0353
0.1831	0.0639	0.1831	0.056	0.1831	0.0516	0.1831	0.0479	0.1831	0.0448	0.1831	0.04	0.1831	0.0364
0.1918	0.064	0.1918	0.056	0.1918	0.0516	0.1918	0.0491	0.1918	0.0473	0.1918	0.0442	0.1918	0.0401
0.2009	0.0641	0.2009	0.0581	0.2009	0.0556	0.2009	0.0533	0.2009	0.0511	0.2009	0.0472	0.2009	0.0422
0.2105	0.0664	0.2105	0.0603	0.2105	0.0575	0.2105	0.0549	0.2105	0.0525	0.2105	0.049	0.2105	0.0448
0.2205	0.078	0.2205	0.0645	0.2205	0.0618	0.2205	0.0594	0.2205	0.0571	0.2205	0.0531	0.2205	0.0482
0.231	0.0931	0.231	0.0772	0.231	0.0692	0.231	0.0628	0.231	0.0597	0.231	0.0554	0.231	0.0502
0.242	0.0931	0.242	0.0772	0.242	0.0722	0.242	0.0678	0.242	0.0637	0.242	0.0565	0.242	0.0512
0.2535	0.0931	0.2535	0.0817	0.2535	0.077	0.2535	0.0728	0.2535	0.069	0.2535	0.0625	0.2535	0.0547
0.2656	0.0931	0.2656	0.0839	0.2656	0.0794	0.2656	0.0753	0.2656	0.0716	0.2656	0.065	0.2656	0.0571
0.2783	0.0955	0.2783	0.0844	0.2783	0.0794	0.2783	0.0753	0.2783	0.0716	0.2783	0.065	0.2783	0.0575
0.2915	0.1183	0.2915	0.0982	0.2915	0.0885	0.2915	0.081	0.2915	0.075	0.2915	0.0666	0.2915	0.0586
0.3054	0.1498	0.3054	0.123	0.3054	0.1093	0.3054	0.0982	0.3054	0.0892	0.3054	0.0757	0.3054	0.0632
0.3199	0.1498	0.3199	0.123	0.3199	0.1093	0.3199	0.0982	0.3199	0.0892	0.3199	0.0797	0.3199	0.07
0.3352	0.1498	0.3352	0.123	0.3352	0.1093	0.3352	0.0982	0.3352	0.0927	0.3352	0.0852	0.3352	0.0755
0.3511	0.1498	0.3511	0.1285	0.3511	0.1168	0.3511	0.1065	0.3511	0.0994	0.3511	0.0891	0.3511	0.0782
0.3678	0.1677	0.3678	0.1435	0.3678	0.13	0.3678	0.1183	0.3678	0.112	0.3678	0.1014	0.3678	0.0894
0.3853	0.1677	0.3853	0.1435	0.3853	0.134	0.3853	0.1273	0.3853	0.1213	0.3853	0.1109	0.3853	0.0986
0.4037	0.1925	0.4037	0.1587	0.4037	0.1415	0.4037	0.1298	0.4037	0.1251	0.4037	0.1163	0.4037	0.1044
0.4229	0.2359	0.4229	0.1897	0.4229	0.1713	0.4229	0.1551	0.4229	0.1411	0.4229	0.1206	0.4229	0.1079
0.4431	0.3083	0.4431	0.219	0.4431	0.1881	0.4431	0.167	0.4431	0.1495	0.4431	0.1263	0.4431	0.1089
0.4642	0.3407	0.4642	0.2508	0.4642	0.2123	0.4642	0.1837	0.4642	0.1622	0.4642	0.1328	0.4642	0.1192
0.4863	0.3407	0.4863	0.2548	0.4863	0.2198	0.4863	0.1918	0.4863	0.1692	0.4863	0.1398	0.4863	0.1303
0.5094	0.3496	0.5094	0.2641	0.5094	0.2311	0.5094	0.2042	0.5094	0.182	0.5094	0.1485	0.5094	0.1369

PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.4063	0.5337	0.2745	0.5337	0.2311	0.5337	0.2042	0.5337	0.182	0.5337	0.1529	0.5337	0.1371
0.5591	0.4063	0.5591	0.2745	0.5591	0.2378	0.5591	0.213	0.5591	0.194	0.5591	0.1646	0.5591	0.1371
0.5857	0.4063	0.5857	0.2745	0.5857	0.2385	0.5857	0.2142	0.5857	0.1966	0.5857	0.1681	0.5857	0.1425
0.6136	0.4438	0.6136	0.2944	0.6136	0.2421	0.6136	0.2213	0.6136	0.2032	0.6136	0.1733	0.6136	0.1425
0.6428	0.4742	0.6428	0.3514	0.6428	0.2975	0.6428	0.2588	0.6428	0.2323	0.6428	0.1964	0.6428	0.1655
0.6734	0.4742	0.6734	0.3514	0.6734	0.2975	0.6734	0.2588	0.6734	0.2383	0.6734	0.2137	0.6734	0.1844
0.7055	0.4742	0.7055	0.3514	0.7055	0.2975	0.7055	0.2588	0.7055	0.2383	0.7055	0.2155	0.7055	0.1892
0.7391	0.4742	0.7391	0.3514	0.7391	0.2975	0.7391	0.2667	0.7391	0.2438	0.7391	0.2155	0.7391	0.1892
0.7743	0.5449	0.7743	0.3911	0.7743	0.3284	0.7743	0.2875	0.7743	0.2646	0.7743	0.2323	0.7743	0.1993
0.8111	0.5449	0.8111	0.3911	0.8111	0.3284	0.8111	0.2996	0.8111	0.2837	0.8111	0.2551	0.8111	0.2205
0.8497	0.5449	0.8497	0.3911	0.8497	0.3284	0.8497	0.3072	0.8497	0.2942	0.8497	0.2684	0.8497	0.2339
0.8902	0.5449	0.8902	0.3911	0.8902	0.3604	0.8902	0.3382	0.8902	0.318	0.8902	0.2831	0.8902	0.2427
0.9326	0.8469	0.9326	0.5495	0.9326	0.4554	0.9326	0.3957	0.9326	0.3545	0.9326	0.3003	0.9326	0.2517
0.977	0.8469	0.977	0.5495	0.977	0.4554	0.977	0.3975	0.977	0.3585	0.977	0.3036	0.977	0.2596
1.0235	0.9107	1.0235	0.5826	1.0235	0.5168	1.0235	0.4731	1.0235	0.4362	1.0235	0.3776	1.0235	0.3164
1.0723	0.9107	1.0723	0.6542	1.0723	0.5901	1.0723	0.535	1.0723	0.4906	1.0723	0.4288	1.0723	0.36
1.1233	1.3081	1.1233	0.8142	1.1233	0.6641	1.1233	0.5708	1.1233	0.5287	1.1233	0.4575	1.1233	0.3904
1.1768	1.3081	1.1768	0.8142	1.1768	0.6641	1.1768	0.5735	1.1768	0.5393	1.1768	0.4764	1.1768	0.4143
1.2328	1.3081	1.2328	0.8142	1.2328	0.7174	1.2328	0.6427	1.2328	0.577	1.2328	0.4965	1.2328	0.439
1.2916	1.3081	1.2916	0.8822	1.2916	0.7774	1.2916	0.6895	1.2916	0.6157	1.2916	0.5283	1.2916	0.4653
1.353	1.3081	1.353	0.9165	1.353	0.7774	1.353	0.6895	1.353	0.6157	1.353	0.5556	1.353	0.4889
1.4175	1.4021	1.4175	0.9165	1.4175	0.7774	1.4175	0.6895	1.4175	0.6326	1.4175	0.5795	1.4175	0.5119
1.485	1.4021	1.485	0.9165	1.485	0.7774	1.485	0.6984	1.485	0.6672	1.485	0.6099	1.485	0.539
1.5557	1.4438	1.5557	0.9843	1.5557	0.8409	1.5557	0.7415	1.5557	0.6919	1.5557	0.6323	1.5557	0.5603
1.6298	1.729	1.6298	1.0527	1.6298	0.9055	1.6298	0.8177	1.6298	0.7518	1.6298	0.6519	1.6298	0.5748
1.7074	1.729	1.7074	1.0527	1.7074	0.9055	1.7074	0.8177	1.7074	0.7518	1.7074	0.6652	1.7074	0.5915
1.7887	1.729	1.7887	1.0527	1.7887	0.9055	1.7887	0.8185	1.7887	0.7553	1.7887	0.6808	1.7887	0.6117
1.8738	1.729	1.8738	1.0527	1.8738	0.9055	1.8738	0.8185	1.8738	0.7765	1.8738	0.7113	1.8738	0.6287
1.963	1.729	1.963	1.0527	1.963	0.9055	1.963	0.8397	1.963	0.7973	1.963	0.7229	1.963	0.6359
2.0565	1.6472	2.0565	1.0359	2.0565	0.902	2.0565	0.8397	2.0565	0.7973	2.0565	0.7229	2.0565	0.6359
2.1544	1.6472	2.1544	1.0359	2.1544	0.902	2.1544	0.8397	2.1544	0.7973	2.1544	0.7229	2.1544	0.6359
2.257	1.4229	2.257	0.9839	2.257	0.8903	2.257	0.8397	2.257	0.7973	2.257	0.7229	2.257	0.6361
2.3645	1.4229	2.3645	0.9839	2.3645	0.8903	2.3645	0.8397	2.3645	0.7973	2.3645	0.7229	2.3645	0.6418
2.4771	1.4229	2.4771	0.9839	2.4771	0.8903	2.4771	0.8363	2.4771	0.7896	2.4771	0.7121	2.4771	0.6484
2.595	1.4229	2.595	0.9839	2.595	0.8416	2.595	0.7692	2.595	0.745	2.595	0.7036	2.595	0.6522

PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
2.7186	1.4229	2.7186	0.9839	2.7186	0.8416	2.7186	0.7692	2.7186	0.745	2.7186	0.7036	2.7186	0.6522
2.848	1.4229	2.848	0.9839	2.848	0.8416	2.848	0.7692	2.848	0.745	2.848	0.7036	2.848	0.6522
2.9836	1.4127	2.9836	0.9839	2.9836	0.8416	2.9836	0.7692	2.9836	0.745	2.9836	0.7036	2.9836	0.6522
3.1257	1.4127	3.1257	0.9586	3.1257	0.8211	3.1257	0.7692	3.1257	0.745	3.1257	0.7036	3.1257	0.6522
3.2745	1.4127	3.2745	0.9586	3.2745	0.8211	3.2745	0.751	3.2745	0.7299	3.2745	0.6954	3.2745	0.6492
3.4305	1.4127	3.4305	0.9586	3.4305	0.8211	3.4305	0.751	3.4305	0.7126	3.4305	0.681	3.4305	0.6403
3.5938	1.4127	3.5938	0.9586	3.5938	0.8211	3.5938	0.751	3.5938	0.6971	3.5938	0.671	3.5938	0.6329
3.7649	1.4127	3.7649	0.9586	3.7649	0.8211	3.7649	0.751	3.7649	0.6954	3.7649	0.6626	3.7649	0.6263
3.9442	1.4127	3.9442	0.9586	3.9442	0.8211	3.9442	0.751	3.9442	0.6954	3.9442	0.659	3.9442	0.6182
4.132	1.4127	4.132	0.9586	4.132	0.8211	4.132	0.751	4.132	0.6954	4.132	0.6519	4.132	0.6132
4.3288	1.4127	4.3288	0.9586	4.3288	0.8211	4.3288	0.751	4.3288	0.6954	4.3288	0.6467	4.3288	0.6045
4.5349	1.4127	4.5349	0.9586	4.5349	0.8211	4.5349	0.751	4.5349	0.6954	4.5349	0.6383	4.5349	0.5926
4.7508	1.376	4.7508	0.9153	4.7508	0.8211	4.7508	0.751	4.7508	0.6954	4.7508	0.6271	4.7508	0.5766
4.977	1.1649	4.977	0.7722	4.977	0.7324	4.977	0.6911	4.977	0.6536	4.977	0.5927	4.977	0.5466
5.214	1.1649	5.214	0.7138	5.214	0.6926	5.214	0.6329	5.214	0.5972	5.214	0.5647	5.214	0.5221
5.4623	1.1649	5.4623	0.7138	5.4623	0.6926	5.4623	0.6329	5.4623	0.5893	5.4623	0.5516	5.4623	0.5074
5.7224	1.1649	5.7224	0.7138	5.7224	0.6926	5.7224	0.6329	5.7224	0.5878	5.7224	0.5268	5.7224	0.486
5.9948	1.1649	5.9948	0.7138	5.9948	0.6926	5.9948	0.6329	5.9948	0.5878	5.9948	0.5235	5.9948	0.4626
6.2803	1.1649	6.2803	0.7138	6.2803	0.6926	6.2803	0.6329	6.2803	0.5878	6.2803	0.5235	6.2803	0.4608
6.5793	1.1649	6.5793	0.7138	6.5793	0.6926	6.5793	0.6329	6.5793	0.5878	6.5793	0.5235	6.5793	0.4608
6.8926	1.1649	6.8926	0.6922	6.8926	0.6037	6.8926	0.5767	6.8926	0.5551	6.8926	0.5117	6.8926	0.4579
7.2208	0.9369	7.2208	0.6922	7.2208	0.6037	7.2208	0.5573	7.2208	0.5298	7.2208	0.4851	7.2208	0.4415
7.5646	0.9251	7.5646	0.6226	7.5646	0.5783	7.5646	0.5462	7.5646	0.5217	7.5646	0.4826	7.5646	0.4415
7.9248	0.8741	7.9248	0.6213	7.9248	0.5773	7.9248	0.5435	7.9248	0.5163	7.9248	0.4761	7.9248	0.4338
8.3022	0.8232	8.3022	0.5748	8.3022	0.5453	8.3022	0.5153	8.3022	0.4877	8.3022	0.449	8.3022	0.4181
8.6975	0.8232	8.6975	0.5748	8.6975	0.5453	8.6975	0.5153	8.6975	0.4877	8.6975	0.4421	8.6975	0.3975
9.1116	0.8232	9.1116	0.5748	9.1116	0.5453	9.1116	0.5153	9.1116	0.4877	9.1116	0.4421	9.1116	0.3917
9.5455	0.8232	9.5455	0.5748	9.5455	0.5453	9.5455	0.5153	9.5455	0.4877	9.5455	0.4421	9.5455	0.3917
10	0.8232	10	0.5748	10	0.5453	10	0.5153	10	0.4877	10	0.4421	10	0.3917
10.4762	0.8232	10.4762	0.5748	10.4762	0.5453	10.4762	0.5153	10.4762	0.4877	10.4762	0.4421	10.4762	0.3917
10.975	0.8069	10.975	0.5748	10.975	0.5453	10.975	0.5153	10.975	0.4877	10.975	0.4421	10.975	0.3917
11.4976	0.8069	11.4976	0.5748	11.4976	0.5453	11.4976	0.5153	11.4976	0.4877	11.4976	0.4421	11.4976	0.3917
12.045	0.8069	12.045	0.5748	12.045	0.5088	12.045	0.481	12.045	0.4623	12.045	0.4284	12.045	0.3857
12.6186	0.8069	12.6186	0.5137	12.6186	0.4887	12.6186	0.4663	12.6186	0.4469	12.6186	0.4171	12.6186	0.3809
13.2194	0.8069	13.2194	0.5136	13.2194	0.4887	13.2194	0.4663	13.2194	0.4469	13.2194	0.4149	13.2194	0.3775

PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.8069	13.8489	0.4975	13.8489	0.44	13.8489	0.426	13.8489	0.4124	13.8489	0.3875	13.8489	0.3566
14.5083	0.8069	14.5083	0.4604	14.5083	0.4358	14.5083	0.4216	14.5083	0.408	14.5083	0.3834	14.5083	0.3525
15.1991	0.8069	15.1991	0.4604	15.1991	0.4273	15.1991	0.4075	15.1991	0.3925	15.1991	0.368	15.1991	0.3399
15.9228	0.8069	15.9228	0.4604	15.9228	0.4111	15.9228	0.379	15.9228	0.3633	15.9228	0.3417	15.9228	0.3258
16.681	0.8069	16.681	0.4604	16.681	0.4111	16.681	0.379	16.681	0.3633	16.681	0.3417	16.681	0.3258
17.4753	0.7678	17.4753	0.4222	17.4753	0.384	17.4753	0.3658	17.4753	0.3531	17.4753	0.338	17.4753	0.3258
18.3074	0.6991	18.3074	0.4145	18.3074	0.384	18.3074	0.3654	18.3074	0.3531	18.3074	0.338	18.3074	0.3258
19.1791	0.6991	19.1791	0.4145	19.1791	0.384	19.1791	0.3654	19.1791	0.3531	19.1791	0.338	19.1791	0.3258
20.0923	0.6809	20.0923	0.4145	20.0923	0.384	20.0923	0.3654	20.0923	0.3531	20.0923	0.338	20.0923	0.3258
21.049	0.6809	21.049	0.4145	21.049	0.384	21.049	0.3654	21.049	0.3531	21.049	0.338	21.049	0.3258
22.0513	0.6809	22.0513	0.4076	22.0513	0.3711	22.0513	0.3497	22.0513	0.3377	22.0513	0.3309	22.0513	0.3223
23.1013	0.6809	23.1013	0.4076	23.1013	0.3711	23.1013	0.3497	23.1013	0.3352	23.1013	0.3223	23.1013	0.3135
24.2013	0.6714	24.2013	0.3876	24.2013	0.3546	24.2013	0.3339	24.2013	0.3248	24.2013	0.3182	24.2013	0.3115
25.3536	0.6714	25.3536	0.3853	25.3536	0.3408	25.3536	0.3181	25.3536	0.3075	25.3536	0.3068	25.3536	0.3051
26.5609	0.6714	26.5609	0.3853	26.5609	0.3408	26.5609	0.3181	26.5609	0.3041	26.5609	0.2986	26.5609	0.2992
27.8256	0.4616	27.8256	0.3378	27.8256	0.3191	27.8256	0.3066	27.8256	0.2988	27.8256	0.296	27.8256	0.2956
29.1505	0.3753	29.1505	0.3037	29.1505	0.2996	29.1505	0.2979	29.1505	0.297	29.1505	0.296	29.1505	0.2951
30.5386	0.3753	30.5386	0.3037	30.5386	0.2996	30.5386	0.2979	30.5386	0.297	30.5386	0.296	30.5386	0.2951
31.9927	0.3196	31.9927	0.2994	31.9927	0.2977	31.9927	0.2968	31.9927	0.2961	31.9927	0.2952	31.9927	0.2943
33.516	0.2961	33.516	0.2957	33.516	0.2953	33.516	0.295	33.516	0.2948	33.516	0.2945	33.516	0.2942
35.1119	0.2952	35.1119	0.2948	35.1119	0.2947	35.1119	0.2946	35.1119	0.2944	35.1119	0.2942	35.1119	0.2939
36.7838	0.2943	36.7838	0.2943	36.7838	0.2942	36.7838	0.2941	36.7838	0.294	36.7838	0.2938	36.7838	0.2936
38.5353	0.2938	38.5353	0.2937	38.5353	0.2936	38.5353	0.2936	38.5353	0.2935	38.5353	0.2934	38.5353	0.2932
40.3702	0.2932	40.3702	0.2931	40.3702	0.2931	40.3702	0.293	40.3702	0.293	40.3702	0.2929	40.3702	0.2928
42.2924	0.2925	42.2924	0.2926	42.2924	0.2925	42.2924	0.2925	42.2924	0.2925	42.2924	0.2924	42.2924	0.2923
44.3062	0.2922	44.3062	0.2921	44.3062	0.2921	44.3062	0.2921	44.3062	0.292	44.3062	0.292	44.3062	0.2919
46.4159	0.2917	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916
48.626	0.2913	48.626	0.2912	48.626	0.2912	48.626	0.2912	48.626	0.2912	48.626	0.2912	48.626	0.2912
50.9414	0.2907	50.9414	0.2908	50.9414	0.2908	50.9414	0.2908	50.9414	0.2908	50.9414	0.2908	50.9414	0.2909

PTEE022.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 22E ~ North-South Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	
0.1098	0.0404	0.1098	0.0365	0.1098	0.0342	0.1098	0.0321	0.1098	0.0302	0.1098	0.0271	0.1098	0.0235	
0.115	0.0404	0.115	0.0365	0.115	0.0342	0.115	0.0321	0.115	0.0302	0.115	0.0271	0.115	0.0253	
0.1204	0.0404	0.1204	0.0365	0.1204	0.0342	0.1204	0.0321	0.1204	0.0306	0.1204	0.0293	0.1204	0.0274	
0.1262	0.0404	0.1262	0.0365	0.1262	0.0349	0.1262	0.034	0.1262	0.033	0.1262	0.0313	0.1262	0.0295	
0.1322	0.0404	0.1322	0.038	0.1322	0.0368	0.1322	0.0357	0.1322	0.0346	0.1322	0.0331	0.1322	0.0316	
0.1385	0.041	0.1385	0.039	0.1385	0.0379	0.1385	0.037	0.1385	0.0362	0.1385	0.0347	0.1385	0.0329	
0.1451	0.0415	0.1451	0.0397	0.1451	0.0386	0.1451	0.0377	0.1451	0.0368	0.1451	0.0353	0.1451	0.0333	
0.152	0.0438	0.152	0.04	0.152	0.0386	0.152	0.0377	0.152	0.0368	0.152	0.0353	0.152	0.0333	
0.1592	0.0461	0.1592	0.0415	0.1592	0.0394	0.1592	0.0377	0.1592	0.0368	0.1592	0.0353	0.1592	0.0333	
0.1668	0.0583	0.1668	0.0505	0.1668	0.0462	0.1668	0.0425	0.1668	0.0394	0.1668	0.0353	0.1668	0.0333	
0.1748	0.0643	0.1748	0.0565	0.1748	0.0521	0.1748	0.0482	0.1748	0.0448	0.1748	0.0392	0.1748	0.0333	
0.1831	0.0666	0.1831	0.0583	0.1831	0.0541	0.1831	0.0504	0.1831	0.047	0.1831	0.0413	0.1831	0.0351	
0.1918	0.0676	0.1918	0.0584	0.1918	0.0541	0.1918	0.0505	0.1918	0.0472	0.1918	0.0415	0.1918	0.0376	
0.2009	0.0696	0.2009	0.0595	0.2009	0.0541	0.2009	0.0509	0.2009	0.0481	0.2009	0.0431	0.2009	0.0405	
0.2105	0.0719	0.2105	0.0616	0.2105	0.0578	0.2105	0.0543	0.2105	0.051	0.2105	0.0476	0.2105	0.0438	
0.2205	0.0815	0.2205	0.0705	0.2205	0.0647	0.2205	0.0596	0.2205	0.0568	0.2205	0.0528	0.2205	0.048	
0.231	0.0954	0.231	0.079	0.231	0.0704	0.231	0.0667	0.231	0.0634	0.231	0.0577	0.231	0.0509	
0.242	0.0977	0.242	0.0841	0.242	0.0771	0.242	0.071	0.242	0.0669	0.242	0.06	0.242	0.0531	
0.2535	0.1051	0.2535	0.0906	0.2535	0.0825	0.2535	0.0755	0.2535	0.0694	0.2535	0.06	0.2535	0.0531	
0.2656	0.1135	0.2656	0.0943	0.2656	0.084	0.2656	0.0755	0.2656	0.0694	0.2656	0.06	0.2656	0.0531	
0.2783	0.1135	0.2783	0.0943	0.2783	0.084	0.2783	0.0776	0.2783	0.0736	0.2783	0.0666	0.2783	0.0591	
0.2915	0.1135	0.2915	0.0994	0.2915	0.093	0.2915	0.0874	0.2915	0.0826	0.2915	0.0745	0.2915	0.0653	
0.3054	0.1163	0.3054	0.104	0.3054	0.0971	0.3054	0.0909	0.3054	0.0855	0.3054	0.0768	0.3054	0.0674	
0.3199	0.1163	0.3199	0.104	0.3199	0.0971	0.3199	0.0909	0.3199	0.0864	0.3199	0.0812	0.3199	0.075	
0.3352	0.1163	0.3352	0.1068	0.3352	0.1025	0.3352	0.0986	0.3352	0.095	0.3352	0.0888	0.3352	0.0821	
0.3511	0.1636	0.3511	0.1274	0.3511	0.1102	0.3511	0.105	0.3511	0.101	0.3511	0.0944	0.3511	0.0865	
0.3678	0.2398	0.3678	0.1821	0.3678	0.1557	0.3678	0.1356	0.3678	0.1202	0.3678	0.0985	0.3678	0.0872	
0.3853	0.2521	0.3853	0.185	0.3853	0.1576	0.3853	0.137	0.3853	0.1232	0.3853	0.1054	0.3853	0.0884	
0.4037	0.2521	0.4037	0.185	0.4037	0.1576	0.4037	0.137	0.4037	0.1254	0.4037	0.1131	0.4037	0.1	
0.4229	0.2521	0.4229	0.185	0.4229	0.1633	0.4229	0.1471	0.4229	0.1332	0.4229	0.1202	0.4229	0.1087	
0.4431	0.3253	0.4431	0.2305	0.4431	0.1995	0.4431	0.1774	0.4431	0.1605	0.4431	0.137	0.4431	0.1162	
0.4642	0.3253	0.4642	0.2305	0.4642	0.1995	0.4642	0.1774	0.4642	0.1605	0.4642	0.137	0.4642	0.1162	
0.4863	0.3253	0.4863	0.2305	0.4863	0.1995	0.4863	0.1774	0.4863	0.1605	0.4863	0.1405	0.4863	0.1237	
0.5094	0.3253	0.5094	0.2305	0.5094	0.1995	0.5094	0.1774	0.5094	0.1605	0.5094	0.1467	0.5094	0.1284	

PTEE022.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 22E ~ North-South Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.3317	0.5337	0.235	0.5337	0.2031	0.5337	0.1861	0.5337	0.1756	0.5337	0.1573	0.5337	0.1368
0.5591	0.3864	0.5591	0.2681	0.5591	0.2359	0.5591	0.2104	0.5591	0.1932	0.5591	0.1694	0.5591	0.1505
0.5857	0.3864	0.5857	0.2751	0.5857	0.2466	0.5857	0.223	0.5857	0.2031	0.5857	0.1791	0.5857	0.1667
0.6136	0.3864	0.6136	0.2751	0.6136	0.2466	0.6136	0.223	0.6136	0.2035	0.6136	0.193	0.6136	0.1795
0.6428	0.3864	0.6428	0.2751	0.6428	0.2466	0.6428	0.2234	0.6428	0.2139	0.6428	0.2039	0.6428	0.1896
0.6734	0.3983	0.6734	0.2751	0.6734	0.251	0.6734	0.2354	0.6734	0.2284	0.6734	0.2154	0.6734	0.1984
0.7055	0.3983	0.7055	0.2895	0.7055	0.2641	0.7055	0.2526	0.7055	0.2425	0.7055	0.2254	0.7055	0.2065
0.7391	0.6097	0.7391	0.3987	0.7391	0.3252	0.7391	0.2766	0.7391	0.2581	0.7391	0.2297	0.7391	0.208
0.7743	0.6097	0.7743	0.3987	0.7743	0.3252	0.7743	0.287	0.7743	0.2697	0.7743	0.2412	0.7743	0.2094
0.8111	0.6287	0.8111	0.4148	0.8111	0.3607	0.8111	0.3191	0.8111	0.2867	0.8111	0.2412	0.8111	0.2094
0.8497	0.6287	0.8497	0.4148	0.8497	0.3768	0.8497	0.3473	0.8497	0.3221	0.8497	0.2809	0.8497	0.2363
0.8902	0.6527	0.8902	0.4263	0.8902	0.3768	0.8902	0.3473	0.8902	0.3236	0.8902	0.2939	0.8902	0.2537
0.9326	0.6829	0.9326	0.4768	0.9326	0.4187	0.9326	0.376	0.9326	0.344	0.9326	0.299	0.9326	0.2562
0.977	0.9086	0.977	0.5785	0.977	0.4758	0.977	0.4112	0.977	0.3674	0.977	0.3135	0.977	0.2721
1.0235	0.9086	1.0235	0.5785	1.0235	0.517	1.0235	0.4689	1.0235	0.429	1.0235	0.368	1.0235	0.3069
1.0723	0.9086	1.0723	0.5886	1.0723	0.5252	1.0723	0.4728	1.0723	0.4295	1.0723	0.3754	1.0723	0.318
1.1233	1.2562	1.1233	0.759	1.1233	0.6339	1.1233	0.5449	1.1233	0.4784	1.1233	0.3889	1.1233	0.318
1.1768	1.2562	1.1768	0.759	1.1768	0.6339	1.1768	0.5449	1.1768	0.4784	1.1768	0.4006	1.1768	0.3289
1.2328	1.2562	1.2328	0.8302	1.2328	0.7291	1.2328	0.6491	1.2328	0.5837	1.2328	0.4845	1.2328	0.3864
1.2916	1.2562	1.2916	0.9189	1.2916	0.7993	1.2916	0.7058	1.2916	0.6308	1.2916	0.5188	1.2916	0.4097
1.353	1.2562	1.353	0.9189	1.353	0.7993	1.353	0.7058	1.353	0.6308	1.353	0.5188	1.353	0.4097
1.4175	1.3538	1.4175	0.9674	1.4175	0.8219	1.4175	0.7323	1.4175	0.6639	1.4175	0.5631	1.4175	0.4667
1.485	1.3538	1.485	0.9674	1.485	0.8219	1.485	0.7371	1.485	0.6874	1.485	0.5977	1.485	0.4967
1.5557	1.5417	1.5557	0.9739	1.5557	0.8219	1.5557	0.7371	1.5557	0.6874	1.5557	0.5977	1.5557	0.5028
1.6298	1.6087	1.6298	1.0257	1.6298	0.9121	1.6298	0.8203	1.6298	0.7505	1.6298	0.6443	1.6298	0.5288
1.7074	1.6087	1.7074	1.0361	1.7074	0.9722	1.7074	0.8761	1.7074	0.795	1.7074	0.6704	1.7074	0.5676
1.7887	1.8947	1.7887	1.0361	1.7887	0.9722	1.7887	0.8761	1.7887	0.795	1.7887	0.6869	1.7887	0.5915
1.8738	1.8947	1.8738	1.0361	1.8738	0.9722	1.8738	0.8761	1.8738	0.795	1.8738	0.7041	1.8738	0.6047
1.963	1.8947	1.963	1.0361	1.963	0.9722	1.963	0.8761	1.963	0.7962	1.963	0.7116	1.963	0.6087
2.0565	1.8947	2.0565	1.0361	2.0565	0.9722	2.0565	0.8761	2.0565	0.7962	2.0565	0.7116	2.0565	0.6087
2.1544	1.8947	2.1544	1.0361	2.1544	0.9581	2.1544	0.8481	2.1544	0.7962	2.1544	0.7116	2.1544	0.6087
2.257	1.6082	2.257	1.0361	2.257	0.9149	2.257	0.8481	2.257	0.7962	2.257	0.7116	2.257	0.6087
2.3645	1.6082	2.3645	0.9942	2.3645	0.9149	2.3645	0.8481	2.3645	0.7962	2.3645	0.7116	2.3645	0.6087
2.4771	1.6082	2.4771	0.9942	2.4771	0.9149	2.4771	0.8481	2.4771	0.7904	2.4771	0.7069	2.4771	0.6029
2.595	1.6082	2.595	0.9942	2.595	0.9149	2.595	0.8481	2.595	0.7904	2.595	0.6952	2.595	0.5873

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 Figure 22E ~ North-South Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%	2%	3%	4%	5%	7%	10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
2.7186	1.6082	2.7186	0.9202	2.7186	0.8531	2.7186	0.7931
2.848	1.6082	2.848	0.9202	2.848	0.845	2.848	0.7403
2.9836	1.6082	2.9836	0.9202	2.9836	0.845	2.9836	0.7403
3.1257	1.6082	3.1257	0.9202	3.1257	0.845	3.1257	0.7403
3.2745	1.6082	3.2745	0.9202	3.2745	0.845	3.2745	0.7403
3.4305	1.6082	3.4305	0.9202	3.4305	0.845	3.4305	0.7403
3.5938	1.6349	3.5938	0.9202	3.5938	0.845	3.5938	0.7403
3.7649	1.6349	3.7649	0.9202	3.7649	0.845	3.7649	0.7403
3.9442	1.6349	3.9442	0.9202	3.9442	0.845	3.9442	0.7403
4.132	1.6349	4.132	0.9202	4.132	0.845	4.132	0.7403
4.3288	1.6926	4.3288	0.9596	4.3288	0.845	4.3288	0.7403
4.5349	1.6926	4.5349	1.0457	4.5349	0.9018	4.5349	0.7756
4.7508	1.6926	4.7508	1.0457	4.7508	0.9018	4.7508	0.7899
4.977	1.6926	4.977	1.0457	4.977	0.9018	4.977	0.7899
5.214	1.6926	5.214	1.0457	5.214	0.9018	5.214	0.7899
5.4623	1.603	5.4623	1.0457	5.4623	0.9018	5.4623	0.7899
5.7224	1.603	5.7224	1.0457	5.7224	0.9018	5.7224	0.7899
5.9948	1.603	5.9948	1.0457	5.9948	0.9018	5.9948	0.7899
6.2803	1.603	6.2803	1.0457	6.2803	0.9018	6.2803	0.7899
6.5793	1.603	6.5793	0.9892	6.5793	0.8782	6.5793	0.7899
6.8926	1.603	6.8926	0.9433	6.8926	0.7981	6.8926	0.72
7.2208	1.2885	7.2208	0.7992	7.2208	0.6983	7.2208	0.6182
7.5646	1.2885	7.5646	0.7357	7.5646	0.6298	7.5646	0.5704
7.9248	1.2885	7.9248	0.6692	7.9248	0.5894	7.9248	0.5439
8.3022	1.2885	8.3022	0.6243	8.3022	0.5267	8.3022	0.4982
8.6975	1.0592	8.6975	0.5768	8.6975	0.5267	8.6975	0.4982
9.1116	1.0592	9.1116	0.5768	9.1116	0.4939	9.1116	0.4536
9.5455	1.0592	9.5455	0.5768	9.5455	0.4939	9.5455	0.4536
10	0.8146	10	0.531	10	0.4775	10	0.4536
10.4762	0.8146	10.4762	0.531	10.4762	0.4725	10.4762	0.4318
10.975	0.7982	10.975	0.531	10.975	0.4725	10.975	0.4261
11.4976	0.7266	11.4976	0.531	11.4976	0.4725	11.4976	0.4244
12.045	0.6949	12.045	0.4302	12.045	0.3979	12.045	0.3828
12.6186	0.6949	12.6186	0.4263	12.6186	0.3839	12.6186	0.3789
13.2194	0.6949	13.2194	0.4263	13.2194	0.3691	13.2194	0.3654
2.7186	0.7395	2.7186	0.6495	2.7186	0.7931	2.7186	0.7395
2.848	0.6948	2.848	0.6221	2.848	0.7403	2.848	0.6948
2.9836	0.6947	2.9836	0.6133	2.9836	0.7403	2.9836	0.6947
3.1257	0.6947	3.1257	0.6133	3.1257	0.7403	3.1257	0.6947
3.2745	0.6947	3.2745	0.6133	3.2745	0.7403	3.2745	0.6947
3.4305	0.6947	3.4305	0.6133	3.4305	0.7403	3.4305	0.6947
3.5938	0.6947	3.5938	0.6133	3.5938	0.7403	3.5938	0.6947
3.7649	0.6947	3.7649	0.6133	3.7649	0.7403	3.7649	0.6947
3.9442	0.6947	3.9442	0.6133	3.9442	0.7403	3.9442	0.6947
4.132	0.6947	4.132	0.6133	4.132	0.7403	4.132	0.6947
4.3288	0.6947	4.3288	0.6133	4.3288	0.7403	4.3288	0.6947
4.5349	0.6947	4.5349	0.6133	4.5349	0.7756	4.5349	0.6947
4.7508	0.7174	4.7508	0.6133	4.7508	0.7899	4.7508	0.7174
4.977	0.7174	4.977	0.6133	4.977	0.7899	4.977	0.7174
5.214	0.7174	5.214	0.6133	5.214	0.7899	5.214	0.7174
5.4623	0.7174	5.4623	0.6133	5.4623	0.7899	5.4623	0.7174
5.7224	0.7174	5.7224	0.6133	5.7224	0.7899	5.7224	0.7174
5.9948	0.7174	5.9948	0.6133	5.9948	0.7899	5.9948	0.7174
6.2803	0.7174	6.2803	0.6133	6.2803	0.7899	6.2803	0.7174
6.5793	0.7174	6.5793	0.6083	6.5793	0.7899	6.5793	0.7174
6.8926	0.6594	6.8926	0.5693	6.8926	0.7981	6.8926	0.6594
7.2208	0.5792	7.2208	0.511	7.2208	0.6983	7.2208	0.5792
7.5646	0.5329	7.5646	0.4765	7.5646	0.6298	7.5646	0.5329
7.9248	0.5121	7.9248	0.466	7.9248	0.5894	7.9248	0.5121
8.3022	0.4778	8.3022	0.4544	8.3022	0.5267	8.3022	0.4778
8.6975	0.4767	8.6975	0.446	8.6975	0.5267	8.6975	0.4767
9.1116	0.442	9.1116	0.4229	9.1116	0.4939	9.1116	0.442
9.5455	0.442	9.5455	0.4229	9.5455	0.4939	9.5455	0.442
10	0.442	10	0.4229	10	0.4775	10	0.442
10.4762	0.4256	10.4762	0.4126	10.4762	0.4725	10.4762	0.4256
10.975	0.412	10.975	0.3988	10.975	0.4725	10.975	0.412
11.4976	0.4001	11.4976	0.3859	11.4976	0.4725	11.4976	0.4001
12.045	0.3795	12.045	0.3743	12.045	0.3979	12.045	0.3795
12.6186	0.3746	12.6186	0.367	12.6186	0.3839	12.6186	0.3746
13.2194	0.3624	13.2194	0.3568	13.2194	0.3691	13.2194	0.3624

PTEE022.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 22E ~ North-South Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.6949	13.8489	0.4263	13.8489	0.3684	13.8489	0.3531	13.8489	0.3514	13.8489	0.3468	13.8489	0.3398
14.5083	0.6949	14.5083	0.4263	14.5083	0.3684	14.5083	0.3479	14.5083	0.3436	14.5083	0.3374	14.5083	0.3305
15.1991	0.6949	15.1991	0.4263	15.1991	0.3684	15.1991	0.3303	15.1991	0.3274	15.1991	0.3248	15.1991	0.3203
15.9228	0.6949	15.9228	0.4263	15.9228	0.3684	15.9228	0.3303	15.9228	0.3191	15.9228	0.3152	15.9228	0.3107
16.681	0.6949	16.681	0.4263	16.681	0.3684	16.681	0.3303	16.681	0.3102	16.681	0.304	16.681	0.301
17.4753	0.6949	17.4753	0.4263	17.4753	0.3684	17.4753	0.3303	17.4753	0.3102	17.4753	0.2998	17.4753	0.2959
18.3074	0.6949	18.3074	0.4263	18.3074	0.3684	18.3074	0.3303	18.3074	0.3102	18.3074	0.2949	18.3074	0.2912
19.1791	0.6949	19.1791	0.4263	19.1791	0.3684	19.1791	0.3303	19.1791	0.3102	19.1791	0.2867	19.1791	0.2854
20.0923	0.7176	20.0923	0.4263	20.0923	0.3684	20.0923	0.3303	20.0923	0.3102	20.0923	0.2866	20.0923	0.2811
21.049	0.7176	21.049	0.4263	21.049	0.3684	21.049	0.3303	21.049	0.3102	21.049	0.2866	21.049	0.2784
22.0513	0.7176	22.0513	0.4263	22.0513	0.3684	22.0513	0.3303	22.0513	0.3102	22.0513	0.2866	22.0513	0.2758
23.1013	0.7176	23.1013	0.3871	23.1013	0.3411	23.1013	0.3241	23.1013	0.3102	23.1013	0.2866	23.1013	0.2728
24.2013	0.7176	24.2013	0.3785	24.2013	0.3411	24.2013	0.3172	24.2013	0.2996	24.2013	0.2743	24.2013	0.2684
25.3536	0.5748	25.3536	0.3598	25.3536	0.3013	25.3536	0.2826	25.3536	0.2697	25.3536	0.264	25.3536	0.2647
26.5609	0.5748	26.5609	0.3598	26.5609	0.3007	26.5609	0.2819	26.5609	0.2697	26.5609	0.264	26.5609	0.2628
27.8256	0.5698	27.8256	0.3224	27.8256	0.2932	27.8256	0.2734	27.8256	0.2629	27.8256	0.2613	27.8256	0.2603
29.1505	0.4937	29.1505	0.3224	29.1505	0.2932	29.1505	0.2734	29.1505	0.2585	29.1505	0.2561	29.1505	0.2571
30.5386	0.4049	30.5386	0.3224	30.5386	0.2867	30.5386	0.2633	30.5386	0.2559	30.5386	0.2553	30.5386	0.2556
31.9927	0.2797	31.9927	0.2618	31.9927	0.2573	31.9927	0.2565	31.9927	0.2559	31.9927	0.2553	31.9927	0.2549
33.516	0.2539	33.516	0.2548	33.516	0.2549	33.516	0.2548	33.516	0.2546	33.516	0.2543	33.516	0.2539
35.1119	0.2533	35.1119	0.2532	35.1119	0.2531	35.1119	0.2531	35.1119	0.253	35.1119	0.2529	35.1119	0.2527
36.7838	0.252	36.7838	0.2519	36.7838	0.2518	36.7838	0.2518	36.7838	0.2518	36.7838	0.2517	36.7838	0.2516
38.5353	0.2507	38.5353	0.2507	38.5353	0.2506	38.5353	0.2506	38.5353	0.2506	38.5353	0.2506	38.5353	0.2505
40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2495
42.2924	0.2486	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487
44.3062	0.2478	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479
46.4159	0.2472	46.4159	0.2471	46.4159	0.2471	46.4159	0.2471	46.4159	0.2471	46.4159	0.2471	46.4159	0.2472
48.626	0.2464	48.626	0.2464	48.626	0.2464	48.626	0.2464	48.626	0.2464	48.626	0.2465	48.626	0.2465
50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458

PTEE024.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 24E ~ Vertical Responses - Slab/Wall Joints ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0291	0.1098	0.026	0.1098	0.0244	0.1098	0.0229	0.1098	0.022	0.1098	0.0212	0.1098	0.0204
0.115	0.0308	0.115	0.026	0.115	0.0244	0.115	0.0233	0.115	0.0229	0.115	0.0221	0.115	0.0213
0.1204	0.0313	0.1204	0.0262	0.1204	0.0245	0.1204	0.024	0.1204	0.0236	0.1204	0.0229	0.1204	0.0218
0.1262	0.0313	0.1262	0.027	0.1262	0.0257	0.1262	0.0246	0.1262	0.0241	0.1262	0.0233	0.1262	0.0221
0.1322	0.0313	0.1322	0.0271	0.1322	0.0258	0.1322	0.0247	0.1322	0.0242	0.1322	0.0234	0.1322	0.0225
0.1385	0.0313	0.1385	0.0277	0.1385	0.0265	0.1385	0.0254	0.1385	0.0245	0.1385	0.0235	0.1385	0.0225
0.1451	0.0316	0.1451	0.0294	0.1451	0.0282	0.1451	0.027	0.1451	0.0259	0.1451	0.0239	0.1451	0.0225
0.152	0.032	0.152	0.0299	0.152	0.0286	0.152	0.0273	0.152	0.0262	0.152	0.0241	0.152	0.0225
0.1592	0.033	0.1592	0.031	0.1592	0.0299	0.1592	0.0288	0.1592	0.0277	0.1592	0.0261	0.1592	0.0241
0.1668	0.0367	0.1668	0.0323	0.1668	0.0312	0.1668	0.0302	0.1668	0.0292	0.1668	0.0276	0.1668	0.0256
0.1748	0.0507	0.1748	0.0427	0.1748	0.0385	0.1748	0.035	0.1748	0.0321	0.1748	0.0284	0.1748	0.0264
0.1831	0.0586	0.1831	0.0492	0.1831	0.0442	0.1831	0.0399	0.1831	0.0362	0.1831	0.0306	0.1831	0.0266
0.1918	0.0586	0.1918	0.0492	0.1918	0.0442	0.1918	0.0399	0.1918	0.0362	0.1918	0.0306	0.1918	0.0267
0.2009	0.0586	0.2009	0.0492	0.2009	0.0442	0.2009	0.0399	0.2009	0.0362	0.2009	0.0323	0.2009	0.0293
0.2105	0.0586	0.2105	0.0492	0.2105	0.0442	0.2105	0.0399	0.2105	0.0384	0.2105	0.0357	0.2105	0.0322
0.2205	0.0586	0.2205	0.0492	0.2205	0.0453	0.2205	0.0426	0.2205	0.0406	0.2205	0.0376	0.2205	0.0337
0.231	0.0586	0.231	0.0492	0.231	0.0458	0.231	0.0439	0.231	0.042	0.231	0.0387	0.231	0.0352
0.242	0.0586	0.242	0.0509	0.242	0.0485	0.242	0.0463	0.242	0.0444	0.242	0.041	0.242	0.0368
0.2535	0.0648	0.2535	0.0572	0.2535	0.0528	0.2535	0.0488	0.2535	0.0453	0.2535	0.041	0.2535	0.0371
0.2656	0.0731	0.2656	0.0586	0.2656	0.0534	0.2656	0.049	0.2656	0.0453	0.2656	0.0424	0.2656	0.0402
0.2783	0.0816	0.2783	0.0598	0.2783	0.0534	0.2783	0.05	0.2783	0.0485	0.2783	0.0459	0.2783	0.0426
0.2915	0.0816	0.2915	0.0619	0.2915	0.058	0.2915	0.0546	0.2915	0.0516	0.2915	0.048	0.2915	0.0437
0.3054	0.0816	0.3054	0.0662	0.3054	0.062	0.3054	0.0583	0.3054	0.0548	0.3054	0.0488	0.3054	0.0448
0.3199	0.0816	0.3199	0.0701	0.3199	0.0659	0.3199	0.0622	0.3199	0.0588	0.3199	0.0531	0.3199	0.0468
0.3352	0.0871	0.3352	0.0766	0.3352	0.0706	0.3352	0.0658	0.3352	0.0624	0.3352	0.0565	0.3352	0.0496
0.3511	0.0905	0.3511	0.0805	0.3511	0.0748	0.3511	0.0698	0.3511	0.0653	0.3511	0.0578	0.3511	0.0502
0.3678	0.1216	0.3678	0.0951	0.3678	0.0823	0.3678	0.0722	0.3678	0.0653	0.3678	0.0578	0.3678	0.0502
0.3853	0.136	0.3853	0.1056	0.3853	0.0918	0.3853	0.0807	0.3853	0.0718	0.3853	0.0587	0.3853	0.0502
0.4037	0.136	0.4037	0.1056	0.4037	0.0918	0.4037	0.082	0.4037	0.076	0.4037	0.0663	0.4037	0.0569
0.4229	0.136	0.4229	0.1056	0.4229	0.0918	0.4229	0.0848	0.4229	0.0796	0.4229	0.0707	0.4229	0.0609
0.4431	0.136	0.4431	0.1056	0.4431	0.0932	0.4431	0.0884	0.4431	0.0838	0.4431	0.0755	0.4431	0.0652
0.4642	0.1375	0.4642	0.1059	0.4642	0.0974	0.4642	0.0915	0.4642	0.086	0.4642	0.0764	0.4642	0.0667
0.4863	0.1479	0.4863	0.1238	0.4863	0.1107	0.4863	0.0995	0.4863	0.0901	0.4863	0.082	0.4863	0.0725
0.5094	0.181	0.5094	0.138	0.5094	0.1214	0.5094	0.108	0.5094	0.0971	0.5094	0.0861	0.5094	0.0744

PTEE024.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 24E ~ Vertical Responses - Slab/Wall Joints ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.2215	0.5337	0.1602	0.5337	0.134	0.5337	0.1151	0.5337	0.1024	0.5337	0.0861	0.5337	0.0744
0.5591	0.2215	0.5591	0.1602	0.5591	0.134	0.5591	0.1151	0.5591	0.1024	0.5591	0.0884	0.5591	0.0754
0.5857	0.2215	0.5857	0.1602	0.5857	0.134	0.5857	0.1151	0.5857	0.1024	0.5857	0.094	0.5857	0.0825
0.6136	0.2215	0.6136	0.1602	0.6136	0.134	0.6136	0.1175	0.6136	0.1108	0.6136	0.1001	0.6136	0.0874
0.6428	0.2268	0.6428	0.163	0.6428	0.1365	0.6428	0.1175	0.6428	0.1126	0.6428	0.1027	0.6428	0.0894
0.6734	0.2268	0.6734	0.163	0.6734	0.1377	0.6734	0.128	0.6734	0.12	0.6734	0.1074	0.6734	0.0928
0.7055	0.2268	0.7055	0.163	0.7055	0.1377	0.7055	0.128	0.7055	0.12	0.7055	0.1086	0.7055	0.0945
0.7391	0.2268	0.7391	0.163	0.7391	0.1413	0.7391	0.1333	0.7391	0.1253	0.7391	0.1108	0.7391	0.0945
0.7743	0.3163	0.7743	0.2131	0.7743	0.1804	0.7743	0.1581	0.7743	0.1421	0.7743	0.1213	0.7743	0.1037
0.8111	0.3163	0.8111	0.2131	0.8111	0.1804	0.8111	0.1581	0.8111	0.1421	0.8111	0.1213	0.8111	0.1064
0.8497	0.3163	0.8497	0.2131	0.8497	0.1804	0.8497	0.1652	0.8497	0.1528	0.8497	0.133	0.8497	0.112
0.8902	0.3163	0.8902	0.2131	0.8902	0.1856	0.8902	0.17	0.8902	0.1571	0.8902	0.1368	0.8902	0.1165
0.9326	0.484	0.9326	0.298	0.9326	0.2451	0.9326	0.2142	0.9326	0.192	0.9326	0.1628	0.9326	0.1368
0.977	0.484	0.977	0.298	0.977	0.2451	0.977	0.2142	0.977	0.192	0.977	0.171	0.977	0.15
1.0235	0.484	1.0235	0.298	1.0235	0.2451	1.0235	0.2142	1.0235	0.1926	1.0235	0.1805	1.0235	0.1621
1.0723	0.484	1.0723	0.298	1.0723	0.2615	1.0723	0.2409	1.0723	0.2242	1.0723	0.1989	1.0723	0.1731
1.1233	0.5753	1.1233	0.3411	1.1233	0.2701	1.1233	0.2409	1.1233	0.2242	1.1233	0.1989	1.1233	0.1746
1.1768	0.5753	1.1768	0.3734	1.1768	0.3107	1.1768	0.2749	1.1768	0.2469	1.1768	0.213	1.1768	0.1874
1.2328	0.5753	1.2328	0.3807	1.2328	0.3438	1.2328	0.3132	1.2328	0.2882	1.2328	0.2506	1.2328	0.2132
1.2916	0.5753	1.2916	0.4139	1.2916	0.3646	1.2916	0.3262	1.2916	0.2999	1.2916	0.2601	1.2916	0.2214
1.353	0.6629	1.353	0.4139	1.353	0.3646	1.353	0.3329	1.353	0.3146	1.353	0.2846	1.353	0.2493
1.4175	0.6629	1.4175	0.429	1.4175	0.3788	1.4175	0.3575	1.4175	0.3384	1.4175	0.3064	1.4175	0.271
1.485	0.6629	1.485	0.457	1.485	0.4099	1.485	0.3825	1.485	0.3581	1.485	0.32	1.485	0.2847
1.5557	0.6629	1.5557	0.4867	1.5557	0.4466	1.5557	0.4193	1.5557	0.3959	1.5557	0.3551	1.5557	0.3075
1.6298	0.8057	1.6298	0.5109	1.6298	0.4763	1.6298	0.4473	1.6298	0.4224	1.6298	0.3819	1.6298	0.335
1.7074	0.8379	1.7074	0.6416	1.7074	0.5704	1.7074	0.5139	1.7074	0.4676	1.7074	0.4014	1.7074	0.3559
1.7887	1.0345	1.7887	0.7676	1.7887	0.6799	1.7887	0.6122	1.7887	0.5562	1.7887	0.4772	1.7887	0.4004
1.8738	1.0345	1.8738	0.8046	1.8738	0.7255	1.8738	0.6502	1.8738	0.5996	1.8738	0.5318	1.8738	0.4441
1.963	1.2645	1.963	0.838	1.963	0.7316	1.963	0.6502	1.963	0.5996	1.963	0.5683	1.963	0.4717
2.0565	1.3932	2.0565	0.838	2.0565	0.7316	2.0565	0.6698	2.0565	0.6339	2.0565	0.584	2.0565	0.4802
2.1544	1.3932	2.1544	0.838	2.1544	0.7316	2.1544	0.6698	2.1544	0.6389	2.1544	0.584	2.1544	0.4802
2.257	1.3932	2.257	0.838	2.257	0.7519	2.257	0.6898	2.257	0.6389	2.257	0.584	2.257	0.4802
2.3645	1.7479	2.3645	0.9979	2.3645	0.8154	2.3645	0.7361	2.3645	0.6766	2.3645	0.584	2.3645	0.4889
2.4771	2.068	2.4771	1.1705	2.4771	0.9105	2.4771	0.7993	2.4771	0.7332	2.4771	0.6216	2.4771	0.5073
2.595	2.142	2.595	1.1705	2.595	0.9105	2.595	0.871	2.595	0.7663	2.595	0.6393	2.595	0.5251



PTEE024.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 24E ~ Vertical Responses - Slab/Wall Joints ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	1.0079	13.8489	0.6123	13.8489	0.5102	13.8489	0.4615	13.8489	0.4386	13.8489	0.4022	13.8489	0.3633
14.5083	1.0079	14.5083	0.6123	14.5083	0.5102	14.5083	0.4547	14.5083	0.4329	14.5083	0.3988	14.5083	0.3633
15.1991	1.0079	15.1991	0.6123	15.1991	0.5102	15.1991	0.4217	15.1991	0.4105	15.1991	0.3706	15.1991	0.3433
15.9228	1.0079	15.9228	0.6123	15.9228	0.5102	15.9228	0.4217	15.9228	0.4105	15.9228	0.3706	15.9228	0.3385
16.681	1.0079	16.681	0.6123	16.681	0.5102	16.681	0.4217	16.681	0.4105	16.681	0.3706	16.681	0.3385
17.4753	1.0079	17.4753	0.6123	17.4753	0.5102	17.4753	0.4217	17.4753	0.4105	17.4753	0.3703	17.4753	0.3348
18.3074	1.0079	18.3074	0.6123	18.3074	0.5102	18.3074	0.4136	18.3074	0.4017	18.3074	0.3481	18.3074	0.3209
19.1791	1.0079	19.1791	0.6123	19.1791	0.5102	19.1791	0.4136	19.1791	0.4017	19.1791	0.3481	19.1791	0.3122
20.0923	0.6551	20.0923	0.4391	20.0923	0.419	20.0923	0.3759	20.0923	0.3461	20.0923	0.319	20.0923	0.2989
21.049	0.6551	21.049	0.4391	21.049	0.419	21.049	0.3759	21.049	0.3461	21.049	0.3119	21.049	0.2909
22.0513	0.6551	22.0513	0.4391	22.0513	0.419	22.0513	0.3759	22.0513	0.3461	22.0513	0.3119	22.0513	0.2881
23.1013	0.4513	23.1013	0.3434	23.1013	0.3322	23.1013	0.3192	23.1013	0.3064	23.1013	0.2882	23.1013	0.278
24.2013	0.4513	24.2013	0.3354	24.2013	0.3097	24.2013	0.2945	24.2013	0.286	24.2013	0.2772	24.2013	0.2733
25.3536	0.4513	25.3536	0.2912	25.3536	0.2849	25.3536	0.2812	25.3536	0.2777	25.3536	0.2725	25.3536	0.269
26.5609	0.4513	26.5609	0.2865	26.5609	0.2793	26.5609	0.2755	26.5609	0.2728	26.5609	0.269	26.5609	0.265
27.8256	0.4513	27.8256	0.2865	27.8256	0.2752	27.8256	0.2694	27.8256	0.2651	27.8256	0.2626	27.8256	0.2598
29.1505	0.4513	29.1505	0.2865	29.1505	0.2672	29.1505	0.2622	29.1505	0.2586	29.1505	0.2556	29.1505	0.2542
30.5386	0.4513	30.5386	0.2865	30.5386	0.2637	30.5386	0.2581	30.5386	0.2572	30.5386	0.2554	30.5386	0.2534
31.9927	0.2716	31.9927	0.2566	31.9927	0.2561	31.9927	0.2556	31.9927	0.2551	31.9927	0.2541	31.9927	0.2527
33.516	0.2543	33.516	0.2538	33.516	0.2536	33.516	0.2533	33.516	0.253	33.516	0.2524	33.516	0.2515
35.1119	0.2519	35.1119	0.2517	35.1119	0.2515	35.1119	0.2514	35.1119	0.2512	35.1119	0.2508	35.1119	0.2502
36.7838	0.2501	36.7838	0.25	36.7838	0.2499	36.7838	0.2498	36.7838	0.2496	36.7838	0.2494	36.7838	0.249
38.5353	0.2486	38.5353	0.2485	38.5353	0.2485	38.5353	0.2484	38.5353	0.2483	38.5353	0.2481	38.5353	0.2479
40.3702	0.2474	40.3702	0.2473	40.3702	0.2473	40.3702	0.2472	40.3702	0.2472	40.3702	0.247	40.3702	0.2468
42.2924	0.2463	42.2924	0.2463	42.2924	0.2462	42.2924	0.2462	42.2924	0.2461	42.2924	0.2461	42.2924	0.2459
44.3062	0.2454	44.3062	0.2453	44.3062	0.2453	44.3062	0.2453	44.3062	0.2453	44.3062	0.2452	44.3062	0.2451
46.4159	0.2446	46.4159	0.2445	46.4159	0.2445	46.4159	0.2445	46.4159	0.2445	46.4159	0.2444	46.4159	0.2444
48.626	0.2438	48.626	0.2438	48.626	0.2438	48.626	0.2438	48.626	0.2438	48.626	0.2437	48.626	0.2437
50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
**24590-PTF-MB-FEP-RBLR-00001B**

Data Sheet No.  
**24590-PTF-MED-FEP-00010**

Project:	<b>RPP-WTP</b>	Description:	<b>Waste Feed Evaporator Reboiler</b>
Project No:	<b>24590</b>	P&ID:	<b>24590-PTF-M6-FEP-00004002</b>
Site:	<b>Hanford</b>	Process Code:	<b>DATA: 24590-QL-POA-MEVV-00001-04-04</b>
Process flow diagram:	<b>24590-PTF-M5-V17T-00004002</b>	Manufacturer Name:	<b>Framatome ANP / Northwest Copper Works, Inc.</b>

**General Data**

Quality Level	<b>Q (See Note 8)</b>	TEMA (Class/Type)	<b>B</b>
Seismic Category	<b>SC-I</b>	Flow Type (Counter current, etc)	<b>2 - pass tubeside</b>
Design Code	<b>ASME VIII Div 1</b>	Heat Exchanger Duty	<b>Btu/hr 17,800,000</b>
Code Stamp	<b>Yes</b>	Heat Exchanger Area	<b>ft<sup>2</sup> 2224</b>
NB Registration	<b>Yes</b>	ΔT (LMTD/Corrected LMTD)	<b>°F 96.5</b>

**Thermal/Hydraulic Data**

	Shell Side		Tube Side	
Fluid Name	<b>Steam</b>		<b>Waste Feed Recirculation</b>	
Fluid Quantities: Total	<b>lbm/hr 18,314</b>		<b>6,524,607</b>	
Condensable Vapor (In/Out)	<b>18,313</b>	<b>3.0</b>	<b>N/A</b>	<b>N/A</b>
Liquid	<b>N/A</b>	<b>18,310</b>	<b>6,524,607</b>	<b>6,524,607</b>
Noncondensable	<b>1.0</b>	<b>1.0</b>	<b>N/A</b>	<b>N/A</b>
Temperature (In/Out)	<b>°F * 4</b>	<b>°F * 4</b>	<b>°F * 4</b>	<b>°F * 4</b>
Density	<b>lbm/ft<sup>3</sup> * 4</b>	<b>lbm/ft<sup>3</sup> * 4</b>	<b>lbm/ft<sup>3</sup> * 4</b>	<b>1.19</b>
Viscosity	<b>Cp * 4</b>	<b>Cp * 4</b>	<b>Cp * 4</b>	<b>12</b>
Molecular Weight	<b>* 4</b>	<b>* 4</b>	<b>* 4</b>	<b>* 4</b>
Molecular Weight, Noncondensable	<b>* 4</b>	<b>* 4</b>	<b>* 4</b>	<b>* 4</b>
Specific Heat	<b>Btu/lbm-°F * 4</b>	<b>Btu/lbm-°F * 4</b>	<b>Btu/lbm-°F * 4</b>	<b>Btu/lbm-°F * 4</b>
Thermal Conductivity	<b>Btu/hr-ft-°F N/A</b>	<b>Btu/hr-ft-°F N/A</b>	<b>Btu/hr-ft-°F N/A</b>	<b>Btu/hr-ft-°F N/A</b>
Latent Heat	<b>Btu/lbm @ °F N/A</b>		<b>Btu/lbm @ °F N/A</b>	
Inlet pressure	<b>psia 14.4</b>		<b>psia N/A</b>	
Tube side Velocity	<b>ft/s N/A</b>		<b>ft/s 6.0</b>	
Pressure Drop (Allowed)	<b>psi N/A</b>		<b>psi N/A</b>	
Fouling Resistance (Min)	<b>hr-ft<sup>2</sup>-°F/Btu 0.0015</b>		<b>hr-ft<sup>2</sup>-°F/Btu 0.007</b>	

**Mechanical Design Data**

	Shell Side		Tube Side	
Design Pressure (Max/Min)	<b>psig 50</b>	<b>Full Vacuum</b>	<b>psig 50</b>	<b>Full Vacuum</b>
Design Temperature (Max/Min)	<b>°F 275</b>	<b>49</b>	<b>°F 175</b>	<b>49</b>
Corrosion Allowance	<b>inch 0.040</b>		<b>inch 0.040</b>	
Erosion Allowance	<b>inch N/A</b>		<b>inch N/A</b>	
Shell OD / ID	<b>inch 60 ID</b>		Overall Dimensions (H x W x L)	<b>inch 72 x 72 x 180</b>
Total No. of Tubes	<b>800</b>		Tube OD	<b>inch 1.5</b>

**Material Data**

Shell	<b>SA 240 304 SS (max carbon 0.030%)</b>	Shell Cover	<b>SA 240 304 SS (max carbon 0.030%)</b>
Channel/Bonnet	<b>SB 582 UNS N06030 (Alloy G-30)</b>	Channel Cover	<b>SB 582 UNS N06030 (Alloy G-30)</b>
Tube	<b>SB 622 UNS N06030 (Alloy G-30 SMLS)</b>	Floating Head Cover	<b>N/A</b>
Stationary Tube Sheet	<b>SB 582 UNS N06030 (Alloy G-30)</b>	Floating Tube Sheet	<b>N/A</b>
Shell Side Gaskets	<b>N/A</b>	Tube Side Gaskets	<b>N/A</b>
Partition Seals	<b>N/A</b>	Baffles/Supports	<b>SA 240 304 SS (max carbon 0.030%)</b>
Insulation	<b>N/A</b>	Forgings (Shell Side)	<b>N/A</b>
Bolting	<b>N/A</b>	Forgings (Channel)	<b>N/A</b>

R11042833



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
24590-PTF-MB-FEP-RBLR-00001B

Data Sheet No.  
24590-PTF-MED-FEP-00010

**Construction Data** (To be determined by the supplier when not specified by the buyer)

Cross Baffle Type	*	% Baffle Cut (Dia.)	*	Spacing (c/c)	inch	*
Bypass Seal Arrangement	*	Longitudinal Seal Type	*	Expansion Joint Type		*
Inlet Nozzle pV <sup>2</sup>	*	Bundle Entrance pV <sup>2</sup>	*	Bundle Exit pV <sup>2</sup>		*
Tube Support Type	*	U-bend Support Type	*	Weight of Bundle	lbf	*
Operating Weight	lbf	Full of Water	lbf	Weight of Shell	lbf	*

**Notes**

\* To be determined / verified by vendor.  $\triangle$

\*\* Deleted.  $\triangle$

- (1) All welds are continuous to avoid crevices, weld surface finish is descaled as laid.
- (2) All welded construction.
- (3) Tube to tubesheet joint shall be strength welded.
- (4) Contents of this drawing are Dangerous Waste Permit Affecting.
- (5) Deleted.
- (6) Deleted.
- (7) For nozzles loads, see 24590-PTF-3PS-MEVV-T0001.
- (8) Vendor will provide item at BNI quality level Q specification, which corresponds with vendor quality level QL-2.
- (9) Vendor design information is from document 24590-QL-POA-MEVV-00001-02-00056.
- (10) Equipment cyclic data is from document 24590-QL-POA-MEVV-00001-04-03.
- (11) The physical design parameters shall be determined by the seller based on TEMA and HEI standards.
- (12) 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.

Safety screening / evaluation required?  Yes  No If yes per 24590-WTP-GPP-SREG-002, E&NS signature required below.

Rev.	Description	By	Checked	EN&S	Approved	Date
4	Updated to reflect WSGM analysis, 24590-PTF-U0N-W16T-00003 and incorporate DOE AEA note (12). * ADDED TO SHOW VALUES TO BE UPDATED	<i>D. Tate</i>	<i>R. Rickenbach</i>	<i>Butt Hall</i>	<i>J. Julyk</i>	2/19/09
3	Updated Design Basis Event High Temperature	R. Rickenbach	C. Knauss	R. Carlstrom	J. Julyk	08/19/2008
2	Incorporated Vendor Design and Equipment Qualification data	R. Rickenbach	C. Knauss	S. Woolfolk	J. Julyk	07/22/2008
1	Incorporated Vendor Design	E. Le	R. Nowak	N/A	J. Julyk	04/04/2005
0	Issued for Procurement	E. Le	S. Shah	N/A	J. Julyk	04/30/2003





# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00010 Rev.: 4

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Equipment Identification			
Component Tag Number	24590-PTF-MB-FEP-RBLR-00001B	Safety Classification	<input checked="" type="checkbox"/> SC <input type="checkbox"/> SS <input type="checkbox"/> APC <input type="checkbox"/> SDC <input type="checkbox"/> SDS <input type="checkbox"/> RRC Note 12 <span style="border: 1px solid black; padding: 0 2px;">4</span>
Manufacturer / Supplier	Northwest Copper Works, Inc. / Areva FS <span style="border: 1px solid black; padding: 0 2px;">4</span>		
Requisition Number	24590-QL-POA-MEVV-00001		
Model	N/A	Seismic Category	<input checked="" type="checkbox"/> SC-I <input type="checkbox"/> SC-II <input type="checkbox"/> SC-III <input type="checkbox"/> SC-IV Note 12 <span style="border: 1px solid black; padding: 0 2px;">4</span>
Description (Include descriptive text [e.g., location, elevation])	Waste Feed Evaporator Reboiler, Room P-0123, elevation 0'-0"		
Safety Function(s)	Confinement (ref. 1) <span style="border: 1px solid black; padding: 0 2px;">4</span>		
Seismic Safety Function	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Room Number(s): P-0123	
Maintenance Accessible	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Method of Maintenance Access: <input checked="" type="checkbox"/> Remote <input type="checkbox"/> Hands On <input type="checkbox"/> None	
Seismic Operability Requirements:	<input checked="" type="checkbox"/> During Seismic Event <span style="border: 1px solid black; padding: 0 2px;">4</span> <input type="checkbox"/> After Seismic Event		
ITS Equipment Type:	<input checked="" type="checkbox"/> Passive Mechanical <input type="checkbox"/> Active Mechanical <input type="checkbox"/> Electrical		

Equipment Environmental Qualification (EEQ)					
Environment <input type="checkbox"/> Mild <input checked="" type="checkbox"/> Harsh	Hi Rad Service <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Design Life (yrs) <input checked="" type="checkbox"/> 40 <input type="checkbox"/> Other _____			
Contamination Class: <u>C5</u>					
Radiation Class: <u>R5</u>					
Parameter Type/Units	Parameter Value	Time Duration (number)	Time Units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Normal</b>					
Normal High Temperature (°F)	113	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal Low Temperature (°F)	59	40	yrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
Normal High Relative Humidity (%RH)	100	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Relative Humidity (%RH)	5	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal High Pressure (in.-w.g.)	0	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Pressure (in.-w.g.)	-1.4	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Radiation Dose Rate (mR/hr)	<span style="border: 1px solid black; padding: 0 2px;">4</span> Note 9	40	yrs	Note 9	Note 1
Vibration Magnitude (g)	N/A	N/A	N/A	N/A	Note 1
Vibration Frequency (Hz)	N/A	N/A	N/A	N/A	Note 1
Additional Normal Information:	See note 2 for pressure units.				



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00010 Rev.: 4

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## Equipment Environmental Qualification (EEQ) (continued)

Parameter Type/Units	Parameter Value	Time Duration (number)	Time units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Abnormal</b>					
Abnormal High Temperature (°F)	△4 131	8	hr/yr	24590-PTF-U0D-W16T-00001, Note 6 △4	Note 1
Abnormal Low Temperature (°F)	59	8	hr/yr	24590-WTP-DB-01-001, Notes 6 & 10	Note 1
Abnormal High Relative Humidity (%RH)	100	24	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Relative Humidity (%RH)	2	22	hr/yr	24590-PTF-U0D-W16T-00001, Note 11 △4	Note 1
Abnormal High Pressure (in.-w.g.)	4	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Pressure (in.-w.g.)	-7.3	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Radiation Dose Rate (mR/hr)	△4 Notes 3&9	△4 0	△4 hr/yr	Note 9	Note 1
Wet Sprinkler System Present	No	N/A △4	N/A △4	24590-PTF-U0D-W16T-00001	Note 1
Additional Abnormal Information	See note 2 for pressure units.				
<b>Design Basis Events (DBE)</b>					
DBE High Temperature (°F)	148	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6 & 11 △4	Note 1
DBE Low Temperature (°F)	40	1000	hrs	24590-PTF-U0D-W16T-00001, Note 6	Note 1
DBE High Relative Humidity (%RH)	100	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Relative Humidity (%RH)	2	1000	hrs	24590-PTF-U0D-W16T-00001, Note 11 △4	Note 1
DBE High Pressure (in.-w.g.)	4	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Pressure (in.-w.g.)	-7.3	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Radiation Dose Rate (mR/hr)	△4 Notes 3&9	△4 0	△4 hr/yr	Note 9	Note 1
Flood Height (ft)	2.08	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
Submergence (ft)	0, Note 4	1000 △4	hrs	24590-PTF-U0D-W16T-00001 24590-QL-POA-MEVV-00001-01-00907	Note 1
Chemical/Spray Exposure	Yes	△4 1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
Additional DBE Information	See note 2 for pressure units.				



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00010 Rev.: 4

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DBE Chemical Exposure Details	
DBE Chemical Types/Concentrations	2M Sodium Hydroxide △4 0.25M Sodium Hydroxide △4 0.1M Sodium Hydroxide △4 Antifoam Agent 2M Nitric Acid △4 Recovered Nitric Acid △4

Interfaces (Electrical)	
Power Supply Voltage (VAC, VDC)	N/A
Power Supply Frequency (Hz)	N/A
Power Connection Method	N/A
I/O Signals to/from Equipment	N/A
I/O Connection Method	N/A

Interfaces (Mechanical)	
Mounting Configuration (orientation)	TBD
Mounting Method (bolts, welds, etc.)	Welded, 24590-PTF-DD-S13T-00028
Auxiliary Devices	N/A

Equipment Seismic Qualification (ESQ)				
Parameter	Title	Reference/Document Number	Version / Revision	Remarks
WTP Seismic Design Specification (BUYER)	Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks	24590-WTP-3PS-SS90-T0001	002	N/A
Specified Seismic Load (BUYER)	Seismic Analysis of Pretreatment Building - WSGM In-Structure Response Spectre (ISRS) △4	24590-PTF-S0C-S15T-00057 △4	00A △4	Calculation is not included in MR, see attached figures 21E, 22E and 24E per CCN 185267. △4
Design Seismic Load (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Method (SELLER)	Note 1	Note 1	Note 1	Note 1
Qualification Report Number (SELLER)	Note 1	Note 1	Note 1	Note 1
Submittal Number (BUYER)	TBD	TBD	TBD	N/A



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-FEP-00010 Rev.: 4

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## Notes and Additional Information

### Notes

1. Data to be provided by SELLER through the submittal process as required on the G-321E.
2. Where pressure is given in inches of water column (in-w.c.) in the source document, it is generally assumed that this is in reference to atmospheric pressure and is therefore equivalent to inches of water gage (in-w.g.).
3. Abnormal and DBE radiation dose rates are set equal to normal and do not contribute to the total integrated dose. 4
4. Submergence depth is the difference between the lowest point on the equipment and the flood depth above the floor. The submergence depth is set to zero if the lowest section of the equipment is above the flood depth.
5. Environmental data from reference 3 is for room environment only.
6. For application of AISC N690, the normal temperatures are not used. Abnormal temperatures shall be applied as Normal Operation Temperature,  $T_O$ , with seismic effects,  $E_S$ . The Design basis event temperature shall be applied as a Thermal Load generated by a postulated accident,  $T_A$ , without seismic effects,  $E_S$  or  $E_O$ .
7. The equipment qualification will be documented in accordance with the requirements in Appendix D of Engineering Specification for Environmental Qualification of Mechanical Equipment, document number 24590-WTP-3PS-G000-T0015 for the passive and active safety functions.
8. Deleted. 4
9. Beta radiation dose is  $1.39 \text{ E}+07 \text{ mRad/hr}$  based on the ratio of Strontium-90 from reference 7 4 as compared to the Strontium and Beta dose given in reference 8. 4 Gamma dose rate is not to exceed  $2.0 \text{ E}+06 \text{ mRad/hr}$  per CCN 175006.
10. Abnormal low temperature, as calculated in reference 3, is based on a Loss of Heating Accident (LOHA) which occurs when steam supply to the building is lost. Since the evaporators are run on steam, this would cause the evaporators to go off-line. Abnormal low temperature will be based on reference 4 at  $59^\circ\text{F}$ .
11. Parameter value used on data sheet has been previously established and determined more conservative than values 4 derived from the reference document noted.
12. For commercial reasons, safety and seismic classification may be higher than elsewhere documented, and therefore 4 conservative.

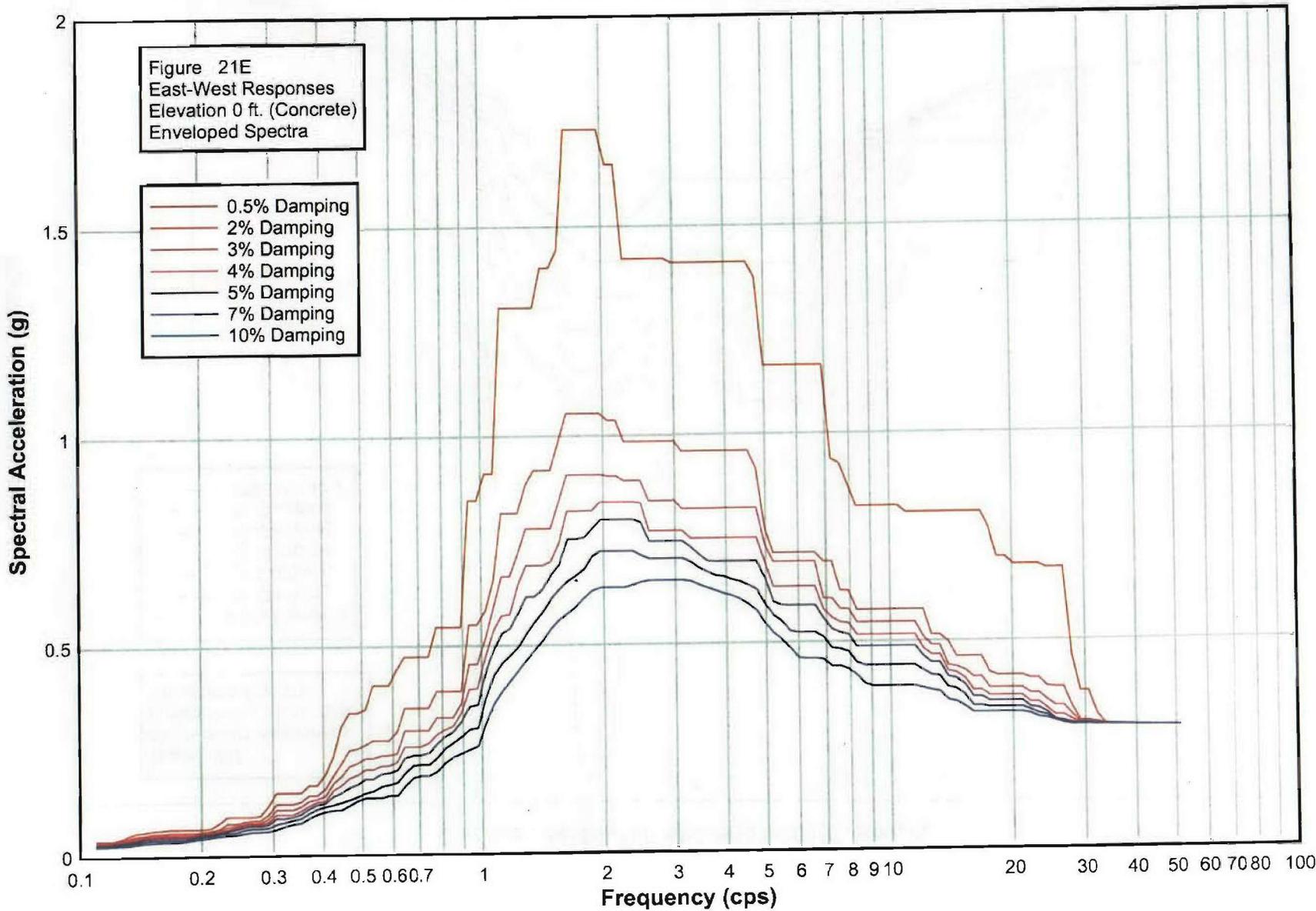
### Reference

1. 24590-WTP-PSAR-ESH-01-002-02, Rev. 04A, Preliminary documented safety analysis to support construction 4 authorization; PT facility specific information.
2. CCN #096661, FEP and CNP Evaporator Vent Problems with New PVP Isolation Valve.
3. 24590-PTF-U0D-W16T-00001, Rev. 0, PTF Room Environment Datasheet.
4. 24590-WTP-DB-ENG-01-001, Rev. 1M, Basis Of Design. 4
5. 24590-PTF-U0N-W16T-00001, Add data for room P-0427. Incorporate additional steam break analysis. 4
6. 24590-PTF-U0N-W16T-00003, Revised temperature & relative humidity data for PTF rooms. 4
7. 24590-WTP-Z0C-50-00008, Rev. B, Comparison of Source Terms for use in Shielding Calculations. 4
8. 24590-LAB-Z0C-80-00001, Rev. D, Beta and Gamma Dose Rate Determinations from Laboratory Sample Bottles. 4

4

# RPP-WTP Pretreatment Facility ISRS

Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A

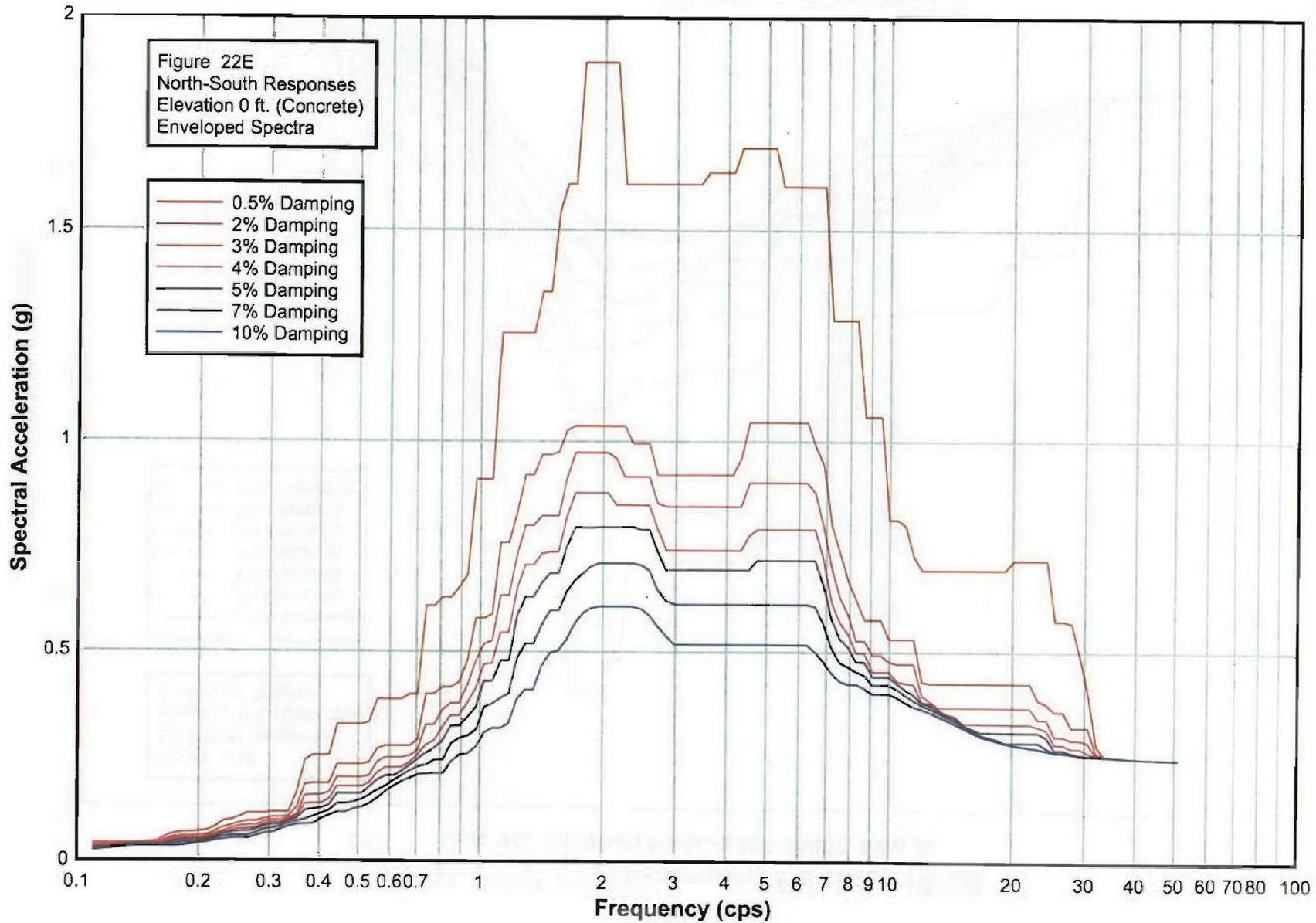


4



# RPP-WTP Pretreatment Facility ISRS

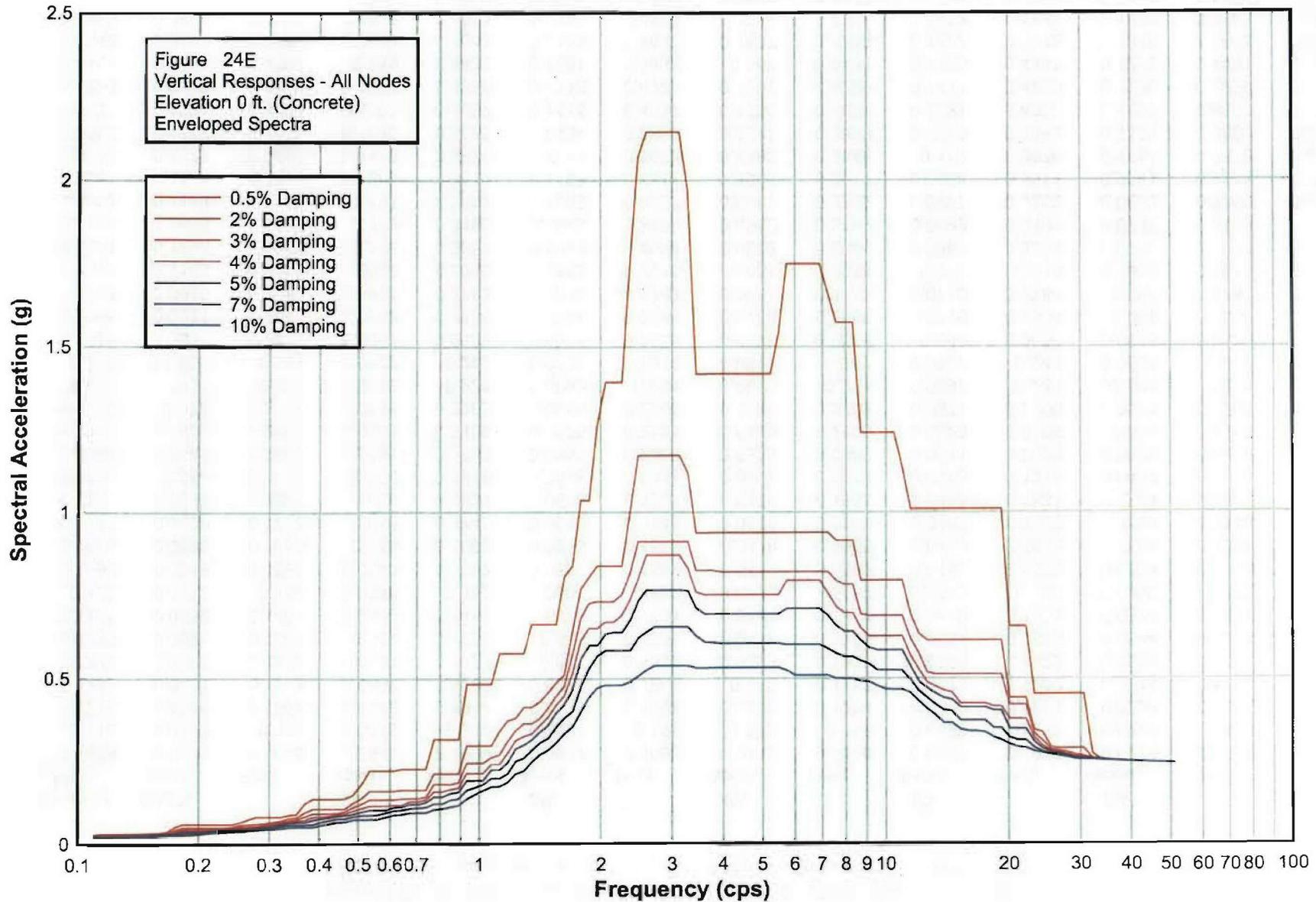
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A





# RPP-WTP Pretreatment Facility ISRS

Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0375	0.1098	0.0345	0.1098	0.0327	0.1098	0.0312	0.1098	0.0298	0.1098	0.0274	0.1098	0.0252
0.115	0.0375	0.115	0.0345	0.115	0.0327	0.115	0.0312	0.115	0.0299	0.115	0.0277	0.115	0.0259
0.1204	0.0375	0.1204	0.0345	0.1204	0.0331	0.1204	0.0322	0.1204	0.0312	0.1204	0.0294	0.1204	0.0268
0.1262	0.0431	0.1262	0.0397	0.1262	0.0378	0.1262	0.036	0.1262	0.0343	0.1262	0.0314	0.1262	0.0277
0.1322	0.0505	0.1322	0.0451	0.1322	0.042	0.1322	0.0393	0.1322	0.0369	0.1322	0.0328	0.1322	0.0281
0.1385	0.0561	0.1385	0.049	0.1385	0.045	0.1385	0.0415	0.1385	0.0384	0.1385	0.0344	0.1385	0.0303
0.1451	0.0582	0.1451	0.0509	0.1451	0.0475	0.1451	0.0444	0.1451	0.0419	0.1451	0.0374	0.1451	0.0325
0.152	0.0617	0.152	0.0546	0.152	0.0507	0.152	0.0472	0.152	0.0442	0.152	0.0392	0.152	0.0336
0.1592	0.0619	0.1592	0.0546	0.1592	0.0507	0.1592	0.0472	0.1592	0.0442	0.1592	0.0394	0.1592	0.0347
0.1668	0.0639	0.1668	0.056	0.1668	0.0516	0.1668	0.0479	0.1668	0.0448	0.1668	0.04	0.1668	0.0353
0.1748	0.0639	0.1748	0.056	0.1748	0.0516	0.1748	0.0479	0.1748	0.0448	0.1748	0.04	0.1748	0.0353
0.1831	0.0639	0.1831	0.056	0.1831	0.0516	0.1831	0.0479	0.1831	0.0448	0.1831	0.04	0.1831	0.0364
0.1918	0.064	0.1918	0.056	0.1918	0.0516	0.1918	0.0491	0.1918	0.0473	0.1918	0.0442	0.1918	0.0401
0.2009	0.0641	0.2009	0.0581	0.2009	0.0556	0.2009	0.0533	0.2009	0.0511	0.2009	0.0472	0.2009	0.0422
0.2105	0.0664	0.2105	0.0603	0.2105	0.0575	0.2105	0.0549	0.2105	0.0525	0.2105	0.049	0.2105	0.0448
0.2205	0.078	0.2205	0.0645	0.2205	0.0618	0.2205	0.0594	0.2205	0.0571	0.2205	0.0531	0.2205	0.0482
0.231	0.0931	0.231	0.0772	0.231	0.0692	0.231	0.0628	0.231	0.0597	0.231	0.0554	0.231	0.0502
0.242	0.0931	0.242	0.0772	0.242	0.0722	0.242	0.0678	0.242	0.0637	0.242	0.0565	0.242	0.0512
0.2535	0.0931	0.2535	0.0817	0.2535	0.077	0.2535	0.0728	0.2535	0.069	0.2535	0.0625	0.2535	0.0547
0.2656	0.0931	0.2656	0.0839	0.2656	0.0794	0.2656	0.0753	0.2656	0.0716	0.2656	0.065	0.2656	0.0571
0.2783	0.0955	0.2783	0.0844	0.2783	0.0794	0.2783	0.0753	0.2783	0.0716	0.2783	0.065	0.2783	0.0575
0.2915	0.1183	0.2915	0.0982	0.2915	0.0885	0.2915	0.081	0.2915	0.075	0.2915	0.0666	0.2915	0.0586
0.3054	0.1498	0.3054	0.123	0.3054	0.1093	0.3054	0.0982	0.3054	0.0892	0.3054	0.0757	0.3054	0.0632
0.3199	0.1498	0.3199	0.123	0.3199	0.1093	0.3199	0.0982	0.3199	0.0892	0.3199	0.0797	0.3199	0.07
0.3352	0.1498	0.3352	0.123	0.3352	0.1093	0.3352	0.0982	0.3352	0.0927	0.3352	0.0852	0.3352	0.0755
0.3511	0.1498	0.3511	0.1285	0.3511	0.1168	0.3511	0.1065	0.3511	0.0994	0.3511	0.0891	0.3511	0.0782
0.3678	0.1677	0.3678	0.1435	0.3678	0.13	0.3678	0.1183	0.3678	0.112	0.3678	0.1014	0.3678	0.0894
0.3853	0.1677	0.3853	0.1435	0.3853	0.134	0.3853	0.1273	0.3853	0.1213	0.3853	0.1109	0.3853	0.0986
0.4037	0.1925	0.4037	0.1587	0.4037	0.1415	0.4037	0.1298	0.4037	0.1251	0.4037	0.1163	0.4037	0.1044
0.4229	0.2359	0.4229	0.1897	0.4229	0.1713	0.4229	0.1551	0.4229	0.1411	0.4229	0.1206	0.4229	0.1079
0.4431	0.3083	0.4431	0.219	0.4431	0.1881	0.4431	0.167	0.4431	0.1495	0.4431	0.1263	0.4431	0.1089
0.4642	0.3407	0.4642	0.2508	0.4642	0.2123	0.4642	0.1837	0.4642	0.1622	0.4642	0.1328	0.4642	0.1192
0.4863	0.3407	0.4863	0.2548	0.4863	0.2198	0.4863	0.1918	0.4863	0.1692	0.4863	0.1398	0.4863	0.1303
0.5094	0.3496	0.5094	0.2641	0.5094	0.2311	0.5094	0.2042	0.5094	0.182	0.5094	0.1485	0.5094	0.1369

PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.4063	0.5337	0.2745	0.5337	0.2311	0.5337	0.2042	0.5337	0.182	0.5337	0.1529	0.5337	0.1371
0.5591	0.4063	0.5591	0.2745	0.5591	0.2378	0.5591	0.213	0.5591	0.194	0.5591	0.1646	0.5591	0.1371
0.5857	0.4063	0.5857	0.2745	0.5857	0.2385	0.5857	0.2142	0.5857	0.1966	0.5857	0.1681	0.5857	0.1425
0.6136	0.4438	0.6136	0.2944	0.6136	0.2421	0.6136	0.2213	0.6136	0.2032	0.6136	0.1733	0.6136	0.1425
0.6428	0.4742	0.6428	0.3514	0.6428	0.2975	0.6428	0.2588	0.6428	0.2323	0.6428	0.1964	0.6428	0.1655
0.6734	0.4742	0.6734	0.3514	0.6734	0.2975	0.6734	0.2588	0.6734	0.2383	0.6734	0.2137	0.6734	0.1844
0.7055	0.4742	0.7055	0.3514	0.7055	0.2975	0.7055	0.2588	0.7055	0.2383	0.7055	0.2155	0.7055	0.1892
0.7391	0.4742	0.7391	0.3514	0.7391	0.2975	0.7391	0.2667	0.7391	0.2438	0.7391	0.2155	0.7391	0.1892
0.7743	0.5449	0.7743	0.3911	0.7743	0.3284	0.7743	0.2875	0.7743	0.2646	0.7743	0.2323	0.7743	0.1993
0.8111	0.5449	0.8111	0.3911	0.8111	0.3284	0.8111	0.2996	0.8111	0.2837	0.8111	0.2551	0.8111	0.2205
0.8497	0.5449	0.8497	0.3911	0.8497	0.3284	0.8497	0.3072	0.8497	0.2942	0.8497	0.2684	0.8497	0.2339
0.8902	0.5449	0.8902	0.3911	0.8902	0.3604	0.8902	0.3382	0.8902	0.318	0.8902	0.2831	0.8902	0.2427
0.9326	0.8469	0.9326	0.5495	0.9326	0.4554	0.9326	0.3957	0.9326	0.3545	0.9326	0.3003	0.9326	0.2517
0.977	0.8469	0.977	0.5495	0.977	0.4554	0.977	0.3975	0.977	0.3585	0.977	0.3036	0.977	0.2596
1.0235	0.9107	1.0235	0.5826	1.0235	0.5168	1.0235	0.4731	1.0235	0.4362	1.0235	0.3776	1.0235	0.3164
1.0723	0.9107	1.0723	0.6542	1.0723	0.5901	1.0723	0.535	1.0723	0.4906	1.0723	0.4288	1.0723	0.36
1.1233	1.3081	1.1233	0.8142	1.1233	0.6641	1.1233	0.5708	1.1233	0.5287	1.1233	0.4575	1.1233	0.3904
1.1768	1.3081	1.1768	0.8142	1.1768	0.6641	1.1768	0.5735	1.1768	0.5393	1.1768	0.4764	1.1768	0.4143
1.2328	1.3081	1.2328	0.8142	1.2328	0.7174	1.2328	0.6427	1.2328	0.577	1.2328	0.4965	1.2328	0.439
1.2916	1.3081	1.2916	0.8822	1.2916	0.7774	1.2916	0.6895	1.2916	0.6157	1.2916	0.5283	1.2916	0.4653
1.353	1.3081	1.353	0.9165	1.353	0.7774	1.353	0.6895	1.353	0.6157	1.353	0.5556	1.353	0.4889
1.4175	1.4021	1.4175	0.9165	1.4175	0.7774	1.4175	0.6895	1.4175	0.6326	1.4175	0.5795	1.4175	0.5119
1.485	1.4021	1.485	0.9165	1.485	0.7774	1.485	0.6984	1.485	0.6672	1.485	0.6099	1.485	0.539
1.5557	1.4438	1.5557	0.9843	1.5557	0.8409	1.5557	0.7415	1.5557	0.6919	1.5557	0.6323	1.5557	0.5603
1.6298	1.729	1.6298	1.0527	1.6298	0.9055	1.6298	0.8177	1.6298	0.7518	1.6298	0.6519	1.6298	0.5748
1.7074	1.729	1.7074	1.0527	1.7074	0.9055	1.7074	0.8177	1.7074	0.7518	1.7074	0.6652	1.7074	0.5915
1.7887	1.729	1.7887	1.0527	1.7887	0.9055	1.7887	0.8185	1.7887	0.7553	1.7887	0.6808	1.7887	0.6117
1.8738	1.729	1.8738	1.0527	1.8738	0.9055	1.8738	0.8185	1.8738	0.7765	1.8738	0.7113	1.8738	0.6287
1.963	1.729	1.963	1.0527	1.963	0.9055	1.963	0.8397	1.963	0.7973	1.963	0.7229	1.963	0.6359
2.0565	1.6472	2.0565	1.0359	2.0565	0.902	2.0565	0.8397	2.0565	0.7973	2.0565	0.7229	2.0565	0.6359
2.1544	1.6472	2.1544	1.0359	2.1544	0.902	2.1544	0.8397	2.1544	0.7973	2.1544	0.7229	2.1544	0.6359
2.257	1.4229	2.257	0.9839	2.257	0.8903	2.257	0.8397	2.257	0.7973	2.257	0.7229	2.257	0.6361
2.3645	1.4229	2.3645	0.9839	2.3645	0.8903	2.3645	0.8397	2.3645	0.7973	2.3645	0.7229	2.3645	0.6418
2.4771	1.4229	2.4771	0.9839	2.4771	0.8903	2.4771	0.8363	2.4771	0.7896	2.4771	0.7121	2.4771	0.6484
2.595	1.4229	2.595	0.9839	2.595	0.8416	2.595	0.7692	2.595	0.745	2.595	0.7036	2.595	0.6522

PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
2.7186	1.4229	2.7186	0.9839	2.7186	0.8416	2.7186	0.7692	2.7186	0.745	2.7186	0.7036	2.7186	0.6522	
2.848	1.4229	2.848	0.9839	2.848	0.8416	2.848	0.7692	2.848	0.745	2.848	0.7036	2.848	0.6522	
2.9836	1.4127	2.9836	0.9839	2.9836	0.8416	2.9836	0.7692	2.9836	0.745	2.9836	0.7036	2.9836	0.6522	
3.1257	1.4127	3.1257	0.9586	3.1257	0.8211	3.1257	0.7692	3.1257	0.745	3.1257	0.7036	3.1257	0.6522	
3.2745	1.4127	3.2745	0.9586	3.2745	0.8211	3.2745	0.751	3.2745	0.7299	3.2745	0.6954	3.2745	0.6492	
3.4305	1.4127	3.4305	0.9586	3.4305	0.8211	3.4305	0.751	3.4305	0.7126	3.4305	0.681	3.4305	0.6403	
3.5938	1.4127	3.5938	0.9586	3.5938	0.8211	3.5938	0.751	3.5938	0.6971	3.5938	0.671	3.5938	0.6329	
3.7649	1.4127	3.7649	0.9586	3.7649	0.8211	3.7649	0.751	3.7649	0.6954	3.7649	0.6626	3.7649	0.6263	
3.9442	1.4127	3.9442	0.9586	3.9442	0.8211	3.9442	0.751	3.9442	0.6954	3.9442	0.659	3.9442	0.6182	
4.132	1.4127	4.132	0.9586	4.132	0.8211	4.132	0.751	4.132	0.6954	4.132	0.6519	4.132	0.6132	
4.3288	1.4127	4.3288	0.9586	4.3288	0.8211	4.3288	0.751	4.3288	0.6954	4.3288	0.6467	4.3288	0.6045	
4.5349	1.4127	4.5349	0.9586	4.5349	0.8211	4.5349	0.751	4.5349	0.6954	4.5349	0.6383	4.5349	0.5926	
4.7508	1.376	4.7508	0.9153	4.7508	0.8211	4.7508	0.751	4.7508	0.6954	4.7508	0.6271	4.7508	0.5766	
4.977	1.1649	4.977	0.7722	4.977	0.7324	4.977	0.6911	4.977	0.6536	4.977	0.5927	4.977	0.5466	
5.214	1.1649	5.214	0.7138	5.214	0.6926	5.214	0.6329	5.214	0.5972	5.214	0.5647	5.214	0.5221	
5.4623	1.1649	5.4623	0.7138	5.4623	0.6926	5.4623	0.6329	5.4623	0.5893	5.4623	0.5516	5.4623	0.5074	
5.7224	1.1649	5.7224	0.7138	5.7224	0.6926	5.7224	0.6329	5.7224	0.5878	5.7224	0.5268	5.7224	0.486	
5.9948	1.1649	5.9948	0.7138	5.9948	0.6926	5.9948	0.6329	5.9948	0.5878	5.9948	0.5235	5.9948	0.4626	
6.2803	1.1649	6.2803	0.7138	6.2803	0.6926	6.2803	0.6329	6.2803	0.5878	6.2803	0.5235	6.2803	0.4608	
6.5793	1.1649	6.5793	0.7138	6.5793	0.6926	6.5793	0.6329	6.5793	0.5878	6.5793	0.5235	6.5793	0.4608	
6.8926	1.1649	6.8926	0.6922	6.8926	0.6037	6.8926	0.5767	6.8926	0.5551	6.8926	0.5117	6.8926	0.4579	
7.2208	0.9369	7.2208	0.6922	7.2208	0.6037	7.2208	0.5573	7.2208	0.5298	7.2208	0.4851	7.2208	0.4415	
7.5646	0.9251	7.5646	0.6226	7.5646	0.5783	7.5646	0.5462	7.5646	0.5217	7.5646	0.4826	7.5646	0.4415	
7.9248	0.8741	7.9248	0.6213	7.9248	0.5773	7.9248	0.5435	7.9248	0.5163	7.9248	0.4761	7.9248	0.4338	
8.3022	0.8232	8.3022	0.5748	8.3022	0.5453	8.3022	0.5153	8.3022	0.4877	8.3022	0.449	8.3022	0.4181	
8.6975	0.8232	8.6975	0.5748	8.6975	0.5453	8.6975	0.5153	8.6975	0.4877	8.6975	0.4421	8.6975	0.3975	
9.1116	0.8232	9.1116	0.5748	9.1116	0.5453	9.1116	0.5153	9.1116	0.4877	9.1116	0.4421	9.1116	0.3917	
9.5455	0.8232	9.5455	0.5748	9.5455	0.5453	9.5455	0.5153	9.5455	0.4877	9.5455	0.4421	9.5455	0.3917	
10	0.8232	10	0.5748	10	0.5453	10	0.5153	10	0.4877	10	0.4421	10	0.3917	
10.4762	0.8232	10.4762	0.5748	10.4762	0.5453	10.4762	0.5153	10.4762	0.4877	10.4762	0.4421	10.4762	0.3917	
10.975	0.8069	10.975	0.5748	10.975	0.5453	10.975	0.5153	10.975	0.4877	10.975	0.4421	10.975	0.3917	
11.4976	0.8069	11.4976	0.5748	11.4976	0.5453	11.4976	0.5153	11.4976	0.4877	11.4976	0.4421	11.4976	0.3917	
12.045	0.8069	12.045	0.5748	12.045	0.5088	12.045	0.481	12.045	0.4623	12.045	0.4284	12.045	0.3857	
12.6186	0.8069	12.6186	0.5137	12.6186	0.4887	12.6186	0.4663	12.6186	0.4469	12.6186	0.4171	12.6186	0.3809	
13.2194	0.8069	13.2194	0.5136	13.2194	0.4887	13.2194	0.4663	13.2194	0.4469	13.2194	0.4149	13.2194	0.3775	

PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.8069	13.8489	0.4975	13.8489	0.44	13.8489	0.426	13.8489	0.4124	13.8489	0.3875	13.8489	0.3566
14.5083	0.8069	14.5083	0.4604	14.5083	0.4358	14.5083	0.4216	14.5083	0.408	14.5083	0.3834	14.5083	0.3525
15.1991	0.8069	15.1991	0.4604	15.1991	0.4273	15.1991	0.4075	15.1991	0.3925	15.1991	0.368	15.1991	0.3399
15.9228	0.8069	15.9228	0.4604	15.9228	0.4111	15.9228	0.379	15.9228	0.3633	15.9228	0.3417	15.9228	0.3258
16.681	0.8069	16.681	0.4604	16.681	0.4111	16.681	0.379	16.681	0.3633	16.681	0.3417	16.681	0.3258
17.4753	0.7678	17.4753	0.4222	17.4753	0.384	17.4753	0.3658	17.4753	0.3531	17.4753	0.338	17.4753	0.3258
18.3074	0.6991	18.3074	0.4145	18.3074	0.384	18.3074	0.3654	18.3074	0.3531	18.3074	0.338	18.3074	0.3258
19.1791	0.6991	19.1791	0.4145	19.1791	0.384	19.1791	0.3654	19.1791	0.3531	19.1791	0.338	19.1791	0.3258
20.0923	0.6809	20.0923	0.4145	20.0923	0.384	20.0923	0.3654	20.0923	0.3531	20.0923	0.338	20.0923	0.3258
21.049	0.6809	21.049	0.4145	21.049	0.384	21.049	0.3654	21.049	0.3531	21.049	0.338	21.049	0.3258
22.0513	0.6809	22.0513	0.4076	22.0513	0.3711	22.0513	0.3497	22.0513	0.3377	22.0513	0.3309	22.0513	0.3223
23.1013	0.6809	23.1013	0.4076	23.1013	0.3711	23.1013	0.3497	23.1013	0.3352	23.1013	0.3223	23.1013	0.3135
24.2013	0.6714	24.2013	0.3876	24.2013	0.3546	24.2013	0.3339	24.2013	0.3248	24.2013	0.3182	24.2013	0.3115
25.3536	0.6714	25.3536	0.3853	25.3536	0.3408	25.3536	0.3181	25.3536	0.3075	25.3536	0.3068	25.3536	0.3051
26.5609	0.6714	26.5609	0.3853	26.5609	0.3408	26.5609	0.3181	26.5609	0.3041	26.5609	0.2986	26.5609	0.2992
27.8256	0.4616	27.8256	0.3378	27.8256	0.3191	27.8256	0.3066	27.8256	0.2988	27.8256	0.296	27.8256	0.2956
29.1505	0.3753	29.1505	0.3037	29.1505	0.2996	29.1505	0.2979	29.1505	0.297	29.1505	0.296	29.1505	0.2951
30.5386	0.3753	30.5386	0.3037	30.5386	0.2996	30.5386	0.2979	30.5386	0.297	30.5386	0.296	30.5386	0.2951
31.9927	0.3196	31.9927	0.2994	31.9927	0.2977	31.9927	0.2968	31.9927	0.2961	31.9927	0.2952	31.9927	0.2943
33.516	0.2961	33.516	0.2957	33.516	0.2953	33.516	0.295	33.516	0.2948	33.516	0.2945	33.516	0.2942
35.1119	0.2952	35.1119	0.2948	35.1119	0.2947	35.1119	0.2946	35.1119	0.2944	35.1119	0.2942	35.1119	0.2939
36.7838	0.2943	36.7838	0.2943	36.7838	0.2942	36.7838	0.2941	36.7838	0.294	36.7838	0.2938	36.7838	0.2936
38.5353	0.2938	38.5353	0.2937	38.5353	0.2936	38.5353	0.2936	38.5353	0.2935	38.5353	0.2934	38.5353	0.2932
40.3702	0.2932	40.3702	0.2931	40.3702	0.2931	40.3702	0.293	40.3702	0.293	40.3702	0.2929	40.3702	0.2928
42.2924	0.2925	42.2924	0.2926	42.2924	0.2925	42.2924	0.2925	42.2924	0.2925	42.2924	0.2924	42.2924	0.2923
44.3062	0.2922	44.3062	0.2921	44.3062	0.2921	44.3062	0.2921	44.3062	0.292	44.3062	0.292	44.3062	0.2919
46.4159	0.2917	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916
48.626	0.2913	48.626	0.2912	48.626	0.2912	48.626	0.2912	48.626	0.2912	48.626	0.2912	48.626	0.2912
50.9414	0.2907	50.9414	0.2908	50.9414	0.2908	50.9414	0.2908	50.9414	0.2908	50.9414	0.2908	50.9414	0.2909

PTEE022.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 22E ~ North-South Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0404	0.1098	0.0365	0.1098	0.0342	0.1098	0.0321	0.1098	0.0302	0.1098	0.0271	0.1098	0.0235
0.115	0.0404	0.115	0.0365	0.115	0.0342	0.115	0.0321	0.115	0.0302	0.115	0.0271	0.115	0.0253
0.1204	0.0404	0.1204	0.0365	0.1204	0.0342	0.1204	0.0321	0.1204	0.0306	0.1204	0.0293	0.1204	0.0274
0.1262	0.0404	0.1262	0.0365	0.1262	0.0349	0.1262	0.034	0.1262	0.033	0.1262	0.0313	0.1262	0.0295
0.1322	0.0404	0.1322	0.038	0.1322	0.0368	0.1322	0.0357	0.1322	0.0346	0.1322	0.0331	0.1322	0.0316
0.1385	0.041	0.1385	0.039	0.1385	0.0379	0.1385	0.037	0.1385	0.0362	0.1385	0.0347	0.1385	0.0329
0.1451	0.0415	0.1451	0.0397	0.1451	0.0386	0.1451	0.0377	0.1451	0.0368	0.1451	0.0353	0.1451	0.0333
0.152	0.0438	0.152	0.04	0.152	0.0386	0.152	0.0377	0.152	0.0368	0.152	0.0353	0.152	0.0333
0.1592	0.0461	0.1592	0.0415	0.1592	0.0394	0.1592	0.0377	0.1592	0.0368	0.1592	0.0353	0.1592	0.0333
0.1668	0.0583	0.1668	0.0505	0.1668	0.0462	0.1668	0.0425	0.1668	0.0394	0.1668	0.0353	0.1668	0.0333
0.1748	0.0643	0.1748	0.0565	0.1748	0.0521	0.1748	0.0482	0.1748	0.0448	0.1748	0.0392	0.1748	0.0333
0.1831	0.0666	0.1831	0.0583	0.1831	0.0541	0.1831	0.0504	0.1831	0.047	0.1831	0.0413	0.1831	0.0351
0.1918	0.0676	0.1918	0.0584	0.1918	0.0541	0.1918	0.0505	0.1918	0.0472	0.1918	0.0415	0.1918	0.0376
0.2009	0.0696	0.2009	0.0595	0.2009	0.0541	0.2009	0.0509	0.2009	0.0481	0.2009	0.0431	0.2009	0.0405
0.2105	0.0719	0.2105	0.0616	0.2105	0.0578	0.2105	0.0543	0.2105	0.051	0.2105	0.0476	0.2105	0.0438
0.2205	0.0815	0.2205	0.0705	0.2205	0.0647	0.2205	0.0596	0.2205	0.0568	0.2205	0.0528	0.2205	0.048
0.231	0.0954	0.231	0.079	0.231	0.0704	0.231	0.0667	0.231	0.0634	0.231	0.0577	0.231	0.0509
0.242	0.0977	0.242	0.0841	0.242	0.0771	0.242	0.071	0.242	0.0669	0.242	0.06	0.242	0.0531
0.2535	0.1051	0.2535	0.0906	0.2535	0.0825	0.2535	0.0755	0.2535	0.0694	0.2535	0.06	0.2535	0.0531
0.2656	0.1135	0.2656	0.0943	0.2656	0.084	0.2656	0.0755	0.2656	0.0694	0.2656	0.06	0.2656	0.0531
0.2783	0.1135	0.2783	0.0943	0.2783	0.084	0.2783	0.0776	0.2783	0.0736	0.2783	0.0666	0.2783	0.0591
0.2915	0.1135	0.2915	0.0994	0.2915	0.093	0.2915	0.0874	0.2915	0.0826	0.2915	0.0745	0.2915	0.0653
0.3054	0.1163	0.3054	0.104	0.3054	0.0971	0.3054	0.0909	0.3054	0.0855	0.3054	0.0768	0.3054	0.0674
0.3199	0.1163	0.3199	0.104	0.3199	0.0971	0.3199	0.0909	0.3199	0.0864	0.3199	0.0812	0.3199	0.075
0.3352	0.1163	0.3352	0.1068	0.3352	0.1025	0.3352	0.0986	0.3352	0.095	0.3352	0.0888	0.3352	0.0821
0.3511	0.1636	0.3511	0.1274	0.3511	0.1102	0.3511	0.105	0.3511	0.101	0.3511	0.0944	0.3511	0.0865
0.3678	0.2398	0.3678	0.1821	0.3678	0.1557	0.3678	0.1356	0.3678	0.1202	0.3678	0.0985	0.3678	0.0872
0.3853	0.2521	0.3853	0.185	0.3853	0.1576	0.3853	0.137	0.3853	0.1232	0.3853	0.1054	0.3853	0.0884
0.4037	0.2521	0.4037	0.185	0.4037	0.1576	0.4037	0.137	0.4037	0.1254	0.4037	0.1131	0.4037	0.1
0.4229	0.2521	0.4229	0.185	0.4229	0.1633	0.4229	0.1471	0.4229	0.1332	0.4229	0.1202	0.4229	0.1087
0.4431	0.3253	0.4431	0.2305	0.4431	0.1995	0.4431	0.1774	0.4431	0.1605	0.4431	0.137	0.4431	0.1162
0.4642	0.3253	0.4642	0.2305	0.4642	0.1995	0.4642	0.1774	0.4642	0.1605	0.4642	0.137	0.4642	0.1162
0.4863	0.3253	0.4863	0.2305	0.4863	0.1995	0.4863	0.1774	0.4863	0.1605	0.4863	0.1405	0.4863	0.1237
0.5094	0.3253	0.5094	0.2305	0.5094	0.1995	0.5094	0.1774	0.5094	0.1605	0.5094	0.1467	0.5094	0.1284

PTEE022.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 22E ~ North-South Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.3317	0.5337	0.235	0.5337	0.2031	0.5337	0.1861	0.5337	0.1756	0.5337	0.1573	0.5337	0.1368
0.5591	0.3864	0.5591	0.2681	0.5591	0.2359	0.5591	0.2104	0.5591	0.1932	0.5591	0.1694	0.5591	0.1505
0.5857	0.3864	0.5857	0.2751	0.5857	0.2466	0.5857	0.223	0.5857	0.2031	0.5857	0.1791	0.5857	0.1667
0.6136	0.3864	0.6136	0.2751	0.6136	0.2466	0.6136	0.223	0.6136	0.2035	0.6136	0.193	0.6136	0.1795
0.6428	0.3864	0.6428	0.2751	0.6428	0.2466	0.6428	0.2234	0.6428	0.2139	0.6428	0.2039	0.6428	0.1896
0.6734	0.3983	0.6734	0.2751	0.6734	0.251	0.6734	0.2354	0.6734	0.2284	0.6734	0.2154	0.6734	0.1984
0.7055	0.3983	0.7055	0.2895	0.7055	0.2641	0.7055	0.2526	0.7055	0.2425	0.7055	0.2254	0.7055	0.2065
0.7391	0.6097	0.7391	0.3987	0.7391	0.3252	0.7391	0.2766	0.7391	0.2581	0.7391	0.2297	0.7391	0.208
0.7743	0.6097	0.7743	0.3987	0.7743	0.3252	0.7743	0.287	0.7743	0.2697	0.7743	0.2412	0.7743	0.2094
0.8111	0.6287	0.8111	0.4148	0.8111	0.3607	0.8111	0.3191	0.8111	0.2867	0.8111	0.2412	0.8111	0.2094
0.8497	0.6287	0.8497	0.4148	0.8497	0.3768	0.8497	0.3473	0.8497	0.3221	0.8497	0.2809	0.8497	0.2363
0.8902	0.6527	0.8902	0.4263	0.8902	0.3768	0.8902	0.3473	0.8902	0.3236	0.8902	0.2939	0.8902	0.2537
0.9326	0.6829	0.9326	0.4768	0.9326	0.4187	0.9326	0.376	0.9326	0.344	0.9326	0.299	0.9326	0.2562
0.977	0.9086	0.977	0.5785	0.977	0.4758	0.977	0.4112	0.977	0.3674	0.977	0.3135	0.977	0.2721
1.0235	0.9086	1.0235	0.5785	1.0235	0.517	1.0235	0.4689	1.0235	0.429	1.0235	0.368	1.0235	0.3069
1.0723	0.9086	1.0723	0.5886	1.0723	0.5252	1.0723	0.4728	1.0723	0.4295	1.0723	0.3754	1.0723	0.318
1.1233	1.2562	1.1233	0.759	1.1233	0.6339	1.1233	0.5449	1.1233	0.4784	1.1233	0.3889	1.1233	0.318
1.1768	1.2562	1.1768	0.759	1.1768	0.6339	1.1768	0.5449	1.1768	0.4784	1.1768	0.4006	1.1768	0.3289
1.2328	1.2562	1.2328	0.8302	1.2328	0.7291	1.2328	0.6491	1.2328	0.5837	1.2328	0.4845	1.2328	0.3864
1.2916	1.2562	1.2916	0.9189	1.2916	0.7993	1.2916	0.7058	1.2916	0.6308	1.2916	0.5188	1.2916	0.4097
1.353	1.2562	1.353	0.9189	1.353	0.7993	1.353	0.7058	1.353	0.6308	1.353	0.5188	1.353	0.4097
1.4175	1.3538	1.4175	0.9674	1.4175	0.8219	1.4175	0.7323	1.4175	0.6639	1.4175	0.5631	1.4175	0.4667
1.485	1.3538	1.485	0.9674	1.485	0.8219	1.485	0.7371	1.485	0.6874	1.485	0.5977	1.485	0.4967
1.5557	1.5417	1.5557	0.9739	1.5557	0.8219	1.5557	0.7371	1.5557	0.6874	1.5557	0.5977	1.5557	0.5028
1.6298	1.6087	1.6298	1.0257	1.6298	0.9121	1.6298	0.8203	1.6298	0.7505	1.6298	0.6443	1.6298	0.5288
1.7074	1.6087	1.7074	1.0361	1.7074	0.9722	1.7074	0.8761	1.7074	0.795	1.7074	0.6704	1.7074	0.5676
1.7887	1.8947	1.7887	1.0361	1.7887	0.9722	1.7887	0.8761	1.7887	0.795	1.7887	0.6869	1.7887	0.5915
1.8738	1.8947	1.8738	1.0361	1.8738	0.9722	1.8738	0.8761	1.8738	0.795	1.8738	0.7041	1.8738	0.6047
1.963	1.8947	1.963	1.0361	1.963	0.9722	1.963	0.8761	1.963	0.7962	1.963	0.7116	1.963	0.6087
2.0565	1.8947	2.0565	1.0361	2.0565	0.9722	2.0565	0.8761	2.0565	0.7962	2.0565	0.7116	2.0565	0.6087
2.1544	1.8947	2.1544	1.0361	2.1544	0.9581	2.1544	0.8481	2.1544	0.7962	2.1544	0.7116	2.1544	0.6087
2.257	1.6082	2.257	1.0361	2.257	0.9149	2.257	0.8481	2.257	0.7962	2.257	0.7116	2.257	0.6087
2.3645	1.6082	2.3645	0.9942	2.3645	0.9149	2.3645	0.8481	2.3645	0.7962	2.3645	0.7116	2.3645	0.6087
2.4771	1.6082	2.4771	0.9942	2.4771	0.9149	2.4771	0.8481	2.4771	0.7904	2.4771	0.7069	2.4771	0.6029
2.595	1.6082	2.595	0.9942	2.595	0.9149	2.595	0.8481	2.595	0.7904	2.595	0.6952	2.595	0.5873

PTEE022.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 22E ~ North-South Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
2.7186	1.6082	2.7186	0.9202	2.7186	0.8531	2.7186	0.7931	2.7186	0.7395	2.7186	0.6495	2.7186	0.562
2.848	1.6082	2.848	0.9202	2.848	0.845	2.848	0.7403	2.848	0.6948	2.848	0.6221	2.848	0.5376
2.9836	1.6082	2.9836	0.9202	2.9836	0.845	2.9836	0.7403	2.9836	0.6947	2.9836	0.6133	2.9836	0.5177
3.1257	1.6082	3.1257	0.9202	3.1257	0.845	3.1257	0.7403	3.1257	0.6947	3.1257	0.6133	3.1257	0.5177
3.2745	1.6082	3.2745	0.9202	3.2745	0.845	3.2745	0.7403	3.2745	0.6947	3.2745	0.6133	3.2745	0.5177
3.4305	1.6082	3.4305	0.9202	3.4305	0.845	3.4305	0.7403	3.4305	0.6947	3.4305	0.6133	3.4305	0.5177
3.5938	1.6349	3.5938	0.9202	3.5938	0.845	3.5938	0.7403	3.5938	0.6947	3.5938	0.6133	3.5938	0.5177
3.7649	1.6349	3.7649	0.9202	3.7649	0.845	3.7649	0.7403	3.7649	0.6947	3.7649	0.6133	3.7649	0.5177
3.9442	1.6349	3.9442	0.9202	3.9442	0.845	3.9442	0.7403	3.9442	0.6947	3.9442	0.6133	3.9442	0.5177
4.132	1.6349	4.132	0.9202	4.132	0.845	4.132	0.7403	4.132	0.6947	4.132	0.6133	4.132	0.5177
4.3288	1.6926	4.3288	0.9596	4.3288	0.845	4.3288	0.7403	4.3288	0.6947	4.3288	0.6133	4.3288	0.5177
4.5349	1.6926	4.5349	1.0457	4.5349	0.9018	4.5349	0.7756	4.5349	0.6947	4.5349	0.6133	4.5349	0.5177
4.7508	1.6926	4.7508	1.0457	4.7508	0.9018	4.7508	0.7899	4.7508	0.7174	4.7508	0.6133	4.7508	0.5177
4.977	1.6926	4.977	1.0457	4.977	0.9018	4.977	0.7899	4.977	0.7174	4.977	0.6133	4.977	0.5177
5.214	1.6926	5.214	1.0457	5.214	0.9018	5.214	0.7899	5.214	0.7174	5.214	0.6133	5.214	0.5177
5.4623	1.603	5.4623	1.0457	5.4623	0.9018	5.4623	0.7899	5.4623	0.7174	5.4623	0.6133	5.4623	0.5177
5.7224	1.603	5.7224	1.0457	5.7224	0.9018	5.7224	0.7899	5.7224	0.7174	5.7224	0.6133	5.7224	0.5177
5.9948	1.603	5.9948	1.0457	5.9948	0.9018	5.9948	0.7899	5.9948	0.7174	5.9948	0.6133	5.9948	0.5177
6.2803	1.603	6.2803	1.0457	6.2803	0.9018	6.2803	0.7899	6.2803	0.7174	6.2803	0.6133	6.2803	0.5177
6.5793	1.603	6.5793	0.9892	6.5793	0.8782	6.5793	0.7899	6.5793	0.7174	6.5793	0.6083	6.5793	0.5013
6.8926	1.603	6.8926	0.9433	6.8926	0.7981	6.8926	0.72	6.8926	0.6594	6.8926	0.5693	6.8926	0.4789
7.2208	1.2885	7.2208	0.7992	7.2208	0.6983	7.2208	0.6182	7.2208	0.5792	7.2208	0.511	7.2208	0.4506
7.5646	1.2885	7.5646	0.7357	7.5646	0.6298	7.5646	0.5704	7.5646	0.5329	7.5646	0.4765	7.5646	0.4309
7.9248	1.2885	7.9248	0.6692	7.9248	0.5894	7.9248	0.5439	7.9248	0.5121	7.9248	0.466	7.9248	0.4241
8.3022	1.2885	8.3022	0.6243	8.3022	0.5267	8.3022	0.4982	8.3022	0.4778	8.3022	0.4544	8.3022	0.4241
8.6975	1.0592	8.6975	0.5768	8.6975	0.5267	8.6975	0.4982	8.6975	0.4767	8.6975	0.446	8.6975	0.4145
9.1116	1.0592	9.1116	0.5768	9.1116	0.4939	9.1116	0.4536	9.1116	0.442	9.1116	0.4229	9.1116	0.4013
9.5455	1.0592	9.5455	0.5768	9.5455	0.4939	9.5455	0.4536	9.5455	0.442	9.5455	0.4229	9.5455	0.4013
10	0.8146	10	0.531	10	0.4775	10	0.4536	10	0.442	10	0.4229	10	0.4013
10.4762	0.8146	10.4762	0.531	10.4762	0.4725	10.4762	0.4318	10.4762	0.4256	10.4762	0.4126	10.4762	0.3942
10.975	0.7982	10.975	0.531	10.975	0.4725	10.975	0.4261	10.975	0.412	10.975	0.3988	10.975	0.3816
11.4976	0.7266	11.4976	0.531	11.4976	0.4725	11.4976	0.4244	11.4976	0.4001	11.4976	0.3859	11.4976	0.3714
12.045	0.6949	12.045	0.4302	12.045	0.3979	12.045	0.3828	12.045	0.3795	12.045	0.3743	12.045	0.3648
12.6186	0.6949	12.6186	0.4263	12.6186	0.3839	12.6186	0.3789	12.6186	0.3746	12.6186	0.367	12.6186	0.3574
13.2194	0.6949	13.2194	0.4263	13.2194	0.3691	13.2194	0.3654	13.2194	0.3624	13.2194	0.3568	13.2194	0.3489

PTEE022.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 22E ~ North-South Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.6949	13.8489	0.4263	13.8489	0.3684	13.8489	0.3531	13.8489	0.3514	13.8489	0.3468	13.8489	0.3398
14.5083	0.6949	14.5083	0.4263	14.5083	0.3684	14.5083	0.3479	14.5083	0.3436	14.5083	0.3374	14.5083	0.3305
15.1991	0.6949	15.1991	0.4263	15.1991	0.3684	15.1991	0.3303	15.1991	0.3274	15.1991	0.3248	15.1991	0.3203
15.9228	0.6949	15.9228	0.4263	15.9228	0.3684	15.9228	0.3303	15.9228	0.3191	15.9228	0.3152	15.9228	0.3107
16.681	0.6949	16.681	0.4263	16.681	0.3684	16.681	0.3303	16.681	0.3102	16.681	0.304	16.681	0.301
17.4753	0.6949	17.4753	0.4263	17.4753	0.3684	17.4753	0.3303	17.4753	0.3102	17.4753	0.2998	17.4753	0.2959
18.3074	0.6949	18.3074	0.4263	18.3074	0.3684	18.3074	0.3303	18.3074	0.3102	18.3074	0.2949	18.3074	0.2912
19.1791	0.6949	19.1791	0.4263	19.1791	0.3684	19.1791	0.3303	19.1791	0.3102	19.1791	0.2867	19.1791	0.2854
20.0923	0.7176	20.0923	0.4263	20.0923	0.3684	20.0923	0.3303	20.0923	0.3102	20.0923	0.2866	20.0923	0.2811
21.049	0.7176	21.049	0.4263	21.049	0.3684	21.049	0.3303	21.049	0.3102	21.049	0.2866	21.049	0.2784
22.0513	0.7176	22.0513	0.4263	22.0513	0.3684	22.0513	0.3303	22.0513	0.3102	22.0513	0.2866	22.0513	0.2758
23.1013	0.7176	23.1013	0.3871	23.1013	0.3411	23.1013	0.3241	23.1013	0.3102	23.1013	0.2866	23.1013	0.2728
24.2013	0.7176	24.2013	0.3785	24.2013	0.3411	24.2013	0.3172	24.2013	0.2996	24.2013	0.2743	24.2013	0.2684
25.3536	0.5748	25.3536	0.3598	25.3536	0.3013	25.3536	0.2826	25.3536	0.2697	25.3536	0.264	25.3536	0.2647
26.5609	0.5748	26.5609	0.3598	26.5609	0.3007	26.5609	0.2819	26.5609	0.2697	26.5609	0.264	26.5609	0.2628
27.8256	0.5698	27.8256	0.3224	27.8256	0.2932	27.8256	0.2734	27.8256	0.2629	27.8256	0.2613	27.8256	0.2603
29.1505	0.4937	29.1505	0.3224	29.1505	0.2932	29.1505	0.2734	29.1505	0.2585	29.1505	0.2561	29.1505	0.2571
30.5386	0.4049	30.5386	0.3224	30.5386	0.2867	30.5386	0.2633	30.5386	0.2559	30.5386	0.2553	30.5386	0.2556
31.9927	0.2797	31.9927	0.2618	31.9927	0.2573	31.9927	0.2565	31.9927	0.2559	31.9927	0.2553	31.9927	0.2549
33.516	0.2539	33.516	0.2548	33.516	0.2549	33.516	0.2548	33.516	0.2546	33.516	0.2543	33.516	0.2539
35.1119	0.2533	35.1119	0.2532	35.1119	0.2531	35.1119	0.2531	35.1119	0.253	35.1119	0.2529	35.1119	0.2527
36.7838	0.252	36.7838	0.2519	36.7838	0.2518	36.7838	0.2518	36.7838	0.2518	36.7838	0.2517	36.7838	0.2516
38.5353	0.2507	38.5353	0.2507	38.5353	0.2506	38.5353	0.2506	38.5353	0.2506	38.5353	0.2506	38.5353	0.2505
40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2495
42.2924	0.2486	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487
44.3062	0.2478	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479
46.4159	0.2472	46.4159	0.2471	46.4159	0.2471	46.4159	0.2471	46.4159	0.2471	46.4159	0.2471	46.4159	0.2472
48.626	0.2464	48.626	0.2464	48.626	0.2464	48.626	0.2464	48.626	0.2464	48.626	0.2465	48.626	0.2465
50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458

PTEE024.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 24E ~ Vertical Responses - Slab/Wall Joints ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0291	0.1098	0.026	0.1098	0.0244	0.1098	0.0229	0.1098	0.022	0.1098	0.0212	0.1098	0.0204
0.115	0.0308	0.115	0.026	0.115	0.0244	0.115	0.0233	0.115	0.0229	0.115	0.0221	0.115	0.0213
0.1204	0.0313	0.1204	0.0262	0.1204	0.0245	0.1204	0.024	0.1204	0.0236	0.1204	0.0229	0.1204	0.0218
0.1262	0.0313	0.1262	0.027	0.1262	0.0257	0.1262	0.0246	0.1262	0.0241	0.1262	0.0233	0.1262	0.0221
0.1322	0.0313	0.1322	0.0271	0.1322	0.0258	0.1322	0.0247	0.1322	0.0242	0.1322	0.0234	0.1322	0.0225
0.1385	0.0313	0.1385	0.0277	0.1385	0.0265	0.1385	0.0254	0.1385	0.0245	0.1385	0.0235	0.1385	0.0225
0.1451	0.0316	0.1451	0.0294	0.1451	0.0282	0.1451	0.027	0.1451	0.0259	0.1451	0.0239	0.1451	0.0225
0.152	0.032	0.152	0.0299	0.152	0.0286	0.152	0.0273	0.152	0.0262	0.152	0.0241	0.152	0.0225
0.1592	0.033	0.1592	0.031	0.1592	0.0299	0.1592	0.0288	0.1592	0.0277	0.1592	0.0261	0.1592	0.0241
0.1668	0.0367	0.1668	0.0323	0.1668	0.0312	0.1668	0.0302	0.1668	0.0292	0.1668	0.0276	0.1668	0.0256
0.1748	0.0507	0.1748	0.0427	0.1748	0.0385	0.1748	0.035	0.1748	0.0321	0.1748	0.0284	0.1748	0.0264
0.1831	0.0586	0.1831	0.0492	0.1831	0.0442	0.1831	0.0399	0.1831	0.0362	0.1831	0.0306	0.1831	0.0266
0.1918	0.0586	0.1918	0.0492	0.1918	0.0442	0.1918	0.0399	0.1918	0.0362	0.1918	0.0306	0.1918	0.0267
0.2009	0.0586	0.2009	0.0492	0.2009	0.0442	0.2009	0.0399	0.2009	0.0362	0.2009	0.0323	0.2009	0.0293
0.2105	0.0586	0.2105	0.0492	0.2105	0.0442	0.2105	0.0399	0.2105	0.0384	0.2105	0.0357	0.2105	0.0322
0.2205	0.0586	0.2205	0.0492	0.2205	0.0453	0.2205	0.0426	0.2205	0.0406	0.2205	0.0376	0.2205	0.0337
0.231	0.0586	0.231	0.0492	0.231	0.0458	0.231	0.0439	0.231	0.042	0.231	0.0387	0.231	0.0352
0.242	0.0586	0.242	0.0509	0.242	0.0485	0.242	0.0463	0.242	0.0444	0.242	0.041	0.242	0.0368
0.2535	0.0648	0.2535	0.0572	0.2535	0.0528	0.2535	0.0488	0.2535	0.0453	0.2535	0.041	0.2535	0.0371
0.2656	0.0731	0.2656	0.0586	0.2656	0.0534	0.2656	0.049	0.2656	0.0453	0.2656	0.0424	0.2656	0.0402
0.2783	0.0816	0.2783	0.0598	0.2783	0.0534	0.2783	0.05	0.2783	0.0485	0.2783	0.0459	0.2783	0.0426
0.2915	0.0816	0.2915	0.0619	0.2915	0.058	0.2915	0.0546	0.2915	0.0516	0.2915	0.048	0.2915	0.0437
0.3054	0.0816	0.3054	0.0662	0.3054	0.062	0.3054	0.0583	0.3054	0.0548	0.3054	0.0488	0.3054	0.0448
0.3199	0.0816	0.3199	0.0701	0.3199	0.0659	0.3199	0.0622	0.3199	0.0588	0.3199	0.0531	0.3199	0.0468
0.3352	0.0871	0.3352	0.0766	0.3352	0.0706	0.3352	0.0658	0.3352	0.0624	0.3352	0.0565	0.3352	0.0496
0.3511	0.0905	0.3511	0.0805	0.3511	0.0748	0.3511	0.0698	0.3511	0.0653	0.3511	0.0578	0.3511	0.0502
0.3678	0.1216	0.3678	0.0951	0.3678	0.0823	0.3678	0.0722	0.3678	0.0653	0.3678	0.0578	0.3678	0.0502
0.3853	0.136	0.3853	0.1056	0.3853	0.0918	0.3853	0.0807	0.3853	0.0718	0.3853	0.0587	0.3853	0.0502
0.4037	0.136	0.4037	0.1056	0.4037	0.0918	0.4037	0.082	0.4037	0.076	0.4037	0.0663	0.4037	0.0569
0.4229	0.136	0.4229	0.1056	0.4229	0.0918	0.4229	0.0848	0.4229	0.0796	0.4229	0.0707	0.4229	0.0609
0.4431	0.136	0.4431	0.1056	0.4431	0.0932	0.4431	0.0884	0.4431	0.0838	0.4431	0.0755	0.4431	0.0652
0.4642	0.1375	0.4642	0.1059	0.4642	0.0974	0.4642	0.0915	0.4642	0.086	0.4642	0.0764	0.4642	0.0667
0.4863	0.1479	0.4863	0.1238	0.4863	0.1107	0.4863	0.0995	0.4863	0.0901	0.4863	0.082	0.4863	0.0725
0.5094	0.181	0.5094	0.138	0.5094	0.1214	0.5094	0.108	0.5094	0.0971	0.5094	0.0861	0.5094	0.0744

PTEE024.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 24E ~ Vertical Responses - Slab/Wall Joints ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.2215	0.5337	0.1602	0.5337	0.134	0.5337	0.1151	0.5337	0.1024	0.5337	0.0861	0.5337	0.0744
0.5591	0.2215	0.5591	0.1602	0.5591	0.134	0.5591	0.1151	0.5591	0.1024	0.5591	0.0884	0.5591	0.0754
0.5857	0.2215	0.5857	0.1602	0.5857	0.134	0.5857	0.1151	0.5857	0.1024	0.5857	0.094	0.5857	0.0825
0.6136	0.2215	0.6136	0.1602	0.6136	0.134	0.6136	0.1175	0.6136	0.1108	0.6136	0.1001	0.6136	0.0874
0.6428	0.2268	0.6428	0.163	0.6428	0.1365	0.6428	0.1175	0.6428	0.1126	0.6428	0.1027	0.6428	0.0894
0.6734	0.2268	0.6734	0.163	0.6734	0.1377	0.6734	0.128	0.6734	0.12	0.6734	0.1074	0.6734	0.0928
0.7055	0.2268	0.7055	0.163	0.7055	0.1377	0.7055	0.128	0.7055	0.12	0.7055	0.1086	0.7055	0.0945
0.7391	0.2268	0.7391	0.163	0.7391	0.1413	0.7391	0.1333	0.7391	0.1253	0.7391	0.1108	0.7391	0.0945
0.7743	0.3163	0.7743	0.2131	0.7743	0.1804	0.7743	0.1581	0.7743	0.1421	0.7743	0.1213	0.7743	0.1037
0.8111	0.3163	0.8111	0.2131	0.8111	0.1804	0.8111	0.1581	0.8111	0.1421	0.8111	0.1213	0.8111	0.1064
0.8497	0.3163	0.8497	0.2131	0.8497	0.1804	0.8497	0.1652	0.8497	0.1528	0.8497	0.133	0.8497	0.112
0.8902	0.3163	0.8902	0.2131	0.8902	0.1856	0.8902	0.17	0.8902	0.1571	0.8902	0.1368	0.8902	0.1165
0.9326	0.484	0.9326	0.298	0.9326	0.2451	0.9326	0.2142	0.9326	0.192	0.9326	0.1628	0.9326	0.1368
0.977	0.484	0.977	0.298	0.977	0.2451	0.977	0.2142	0.977	0.192	0.977	0.171	0.977	0.15
1.0235	0.484	1.0235	0.298	1.0235	0.2451	1.0235	0.2142	1.0235	0.1926	1.0235	0.1805	1.0235	0.1621
1.0723	0.484	1.0723	0.298	1.0723	0.2615	1.0723	0.2409	1.0723	0.2242	1.0723	0.1989	1.0723	0.1731
1.1233	0.5753	1.1233	0.3411	1.1233	0.2701	1.1233	0.2409	1.1233	0.2242	1.1233	0.1989	1.1233	0.1746
1.1768	0.5753	1.1768	0.3734	1.1768	0.3107	1.1768	0.2749	1.1768	0.2469	1.1768	0.213	1.1768	0.1874
1.2328	0.5753	1.2328	0.3807	1.2328	0.3438	1.2328	0.3132	1.2328	0.2882	1.2328	0.2506	1.2328	0.2132
1.2916	0.5753	1.2916	0.4139	1.2916	0.3646	1.2916	0.3262	1.2916	0.2999	1.2916	0.2601	1.2916	0.2214
1.353	0.6629	1.353	0.4139	1.353	0.3646	1.353	0.3329	1.353	0.3146	1.353	0.2846	1.353	0.2493
1.4175	0.6629	1.4175	0.429	1.4175	0.3788	1.4175	0.3575	1.4175	0.3384	1.4175	0.3064	1.4175	0.271
1.485	0.6629	1.485	0.457	1.485	0.4099	1.485	0.3825	1.485	0.3581	1.485	0.32	1.485	0.2847
1.5557	0.6629	1.5557	0.4867	1.5557	0.4466	1.5557	0.4193	1.5557	0.3959	1.5557	0.3551	1.5557	0.3075
1.6298	0.8057	1.6298	0.5109	1.6298	0.4763	1.6298	0.4473	1.6298	0.4224	1.6298	0.3819	1.6298	0.335
1.7074	0.8379	1.7074	0.6416	1.7074	0.5704	1.7074	0.5139	1.7074	0.4676	1.7074	0.4014	1.7074	0.3559
1.7887	1.0345	1.7887	0.7676	1.7887	0.6799	1.7887	0.6122	1.7887	0.5562	1.7887	0.4772	1.7887	0.4004
1.8738	1.0345	1.8738	0.8046	1.8738	0.7255	1.8738	0.6502	1.8738	0.5996	1.8738	0.5318	1.8738	0.4441
1.963	1.2645	1.963	0.838	1.963	0.7316	1.963	0.6502	1.963	0.5996	1.963	0.5683	1.963	0.4717
2.0565	1.3932	2.0565	0.838	2.0565	0.7316	2.0565	0.6698	2.0565	0.6339	2.0565	0.584	2.0565	0.4802
2.1544	1.3932	2.1544	0.838	2.1544	0.7316	2.1544	0.6698	2.1544	0.6389	2.1544	0.584	2.1544	0.4802
2.257	1.3932	2.257	0.838	2.257	0.7519	2.257	0.6898	2.257	0.6389	2.257	0.584	2.257	0.4802
2.3645	1.7479	2.3645	0.9979	2.3645	0.8154	2.3645	0.7361	2.3645	0.6766	2.3645	0.584	2.3645	0.4889
2.4771	2.068	2.4771	1.1705	2.4771	0.9105	2.4771	0.7993	2.4771	0.7332	2.4771	0.6216	2.4771	0.5073
2.595	2.142	2.595	1.1705	2.595	0.9105	2.595	0.871	2.595	0.7663	2.595	0.6393	2.595	0.5251



PTEE024.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 24E ~ Vertical Responses - Slab/Wall Joints ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	1.0079	13.8489	0.6123	13.8489	0.5102	13.8489	0.4615	13.8489	0.4386	13.8489	0.4022	13.8489	0.3633
14.5083	1.0079	14.5083	0.6123	14.5083	0.5102	14.5083	0.4547	14.5083	0.4329	14.5083	0.3988	14.5083	0.3633
15.1991	1.0079	15.1991	0.6123	15.1991	0.5102	15.1991	0.4217	15.1991	0.4105	15.1991	0.3706	15.1991	0.3433
15.9228	1.0079	15.9228	0.6123	15.9228	0.5102	15.9228	0.4217	15.9228	0.4105	15.9228	0.3706	15.9228	0.3385
16.681	1.0079	16.681	0.6123	16.681	0.5102	16.681	0.4217	16.681	0.4105	16.681	0.3706	16.681	0.3385
17.4753	1.0079	17.4753	0.6123	17.4753	0.5102	17.4753	0.4217	17.4753	0.4105	17.4753	0.3703	17.4753	0.3348
18.3074	1.0079	18.3074	0.6123	18.3074	0.5102	18.3074	0.4136	18.3074	0.4017	18.3074	0.3481	18.3074	0.3209
19.1791	1.0079	19.1791	0.6123	19.1791	0.5102	19.1791	0.4136	19.1791	0.4017	19.1791	0.3481	19.1791	0.3122
20.0923	0.6551	20.0923	0.4391	20.0923	0.419	20.0923	0.3759	20.0923	0.3461	20.0923	0.319	20.0923	0.2989
21.049	0.6551	21.049	0.4391	21.049	0.419	21.049	0.3759	21.049	0.3461	21.049	0.3119	21.049	0.2909
22.0513	0.6551	22.0513	0.4391	22.0513	0.419	22.0513	0.3759	22.0513	0.3461	22.0513	0.3119	22.0513	0.2881
23.1013	0.4513	23.1013	0.3434	23.1013	0.3322	23.1013	0.3192	23.1013	0.3064	23.1013	0.2882	23.1013	0.278
24.2013	0.4513	24.2013	0.3354	24.2013	0.3097	24.2013	0.2945	24.2013	0.286	24.2013	0.2772	24.2013	0.2733
25.3536	0.4513	25.3536	0.2912	25.3536	0.2849	25.3536	0.2812	25.3536	0.2777	25.3536	0.2725	25.3536	0.269
26.5609	0.4513	26.5609	0.2865	26.5609	0.2793	26.5609	0.2755	26.5609	0.2728	26.5609	0.269	26.5609	0.265
27.8256	0.4513	27.8256	0.2865	27.8256	0.2752	27.8256	0.2694	27.8256	0.2651	27.8256	0.2626	27.8256	0.2598
29.1505	0.4513	29.1505	0.2865	29.1505	0.2672	29.1505	0.2622	29.1505	0.2586	29.1505	0.2556	29.1505	0.2542
30.5386	0.4513	30.5386	0.2865	30.5386	0.2637	30.5386	0.2581	30.5386	0.2572	30.5386	0.2554	30.5386	0.2534
31.9927	0.2716	31.9927	0.2566	31.9927	0.2561	31.9927	0.2556	31.9927	0.2551	31.9927	0.2541	31.9927	0.2527
33.516	0.2543	33.516	0.2538	33.516	0.2536	33.516	0.2533	33.516	0.253	33.516	0.2524	33.516	0.2515
35.1119	0.2519	35.1119	0.2517	35.1119	0.2515	35.1119	0.2514	35.1119	0.2512	35.1119	0.2508	35.1119	0.2502
36.7838	0.2501	36.7838	0.25	36.7838	0.2499	36.7838	0.2498	36.7838	0.2496	36.7838	0.2494	36.7838	0.249
38.5353	0.2486	38.5353	0.2485	38.5353	0.2485	38.5353	0.2484	38.5353	0.2483	38.5353	0.2481	38.5353	0.2479
40.3702	0.2474	40.3702	0.2473	40.3702	0.2473	40.3702	0.2472	40.3702	0.2472	40.3702	0.247	40.3702	0.2468
42.2924	0.2463	42.2924	0.2463	42.2924	0.2462	42.2924	0.2462	42.2924	0.2461	42.2924	0.2461	42.2924	0.2459
44.3062	0.2454	44.3062	0.2453	44.3062	0.2453	44.3062	0.2453	44.3062	0.2453	44.3062	0.2452	44.3062	0.2451
46.4159	0.2446	46.4159	0.2445	46.4159	0.2445	46.4159	0.2445	46.4159	0.2445	46.4159	0.2444	46.4159	0.2444
48.626	0.2438	48.626	0.2438	48.626	0.2438	48.626	0.2438	48.626	0.2438	48.626	0.2437	48.626	0.2437
50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
**24590-PTF-ME-TLP-COND-00001**  
Data Sheet No.  
**24590-PTF-MED-TLP-00001**

R11042839

Project:	<b>RPP-WTP</b>	Description:	<b>Treated LAW Evaporator Primary Condenser</b>
Project No:	<b>24590</b>	P&ID:	<b>24590-PTF-M6-TLP-00002</b>
Site:	<b>Hanford</b>	Process Data:	<b>24590-PTF-MVC-TLP-00002</b>
Process flow diagram:	<b>24590-PTF-M5-V17T-00005</b>	Manufacturer Name	<b>Framatome ANP / UST&amp;D</b>

**General Data**

Quality Level	<b>Q (10)</b>	TEMA (Class/Type)	<b>B</b>
Seismic Category	<b>SC-I</b>	Flow Type (Counter current, etc)	<b>8 PASS</b>
Design Code	<b>ASME VIII Div 1</b>	Heat Exchanger Duty	<b>17,165,333 Btu/hr</b>
Code Stamp	<b>Yes</b>	Heat Exchanger Area	<b>3795 ft<sup>2</sup></b>
NB Registration	<b>Yes</b>	ΔT (LMTD/Corrected LMTD)	<b>18 °F</b>

**ISSUED BY**  
**RPP-WTP PDC**

**Thermal/Hydraulic Data**

	Shell Side		Tube Side	
	<b>IN</b>	<b>STEAM</b>	<b>OUT</b>	<b>IN Cooling Water</b>
Fluid Name				
Fluid Quantities: Total	<b>16,579</b>		<b>950,377</b>	
Condensable Vapor (In/Out)	<b>16,537</b>	<b>103</b>	<b>0</b>	<b>N/A</b>
Liquid	<b>0</b>	<b>16,434</b>	<b>950,377</b>	<b>950,377</b>
Noncondensable	<b>42.7</b>	<b>42.7</b>	<b>0</b>	<b>0</b>
Temperature (In/Out)	<b>3</b> * <b>42.7</b>	<b>102.5</b>	<b>75</b>	<b>*</b> <b>3</b>
Density	<b>0.003</b>	<b>N/A</b>	<b>62.18</b>	<b>N/A</b>
Viscosity	<b>0.004</b>	<b>N/A</b>	<b>0.818</b>	<b>N/A</b>
Molecular Weight	<b>18.02</b>	<b>18.02</b>	<b>N/A</b>	<b>N/A</b>
Molecular Weight, Noncondensable	<b>29</b>	<b>29</b>	<b>N/A</b>	<b>N/A</b>
Specific Heat	<b>N/A</b>	<b>N/A</b>	<b>1.0</b>	<b>N/A</b>
Thermal Conductivity	<b>N/A</b>	<b>N/A</b>	<b>0.355</b>	<b>N/A</b>
Latent Heat	<b>1107</b>	<b>70.6</b>	<b>43.07</b>	<b>61.05</b>
Inlet pressure	<b>1.11</b>		<b>*</b>	<b>3</b>
Tube side Velocity	<b>N/A</b>		<b>7.14</b>	
Pressure Drop (Allowed)	<b>0.095</b>		<b>22.6</b>	
Fouling Resistance (Min)	<b>0.0015</b>		<b>0.001</b>	

**Mechanical Design Data**

	Shell Side		Tube Side	
	<b>50</b>	<b>Full Vacuum</b>	<b>100</b>	<b>Full Vacuum</b>
Design Pressure (Max/Min)	<b>3</b> <b>175</b>	<b>49</b>	<b>3</b> <b>175</b>	<b>49</b>
Design Temperature (Max/Min)	<b>0.04</b>		<b>0.04</b>	
Corrosion Allowance	<b>N/A</b>		<b>N/A</b>	
Erosion Allowance	<b>57 ID</b>		Overall Dimensions (HxWxL)	<b>115 3/4 x 72 3/4 x 282 13/16</b>
Shell OD / ID	<b>1152</b>		Tube OD	<b>1</b>
Total No. of Tubes				

**Material Data**

Shell	<b>SA 240 316 SS(max. carbon 0.030%)</b>	Shell Cover	<b>SA 240 316 SS(max. carbon 0.030%)</b>
Channel/Bonnet	<b>SA 240 316 SS(max. carbon 0.030%)</b>	Channel Cover	<b>SA 240 316 SS(max. carbon 0.030%)</b>
Tube	<b>SA 213 316 SML SS (max. carbon 0.030%)</b>	Floating Head Cover	<b>N/A</b>
Stationary Tube Sheet	<b>SA 240 316 SS(max. carbon 0.030%)</b>	Floating Tube Sheet	<b>N/A</b>
Shell Side Gaskets	<b>N/A</b>	Tube Side Gaskets	<b>SA 240 316 SS Flex Spiral Wound w/ PTFE Filler</b>
Partition Seals	<b>N/A</b>	Baffles/Supports	<b>SA 240 316 SS(max. carbon 0.030%)</b>
Insulation	<b>N/A</b>	Forgings (Shell side)	<b>N/A</b>
Bolting	<b>SA-193 Gr B8M</b>	Forgings (Channel)	<b>N/A</b>





**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
24590-PTF-ME-TLP-COND-00001

Data Sheet No.  
24590-PTF-MED-TLP-00001

**Construction Data** (To be determined by the supplier when not specified by the buyer)

Cross Baffle Type	(4)	% Baffle Cut (Dia.)	29.5%	Spacing (c/c) inch	15' 11-5/8"
Bypass Seal Arrangement	N/A	Longitudinal Seal Type	N/A	Expansion Joint Type	(5)
Inlet Nozzle $\rho V^2$	By Others	Bundle Entrance $\rho V^2$	By Others	Bundle Exit $\rho V^2$	By Others
Tube Support Type	Baffle & Axi-Grid	U-bend Support Type	N/A	Weight of Bundle lbf	16,000 (tubes only)
Operating Weight lbf	46,500	Full of Water lbf	74,500	Weight of Shell lbf	17,500 (6)

**Notes**

**Notes:**

- (1) All welds are continuous to avoid crevices, weld surface finish is descaled as laid.
- (2) All welded construction on process side only.
- (3) Tube to tubesheet joint shall be strength welded.
- (4) Double Segmental with Axi-Grid.
- (5) Inherent steam Bustle Construction.
- (6) Dry Weight Less Tubes.
- (7) Deleted.
- (8) Deleted.
- (9) For nozzles loads, see 24590-PTF-3PS-MEVV-T0001.
- (10) Component will be manufactured to Bechtel quality level Q, which corresponds with Vendor quality level QL-2.
- (11) Vendor design information is from document 24590-QL-POA-MEVV-00001-02-00056.
- (12) Equipment cyclic data is from document 24590-QL-POA-MEVV-00001-04-03.
- (13) Contents of this document are dangerous waste permit affecting.
- (14) The physical design parameters shall be determined by the seller based on TEMA and HEI standards.
- (15) 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.

(Safety screening/evaluation required?  Yes  No If yes per 24590-WTP-GPP-SREG-002, E&NS signature required below.)

Rev.	Description	By	Checked	E&NS	Approved	Date
3	Updated to reflect WSGM analysis, 24590-PTF-U0N-W16T-00003 and incorporate DOE AEA note (15). * ADDED TO SHOW VALUES TO BE UPDATED	D. Tate	R. Rickenbach	B. Hall B. Hall	J. Julyk	2/19/09
2	Incorporated Vendor Design and Equipment Qualification Data	R. Rickenbach	E. Le	S. Woolfolk	J. Julyk	07/14/2008
1	Incorporated Vendor Design	E. Le	R. Nowak	N/A	J. Julyk	04/04/2005
0	Issued for Procurement	E. Le	S. Shah	N/A	J. Julyk	04/30/2003





# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-TLP-00001 Rev.: 3

Attachment 1, Page 3 of 31

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Equipment Identification			
Component Tag Number	24590-PTF-ME-TLP-COND-00001	Safety Classification	<input checked="" type="checkbox"/> SC <input type="checkbox"/> SS <input type="checkbox"/> APC <input type="checkbox"/> SDC <input type="checkbox"/> SDS <input type="checkbox"/> RRC Note 10 <span style="border: 1px solid black; padding: 2px;">3</span>
Manufacturer / Supplier	UST&D		
Requisition Number	24590-QL-POA-MEVV-00001		
Model	TBD	Seismic Category	<input checked="" type="checkbox"/> SC-I <input type="checkbox"/> SC-II <input type="checkbox"/> SC-III <input type="checkbox"/> SC-IV Note 10 <span style="border: 1px solid black; padding: 2px;">3</span>
Description (Include descriptive text [e.g., location, elevation])	Treated LAW Evaporator Primary Condensator, room P-0325, Elevation 56'-0"		
Safety Function(s)	Confinement (ref. 1) <span style="border: 1px solid black; padding: 2px;">3</span>		
Seismic Safety Function	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Room Number(s): P-0325	
Maintenance Accessible	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Method of Maintenance Access: <input type="checkbox"/> Remote <input checked="" type="checkbox"/> Hands On <input type="checkbox"/> None	
Seismic Operability Requirements: <span style="border: 1px solid black; padding: 2px;">3</span> <input type="checkbox"/> During Seismic Event <span style="border: 1px solid black; padding: 2px;">3</span> <input type="checkbox"/> After Seismic Event			
ITS Equipment Type: <input checked="" type="checkbox"/> Passive Mechanical <input type="checkbox"/> Active Mechanical <input type="checkbox"/> Electrical			

Equipment Environmental Qualification (EEQ)					
Environment	<input type="checkbox"/> Mild <input checked="" type="checkbox"/> Harsh	Hi Rad Service	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Design Life (yrs)	<input checked="" type="checkbox"/> 40 <input type="checkbox"/> Other _____
Contamination Class:	C3				
Radiation Class:	R3				
Parameter Type/Units	Parameter Value	Time Duration (number)	Time Units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Normal</b>					
Normal High Temperature (°F)	95	40	yrs	24590-PTF-U0D-W16T-00001, Note 7	Note 1
Normal Low Temperature (°F)	59	40	yrs	24590-PTF-U0D-W16T-00001, Note 7	Note 1
Normal High Relative Humidity (%RH)	100	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Relative Humidity (%RH)	10	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal High Pressure (in.-w.g.)	0	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Pressure (in.-w.g.)	-0.4	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Radiation Dose Rate (mR/hr)	10	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Vibration Magnitude (g)	N/A	N/A	N/A	N/A	Note 1
Vibration Frequency (Hz)	N/A	N/A	N/A	N/A	Note 1
Additional Normal Information:		See Note 2 for Pressure Units.			



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-TLP-00001 Rev.: 3

Attachment 1, Page 4 of 31

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## Equipment Environmental Qualification (EEQ) (continued)

Parameter Type/Units	Parameter Value	Time Duration (number)	Time units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Abnormal</b>					
Abnormal High Temperature (°F)	126	8	hr/yr	24590-PTF-U0D-W16T-00001, Note 7 & 9 <span style="border: 1px solid black; padding: 2px;">3</span>	Note 1
Abnormal Low Temperature (°F)	59	8	hr/yr	24590-WTP-DB-01-001, Notes 7 & 8	Note 1
Abnormal High Relative Humidity (%RH)	100	24	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Relative Humidity (%RH)	2	22	hr/yr	24590-PTF-U0D-W16T-00001, Note 9 <span style="border: 1px solid black; padding: 2px;">3</span>	Note 1
Abnormal High Pressure (in.-w.g.)	4	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Pressure (in.-w.g.)	-7.3	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Radiation Dose Rate (mR/hr)	10 Note 3	0	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Wet Sprinkler System Present	YES	2	hr <span style="border: 1px solid black; padding: 2px;">3</span>	24590-PTF-U0D-W16T-00001	Note 1
Additional Abnormal Information	See Note 2 for Pressure Units				
<b>Design Basis Events (DBE)</b>					
DBE High Temperature (°F)	128	1000	hrs	24590-PTF-U0D-W16T-00001, Note 7 & 9 <span style="border: 1px solid black; padding: 2px;">3</span>	Note 1
DBE Low Temperature (°F)	40	1000	hrs	24590-PTF-U0D-W16T-00001, Note 7	Note 1
DBE High Relative Humidity (%RH)	100	482	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Relative Humidity (%RH)	6	1000	hrs	24590-PTF-U0D-W16T-00001, Note 9 <span style="border: 1px solid black; padding: 2px;">3</span>	Note 1
DBE High Pressure (in.-w.g.)	4	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Pressure (in.-w.g.)	-7.3	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Radiation Dose Rate (mR/hr)	10 Note 3	0	hrs	24590-PTF-U0D-W16T-00001	Note 1
Flood Height (ft)	1.58	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
Submergence (ft)	0, Note 5	N/A	hrs	24590-PTF-U0D-W16T-00001 24590-QL-POA-MEVV-00001-01-00817 <span style="border: 1px solid black; padding: 2px;">3</span>	Note 1
Chemical/Spray Exposure	YES	12.5	hrs	24590-PTF-U0D-W16T-00001	Note 1
Additional DBE Information	See Note 2 for Pressure Units				



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-TLP-00001 Rev.: 3

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DBE Chemical Exposure Details	
DBE Chemical Types/Concentrations	Sodium Hydroxide, 5M

Interfaces (Electrical)	
Power Supply Voltage (VAC, VDC)	N/A
Power Supply Frequency (Hz)	N/A
Power Connection Method	N/A
I/O Signals to/from Equipment	N/A
I/O Connection Method	N/A

Interfaces (Mechanical)	
Mounting Configuration (orientation)	See dwg. 24590-QL-POA-MEVV-00001-01-00817
Mounting Method (bolts, welds, etc.)	Anchor Bolts, TLP-SKID-00001, 24590-PTF-DB-S13T-00056
Auxiliary Devices	N/A

Equipment Seismic Qualification (ESQ)				
Parameter	Title	Reference/Document Number	Version / Revision	Remarks
WTP Seismic Design Specification (BUYER)	Engineering Specification for Seismic Qualification Criteria for Pressure Vessels	24590-WTP-3PS-MV00-T0002	002	N/A
Specified Seismic Load (BUYER)	Seismic Analysis of Pretreatment Building - WSGM In-Structure Response Spectre (ISRS)	24590-PTF-S0C-S15T-00057	00A	Calculation is not included in MR, see attached figures 37, 38, 40, 41 and 115 per CCN 185267.
Design Seismic Load (SELLER)	Calculation - HEP 1 FEP and TLP Condenser Skids Seismic Qualification	24590-QL-POA-MEVV-00001-04-00027	00D	
Qualification Method (SELLER)	Calculation - HEP 1 FEP and TLP Condenser Skids Seismic Qualification	24590-QL-POA-MEVV-00001-04-00027	00D	
Qualification Report Number (SELLER)	Calculation - HEP 1 FEP and TLP Condenser Skids Seismic Qualification	24590-QL-POA-MEVV-00001-04-00027	00D	
Submittal Number (BUYER)	Calculation - HEP 1 FEP and TLP Condenser Skids Seismic Qualification	24590-QL-POA-MEVV-00001-04-00027	00D	



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-TLP-00001 Rev.: 3

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## Notes and Additional Information

### Notes:

1. Data to be provided by SELLER through the submittal process as required on the G-321-E form.
2. Where pressure is given in inches of water column (in.-w.c.) in the source document, it is generally assumed that this is in reference to atmospheric pressure and is therefore equivalent to inches of water gage (in.-w.g.).
3. Abnormal and DBE radiation dose rates are set equal to normal dose rate and do not contribute to the total integrated dose.
4. Deleted. <sup>3</sup>
5. Submergence is determined from the lowest point of the vessel in relation to the flood height above the floor.
6. Environmental data given document 24590-PTF-U0D-W16T-00001 is for room environment only.
7. For application of AISC N690, the normal temperatures are not used. Abnormal temperatures shall be applied as Normal Operation Temperature,  $T_O$ , with seismic effects,  $E_S$ . The Design basis event temperature shall be applied as a Thermal Load generated by a postulated accident,  $T_A$ , without seismic effects,  $E_S$  or  $E_0$ .
8. Abnormal low temperature, as calculated in reference 2, <sup>3</sup> is based on a Loss of Heating Accident (LOHA) which occurs when steam supply to the building is lost. Since the evaporators are run on steam, this would cause the evaporators to go off-line. Abnormal low temperature will be based on reference 3, <sup>3</sup> at 59°F.
9. Parameter value used on data sheet has been previously established and determined more conservative than values <sup>3</sup> derived from the reference document noted.
10. For commercial reasons, safety and seismic classification may be higher than elsewhere documented, and therefore <sup>3</sup> conservative.

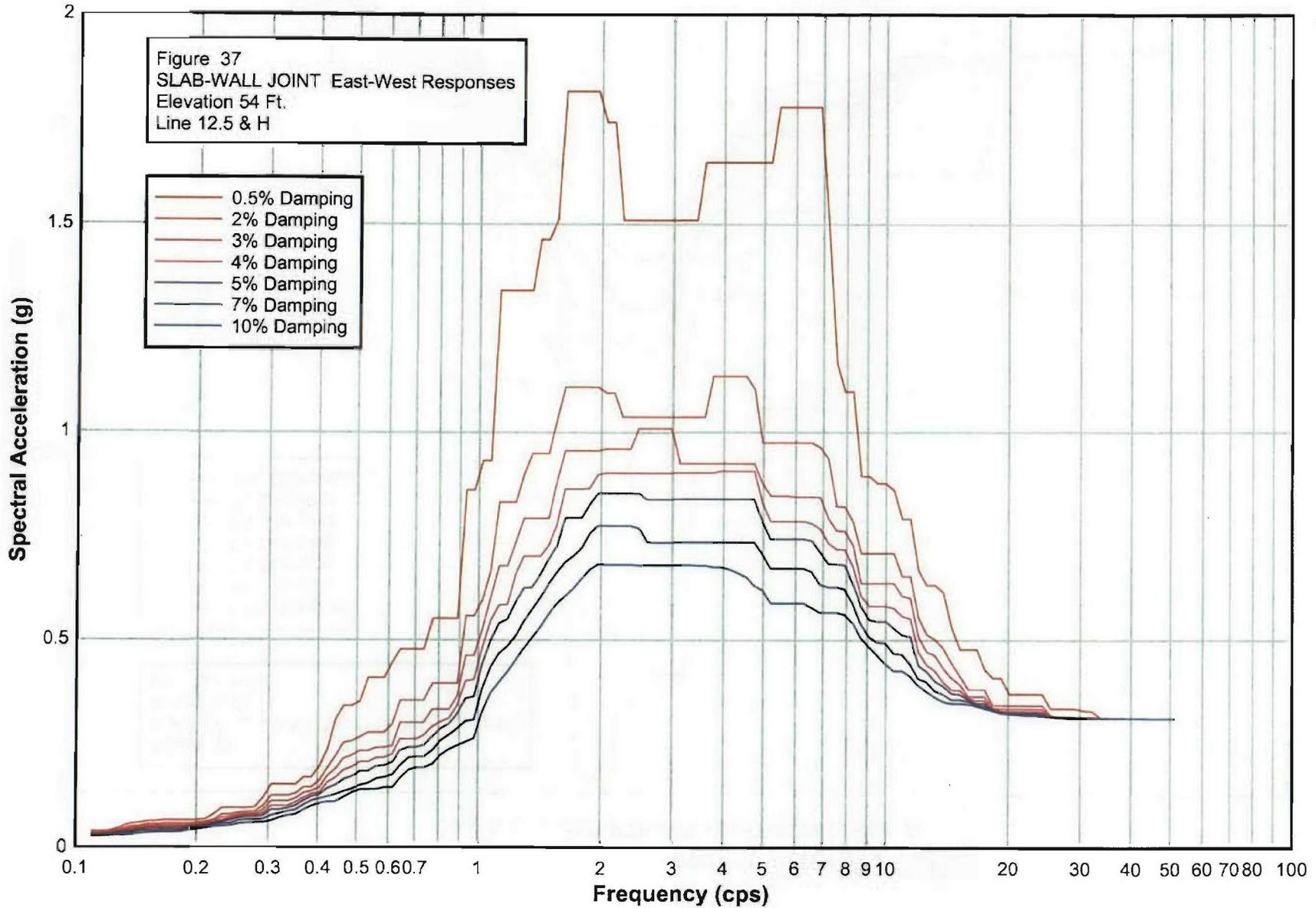
### References:

1. 24590-WTP-PSAR-ESH-01-002-02, Rev. 04A, Preliminary documented safety analysis to support construction <sup>3</sup> authorization; PT facility specific information.
2. 24590-PTF-U0D-W16T-00001, Rev. 0, PTF Room Environment Datasheet.
3. 24590-WTP-DB-ENG-01-001, Rev. 1M, Basis of Design. <sup>3</sup>
4. 24590-PTF-U0N-W16T-00001, Add data for room p-0427. Incorporate additional steam break analysis. <sup>3</sup>
5. 24590-PTF-U0N-W16T-00003, Revised temperature & relative humidity data for PTF rooms. <sup>3</sup>

3

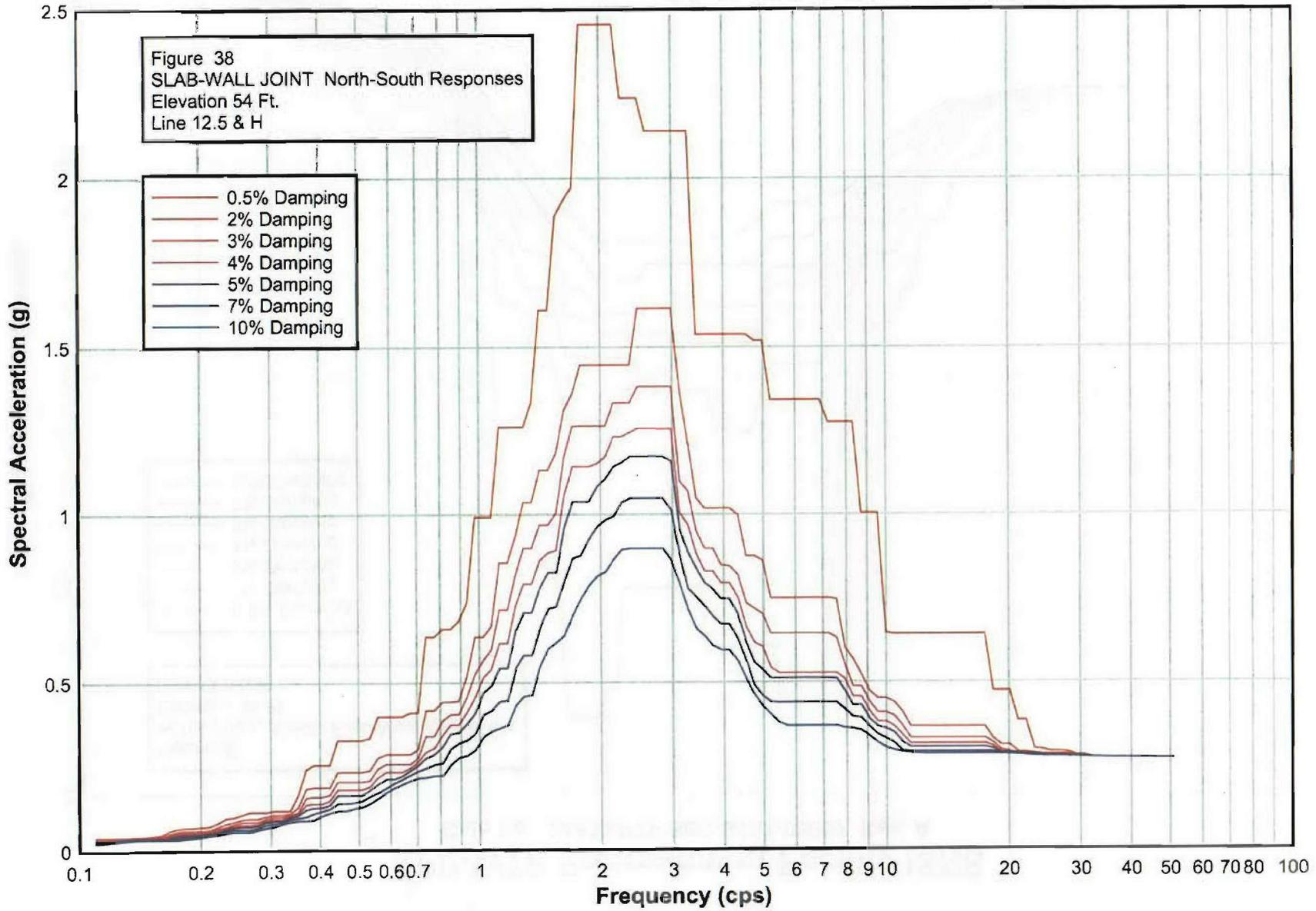
# RPP-WTP Pretreatment Facility ISRS

Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



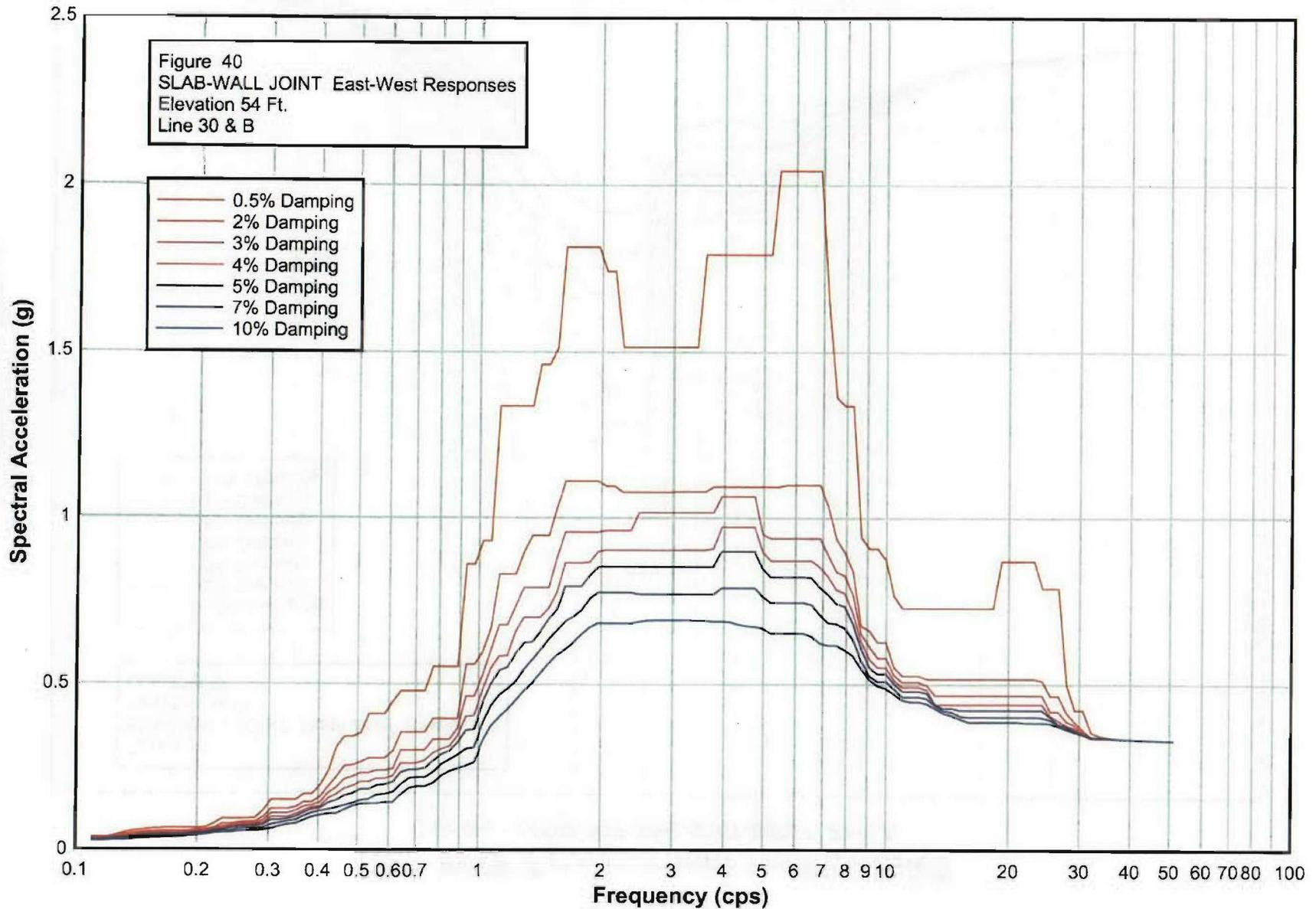
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3
**RPP-WTP Pretreatment Facility ISRS**  
 Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A

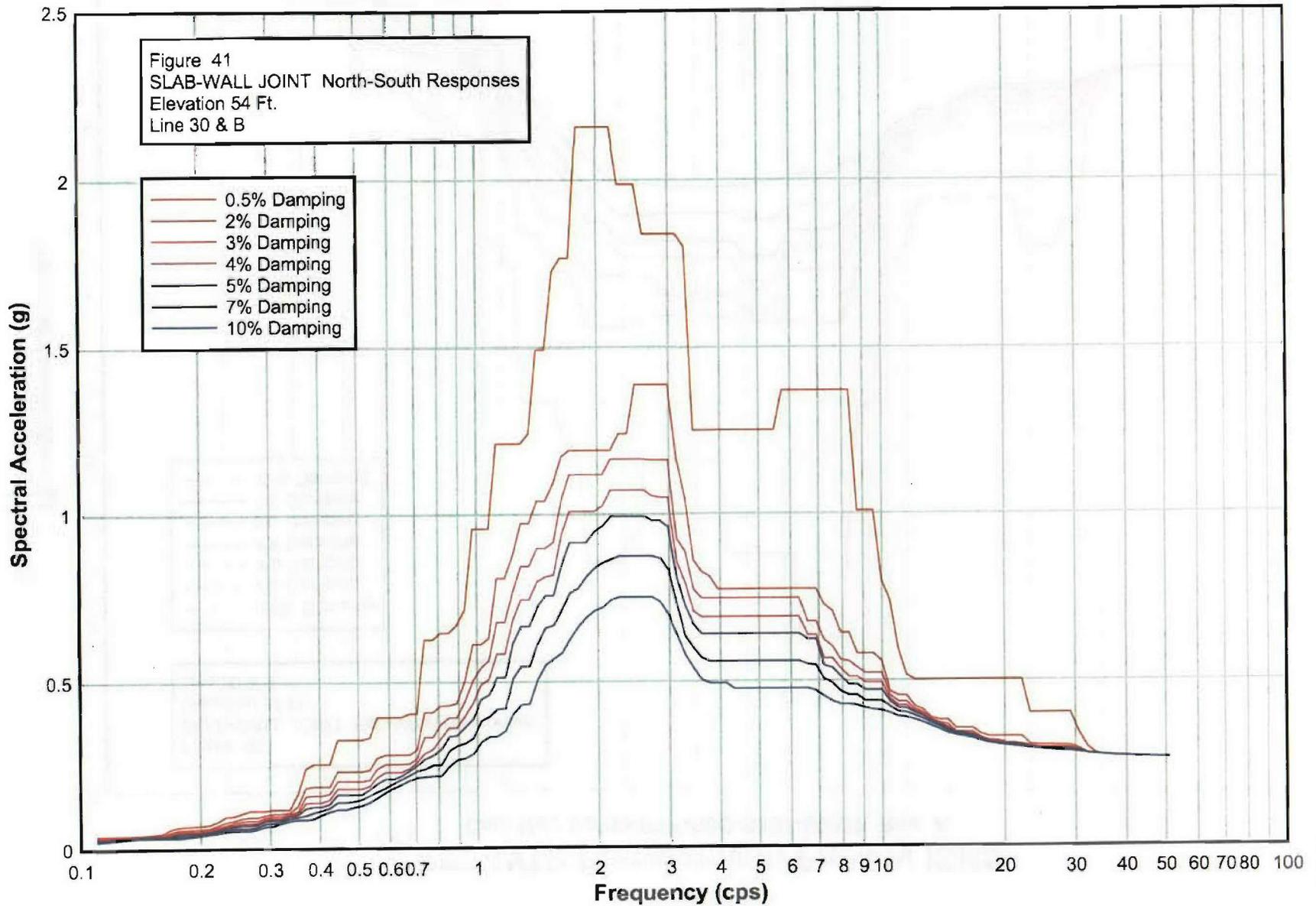


# RPP-WTP Pretreatment Facility ISRS

Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A

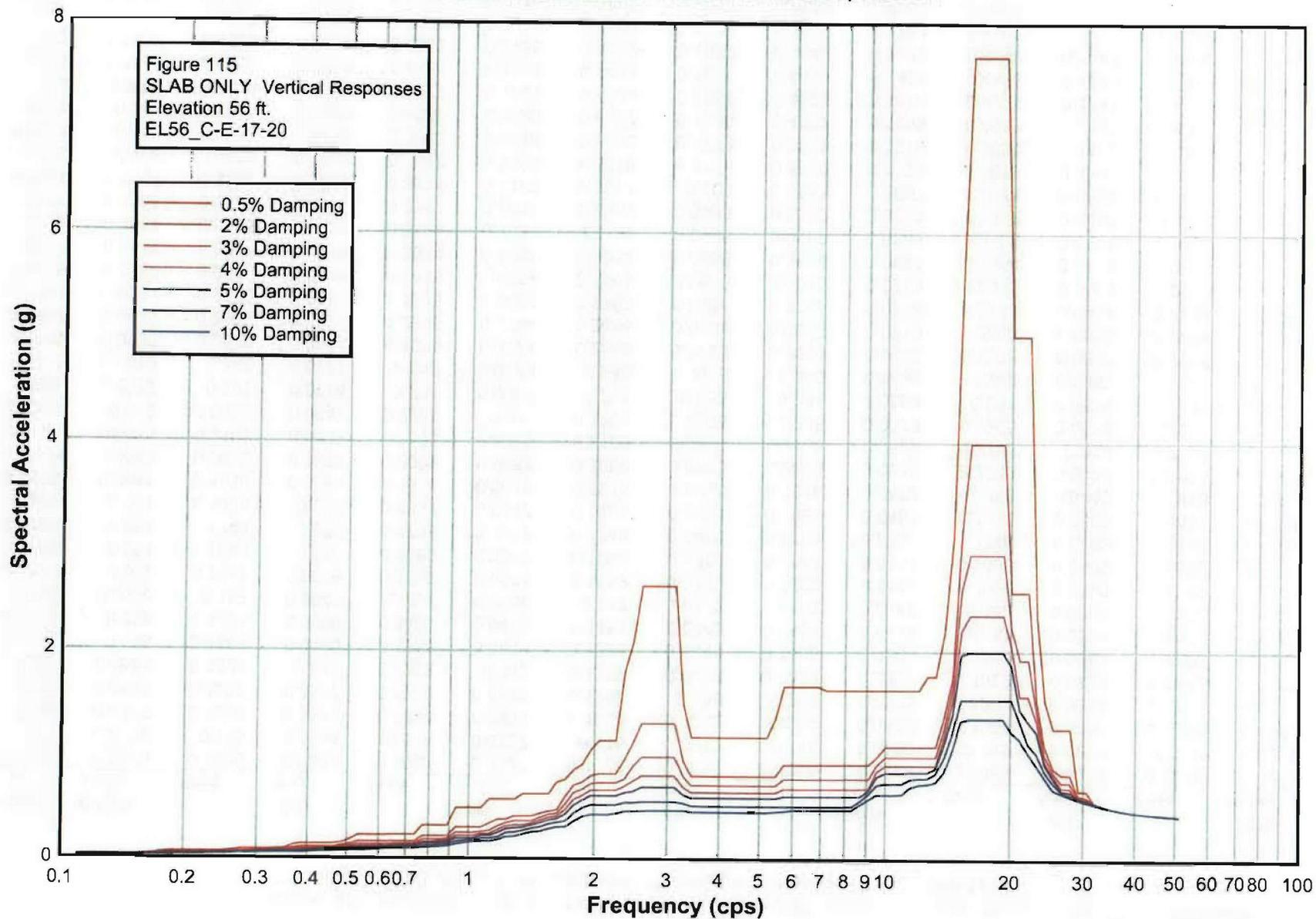


3 **RPP-WTP Pretreatment Facility ISRS**  
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



3 RPP-WTP Pretreatment Facility ISRS

Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0375	0.1098	0.0344	0.1098	0.0327	0.1098	0.0312	0.1098	0.0298	0.1098	0.0274	0.1098	0.0252
0.115	0.0375	0.115	0.0344	0.115	0.0327	0.115	0.0312	0.115	0.0299	0.115	0.0277	0.115	0.0258
0.1204	0.0375	0.1204	0.0344	0.1204	0.0331	0.1204	0.0322	0.1204	0.0312	0.1204	0.0294	0.1204	0.0269
0.1262	0.0431	0.1262	0.0397	0.1262	0.0378	0.1262	0.036	0.1262	0.0343	0.1262	0.0314	0.1262	0.0278
0.1322	0.0504	0.1322	0.045	0.1322	0.042	0.1322	0.0393	0.1322	0.0369	0.1322	0.0328	0.1322	0.0281
0.1385	0.056	0.1385	0.0489	0.1385	0.0449	0.1385	0.0414	0.1385	0.0384	0.1385	0.0344	0.1385	0.0303
0.1451	0.058	0.1451	0.0509	0.1451	0.0475	0.1451	0.0445	0.1451	0.0419	0.1451	0.0375	0.1451	0.0325
0.152	0.0616	0.152	0.0546	0.152	0.0506	0.152	0.0472	0.152	0.0442	0.152	0.0391	0.152	0.0338
0.1592	0.062	0.1592	0.0546	0.1592	0.0506	0.1592	0.0472	0.1592	0.0442	0.1592	0.0396	0.1592	0.0351
0.1668	0.064	0.1668	0.056	0.1668	0.0517	0.1668	0.0481	0.1668	0.0451	0.1668	0.0403	0.1668	0.0356
0.1748	0.064	0.1748	0.056	0.1748	0.0517	0.1748	0.0481	0.1748	0.0451	0.1748	0.0403	0.1748	0.0356
0.1831	0.064	0.1831	0.056	0.1831	0.0517	0.1831	0.0481	0.1831	0.0451	0.1831	0.0403	0.1831	0.0368
0.1918	0.0641	0.1918	0.0561	0.1918	0.0517	0.1918	0.0495	0.1918	0.0477	0.1918	0.0445	0.1918	0.0404
0.2009	0.0642	0.2009	0.0583	0.2009	0.0558	0.2009	0.0535	0.2009	0.0513	0.2009	0.0474	0.2009	0.0424
0.2105	0.0665	0.2105	0.0603	0.2105	0.0575	0.2105	0.0549	0.2105	0.0525	0.2105	0.049	0.2105	0.0448
0.2205	0.078	0.2205	0.0647	0.2205	0.062	0.2205	0.0595	0.2205	0.0573	0.2205	0.0533	0.2205	0.0484
0.231	0.0933	0.231	0.0774	0.231	0.0694	0.231	0.063	0.231	0.0598	0.231	0.0556	0.231	0.0503
0.242	0.0933	0.242	0.0774	0.242	0.0723	0.242	0.0678	0.242	0.0638	0.242	0.0567	0.242	0.0513
0.2535	0.0933	0.2535	0.0817	0.2535	0.0771	0.2535	0.0729	0.2535	0.0692	0.2535	0.0628	0.2535	0.0553
0.2656	0.0933	0.2656	0.0839	0.2656	0.0794	0.2656	0.0754	0.2656	0.0718	0.2656	0.0653	0.2656	0.0575
0.2783	0.0954	0.2783	0.0847	0.2783	0.0794	0.2783	0.0754	0.2783	0.0718	0.2783	0.0653	0.2783	0.058
0.2915	0.1187	0.2915	0.0987	0.2915	0.089	0.2915	0.0813	0.2915	0.0753	0.2915	0.0668	0.2915	0.0592
0.3054	0.1504	0.3054	0.1235	0.3054	0.1097	0.3054	0.0985	0.3054	0.0894	0.3054	0.0758	0.3054	0.0633
0.3199	0.1504	0.3199	0.1235	0.3199	0.1097	0.3199	0.0985	0.3199	0.0894	0.3199	0.0801	0.3199	0.0706
0.3352	0.1504	0.3352	0.1235	0.3352	0.1097	0.3352	0.0985	0.3352	0.0931	0.3352	0.0857	0.3352	0.0762
0.3511	0.1504	0.3511	0.1289	0.3511	0.1172	0.3511	0.107	0.3511	0.0997	0.3511	0.0894	0.3511	0.0786
0.3678	0.168	0.3678	0.1438	0.3678	0.1303	0.3678	0.1186	0.3678	0.1121	0.3678	0.1017	0.3678	0.0898
0.3853	0.168	0.3853	0.1438	0.3853	0.1346	0.3853	0.1279	0.3853	0.1219	0.3853	0.1115	0.3853	0.0992
0.4037	0.194	0.4037	0.1598	0.4037	0.1426	0.4037	0.1306	0.4037	0.1259	0.4037	0.117	0.4037	0.1054
0.4229	0.2368	0.4229	0.1906	0.4229	0.1721	0.4229	0.1558	0.4229	0.1416	0.4229	0.1217	0.4229	0.1092
0.4431	0.3088	0.4431	0.2193	0.4431	0.1881	0.4431	0.1671	0.4431	0.1496	0.4431	0.1273	0.4431	0.1097
0.4642	0.3417	0.4642	0.2524	0.4642	0.2138	0.4642	0.1852	0.4642	0.1637	0.4642	0.1345	0.4642	0.1211
0.4863	0.3417	0.4863	0.256	0.4863	0.2208	0.4863	0.1928	0.4863	0.1701	0.4863	0.1409	0.4863	0.1323
0.5094	0.3522	0.5094	0.2656	0.5094	0.2325	0.5094	0.2054	0.5094	0.1831	0.5094	0.1497	0.5094	0.1391

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.4096	0.5337	0.2771	0.5337	0.2325	0.5337	0.2054	0.5337	0.1831	0.5337	0.1539	0.5337	0.1396
0.5591	0.4096	0.5591	0.2771	0.5591	0.2398	0.5591	0.2148	0.5591	0.1949	0.5591	0.1654	0.5591	0.1396
0.5857	0.4096	0.5857	0.2771	0.5857	0.2404	0.5857	0.2159	0.5857	0.1975	0.5857	0.1686	0.5857	0.1441
0.6136	0.4475	0.6136	0.2969	0.6136	0.2444	0.6136	0.2234	0.6136	0.2051	0.6136	0.1751	0.6136	0.1441
0.6428	0.478	0.6428	0.3547	0.6428	0.3006	0.6428	0.2612	0.6428	0.2347	0.6428	0.1988	0.6428	0.168
0.6734	0.478	0.6734	0.3547	0.6734	0.3006	0.6734	0.2612	0.6734	0.2413	0.6734	0.2165	0.6734	0.1872
0.7055	0.478	0.7055	0.3547	0.7055	0.3006	0.7055	0.2612	0.7055	0.2413	0.7055	0.2186	0.7055	0.1922
0.7391	0.478	0.7391	0.3547	0.7391	0.3006	0.7391	0.2692	0.7391	0.2463	0.7391	0.2186	0.7391	0.1922
0.7743	0.5518	0.7743	0.3958	0.7743	0.3332	0.7743	0.2918	0.7743	0.268	0.7743	0.2351	0.7743	0.2018
0.8111	0.5518	0.8111	0.3958	0.8111	0.3332	0.8111	0.3035	0.8111	0.2874	0.8111	0.2587	0.8111	0.2236
0.8497	0.5518	0.8497	0.3958	0.8497	0.3332	0.8497	0.3117	0.8497	0.2984	0.8497	0.2723	0.8497	0.2373
0.8902	0.5518	0.8902	0.3958	0.8902	0.3656	0.8902	0.3431	0.8902	0.3226	0.8902	0.2873	0.8902	0.2462
0.9326	0.8605	0.9326	0.5585	0.9326	0.4629	0.9326	0.4023	0.9326	0.3602	0.9326	0.3049	0.9326	0.2549
0.977	0.8605	0.977	0.5585	0.977	0.4629	0.977	0.4045	0.977	0.3644	0.977	0.3083	0.977	0.2637
1.0235	0.9315	1.0235	0.5965	1.0235	0.5261	1.0235	0.4814	1.0235	0.4436	1.0235	0.3837	1.0235	0.3277
1.0723	0.9315	1.0723	0.6685	1.0723	0.603	1.0723	0.5467	1.0723	0.4995	1.0723	0.4355	1.0723	0.3729
1.1233	1.3398	1.1233	0.8315	1.1233	0.6788	1.1233	0.5837	1.1233	0.5408	1.1233	0.4681	1.1233	0.3987
1.1768	1.3398	1.1768	0.8315	1.1768	0.6788	1.1768	0.5855	1.1768	0.5505	1.1768	0.4858	1.1768	0.4238
1.2328	1.3398	1.2328	0.8315	1.2328	0.7369	1.2328	0.6596	1.2328	0.5925	1.2328	0.5105	1.2328	0.452
1.2916	1.3398	1.2916	0.9002	1.2916	0.7926	1.2916	0.7024	1.2916	0.6263	1.2916	0.5455	1.2916	0.4806
1.353	1.3398	1.353	0.9485	1.353	0.7926	1.353	0.7024	1.353	0.6282	1.353	0.574	1.353	0.5058
1.4175	1.4626	1.4175	0.9485	1.4175	0.7926	1.4175	0.7024	1.4175	0.6579	1.4175	0.6026	1.4175	0.5321
1.485	1.4626	1.485	0.9485	1.485	0.7926	1.485	0.7282	1.485	0.6958	1.485	0.636	1.485	0.5624
1.5557	1.5113	1.5557	1.0297	1.5557	0.8797	1.5557	0.7754	1.5557	0.726	1.5557	0.6634	1.5557	0.5886
1.6298	1.8158	1.6298	1.1086	1.6298	0.9552	1.6298	0.8627	1.6298	0.7931	1.6298	0.6875	1.6298	0.6064
1.7074	1.8158	1.7074	1.1086	1.7074	0.9552	1.7074	0.8627	1.7074	0.7931	1.7074	0.7024	1.7074	0.6246
1.7887	1.8158	1.7887	1.1086	1.7887	0.9552	1.7887	0.8627	1.7887	0.7931	1.7887	0.7213	1.7887	0.6476
1.8738	1.8158	1.8738	1.1086	1.8738	0.9552	1.8738	0.8651	1.8738	0.8263	1.8738	0.7567	1.8738	0.6698
1.963	1.8158	1.963	1.1086	1.963	0.9552	1.963	0.8972	1.963	0.8525	1.963	0.7755	1.963	0.683
2.0565	1.7414	2.0565	1.0948	2.0565	0.9593	2.0565	0.9017	2.0565	0.8525	2.0565	0.7755	2.0565	0.683
2.1544	1.7414	2.1544	1.0948	2.1544	0.9593	2.1544	0.9017	2.1544	0.8525	2.1544	0.7755	2.1544	0.683
2.257	1.5091	2.257	1.0367	2.257	0.9593	2.257	0.9017	2.257	0.8525	2.257	0.7755	2.257	0.683
2.3645	1.5091	2.3645	1.0367	2.3645	0.9593	2.3645	0.9017	2.3645	0.8525	2.3645	0.7755	2.3645	0.683
2.4771	1.5091	2.4771	1.0367	2.4771	1.009	2.4771	0.9017	2.4771	0.852	2.4771	0.7697	2.4771	0.6811
2.595	1.5091	2.595	1.0367	2.595	1.009	2.595	0.9017	2.595	0.8387	2.595	0.7357	2.595	0.6811

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
2.7186	1.5091	2.7186	1.0367	2.7186	1.009	2.7186	0.9017	2.7186	0.8387	2.7186	0.7357	2.7186	0.6811	
2.848	1.5091	2.848	1.0367	2.848	1.009	2.848	0.9017	2.848	0.8387	2.848	0.7357	2.848	0.6811	
2.9836	1.5091	2.9836	1.0367	2.9836	1.009	2.9836	0.9017	2.9836	0.8387	2.9836	0.7357	2.9836	0.6811	
3.1257	1.5091	3.1257	1.0367	3.1257	0.9237	3.1257	0.9017	3.1257	0.8387	3.1257	0.7357	3.1257	0.6811	
3.2745	1.5091	3.2745	1.0367	3.2745	0.9237	3.2745	0.9017	3.2745	0.8387	3.2745	0.7357	3.2745	0.6811	
3.4305	1.5091	3.4305	1.0367	3.4305	0.9237	3.4305	0.9017	3.4305	0.8387	3.4305	0.7357	3.4305	0.6801	
3.5938	1.6472	3.5938	1.0367	3.5938	0.9237	3.5938	0.9017	3.5938	0.8387	3.5938	0.7357	3.5938	0.6766	
3.7649	1.6472	3.7649	1.1356	3.7649	0.9237	3.7649	0.9017	3.7649	0.8387	3.7649	0.7357	3.7649	0.6759	
3.9442	1.6472	3.9442	1.1356	3.9442	0.9237	3.9442	0.906	3.9442	0.8387	3.9442	0.7357	3.9442	0.6712	
4.132	1.6472	4.132	1.1356	4.132	0.9237	4.132	0.906	4.132	0.8387	4.132	0.7357	4.132	0.6712	
4.3288	1.6472	4.3288	1.1356	4.3288	0.9237	4.3288	0.906	4.3288	0.8387	4.3288	0.7357	4.3288	0.6626	
4.5349	1.6472	4.5349	1.1356	4.5349	0.9237	4.5349	0.906	4.5349	0.8387	4.5349	0.7357	4.5349	0.6525	
4.7508	1.6472	4.7508	1.1048	4.7508	0.9237	4.7508	0.906	4.7508	0.8387	4.7508	0.7357	4.7508	0.6316	
4.977	1.6472	4.977	0.9746	4.977	0.8757	4.977	0.829	4.977	0.7851	4.977	0.7083	4.977	0.6206	
5.214	1.6472	5.214	0.9746	5.214	0.8463	5.214	0.785	5.214	0.7434	5.214	0.6732	5.214	0.5898	
5.4623	1.7798	5.4623	0.9746	5.4623	0.8463	5.4623	0.785	5.4623	0.7434	5.4623	0.6732	5.4623	0.5898	
5.7224	1.7798	5.7224	0.9746	5.7224	0.8463	5.7224	0.785	5.7224	0.7434	5.7224	0.6732	5.7224	0.5898	
5.9948	1.7798	5.9948	0.9746	5.9948	0.8438	5.9948	0.785	5.9948	0.7434	5.9948	0.6732	5.9948	0.5898	
6.2803	1.7798	6.2803	0.9746	6.2803	0.8438	6.2803	0.785	6.2803	0.7434	6.2803	0.6732	6.2803	0.5898	
6.5793	1.7798	6.5793	0.9746	6.5793	0.8438	6.5793	0.7804	6.5793	0.7393	6.5793	0.6657	6.5793	0.5795	
6.8926	1.7798	6.8926	0.963	6.8926	0.8429	6.8926	0.7674	6.8926	0.7128	6.8926	0.6345	6.8926	0.5677	
7.2208	1.4914	7.2208	0.935	7.2208	0.7922	7.2208	0.7331	7.2208	0.6844	7.2208	0.6283	7.2208	0.5677	
7.5646	1.168	7.5646	0.822	7.5646	0.7632	7.5646	0.7188	7.5646	0.6833	7.5646	0.6283	7.5646	0.5677	
7.9248	1.0987	7.9248	0.8201	7.9248	0.7623	7.9248	0.7176	7.9248	0.6811	7.9248	0.6237	7.9248	0.5627	
8.3022	1.0987	8.3022	0.7845	8.3022	0.7283	8.3022	0.6777	8.3022	0.6364	8.3022	0.5884	8.3022	0.5417	
8.6975	0.8935	8.6975	0.7092	8.6975	0.6368	8.6975	0.6061	8.6975	0.5819	8.6975	0.5373	8.6975	0.5059	
9.1116	0.8935	9.1116	0.7092	9.1116	0.6368	9.1116	0.5827	9.1116	0.5505	9.1116	0.5085	9.1116	0.4846	
9.5455	0.8763	9.5455	0.7092	9.5455	0.6368	9.5455	0.5827	9.5455	0.5459	9.5455	0.4951	9.5455	0.4643	
10	0.8763	10	0.7092	10	0.6368	10	0.5827	10	0.5459	10	0.4934	10	0.4429	
10.4762	0.8603	10.4762	0.7092	10.4762	0.6368	10.4762	0.5774	10.4762	0.5297	10.4762	0.4688	10.4762	0.4271	
10.975	0.791	10.975	0.6543	10.975	0.6067	10.975	0.5582	10.975	0.5137	10.975	0.4674	10.975	0.4271	
11.4976	0.791	11.4976	0.6543	11.4976	0.6014	11.4976	0.5519	11.4976	0.5094	11.4976	0.4435	11.4976	0.4142	
12.045	0.6677	12.045	0.5543	12.045	0.5086	12.045	0.4716	12.045	0.4394	12.045	0.4081	12.045	0.3915	
12.6186	0.6325	12.6186	0.5145	12.6186	0.4727	12.6186	0.4409	12.6186	0.4251	12.6186	0.4004	12.6186	0.3774	
13.2194	0.6325	13.2194	0.5025	13.2194	0.4639	13.2194	0.4269	13.2194	0.4021	13.2194	0.379	13.2194	0.3634	

PTWW037.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 37 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.6152	13.8489	0.4815	13.8489	0.433	13.8489	0.3995	13.8489	0.3896	13.8489	0.3705	13.8489	0.3527
14.5083	0.5318	14.5083	0.4455	14.5083	0.4096	14.5083	0.381	14.5083	0.3726	14.5083	0.3575	14.5083	0.3484
15.1991	0.4787	15.1991	0.4141	15.1991	0.3936	15.1991	0.3795	15.1991	0.3697	15.1991	0.3575	15.1991	0.3484
15.9228	0.4787	15.9228	0.3815	15.9228	0.3644	15.9228	0.3609	15.9228	0.358	15.9228	0.3528	15.9228	0.3467
16.681	0.4787	16.681	0.3815	16.681	0.3644	16.681	0.3544	16.681	0.3483	16.681	0.3439	16.681	0.3416
17.4753	0.4307	17.4753	0.3815	17.4753	0.3644	17.4753	0.3544	17.4753	0.3483	17.4753	0.3418	17.4753	0.337
18.3074	0.4095	18.3074	0.3431	18.3074	0.3367	18.3074	0.3354	18.3074	0.3336	18.3074	0.3315	18.3074	0.3305
19.1791	0.4095	19.1791	0.3431	19.1791	0.3349	19.1791	0.3293	19.1791	0.3262	19.1791	0.3251	19.1791	0.325
20.0923	0.3708	20.0923	0.3431	20.0923	0.3349	20.0923	0.3293	20.0923	0.3262	20.0923	0.3243	20.0923	0.323
21.049	0.3708	21.049	0.3431	21.049	0.3349	21.049	0.3293	21.049	0.3262	21.049	0.3236	21.049	0.3215
22.0513	0.3708	22.0513	0.3431	22.0513	0.3349	22.0513	0.3293	22.0513	0.3262	22.0513	0.323	22.0513	0.3199
23.1013	0.3708	23.1013	0.3431	23.1013	0.3349	23.1013	0.3293	23.1013	0.3262	23.1013	0.323	23.1013	0.3199
24.2013	0.3708	24.2013	0.3431	24.2013	0.3349	24.2013	0.3293	24.2013	0.3255	24.2013	0.3206	24.2013	0.3186
25.3536	0.3358	25.3536	0.3197	25.3536	0.3192	25.3536	0.3187	25.3536	0.3181	25.3536	0.317	25.3536	0.3164
26.5609	0.3358	26.5609	0.3169	26.5609	0.3159	26.5609	0.3158	26.5609	0.3158	26.5609	0.3155	26.5609	0.3148
27.8256	0.3358	27.8256	0.3169	27.8256	0.3159	27.8256	0.3153	27.8256	0.3149	27.8256	0.3143	27.8256	0.3137
29.1505	0.3358	29.1505	0.3165	29.1505	0.3153	29.1505	0.3142	29.1505	0.3137	29.1505	0.3132	29.1505	0.313
30.5386	0.3312	30.5386	0.3165	30.5386	0.3153	30.5386	0.3142	30.5386	0.3133	30.5386	0.3131	30.5386	0.313
31.9927	0.3297	31.9927	0.3163	31.9927	0.3146	31.9927	0.3138	31.9927	0.3132	31.9927	0.3131	31.9927	0.313
33.516	0.3144	33.516	0.3134	33.516	0.3133	33.516	0.3132	33.516	0.3132	33.516	0.3131	33.516	0.313
35.1119	0.3135	35.1119	0.3134	35.1119	0.3133	35.1119	0.3132	35.1119	0.3132	35.1119	0.3131	35.1119	0.313
36.7838	0.3134	36.7838	0.3133	36.7838	0.3132	36.7838	0.3132	36.7838	0.3132	36.7838	0.3131	36.7838	0.313
38.5353	0.3132	38.5353	0.3132	38.5353	0.3131	38.5353	0.3131	38.5353	0.3131	38.5353	0.3131	38.5353	0.313
40.3702	0.3131	40.3702	0.3131	40.3702	0.3131	40.3702	0.313	40.3702	0.313	40.3702	0.313	40.3702	0.3129
42.2924	0.313	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129	42.2924	0.3129
44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128	44.3062	0.3128
46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127	46.4159	0.3127
48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126	48.626	0.3126
50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125	50.9414	0.3125

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%	2%		3%		4%		5%		7%		10%	
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0405	0.1098	0.0365	0.1098	0.0342	0.1098	0.0322	0.1098	0.0303	0.1098	0.0272	0.1098	0.0235
0.115	0.0405	0.115	0.0365	0.115	0.0342	0.115	0.0322	0.115	0.0303	0.115	0.0272	0.115	0.0259
0.1204	0.0405	0.1204	0.0365	0.1204	0.0342	0.1204	0.0322	0.1204	0.031	0.1204	0.0297	0.1204	0.028
0.1262	0.0405	0.1262	0.0365	0.1262	0.0352	0.1262	0.0342	0.1262	0.0334	0.1262	0.0318	0.1262	0.0297
0.1322	0.0405	0.1322	0.0382	0.1322	0.037	0.1322	0.0359	0.1322	0.0349	0.1322	0.0333	0.1322	0.0316
0.1385	0.0411	0.1385	0.0392	0.1385	0.0382	0.1385	0.0372	0.1385	0.0363	0.1385	0.0348	0.1385	0.0328
0.1451	0.0417	0.1451	0.0398	0.1451	0.0387	0.1451	0.0377	0.1451	0.0368	0.1451	0.0352	0.1451	0.0332
0.152	0.0439	0.152	0.0401	0.152	0.0387	0.152	0.0377	0.152	0.0368	0.152	0.0352	0.152	0.0332
0.1592	0.0462	0.1592	0.0416	0.1592	0.0396	0.1592	0.0377	0.1592	0.0368	0.1592	0.0352	0.1592	0.0332
0.1668	0.0584	0.1668	0.0506	0.1668	0.0463	0.1668	0.0426	0.1668	0.0395	0.1668	0.0352	0.1668	0.0332
0.1748	0.0645	0.1748	0.0566	0.1748	0.0522	0.1748	0.0484	0.1748	0.045	0.1748	0.0394	0.1748	0.0332
0.1831	0.0668	0.1831	0.0583	0.1831	0.0541	0.1831	0.0504	0.1831	0.0471	0.1831	0.0415	0.1831	0.0354
0.1918	0.0678	0.1918	0.0586	0.1918	0.0543	0.1918	0.0507	0.1918	0.0474	0.1918	0.0418	0.1918	0.038
0.2009	0.0697	0.2009	0.0596	0.2009	0.0543	0.2009	0.0514	0.2009	0.0487	0.2009	0.0438	0.2009	0.0411
0.2105	0.0722	0.2105	0.062	0.2105	0.0582	0.2105	0.0547	0.2105	0.0516	0.2105	0.0482	0.2105	0.0446
0.2205	0.0819	0.2205	0.0709	0.2205	0.0651	0.2205	0.06	0.2205	0.0574	0.2205	0.0531	0.2205	0.0475
0.231	0.0959	0.231	0.0792	0.231	0.0703	0.231	0.0665	0.231	0.063	0.231	0.0578	0.231	0.0525
0.242	0.0984	0.242	0.0845	0.242	0.0774	0.242	0.0721	0.242	0.0681	0.242	0.0618	0.242	0.0551
0.2535	0.1059	0.2535	0.0913	0.2535	0.0833	0.2535	0.0763	0.2535	0.0702	0.2535	0.0618	0.2535	0.0551
0.2656	0.1138	0.2656	0.0944	0.2656	0.084	0.2656	0.0763	0.2656	0.0702	0.2656	0.0618	0.2656	0.0551
0.2783	0.1138	0.2783	0.0944	0.2783	0.084	0.2783	0.0779	0.2783	0.074	0.2783	0.0677	0.2783	0.0611
0.2915	0.1138	0.2915	0.1008	0.2915	0.0946	0.2915	0.0892	0.2915	0.0843	0.2915	0.0764	0.2915	0.0677
0.3054	0.1179	0.3054	0.1056	0.3054	0.0987	0.3054	0.0926	0.3054	0.0872	0.3054	0.0785	0.3054	0.0706
0.3199	0.1179	0.3199	0.1056	0.3199	0.0987	0.3199	0.0926	0.3199	0.0894	0.3199	0.0844	0.3199	0.0786
0.3352	0.1179	0.3352	0.1098	0.3352	0.1056	0.3352	0.1017	0.3352	0.0982	0.3352	0.0921	0.3352	0.0848
0.3511	0.1654	0.3511	0.129	0.3511	0.1133	0.3511	0.1075	0.3511	0.1035	0.3511	0.0964	0.3511	0.088
0.3678	0.2415	0.3678	0.1832	0.3678	0.1565	0.3678	0.1364	0.3678	0.1213	0.3678	0.1006	0.3678	0.088
0.3853	0.2549	0.3853	0.187	0.3853	0.1595	0.3853	0.1387	0.3853	0.1269	0.3853	0.1092	0.3853	0.091
0.4037	0.2549	0.4037	0.187	0.4037	0.1595	0.4037	0.1387	0.4037	0.1279	0.4037	0.1163	0.4037	0.1034
0.4229	0.2549	0.4229	0.187	0.4229	0.1651	0.4229	0.1485	0.4229	0.1344	0.4229	0.1233	0.4229	0.1111
0.4431	0.3288	0.4431	0.2339	0.4431	0.2038	0.4431	0.1813	0.4431	0.1641	0.4431	0.1399	0.4431	0.1181
0.4642	0.3288	0.4642	0.2339	0.4642	0.2038	0.4642	0.1813	0.4642	0.1641	0.4642	0.1399	0.4642	0.1181
0.4863	0.3288	0.4863	0.2339	0.4863	0.2038	0.4863	0.1813	0.4863	0.1641	0.4863	0.1421	0.4863	0.1246
0.5094	0.3288	0.5094	0.2339	0.5094	0.2038	0.5094	0.1813	0.5094	0.1641	0.5094	0.1472	0.5094	0.1295

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.3356	0.5337	0.2387	0.5337	0.2081	0.5337	0.19	0.5337	0.1796	0.5337	0.1614	0.5337	0.1401
0.5591	0.3997	0.5591	0.2762	0.5591	0.244	0.5591	0.2179	0.5591	0.1971	0.5591	0.1724	0.5591	0.1556
0.5857	0.3997	0.5857	0.2863	0.5857	0.2573	0.5857	0.2332	0.5857	0.2128	0.5857	0.1853	0.5857	0.1724
0.6136	0.3997	0.6136	0.2863	0.6136	0.2573	0.6136	0.2332	0.6136	0.2128	0.6136	0.1998	0.6136	0.1858
0.6428	0.3997	0.6428	0.2863	0.6428	0.2573	0.6428	0.2332	0.6428	0.2219	0.6428	0.2115	0.6428	0.1969
0.6734	0.411	0.6734	0.2863	0.6734	0.2574	0.6734	0.2449	0.6734	0.2378	0.6734	0.2244	0.6734	0.2072
0.7055	0.411	0.7055	0.301	0.7055	0.2757	0.7055	0.2638	0.7055	0.2534	0.7055	0.2357	0.7055	0.2156
0.7391	0.6367	0.7391	0.4169	0.7391	0.3404	0.7391	0.2927	0.7391	0.2746	0.7391	0.2445	0.7391	0.217
0.7743	0.6367	0.7743	0.4169	0.7743	0.3404	0.7743	0.3038	0.7743	0.2858	0.7743	0.2555	0.7743	0.2218
0.8111	0.6596	0.8111	0.4428	0.8111	0.386	0.8111	0.3422	0.8111	0.3081	0.8111	0.2598	0.8111	0.2218
0.8497	0.6596	0.8497	0.4428	0.8497	0.4051	0.8497	0.3738	0.8497	0.347	0.8497	0.3034	0.8497	0.256
0.8902	0.6828	0.8902	0.4451	0.8902	0.4051	0.8902	0.3738	0.8902	0.3511	0.8902	0.3194	0.8902	0.2761
0.9326	0.737	0.9326	0.5191	0.9326	0.4567	0.9326	0.411	0.9326	0.3766	0.9326	0.328	0.9326	0.2821
0.977	0.9914	0.977	0.6358	0.977	0.525	0.977	0.4553	0.977	0.408	0.977	0.3484	0.977	0.2994
1.0235	0.9914	1.0235	0.6358	1.0235	0.5662	1.0235	0.5139	1.0235	0.4702	1.0235	0.4041	1.0235	0.3384
1.0723	0.9914	1.0723	0.6668	1.0723	0.5976	1.0723	0.5399	1.0723	0.4914	1.0723	0.4166	1.0723	0.3541
1.1233	1.2606	1.1233	0.8561	1.1233	0.7168	1.1233	0.6174	1.1233	0.5433	1.1233	0.4431	1.1233	0.3633
1.1768	1.2606	1.1768	0.8561	1.1768	0.7168	1.1768	0.6174	1.1768	0.5433	1.1768	0.4467	1.1768	0.3729
1.2328	1.2606	1.2328	0.935	1.2328	0.8202	1.2328	0.7293	1.2328	0.6556	1.2328	0.5433	1.2328	0.4321
1.2916	1.2606	1.2916	1.0351	1.2916	0.8991	1.2916	0.793	1.2916	0.708	1.2916	0.5814	1.2916	0.4586
1.353	1.3319	1.353	1.0351	1.353	0.8991	1.353	0.793	1.353	0.708	1.353	0.5814	1.353	0.4631
1.4175	1.6092	1.4175	1.1325	1.4175	0.9683	1.4175	0.8621	1.4175	0.7817	1.4175	0.6627	1.4175	0.5486
1.485	1.6092	1.485	1.1325	1.485	0.9683	1.485	0.885	1.485	0.8264	1.485	0.7199	1.485	0.6006
1.5557	1.8872	1.5557	1.1818	1.5557	1.0008	1.5557	0.892	1.5557	0.8264	1.5557	0.7265	1.5557	0.6185
1.6298	1.9322	1.6298	1.3084	1.6298	1.1683	1.6298	1.0534	1.6298	0.9565	1.6298	0.8016	1.6298	0.6401
1.7074	1.9702	1.7074	1.3601	1.7074	1.2627	1.7074	1.1415	1.7074	1.0371	1.7074	0.8692	1.7074	0.7006
1.7887	2.4552	1.7887	1.4456	1.7887	1.2629	1.7887	1.1415	1.7887	1.0371	1.7887	0.8773	1.7887	0.7486
1.8738	2.4552	1.8738	1.4456	1.8738	1.2629	1.8738	1.1415	1.8738	1.0371	1.8738	0.9259	1.8738	0.788
1.963	2.4552	1.963	1.4456	1.963	1.2629	1.963	1.1498	1.963	1.0818	1.963	0.9626	1.963	0.8157
2.0565	2.4552	2.0565	1.4456	2.0565	1.2629	2.0565	1.1701	2.0565	1.1049	2.0565	0.9829	2.0565	0.8288
2.1544	2.4552	2.1544	1.4456	2.1544	1.3316	2.1544	1.2297	2.1544	1.1411	2.1544	0.9932	2.1544	0.8645
2.257	2.2367	2.257	1.4456	2.257	1.3316	2.257	1.2297	2.257	1.1534	2.257	1.0344	2.257	0.8939
2.3645	2.2367	2.3645	1.4456	2.3645	1.3316	2.3645	1.2422	2.3645	1.1724	2.3645	1.0471	2.3645	0.898
2.4771	2.2367	2.4771	1.6143	2.4771	1.3804	2.4771	1.2551	2.4771	1.1724	2.4771	1.0471	2.4771	0.898
2.595	2.138	2.595	1.6143	2.595	1.3804	2.595	1.2551	2.595	1.1724	2.595	1.0471	2.595	0.898

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
2.7186	2.138	2.7186	1.6143	2.7186	1.3804	2.7186	1.2551	2.7186	1.1724	2.7186	1.0471	2.7186	0.898	
2.848	2.138	2.848	1.6143	2.848	1.3804	2.848	1.2551	2.848	1.1724	2.848	1.0471	2.848	0.898	
2.9836	2.138	2.9836	1.6143	2.9836	1.3804	2.9836	1.2551	2.9836	1.1568	2.9836	1.0114	2.9836	0.8645	
3.1257	2.138	3.1257	1.3773	3.1257	1.0982	3.1257	1.0035	3.1257	0.9573	3.1257	0.8829	3.1257	0.7931	
3.2745	2.138	3.2745	1.2119	3.2745	1.0686	3.2745	0.9673	3.2745	0.886	3.2745	0.778	3.2745	0.7168	
3.4305	1.5368	3.4305	1.0471	3.4305	0.9495	3.4305	0.8824	3.4305	0.8379	3.4305	0.7547	3.4305	0.6598	
3.5938	1.5368	3.5938	1.0165	3.5938	0.898	3.5938	0.8299	3.5938	0.7946	3.5938	0.7273	3.5938	0.6376	
3.7649	1.5368	3.7649	1.0165	3.7649	0.898	3.7649	0.8299	3.7649	0.7769	3.7649	0.6958	3.7649	0.6089	
3.9442	1.5368	3.9442	1.0165	3.9442	0.8472	3.9442	0.7941	3.9442	0.7477	3.9442	0.6723	3.9442	0.5955	
4.132	1.5368	4.132	1.0165	4.132	0.845	4.132	0.7941	4.132	0.7477	4.132	0.6723	4.132	0.5955	
4.3288	1.5368	4.3288	0.9973	4.3288	0.8194	4.3288	0.7522	4.3288	0.7017	4.3288	0.6303	4.3288	0.5622	
4.5349	1.5368	4.5349	0.8745	4.5349	0.7347	4.5349	0.6652	4.5349	0.6197	4.5349	0.5656	4.5349	0.5097	
4.7508	1.518	4.7508	0.8745	4.7508	0.7183	4.7508	0.6169	4.7508	0.5587	4.7508	0.4909	4.7508	0.4618	
4.977	1.518	4.977	0.8614	4.977	0.7025	4.977	0.6052	4.977	0.5367	4.977	0.4572	4.977	0.4284	
5.214	1.3404	5.214	0.7497	5.214	0.6443	5.214	0.5421	5.214	0.5109	5.214	0.4398	5.214	0.4021	
5.4623	1.3404	5.4623	0.7497	5.4623	0.6443	5.4623	0.5254	5.4623	0.5109	5.4623	0.438	5.4623	0.3783	
5.7224	1.3404	5.7224	0.7497	5.7224	0.6443	5.7224	0.5254	5.7224	0.5109	5.7224	0.438	5.7224	0.3681	
5.9948	1.3404	5.9948	0.7497	5.9948	0.6443	5.9948	0.5254	5.9948	0.5109	5.9948	0.438	5.9948	0.3681	
6.2803	1.3404	6.2803	0.7497	6.2803	0.6443	6.2803	0.5254	6.2803	0.5109	6.2803	0.438	6.2803	0.3681	
6.5793	1.3404	6.5793	0.7497	6.5793	0.6443	6.5793	0.5254	6.5793	0.5109	6.5793	0.438	6.5793	0.3681	
6.8926	1.3404	6.8926	0.7497	6.8926	0.6443	6.8926	0.5254	6.8926	0.5109	6.8926	0.438	6.8926	0.3681	
7.2208	1.274	7.2208	0.7497	7.2208	0.6443	7.2208	0.5254	7.2208	0.5109	7.2208	0.438	7.2208	0.3681	
7.5646	1.274	7.5646	0.7455	7.5646	0.6309	7.5646	0.5254	7.5646	0.5092	7.5646	0.438	7.5646	0.3681	
7.9248	1.274	7.9248	0.6003	7.9248	0.5494	7.9248	0.5064	7.9248	0.471	7.9248	0.4168	7.9248	0.3609	
8.3022	1.274	8.3022	0.5659	8.3022	0.4849	8.3022	0.454	8.3022	0.4288	8.3022	0.394	8.3022	0.3594	
8.6975	1.0027	8.6975	0.521	8.6975	0.4849	8.6975	0.454	8.6975	0.4288	8.6975	0.3913	8.6975	0.3536	
9.1116	1.0027	9.1116	0.4701	9.1116	0.4386	9.1116	0.4105	9.1116	0.3865	9.1116	0.3654	9.1116	0.3376	
9.5455	1.0027	9.5455	0.4494	9.5455	0.4069	9.5455	0.3794	9.5455	0.3652	9.5455	0.3418	9.5455	0.3167	
10	0.6463	10	0.4494	10	0.4069	10	0.3794	10	0.3585	10	0.3293	10	0.3015	
10.4762	0.6411	10.4762	0.4371	10.4762	0.3959	10.4762	0.3648	10.4762	0.347	10.4762	0.3169	10.4762	0.2936	
10.975	0.6411	10.975	0.4085	10.975	0.3668	10.975	0.3387	10.975	0.3179	10.975	0.2923	10.975	0.2891	
11.4976	0.6411	11.4976	0.3647	11.4976	0.3304	11.4976	0.3133	11.4976	0.3024	11.4976	0.2893	11.4976	0.2857	
12.045	0.6411	12.045	0.3647	12.045	0.3304	12.045	0.3133	12.045	0.3024	12.045	0.2893	12.045	0.2839	
12.6186	0.6411	12.6186	0.3647	12.6186	0.3304	12.6186	0.3133	12.6186	0.3024	12.6186	0.2893	12.6186	0.2831	
13.2194	0.6411	13.2194	0.3647	13.2194	0.3304	13.2194	0.3133	13.2194	0.3024	13.2194	0.2893	13.2194	0.2831	

PTWW038.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 38 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 12.5 H

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.6411	13.8489	0.3647	13.8489	0.3304	13.8489	0.3133	13.8489	0.3024	13.8489	0.2893	13.8489	0.2831
14.5083	0.6411	14.5083	0.3647	14.5083	0.3304	14.5083	0.3133	14.5083	0.3024	14.5083	0.2893	14.5083	0.2831
15.1991	0.6411	15.1991	0.3647	15.1991	0.3304	15.1991	0.3133	15.1991	0.3024	15.1991	0.2893	15.1991	0.2831
15.9228	0.6411	15.9228	0.3647	15.9228	0.3304	15.9228	0.3133	15.9228	0.3024	15.9228	0.2893	15.9228	0.2831
16.681	0.6411	16.681	0.3647	16.681	0.3304	16.681	0.3133	16.681	0.3024	16.681	0.2893	16.681	0.2831
17.4753	0.6411	17.4753	0.3647	17.4753	0.3304	17.4753	0.3133	17.4753	0.3024	17.4753	0.2893	17.4753	0.2831
18.3074	0.4714	18.3074	0.3284	18.3074	0.3152	18.3074	0.3052	18.3074	0.298	18.3074	0.2893	18.3074	0.2831
19.1791	0.4714	19.1791	0.3088	19.1791	0.2936	19.1791	0.2872	19.1791	0.2851	19.1791	0.2842	19.1791	0.2825
20.0923	0.4714	20.0923	0.3088	20.0923	0.2886	20.0923	0.2865	20.0923	0.2851	20.0923	0.2833	20.0923	0.2814
21.049	0.3824	21.049	0.2877	21.049	0.2842	21.049	0.2843	21.049	0.2836	21.049	0.2819	21.049	0.2801
22.0513	0.3824	22.0513	0.2873	22.0513	0.2834	22.0513	0.2816	22.0513	0.2806	22.0513	0.2795	22.0513	0.2783
23.1013	0.2973	23.1013	0.2832	23.1013	0.2814	23.1013	0.2802	23.1013	0.2793	23.1013	0.2779	23.1013	0.2765
24.2013	0.2947	24.2013	0.2805	24.2013	0.2788	24.2013	0.2776	24.2013	0.2768	24.2013	0.2763	24.2013	0.2756
25.3536	0.288	25.3536	0.2805	25.3536	0.2788	25.3536	0.2776	25.3536	0.2768	25.3536	0.2757	25.3536	0.2749
26.5609	0.288	26.5609	0.2805	26.5609	0.2788	26.5609	0.2776	26.5609	0.2768	26.5609	0.2757	26.5609	0.2747
27.8256	0.2867	27.8256	0.28	27.8256	0.2782	27.8256	0.2771	27.8256	0.2762	27.8256	0.2751	27.8256	0.2741
29.1505	0.2773	29.1505	0.2753	29.1505	0.2749	29.1505	0.2745	29.1505	0.2742	29.1505	0.2738	29.1505	0.2732
30.5386	0.2773	30.5386	0.2727	30.5386	0.2726	30.5386	0.2725	30.5386	0.2724	30.5386	0.2723	30.5386	0.2721
31.9927	0.2707	31.9927	0.271	31.9927	0.271	31.9927	0.2711	31.9927	0.2711	31.9927	0.2712	31.9927	0.2712
33.516	0.2707	33.516	0.2707	33.516	0.2706	33.516	0.2706	33.516	0.2706	33.516	0.2706	33.516	0.2706
35.1119	0.27	35.1119	0.27	35.1119	0.27	35.1119	0.2701	35.1119	0.2701	35.1119	0.2701	35.1119	0.2701
36.7838	0.2695	36.7838	0.2696	36.7838	0.2696	36.7838	0.2696	36.7838	0.2697	36.7838	0.2697	36.7838	0.2697
38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693	38.5353	0.2693
40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269	40.3702	0.269
42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2687	42.2924	0.2688
44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685	44.3062	0.2685
46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683	46.4159	0.2683
48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681	48.626	0.2681
50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679	50.9414	0.2679



PTWW040.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 40 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 30 B

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.4094	0.5337	0.277	0.5337	0.2324	0.5337	0.2053	0.5337	0.1831	0.5337	0.1539	0.5337	0.1399
0.5591	0.4094	0.5591	0.277	0.5591	0.2399	0.5591	0.2149	0.5591	0.195	0.5591	0.1656	0.5591	0.1399
0.5857	0.4094	0.5857	0.277	0.5857	0.2401	0.5857	0.2157	0.5857	0.1974	0.5857	0.1686	0.5857	0.144
0.6136	0.4473	0.6136	0.2968	0.6136	0.2443	0.6136	0.2233	0.6136	0.205	0.6136	0.175	0.6136	0.144
0.6428	0.478	0.6428	0.3546	0.6428	0.3004	0.6428	0.2612	0.6428	0.2347	0.6428	0.1989	0.6428	0.1683
0.6734	0.478	0.6734	0.3546	0.6734	0.3004	0.6734	0.2612	0.6734	0.2416	0.6734	0.2168	0.6734	0.1875
0.7055	0.478	0.7055	0.3546	0.7055	0.3004	0.7055	0.2612	0.7055	0.2416	0.7055	0.2187	0.7055	0.1922
0.7391	0.478	0.7391	0.3546	0.7391	0.3004	0.7391	0.2693	0.7391	0.2464	0.7391	0.2187	0.7391	0.1922
0.7743	0.5516	0.7743	0.3957	0.7743	0.3328	0.7743	0.2914	0.7743	0.2681	0.7743	0.2353	0.7743	0.2018
0.8111	0.5516	0.8111	0.3957	0.8111	0.3328	0.8111	0.3036	0.8111	0.2876	0.8111	0.2588	0.8111	0.2241
0.8497	0.5516	0.8497	0.3957	0.8497	0.3328	0.8497	0.312	0.8497	0.2986	0.8497	0.2726	0.8497	0.2377
0.8902	0.5516	0.8902	0.3957	0.8902	0.3658	0.8902	0.3432	0.8902	0.3226	0.8902	0.2872	0.8902	0.2459
0.9326	0.86	0.9326	0.5582	0.9326	0.4625	0.9326	0.4018	0.9326	0.3596	0.9326	0.3042	0.9326	0.2543
0.977	0.86	0.977	0.5582	0.977	0.4625	0.977	0.4042	0.977	0.3641	0.977	0.3081	0.977	0.2635
1.0235	0.9305	1.0235	0.596	1.0235	0.5259	1.0235	0.4813	1.0235	0.4435	1.0235	0.3836	1.0235	0.3273
1.0723	0.9305	1.0723	0.6681	1.0723	0.6026	1.0723	0.5463	1.0723	0.4991	1.0723	0.435	1.0723	0.3728
1.1233	1.3364	1.1233	0.8307	1.1233	0.678	1.1233	0.5832	1.1233	0.5403	1.1233	0.4675	1.1233	0.3994
1.1768	1.3364	1.1768	0.8307	1.1768	0.678	1.1768	0.5853	1.1768	0.5503	1.1768	0.486	1.1768	0.4233
1.2328	1.3364	1.2328	0.8307	1.2328	0.7352	1.2328	0.6585	1.2328	0.5916	1.2328	0.5089	1.2328	0.45
1.2916	1.3364	1.2916	0.8976	1.2916	0.7903	1.2916	0.7004	1.2916	0.6246	1.2916	0.5436	1.2916	0.479
1.353	1.3364	1.353	0.9456	1.353	0.7903	1.353	0.7004	1.353	0.6262	1.353	0.5719	1.353	0.5034
1.4175	1.4619	1.4175	0.9456	1.4175	0.7903	1.4175	0.7004	1.4175	0.6574	1.4175	0.6019	1.4175	0.5319
1.485	1.4619	1.485	0.9456	1.485	0.7903	1.485	0.7283	1.485	0.6958	1.485	0.6359	1.485	0.562
1.5557	1.5117	1.5557	1.0299	1.5557	0.8804	1.5557	0.7761	1.5557	0.7253	1.5557	0.6625	1.5557	0.5874
1.6298	1.815	1.6298	1.1102	1.6298	0.9568	1.6298	0.8641	1.6298	0.7943	1.6298	0.6883	1.6298	0.605
1.7074	1.815	1.7074	1.1102	1.7074	0.9568	1.7074	0.8641	1.7074	0.7943	1.7074	0.703	1.7074	0.6249
1.7887	1.815	1.7887	1.1102	1.7887	0.9568	1.7887	0.8641	1.7887	0.7943	1.7887	0.7234	1.7887	0.6496
1.8738	1.815	1.8738	1.1102	1.8738	0.9568	1.8738	0.8669	1.8738	0.8279	1.8738	0.7584	1.8738	0.6712
1.963	1.815	1.963	1.1102	1.963	0.9568	1.963	0.8979	1.963	0.8532	1.963	0.7761	1.963	0.6839
2.0565	1.7425	2.0565	1.0955	2.0565	0.961	2.0565	0.9033	2.0565	0.8536	2.0565	0.7761	2.0565	0.6839
2.1544	1.7425	2.1544	1.0955	2.1544	0.961	2.1544	0.9033	2.1544	0.8536	2.1544	0.7761	2.1544	0.6839
2.257	1.515	2.257	1.0774	2.257	0.961	2.257	0.9033	2.257	0.8536	2.257	0.7761	2.257	0.6839
2.3645	1.515	2.3645	1.0774	2.3645	0.961	2.3645	0.9033	2.3645	0.8536	2.3645	0.7761	2.3645	0.6839
2.4771	1.515	2.4771	1.0774	2.4771	1.0152	2.4771	0.9033	2.4771	0.8536	2.4771	0.7713	2.4771	0.6886
2.595	1.515	2.595	1.0774	2.595	1.0152	2.595	0.9033	2.595	0.8536	2.595	0.7713	2.595	0.6927

PTWW040.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 40 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 30 B

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
2.7186	1.515	2.7186	1.0774	2.7186	1.0152	2.7186	0.9033	2.7186	0.8536	2.7186	0.7713	2.7186	0.6934	
2.848	1.515	2.848	1.0774	2.848	1.0152	2.848	0.9033	2.848	0.8536	2.848	0.7713	2.848	0.6934	
2.9836	1.515	2.9836	1.0774	2.9836	1.0152	2.9836	0.9033	2.9836	0.8536	2.9836	0.7713	2.9836	0.6934	
3.1257	1.515	3.1257	1.0774	3.1257	1.0152	3.1257	0.9033	3.1257	0.8536	3.1257	0.7713	3.1257	0.6934	
3.2745	1.515	3.2745	1.0774	3.2745	1.0152	3.2745	0.9033	3.2745	0.8536	3.2745	0.7713	3.2745	0.6934	
3.4305	1.515	3.4305	1.0774	3.4305	1.0152	3.4305	0.9033	3.4305	0.8536	3.4305	0.7713	3.4305	0.692	
3.5938	1.7924	3.5938	1.0774	3.5938	1.0152	3.5938	0.9033	3.5938	0.8536	3.5938	0.7713	3.5938	0.6916	
3.7649	1.7924	3.7649	1.0921	3.7649	1.0152	3.7649	0.9076	3.7649	0.8536	3.7649	0.7713	3.7649	0.6893	
3.9442	1.7924	3.9442	1.0921	3.9442	1.0628	3.9442	0.9721	3.9442	0.9001	3.9442	0.7901	3.9442	0.6893	
4.132	1.7924	4.132	1.0921	4.132	1.0628	4.132	0.9721	4.132	0.9001	4.132	0.7901	4.132	0.6876	
4.3288	1.7924	4.3288	1.0921	4.3288	1.0628	4.3288	0.9721	4.3288	0.9001	4.3288	0.7901	4.3288	0.6805	
4.5349	1.7924	4.5349	1.0921	4.5349	1.0628	4.5349	0.9721	4.5349	0.9001	4.5349	0.7901	4.5349	0.676	
4.7508	1.7924	4.7508	1.0921	4.7508	1.0628	4.7508	0.9721	4.7508	0.9001	4.7508	0.7901	4.7508	0.6736	
4.977	1.7924	4.977	1.0921	4.977	0.9506	4.977	0.8979	4.977	0.8494	4.977	0.7652	4.977	0.6688	
5.214	1.7924	5.214	1.0921	5.214	0.9383	5.214	0.8718	5.214	0.8233	5.214	0.7464	5.214	0.654	
5.4623	2.0429	5.4623	1.0921	5.4623	0.9383	5.4623	0.8718	5.4623	0.8233	5.4623	0.7464	5.4623	0.654	
5.7224	2.0429	5.7224	1.0974	5.7224	0.9383	5.7224	0.8718	5.7224	0.8233	5.7224	0.7464	5.7224	0.654	
5.9948	2.0429	5.9948	1.0974	5.9948	0.9383	5.9948	0.8718	5.9948	0.8233	5.9948	0.7464	5.9948	0.654	
6.2803	2.0429	6.2803	1.0974	6.2803	0.9383	6.2803	0.8718	6.2803	0.8233	6.2803	0.7464	6.2803	0.654	
6.5793	2.0429	6.5793	1.0974	6.5793	0.9383	6.5793	0.8718	6.5793	0.8218	6.5793	0.7401	6.5793	0.6457	
6.8926	2.0429	6.8926	1.0974	6.8926	0.9383	6.8926	0.852	6.8926	0.7921	6.8926	0.7107	6.8926	0.6236	
7.2208	1.6443	7.2208	1.0312	7.2208	0.8872	7.2208	0.8236	7.2208	0.7712	7.2208	0.6856	7.2208	0.6178	
7.5646	1.3629	7.5646	0.9367	7.5646	0.8389	7.5646	0.785	7.5646	0.7436	7.5646	0.6831	7.5646	0.6178	
7.9248	1.3378	7.9248	0.8974	7.9248	0.827	7.9248	0.7757	7.9248	0.7347	7.9248	0.6707	7.9248	0.604	
8.3022	1.3378	8.3022	0.8407	8.3022	0.7713	8.3022	0.7153	8.3022	0.6828	8.3022	0.6374	8.3022	0.5873	
8.6975	0.9422	8.6975	0.6767	8.6975	0.6523	8.6975	0.6296	8.6975	0.6076	8.6975	0.5724	8.6975	0.5488	
9.1116	0.9081	9.1116	0.6623	9.1116	0.6141	9.1116	0.5759	9.1116	0.551	9.1116	0.5261	9.1116	0.5145	
9.5455	0.9081	9.5455	0.6266	9.5455	0.5795	9.5455	0.5505	9.5455	0.5315	9.5455	0.5085	9.5455	0.4961	
10	0.8734	10	0.6266	10	0.5795	10	0.5505	10	0.5315	10	0.5083	10	0.4875	
10.4762	0.7653	10.4762	0.5513	10.4762	0.528	10.4762	0.5125	10.4762	0.5017	10.4762	0.4862	10.4762	0.4714	
10.975	0.7298	10.975	0.5252	10.975	0.5066	10.975	0.4911	10.975	0.479	10.975	0.4624	10.975	0.4529	
11.4976	0.7298	11.4976	0.5252	11.4976	0.5066	11.4976	0.4911	11.4976	0.479	11.4976	0.4624	11.4976	0.4475	
12.045	0.7298	12.045	0.5252	12.045	0.5066	12.045	0.4911	12.045	0.479	12.045	0.4624	12.045	0.4475	
12.6186	0.7298	12.6186	0.516	12.6186	0.4966	12.6186	0.483	12.6186	0.4727	12.6186	0.4569	12.6186	0.4415	
13.2194	0.7298	13.2194	0.516	13.2194	0.4659	13.2194	0.4393	13.2194	0.438	13.2194	0.4349	13.2194	0.4272	

PTWW040.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 40 ~ SLAB-WALL JOINT East-West Responses ~ Elevation 54 Ft. ~ Line 30 B

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.7298	13.8489	0.516	13.8489	0.4659	13.8489	0.4388	13.8489	0.4278	13.8489	0.4202	13.8489	0.4132
14.5083	0.7298	14.5083	0.516	14.5083	0.4659	14.5083	0.4388	14.5083	0.4278	14.5083	0.4164	14.5083	0.4056
15.1991	0.7298	15.1991	0.516	15.1991	0.4659	15.1991	0.4388	15.1991	0.4209	15.1991	0.4033	15.1991	0.3946
15.9228	0.7298	15.9228	0.516	15.9228	0.4659	15.9228	0.4388	15.9228	0.4209	15.9228	0.4007	15.9228	0.3861
16.681	0.7298	16.681	0.516	16.681	0.4659	16.681	0.4388	16.681	0.4209	16.681	0.4007	16.681	0.3861
17.4753	0.7298	17.4753	0.516	17.4753	0.4659	17.4753	0.4388	17.4753	0.4209	17.4753	0.4007	17.4753	0.3861
18.3074	0.7298	18.3074	0.516	18.3074	0.4659	18.3074	0.4388	18.3074	0.4209	18.3074	0.4007	18.3074	0.3861
19.1791	0.8702	19.1791	0.516	19.1791	0.4659	19.1791	0.4388	19.1791	0.4209	19.1791	0.4007	19.1791	0.3861
20.0923	0.8702	20.0923	0.516	20.0923	0.4659	20.0923	0.4388	20.0923	0.4209	20.0923	0.4007	20.0923	0.3861
21.049	0.8702	21.049	0.516	21.049	0.4659	21.049	0.4388	21.049	0.4209	21.049	0.4007	21.049	0.3861
22.0513	0.8702	22.0513	0.516	22.0513	0.4659	22.0513	0.4388	22.0513	0.4209	22.0513	0.4007	22.0513	0.3835
23.1013	0.8702	23.1013	0.516	23.1013	0.4659	23.1013	0.4388	23.1013	0.4209	23.1013	0.4007	23.1013	0.3835
24.2013	0.7893	24.2013	0.5103	24.2013	0.4659	24.2013	0.4388	24.2013	0.4209	24.2013	0.3995	24.2013	0.3835
25.3536	0.7893	25.3536	0.4648	25.3536	0.4175	25.3536	0.405	25.3536	0.4012	25.3536	0.3926	25.3536	0.3817
26.5609	0.7893	26.5609	0.4648	26.5609	0.4175	26.5609	0.3899	26.5609	0.38	26.5609	0.3779	26.5609	0.3729
27.8256	0.4998	27.8256	0.4141	27.8256	0.3879	27.8256	0.3762	27.8256	0.3726	27.8256	0.3682	27.8256	0.3643
29.1505	0.4217	29.1505	0.3866	29.1505	0.3763	29.1505	0.3678	29.1505	0.3612	29.1505	0.3558	29.1505	0.3554
30.5386	0.4217	30.5386	0.3633	30.5386	0.3554	30.5386	0.3517	30.5386	0.3499	30.5386	0.3485	30.5386	0.348
31.9927	0.3545	31.9927	0.3404	31.9927	0.3386	31.9927	0.3376	31.9927	0.3374	31.9927	0.3399	31.9927	0.3417
33.516	0.3442	33.516	0.3404	33.516	0.3386	33.516	0.3376	33.516	0.3371	33.516	0.3365	33.516	0.3379
35.1119	0.3392	35.1119	0.3385	35.1119	0.338	35.1119	0.3376	35.1119	0.3371	35.1119	0.3365	35.1119	0.3359
36.7838	0.3368	36.7838	0.3366	36.7838	0.3364	36.7838	0.3362	36.7838	0.336	36.7838	0.3356	36.7838	0.3352
38.5353	0.3351	38.5353	0.335	38.5353	0.3349	38.5353	0.3348	38.5353	0.3347	38.5353	0.3345	38.5353	0.3343
40.3702	0.3338	40.3702	0.3337	40.3702	0.3336	40.3702	0.3336	40.3702	0.3336	40.3702	0.3334	40.3702	0.3333
42.2924	0.3326	42.2924	0.3326	42.2924	0.3325	42.2924	0.3325	42.2924	0.3325	42.2924	0.3324	42.2924	0.3323
44.3062	0.3316	44.3062	0.3316	44.3062	0.3316	44.3062	0.3316	44.3062	0.3315	44.3062	0.3315	44.3062	0.3315
46.4159	0.3307	46.4159	0.3307	46.4159	0.3307	46.4159	0.3307	46.4159	0.3307	46.4159	0.3307	46.4159	0.3307
48.626	0.3299	48.626	0.3299	48.626	0.3299	48.626	0.3299	48.626	0.3299	48.626	0.3299	48.626	0.3299
50.9414	0.3291	50.9414	0.3291	50.9414	0.3291	50.9414	0.3291	50.9414	0.3291	50.9414	0.3291	50.9414	0.3292

PTWW041.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 41 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 30 B

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	
0.1098	0.0404	0.1098	0.0365	0.1098	0.0342	0.1098	0.0321	0.1098	0.0303	0.1098	0.0271	0.1098	0.0235	
0.115	0.0404	0.115	0.0365	0.115	0.0342	0.115	0.0321	0.115	0.0303	0.115	0.0271	0.115	0.0256	
0.1204	0.0404	0.1204	0.0365	0.1204	0.0342	0.1204	0.0321	0.1204	0.0309	0.1204	0.0295	0.1204	0.0277	
0.1262	0.0404	0.1262	0.0365	0.1262	0.0351	0.1262	0.0342	0.1262	0.0332	0.1262	0.0315	0.1262	0.0295	
0.1322	0.0404	0.1322	0.0381	0.1322	0.0369	0.1322	0.0357	0.1322	0.0347	0.1322	0.0331	0.1322	0.0315	
0.1385	0.0409	0.1385	0.039	0.1385	0.0379	0.1385	0.037	0.1385	0.0361	0.1385	0.0346	0.1385	0.0327	
0.1451	0.0416	0.1451	0.0397	0.1451	0.0386	0.1451	0.0376	0.1451	0.0367	0.1451	0.0352	0.1451	0.0332	
0.152	0.0439	0.152	0.0401	0.152	0.0386	0.152	0.0376	0.152	0.0367	0.152	0.0352	0.152	0.0332	
0.1592	0.0462	0.1592	0.0416	0.1592	0.0395	0.1592	0.0376	0.1592	0.0367	0.1592	0.0352	0.1592	0.0332	
0.1668	0.0584	0.1668	0.0505	0.1668	0.0462	0.1668	0.0426	0.1668	0.0394	0.1668	0.0352	0.1668	0.0332	
0.1748	0.0644	0.1748	0.0566	0.1748	0.0521	0.1748	0.0483	0.1748	0.045	0.1748	0.0394	0.1748	0.0332	
0.1831	0.0667	0.1831	0.0582	0.1831	0.0541	0.1831	0.0504	0.1831	0.047	0.1831	0.0414	0.1831	0.0353	
0.1918	0.0678	0.1918	0.0585	0.1918	0.0542	0.1918	0.0506	0.1918	0.0473	0.1918	0.0417	0.1918	0.0379	
0.2009	0.0697	0.2009	0.0595	0.2009	0.0542	0.2009	0.0511	0.2009	0.0484	0.2009	0.0434	0.2009	0.041	
0.2105	0.0721	0.2105	0.0618	0.2105	0.0579	0.2105	0.0545	0.2105	0.0514	0.2105	0.0481	0.2105	0.0444	
0.2205	0.0818	0.2205	0.0709	0.2205	0.0651	0.2205	0.0599	0.2205	0.0573	0.2205	0.053	0.2205	0.0474	
0.231	0.0958	0.231	0.0791	0.231	0.0703	0.231	0.0666	0.231	0.0631	0.231	0.0572	0.231	0.0519	
0.242	0.098	0.242	0.0843	0.242	0.0773	0.242	0.0714	0.242	0.0675	0.242	0.0613	0.242	0.0546	
0.2535	0.1056	0.2535	0.091	0.2535	0.083	0.2535	0.0759	0.2535	0.0699	0.2535	0.0613	0.2535	0.0546	
0.2656	0.1138	0.2656	0.0945	0.2656	0.0842	0.2656	0.0759	0.2656	0.0699	0.2656	0.0613	0.2656	0.0546	
0.2783	0.1138	0.2783	0.0945	0.2783	0.0842	0.2783	0.0778	0.2783	0.0737	0.2783	0.067	0.2783	0.06	
0.2915	0.1138	0.2915	0.1001	0.2915	0.0939	0.2915	0.0884	0.2915	0.0835	0.2915	0.0753	0.2915	0.0664	
0.3054	0.1172	0.3054	0.1049	0.3054	0.0979	0.3054	0.0918	0.3054	0.0864	0.3054	0.0776	0.3054	0.0687	
0.3199	0.1172	0.3199	0.1049	0.3199	0.0979	0.3199	0.0918	0.3199	0.0881	0.3199	0.0829	0.3199	0.0766	
0.3352	0.1172	0.3352	0.1085	0.3352	0.1042	0.3352	0.1003	0.3352	0.0967	0.3352	0.0904	0.3352	0.083	
0.3511	0.1645	0.3511	0.128	0.3511	0.1118	0.3511	0.1061	0.3511	0.102	0.3511	0.095	0.3511	0.0868	
0.3678	0.2408	0.3678	0.1827	0.3678	0.1561	0.3678	0.1359	0.3678	0.1205	0.3678	0.0995	0.3678	0.0869	
0.3853	0.2539	0.3853	0.1862	0.3853	0.1588	0.3853	0.138	0.3853	0.1255	0.3853	0.1079	0.3853	0.0897	
0.4037	0.2539	0.4037	0.1862	0.4037	0.1588	0.4037	0.138	0.4037	0.1261	0.4037	0.1142	0.4037	0.102	
0.4229	0.2539	0.4229	0.1862	0.4229	0.1641	0.4229	0.1478	0.4229	0.1338	0.4229	0.122	0.4229	0.1107	
0.4431	0.3276	0.4431	0.2318	0.4431	0.2019	0.4431	0.1796	0.4431	0.1626	0.4431	0.1389	0.4431	0.1174	
0.4642	0.3276	0.4642	0.2318	0.4642	0.2019	0.4642	0.1796	0.4642	0.1626	0.4642	0.1389	0.4642	0.1174	
0.4863	0.3276	0.4863	0.2318	0.4863	0.2019	0.4863	0.1796	0.4863	0.1626	0.4863	0.1415	0.4863	0.1242	
0.5094	0.3276	0.5094	0.2318	0.5094	0.2019	0.5094	0.1796	0.5094	0.1626	0.5094	0.1475	0.5094	0.1293	
0.5337	0.3338	0.5337	0.2366	0.5337	0.2061	0.5337	0.1882	0.5337	0.1776	0.5337	0.1596	0.5337	0.1387	
0.5591	0.3945	0.5591	0.2731	0.5591	0.2401	0.5591	0.2143	0.5591	0.1954	0.5591	0.171	0.5591	0.1533	
0.5857	0.3945	0.5857	0.2819	0.5857	0.2531	0.5857	0.229	0.5857	0.2088	0.5857	0.1825	0.5857	0.1694	

PTWW041.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 41 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 30 B

Damping	0.50%	2%	3%	4%	5%	7%	10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.6136	0.3945	0.6136	0.2819	0.6136	0.2531	0.6136	0.229
0.6428	0.3945	0.6428	0.2819	0.6428	0.2531	0.6428	0.229
0.6734	0.4051	0.6734	0.2819	0.6734	0.2545	0.6734	0.2401
0.7055	0.4051	0.7055	0.2964	0.7055	0.271	0.7055	0.2595
0.7391	0.6253	0.7391	0.4092	0.7391	0.3339	0.7391	0.2852
0.7743	0.6253	0.7743	0.4092	0.7743	0.3339	0.7743	0.2977
0.8111	0.6459	0.8111	0.4284	0.8111	0.373	0.8111	0.3304
0.8497	0.6459	0.8497	0.4295	0.8497	0.3929	0.8497	0.3623
0.8902	0.6685	0.8902	0.436	0.8902	0.3929	0.8902	0.3623
0.9326	0.715	0.9326	0.5019	0.9326	0.4411	0.9326	0.3968
0.977	0.9571	0.977	0.6109	0.977	0.5027	0.977	0.4349
1.0235	0.9571	1.0235	0.6109	1.0235	0.5406	1.0235	0.4899
1.0723	0.9571	1.0723	0.629	1.0723	0.5623	1.0723	0.5069
1.1233	1.2112	1.1233	0.8095	1.1233	0.677	1.1233	0.5824
1.1768	1.2112	1.1768	0.8095	1.1768	0.677	1.1768	0.5824
1.2328	1.2112	1.2328	0.8776	1.2328	0.7698	1.2328	0.6846
1.2916	1.2112	1.2916	0.9725	1.2916	0.8448	1.2916	0.7451
1.353	1.2406	1.353	0.9725	1.353	0.8448	1.353	0.7451
1.4175	1.4927	1.4175	1.0398	1.4175	0.8977	1.4175	0.7987
1.485	1.4927	1.485	1.0398	1.485	0.8977	1.485	0.8136
1.5557	1.7257	1.5557	1.093	1.5557	0.9164	1.5557	0.8185
1.6298	1.7649	1.6298	1.1715	1.6298	1.0429	1.6298	0.9398
1.7074	1.7649	1.7074	1.1911	1.7074	1.1181	1.7074	1.0082
1.7887	2.1543	1.7887	1.1911	1.7887	1.1181	1.7887	1.0082
1.8738	2.1543	1.8738	1.1911	1.8738	1.1181	1.8738	1.0082
1.963	2.1543	1.963	1.1911	1.963	1.1181	1.963	1.0086
2.0565	2.1543	2.0565	1.1911	2.0565	1.1181	2.0565	1.0239
2.1544	2.1543	2.1544	1.1911	2.1544	1.1641	2.1544	1.0719
2.257	1.9859	2.257	1.2401	2.257	1.1641	2.257	1.0719
2.3645	1.9859	2.3645	1.2401	2.3645	1.1641	2.3645	1.0719
2.4771	1.9859	2.4771	1.3882	2.4771	1.1641	2.4771	1.0719
2.595	1.838	2.595	1.3882	2.595	1.1641	2.595	1.0719
2.7186	1.838	2.7186	1.3882	2.7186	1.1614	2.7186	1.0549
2.848	1.838	2.848	1.3882	2.848	1.1614	2.848	1.0498
2.9836	1.838	2.9836	1.3882	2.9836	1.1614	2.9836	1.0498
3.1257	1.838	3.1257	1.1633	3.1257	0.9244	3.1257	0.8554
3.2745	1.7993	3.2745	1.0437	3.2745	0.8857	3.2745	0.7926
3.4305	1.2506	3.4305	0.8608	3.4305	0.774	3.4305	0.7077

PTWW041.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 41 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 30 B

Damping Freq.	0.50% Accel.	2% Freq.	2% Accel.	3% Freq.	3% Accel.	4% Freq.	4% Accel.	5% Freq.	5% Accel.	7% Freq.	7% Accel.	10% Freq.	10% Accel.
3.5938	1.2506	3.5938	0.826	3.5938	0.7467	3.5938	0.6903	3.5938	0.6397	3.5938	0.5691	3.5938	0.503
3.7649	1.2506	3.7649	0.8108	3.7649	0.7467	3.7649	0.6903	3.7649	0.6397	3.7649	0.5581	3.7649	0.4924
3.9442	1.2506	3.9442	0.7736	3.9442	0.7467	3.9442	0.6903	3.9442	0.6397	3.9442	0.5581	3.9442	0.4924
4.132	1.2506	4.132	0.7736	4.132	0.7467	4.132	0.6903	4.132	0.6397	4.132	0.5581	4.132	0.4924
4.3288	1.2506	4.3288	0.7736	4.3288	0.7467	4.3288	0.6903	4.3288	0.6397	4.3288	0.5581	4.3288	0.4759
4.5349	1.2506	4.5349	0.7736	4.5349	0.7467	4.5349	0.6903	4.5349	0.6397	4.5349	0.5581	4.5349	0.4759
4.7508	1.2506	4.7508	0.7736	4.7508	0.7467	4.7508	0.6903	4.7508	0.6397	4.7508	0.5581	4.7508	0.4759
4.977	1.2506	4.977	0.7736	4.977	0.7467	4.977	0.6903	4.977	0.6397	4.977	0.5581	4.977	0.4759
5.214	1.2506	5.214	0.7736	5.214	0.7467	5.214	0.6903	5.214	0.6397	5.214	0.5581	5.214	0.4759
5.4623	1.2506	5.4623	0.7736	5.4623	0.7467	5.4623	0.6903	5.4623	0.6397	5.4623	0.5581	5.4623	0.4759
5.7224	1.3691	5.7224	0.7736	5.7224	0.7467	5.7224	0.6903	5.7224	0.6397	5.7224	0.5581	5.7224	0.4759
5.9948	1.3691	5.9948	0.7736	5.9948	0.7467	5.9948	0.6903	5.9948	0.6397	5.9948	0.5581	5.9948	0.4759
6.2803	1.3691	6.2803	0.7736	6.2803	0.7467	6.2803	0.6903	6.2803	0.6397	6.2803	0.5581	6.2803	0.4759
6.5793	1.3691	6.5793	0.7736	6.5793	0.6755	6.5793	0.6357	6.5793	0.6231	6.5793	0.5476	6.5793	0.4759
6.8926	1.3691	6.8926	0.7736	6.8926	0.6755	6.8926	0.6357	6.8926	0.6231	6.8926	0.5452	6.8926	0.4683
7.2208	1.3691	7.2208	0.7253	7.2208	0.6201	7.2208	0.5644	7.2208	0.5427	7.2208	0.503	7.2208	0.4505
7.5646	1.3691	7.5646	0.7065	7.5646	0.6004	7.5646	0.5644	7.5646	0.5365	7.5646	0.4909	7.5646	0.436
7.9248	1.3691	7.9248	0.6416	7.9248	0.5598	7.9248	0.5335	7.9248	0.509	7.9248	0.4659	7.9248	0.4264
8.3022	1.3691	8.3022	0.6416	8.3022	0.556	8.3022	0.5083	8.3022	0.486	8.3022	0.454	8.3022	0.4264
8.6975	1.0067	8.6975	0.5785	8.6975	0.5365	8.6975	0.5083	8.6975	0.486	8.6975	0.454	8.6975	0.4229
9.1116	1.0067	9.1116	0.5785	9.1116	0.5203	9.1116	0.4913	9.1116	0.4686	9.1116	0.4364	9.1116	0.4147
9.5455	1.0067	9.5455	0.5785	9.5455	0.5203	9.5455	0.4913	9.5455	0.4686	9.5455	0.4364	9.5455	0.4101
10	0.7958	10	0.5553	10	0.5203	10	0.4913	10	0.4686	10	0.4364	10	0.4073
10.4762	0.7386	10.4762	0.4651	10.4762	0.4518	10.4762	0.4415	10.4762	0.4329	10.4762	0.4181	10.4762	0.3995
10.975	0.5938	10.975	0.4522	10.975	0.4338	10.975	0.4223	10.975	0.4154	10.975	0.4045	10.975	0.3897
11.4976	0.5139	11.4976	0.4522	11.4976	0.4338	11.4976	0.422	11.4976	0.4137	11.4976	0.4011	11.4976	0.3866
12.045	0.5	12.045	0.4195	12.045	0.4106	12.045	0.4049	12.045	0.4002	12.045	0.3914	12.045	0.3794
12.6186	0.5	12.6186	0.4087	12.6186	0.4008	12.6186	0.3948	12.6186	0.3897	12.6186	0.3812	12.6186	0.3706
13.2194	0.5	13.2194	0.3855	13.2194	0.3801	13.2194	0.3771	13.2194	0.3744	13.2194	0.3688	13.2194	0.3604
13.8489	0.5	13.8489	0.3777	13.8489	0.3691	13.8489	0.3663	13.8489	0.3634	13.8489	0.3575	13.8489	0.3497
14.5083	0.5	14.5083	0.3777	14.5083	0.3639	14.5083	0.3557	14.5083	0.3504	14.5083	0.3441	14.5083	0.3379
15.1991	0.5	15.1991	0.3523	15.1991	0.3413	15.1991	0.3407	15.1991	0.3396	15.1991	0.3366	15.1991	0.3315
15.9228	0.5	15.9228	0.3523	15.9228	0.3412	15.9228	0.3382	15.9228	0.3365	15.9228	0.3326	15.9228	0.3271
16.681	0.5	16.681	0.3523	16.681	0.3412	16.681	0.3355	16.681	0.3317	16.681	0.3266	16.681	0.3214
17.4753	0.5	17.4753	0.3351	17.4753	0.325	17.4753	0.321	17.4753	0.319	17.4753	0.3167	17.4753	0.3142
18.3074	0.5	18.3074	0.3274	18.3074	0.315	18.3074	0.3103	18.3074	0.3078	18.3074	0.3085	18.3074	0.3079
19.1791	0.5	19.1791	0.3274	19.1791	0.315	19.1791	0.3103	19.1791	0.3078	19.1791	0.3055	19.1791	0.3039
20.0923	0.5	20.0923	0.3274	20.0923	0.308	20.0923	0.3058	20.0923	0.3038	20.0923	0.302	20.0923	0.3007

PTWW041.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 41 ~ SLAB-WALL JOINT North-South Responses ~ Elevation 54 Ft. ~ Line 30 B

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
21.049	0.5	21.049	0.3274	21.049	0.308	21.049	0.3058	21.049	0.3038	21.049	0.3009	21.049	0.2981
22.0513	0.5	22.0513	0.3274	22.0513	0.304	22.0513	0.3018	22.0513	0.3	22.0513	0.2973	22.0513	0.2949
23.1013	0.3991	23.1013	0.3036	23.1013	0.2994	23.1013	0.297	23.1013	0.2955	23.1013	0.2936	23.1013	0.2918
24.2013	0.3991	24.2013	0.3007	24.2013	0.294	24.2013	0.2912	24.2013	0.2902	24.2013	0.2896	24.2013	0.2887
25.3536	0.3991	25.3536	0.3007	25.3536	0.294	25.3536	0.2912	25.3536	0.2902	25.3536	0.2886	25.3536	0.2871
26.5609	0.3991	26.5609	0.3007	26.5609	0.294	26.5609	0.2907	26.5609	0.2888	26.5609	0.2868	26.5609	0.2852
27.8256	0.3991	27.8256	0.2989	27.8256	0.2931	27.8256	0.2896	27.8256	0.2872	27.8256	0.2843	27.8256	0.2831
29.1505	0.3991	29.1505	0.2989	29.1505	0.2931	29.1505	0.2896	29.1505	0.2872	29.1505	0.2843	29.1505	0.282
30.5386	0.3399	30.5386	0.2901	30.5386	0.2875	30.5386	0.2855	30.5386	0.284	30.5386	0.2817	30.5386	0.2796
31.9927	0.2956	31.9927	0.2753	31.9927	0.2743	31.9927	0.2755	31.9927	0.2761	31.9927	0.2765	31.9927	0.2762
33.516	0.2753	33.516	0.2729	33.516	0.2727	33.516	0.2728	33.516	0.2729	33.516	0.2732	33.516	0.2734
35.1119	0.2708	35.1119	0.2709	35.1119	0.271	35.1119	0.2711	35.1119	0.2711	35.1119	0.2712	35.1119	0.2714
36.7838	0.2688	36.7838	0.2691	36.7838	0.2692	36.7838	0.2693	36.7838	0.2694	36.7838	0.2696	36.7838	0.2697
38.5353	0.2675	38.5353	0.2677	38.5353	0.2679	38.5353	0.268	38.5353	0.268	38.5353	0.2682	38.5353	0.2684
40.3702	0.2666	40.3702	0.2668	40.3702	0.2669	40.3702	0.2669	40.3702	0.267	40.3702	0.2672	40.3702	0.2673
42.2924	0.2659	42.2924	0.266	42.2924	0.2661	42.2924	0.2661	42.2924	0.2662	42.2924	0.2663	42.2924	0.2664
44.3062	0.2653	44.3062	0.2654	44.3062	0.2654	44.3062	0.2654	44.3062	0.2655	44.3062	0.2655	44.3062	0.2657
46.4159	0.2648	46.4159	0.2648	46.4159	0.2648	46.4159	0.2648	46.4159	0.2648	46.4159	0.2649	46.4159	0.265
48.626	0.2643	48.626	0.2643	48.626	0.2643	48.626	0.2643	48.626	0.2643	48.626	0.2643	48.626	0.2644
50.9414	0.2638	50.9414	0.2638	50.9414	0.2638	50.9414	0.2638	50.9414	0.2638	50.9414	0.2638	50.9414	0.2638

PTWW115.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 115 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_C-E-17-20

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0291	0.1098	0.026	0.1098	0.0244	0.1098	0.023	0.1098	0.0221	0.1098	0.0214	0.1098	0.0205
0.115	0.0309	0.115	0.026	0.115	0.0244	0.115	0.0234	0.115	0.023	0.115	0.0222	0.115	0.0212
0.1204	0.0313	0.1204	0.0263	0.1204	0.0246	0.1204	0.0241	0.1204	0.0236	0.1204	0.0228	0.1204	0.0218
0.1262	0.0313	0.1262	0.0269	0.1262	0.0257	0.1262	0.0245	0.1262	0.024	0.1262	0.0233	0.1262	0.0224
0.1322	0.0313	0.1322	0.0271	0.1322	0.0258	0.1322	0.0248	0.1322	0.0244	0.1322	0.0236	0.1322	0.0226
0.1385	0.0313	0.1385	0.0277	0.1385	0.0265	0.1385	0.0255	0.1385	0.0246	0.1385	0.0236	0.1385	0.0226
0.1451	0.0316	0.1451	0.0295	0.1451	0.0283	0.1451	0.0271	0.1451	0.0261	0.1451	0.0241	0.1451	0.0226
0.152	0.032	0.152	0.0299	0.152	0.0286	0.152	0.0274	0.152	0.0262	0.152	0.0241	0.152	0.0226
0.1592	0.033	0.1592	0.0311	0.1592	0.0299	0.1592	0.0288	0.1592	0.0278	0.1592	0.0261	0.1592	0.0243
0.1668	0.0367	0.1668	0.0323	0.1668	0.0312	0.1668	0.0302	0.1668	0.0293	0.1668	0.0277	0.1668	0.0257
0.1748	0.0507	0.1748	0.0427	0.1748	0.0385	0.1748	0.035	0.1748	0.0321	0.1748	0.0285	0.1748	0.0265
0.1831	0.0586	0.1831	0.0493	0.1831	0.0442	0.1831	0.0399	0.1831	0.0362	0.1831	0.0305	0.1831	0.0266
0.1918	0.0586	0.1918	0.0493	0.1918	0.0442	0.1918	0.0399	0.1918	0.0362	0.1918	0.0305	0.1918	0.0269
0.2009	0.0586	0.2009	0.0493	0.2009	0.0442	0.2009	0.0399	0.2009	0.0362	0.2009	0.0326	0.2009	0.0299
0.2105	0.0586	0.2105	0.0493	0.2105	0.0442	0.2105	0.0401	0.2105	0.0386	0.2105	0.0361	0.2105	0.0327
0.2205	0.0586	0.2205	0.0493	0.2205	0.0454	0.2205	0.0427	0.2205	0.0409	0.2205	0.038	0.2205	0.0341
0.231	0.0586	0.231	0.0493	0.231	0.0457	0.231	0.0438	0.231	0.042	0.231	0.0388	0.231	0.0354
0.242	0.0586	0.242	0.0509	0.242	0.0486	0.242	0.0465	0.242	0.0445	0.242	0.041	0.242	0.0368
0.2535	0.0649	0.2535	0.0574	0.2535	0.0531	0.2535	0.0491	0.2535	0.0457	0.2535	0.041	0.2535	0.0371
0.2656	0.0731	0.2656	0.0586	0.2656	0.0536	0.2656	0.0491	0.2656	0.0457	0.2656	0.0424	0.2656	0.0401
0.2783	0.0817	0.2783	0.0599	0.2783	0.0536	0.2783	0.05	0.2783	0.0484	0.2783	0.0458	0.2783	0.0425
0.2915	0.0817	0.2915	0.0618	0.2915	0.0581	0.2915	0.0547	0.2915	0.0516	0.2915	0.0479	0.2915	0.0436
0.3054	0.0817	0.3054	0.0663	0.3054	0.0622	0.3054	0.0585	0.3054	0.0551	0.3054	0.0492	0.3054	0.045
0.3199	0.0817	0.3199	0.0701	0.3199	0.0659	0.3199	0.0623	0.3199	0.0589	0.3199	0.0536	0.3199	0.0474
0.3352	0.0873	0.3352	0.0767	0.3352	0.0709	0.3352	0.0662	0.3352	0.0629	0.3352	0.0571	0.3352	0.0501
0.3511	0.0906	0.3511	0.0806	0.3511	0.0749	0.3511	0.0698	0.3511	0.0653	0.3511	0.0577	0.3511	0.0502
0.3678	0.1215	0.3678	0.095	0.3678	0.0823	0.3678	0.0722	0.3678	0.0653	0.3678	0.0577	0.3678	0.0502
0.3853	0.1361	0.3853	0.1057	0.3853	0.0919	0.3853	0.0808	0.3853	0.0718	0.3853	0.0587	0.3853	0.0505
0.4037	0.1361	0.4037	0.1057	0.4037	0.0919	0.4037	0.0821	0.4037	0.0762	0.4037	0.0664	0.4037	0.0568
0.4229	0.1361	0.4229	0.1057	0.4229	0.0919	0.4229	0.0852	0.4229	0.0801	0.4229	0.0711	0.4229	0.0615
0.4431	0.1361	0.4431	0.1057	0.4431	0.0935	0.4431	0.0889	0.4431	0.0843	0.4431	0.0761	0.4431	0.0657
0.4642	0.1373	0.4642	0.1057	0.4642	0.0976	0.4642	0.0916	0.4642	0.086	0.4642	0.0763	0.4642	0.0674
0.4863	0.1479	0.4863	0.1238	0.4863	0.1108	0.4863	0.0997	0.4863	0.0904	0.4863	0.0827	0.4863	0.0733
0.5094	0.1814	0.5094	0.1384	0.5094	0.1218	0.5094	0.1085	0.5094	0.0977	0.5094	0.0867	0.5094	0.0754

PTWW115.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 115 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_C-E-17-20

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.2216	0.5337	0.1605	0.5337	0.1343	0.5337	0.1149	0.5337	0.1023	0.5337	0.0867	0.5337	0.0754
0.5591	0.2216	0.5591	0.1605	0.5591	0.1343	0.5591	0.1149	0.5591	0.1023	0.5591	0.088	0.5591	0.0754
0.5857	0.2216	0.5857	0.1605	0.5857	0.1343	0.5857	0.1149	0.5857	0.1023	0.5857	0.0937	0.5857	0.0821
0.6136	0.2216	0.6136	0.1605	0.6136	0.1343	0.6136	0.1178	0.6136	0.1111	0.6136	0.1003	0.6136	0.0874
0.6428	0.2257	0.6428	0.1621	0.6428	0.1356	0.6428	0.1179	0.6428	0.1131	0.6428	0.103	0.6428	0.0901
0.6734	0.2257	0.6734	0.1621	0.6734	0.1389	0.6734	0.1291	0.6734	0.1211	0.6734	0.1084	0.6734	0.0936
0.7055	0.2257	0.7055	0.1621	0.7055	0.1389	0.7055	0.1291	0.7055	0.1211	0.7055	0.1095	0.7055	0.0952
0.7391	0.2257	0.7391	0.1621	0.7391	0.1413	0.7391	0.1328	0.7391	0.1244	0.7391	0.1097	0.7391	0.0952
0.7743	0.3175	0.7743	0.2132	0.7743	0.1805	0.7743	0.1581	0.7743	0.1421	0.7743	0.1211	0.7743	0.1032
0.8111	0.3175	0.8111	0.2132	0.8111	0.1805	0.8111	0.1581	0.8111	0.1421	0.8111	0.1211	0.8111	0.1065
0.8497	0.3175	0.8497	0.2132	0.8497	0.1805	0.8497	0.166	0.8497	0.1535	0.8497	0.134	0.8497	0.1129
0.8902	0.3175	0.8902	0.2132	0.8902	0.1869	0.8902	0.1713	0.8902	0.1583	0.8902	0.1378	0.8902	0.1175
0.9326	0.4866	0.9326	0.2993	0.9326	0.2464	0.9326	0.215	0.9326	0.1926	0.9326	0.1632	0.9326	0.1377
0.977	0.4866	0.977	0.2993	0.977	0.2464	0.977	0.215	0.977	0.1926	0.977	0.1712	0.977	0.1493
1.0235	0.4866	1.0235	0.2993	1.0235	0.2464	1.0235	0.215	1.0235	0.1926	1.0235	0.1775	1.0235	0.1586
1.0723	0.4866	1.0723	0.2993	1.0723	0.2574	1.0723	0.2363	1.0723	0.2193	1.0723	0.1933	1.0723	0.1665
1.1233	0.5744	1.1233	0.3387	1.1233	0.2663	1.1233	0.2363	1.1233	0.2193	1.1233	0.1933	1.1233	0.1665
1.1768	0.5744	1.1768	0.3781	1.1768	0.3127	1.1768	0.2762	1.1768	0.247	1.1768	0.2076	1.1768	0.1828
1.2328	0.5744	1.2328	0.3801	1.2328	0.3429	1.2328	0.3128	1.2328	0.2874	1.2328	0.2483	1.2328	0.2091
1.2916	0.5744	1.2916	0.4124	1.2916	0.3638	1.2916	0.3237	1.2916	0.295	1.2916	0.2539	1.2916	0.2139
1.353	0.6253	1.353	0.4124	1.353	0.3638	1.353	0.3237	1.353	0.3026	1.353	0.2724	1.353	0.2369
1.4175	0.6253	1.4175	0.4124	1.4175	0.3638	1.4175	0.3419	1.4175	0.3245	1.4175	0.2933	1.4175	0.2571
1.485	0.6253	1.485	0.4371	1.485	0.3975	1.485	0.3717	1.485	0.3478	1.485	0.3068	1.485	0.2662
1.5557	0.6253	1.5557	0.456	1.5557	0.426	1.5557	0.3995	1.5557	0.376	1.5557	0.3358	1.5557	0.2887
1.6298	0.7362	1.6298	0.4726	1.6298	0.4349	1.6298	0.4101	1.6298	0.3877	1.6298	0.3499	1.6298	0.3051
1.7074	0.7659	1.7074	0.5983	1.7074	0.5291	1.7074	0.4732	1.7074	0.428	1.7074	0.3634	1.7074	0.3086
1.7887	0.8581	1.7887	0.7092	1.7887	0.635	1.7887	0.5721	1.7887	0.5184	1.7887	0.4408	1.7887	0.3653
1.8738	0.9071	1.8738	0.7382	1.8738	0.6675	1.8738	0.6084	1.8738	0.5648	1.8738	0.4905	1.8738	0.4072
1.963	1.0464	1.963	0.7997	1.963	0.7215	1.963	0.6607	1.963	0.6081	1.963	0.5225	1.963	0.4276
2.0565	1.1387	2.0565	0.8196	2.0565	0.732	2.0565	0.661	2.0565	0.6081	2.0565	0.5225	2.0565	0.4276
2.1544	1.1387	2.1544	0.8196	2.1544	0.732	2.1544	0.661	2.1544	0.6081	2.1544	0.5225	2.1544	0.4276
2.257	1.1387	2.257	0.8196	2.257	0.732	2.257	0.6622	2.257	0.6085	2.257	0.5225	2.257	0.439
2.3645	1.8015	2.3645	0.9555	2.3645	0.7668	2.3645	0.6987	2.3645	0.6389	2.3645	0.5434	2.3645	0.4598
2.4771	2.0921	2.4771	1.1123	2.4771	0.8901	2.4771	0.7484	2.4771	0.6503	2.4771	0.5434	2.4771	0.4618
2.595	2.6286	2.595	1.3049	2.595	0.9786	2.595	0.8001	2.595	0.6919	2.595	0.5515	2.595	0.4636

PTWW115.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 115 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_C-E-17-20

Damping	0.50%		2%		3%		4%		5%		7%		10%	
Freq.	Accel.													
2.7186	2.6286	2.7186	1.3049	2.7186	0.9786	2.7186	0.8001	2.7186	0.6919	2.7186	0.5515	2.7186	0.4669	
2.848	2.6286	2.848	1.3049	2.848	0.9786	2.848	0.8001	2.848	0.6919	2.848	0.5515	2.848	0.4669	
2.9836	2.6286	2.9836	1.3049	2.9836	0.9786	2.9836	0.8001	2.9836	0.6919	2.9836	0.5515	2.9836	0.4669	
3.1257	2.6286	3.1257	1.3049	3.1257	0.9786	3.1257	0.8001	3.1257	0.6919	3.1257	0.5515	3.1257	0.4669	
3.2745	1.4875	3.2745	0.9429	3.2745	0.7973	3.2745	0.6916	3.2745	0.6178	3.2745	0.5384	3.2745	0.4669	
3.4305	1.1706	3.4305	0.7986	3.4305	0.7066	3.4305	0.6392	3.4305	0.589	3.4305	0.5099	3.4305	0.4525	
3.5938	1.1706	3.5938	0.7986	3.5938	0.7066	3.5938	0.6392	3.5938	0.589	3.5938	0.5097	3.5938	0.4525	
3.7649	1.1706	3.7649	0.7986	3.7649	0.7066	3.7649	0.6392	3.7649	0.589	3.7649	0.5097	3.7649	0.4525	
3.9442	1.1706	3.9442	0.7986	3.9442	0.7066	3.9442	0.6392	3.9442	0.589	3.9442	0.5097	3.9442	0.4525	
4.132	1.1706	4.132	0.7986	4.132	0.7066	4.132	0.6392	4.132	0.589	4.132	0.5097	4.132	0.4525	
4.3288	1.1706	4.3288	0.7986	4.3288	0.7066	4.3288	0.6392	4.3288	0.589	4.3288	0.5097	4.3288	0.4525	
4.5349	1.1706	4.5349	0.7986	4.5349	0.7066	4.5349	0.6392	4.5349	0.589	4.5349	0.5097	4.5349	0.4525	
4.7508	1.1706	4.7508	0.7986	4.7508	0.7066	4.7508	0.6392	4.7508	0.589	4.7508	0.5097	4.7508	0.4525	
4.977	1.1706	4.977	0.7986	4.977	0.7066	4.977	0.6392	4.977	0.589	4.977	0.5097	4.977	0.4525	
5.214	1.1706	5.214	0.7986	5.214	0.7066	5.214	0.6392	5.214	0.589	5.214	0.5097	5.214	0.4525	
5.4623	1.3551	5.4623	0.7986	5.4623	0.7066	5.4623	0.6392	5.4623	0.589	5.4623	0.5097	5.4623	0.4599	
5.7224	1.6638	5.7224	0.9095	5.7224	0.7723	5.7224	0.6766	5.7224	0.6048	5.7224	0.5097	5.7224	0.4637	
5.9948	1.6638	5.9948	0.9095	5.9948	0.7723	5.9948	0.6766	5.9948	0.6048	5.9948	0.5097	5.9948	0.4734	
6.2803	1.6638	6.2803	0.9095	6.2803	0.7723	6.2803	0.6766	6.2803	0.6048	6.2803	0.5097	6.2803	0.4734	
6.5793	1.6638	6.5793	0.9095	6.5793	0.7723	6.5793	0.6766	6.5793	0.6048	6.5793	0.5097	6.5793	0.4734	
6.8926	1.6638	6.8926	0.9095	6.8926	0.7723	6.8926	0.6766	6.8926	0.6048	6.8926	0.5097	6.8926	0.4734	
7.2208	1.6308	7.2208	0.9095	7.2208	0.7723	7.2208	0.6766	7.2208	0.6048	7.2208	0.5097	7.2208	0.4734	
7.5646	1.6308	7.5646	0.9095	7.5646	0.7723	7.5646	0.6766	7.5646	0.6048	7.5646	0.5097	7.5646	0.4734	
7.9248	1.6308	7.9248	0.9095	7.9248	0.7723	7.9248	0.6766	7.9248	0.6048	7.9248	0.5097	7.9248	0.4734	
8.3022	1.6308	8.3022	0.9095	8.3022	0.7723	8.3022	0.6766	8.3022	0.6048	8.3022	0.5116	8.3022	0.4743	
8.6975	1.6308	8.6975	0.9095	8.6975	0.7723	8.6975	0.6766	8.6975	0.6048	8.6975	0.5631	8.6975	0.528	
9.1116	1.6308	9.1116	0.9095	9.1116	0.7723	9.1116	0.6822	9.1116	0.665	9.1116	0.6322	9.1116	0.5799	
9.5455	1.6308	9.5455	0.9835	9.5455	0.9073	9.5455	0.848	9.5455	0.7987	9.5455	0.7177	9.5455	0.625	
10	1.6308	10	1.0819	10	0.9829	10	0.9016	10	0.8346	10	0.7301	10	0.625	
10.4762	1.6308	10.4762	1.0819	10.4762	0.9829	10.4762	0.9016	10.4762	0.8346	10.4762	0.7301	10.4762	0.625	
10.975	1.6308	10.975	1.0819	10.975	0.9829	10.975	0.9016	10.975	0.8346	10.975	0.7301	10.975	0.6298	
11.4976	1.6308	11.4976	1.0819	11.4976	0.9829	11.4976	0.9016	11.4976	0.8378	11.4976	0.7712	11.4976	0.6955	
12.045	1.6308	12.045	1.0819	12.045	0.9829	12.045	0.9016	12.045	0.8378	12.045	0.7828	12.045	0.7206	
12.6186	1.7655	12.6186	1.0819	12.6186	0.9829	12.6186	0.9016	12.6186	0.8378	12.6186	0.7828	12.6186	0.7274	
13.2194	1.7655	13.2194	1.0819	13.2194	0.9829	13.2194	0.9016	13.2194	0.8748	13.2194	0.823	13.2194	0.7439	

PTWW115.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g)  
 ~ Figure 115 ~ SLAB ONLY Vertical Responses ~ Elevation 56 ft. ~ EL56\_C-E-17-20

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	2.1962	13.8489	1.3794	13.8489	1.2634	13.8489	1.1839	13.8489	1.1151	13.8489	0.9858	13.8489	0.8419
14.5083	3.099	14.5083	1.7518	14.5083	1.6507	14.5083	1.5281	14.5083	1.3976	14.5083	1.2195	14.5083	1.0605
15.1991	5.721	15.1991	3.1594	15.1991	2.5932	15.1991	2.2035	15.1991	1.9756	15.1991	1.5418	15.1991	1.3364
15.9228	7.6802	15.9228	3.9908	15.9228	2.9281	15.9228	2.3497	15.9228	1.998	15.9228	1.5418	15.9228	1.3585
16.681	7.6802	16.681	3.9908	16.681	2.9281	16.681	2.3497	16.681	1.998	16.681	1.5418	16.681	1.3585
17.4753	7.6802	17.4753	3.9908	17.4753	2.9281	17.4753	2.3497	17.4753	1.998	17.4753	1.5418	17.4753	1.3585
18.3074	7.6802	18.3074	3.9908	18.3074	2.9281	18.3074	2.3497	18.3074	1.998	18.3074	1.5418	18.3074	1.3585
19.1791	7.6802	19.1791	3.9908	19.1791	2.9281	19.1791	2.3497	19.1791	1.998	19.1791	1.5418	19.1791	1.3585
20.0923	5.0233	20.0923	2.5698	20.0923	2.2318	20.0923	2.0531	20.0923	1.8683	20.0923	1.5418	20.0923	1.2323
21.049	5.0233	21.049	2.5698	21.049	1.9224	21.049	1.5699	21.049	1.4464	21.049	1.3294	21.049	1.1577
22.0513	5.0233	22.0513	2.5698	22.0513	1.9224	22.0513	1.5699	22.0513	1.3278	22.0513	1.1117	22.0513	1.0269
23.1013	2.3419	23.1013	1.5377	23.1013	1.433	23.1013	1.3325	23.1013	1.2262	23.1013	1.0197	23.1013	0.9065
24.2013	1.5293	24.2013	1.0859	24.2013	1.0006	24.2013	0.9426	24.2013	0.9155	24.2013	0.8472	24.2013	0.7881
25.3536	1.2574	25.3536	0.8767	25.3536	0.8421	25.3536	0.8119	25.3536	0.7853	25.3536	0.7362	25.3536	0.6758
26.5609	1.2574	26.5609	0.8155	26.5609	0.7384	26.5609	0.6923	26.5609	0.6671	26.5609	0.6573	26.5609	0.6403
27.8256	1.2574	27.8256	0.8155	27.8256	0.7384	27.8256	0.6884	27.8256	0.6534	27.8256	0.6229	27.8256	0.6093
29.1505	0.6647	29.1505	0.618	29.1505	0.6094	29.1505	0.5972	29.1505	0.5935	29.1505	0.5904	29.1505	0.5816
30.5386	0.6591	30.5386	0.6039	30.5386	0.5896	30.5386	0.581	30.5386	0.5752	30.5386	0.5671	30.5386	0.5581
31.9927	0.5376	31.9927	0.5492	31.9927	0.5493	31.9927	0.5479	31.9927	0.546	31.9927	0.5418	31.9927	0.5355
33.516	0.5125	33.516	0.5181	33.516	0.5192	33.516	0.5192	33.516	0.5188	33.516	0.5173	33.516	0.5142
35.1119	0.4954	35.1119	0.4964	35.1119	0.4969	35.1119	0.4972	35.1119	0.4973	35.1119	0.4971	35.1119	0.4958
36.7838	0.4806	36.7838	0.481	36.7838	0.4812	36.7838	0.4813	36.7838	0.4814	36.7838	0.4813	36.7838	0.4807
38.5353	0.468	38.5353	0.4683	38.5353	0.4684	38.5353	0.4684	38.5353	0.4685	38.5353	0.4684	38.5353	0.4681
40.3702	0.4573	40.3702	0.4574	40.3702	0.4575	40.3702	0.4575	40.3702	0.4576	40.3702	0.4575	40.3702	0.4574
42.2924	0.4479	42.2924	0.448	42.2924	0.448	42.2924	0.4481	42.2924	0.4481	42.2924	0.4481	42.2924	0.4481
44.3062	0.4396	44.3062	0.4396	44.3062	0.4397	44.3062	0.4397	44.3062	0.4397	44.3062	0.4398	44.3062	0.4398
46.4159	0.4321	46.4159	0.4321	46.4159	0.4322	46.4159	0.4322	46.4159	0.4322	46.4159	0.4323	46.4159	0.4325
48.626	0.4252	48.626	0.4252	48.626	0.4253	48.626	0.4253	48.626	0.4254	48.626	0.4255	48.626	0.4258
50.9414	0.4188	50.9414	0.4188	50.9414	0.4188	50.9414	0.4189	50.9414	0.4189	50.9414	0.4191	50.9414	0.4195



**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
**24590-PTF-MB-TLP-RBLR-00001**  
Data Sheet No.  
**24590-PTF-MED-TLP-00004**

R11042829

Project:	<b>RPP-WTP</b>	Description:	<b>Treated LAW Evaporator Reboiler</b>
Project No:	<b>24590</b>	P&ID:	<b>24590-PTF-M6-TLP-00003</b>
Site:	<b>Hanford</b>	Process Data:	<b>24590-PTF-MVC-TLP-00002</b> $\Delta$ 3
Process flow diagram:	<b>24590-PTF-M5-V17T-00005</b>	Manufacturer Name:	<b>Framatome ANP / Northwest Copper Works, Inc.</b>

**General Data**

Quality Level	<b>Q (8)</b>	TEMA (Class/Type)	<b>B</b>
Seismic Category	<b>SC-I</b>	Flow Type (Counter current, etc)	<b>2-Pass Tubeside</b>
Design Code	<b>ASME VIII Div 1</b>	Heat Exchanger Duty	Btu/hr <b>17,800,000</b>
Code Stamp	<b>Yes</b>	Heat Exchanger Area	ft <sup>2</sup> <b>2224</b>
NB Registration	<b>Yes</b>	$\Delta$ T (LMTD/Corrected LMTD)	°F <b>96.5</b>

ISSUED BY  
**RPP-WTP PDC**

**Thermal/Hydraulic Data**

	Shell Side		Tube Side	
	<b>IN</b>	<b>STEAM</b>	<b>OUT</b>	<b>IN Cooling Water</b>
Fluid Name				
Fluid Quantities: Total	lbm/hr <b>18,024</b>		lbm/hr <b>7,371,708</b>	
Condensable Vapor (In/Out)	<b>18,023</b>	<b>4.0</b>	<b>N/A</b>	<b>N/A</b>
Liquid	<b>N/A</b>	<b>18,019</b>	<b>7,371,708</b>	<b>7,371,708</b>
Noncondensable	<b>1.0</b>	<b>1.0</b>	<b>N/A</b>	<b>N/A</b>
Temperature (In/Out)	°F * $\Delta$ 3	°F * $\Delta$ 3	°F * $\Delta$ 3	°F * $\Delta$ 3
Density	lbm/ft <sup>3</sup> * $\Delta$ 3	lbm/ft <sup>3</sup> * $\Delta$ 3	lbm/ft <sup>3</sup> * $\Delta$ 3	lbm/ft <sup>3</sup> <b>1.34</b>
Viscosity	Cp * $\Delta$ 3	Cp * $\Delta$ 3	Cp * $\Delta$ 3	Cp <b>30</b>
Molecular Weight	* $\Delta$ 3	* $\Delta$ 3	* $\Delta$ 3	* $\Delta$ 3
Molecular Weight, Noncondensable	* $\Delta$ 3	* $\Delta$ 3	* $\Delta$ 3	* $\Delta$ 3
Specific Heat	Btu/lbm-°F * $\Delta$ 3	Btu/lbm-°F * $\Delta$ 3	Btu/lbm-°F * $\Delta$ 3	Btu/lbm-°F * $\Delta$ 3
Thermal Conductivity	Btu/hr-ft-°F <b>N/A</b>	Btu/hr-ft-°F <b>N/A</b>	Btu/hr-ft-°F <b>0.355</b>	Btu/hr-ft-°F <b>N/A</b>
Latent Heat	Btu/lbm @ °F <b>N/A</b>		Btu/lbm @ °F <b>N/A</b>	
Inlet pressure	psia <b>16.9 (Note 13)</b> $\Delta$ 3		psia <b>N/A</b>	
Tube side Velocity	ft/s <b>N/A</b>		ft/s <b>6.0</b>	
Pressure Drop (Allowed)	psi <b>N/A</b>		psi <b>N/A</b>	
Fouling Resistance (Min)	hr-ft <sup>2</sup> -°F/Btu <b>0.0015</b>		hr-ft <sup>2</sup> -°F/Btu <b>0.007</b>	

**Mechanical Design Data**

	Shell Side		Tube Side	
	Design Pressure (Max/Min)	psig <b>50</b>	psig <b>Full Vacuum</b>	psig <b>50</b>
Design Temperature (Max/Min)	°F <b>275</b>	°F <b>49</b>	°F <b>175</b>	°F <b>49</b>
Corrosion Allowance	inch <b>0.04</b>		inch <b>0.04</b>	
Erosion Allowance	inch <b>N/A</b>		inch <b>N/A</b>	
Shell OD / ID	<b>60 ID</b>		Overall Dimensions (HxWxL)	<b>72 x 72 x 180</b>
Total No. of Tubes	<b>800</b>		Tube OD	inch <b>1.5</b>

**Material Data**

Shell	<b>SA 240 304 SS (max. carbon 0.030%)</b>	Shell Cover	<b>SA 240 304 SS (max. carbon 0.030%)</b>
Channel/Bonnet	<b>SB 582 UNS N06030 (Alloy G-30)</b>	Channel Cover	<b>SB 582 UNS N06030 (Alloy G-30)</b>
Tube	<b>SB 622 UNS N06030 (Alloy G-30 SMLS)</b>	Floating Head Cover	<b>N/A</b>
Stationary Tube Sheet	<b>SB 582 UNS N06030 (Alloy G-30)</b>	Floating Tube Sheet	<b>N/A</b>
Shell Side Gaskets	<b>N/A</b>	Tube Side Gaskets	<b>N/A</b>
Partition Seals	<b>N/A</b>	Baffles/Supports	<b>SA 240 304 SS (max. carbon 0.030%)</b>
Insulation	<b>N/A</b>	Forgings (Shell side)	<b>N/A</b>
Bolting	<b>N/A</b>	Forgings (Channel)	<b>N/A</b>





**MECHANICAL DATA SHEET**  
**SHELL AND TUBE HEAT EXCHANGER**

PLANT ITEM No.  
24590-PTF-MB-TLP-RBLR-00001

Data Sheet No.  
24590-PTF-MED-TLP-00004

**Construction Data** (To be determined by the supplier when not specified by the buyer)

Cross Baffle Type	*	% Baffle Cut (Dia.)	*	Spacing (c/c)	inch	*
Bypass Seal Arrangement	*	Longitudinal Seal Type	*	Expansion Joint Type		*
Inlet Nozzle $\rho V^2$	*	Bundle Entrance $\rho V^2$	*	Bundle Exit $\rho V^2$		*
Tube Support Type	*	U-bend Support Type	*	Weight of Bundle	lbf	*
Operating Weight	lbf	Full of Water	lbf	Weight of Shell	lbf	*

**Notes**

\* Vendor to Specify.

\*\* Deleted.  $\triangle$  3

**Notes:**

(1) All welds are continuous to avoid crevices, weld surface finish is descaled as laid.

(2) All welded construction on both tube and shell sides.

(3) Tubes welded to the tubesheets with full strength welds.

(4) Contents of this document are dangerous waste permit affecting.

(5) Deleted.

(6) Deleted.  $\triangle$  3

(7) For nozzles loads, see 24590-PTF-3PS-MEVV-T0001.  $\triangle$  3

(8) Component will be manufactured to Bechtel quality level Q, which corresponds with Vendor quality level QL-2.

(9) Vendor design information is from document 24590-QL-POA-MEVV-00001-02-00056.

(10) Equipment cyclic data is from document 24590-QL-POA-MEVV-00001-04-03.

(11) The physical design parameters shall be determined by the seller based on TEMA and HEI standards.

$\triangle$  3 (12) 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.

$\triangle$  3 (13) Value indicated is for fouling conditions.

(Safety screening/evaluation required?  Yes  No If yes per 24590-WTP-GPP-SREG-002, E&NS signature required below.)

Rev.	Description	By	Checked	E&NS	Approved	Date
3	Updated to reflect WSGM analysis, 24590-PTF-U0N-W16T-00003 and incorporate DOE AEA note 12. * INDICATES VALVES TO BE UPDATED	D. Tate	R. Rickenbach	Rust Hall B. Hall	John Jutik	2/19/09
2	Incorporated Vendor Design and Equipment Qualification Data	R. Rickenbach	E. Le	S. Woolfolk	J. Julyk	07/22/2008
1	Incorporated Vendor Design	E. Le	R. Nowak	N/A	J. Julyk	04/04/2005
0	Issued for Procurement	E. Le	S. Shah	N/A	J. Julyk	04/30/2003



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-TLP-00004 Rev.: 3

Attachment 1, Page 3 of 21

3

Equipment Identification	
Component Tag Number	24590-PTF-MB-TLP-RBLR-00001
Manufacturer / Supplier	Northwest Copper Works, Inc. / AREVA NP, Inc.
Requisition Number	24590-QL-POA-MEVV-00001
Model	N/A
Description (Include descriptive text [e.g., location, elevation])	Treated LAW Evaporator Reboiler, room P-0123, Elevation 0'-0"
Safety Function(s)	Confinement (ref. 1) 3
Seismic Safety Function	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Room Number(s): P-0123
Maintenance Accessible	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Method of Maintenance Access: <input checked="" type="checkbox"/> Remote <input type="checkbox"/> Hands On <input type="checkbox"/> None
Seismic Operability Requirements:	3 <input type="checkbox"/> During Seismic Event 3 <input type="checkbox"/> After Seismic Event
ITS Equipment Type:	<input checked="" type="checkbox"/> Passive Mechanical <input type="checkbox"/> Active Mechanical <input type="checkbox"/> Electrical

Equipment Environmental Qualification (EEQ)					
Environment	<input type="checkbox"/> Mild <input checked="" type="checkbox"/> Harsh	Hi Rad Service	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Design Life (yrs)	<input checked="" type="checkbox"/> 40 <input type="checkbox"/> Other ____
Contamination Class:	C5				
Radiation Class:	R5				
Parameter Type/Units	Parameter Value	Time Duration (number)	Time Units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Normal</b>					
Normal High Temperature (°F)	113	40	yrs	24590-PTF-U0D-W16T-00001, Note 7	Note 1
Normal Low Temperature (°F)	59	40	yrs	24590-PTF-U0D-W16T-00001, Note 7	Note 1
Normal High Relative Humidity (%RH)	100	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Relative Humidity (%RH)	5	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal High Pressure (in.-w.g.)	0	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Low Pressure (in.-w.g.)	-1.4	40	yrs	24590-PTF-U0D-W16T-00001	Note 1
Normal Radiation Dose Rate (mR/hr)	Note 4 3	40	yrs	Note 4	Note 1
Vibration Magnitude (g)	N/A	N/A	N/A	N/A	Note 1
Vibration Frequency (Hz)	N/A	N/A	N/A	N/A	Note 1
Additional Normal Information:	See Note 2 for Pressure Units.				



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-TLP-00004 Rev.: 3

Attachment 1, Page 4 of 21

△ 3

## Equipment Environmental Qualification (EEQ) (continued)

Parameter Type/Units	Parameter Value	Time Duration (number)	Time units	WTP Document Number (BUYER)	Submittal Number (SELLER)
<b>Abnormal</b>					
Abnormal High Temperature (°F)	△ 3 131	8	hr/yr	24590-PTF-U0D-W16T-00001, Note 7 △ 3	Note 1
Abnormal Low Temperature (°F)	59	8	hr/yr	24590-WTP-DB-01-001, Notes 7 & 11	Note 1
Abnormal High Relative Humidity (%RH)	100	24	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Relative Humidity (%RH)	2	22	hr/yr	24590-PTF-U0D-W16T-00001, Note 13 △ 3	Note 1
Abnormal High Pressure (in.-w.g.)	4	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Low Pressure (in.-w.g.)	-7.3	8	hr/yr	24590-PTF-U0D-W16T-00001	Note 1
Abnormal Radiation Dose Rate (mR/hr)	△ 3 Notes 3&4	0	hr/yr	Note 4	Note 1
Wet Sprinkler System Present	No	N/A	N/A	24590-PTF-U0D-W16T-00001	Note 1
Additional Abnormal Information	See Note 2 for Pressure Units				
<b>Design Basis Events (DBE)</b>					
DBE High Temperature (°F)	148	1000	hrs	24590-PTF-U0D-W16T-00001, Note 7 & 13 △ 3	Note 1
DBE Low Temperature (°F)	40	1000	hrs	24590-PTF-U0D-W16T-00001, Note 7	Note 1
DBE High Relative Humidity (%RH)	100	482	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Relative Humidity (%RH)	2	1000	hrs	24590-PTF-U0D-W16T-00001, Note 13 △ 3	Note 1
DBE High Pressure (in.-w.g.)	4	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Low Pressure (in.-w.g.)	-7.3	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
DBE Radiation Dose Rate (mR/hr)	△ 3 Notes 3&4	0	hrs	Note 4	Note 1
Flood Height (ft)	2.08	1000	hrs	24590-PTF-U0D-W16T-00001	Note 1
Submergence (ft)	0 Note 5	△ 3 0	hrs	24590-PTF-U0D-W16T-00001 24590-QL-POA-MEVV-00001-01-00817 △ 3	Note 1
Chemical/Spray Exposure	YES, Note 8	1000 △ 3	hrs	24590-PTF-U0D-W16T-00001	Note 1
Additional DBE Information	See Note 2 for Pressure Units				



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-TLP-00004 Rev.: 3

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DBE Chemical Exposure Details	
DBE Chemical Types/Concentrations	Sodium Hydroxide, 0.25M, 0.1M, 2M <span style="float: right;">△3</span> Anti-foaming agent <span style="float: right;">△3</span> Nitric Acid, 2M <span style="float: right;">△3</span> Recovered Nitric Acid <span style="float: right;">△3</span>

Interfaces (Electrical)	
Power Supply Voltage (VAC, VDC)	N/A
Power Supply Frequency (Hz)	N/A
Power Connection Method	N/A
I/O Signals to/from Equipment	N/A
I/O Connection Method	N/A

Interfaces (Mechanical)	
Mounting Configuration (orientation)	See dwg. 24590-QL-POA-MEVV-00001-01-00907, Note 10
Mounting Method (bolts, welds, etc.)	Welded to Frame (rigid)
Auxiliary Devices	N/A

Equipment Seismic Qualification (ESQ)				
Parameter	Title	Reference/Document Number	Version / Revision	Remarks
WTP Seismic Design Specification (BUYER)	Engineering Specification for Seismic Qualification Criteria for Pressure Vessels	24590-WTP-3PS-MV00-T0002	002	N/A
Specified Seismic Load (BUYER)	Seismic Analysis of Pretreatment Building - WSGM In-Structure Response Spectre (ISRS) <span style="float: right;">△3</span>	24590-PTF-SOC-S15T-00057 <span style="float: right;">△3</span>	00A <span style="float: right;">△3</span>	Calculation is not included in MR, see attached figures 21E, 22E and 24E per CCN 185267. <span style="float: right;">△3</span>
Design Seismic Load (SELLER)	Calculation - 60% Design - HEP 1 TLP & FEP Reboiler Vessel Skid Seismic Evaluation.	24590-QL-POA-MEVV-00001-04-00061	00A	
Qualification Method (SELLER)	Calculation - 60% Design - HEP 1 TLP & FEP Reboiler Vessel Skid Seismic Evaluation.	24590-QL-POA-MEVV-00001-04-00061	00A	
Qualification Report Number (SELLER)	Calculation - 60% Design - HEP 1 TLP & FEP Reboiler Vessel Skid Seismic Evaluation.	24590-QL-POA-MEVV-00001-04-00061	00A	
Submittal Number (BUYER)	Calculation - 60% Design - HEP 1 TLP & FEP Reboiler Vessel Skid Seismic Evaluation.	24590-QL-POA-MEVV-00001-04-00061	00A	



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

24590-PTF-MED-TLP-00004 Rev.: 3

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## Notes and Additional Information

### Notes:

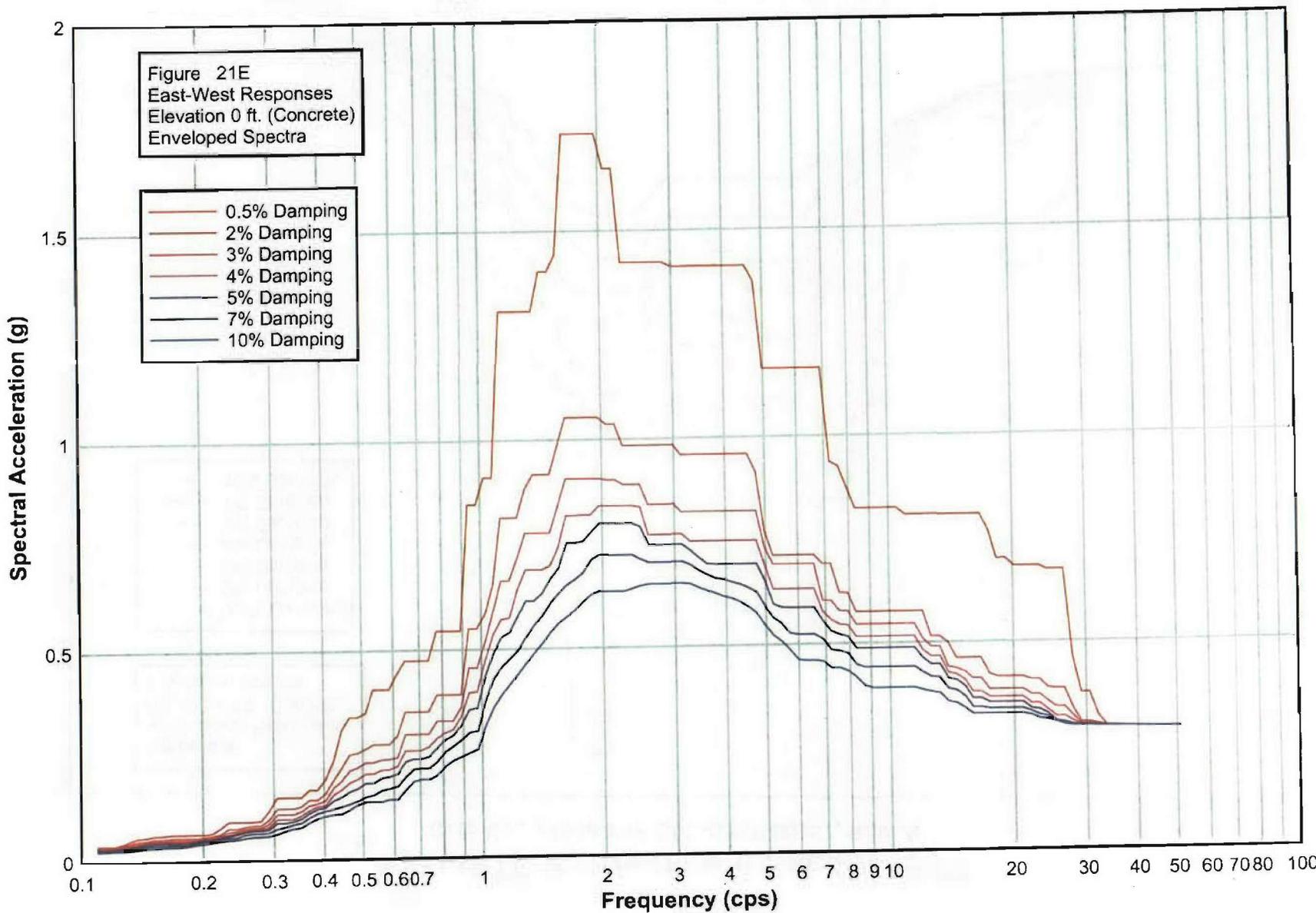
1. Data to be provided by SELLER through the submittal process as required on the G-321-E form.
2. Where pressure is given in inches of water column (in.-w.c.) in the source document, it is generally assumed that this is in reference to atmospheric pressure and is therefore equivalent to inches of water gage (in.-w.g.).
3. Abnormal and DBE radiation dose rates are set equal to normal dose rate and do not contribute to the total integrated dose.
4. Gamma radiation dose rate will not exceed  $2.0 \text{ E}+06$  mRad/hr, per CCN 175006. Beta radiation dose rate is  $3.46\text{E}+03$  mRad/hr based on the ratio of Strontium-90 from reference 6 as compared to the beta dose rate of Strontium-90 found in reference 7. The beta dose found in reference 7 is considered bounding. Beta dose rate source is process fluid from within the equipment. Dose rates are preliminary and subject to confirmation prior to shipment.
5. Submergence is determined from the lowest point of the vessel in relation to the flood height above the floor.
6. Environmental data given document 24590-PTF-U0D-W16T-00001 is for room environment only.
7. For application of AISC N690, the normal temperatures are not used. Abnormal temperatures shall be applied as Normal Operation Temperature,  $T_O$ , with seismic effects,  $E_s$ . The Design basis event temperature shall be applied as a Thermal Load generated by a postulated accident,  $T_A$ , without seismic effects,  $E_s$  or  $E_o$ .
8. Chemical Spray source may be comprised of only one of the following; Sodium Hydroxide, High Pressure Steam, or anti-foam reagent.
9. Deleted. 3
10. Top of sole plate is at elevation 2'-2-5/16". BNI will install an equipment pad to elevation 1'-4".
11. Abnormal low temperature, as calculated in reference 2, is based on a Loss of Heating Accident (LOHA) which occurs when steam supply to the building is lost. Since the evaporators are run on steam, this would cause the evaporators to go off-line. Abnormal low temperature will be based on reference 3 at 59°F.
12. The equipment qualification will be documented in accordance with the requirements in Appendix D of Engineering Specification for Environmental Qualification of Mechanical Equipment, document number 24590-WTP-3PS-G000-T0015 for the passive and active safety functions.
13. Parameter value used on data sheet has been previously established and determined more conservative than values 3 derived from the reference document noted.
14. For commercial reasons, safety and seismic classification may be higher than elsewhere documented, and therefore 3 conservative.

### References:

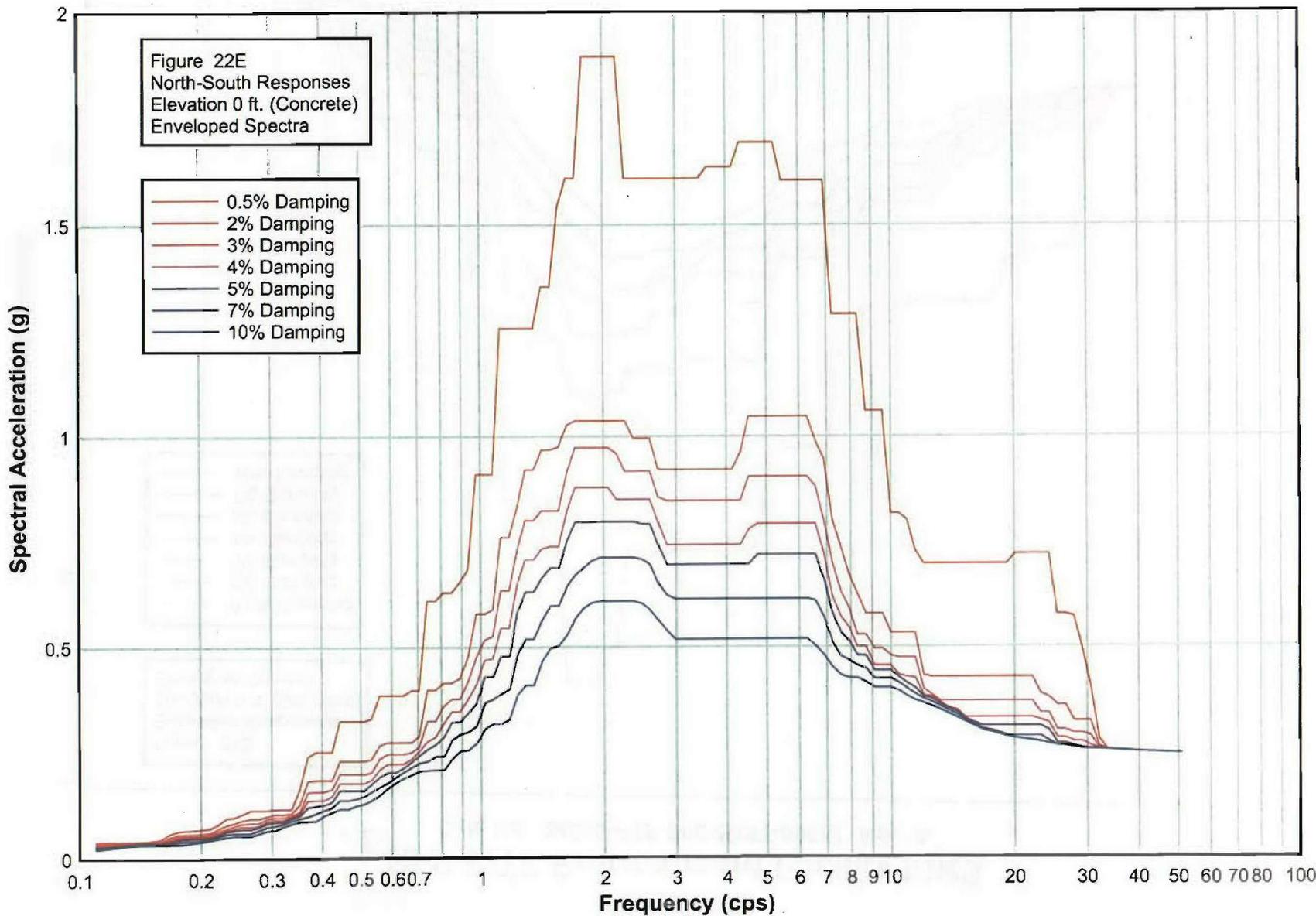
1. 24590-WTP-PSAR-ESH-01-002-02, Rev. 04A, Preliminary documented safety analysis to support construction 3 authorization; PT facility specific information.
2. 24590-PTF-U0D-W16T-00001, Rev. 0, PTF Room Environment Datasheet.
3. 24590-WTP-DB-ENG-01-001, Rev. 1M, Basis of Design. 3
4. 24590-PTF-U0N-W16T-00001, Add data for room p-0427. Incorporate additional steam break analysis. 3
5. 24590-PTF-U0N-W16T-00003, Revised temperature & relative humidity data for PTF rooms. 3
6. 24590-WTP-Z0C-50-0008, Rev. B, Comparison of Source Terms for Use in Shielding Calculations.
7. 24590-LAB-Z0C-80-00001, Rev. D, Beta and Gamma Dose Rate Determinations from Laboratory Sample Bottles.

# RPP-WTP Pretreatment Facility ISRS

Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A

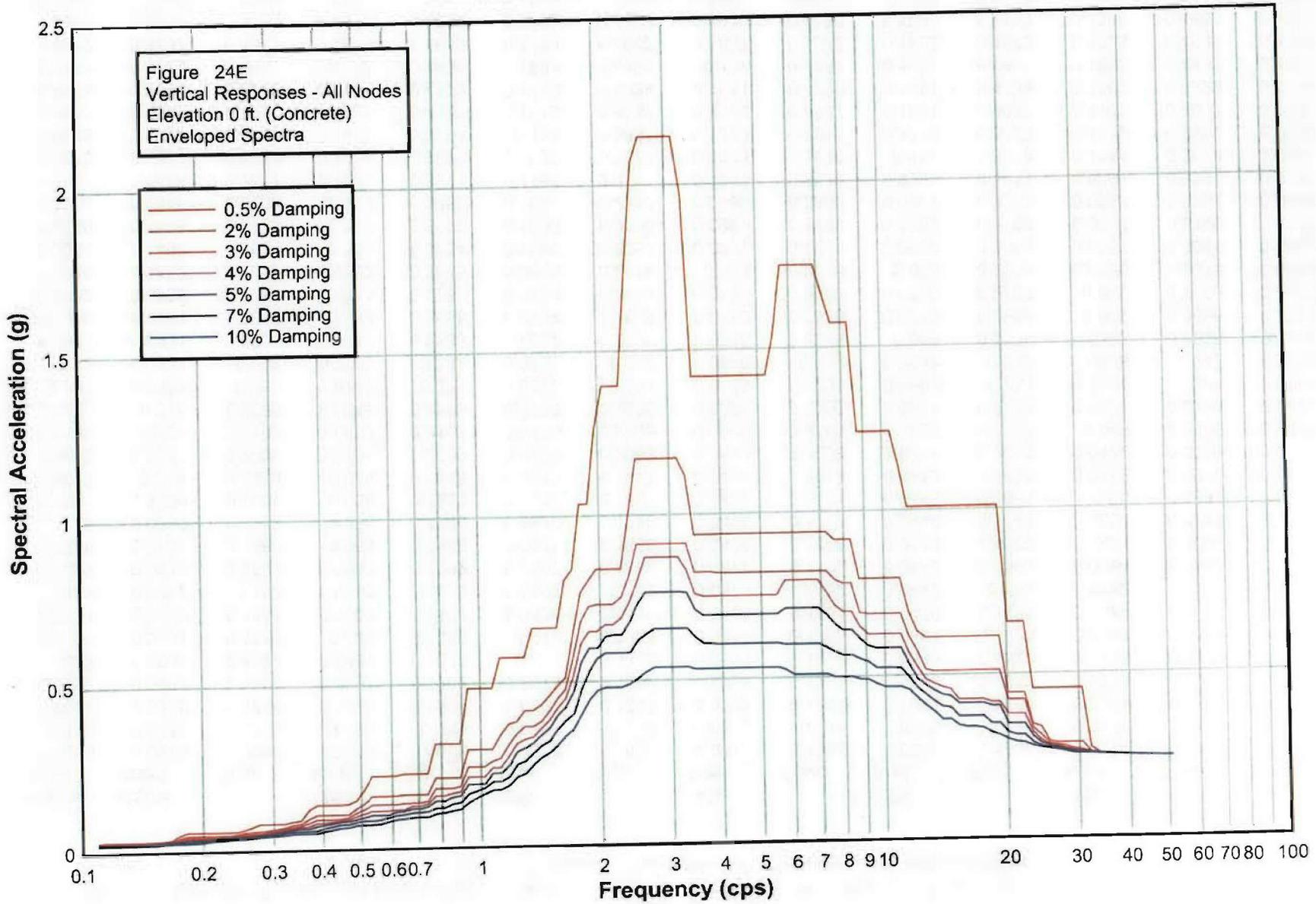


3 **RPP-WTP Pretreatment Facility ISRS**  
Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



# RPP-WTP Pretreatment Facility ISRS

Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A



PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0375	0.1098	0.0345	0.1098	0.0327	0.1098	0.0312	0.1098	0.0298	0.1098	0.0274	0.1098	0.0252
0.115	0.0375	0.115	0.0345	0.115	0.0327	0.115	0.0312	0.115	0.0299	0.115	0.0277	0.115	0.0259
0.1204	0.0375	0.1204	0.0345	0.1204	0.0331	0.1204	0.0322	0.1204	0.0312	0.1204	0.0294	0.1204	0.0268
0.1262	0.0431	0.1262	0.0397	0.1262	0.0378	0.1262	0.036	0.1262	0.0343	0.1262	0.0314	0.1262	0.0277
0.1322	0.0505	0.1322	0.0451	0.1322	0.042	0.1322	0.0393	0.1322	0.0369	0.1322	0.0328	0.1322	0.0281
0.1385	0.0561	0.1385	0.049	0.1385	0.045	0.1385	0.0415	0.1385	0.0384	0.1385	0.0344	0.1385	0.0303
0.1451	0.0582	0.1451	0.0509	0.1451	0.0475	0.1451	0.0444	0.1451	0.0419	0.1451	0.0374	0.1451	0.0325
0.152	0.0617	0.152	0.0546	0.152	0.0507	0.152	0.0472	0.152	0.0442	0.152	0.0392	0.152	0.0336
0.1592	0.0619	0.1592	0.0546	0.1592	0.0507	0.1592	0.0472	0.1592	0.0442	0.1592	0.0394	0.1592	0.0347
0.1668	0.0639	0.1668	0.056	0.1668	0.0516	0.1668	0.0479	0.1668	0.0448	0.1668	0.04	0.1668	0.0353
0.1748	0.0639	0.1748	0.056	0.1748	0.0516	0.1748	0.0479	0.1748	0.0448	0.1748	0.04	0.1748	0.0353
0.1831	0.0639	0.1831	0.056	0.1831	0.0516	0.1831	0.0479	0.1831	0.0448	0.1831	0.04	0.1831	0.0364
0.1918	0.064	0.1918	0.056	0.1918	0.0516	0.1918	0.0491	0.1918	0.0473	0.1918	0.0442	0.1918	0.0401
0.2009	0.0641	0.2009	0.0581	0.2009	0.0556	0.2009	0.0533	0.2009	0.0511	0.2009	0.0472	0.2009	0.0422
0.2105	0.0664	0.2105	0.0603	0.2105	0.0575	0.2105	0.0549	0.2105	0.0525	0.2105	0.049	0.2105	0.0448
0.2205	0.078	0.2205	0.0645	0.2205	0.0618	0.2205	0.0594	0.2205	0.0571	0.2205	0.0531	0.2205	0.0482
0.231	0.0931	0.231	0.0772	0.231	0.0692	0.231	0.0628	0.231	0.0597	0.231	0.0554	0.231	0.0502
0.242	0.0931	0.242	0.0772	0.242	0.0722	0.242	0.0678	0.242	0.0637	0.242	0.0565	0.242	0.0512
0.2535	0.0931	0.2535	0.0817	0.2535	0.077	0.2535	0.0728	0.2535	0.069	0.2535	0.0625	0.2535	0.0547
0.2656	0.0931	0.2656	0.0839	0.2656	0.0794	0.2656	0.0753	0.2656	0.0716	0.2656	0.065	0.2656	0.0571
0.2783	0.0955	0.2783	0.0844	0.2783	0.0794	0.2783	0.0753	0.2783	0.0716	0.2783	0.065	0.2783	0.0575
0.2915	0.1183	0.2915	0.0982	0.2915	0.0885	0.2915	0.081	0.2915	0.075	0.2915	0.0666	0.2915	0.0586
0.3054	0.1498	0.3054	0.123	0.3054	0.1093	0.3054	0.0982	0.3054	0.0892	0.3054	0.0757	0.3054	0.0632
0.3199	0.1498	0.3199	0.123	0.3199	0.1093	0.3199	0.0982	0.3199	0.0892	0.3199	0.0797	0.3199	0.07
0.3352	0.1498	0.3352	0.123	0.3352	0.1093	0.3352	0.0982	0.3352	0.0927	0.3352	0.0852	0.3352	0.0755
0.3511	0.1498	0.3511	0.1285	0.3511	0.1168	0.3511	0.1065	0.3511	0.0994	0.3511	0.0891	0.3511	0.0782
0.3678	0.1677	0.3678	0.1435	0.3678	0.13	0.3678	0.1183	0.3678	0.112	0.3678	0.1014	0.3678	0.0894
0.3853	0.1677	0.3853	0.1435	0.3853	0.134	0.3853	0.1273	0.3853	0.1213	0.3853	0.1109	0.3853	0.0986
0.4037	0.1925	0.4037	0.1587	0.4037	0.1415	0.4037	0.1298	0.4037	0.1251	0.4037	0.1163	0.4037	0.1044
0.4229	0.2359	0.4229	0.1897	0.4229	0.1713	0.4229	0.1551	0.4229	0.1411	0.4229	0.1206	0.4229	0.1079
0.4431	0.3083	0.4431	0.219	0.4431	0.1881	0.4431	0.167	0.4431	0.1495	0.4431	0.1263	0.4431	0.1089
0.4642	0.3407	0.4642	0.2508	0.4642	0.2123	0.4642	0.1837	0.4642	0.1622	0.4642	0.1328	0.4642	0.1192
0.4863	0.3407	0.4863	0.2548	0.4863	0.2198	0.4863	0.1918	0.4863	0.1692	0.4863	0.1398	0.4863	0.1303
0.5094	0.3496	0.5094	0.2641	0.5094	0.2311	0.5094	0.2042	0.5094	0.182	0.5094	0.1485	0.5094	0.1369

PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.4063	0.5337	0.2745	0.5337	0.2311	0.5337	0.2042	0.5337	0.182	0.5337	0.1529	0.5337	0.1371
0.5591	0.4063	0.5591	0.2745	0.5591	0.2378	0.5591	0.213	0.5591	0.194	0.5591	0.1646	0.5591	0.1371
0.5857	0.4063	0.5857	0.2745	0.5857	0.2385	0.5857	0.2142	0.5857	0.1966	0.5857	0.1681	0.5857	0.1425
0.6136	0.4438	0.6136	0.2944	0.6136	0.2421	0.6136	0.2213	0.6136	0.2032	0.6136	0.1733	0.6136	0.1425
0.6428	0.4742	0.6428	0.3514	0.6428	0.2975	0.6428	0.2588	0.6428	0.2323	0.6428	0.1964	0.6428	0.1655
0.6734	0.4742	0.6734	0.3514	0.6734	0.2975	0.6734	0.2588	0.6734	0.2383	0.6734	0.2137	0.6734	0.1844
0.7055	0.4742	0.7055	0.3514	0.7055	0.2975	0.7055	0.2588	0.7055	0.2383	0.7055	0.2155	0.7055	0.1892
0.7391	0.4742	0.7391	0.3514	0.7391	0.2975	0.7391	0.2667	0.7391	0.2438	0.7391	0.2155	0.7391	0.1892
0.7743	0.5449	0.7743	0.3911	0.7743	0.3284	0.7743	0.2875	0.7743	0.2646	0.7743	0.2323	0.7743	0.1993
0.8111	0.5449	0.8111	0.3911	0.8111	0.3284	0.8111	0.2996	0.8111	0.2837	0.8111	0.2551	0.8111	0.2205
0.8497	0.5449	0.8497	0.3911	0.8497	0.3284	0.8497	0.3072	0.8497	0.2942	0.8497	0.2684	0.8497	0.2339
0.8902	0.5449	0.8902	0.3911	0.8902	0.3604	0.8902	0.3382	0.8902	0.318	0.8902	0.2831	0.8902	0.2427
0.9326	0.8469	0.9326	0.5495	0.9326	0.4554	0.9326	0.3957	0.9326	0.3545	0.9326	0.3003	0.9326	0.2517
0.977	0.8469	0.977	0.5495	0.977	0.4554	0.977	0.3975	0.977	0.3585	0.977	0.3036	0.977	0.2596
1.0235	0.9107	1.0235	0.5826	1.0235	0.5168	1.0235	0.4731	1.0235	0.4362	1.0235	0.3776	1.0235	0.3164
1.0723	0.9107	1.0723	0.6542	1.0723	0.5901	1.0723	0.535	1.0723	0.4906	1.0723	0.4288	1.0723	0.36
1.1233	1.3081	1.1233	0.8142	1.1233	0.6641	1.1233	0.5708	1.1233	0.5287	1.1233	0.4575	1.1233	0.3904
1.1768	1.3081	1.1768	0.8142	1.1768	0.6641	1.1768	0.5735	1.1768	0.5393	1.1768	0.4764	1.1768	0.4143
1.2328	1.3081	1.2328	0.8142	1.2328	0.7174	1.2328	0.6427	1.2328	0.577	1.2328	0.4965	1.2328	0.439
1.2916	1.3081	1.2916	0.8822	1.2916	0.7774	1.2916	0.6895	1.2916	0.6157	1.2916	0.5283	1.2916	0.4653
1.353	1.3081	1.353	0.9165	1.353	0.7774	1.353	0.6895	1.353	0.6157	1.353	0.5556	1.353	0.4889
1.4175	1.4021	1.4175	0.9165	1.4175	0.7774	1.4175	0.6895	1.4175	0.6326	1.4175	0.5795	1.4175	0.5119
1.485	1.4021	1.485	0.9165	1.485	0.7774	1.485	0.6984	1.485	0.6672	1.485	0.6099	1.485	0.539
1.5557	1.4438	1.5557	0.9843	1.5557	0.8409	1.5557	0.7415	1.5557	0.6919	1.5557	0.6323	1.5557	0.5603
1.6298	1.729	1.6298	1.0527	1.6298	0.9055	1.6298	0.8177	1.6298	0.7518	1.6298	0.6519	1.6298	0.5748
1.7074	1.729	1.7074	1.0527	1.7074	0.9055	1.7074	0.8177	1.7074	0.7518	1.7074	0.6652	1.7074	0.5915
1.7887	1.729	1.7887	1.0527	1.7887	0.9055	1.7887	0.8185	1.7887	0.7553	1.7887	0.6808	1.7887	0.6117
1.8738	1.729	1.8738	1.0527	1.8738	0.9055	1.8738	0.8185	1.8738	0.7765	1.8738	0.7113	1.8738	0.6287
1.963	1.729	1.963	1.0527	1.963	0.9055	1.963	0.8397	1.963	0.7973	1.963	0.7229	1.963	0.6359
2.0565	1.6472	2.0565	1.0359	2.0565	0.902	2.0565	0.8397	2.0565	0.7973	2.0565	0.7229	2.0565	0.6359
2.1544	1.6472	2.1544	1.0359	2.1544	0.902	2.1544	0.8397	2.1544	0.7973	2.1544	0.7229	2.1544	0.6359
2.257	1.4229	2.257	0.9839	2.257	0.8903	2.257	0.8397	2.257	0.7973	2.257	0.7229	2.257	0.6361
2.3645	1.4229	2.3645	0.9839	2.3645	0.8903	2.3645	0.8397	2.3645	0.7973	2.3645	0.7229	2.3645	0.6418
2.4771	1.4229	2.4771	0.9839	2.4771	0.8903	2.4771	0.8363	2.4771	0.7896	2.4771	0.7121	2.4771	0.6484
2.595	1.4229	2.595	0.9839	2.595	0.8416	2.595	0.7692	2.595	0.745	2.595	0.7036	2.595	0.6522

PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
2.7186	1.4229	2.7186	0.9839	2.7186	0.8416	2.7186	0.7692	2.7186	0.745	2.7186	0.7036	2.7186	0.6522
2.848	1.4229	2.848	0.9839	2.848	0.8416	2.848	0.7692	2.848	0.745	2.848	0.7036	2.848	0.6522
2.9836	1.4127	2.9836	0.9839	2.9836	0.8416	2.9836	0.7692	2.9836	0.745	2.9836	0.7036	2.9836	0.6522
3.1257	1.4127	3.1257	0.9586	3.1257	0.8211	3.1257	0.7692	3.1257	0.745	3.1257	0.7036	3.1257	0.6522
3.2745	1.4127	3.2745	0.9586	3.2745	0.8211	3.2745	0.751	3.2745	0.7299	3.2745	0.6954	3.2745	0.6492
3.4305	1.4127	3.4305	0.9586	3.4305	0.8211	3.4305	0.751	3.4305	0.7126	3.4305	0.681	3.4305	0.6403
3.5938	1.4127	3.5938	0.9586	3.5938	0.8211	3.5938	0.751	3.5938	0.6971	3.5938	0.671	3.5938	0.6329
3.7649	1.4127	3.7649	0.9586	3.7649	0.8211	3.7649	0.751	3.7649	0.6954	3.7649	0.6626	3.7649	0.6263
3.9442	1.4127	3.9442	0.9586	3.9442	0.8211	3.9442	0.751	3.9442	0.6954	3.9442	0.659	3.9442	0.6182
4.132	1.4127	4.132	0.9586	4.132	0.8211	4.132	0.751	4.132	0.6954	4.132	0.6519	4.132	0.6132
4.3288	1.4127	4.3288	0.9586	4.3288	0.8211	4.3288	0.751	4.3288	0.6954	4.3288	0.6467	4.3288	0.6045
4.5349	1.4127	4.5349	0.9586	4.5349	0.8211	4.5349	0.751	4.5349	0.6954	4.5349	0.6383	4.5349	0.5926
4.7508	1.376	4.7508	0.9153	4.7508	0.8211	4.7508	0.751	4.7508	0.6954	4.7508	0.6271	4.7508	0.5766
4.977	1.1649	4.977	0.7722	4.977	0.7324	4.977	0.6911	4.977	0.6536	4.977	0.5927	4.977	0.5466
5.214	1.1649	5.214	0.7138	5.214	0.6926	5.214	0.6329	5.214	0.5972	5.214	0.5647	5.214	0.5221
5.4623	1.1649	5.4623	0.7138	5.4623	0.6926	5.4623	0.6329	5.4623	0.5893	5.4623	0.5516	5.4623	0.5074
5.7224	1.1649	5.7224	0.7138	5.7224	0.6926	5.7224	0.6329	5.7224	0.5878	5.7224	0.5268	5.7224	0.486
5.9948	1.1649	5.9948	0.7138	5.9948	0.6926	5.9948	0.6329	5.9948	0.5878	5.9948	0.5235	5.9948	0.4626
6.2803	1.1649	6.2803	0.7138	6.2803	0.6926	6.2803	0.6329	6.2803	0.5878	6.2803	0.5235	6.2803	0.4608
6.5793	1.1649	6.5793	0.7138	6.5793	0.6926	6.5793	0.6329	6.5793	0.5878	6.5793	0.5235	6.5793	0.4608
6.8926	1.1649	6.8926	0.6922	6.8926	0.6037	6.8926	0.5767	6.8926	0.5551	6.8926	0.5117	6.8926	0.4579
7.2208	0.9369	7.2208	0.6922	7.2208	0.6037	7.2208	0.5573	7.2208	0.5298	7.2208	0.4851	7.2208	0.4415
7.5646	0.9251	7.5646	0.6226	7.5646	0.5783	7.5646	0.5462	7.5646	0.5217	7.5646	0.4826	7.5646	0.4415
7.9248	0.8741	7.9248	0.6213	7.9248	0.5773	7.9248	0.5435	7.9248	0.5163	7.9248	0.4761	7.9248	0.4338
8.3022	0.8232	8.3022	0.5748	8.3022	0.5453	8.3022	0.5153	8.3022	0.4877	8.3022	0.449	8.3022	0.4181
8.6975	0.8232	8.6975	0.5748	8.6975	0.5453	8.6975	0.5153	8.6975	0.4877	8.6975	0.4421	8.6975	0.3975
9.1116	0.8232	9.1116	0.5748	9.1116	0.5453	9.1116	0.5153	9.1116	0.4877	9.1116	0.4421	9.1116	0.3917
9.5455	0.8232	9.5455	0.5748	9.5455	0.5453	9.5455	0.5153	9.5455	0.4877	9.5455	0.4421	9.5455	0.3917
10	0.8232	10	0.5748	10	0.5453	10	0.5153	10	0.4877	10	0.4421	10	0.3917
10.4762	0.8232	10.4762	0.5748	10.4762	0.5453	10.4762	0.5153	10.4762	0.4877	10.4762	0.4421	10.4762	0.3917
10.975	0.8069	10.975	0.5748	10.975	0.5453	10.975	0.5153	10.975	0.4877	10.975	0.4421	10.975	0.3917
11.4976	0.8069	11.4976	0.5748	11.4976	0.5453	11.4976	0.5153	11.4976	0.4877	11.4976	0.4421	11.4976	0.3917
12.045	0.8069	12.045	0.5748	12.045	0.5088	12.045	0.481	12.045	0.4623	12.045	0.4284	12.045	0.3857
12.6186	0.8069	12.6186	0.5137	12.6186	0.4887	12.6186	0.4663	12.6186	0.4469	12.6186	0.4171	12.6186	0.3809
13.2194	0.8069	13.2194	0.5136	13.2194	0.4887	13.2194	0.4663	13.2194	0.4469	13.2194	0.4149	13.2194	0.3775

PTEE021.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 21E ~ East-West Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.8069	13.8489	0.4975	13.8489	0.44	13.8489	0.426	13.8489	0.4124	13.8489	0.3875	13.8489	0.3566
14.5083	0.8069	14.5083	0.4604	14.5083	0.4358	14.5083	0.4216	14.5083	0.408	14.5083	0.3834	14.5083	0.3525
15.1991	0.8069	15.1991	0.4604	15.1991	0.4273	15.1991	0.4075	15.1991	0.3925	15.1991	0.368	15.1991	0.3399
15.9228	0.8069	15.9228	0.4604	15.9228	0.4111	15.9228	0.379	15.9228	0.3633	15.9228	0.3417	15.9228	0.3258
16.681	0.8069	16.681	0.4604	16.681	0.4111	16.681	0.379	16.681	0.3633	16.681	0.3417	16.681	0.3258
17.4753	0.7678	17.4753	0.4222	17.4753	0.384	17.4753	0.3658	17.4753	0.3531	17.4753	0.338	17.4753	0.3258
18.3074	0.6991	18.3074	0.4145	18.3074	0.384	18.3074	0.3654	18.3074	0.3531	18.3074	0.338	18.3074	0.3258
19.1791	0.6991	19.1791	0.4145	19.1791	0.384	19.1791	0.3654	19.1791	0.3531	19.1791	0.338	19.1791	0.3258
20.0923	0.6809	20.0923	0.4145	20.0923	0.384	20.0923	0.3654	20.0923	0.3531	20.0923	0.338	20.0923	0.3258
21.049	0.6809	21.049	0.4145	21.049	0.384	21.049	0.3654	21.049	0.3531	21.049	0.338	21.049	0.3258
22.0513	0.6809	22.0513	0.4076	22.0513	0.3711	22.0513	0.3497	22.0513	0.3377	22.0513	0.3309	22.0513	0.3223
23.1013	0.6809	23.1013	0.4076	23.1013	0.3711	23.1013	0.3497	23.1013	0.3352	23.1013	0.3223	23.1013	0.3135
24.2013	0.6714	24.2013	0.3876	24.2013	0.3546	24.2013	0.3339	24.2013	0.3248	24.2013	0.3182	24.2013	0.3115
25.3536	0.6714	25.3536	0.3853	25.3536	0.3408	25.3536	0.3181	25.3536	0.3075	25.3536	0.3068	25.3536	0.3051
26.5609	0.6714	26.5609	0.3853	26.5609	0.3408	26.5609	0.3181	26.5609	0.3041	26.5609	0.2986	26.5609	0.2992
27.8256	0.4616	27.8256	0.3378	27.8256	0.3191	27.8256	0.3066	27.8256	0.2988	27.8256	0.296	27.8256	0.2956
29.1505	0.3753	29.1505	0.3037	29.1505	0.2996	29.1505	0.2979	29.1505	0.297	29.1505	0.296	29.1505	0.2951
30.5386	0.3753	30.5386	0.3037	30.5386	0.2996	30.5386	0.2979	30.5386	0.297	30.5386	0.296	30.5386	0.2951
31.9927	0.3196	31.9927	0.2994	31.9927	0.2977	31.9927	0.2968	31.9927	0.2961	31.9927	0.2952	31.9927	0.2943
33.516	0.2961	33.516	0.2957	33.516	0.2953	33.516	0.295	33.516	0.2948	33.516	0.2945	33.516	0.2942
35.1119	0.2952	35.1119	0.2948	35.1119	0.2947	35.1119	0.2946	35.1119	0.2944	35.1119	0.2942	35.1119	0.2939
36.7838	0.2943	36.7838	0.2943	36.7838	0.2942	36.7838	0.2941	36.7838	0.294	36.7838	0.2938	36.7838	0.2936
38.5353	0.2938	38.5353	0.2937	38.5353	0.2936	38.5353	0.2936	38.5353	0.2935	38.5353	0.2934	38.5353	0.2932
40.3702	0.2932	40.3702	0.2931	40.3702	0.2931	40.3702	0.293	40.3702	0.293	40.3702	0.2929	40.3702	0.2928
42.2924	0.2925	42.2924	0.2926	42.2924	0.2925	42.2924	0.2925	42.2924	0.2925	42.2924	0.2924	42.2924	0.2923
44.3062	0.2922	44.3062	0.2921	44.3062	0.2921	44.3062	0.2921	44.3062	0.292	44.3062	0.292	44.3062	0.2919
46.4159	0.2917	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916	46.4159	0.2916
48.626	0.2913	48.626	0.2912	48.626	0.2912	48.626	0.2912	48.626	0.2912	48.626	0.2912	48.626	0.2912
50.9414	0.2907	50.9414	0.2908	50.9414	0.2908	50.9414	0.2908	50.9414	0.2908	50.9414	0.2908	50.9414	0.2909

PTEE022.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 22E ~ North-South Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0404	0.1098	0.0365	0.1098	0.0342	0.1098	0.0321	0.1098	0.0302	0.1098	0.0271	0.1098	0.0235
0.115	0.0404	0.115	0.0365	0.115	0.0342	0.115	0.0321	0.115	0.0302	0.115	0.0271	0.115	0.0253
0.1204	0.0404	0.1204	0.0365	0.1204	0.0342	0.1204	0.0321	0.1204	0.0306	0.1204	0.0293	0.1204	0.0274
0.1262	0.0404	0.1262	0.0365	0.1262	0.0349	0.1262	0.034	0.1262	0.033	0.1262	0.0313	0.1262	0.0295
0.1322	0.0404	0.1322	0.038	0.1322	0.0368	0.1322	0.0357	0.1322	0.0346	0.1322	0.0331	0.1322	0.0316
0.1385	0.041	0.1385	0.039	0.1385	0.0379	0.1385	0.037	0.1385	0.0362	0.1385	0.0347	0.1385	0.0329
0.1451	0.0415	0.1451	0.0397	0.1451	0.0386	0.1451	0.0377	0.1451	0.0368	0.1451	0.0353	0.1451	0.0333
0.152	0.0438	0.152	0.04	0.152	0.0386	0.152	0.0377	0.152	0.0368	0.152	0.0353	0.152	0.0333
0.1592	0.0461	0.1592	0.0415	0.1592	0.0394	0.1592	0.0377	0.1592	0.0368	0.1592	0.0353	0.1592	0.0333
0.1668	0.0583	0.1668	0.0505	0.1668	0.0462	0.1668	0.0425	0.1668	0.0394	0.1668	0.0353	0.1668	0.0333
0.1748	0.0643	0.1748	0.0565	0.1748	0.0521	0.1748	0.0482	0.1748	0.0448	0.1748	0.0392	0.1748	0.0333
0.1831	0.0666	0.1831	0.0583	0.1831	0.0541	0.1831	0.0504	0.1831	0.047	0.1831	0.0413	0.1831	0.0351
0.1918	0.0676	0.1918	0.0584	0.1918	0.0541	0.1918	0.0505	0.1918	0.0472	0.1918	0.0415	0.1918	0.0376
0.2009	0.0696	0.2009	0.0595	0.2009	0.0541	0.2009	0.0509	0.2009	0.0481	0.2009	0.0431	0.2009	0.0405
0.2105	0.0719	0.2105	0.0616	0.2105	0.0578	0.2105	0.0543	0.2105	0.051	0.2105	0.0476	0.2105	0.0438
0.2205	0.0815	0.2205	0.0705	0.2205	0.0647	0.2205	0.0596	0.2205	0.0568	0.2205	0.0528	0.2205	0.048
0.231	0.0954	0.231	0.079	0.231	0.0704	0.231	0.0667	0.231	0.0634	0.231	0.0577	0.231	0.0509
0.242	0.0977	0.242	0.0841	0.242	0.0771	0.242	0.071	0.242	0.0669	0.242	0.06	0.242	0.0531
0.2535	0.1051	0.2535	0.0906	0.2535	0.0825	0.2535	0.0755	0.2535	0.0694	0.2535	0.06	0.2535	0.0531
0.2656	0.1135	0.2656	0.0943	0.2656	0.084	0.2656	0.0755	0.2656	0.0694	0.2656	0.06	0.2656	0.0531
0.2783	0.1135	0.2783	0.0943	0.2783	0.084	0.2783	0.0776	0.2783	0.0736	0.2783	0.0666	0.2783	0.0591
0.2915	0.1135	0.2915	0.0994	0.2915	0.093	0.2915	0.0874	0.2915	0.0826	0.2915	0.0745	0.2915	0.0653
0.3054	0.1163	0.3054	0.104	0.3054	0.0971	0.3054	0.0909	0.3054	0.0855	0.3054	0.0768	0.3054	0.0674
0.3199	0.1163	0.3199	0.104	0.3199	0.0971	0.3199	0.0909	0.3199	0.0864	0.3199	0.0812	0.3199	0.075
0.3352	0.1163	0.3352	0.1068	0.3352	0.1025	0.3352	0.0986	0.3352	0.095	0.3352	0.0888	0.3352	0.0821
0.3511	0.1636	0.3511	0.1274	0.3511	0.1102	0.3511	0.105	0.3511	0.101	0.3511	0.0944	0.3511	0.0865
0.3678	0.2398	0.3678	0.1821	0.3678	0.1557	0.3678	0.1356	0.3678	0.1202	0.3678	0.0985	0.3678	0.0872
0.3853	0.2521	0.3853	0.185	0.3853	0.1576	0.3853	0.137	0.3853	0.1232	0.3853	0.1054	0.3853	0.0884
0.4037	0.2521	0.4037	0.185	0.4037	0.1576	0.4037	0.137	0.4037	0.1254	0.4037	0.1131	0.4037	0.1
0.4229	0.2521	0.4229	0.185	0.4229	0.1633	0.4229	0.1471	0.4229	0.1332	0.4229	0.1202	0.4229	0.1087
0.4431	0.3253	0.4431	0.2305	0.4431	0.1995	0.4431	0.1774	0.4431	0.1605	0.4431	0.137	0.4431	0.1162
0.4642	0.3253	0.4642	0.2305	0.4642	0.1995	0.4642	0.1774	0.4642	0.1605	0.4642	0.137	0.4642	0.1162
0.4863	0.3253	0.4863	0.2305	0.4863	0.1995	0.4863	0.1774	0.4863	0.1605	0.4863	0.1405	0.4863	0.1237
0.5094	0.3253	0.5094	0.2305	0.5094	0.1995	0.5094	0.1774	0.5094	0.1605	0.5094	0.1467	0.5094	0.1284

PTEE022.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-SOC-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 22E ~ North-South Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.3317	0.5337	0.235	0.5337	0.2031	0.5337	0.1861	0.5337	0.1756	0.5337	0.1573	0.5337	0.1368
0.5591	0.3864	0.5591	0.2681	0.5591	0.2359	0.5591	0.2104	0.5591	0.1932	0.5591	0.1694	0.5591	0.1505
0.5857	0.3864	0.5857	0.2751	0.5857	0.2466	0.5857	0.223	0.5857	0.2031	0.5857	0.1791	0.5857	0.1667
0.6136	0.3864	0.6136	0.2751	0.6136	0.2466	0.6136	0.223	0.6136	0.2035	0.6136	0.193	0.6136	0.1795
0.6428	0.3864	0.6428	0.2751	0.6428	0.2466	0.6428	0.2234	0.6428	0.2139	0.6428	0.2039	0.6428	0.1896
0.6734	0.3983	0.6734	0.2751	0.6734	0.251	0.6734	0.2354	0.6734	0.2284	0.6734	0.2154	0.6734	0.1984
0.7055	0.3983	0.7055	0.2895	0.7055	0.2641	0.7055	0.2526	0.7055	0.2425	0.7055	0.2254	0.7055	0.2065
0.7391	0.6097	0.7391	0.3987	0.7391	0.3252	0.7391	0.2766	0.7391	0.2581	0.7391	0.2297	0.7391	0.208
0.7743	0.6097	0.7743	0.3987	0.7743	0.3252	0.7743	0.287	0.7743	0.2697	0.7743	0.2412	0.7743	0.2094
0.8111	0.6287	0.8111	0.4148	0.8111	0.3607	0.8111	0.3191	0.8111	0.2867	0.8111	0.2412	0.8111	0.2094
0.8497	0.6287	0.8497	0.4148	0.8497	0.3768	0.8497	0.3473	0.8497	0.3221	0.8497	0.2809	0.8497	0.2363
0.8902	0.6527	0.8902	0.4263	0.8902	0.3768	0.8902	0.3473	0.8902	0.3236	0.8902	0.2939	0.8902	0.2537
0.9326	0.6829	0.9326	0.4768	0.9326	0.4187	0.9326	0.376	0.9326	0.344	0.9326	0.299	0.9326	0.2562
0.977	0.9086	0.977	0.5785	0.977	0.4758	0.977	0.4112	0.977	0.3674	0.977	0.3135	0.977	0.2721
1.0235	0.9086	1.0235	0.5785	1.0235	0.517	1.0235	0.4689	1.0235	0.429	1.0235	0.368	1.0235	0.3069
1.0723	0.9086	1.0723	0.5886	1.0723	0.5252	1.0723	0.4728	1.0723	0.4295	1.0723	0.3754	1.0723	0.318
1.1233	1.2562	1.1233	0.759	1.1233	0.6339	1.1233	0.5449	1.1233	0.4784	1.1233	0.3889	1.1233	0.318
1.1768	1.2562	1.1768	0.759	1.1768	0.6339	1.1768	0.5449	1.1768	0.4784	1.1768	0.4006	1.1768	0.3289
1.2328	1.2562	1.2328	0.8302	1.2328	0.7291	1.2328	0.6491	1.2328	0.5837	1.2328	0.4845	1.2328	0.3864
1.2916	1.2562	1.2916	0.9189	1.2916	0.7993	1.2916	0.7058	1.2916	0.6308	1.2916	0.5188	1.2916	0.4097
1.353	1.2562	1.353	0.9189	1.353	0.7993	1.353	0.7058	1.353	0.6308	1.353	0.5188	1.353	0.4097
1.4175	1.3538	1.4175	0.9674	1.4175	0.8219	1.4175	0.7323	1.4175	0.6639	1.4175	0.5631	1.4175	0.4667
1.485	1.3538	1.485	0.9674	1.485	0.8219	1.485	0.7371	1.485	0.6874	1.485	0.5977	1.485	0.4967
1.5557	1.5417	1.5557	0.9739	1.5557	0.8219	1.5557	0.7371	1.5557	0.6874	1.5557	0.5977	1.5557	0.5028
1.6298	1.6087	1.6298	1.0257	1.6298	0.9121	1.6298	0.8203	1.6298	0.7505	1.6298	0.6443	1.6298	0.5288
1.7074	1.6087	1.7074	1.0361	1.7074	0.9722	1.7074	0.8761	1.7074	0.795	1.7074	0.6704	1.7074	0.5676
1.7887	1.8947	1.7887	1.0361	1.7887	0.9722	1.7887	0.8761	1.7887	0.795	1.7887	0.6869	1.7887	0.5915
1.8738	1.8947	1.8738	1.0361	1.8738	0.9722	1.8738	0.8761	1.8738	0.795	1.8738	0.7041	1.8738	0.6047
1.963	1.8947	1.963	1.0361	1.963	0.9722	1.963	0.8761	1.963	0.7962	1.963	0.7116	1.963	0.6087
2.0565	1.8947	2.0565	1.0361	2.0565	0.9722	2.0565	0.8761	2.0565	0.7962	2.0565	0.7116	2.0565	0.6087
2.1544	1.8947	2.1544	1.0361	2.1544	0.9581	2.1544	0.8481	2.1544	0.7962	2.1544	0.7116	2.1544	0.6087
2.257	1.6082	2.257	1.0361	2.257	0.9149	2.257	0.8481	2.257	0.7962	2.257	0.7116	2.257	0.6087
2.3645	1.6082	2.3645	0.9942	2.3645	0.9149	2.3645	0.8481	2.3645	0.7962	2.3645	0.7116	2.3645	0.6087
2.4771	1.6082	2.4771	0.9942	2.4771	0.9149	2.4771	0.8481	2.4771	0.7904	2.4771	0.7069	2.4771	0.6029
2.595	1.6082	2.595	0.9942	2.595	0.9149	2.595	0.8481	2.595	0.7904	2.595	0.6952	2.595	0.5873

PTEE022.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 22E ~ North-South Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
2.7186	1.6082	2.7186	0.9202	2.7186	0.8531	2.7186	0.7931	2.7186	0.7395	2.7186	0.6495	2.7186	0.562
2.848	1.6082	2.848	0.9202	2.848	0.845	2.848	0.7403	2.848	0.6948	2.848	0.6221	2.848	0.5376
2.9836	1.6082	2.9836	0.9202	2.9836	0.845	2.9836	0.7403	2.9836	0.6947	2.9836	0.6133	2.9836	0.5177
3.1257	1.6082	3.1257	0.9202	3.1257	0.845	3.1257	0.7403	3.1257	0.6947	3.1257	0.6133	3.1257	0.5177
3.2745	1.6082	3.2745	0.9202	3.2745	0.845	3.2745	0.7403	3.2745	0.6947	3.2745	0.6133	3.2745	0.5177
3.4305	1.6082	3.4305	0.9202	3.4305	0.845	3.4305	0.7403	3.4305	0.6947	3.4305	0.6133	3.4305	0.5177
3.5938	1.6349	3.5938	0.9202	3.5938	0.845	3.5938	0.7403	3.5938	0.6947	3.5938	0.6133	3.5938	0.5177
3.7649	1.6349	3.7649	0.9202	3.7649	0.845	3.7649	0.7403	3.7649	0.6947	3.7649	0.6133	3.7649	0.5177
3.9442	1.6349	3.9442	0.9202	3.9442	0.845	3.9442	0.7403	3.9442	0.6947	3.9442	0.6133	3.9442	0.5177
4.132	1.6349	4.132	0.9202	4.132	0.845	4.132	0.7403	4.132	0.6947	4.132	0.6133	4.132	0.5177
4.3288	1.6926	4.3288	0.9596	4.3288	0.845	4.3288	0.7403	4.3288	0.6947	4.3288	0.6133	4.3288	0.5177
4.5349	1.6926	4.5349	1.0457	4.5349	0.9018	4.5349	0.7756	4.5349	0.6947	4.5349	0.6133	4.5349	0.5177
4.7508	1.6926	4.7508	1.0457	4.7508	0.9018	4.7508	0.7899	4.7508	0.7174	4.7508	0.6133	4.7508	0.5177
4.977	1.6926	4.977	1.0457	4.977	0.9018	4.977	0.7899	4.977	0.7174	4.977	0.6133	4.977	0.5177
5.214	1.6926	5.214	1.0457	5.214	0.9018	5.214	0.7899	5.214	0.7174	5.214	0.6133	5.214	0.5177
5.4623	1.603	5.4623	1.0457	5.4623	0.9018	5.4623	0.7899	5.4623	0.7174	5.4623	0.6133	5.4623	0.5177
5.7224	1.603	5.7224	1.0457	5.7224	0.9018	5.7224	0.7899	5.7224	0.7174	5.7224	0.6133	5.7224	0.5177
5.9948	1.603	5.9948	1.0457	5.9948	0.9018	5.9948	0.7899	5.9948	0.7174	5.9948	0.6133	5.9948	0.5177
6.2803	1.603	6.2803	1.0457	6.2803	0.9018	6.2803	0.7899	6.2803	0.7174	6.2803	0.6133	6.2803	0.5177
6.5793	1.603	6.5793	0.9892	6.5793	0.8782	6.5793	0.7899	6.5793	0.7174	6.5793	0.6083	6.5793	0.5013
6.8926	1.603	6.8926	0.9433	6.8926	0.7981	6.8926	0.72	6.8926	0.6594	6.8926	0.5693	6.8926	0.4789
7.2208	1.2885	7.2208	0.7992	7.2208	0.6983	7.2208	0.6182	7.2208	0.5792	7.2208	0.511	7.2208	0.4506
7.5646	1.2885	7.5646	0.7357	7.5646	0.6298	7.5646	0.5704	7.5646	0.5329	7.5646	0.4765	7.5646	0.4309
7.9248	1.2885	7.9248	0.6692	7.9248	0.5894	7.9248	0.5439	7.9248	0.5121	7.9248	0.466	7.9248	0.4241
8.3022	1.2885	8.3022	0.6243	8.3022	0.5267	8.3022	0.4982	8.3022	0.4778	8.3022	0.4544	8.3022	0.4241
8.6975	1.0592	8.6975	0.5768	8.6975	0.5267	8.6975	0.4982	8.6975	0.4767	8.6975	0.446	8.6975	0.4145
9.1116	1.0592	9.1116	0.5768	9.1116	0.4939	9.1116	0.4536	9.1116	0.442	9.1116	0.4229	9.1116	0.4013
9.5455	1.0592	9.5455	0.5768	9.5455	0.4939	9.5455	0.4536	9.5455	0.442	9.5455	0.4229	9.5455	0.4013
10	0.8146	10	0.531	10	0.4775	10	0.4536	10	0.442	10	0.4229	10	0.4013
10.4762	0.8146	10.4762	0.531	10.4762	0.4725	10.4762	0.4318	10.4762	0.4256	10.4762	0.4126	10.4762	0.3942
10.975	0.7982	10.975	0.531	10.975	0.4725	10.975	0.4261	10.975	0.412	10.975	0.3988	10.975	0.3816
11.4976	0.7266	11.4976	0.531	11.4976	0.4725	11.4976	0.4244	11.4976	0.4001	11.4976	0.3859	11.4976	0.3714
12.045	0.6949	12.045	0.4302	12.045	0.3979	12.045	0.3828	12.045	0.3795	12.045	0.3743	12.045	0.3648
12.6186	0.6949	12.6186	0.4263	12.6186	0.3839	12.6186	0.3789	12.6186	0.3746	12.6186	0.367	12.6186	0.3574
13.2194	0.6949	13.2194	0.4263	13.2194	0.3691	13.2194	0.3654	13.2194	0.3624	13.2194	0.3568	13.2194	0.3489

PTEE022.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 22E ~ North-South Responses ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.												
13.8489	0.6949	13.8489	0.4263	13.8489	0.3684	13.8489	0.3531	13.8489	0.3514	13.8489	0.3468	13.8489	0.3398
14.5083	0.6949	14.5083	0.4263	14.5083	0.3684	14.5083	0.3479	14.5083	0.3436	14.5083	0.3374	14.5083	0.3305
15.1991	0.6949	15.1991	0.4263	15.1991	0.3684	15.1991	0.3303	15.1991	0.3274	15.1991	0.3248	15.1991	0.3203
15.9228	0.6949	15.9228	0.4263	15.9228	0.3684	15.9228	0.3303	15.9228	0.3191	15.9228	0.3152	15.9228	0.3107
16.681	0.6949	16.681	0.4263	16.681	0.3684	16.681	0.3303	16.681	0.3102	16.681	0.304	16.681	0.301
17.4753	0.6949	17.4753	0.4263	17.4753	0.3684	17.4753	0.3303	17.4753	0.3102	17.4753	0.2998	17.4753	0.2959
18.3074	0.6949	18.3074	0.4263	18.3074	0.3684	18.3074	0.3303	18.3074	0.3102	18.3074	0.2949	18.3074	0.2912
19.1791	0.6949	19.1791	0.4263	19.1791	0.3684	19.1791	0.3303	19.1791	0.3102	19.1791	0.2867	19.1791	0.2854
20.0923	0.7176	20.0923	0.4263	20.0923	0.3684	20.0923	0.3303	20.0923	0.3102	20.0923	0.2866	20.0923	0.2811
21.049	0.7176	21.049	0.4263	21.049	0.3684	21.049	0.3303	21.049	0.3102	21.049	0.2866	21.049	0.2784
22.0513	0.7176	22.0513	0.4263	22.0513	0.3684	22.0513	0.3303	22.0513	0.3102	22.0513	0.2866	22.0513	0.2758
23.1013	0.7176	23.1013	0.3871	23.1013	0.3411	23.1013	0.3241	23.1013	0.3102	23.1013	0.2866	23.1013	0.2728
24.2013	0.7176	24.2013	0.3785	24.2013	0.3411	24.2013	0.3172	24.2013	0.2996	24.2013	0.2743	24.2013	0.2684
25.3536	0.5748	25.3536	0.3598	25.3536	0.3013	25.3536	0.2826	25.3536	0.2697	25.3536	0.264	25.3536	0.2647
26.5609	0.5748	26.5609	0.3598	26.5609	0.3007	26.5609	0.2819	26.5609	0.2697	26.5609	0.264	26.5609	0.2628
27.8256	0.5698	27.8256	0.3224	27.8256	0.2932	27.8256	0.2734	27.8256	0.2629	27.8256	0.2613	27.8256	0.2603
29.1505	0.4937	29.1505	0.3224	29.1505	0.2932	29.1505	0.2734	29.1505	0.2585	29.1505	0.2561	29.1505	0.2571
30.5386	0.4049	30.5386	0.3224	30.5386	0.2867	30.5386	0.2633	30.5386	0.2559	30.5386	0.2553	30.5386	0.2556
31.9927	0.2797	31.9927	0.2618	31.9927	0.2573	31.9927	0.2565	31.9927	0.2559	31.9927	0.2553	31.9927	0.2549
33.516	0.2539	33.516	0.2548	33.516	0.2549	33.516	0.2548	33.516	0.2546	33.516	0.2543	33.516	0.2539
35.1119	0.2533	35.1119	0.2532	35.1119	0.2531	35.1119	0.2531	35.1119	0.253	35.1119	0.2529	35.1119	0.2527
36.7838	0.252	36.7838	0.2519	36.7838	0.2518	36.7838	0.2518	36.7838	0.2518	36.7838	0.2517	36.7838	0.2516
38.5353	0.2507	38.5353	0.2507	38.5353	0.2506	38.5353	0.2506	38.5353	0.2506	38.5353	0.2506	38.5353	0.2505
40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2496	40.3702	0.2495
42.2924	0.2486	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487	42.2924	0.2487
44.3062	0.2478	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479	44.3062	0.2479
46.4159	0.2472	46.4159	0.2471	46.4159	0.2471	46.4159	0.2471	46.4159	0.2471	46.4159	0.2471	46.4159	0.2472
48.626	0.2464	48.626	0.2464	48.626	0.2464	48.626	0.2464	48.626	0.2464	48.626	0.2465	48.626	0.2465
50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458	50.9414	0.2458

PTEE024.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 24E ~ Vertical Responses - Slab/Wall Joints ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.1098	0.0291	0.1098	0.026	0.1098	0.0244	0.1098	0.0229	0.1098	0.022	0.1098	0.0212	0.1098	0.0204
0.115	0.0308	0.115	0.026	0.115	0.0244	0.115	0.0233	0.115	0.0229	0.115	0.0221	0.115	0.0213
0.1204	0.0313	0.1204	0.0262	0.1204	0.0245	0.1204	0.024	0.1204	0.0236	0.1204	0.0229	0.1204	0.0218
0.1262	0.0313	0.1262	0.027	0.1262	0.0257	0.1262	0.0246	0.1262	0.0241	0.1262	0.0233	0.1262	0.0221
0.1322	0.0313	0.1322	0.0271	0.1322	0.0258	0.1322	0.0247	0.1322	0.0242	0.1322	0.0234	0.1322	0.0225
0.1385	0.0313	0.1385	0.0277	0.1385	0.0265	0.1385	0.0254	0.1385	0.0245	0.1385	0.0235	0.1385	0.0225
0.1451	0.0316	0.1451	0.0294	0.1451	0.0282	0.1451	0.027	0.1451	0.0259	0.1451	0.0239	0.1451	0.0225
0.152	0.032	0.152	0.0299	0.152	0.0286	0.152	0.0273	0.152	0.0262	0.152	0.0241	0.152	0.0225
0.1592	0.033	0.1592	0.031	0.1592	0.0299	0.1592	0.0288	0.1592	0.0277	0.1592	0.0261	0.1592	0.0241
0.1668	0.0367	0.1668	0.0323	0.1668	0.0312	0.1668	0.0302	0.1668	0.0292	0.1668	0.0276	0.1668	0.0256
0.1748	0.0507	0.1748	0.0427	0.1748	0.0385	0.1748	0.035	0.1748	0.0321	0.1748	0.0284	0.1748	0.0264
0.1831	0.0586	0.1831	0.0492	0.1831	0.0442	0.1831	0.0399	0.1831	0.0362	0.1831	0.0306	0.1831	0.0266
0.1918	0.0586	0.1918	0.0492	0.1918	0.0442	0.1918	0.0399	0.1918	0.0362	0.1918	0.0306	0.1918	0.0267
0.2009	0.0586	0.2009	0.0492	0.2009	0.0442	0.2009	0.0399	0.2009	0.0362	0.2009	0.0323	0.2009	0.0293
0.2105	0.0586	0.2105	0.0492	0.2105	0.0442	0.2105	0.0399	0.2105	0.0384	0.2105	0.0357	0.2105	0.0322
0.2205	0.0586	0.2205	0.0492	0.2205	0.0453	0.2205	0.0426	0.2205	0.0406	0.2205	0.0376	0.2205	0.0337
0.231	0.0586	0.231	0.0492	0.231	0.0458	0.231	0.0439	0.231	0.042	0.231	0.0387	0.231	0.0352
0.242	0.0586	0.242	0.0509	0.242	0.0485	0.242	0.0463	0.242	0.0444	0.242	0.041	0.242	0.0368
0.2535	0.0648	0.2535	0.0572	0.2535	0.0528	0.2535	0.0488	0.2535	0.0453	0.2535	0.041	0.2535	0.0371
0.2656	0.0731	0.2656	0.0586	0.2656	0.0534	0.2656	0.049	0.2656	0.0453	0.2656	0.0424	0.2656	0.0402
0.2783	0.0816	0.2783	0.0598	0.2783	0.0534	0.2783	0.05	0.2783	0.0485	0.2783	0.0459	0.2783	0.0426
0.2915	0.0816	0.2915	0.0619	0.2915	0.058	0.2915	0.0546	0.2915	0.0516	0.2915	0.048	0.2915	0.0437
0.3054	0.0816	0.3054	0.0662	0.3054	0.062	0.3054	0.0583	0.3054	0.0548	0.3054	0.0488	0.3054	0.0448
0.3199	0.0816	0.3199	0.0701	0.3199	0.0659	0.3199	0.0622	0.3199	0.0588	0.3199	0.0531	0.3199	0.0468
0.3352	0.0871	0.3352	0.0766	0.3352	0.0706	0.3352	0.0658	0.3352	0.0624	0.3352	0.0565	0.3352	0.0496
0.3511	0.0905	0.3511	0.0805	0.3511	0.0748	0.3511	0.0698	0.3511	0.0653	0.3511	0.0578	0.3511	0.0502
0.3678	0.1216	0.3678	0.0951	0.3678	0.0823	0.3678	0.0722	0.3678	0.0653	0.3678	0.0578	0.3678	0.0502
0.3853	0.136	0.3853	0.1056	0.3853	0.0918	0.3853	0.0807	0.3853	0.0718	0.3853	0.0587	0.3853	0.0502
0.4037	0.136	0.4037	0.1056	0.4037	0.0918	0.4037	0.082	0.4037	0.076	0.4037	0.0663	0.4037	0.0569
0.4229	0.136	0.4229	0.1056	0.4229	0.0918	0.4229	0.0848	0.4229	0.0796	0.4229	0.0707	0.4229	0.0609
0.4431	0.136	0.4431	0.1056	0.4431	0.0932	0.4431	0.0884	0.4431	0.0838	0.4431	0.0755	0.4431	0.0652
0.4642	0.1375	0.4642	0.1059	0.4642	0.0974	0.4642	0.0915	0.4642	0.086	0.4642	0.0764	0.4642	0.0667
0.4863	0.1479	0.4863	0.1238	0.4863	0.1107	0.4863	0.0995	0.4863	0.0901	0.4863	0.082	0.4863	0.0725
0.5094	0.181	0.5094	0.138	0.5094	0.1214	0.5094	0.108	0.5094	0.0971	0.5094	0.0861	0.5094	0.0744

PTEE024.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 24E ~ Vertical Responses - Slab/Wall Joints ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping	0.50%		2%		3%		4%		5%		7%		10%
Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.	Freq.	Accel.
0.5337	0.2215	0.5337	0.1602	0.5337	0.134	0.5337	0.1151	0.5337	0.1024	0.5337	0.0861	0.5337	0.0744
0.5591	0.2215	0.5591	0.1602	0.5591	0.134	0.5591	0.1151	0.5591	0.1024	0.5591	0.0884	0.5591	0.0754
0.5857	0.2215	0.5857	0.1602	0.5857	0.134	0.5857	0.1151	0.5857	0.1024	0.5857	0.094	0.5857	0.0825
0.6136	0.2215	0.6136	0.1602	0.6136	0.134	0.6136	0.1175	0.6136	0.1108	0.6136	0.1001	0.6136	0.0874
0.6428	0.2268	0.6428	0.163	0.6428	0.1365	0.6428	0.1175	0.6428	0.1126	0.6428	0.1027	0.6428	0.0894
0.6734	0.2268	0.6734	0.163	0.6734	0.1377	0.6734	0.128	0.6734	0.12	0.6734	0.1074	0.6734	0.0928
0.7055	0.2268	0.7055	0.163	0.7055	0.1377	0.7055	0.128	0.7055	0.12	0.7055	0.1086	0.7055	0.0945
0.7391	0.2268	0.7391	0.163	0.7391	0.1413	0.7391	0.1333	0.7391	0.1253	0.7391	0.1108	0.7391	0.0945
0.7743	0.3163	0.7743	0.2131	0.7743	0.1804	0.7743	0.1581	0.7743	0.1421	0.7743	0.1213	0.7743	0.1037
0.8111	0.3163	0.8111	0.2131	0.8111	0.1804	0.8111	0.1581	0.8111	0.1421	0.8111	0.1213	0.8111	0.1064
0.8497	0.3163	0.8497	0.2131	0.8497	0.1804	0.8497	0.1652	0.8497	0.1528	0.8497	0.133	0.8497	0.112
0.8902	0.3163	0.8902	0.2131	0.8902	0.1856	0.8902	0.17	0.8902	0.1571	0.8902	0.1368	0.8902	0.1165
0.9326	0.484	0.9326	0.298	0.9326	0.2451	0.9326	0.2142	0.9326	0.192	0.9326	0.1628	0.9326	0.1368
0.977	0.484	0.977	0.298	0.977	0.2451	0.977	0.2142	0.977	0.192	0.977	0.171	0.977	0.15
1.0235	0.484	1.0235	0.298	1.0235	0.2451	1.0235	0.2142	1.0235	0.1926	1.0235	0.1805	1.0235	0.1621
1.0723	0.484	1.0723	0.298	1.0723	0.2615	1.0723	0.2409	1.0723	0.2242	1.0723	0.1989	1.0723	0.1731
1.1233	0.5753	1.1233	0.3411	1.1233	0.2701	1.1233	0.2409	1.1233	0.2242	1.1233	0.1989	1.1233	0.1746
1.1768	0.5753	1.1768	0.3734	1.1768	0.3107	1.1768	0.2749	1.1768	0.2469	1.1768	0.213	1.1768	0.1874
1.2328	0.5753	1.2328	0.3807	1.2328	0.3438	1.2328	0.3132	1.2328	0.2882	1.2328	0.2506	1.2328	0.2132
1.2916	0.5753	1.2916	0.4139	1.2916	0.3646	1.2916	0.3262	1.2916	0.2999	1.2916	0.2601	1.2916	0.2214
1.353	0.6629	1.353	0.4139	1.353	0.3646	1.353	0.3329	1.353	0.3146	1.353	0.2846	1.353	0.2493
1.4175	0.6629	1.4175	0.429	1.4175	0.3788	1.4175	0.3575	1.4175	0.3384	1.4175	0.3064	1.4175	0.271
1.485	0.6629	1.485	0.457	1.485	0.4099	1.485	0.3825	1.485	0.3581	1.485	0.32	1.485	0.2847
1.5557	0.6629	1.5557	0.4867	1.5557	0.4466	1.5557	0.4193	1.5557	0.3959	1.5557	0.3551	1.5557	0.3075
1.6298	0.8057	1.6298	0.5109	1.6298	0.4763	1.6298	0.4473	1.6298	0.4224	1.6298	0.3819	1.6298	0.335
1.7074	0.8379	1.7074	0.6416	1.7074	0.5704	1.7074	0.5139	1.7074	0.4676	1.7074	0.4014	1.7074	0.3559
1.7887	1.0345	1.7887	0.7676	1.7887	0.6799	1.7887	0.6122	1.7887	0.5562	1.7887	0.4772	1.7887	0.4004
1.8738	1.0345	1.8738	0.8046	1.8738	0.7255	1.8738	0.6502	1.8738	0.5996	1.8738	0.5318	1.8738	0.4441
1.963	1.2645	1.963	0.838	1.963	0.7316	1.963	0.6502	1.963	0.5996	1.963	0.5683	1.963	0.4717
2.0565	1.3932	2.0565	0.838	2.0565	0.7316	2.0565	0.6698	2.0565	0.6339	2.0565	0.584	2.0565	0.4802
2.1544	1.3932	2.1544	0.838	2.1544	0.7316	2.1544	0.6698	2.1544	0.6389	2.1544	0.584	2.1544	0.4802
2.257	1.3932	2.257	0.838	2.257	0.7519	2.257	0.6898	2.257	0.6389	2.257	0.584	2.257	0.4802
2.3645	1.7479	2.3645	0.9979	2.3645	0.8154	2.3645	0.7361	2.3645	0.6766	2.3645	0.584	2.3645	0.4889
2.4771	2.068	2.4771	1.1705	2.4771	0.9105	2.4771	0.7993	2.4771	0.7332	2.4771	0.6216	2.4771	0.5073
2.595	2.142	2.595	1.1705	2.595	0.9105	2.595	0.871	2.595	0.7663	2.595	0.6393	2.595	0.5251



PTEE024.grf ~ RPP-WTP Pretreatment Facility ISRS ~ Calc No.: 24590-PTF-S0C-S15T-00057, Rev. A ~ Frequency (cps) ~ Spectral Acceleration (g) ~  
 Figure 24E ~ Vertical Responses - Slab/Wall Joints ~ Elevation 0 ft. (Concrete) ~ Enveloped Spectra

Damping Freq.	0.50% Accel.	2% Freq.	2% Accel.	3% Freq.	3% Accel.	4% Freq.	4% Accel.	5% Freq.	5% Accel.	7% Freq.	7% Accel.	10% Freq.	10% Accel.
13.8489	1.0079	13.8489	0.6123	13.8489	0.5102	13.8489	0.4615	13.8489	0.4386	13.8489	0.4022	13.8489	0.3633
14.5083	1.0079	14.5083	0.6123	14.5083	0.5102	14.5083	0.4547	14.5083	0.4329	14.5083	0.3988	14.5083	0.3633
15.1991	1.0079	15.1991	0.6123	15.1991	0.5102	15.1991	0.4217	15.1991	0.4105	15.1991	0.3706	15.1991	0.3433
15.9228	1.0079	15.9228	0.6123	15.9228	0.5102	15.9228	0.4217	15.9228	0.4105	15.9228	0.3706	15.9228	0.3385
16.681	1.0079	16.681	0.6123	16.681	0.5102	16.681	0.4217	16.681	0.4105	16.681	0.3706	16.681	0.3385
17.4753	1.0079	17.4753	0.6123	17.4753	0.5102	17.4753	0.4217	17.4753	0.4105	17.4753	0.3703	17.4753	0.3348
18.3074	1.0079	18.3074	0.6123	18.3074	0.5102	18.3074	0.4136	18.3074	0.4017	18.3074	0.3481	18.3074	0.3209
19.1791	1.0079	19.1791	0.6123	19.1791	0.5102	19.1791	0.4136	19.1791	0.4017	19.1791	0.3481	19.1791	0.3122
20.0923	0.6551	20.0923	0.4391	20.0923	0.419	20.0923	0.3759	20.0923	0.3461	20.0923	0.319	20.0923	0.2989
21.049	0.6551	21.049	0.4391	21.049	0.419	21.049	0.3759	21.049	0.3461	21.049	0.3119	21.049	0.2909
22.0513	0.6551	22.0513	0.4391	22.0513	0.419	22.0513	0.3759	22.0513	0.3461	22.0513	0.3119	22.0513	0.2881
23.1013	0.4513	23.1013	0.3434	23.1013	0.3322	23.1013	0.3192	23.1013	0.3064	23.1013	0.2882	23.1013	0.278
24.2013	0.4513	24.2013	0.3354	24.2013	0.3097	24.2013	0.2945	24.2013	0.286	24.2013	0.2772	24.2013	0.2733
25.3536	0.4513	25.3536	0.2912	25.3536	0.2849	25.3536	0.2812	25.3536	0.2777	25.3536	0.2725	25.3536	0.269
26.5609	0.4513	26.5609	0.2865	26.5609	0.2793	26.5609	0.2755	26.5609	0.2728	26.5609	0.269	26.5609	0.265
27.8256	0.4513	27.8256	0.2865	27.8256	0.2752	27.8256	0.2694	27.8256	0.2651	27.8256	0.2626	27.8256	0.2598
29.1505	0.4513	29.1505	0.2865	29.1505	0.2672	29.1505	0.2622	29.1505	0.2586	29.1505	0.2556	29.1505	0.2542
30.5386	0.4513	30.5386	0.2865	30.5386	0.2637	30.5386	0.2581	30.5386	0.2572	30.5386	0.2554	30.5386	0.2534
31.9927	0.2716	31.9927	0.2566	31.9927	0.2561	31.9927	0.2556	31.9927	0.2551	31.9927	0.2541	31.9927	0.2527
33.516	0.2543	33.516	0.2538	33.516	0.2536	33.516	0.2533	33.516	0.253	33.516	0.2524	33.516	0.2515
35.1119	0.2519	35.1119	0.2517	35.1119	0.2515	35.1119	0.2514	35.1119	0.2512	35.1119	0.2508	35.1119	0.2502
36.7838	0.2501	36.7838	0.25	36.7838	0.2499	36.7838	0.2498	36.7838	0.2496	36.7838	0.2494	36.7838	0.249
38.5353	0.2486	38.5353	0.2485	38.5353	0.2485	38.5353	0.2484	38.5353	0.2483	38.5353	0.2481	38.5353	0.2479
40.3702	0.2474	40.3702	0.2473	40.3702	0.2473	40.3702	0.2472	40.3702	0.2472	40.3702	0.247	40.3702	0.2468
42.2924	0.2463	42.2924	0.2463	42.2924	0.2462	42.2924	0.2462	42.2924	0.2461	42.2924	0.2461	42.2924	0.2459
44.3062	0.2454	44.3062	0.2453	44.3062	0.2453	44.3062	0.2453	44.3062	0.2453	44.3062	0.2452	44.3062	0.2451
46.4159	0.2446	46.4159	0.2445	46.4159	0.2445	46.4159	0.2445	46.4159	0.2445	46.4159	0.2444	46.4159	0.2444
48.626	0.2438	48.626	0.2438	48.626	0.2438	48.626	0.2438	48.626	0.2438	48.626	0.2437	48.626	0.2437
50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431	50.9414	0.2431

Quarter Ending March 31, 2012

24590-PTF-PCN-ENV-10-036

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**Hanford Facility RCRA Permit Modification Notification Form**  
**Part III, Operating Unit 10**  
**Waste Treatment and Immobilization Plant**

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Page 2 of 4: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant  
Replace mechanical data sheets and equipment assembly drawings for the PTF Ultrafiltration Feed  
Preparation Vessels (UFP-VSL-00001A and UFP-VSL-00001B) in Appendix 8.6 of the Dangerous Waste  
Permit (DWP).

Submitted by Co-Operator:

Donna Busche      1/31/12  
D. M. Busche      Date

Reviewed by ORP Program Office:

D. L. Noyes      2/23/12  
D. L. Noyes      Date

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### Hanford Facility RCRA Permit Modification Notification Form

Unit: <b>Waste Treatment and Immobilization Plant</b>	Permit Part: <b>Part III, Operating Unit 10</b>
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**Description of Modification:**

The purpose of this Class 1 prime modification is to update the mechanical data sheets and the equipment assembly drawings for the PTF Ultrafiltration Feed Preparation Vessels (UFP-VSL-00001A and UFP-VSL-00001B) in Appendix 8.6 of the DWP. This modification includes also four new equipment drawings (PTF-MV-UFP-00027001 through PTF-MV-UFP-00027004) that are necessary to show additional detail.

The following mechanical data sheets and equipment assembly drawings are being submitted to replace the documents currently in Appendix 8.6. The increase in the number of equipment assembly drawings submitted results from converting each source drawing into three drawings to provide a clearer representation of the system, including additional details for internal assemblies:

Appendix 8.6			
Replace:	24590-PTF-MVD-UFP-00001, Rev. 11	With:	24590-PTF-MVD-UFP-00001, Rev. 12
	24590-PTF-MVD-UFP-P0002, Rev. 1		24590-PTF-MVD-UFP-00002, Rev. 12
	24590-PTF-MV-UFP-P0001, Rev. 1		24590-PTF-MV-UFP-00001001, Rev. 1
			24590-PTF-MV-UFP-00001002, Rev. 1
			24590-PTF-MV-UFP-00001003, Rev. 1
	24590-PTF-MV-UFP-P0002, Rev. 2		24590-PTF-MV-UFP-00002001, Rev. 1
			24590-PTF-MV-UFP-00002002, Rev. 1
			24590-PTF-MV-UFP-00002003, Rev. 1

The following equipment assembly drawings are newly submitted to accommodate additional detail:

Appendix 8.6			
Replace:	NA	With:	24590-PTF-MV-UFP-00027001, Rev. 0
			24590-PTF-MV-UFP-00027002, Rev. 0
			24590-PTF-MV-UFP-00027003, Rev. 0
			24590-PTF-MV-UFP-00027004, Rev. 0

This modification requests Ecology approval and incorporation into the permit the specific changes to the above DWP documents and the four new documents. Conversion from one to three drawings represents a major revision and no revision clouds are required. Revisions are the result of ongoing design (changes from vendor preliminary data to vendor detailed design), seismic and mixing analyses, and general criteria from design verification review. The following identifies the significant changes that have been incorporated:

**Mechanical Data Sheets (24590-PTF-MVD-UFP-00001):**

- Modified, deleted, and added notes, and updated references
- Added four Pulse Jet Mixers (PJM) and updated Design Considerations for Loads Induced by PJMs, Hydrodynamic Loads Due to PJM Operations, and Equipment Cyclic Data Sheets. Updated Nozzle Loads table and table notes

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Mechanical Data Sheets (24590-PTF-MVD-UPF-00002):

- Modified, deleted, and added notes, and updated references including addition of Attachment 1
- Added four PJMs and added sections for Design Considerations for Loads Induced by PJMs, Hydrodynamic Loads Due to PJM Operations, and PJM Overblow Loads
- Expanded Equipment Cyclic Data Sheet to include sheets for Parent Vessel, PJMs, and Steam Spargers
- Added Nozzle Loads table
- Added Equipment Identification sheet and Equipment Qualification Datasheet

Equipment Assembly Drawings (24590-PTF-MV-UFP-00001001, 24590-PTF-MV-UFP-00001002, and 24590-PTF-MV-UFP-00001003; and 24590-PTF-MV-UFP-00002001, 24590-PTF-MV-UFP-00002002, and 24590-PTF-MV-UFP-00002003):

- Modified, deleted, and added notes, holds, and references
- Modified elevation and plan views, and Sections A-A and B-B shown on sheet 1 of 3; no clouds used to indicate changes
- Added Details 3 and 4 to sheet 1 of 3; expanded Detail 2 and moved to sheet 2 of 3
- Added sheets (2 of 3 and 3 of 3) with nozzle and PJM supports in plan, elevation, section, and detail views. Note that sheets 2 of 3 and 3 of 3 incorporate DCN requirements as modified by the results of calculation 24590-PTF-MC-UFP-00022. For example, the calculation determined that integral pads specified by DCN 24590-PTF-MVN-UFP-00032 were not required and, consequently, a table with information on integral pads, as specified by the DCN, is not included in these drawings
- Added six nozzles (N65-N71) for instruments and steam spargers
- Note: Reference Drawings table will be updated per DCN 24590-PTF-MVN-UFP-00048 to include the four new drawings submitted with this PCN

Equipment Assembly Drawings (24590-PTF-MV-UFP-00027001, 24590-PTF-MV-UFP-00027002, 24590-PTF-MV-UFP-00027003, and 24590-PTF-MV-UFP-00027004):

- Added mixing assessment equipment changes in plan, elevation, section, and detail views
- Added nozzle tables for eight new nozzles (N72-N79) for each vessel for air/vacuum to PJMs and camera ports

This modification requests Ecology approval and incorporation of the following outstanding change document(s) into the permit. Although not yet incorporated into the revised documents included in this PCN, the listed outstanding change document(s) are intended to be incorporated into the permit:

24590-PTF-MV-UFP-00001001 and 24590-PTF-MV-UFP-00002001: 24590-PTF-MVN-UFP-00048 and 24590-WTP-SDDR-MS-10-00019

*NOTE: DCN 24590-PTF-MVN-UFP-00048 added references to the drawings 24590-PTF-MV-UFP-00027001, -00027002, -00027003 and -00027004, which illustrate the addition of four new PJMs and the restructure of UFP-VSL-00001A/B.*

24590-PTF-MV-UFP-00001002: 24590-WTP-SDDR-MS-09-00102 and 24590-WTP-SDDR-MS-09-00110

24590-PTF-MV-UFP-00002002: 24590-WTP-SDDR-MS-09-00102, 24590-WTP-SDDR-MS-09-00110, and 24590-WTP-SDDR-MS-09-00118

24590-PTF-MV-UFP-00027001: 24590-WTP-MVN-M80T-00001

24590-PTF-MV-UFP-00027002: 24590-WTP-SDDR-MS-11-00271

24590-PTF-MV-UFP-00027004: 24590-WTP-SDDR-MS-11-00142, 24590-WTP-SDDR-MS-11-00143, 24590-WTP-SDDR-MS-11-00177, 24590-WTP-SDDR-MS-11-00270, and 24590-WTP-SDDR-MS-12-00002

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24590-PTF-PCN-ENV-10-036

WAC 173-303-830 Modification Class:	Class 1	Class <sup>1</sup> 1	Class 2	Class 3
Please mark the Modification Class:		X		
Enter relevant WAC 173-303-830, Appendix I Modification citation number: NA				
Enter wording of WAC 173-303-830, Appendix I Modification citation:				
In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class <sup>1</sup> 1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."				
Modification Approved/Concur: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> Denied (state reason below) Reason for denial:	Reviewed by Ecology:  A. Carlson <span style="float: right;">Date 3-16-12</span>			



# MECHANICAL DATASHEET: VESSEL

PLANT ITEM No.  
24590-PTF-MV-UFP-VSL-00001A



Project:	<b>RPP-WTP</b>	P&IDs:	<b>24590-PTF-MG-UFP-00001001, 00001002, 00015002, 00027007</b>
Project No:	<b>24590</b>	Calculations:	<b>Attachment 1</b>
Project Site:	<b>Hanford</b>	Vessel Drawings:	<b>24590-PTF-MV-UFP-00001001, 00001002, 00001003</b>
Description:	<b>Ultrafiltration Feed Preparation Vessel</b>	Reports:	<b>Attachment 1</b>

### Reference Data

Charge Vessels (Tag Numbers)	<b>N/A</b>
Pulsejet Mixers / Agitators (Tag Numbers)	<b>UFP-PJM-00001, UFP-PJM-00002, UFP-PJM-00003, UFP-PJM-00004, UFP-PJM-00044, UFP-PJM-00053, UFP-PJM-00105, UFP-PJM-00106, UFP-PJM-00108, UFP-PJM-00109, UFP-PJM-00110, UFP-PJM-00111</b>
RFDs/Pumps (Tag Numbers)	<b>N/A</b>

### Design Data

Quality Level	<b>Q (See Note 18)</b>	Fabrication Specs	<b>24590-WTP-3PS-MV00-T0001</b>	
Seismic Category	<b>SC-1</b>	Design Code	<b>ASME Section VIII, Division 1</b>	
Service/Contents	<b>Radioactive Liquid</b>	Code Stamp	<b>Yes</b>	
Design Specific Gravity	<b>1.5</b>	NB Registration	<b>Yes</b>	
Maximum Operating Volume	gal <b>64066</b> <sup>12</sup>	Weights (lbs)	Empty	Operating
Total Volume	gal <b>75119</b> <sup>12</sup>	Estimated <sup>12</sup>	<b>220,440</b>	<b>1,152,000</b>
Equipment Qualification	<b>See EQD Section</b>			
			Test	<b>833,400</b>

Inside Diameter	inch	<b>240</b>	Wind Design	<b>Not Required</b>
Length/Height (TL-TL)	inch	<b>303.6</b> <sup>12</sup>	Snow Design	<b>Not Required</b>
			Seismic Design	<b>24590-WTP-3PS-MV00-T0002</b>
Internal Pressure	psig	<b>ATM</b>	Vessel Operating	<b>15</b>
External Pressure	psig	<b>1.5</b>	Vessel Design	<b>2.0</b>
		<b>(Note 3)</b>	Coil/Jacket Design	<b>0.0</b>
			Sparger Operating	<b>135</b>
			Sparger Design	<b>160</b>
Temperature	°F	<b>194</b>	Postweld Heat Treat	<b>Not Required</b>
Min. Design Metal Temp.	°F	<b>40</b>	Corrosion Allowance	Inch <b>0.040 (Note 12, 13, 20)</b>
		<b>230</b> <sup>12</sup>		
		<b>230</b> <sup>12</sup>		
		<b>358</b>		
		<b>375</b>		

### Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	<b>SA 240 316 (Note 1)</b>	<b>See Drawing</b>	<b>Auxiliary (Note 8)</b>
Shell	<b>SA 240 316 (Note 1)</b>	<b>See Drawing</b>	<b>Primary (Note 8)</b>
Bottom Head	<b>SA 240 316 (Note 1)</b>	<b>See Drawing</b>	<b>Primary (Note 8)</b>
Support	<b>SA 240 304 (Note 1)</b>	<b>See Drawing</b>	<b>N/A</b>
Jacket/Coils/Half-Pipe Jacket	<b>SA 240 316 (Note 1, Note 1a)</b>	<b>See Drawing</b>	<b>N/A</b>
Internals (UNO)	<b>SA 240 316 (Note 1)</b>	<b>See Drawing</b>	
Pipe Nozzles	<b>SA 312 TP316 (Note 1, Note 1b)</b>	<b>See Drawing</b>	<b>Primary (Note 8)</b>
Forgings/ Bar stock	<b>SA 182 F316 (Note 1)</b>	<b>See Drawing</b>	<b>N/A</b>
Wash Ring Pipe	<b>SA 312 TP316 (seamless) (Note 1)</b>	<b>See Drawing</b>	<b>N/A</b>
Bolting/Gaskets	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
Wear Plates	<b>SA 240 316 (Note 1)</b>	<b>See Drawing</b>	<b>N/A</b>
Steam Spargers	<b>SB 622 (seamless) UNS N10276</b>	<b>See Drawing</b>	<b>Auxiliary (Note 8)</b>
PJM Cone <sup>12</sup>	<b>SA 494 TP CX2MW (Cast Cones)</b>	<b>See Drawing</b>	<b>N/A</b>
	<b>SA 240 TP 316 (Fabricated Cones)</b>	<b>See Drawing</b>	<b>N/A</b>

### Miscellaneous Data

Orientation	<b>Vertical</b>	Support Type	<b>Skirt</b>
Insulation Function	<b>Not Applicable</b>	Insulation Material	<b>Not Applicable</b>
Insulation Thickness (inch)	<b>Not Applicable</b>	Internal Finish	<b>(Note 2)</b>
		External Finish	<b>(Note 2)</b>



**MECHANICAL DATASHEET: VESSEL**

PLANT ITEM No.  
24590-PTF-MV-UFP-VSL-00001A

**Notes/Remarks**

- Note 1: Maximum 0.030% carbon.
- Note 1a. Cooling water jacket on the vessel shell is SA 240 304 0.030% max carbon. <sup>12</sup>
- Note 1b. Pipe material (SA312) to be seamless, use of plate material (SA 240) for nozzles shall have the seam weld 100% volumetrically examined
- Note 2: Welds de-scaled as laid.
- Note 3: External design pressure under the jacket shall be rated for the jacket internal design pressure plus vessel external design pressure to account for ventilation fan pressure. External design pressure of 2.0 psig is based on a normal operating pressure of -35 in WG (1.26 psig) with an additional margin (see 24590-PTF-M6C-PVP-00017).
- Note 4: Deleted
- Note 5: Deleted
- Note 6: Vessel volumes are approximate and do not account for the manufacturing tolerances, nozzles, and displacement of internals.
- Note 7: This vessel is in a Black Cell.
- Note 8: All welds forming part of the primary and auxiliary containment including nozzle attachment welds shall be subjected to 100% volumetric examination.
- Note 9: Contents of this document are Dangerous Waste Permit affecting.
- Note 10: Deleted. <sup>12</sup>
- Note 11: Deleted.
- Note 12: Seller shall provide wear plates for erosion control on the bottom head. Minimum wear plate thickness is 0.478". <sup>12</sup>
- Note 13: Ensure that an additional 0.251" is available for erosion in the lower 4" of the interior conical surface of pulse jet mixers based on SA 240 type 316 material. <sup>12</sup>
- Note 14: Deleted. <sup>12</sup>
- Note 15: Deleted.
- Note 16: Deleted.
- Note 17: Deleted. <sup>12</sup>
- Note 18: Vessel to be designed, fabricated, tested to Q, L-1 and Black Cell requirements defined in 24590-WTP-3PS-MV00-T0001. <sup>12</sup>
- Note 19: Deleted <sup>12</sup>
- Note 20: Corrosion allowance for jacket shall be 0.040 inch. <sup>12</sup>
- Note 20a. Localized corrosion/erosion allowance for the Steam Sparger holes is 0.020 inches. The steam sparger piping will have a total corrosion/erosion allowance of 0.135 (total for inside, outside, and general corrosion allowance [Reference CCN 233172]). The values used for the Steam Sparger corrosion/erosion (per CCN 233172) design will be superseded after issuance of the revised corrosion/erosion evaluation for this vessel. The CCN 233172 is tracked as an assumption requiring verification in the vessel seismic and stress analysis calculation. <sup>12</sup>
- Note 21: Changed the quality level, revised specific gravity, revised operating temperature, revised vessel external design pressure, revised design temperatures for vessel and jacket, revised Notes 3, 4, 14, 15, and 16, added Notes 1a, 1b, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, and 28, added functional/safety requirements, added seismic section, change to parent vessel cyclic data, change to hydrodynamic loads for normal operations, revised single overblow loads, added MOB loads, change to PJM cyclic data, added nozzle loads, added Equipment Qualification Data Sheet, added DOE Radioactive Material Disclaimer, added E&NS table and signature.
- Notes 22 - 28: Deleted.
- Note 29: If any Sections contain a revision triangle <sup>#</sup> next to the Section heading, this means the entire section has been revised or is new - the entire section must be reviewed for changes/additions. Revised E&NS screening statement supporting E&NS simplified review process. Added the Steam Sparging System which includes Material and corrosion call outs, additional nozzle loads and a Steam Sparger Section in the Equipment Cyclic Data Sheets. Modified/updated pressure and temperatures to match current P&ID Line Lists and removed the requirements for the Hot Nozzles (N18, N55, N56 & N57) which included deleting Note 16. Revisions to EQ Data Sheets as noted.
- Note 30: Deleted. <sup>12</sup>
- Note 31: Added 4 Pulse Jet Mixers (PJMs), Design Considerations for Loads Induced by Pulse Jet Mixers (PJMs), Hydrodynamic Loads Due to PJM Operations. Revised PJM Overblow Loads, Nozzle Loads, Notes for Nozzle Loads, and Equipment Qualification data to new form. Deleted Functional/Safety Requirements and Seismic section. Deleted Note 30 as this information is contained in the Process Report. <sup>12</sup>





**MECHANICAL DATASHEET: VESSEL**

PLANT ITEM No.  
24590-PTF-MV-UFP-VSL-00001A

**Equipment Cyclic Data Sheet – Parent Vessel**



Component Plant Item Number:	24590-PTF-MV-UFP-VSL-00001A				
Component Description	Ultrafiltration Feed Preparation Vessel				
<i>The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.</i>					
Materials of Construction	ASME SA240 316 with 0.030 % max. Carbon				
Design Life	40 Years				
Component Function and Life Cycle Description	The system receives waste feed from the Waste Feed Evaporation Process System (FEP), Waste Feed Receipt Vessels (FRP), and HLW Feed Receipt Vessel (HLP). The vessel is filled over a period of approximately 5 hours. If necessary, the vessel cools the waste prior to ultrafiltration operations. The precipitation of Sr/TRU compounds occurs in this vessel. The main transfer from this vessel occurs through a centrifugal pump to the Ultrafiltration Feed Vessels.				
<b>Load Type</b>		Min	Max	Number of Cycles	Comment
Design Pressure	psig	-2.0	15	10	Nominal assumption for testing, applied with 35 psig in cooling jacket
Operating Pressure	psig	-1.5 0	0 2.8	7.0E6 40	The vessel will remain at constant pressure depending upon the HVAC plant
Operating Temp	°F	59	194	12120	Minimum temperature is assumed to be the same on chilled water jacket.
Contents Specific Gravity		1.2	1.5	12120	Stress range is for empty to full. Minimum specific gravity is based on water in wall of vessel.
Contents Level	inch	0	350	12120	
<b>Localized Features</b>					
Cooling Jacket (operating conditions)		50°F chilled water inlet temp	N/A	12120	Chilled water input to the cooling jacket will cool the vessel contents.

**Cyclic Data Notes - Parent Vessel**

- Cycle increase: Increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.
- This vessel will be heated 12120 times over the 40 year life of the plant, per UFP batch cycle.

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



**MECHANICAL DATASHEET: VESSEL**

PLANT ITEM No.  
24590-PTF-MV-UFP-VSL-00001A

**Equipment Cyclic Data Sheet - PJMs** 12

Component Plant Item Number:	UFP-PJM-00001, UFP-PJM-00002, UFP-PJM-00003, UFP-PJM-00004, UFP-PJM-00044, UFP-PJM-00053, UFP-PJM-00105, UFP-PJM-00106, UFP-PJM-00108, UFP-PJM-00109, UFP-PJM-00110, UFP-PJM-00111
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 0.03 % max. 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 operating pressure and the minimum operating 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 loads shall be applied to the fully buoyant state, assume parent vessel is full for 50% of the PJM cycles.			
<b>Load Type</b>	Min	Max	Number of Cycles	Comment
Design Pressure      psig	FV	80	100	Nominal assumption for testing. Minimum design pressure is full vacuum (FV) for potential steam collapse.
Operating Pressure      psig	FV	41	9.7E6	
Operating Temperature      °F	59	194	12120	Same as Parent Vessel
Contents Specific Gravity	1.2	1.5	12120	Same as Parent Vessel
Contents Level      inch	Empty	Flooded	9.7E6	
Thrust      lbf	- 444	444	9.7E6	Conservative
<b>Localized Features</b>				
Nozzles	N/A			
Supports	Buoyant	Loaded	9.7E6	

**Cyclic Data Notes - PJMs**

- Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.
- This vessel will be heated 12120 times over the 40 year life of the plant, per UFP batch cycle. 12



**MECHANICAL DATASHEET: VESSEL**

PLANT ITEM No.  
24590-PTF-MV-UFP-VSL-00001A

**Equipment Cyclic Data Sheet – Steam Spargers**

Component Plant Item Number:	<i>There is no Component Plant Item Number associated with Nozzles N70 and N71.</i>
Component Description	<i>Steam Spargers</i>

*The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.*

Materials of Construction	<i>Hastelloy</i>						
Design Life	<i>40 Years</i>						
Component Function and Life Cycle Description	<i>The Steam Spargers will heat the process fluid until it gets up to temperature for digestion and will sustain this temperature for the time required to complete digestion. It will take up to approximately 9 hrs to heat and up to 8 hrs to digest (24590-WTP-RPT-ENG-08-016). The Steam Sparger is pressurized by air until the vessel is full and the steam is introduced. The vessel is heated up this occurs 12120 cycles. After vessel is heated the Steam Sparger is again pressurized by air.</i>						
<b>Load Type</b>	Min Steam	Max Steam	Min Air	Max Air	Number of Cycles	Comment	
Design Pressure	psig	<i>FV</i>	<i>160</i>	<i>-2.0</i>	<i>150</i>	<i>10</i>	<i>Nominal assumption for testing. Minimum design pressure is full vacuum for potential steam collapse.</i>
Design Temp.	°F	<i>50</i>	<i>375</i>	<i>50</i>	<i>140</i>	<i>N/A</i>	
Operating Pressure	psig	<i>-1.5</i>	<i>111/76</i>	<i>-1.5</i>	<i>150/51</i>	<i>12120</i>	<i>See EC-Note 2 below for Max Steam and Max Air Values. Conservative Cyclic Assumption, see EC-Note 3 below.</i>
Operating Temp	°F	<i>50</i>	<i>343/320</i>	<i>50</i>	<i>135/80</i>	<i>12120</i>	<i>See EC-Note 2 below for Max Steam and Max Air Values. Conservative Cyclic Assumption, see EC-Note 3 below.</i>
Contents Specific Gravity		<i>0.0</i>	<i>3.81</i> <i>SG air</i>		<i>11.0</i> <i>SG air</i>	<i>12120</i>	<i>Per Process Stream Properties, 24590-WTP-RPT-ENG-07-007, Rev. 0A, Table 4-18. Cycles per the Conservative Assumption, see notes below. The worst case is the pipe gets flooded, vessel SG used.</i>
Contents Specific Gravity w / liquid		<i>1.2</i> 	<i>1.5</i>				
<b>Localized Features</b>							
Nozzles: <i>N70, N71</i>		<i>59°F</i>	<i>375°F</i>			<i>12120</i>	



## MECHANICAL DATASHEET: VESSEL

PLANT ITEM No.  
24590-PTF-MV-UFP-VSL-00001A

### Cyclic Data Notes - Steam Spargers

**EC-Note 1:** Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.

**EC-Note 2:** The Steam lines are controlled by a Steam Control Valve (on the HPS-RK-17) upstream of the vessel. According to 24590-PTF-M6C-UFP-00021 the pressure drop across that valve will vary from 24 psi to 59 psi.

Therefore, with an upstream pressure prior to the valve of 135 psig (per the normal pressure of line 24590-PTF-PP-UFP-DB-03119-S11C-06-01 from both P&ID Line Lists 24590-PTF-M6X-UFP-00386 and 24590-PTF-M6X-UFP-00387) the range of pressure the Steam Sparger will see for normal operations will be from 111 psig (135 psig - 24 psig) to 76 psig (135 psig - 59 psig). The steam temperature is determined from the steam table for the correspondent pressure of 111 psig or 76 psig.

The Max Temperature and Max Pressure for the air purge cycle of the Steam Sparger System are per the PSA supply lines as defined in Notes 5 and 6 of P&ID Line Lists 24590-PTF-M6X-UFP-00386 and 24590-PTF-M6X-UFP-00387 respectively.

The Normal Temperature and Normal Pressure for the air purge cycle of the Steam Sparger System are per the normal values given for line 24590-PTF-PP-UFP-GQ-64454-S11C-011/2-01 in P&ID Line Lists 24590-PTF-M6X-UFP-00386 and 24590-PTF-M6X-UFP-00387.

The steam and air used in the Sparger operation varies over a short range during operation. These values are to be used such as to give the highest loading on the system/vessel. The pressure and temperatures values are shown in pairs at the extremes and should be used together, i.e., 111 psig and 343 F.

Minimum values are based on the vessel's minimum pressures and temperatures.

**EC-Note 3:** Conservative Cyclic Assumption is based on the following:

#### Cycles to Heat the Vessel

This vessel will be heated 12120 times over the 40 year life of the plant, per UFP batch cycle.  $\triangle_{12}$

#### Cycles to Maintain the Vessel Temperature

The steam nozzles are not planned to be cycled on/off for the temperature control valve on the steam supply line. Both of the semi-circle steam sparge rings are to be used for heat up of the vessel contents. Once the vessel contents reach digestion temperature, one of the semi-circle steam sparge ring will be shut off and purged with air. The remaining semi-circle steam sparge ring will be operated at reduced steam flowrate to maintain the temperature set point (see calculation 24590-PTF-MCC-UFP-00004 for steam flow rate requirements). Therefore, the cycles to maintain the vessel temperature is the same as the heating cycle, 12120 cycles.

The specific volume of the steam at 111 psig is 3.5 ft<sup>3</sup>/lb the density of air at 70 F is 0.075 lb/ft<sup>3</sup> the specific gravity is then:  
 $(1/3.5)/0.075 = 3.81$  in SG.

The specific gravity of air at 150 psig is then found by: The density of air at 70 F and 0 psig 0.075 lb/ft<sup>3</sup> and at 80 F and 150 psig 0.824 lb/ft<sup>3</sup> calculating  $0.824 / 0.075 = 11.0$  the SG<sub>air</sub>.

The sparger system is to be operated such: Air is to be used to keep the liquid out of the sparger during vessel filling and draining. After vessel is filled the air is replaced by steam through the sparger to heat the liquid to 194 F. One of the spargers is returned to air service after the liquid reaches 194 F. One of the spargers is used throttled back to maintain liquid temperature.

The Specific gravity of the vessel liquid is not significantly changed during the process, however the specific gravity of each batch can vary as noted above.

**EC-Note 4.** External design pressure under the jacket shall be rated for the jacket internal design pressure plus vessel external design pressure to account for ventilation fan pressure. External design pressure of 2.0 psig is based on a normal operating pressure of -35 in WG (1.26 psig) with an additional margin (see 24590-PTF-M6C-PVP-00017).  $\triangle_{12}$



## MECHANICAL DATASHEET: VESSEL

PLANT ITEM No.  
24590-PTF-MV-UFP-VSL-00001A

### Design Considerations for Loads Induced by Pulse Jet Mixers (PJMs)



Pulse Jet Mixers (PJMs) are designed to mix the vessel contents using a liquid jet discharge. PJMs are driven by compressed air. The mixing is required to enhance heat transfer, to break up hydrogen-containing particles, and to homogenize the solution. Normally, the PJMs are operated simultaneously within the parent vessel.

The PJMs operate in the following three cycles: Suction, Drive, and Vent. During the suction cycle a vacuum is created in the PJM headspace and the level within the PJM rises to fill the PJM. During the drive cycle the PJM is pressurized and liquid is discharged. During the vent cycle, the pressure in the headspace approaches atmospheric and the level within the PJM is allowed to reach equilibrium.

Vessel components shall be designed to withstand loading induced by PJM operations as described herein.

**Normal Operations:** Liquid flows around internal structures within the parent vessel producing hydrodynamic loads such as drag and vortex shedding.

To mitigate the dynamic effects, the following pipe sizes dipped internal to the vessel are required to have a minimum first natural frequency that is double the vortex shedding frequency:

Nominal Pipe Size	Minimum First Natural Frequency
1 inch	14 Hz*
2 inch	8.0 Hz*
3 inch	5.0 Hz**

\* See 24590-WTP-MVC-50-00001, Section 8.1.5.2

\*\* By extrapolation from 1 inch and 2 inch

**Overblow Condition:** Occasionally the drive cycle lasts too long and compressed air is discharged from the PJM. Overblows can also occur during system calibration. One or multiple PJMs may overblow at any time. These conditions induce acoustic and bubble rise loads on structures.

All internal components shall be designed for the combination of normal operational hydrodynamic loads and overblow loads. Single overblows (SOB) are assumed to act concurrently with the seismic event, however multiple overblows (MOB) are not assumed to act concurrently with the seismic event. Figure 1 (below) provides the acoustic load intensity that encompasses both SOB and MOB.

### Hydrodynamic Loads Due to PJM Operations



Normal operation imposes a cyclical load ranging between -0.15 and 0.25 psi in the radial direction and -0.15 to 0.15 psi in the vertical direction for 9.7E6 cycles. The hydrodynamic pressure applies 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.



**MECHANICAL DATASHEET: VESSEL**

PLANT ITEM No.  
24590-PTF-MV-UFP-VSL-00001A

**PJM Overblow Loads** 12

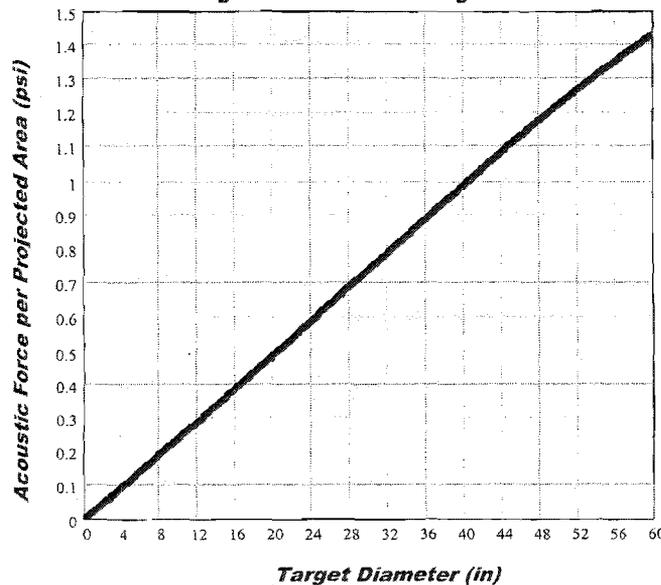
**Discussion:** During normal operation, pulse jet mixers (PJMs) mix the fluid by pulling in (suction) and pushing out (drive) fluid. During an upset condition, designated as an 'overblow', air is discharged following the drive cycle of one or more PJMs. The load consists of acoustic pressure (2Hz to 200Hz) developed in the first 200ms of the event and a load due to the bubble rising through the fluid.

The acoustic load and the bubble load are design loads as defined by ASME B&PVC, Section VIII, Division 1, UG-22, applied statically. The acoustic load is not added to the bubble rise load because they occur at different times during the overblow event.

Acoustic Load

- The acoustic design load in Figure 1 is applied to the visible (as viewed from the overblow origin) surface of cylindrical targets such as pipes, charge vessels, and PJMs. The load is applied in the direction normal to the principal axis of the target as illustrated in Figure 2. Note: The intended net effective load on the target is equal to the projected (i.e. cross-sectional) area of the object times the acoustic design load (psi) indicated in Figure 1.
- Each target is considered independent of the surrounding targets: e.g. the surrounding targets do not impede the acoustic wave by casting a shadow, as illustrated in Figure 2.
- The load is not applied to small supports such as gussets, brackets, tabs, clamps, and bolts because they are rigid and the pressure drop across the target is negligible.
- When the vessel contains multiple PJMs, the load from one PJM is independent of the load from other PJMs. The loads are not additive for multiple overblows.
- No internal components shall be placed within 5 PJM nozzle diameters ( $5 * 4 \text{ in} = 20 \text{ in}$ ) of a spherical zone centered at any overblowing PJM nozzle.

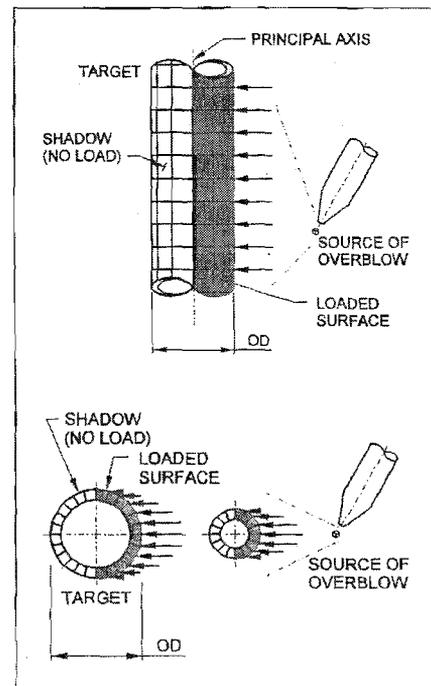
**Figure 1: Acoustic Design Load**



The following data is required to determine the load:

- Target Diameter
- Target Principal Axis
- Overblow Source Coordinates

**Figure 2: Load Application**



Number of Acoustic Cycles: **1000 events X 40 cycles/event for a total of 40,000 acoustic cycles.**

Bubble Rise Load: **A vertical force per projected area of 1.7 psi is applied to the surfaces in the 36-inch diameter cylindrical zone centered at the overblowing PJM(s). The bubble can be at any elevation above the overblowing PJM and only affects one zone (36-inch diameter region) at a time. When there are multiple PJMs in a vessel (MOB), each PJM has its own bubble. To simplify analysis the bubble can be applied in a continuous cylindrical zone above each PJM top head.**

Number Bubble Rise Cycles: **1000 events X 1 cycle/event for a total of 1000 cycles.**



**MECHANICAL DATASHEET: VESSEL**

**PLANT ITEM No.**  
24590-PTF-MV-UFP-VSL-00001A

Nozzle Loads 12

Nozzle	Design Nozzle Press(psig) (Note H)	Design Nozzle Temp (°F) (Note H & Note I)	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N02	170	230	3"	Weight	52	138	52	160	75	204
				Seismic	284	189	284	819	1227	1227
				Thermal	134	58	228	190	380	380
N04	15	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	33	29	44	49	97	97
N05	15	230	6"	Weight	N05 is parent nozzle, nozzle loads are applied via N05A, N05B, N05C					
				Seismic						
				Thermal						
N05A (Note E)	15	230	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	9	8	12	11	22	22
N05B (Note E)	100	230	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	9	8	12	12	22	22
N05C (Note E)	100	230	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	9	8	12	12	22	22
N07	75	230	4"	Weight	87	262	87	216	135	135
				Seismic	586	331	480	2534	2310	3890
				Thermal	113	131	150	360	720	720
N11	169	230	3"	Weight	52	203	52	119	75	75
				Seismic	284	256	284	952	1227	1227
				Thermal	66	76	88	303	380	380
N13	125	230	3"	Weight	52	131	52	119	75	89
				Seismic	471	373	669	1572	1227	1227
				Thermal	66	58	88	190	380	380
N15	15	230	3"	Weight	52	84	52	119	75	75
				Seismic	284	189	284	819	1227	1227
				Thermal	66	58	88	190	380	380
N16	125	230	3"	Weight	52	84	52	119	75	75
				Seismic	284	189	284	819	1227	1227
				Thermal	66	58	88	190	380	380
N18	195	230	6"	Weight	210	612	210	497	311	311
				Seismic	525	525	350	1750	1313	2625
				Thermal	780	1480	1400	6210	1000	1000
N19	15	230	8"	Weight	234	373	234	741	464	464
				Seismic	1285	858	1285	5159	7732	7732
				Thermal	340	303	455	1378	2740	2740
N22	15	230	1.5"	Weight	35	35	35	40	40	40
				Seismic	105	70	105	159	240	240
				Thermal	19	17	25	28	55	55



**MECHANICAL DATASHEET: VESSEL**

**PLANT ITEM No.**  
**24590-PTF-MV-UFP-VSL-00001A**

Nozzle	Design Nozzle Press (psig) (Note H)	Design Nozzle Temp (°F) (Note I)	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N23	170	230	3"	Weight	52	148	52	119	75	75
				Seismic	336	208	284	1164	1227	1782
				Thermal	66	58	88	388	380	380
N24	125	230	3"	Weight	52	164	52	119	75	75
				Seismic	399	1195	964	4020	1227	1227
				Thermal	66	136	88	213	380	380
N28	75	230	4"	Weight	87	146	87	216	135	135
				Seismic	480	320	480	1537	2310	2310
				Thermal	113	100	150	360	720	720
N30	75	230	4"	Weight	87	346	87	216	135	224
				Seismic	480	436	480	2340	2310	2310
				Thermal	113	100	150	360	720	720
N35	190	230	3"	Weight	52	86	52	119	75	75
				Seismic	284	189	284	819	1297	1227
				Thermal	66	58	88	190	380	380
N37	124	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	45	118	44	125	97	168
N38	124	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	33	42	51	186	97	97
N39	124	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	33	114	70	252	97	97
N40	124	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	732	415	415
				Thermal	33	81	44	49	97	97
N41	124	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	45	118	44	125	97	168
N42	124	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	33	69	68	254	97	97
N43	124	230	2"	Weight	50	62	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	33	29	44	126	97	97
N44	124	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	33	48	47	179	97	97
N47	170	230	2"	Weight	50	87	50	75	75	75
				Seismic	186	123	186	277	415	471
				Thermal	33	29	44	112	97	97
N48	170	230	2"	Weight	50	72	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	33	33	45	185	97	97



**MECHANICAL DATASHEET: VESSEL**

**PLANT ITEM No.**  
24590-PTF-MV-UFP-VSL-00001A

Nozzle	Design Nozzle Press(psig) (Note H)	Design Nozzle Temp (°F) (Note H & Note I)	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N49	170	230	2"	Weight	50	99	50	75	75	75
				Seismic	186	214	186	424	415	424
				Thermal	33	29	44	152	97	97
N51	170	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	429	415	431
				Thermal	33	38	44	64	97	97
N52	170	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	99	29	106	209	183	97
N53	125	230	3"	Weight	52	143	52	119	75	75
				Seismic	284	189	284	819	1227	1227
				Thermal	129	58	88	190	380	396
N54	15	230	8"	Weight	234	492	234	660	413	978
				Seismic	1750	2076	2450	2625	10500	8750
				Thermal	410	820	660	2390	5040	6290
N55 spare	15	230	6"	Weight	210	461	210	473	296	296
				Seismic	1160	788	788	1750	4204	5488
				Thermal	280	1330	1500	6390	1617	2404
N56 spare	15	230	2"	Weight	50	111	50	75	75	75
				Seismic	186	123	186	373	415	415
				Thermal	33	29	44	49	97	97
N57 spare	15	230	2"	Weight	50	105	50	75	75	230
				Seismic	186	123	186	277	415	415
				Thermal	148	30	44	49	97	97
N58 (Note F)	35	230	6"	Weight	210	335	210	598	374	374
				Seismic	1160	775	1160	4240	6367	6367
				Thermal	280	250	375	1023	2046	2046
N59	35	230	6"	Weight	210	459	210	401	251	660
				Seismic	1160	816	1160	2121	3183	2450
				Thermal	280	250	375	736	1371	1000
N60	15	230	3"	Weight	52	84	52	119	75	75
				Seismic	284	189	284	861	1663	1227
				Thermal	76	190	88	530	380	380
N61	15	230	24"	Weight	Manway					
				Seismic						
				Thermal						
N62	169	230	3"	Weight	100	150	100	200	200	200
				Seismic	284	189	284	819	1227	1227
				Thermal	66	58	88	190	380	380
N63	170	230	2"	Weight	50	60	50	75	75	75
				Seismic	322	123	186	219	289	656
				Thermal	33	29	44	49	97	97



**MECHANICAL DATASHEET: VESSEL**

**PLANT ITEM No.**  
24590-PTF-MV-UFP-VSL-00001A

Nozzle	Design Nozzle Press(psig) (Note H)	Design Nozzle Temp (°F) (Note H & Note I)	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N65	15	230	6"	Weight	N65 is parent nozzle, nozzle loads are applied via N65A, N65B, N65C					
				Seismic						
				Thermal						
N65A (Notes E&J)	15	230	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	9	8	12	12	22	22
N65B (Notes E&J)	100	230	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	9	8	12	12	22	22
N65C (Notes E&J)	100	230	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	9	8	12	12	22	22
N70 (Note K)	160	375	4"	Weight	87	359	87	216	135	224
				Seismic	586	436	480	2534	2310	3890
				Thermal	120	147	441	1838	720	720
N71 (Note K)	160	375	4"	Weight	87	359	87	216	135	224
				Seismic	586	436	480	2534	2310	3890
				Thermal	120	147	441	1838	720	720
N72 (Note L)	124	230	2"	Weight	50	62	50	75	75	75
				Seismic	268	140	186	732	415	809
				Thermal	56	352	237	489	100	168
N73 (Note L)	124	230	2"	Weight	50	62	50	75	75	75
				Seismic	268	140	186	732	415	809
				Thermal	56	352	237	489	100	168
N74 (Note L)	124	230	2"	Weight	50	62	50	75	75	75
				Seismic	268	140	186	732	415	809
				Thermal	56	352	237	489	100	168
N75 (Note L)	124	230	2"	Weight	50	62	50	75	75	75
				Seismic	268	140	186	732	415	809
				Thermal	56	352	237	489	100	168
N76	15	230	8"	Weight	475	750	475	1500	950	950
				Seismic	1313	875	1313	5163	7744	7744
				Thermal	600	550	800	2400	4800	4800
N77	15	230	8"	Weight	475	750	475	1500	950	950
				Seismic	1313	875	1313	5163	7744	7744
				Thermal	600	550	800	2400	4800	4800



**MECHANICAL DATASHEET: VESSEL**

**PLANT ITEM No.**  
**24590-PTF-MV-UFP-VSL-00001A**

**Notes for Nozzle Loads**

- A. *Direction of load application for shell nozzles is per diagrams in 24590-WTP-3PS-MV00-T0001, Appendix A.*
- B. *For nozzles in head: x = North/South, y = Vertical, and z = East/West - Vessel 0° defined as north.*
- C. *Deleted.*
- D. *Nozzle loads shown are to be used in place of those specified in 24590-WTP-3PS-MV00-T0001 – do not apply thermal reduction factors.*
- E. *Values provided at plate on top of parent nozzle.*
- F. *Values provided at jacket, not at skirt penetration.*
- G. *All Pretreatment RGM Seismic Piping Nozzle loads from Plant Design have a 1.75 load factor applied to all seismic loads to address coupling effects between the flexible vessels and piping in accordance with the Seismic Classification and Evaluation for the Pretreatment Facility Piping and Vessels 24590-WTP-RPT-ENG-09-040. (BNI use only, see 24590-WTP-GPG-ENG-0150 for nozzle load management).* 
- H. *Design Pressures and Temperatures to be used to qualify the nozzles only.* 
- I. *Nozzle temperatures that are equal or less than vessel design temperature shall use the vessel design temperature as the bounding temperature to perform the nozzle analysis. Nozzle temperatures that are greater than the vessel design temperature shall be used to analyze the hot nozzles.* 
- J. *Instrumentation bubbler nozzle loads for N65A, N65B, and N65C are based on instrumentation bubbler nozzle loads from N05A, N05B, and N05C.* 
- K. *Maximum enveloped nozzle loads from all UFP-VSL-1A/B 4" nozzles applied to N70 and N71.* 
- L. *Maximum enveloped loads from UFP-VSL-1A/B (N37 thru N44) applied to N72 thru N75.* 



Equipment Identification			
Full Component Tag Number or BNI Stock Code Number	24590-PTF-MV-UFP-VSL-00001A		Safety Classification
Equipment Datasheet Number	24590-PTF-MVD-UFP-00001		<input checked="" type="checkbox"/> SC <input type="checkbox"/> SS <input type="checkbox"/> APC-PAM All subcomponents are SC
Description	Ultrafiltration Feed Preparation Vessel		Seismic Category <input checked="" type="checkbox"/> SC-I <input type="checkbox"/> SC-II <input type="checkbox"/> SC-III <input type="checkbox"/> SC-IV <input type="checkbox"/> SC-III Seismic Interaction only All subcomponents are SC-I
Location (Facility / Building and Room No.)	PTF, Column Lines J/11.5, 0'-0" Elevation, Room P-0106		
Safety Function(s)	UFP-VSL-00001A (parent vessel) is considered a high active process vessel credited to prevent spills of large quantities of high activity process liquid and provide primary confinement for radioactive releases. Pulse Jet Mixers (PJM) provide a mixing function in the vessel to prevent hydrogen accumulation. Reference: 24590-WTP-PSAR-ESH-01-002-02		
Equipment Safety Function Type	<input checked="" type="checkbox"/> Passive Mechanical	<input type="checkbox"/> Active Mechanical	<input type="checkbox"/> Electrical
Seismic Safety Function	Seismic Operability Requirements		
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> During Seismic Event	<input checked="" type="checkbox"/> After Seismic Event	<input type="checkbox"/> None

Equipment Environmental Qualification (EEQ)				
(Parameter values stated in this section do not include process conditions or operation induced conditions)				
Classification of Environment <input type="checkbox"/> Mild <input checked="" type="checkbox"/> Harsh		Qualified Life (years) <input checked="" type="checkbox"/> 40 <input type="checkbox"/> Other		
Parameter Type/Units	Parameter Value	Parameter Duration (number)	Duration Units	WTP Source Document Number
<b>Normal Ambients</b>				
High Temperature (°F)	113	Note a	Years	24590-PTF-U0D-W16T-00001, E-Note 1
Low Temperature (°F)	59	Note b	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
High Relative Humidity (%RH)	90	Note c	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
Low Relative Humidity (%RH)	5	Note c	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
High Pressure (in.-w.g.)	0 (E-Note 2)	Note d	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
Low Pressure (in.-w.g.)	(-) 1.4 (E-Note 2)	Note d	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
Radiation Dose Rate (mRad/hr)	255000 (E-Note 4)	40 (E-Note 7)	Years (Note e-1)	24590-PTF-U0D-W16T-00001, E-Note 1
Plant/Process Induced Vibration	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Additional Normal Ambient Information:	N/A			



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

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## Equipment Environmental Qualification (EEQ) (continued)

Parameter Type/Units	Parameter Value	Parameter Duration (number)	Duration Units	WTP Source Document Number
<b>Abnormal Ambients</b>				
High Temperature (°F)	128	8	hours / year	24590-PTF-U0D-W16T-00001, E-Note 1
Low Temperature (°F)	40	Note b	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
High Relative Humidity (%RH)	100c	Note c	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
Low Relative Humidity (%RH)	6	Note c	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
High Pressure (in.-w.g)	4 (E-Note 2)	Note d	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
Low Pressure (in.-w.g)	(-) 7.3 (E-Note 2)	Note d	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
Radiation Dose Rate (mR/hr)	255000 (E-Note 4)	0 (E-Note 7)	Years (Note e-1)	24590-PTF-U0D-W16T-00001, E-Note 1
Exposure to Wet Sprinkler System	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		hours	24590-PTF-U0D-W16T-00001, E-Note 1
Additional Abnormal Ambient Information	N/A			
<b>Design Basis Events (DBE) Ambients</b>				
High Temperature (°F)	138	1000	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Low Temperature (°F)	40	Note b	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
High Relative Humidity (%RH)	100c	40	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Low Relative Humidity (%RH)	4	1000	hours	24590-PTF-U0D-W16T-00001, E-Note 1
High Pressure (in.-w.g)	4 (E-Note 2)	8	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Low Pressure (in.-w.g)	(-) 7.3 (E-Note 2)	1000	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Radiation Dose Rate (mR/hr)	255000 (E-Note 4)	0	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Submergence	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (E-Note 5)	N/A	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Chemical/Spray Exposure	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	12.5	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Additional DBE Information	N/A			

<b>DBE Chemical Exposure Details</b>
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# EQUIPMENT QUALIFICATION DATASHEET (EQD)

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<b>DBE Chemical Exposure Details</b>	
DBE Chemical Types / Concentrations	Process Rad Condensate Sodium Hydroxide 2M Sodium Permanganate 1M Strontium Nitrate 1M Water Nitric Acid (RDP09), 87°F, pH 2.5 Sodium Hydroxide (UFP04), 77°F, pH 15.5 Sodium Hydroxide (UFP33), 84°F, pH 14.5 Sodium Hydroxide (FEP01), 103°F, pH 14.5 Sodium Hydroxide (FEP08a), 104°F, pH 11.5 Sodium Hydroxide (FEP12a), 104°F, pH 11.5 Sodium Hydroxide (PWD01), 106°F, pH 14.0 Sodium Hydroxide (FRP02), 110°F, pH 14.5 Sodium Hydroxide (FRP13), 110°F, pH 14.5 Sodium Hydroxide (HLP11), 113°F, pH 14.5 Sodium Hydroxide (HLP12), 113°F, pH 15.0 Sodium Hydroxide (HLP13), 113°F, pH 15.0 Sodium Hydroxide (TCP05), 120°F, pH 15.0 Sodium Hydroxide (FRP01), 121°F, pH 14.5 Sodium Hydroxide (FEP19), 121°F, pH 15.0 Sodium Hydroxide (FRP14), 191°F, pH 15.0

<b>Electrical Interfaces Supporting the Safety Function</b>	
Power Supply Voltage (VAC, VDC)	N/A
Power Supply Frequency (Hz)	N/A
Power Connection Method	N/A
I/O Signals to/from Equipment	N/A
I/O Connection Method	N/A

<b>Mechanical Interfaces</b>	
Mounting Configuration (orientation)	Vertical Mounted, Skirt
Mounting Method (bolts, welds, etc.)	Welded skirt to ring beam welded to embedment plates. Embedment plate details per 24590-PTF-DD-S13T-00036, 24590-PTF-DD-S13T-00039, 24590-PTF-DD-S13T-00043, and 24590-PTF-DD-S13T-00045 provided to the vendor in the material requisition
Auxiliary Devices	Pules Jet Mixers: UFP-PJM-00001, UFP-PJM-00002, UFP-PJM-00003, UFP-PJM-00004, UFP-PJM-00044, UFP-PJM-00053, UFP-PJM-00105, UFP-PJM-00106, UFP-PJM-00108, UFP-PJM-00109, UFP-PJM-00110, UFP-PJM-00111, Auxiliary Devices are located within the vessel



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

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<b>Equipment Seismic Qualification (ESQ)</b>				
Parameter	Title	Reference/Document Number	Version / Revision	Remarks
WTP Seismic Design Specification	Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks	24590-WTP-3PS-SS90-T0001	2	N/A
	Engineering Specification for Seismic Qualification Criteria for Pressure Vessels	24590-WTP-3PS-MV00-T0002	3	
Specified Seismic Load Parameters	Seismic Analysis of Pretreatment Building - WSGM In-Structure Response Spectra (ISRS)	24590-PTF-S0C-S15T-00057	A	CCN 158079; WSGM ISRS Curves: 67, 68, 69

<b>Equipment Qualification Notes and Additional Information</b>
<p>a) For thermal aging, the high normal temperature shall be assumed to subsist for 40 years less the duration of the high abnormal temperature. For any lesser qualified life, the normal and abnormal condition durations shall be assigned proportionally. The abnormal temperature is stated to subsist for a certain number of hours per year. It shall be taken to subsist for this number of hours for each year of the qualified life.</p> <p>b) The ability to provide the safety function at the low normal temperature, the low abnormal temperature or the low DBE temperature (whichever be the lowest) shall be established by test, analysis, or operating experience. The thermal aging at these respective low temperatures will be conservatively covered by the thermal aging per item a) above. Therefore, no duration is assigned for the low temperatures.</p> <p>c) The ability to provide the safety function at the extremes of the normal and abnormal humidity conditions, taking into consideration the high and the low normal and high and low abnormal, shall be established by test, analysis, or operating experience. No duration is assigned for the normal and abnormal humidity conditions.</p> <p>d) If the performance of the safety function of the equipment is affected by ambient pressure, the ability to provide the safety function at the extremes of the normal and abnormal pressure conditions, taking into consideration the high and the low normal and the high and low abnormal pressures, shall be established by test, analysis, or operating experience. No duration is assigned to the normal and abnormal pressure conditions.</p> <p>e) (1) If the abnormal radiation dose rate is the same as the normal radiation dose rate, the normal radiation dose rate shall be assumed to subsist for 40 years, or any lesser qualified life, and the duration of the abnormal radiation dose rate is "0."            (2) If the abnormal radiation dose rate is higher than the normal radiation dose rate, the abnormal radiation dose rate shall be assumed to subsist for 40 years, or any lesser qualified life, and the duration of the normal radiation dose rate is "0."</p> <p>f) The DBE conditions shall be taken to subsist for the stated number of hours following the qualified life of the equipment.</p> <p>g) Spray due to fire sprinkler actuation shall be taken to occur once over the entire qualified life duration for a period of 2 hours, even if the qualified life is a period less than 40 years. If spray qualification is provided for DBE conditions (whether for water or chemical spray), then separate qualification for the fire sprinkler spray need not be provided.</p> <p>h) The values stated in this EQD are the ambients and do not include the thermodynamic and radiation conditions imposed by the process fluids, self-heating, etc. The data pertaining to process fluid and service induced parameters are to be taken into account where significant, such as in thermal aging analyses. These data can be obtained from the equipment data sheets or the Equipment Specification.</p> <p>i) Equipment that is to be installed in inaccessible locations must be qualified to a 40-year life without the need for maintenance or replacement.</p>



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

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## Equipment Qualification Notes and Additional Information

- E-Note 1: BNI (BUYER) shall perform Equipment Environmental Qualification in accordance with 24590-WTP-DC-ENG-06-001, Design Criteria for Environmental and Natural Phenomena Hazard Qualification of Equipment.
- E-Note 2: Where pressure is given in inches of water column (in-w.c.) in the source document, it is generally assumed that this is in reference to atmospheric pressure and is therefore equivalent to inches of water gage (in-w.g.).
- E-Note 3: BNI (BUYER) shall perform Equipment Seismic Qualification in accordance with the listed parameters and the applicable specification requirements.
- E-Note 4: Radiation Dose Rates are for determining shielding requirements only for the black cell and are not at the source (vessel). Since the vessel is all metallic and the source has no neutron components for material embrittlement, the dose rates are of no concern on the vessel or its subcomponents.
- E-Note 5: Flood height is 2.08 ft above the floor, bottom of vessel is above this level therefore, no submergence evaluation is required.
- E-Note 6: Environmental data shown are for the room only.
- E-Note 7: Normal, Abnormal, and DBE dose rates are the same, therefore, abnormal & DBE doses do not add to total integrated dose based on normal dose rates over 40 years.

### DOE Radioactive Materials Disclaimer:

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

Screening / Evaluation Required? If yes per 24590-WTP-GPP-SREG-002, E&NS signature required below	X	Yes		No
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# EQUIPMENT QUALIFICATION DATASHEET (EQD)

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### Approval

Rev	Description	Vessel Engineer	Checked	System Engineer	Reviewed MET	E&NS	Approved	Date
0	Issue for Purchase	H.K	US/CS	P.A	JJ	N/A	SK	10/20/02
1	Revised as noted	HK	PA/CS	MA	JJ	N/A	MWH	8/18/03
2	Revised as Noted	HK	PA/CS	MA	RES	N/A	MWH	11/14/03
3	Revised as Noted	H Khurana	P Aviguetero C Slater	M. Askar	J Julyk	N/A	C. Morley for M Hoffmann	2/5/04
4	Added hydrodynamic loads and other revisions as noted.	H Khurana	P Aviguetero C Slater	M. Askar	J Julyk	N/A	M Hoffmann	9/8/04
5	Added wear plates as noted.	H Khurana	P Aviguetero C Slater	M. Askar	J Julyk	N/A	M Hoffmann	10/3/04
6	Added note 14 & 15, deleted note 10, revised note 12, added P&ID reference and changes as noted. Incorporated SDDR # 24590-WTP-SDDR-PROC-05-00227 by reference.	H Khurana	P Aviguetero C Slater	M. Askar	J Julyk	N/A	M Hoffmann	03/02/05
7	Revised Notes on page 2 & 3 as noted	H Khurana	MAP for C/S	M. Askar	RES	N/A	M Hoffmann	07/28/05
8	Revised per note 17 on page 2 and as noted.	H Khurana	Jl Polani	M. Askar	C Slater D Adler	N/A	J. Julyk	10/28/05
9	Revised per Note 21, due to revised load conditions, new load conditions for MOB, single overflow, and revised process conditions	M Seed	W Wilcox	D Vo	B Makadla	G Hendricks	J Julyk	03/20/08
10	Revised per Note 29 & 30. Added Steam Spargers.	M Seed	R Peters	D Vo	R Davis	J Hinckley	J Julyk	01/16/09
11	Revised as noted by revision triangles. Added Nozzle Pressure and Temperature to Nozzle Table. Renumbered Equipment Qualification Notes to E-Note xyz for clarity to EQ Sections. Updated Cyclic data for Sparger	M Seed	D Harris	D Vo	D Adler	J Hinckley	J Julyk	08/24/09
12	Revised per Note 31 (Notes/Remarks section, page 2) and as noted by revision triangles. Supersedes 24590-PTF-MVD-UFP-P0001, Rev 2.	J Grusetski <i>J Grusetski</i>	M Seed <i>M Seed</i>	<del>D Evans</del> D Vo 5/24/11 <i>Douglas Vb</i>	D Adler <i>[Signature]</i>	<del>R Lanning</del> 5/20/11 <i>[Signature]</i> J. Hinckley	J Julyk <i>[Signature]</i>	5/20/11 <i>[Signature]</i>

Data	Document #	Rev	Document Title
Quality Level	24590-PTF-M6-UFP-00001001	0	<i>P&amp;ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001A</i>
	24590-PTF-M6-UFP-00001004	0	<i>P&amp;ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001B</i>
Seismic Category	24590-PTF-M6-UFP-00001001	0	<i>P&amp;ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001A</i>
	24590-PTF-M6-UFP-00001004	0	<i>P&amp;ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001B</i>
Design Specific Gravity	24590-WTP-RPT-ENG-07-007	0	<i>Process Stream Properties / Section 4.18</i>
Max Operating Volume	24590-PTF-M6C-UFP-00004	E 	<i>Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B, / Sheet 31</i> 
Total Volume	24590-PTF-M6C-UFP-00004	E 	<i>Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B, / Sheet 25</i> 
Inside Diameter	24590-PTF-M6C-UFP-00004	E 	<i>Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B, / Sheet 2</i> 
Length TL-TL	24590-PTF-M6C-UFP-00004	E 	<i>Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B, / Sheet 31</i> 
Operating Pressure Parent Vessel (external)	24590-PTF-M6C-PVP-00017	A	<i>HADCRT Analysis of PTF PVP System at various Operating Scenarios / (see sheet 14 - the PVP scrubber inlet is controlled to 35 in-wg) External pressure of 1.5 psig is based on a normal operating pressure of -35 in WG (1.26 psig) with an additional margin. (24590-PTF-M5-V17T-00021001 &amp; 00021004 indicate the process flow diagrams)</i>
Operating Pressure Parent Vessel (internal)	N/A		Maximum value possible, assuming fans off, is atmospheric pressure
Design Pressure Parent Vessel (internal)	24590-WTP-DB-ENG-01-001	1P	<i>Basis of Design / Section 16.4.2.1</i>
Design Pressure Parent Vessel (external)	24590-PTF-M6C-PVP-00017	A	<i>HADCRT Analysis of PTF PVP System at various Operating Scenarios / External design pressure of 2.0 psig is based on a normal operating pressure of -35 in WG (1.26 psig) with an additional margin</i>
Jacket Design Pressure (internal) 	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs/ use 35 psig</i>
	24590-PTF-M6C-10-00008	A	<i>Overpressure Protection Evaluation for PTF Vessel Jackets/ Section 8</i>
Operating Temp (parent vessel) 	24590-WTP-RPT-ENG-07-007	0	<i>Process Stream Properties Report</i>
Design Temp (parent vessel) 	24590-WTP-RPT-ENG-07-007	0	<i>Process Stream Properties Report</i>
Sparger Operation/Design	24590-PTF-M6X-UFP-00386	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034002, Rev 0</i>
	24590-PTF-M6X-UFP-00387	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034003, Rev 0</i>
	24590-PTF-M6X-UFP-00388	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034004, Rev 0</i>
	24590-PTF-M6X-UFP-00389	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034005, Rev 0</i>
Jacket Design Temp 	24590-PTF-MVC-UFP-00007	C	<i>Design of Cooling Jacket for the Ultrafiltration Feed Preparation Vessels (UFP-VSL-00001A/B)</i>
Corrosion Allowance, Erosion Allowance 	24590-PTF-N1D-UFP-00005	5	<i>Corrosion Evaluation UFP-VSL-00001A/B</i>
	24590-WTP-M0C-50-00004	E	<i>Wear Allowance for WTP Waste Slurry Systems (24590-WTP-M0E-50-00014)</i>
Materials of Construction	24590-PTF-N1D-UFP-00005	5	<i>Corrosion Evaluation UFP-VSL-00001A/B</i>
Design Pressure (PJM) 	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs (24590-PTF-MVE-10-00012)</i>
	24590-WTP-M6C-50-00011	A	<i>Pulse Jet Mixer Internal Pressures and Thrust / Section 8</i>

Data	Document #	Rev	Document Title
Operating Pressure (PJM) 	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs (24590-PTF-MVE-10-00012)</i>
	24590-WTP-M6C-50-00011	A	<i>Pulse Jet Mixer Internal Pressures and Thrust / Section 8</i>
Operating Temperature (PJM)	N/A		same as parent vessel
Cyclic Data (Vessel) 	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs</i>
	24590-PTF-M6C-PVP-00017	A	<i>HADCRT Analysis of PTF PVP System at various Operating Scenarios</i>
Cyclic Data (PJM)	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs (24590-PTF-MVE-10-00012)</i> 
Cyclic Data (Steam Spargers) 	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs (24590-PTF-MVE-10-00005)</i>
Operating conditions (Air)	24590-PTF-M6X-UFP-00386	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034002, Rev 0</i>
	24590-PTF-M6X-UFP-00387	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034003, Rev 0</i>
	24590-PTF-M6X-UFP-00388	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034004, Rev 0</i>
	24590-PTF-M6X-UFP-00389	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034005, Rev 0</i>
Operating Conditions (Steam)	24590-PTF-M6X-UFP-00386	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034002, Rev 0</i>
	24590-PTF-M6X-UFP-00387	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034003, Rev 0</i>
	24590-PTF-M6X-UFP-00388	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034004, Rev 0</i>
	24590-PTF-M6X-UFP-00389	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034005, Rev 0</i>
Hydrodynamic Loads	24590-WTP-MVC-50-00001	A	<i>Hydrodynamic Loads for Normal PJM Operation in Vessels with Newtonian Fluids</i>
Single PJM Overblow Loads 	24590-WTP-MVC-50-00011	B	<i>Pulse Jet Mixer Overblow Vessel Loads</i>
PJM Overblow Loads 	24590-WTP-MVC-50-00011	B	<i>Pulse Jet Mixer Overblow Vessel Loads</i>
Single Overblow cycles 	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs (24590-PTF-MVE-10-00004)</i>
Multiple Overblow Cycles 	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs (24590-PTF-MVE-10-00004)</i>
Nozzle Loads  	CCN 126187	N/A	<i>Nozzle Loads for UFP-VSL-00001A</i>
	CCN 126188	N/A	<i>Nozzle Loads for UFP-VSL-00001B</i>
	CCN 202057	N/A	<i>Supplemental Design Nozzle Loads for UFP-VSL-00001A/B</i>
	CCN 230860	N/A	<i>Supplemental Nozzle Design Loads for UFP-VSL-00001A</i>
	CCN 230861	N/A	<i>Supplemental Nozzle Design Loads for UFP-VSL-00001B</i>
Equipment Environmental Qualification (EEQ) 	24590-PTF-U0D-W16T-00001	2	<i>PTF Room Environment Datasheet (24590-PTF-U0N-W16T-00007)</i>

Data	Document #	Rev	Document Title
Nozzle Design Pressures and Temperatures 	24590-PTF-M6X-UFP-00288	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00001001, Rev 0 UFP-VSL-1A (psig change N18 24590-PTF-M80T-00015 and psig change N51/N52 24590-PTF-M6LN-M80T-00039)</i>
	24590-PTF-M6X-UFP-00291	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00001002, Rev 0 UFP-VSL-1A</i>
	24590-PTF-M6X-UFP-00429	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00015002, Rev 0 UFP-VSL-1A</i>
	24590-PTF-M6WX-UFP-00027007	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00027007, Rev 0 UFP-VSL-1A</i>
	24590-PTF-M6X-UFP-00306	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00001004, Rev 0 UFP-VSL-1B (psig change N51/52 24590-PTF-M6LN-M80T-00039)</i>
	24590-PTF-M6X-UFP-00301	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00001005, Rev 0 UFP-VSL-1B</i>
	24590-PTF-M6WX-UFP-00007007	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00007007, Rev 1 UFP-VSL-1B</i>
	24590-PTF-M6X-PWD-00113	2	<i>Pipeline List for P&amp;ID 24590-PTF-M6-PWD-00046, Rev 2 UFP-VSL-1B</i>
Nozzle Load Management 	24590-WTP-GPG-ENG-0150	0	<i>Plant Design/Mechanical Systems Equipment Interfaces: Terminal End Equipment / CCN 229865</i>



## MECHANICAL DATASHEET: VESSEL

PLANT ITEM No.  
24590-PTF-MV-UFP-VSL-00001B



R11229231

Project:	<b>RPP-WTP</b>	P&IDs:	$\triangle_{12}$ 24590-PTF-M6-UFP-00001004, 00001005, 00007007, 24590-PTF-M6-PWD-00046
Project No:	<b>24590</b>	Calculations:	$\triangle_{12}$ <b>Attachment 1</b>
Project Site:	<b>Hanford</b>	Vessel Drawings:	$\triangle_{12}$ 24590-PTF-MV-UFP-00002001, 00002002, 00002003
Description:	<b>Ultrafiltration Feed Preparation Vessel</b>	Reports:	$\triangle_{12}$ <b>Attachment 1</b>

**ISSUED BY  
RPP-WTP PDC**

### Reference Data

Charge Vessels (Tag Numbers)	<b>N/A</b>
Pulsejet Mixers / Agitators (Tag Numbers)	<b>UFP-PJM-00045, UFP-PJM-00046, UFP-PJM-00047, UFP-PJM-00048, UFP-PJM-00049, UFP-PJM-00050, UFP-PJM-00101, UFP-PJM-00102, UFP-PJM-00112, UFP-PJM-00113, UFP-PJM-00114, UFP-PJM-00115</b>
RFDs/Pumps (Tag Numbers)	<b>N/A</b>

### Design Data

Quality Level	<b>Q (See Note 18)</b>		Fabrication Specs	<b>24590-WTP-3PS-MV00-T0001</b>		
Seismic Category	<b>SC-1</b>		Design Code	<b>ASME Section VIII Division 1</b>		
Service/Contents	<b>Radioactive Liquid</b>		Code Stamp	<b>Yes</b>		
Design Specific Gravity	<b>1.5</b>		NB Registration	<b>Yes</b>		
Maximum Operating Volume	gal	<b>64066</b> $\triangle_{12}$	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	<b>75119</b> $\triangle_{12}$	Estimated	$\triangle_{12}$ <b>220,440</b>	<b>1,152,000</b>	<b>833,400</b>
Environmental Qualification	<b>See EQD Section</b>					

Inside Diameter	inch	<b>240</b>				Wind Design	<b>Not Required</b>
Length/Height (TL-TL)	inch	<b>303.6</b> $\triangle_{12}$				Snow Design	<b>Not Required</b>
		Vessel Operating	Vessel Design	Coil/Jacket Design	Sparger Operating	Sparger Design	Seismic Design
Internal Pressure	psig	<b>ATM</b>	<b>15</b>	<b>35</b>	<b>135</b>	<b>160</b>	<b>24590-WTP-3PS-MV00-T0002</b>
External Pressure	psig	<b>1.5</b> <i>(Note 3)</i>	<b>2.0</b> <i>(Note 3)</i>	<b>0.0</b>	<b>Vessel Internal Pressure (OP)</b> <i>(EC Note 2)</i>	<b>Vessel Internal Pressure (Design)</b> <i>(EC Note 2)</i>	Postweld Heat Treat
Temperature	°F	<b>194</b>	<b>230</b> $\triangle_{12}$	<b>230</b> $\triangle_{12}$	<b>358</b>	<b>375</b>	Corrosion Allowance
Min. Design Metal Temp.	°F	<b>40</b>					
							Inch <b>0.040 (Note 12, 13, 20)</b>

### Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	<b>SA 240 316 (Note 1)</b>	<b>See Drawing</b>	<b>Auxiliary (Note 8)</b>
Shell	<b>SA 240 316 (Note 1)</b>	<b>See Drawing</b>	<b>Primary (Note 8)</b>
Bottom Head	<b>SA 240 316 (Note 1)</b>	<b>See Drawing</b>	<b>Primary (Note 8)</b>
Support	<b>SA 240 304 (Note 1)</b>	<b>See Drawing</b>	<b>N/A</b>
Jacket/Coils/Half-Pipe Jacket	<b>SA 240 316 (Note 1, Note 1a)</b>	<b>See Drawing</b>	<b>N/A</b>
Internals (UNO)	<b>SA 240 316 (Note 1)</b>	<b>See Drawing</b>	
Pipe Nozzles	<b>SA 312 TP316 (Note 1, Note 1b)</b>	<b>See Drawing</b>	<b>Primary (Note 8)</b>
Forgings/ Bar stock	<b>SA 182 F316 (Note 1)</b>	<b>See Drawing</b>	<b>N/A</b>
Wash Ring Pipe	<b>SA 312 TP316 (seamless) (Note 1)</b>	<b>See Drawing</b>	<b>N/A</b>
Bolting/Gaskets	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
Wear Plates	<b>SA 240 316 (Note 1)</b>	<b>See Drawing</b>	<b>N/A</b>
Steam Spargers	<b>SB 622 (seamless) UNS N10276</b>	<b>See Drawing</b>	<b>Auxiliary (Note 8)</b>
PJM Cone $\triangle_{12}$	<b>SA 494 TP CX2MW (Cast Cones)</b>	<b>See Drawing</b>	<b>N/A</b>
	<b>SA 240 TP 316 (Fabricated Cones)</b>	<b>See Drawing</b>	<b>N/A</b>

### Miscellaneous Data

Orientation	<b>Vertical</b>	Support Type	<b>Skirt</b>
Insulation Function	<b>Not Applicable</b>	Insulation Material	<b>Not Applicable</b>
Insulation Thickness (inch)	<b>Not Applicable</b>	Internal Finish	<b>(Note 2)</b>
		External Finish	<b>(Note 2)</b>



**MECHANICAL DATASHEET: VESSEL**

PLANT ITEM No.  
24590-PTF-MV-UFP-VSL-00001B

**Notes/Remarks**

- Note 1. Maximum 0.030% carbon.
- Note 1a. Cooling water jacket on the vessel shell is SA 240 304 0.030% max carbon. <sup>12</sup>
- Note 1b. Pipe material (SA312) to be seamless, use of plate material (SA 240) for nozzles shall have the seam weld 100% volumetrically examined
- Note 2. Welds de-scaled as laid.
- Note 3. External design pressure under the jacket shall be rated for the jacket internal design pressure plus vessel external design pressure to account for ventilation fan pressure. External design pressure of 2.0 psig is based on a normal operating pressure of -35 in WG (1.26 psig) with an additional margin (see 24590-PTF-M6C-PVP-00017).
- Note 4. Deleted
- Note 5. Deleted
- Note 6. Vessel volumes are approximate and do not account for the manufacturing tolerances, nozzles, and displacement of internals.
- Note 7. This vessel is in a Black Cell.
- Note 8. All welds forming part of the primary and auxiliary containment including nozzle attachment welds shall be subjected to 100% volumetric examination.
- Note 9. Contents of this document are Dangerous Waste Permit affecting.
- Note 10. Deleted. <sup>12</sup>
- Note 11. Deleted.
- Note 12. Seller shall provide wear plates for erosion control on the bottom head. Minimum wear plate thickness is 0.478" <sup>12</sup>
- Note 13. Ensure that an additional 0.251" is available for erosion in the lower 4" of the interior conical surface of pulse jet mixers based on SA 240 type 316 material. <sup>12</sup>
- Note 14. Deleted. <sup>12</sup>
- Note 15. Deleted.
- Note 16. Deleted.
- Note 17. Deleted. <sup>12</sup>
- Note 18. Vessel to be designed, fabricated, tested to Q, L-1 and Black Cell requirements defined in 24590-WTP-3PS-MV00-T0001. <sup>12</sup>
- Note 19. Deleted <sup>12</sup>
- Note 20. Corrosion allowance for jacket shall be 0.040 inch. <sup>12</sup>
- Note 20a. Localized corrosion/erosion allowance for the Steam Sparger holes is 0.020 inches. The steam sparger piping will have a total corrosion/erosion allowance of 0.135 (total for inside, outside, and general corrosion allowance [Reference CCN 233172]). The values used for the Steam Sparger corrosion/erosion (per CCN 233172) design will be superseded after issuance of the revised corrosion/erosion evaluation for this vessel. The CCN 233172 is tracked as an assumption requiring verification in the vessel seismic and stress analysis calculation. <sup>12</sup>
- Note 21. Changed the quality level, revised specific gravity, revised operating temperature, revised vessel external design pressure, revised design temperatures for vessel and jacket, revised Notes 3, 4, 14, 15, and 16, added Notes 1a, 1b, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, and 28, added functional/safety requirements, added seismic section, change to parent vessel cyclic data, change to hydrodynamic loads for normal operations, revised single overblow loads, added MOB loads, change to PJM cyclic data, added nozzle loads, added Equipment Qualification Data Sheet, added DOE Radioactive Material Disclaimer, added E&NS table and signature.
- Notes 22 - 28: Deleted.
- Note 29: If any Sections contain a revision triangle <sup>#</sup> next to the Section heading, this means the entire section has been revised or is new - the entire section must be reviewed for changes/additions. Revised E&NS screening statement supporting E&NS simplified review process. Added the Steam Sparging System which includes Material and corrosion call outs, additional nozzle loads and a Steam Sparger Section in the Equipment Cyclic Data Sheets. Modified/updated pressure and temperatures to match current P&ID Line Lists and removed the requirements for the Hot Nozzles (N18, N55, N56 & N57) which included deleting Note 16. Revisions to EQ Data Sheets as noted.
- Note 30: Deleted. <sup>12</sup>
- Note 31: Added 4 Pulse Jet Mixers (PJMs), Design Considerations for Loads Induced by Pulse Jet Mixers (PJMs), Hydrodynamic Loads Due to PJM Operations. Revised PJM Overblow Loads, Nozzle Loads, Notes for Nozzle Loads, and Equipment Qualification data to new form. Deleted Functional/Safety Requirements and Seismic section. Deleted Note 30 as this information is contained in the Process Report. <sup>12</sup>

<sup>12</sup>  
<sup>12</sup>



**MECHANICAL DATASHEET: VESSEL**

**PLANT ITEM No.**  
24590-PTF-MV-UFP-VSL-00001B

**Equipment Cyclic Data Sheet – Parent Vessel**



Component Plant Item Number:	24590-PTF-MV-UFP-VSL-00001B				
Component Description	Ultrafiltration Feed Preparation Vessel				
<i>The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.</i>					
Materials of Construction	ASME SA240 316 with 0.030 % max. Carbon				
Design Life	40 Years				
Component Function and Life Cycle Description	The system receives waste feed from the Waste Feed Evaporation Process System (FEP), Waste Feed Receipt Vessels (FRP), and HLW Feed Receipt Vessel (HLP). The vessel is filled over a period of approximately 5 hours. If necessary, the vessel cools the waste prior to ultrafiltration operations. The precipitation of Sr/TRU compounds occurs in this vessel. The main transfer from this vessel occurs through a centrifugal pump to the Ultrafiltration Feed Vessels.				
<b>Load Type</b>		Min	Max	Number of Cycles	Comment
Design Pressure	psig	-2.0	15	10	Nominal assumption for testing, applied with 35 psig in cooling jacket
Operating Pressure	psig	-1.5 0	0 2.8	7.0E6 40	The vessel will remain at constant pressure depending upon the HVAC plant
Operating Temp	°F	59	194	12120	Minimum temperature is assumed to be the same on chilled water jacket.
Contents Specific Gravity		1.2	1.5	12120	Stress range is for empty to full. Minimum specific gravity is based on water in wall of vessel.
Contents Level	inch	0	350	12120	
<b>Localized Features</b>					
Cooling Jacket (operating conditions)		50°F chilled water inlet temp	N/A	12120	Chilled water input to the cooling jacket will cool the vessel contents.

**Cyclic Data Notes - Parent Vessel**

- **Cycle increase:** Increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.
- **This vessel will be heated 12120 times over the 40 year life of the plant, per UFP batch cycle.**



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



**MECHANICAL DATASHEET: VESSEL**

**PLANT ITEM No.**  
24590-PTF-MV-UFP-VSL-00001B

**Equipment Cyclic Data Sheet - PJMs** 

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, UFP-PJM-00112, UFP-PJM-00113, UFP-PJM-00114, UFP-PJM-00115
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 0.03 % max. 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 operating pressure and the minimum operating 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 loads shall be applied to the fully buoyant state, assume parent vessel is full for 50% of the PJM cycles.				
<b>Load Type</b>		Min	Max	Number of Cycles	Comment
Design Pressure	psig	FV	80	100	Nominal assumption for testing. Minimum design pressure is full vacuum (FV) for potential steam collapse.
Operating Pressure	psig	FV	41	9.7E6	
Operating Temperature	°F	59	194	12120	Same as Parent Vessel
Contents Specific Gravity		1.2	1.5	12120	Same as Parent Vessel
Contents Level	inch	Empty	Flooded	9.7E6	
Thrust	lbf	-444	444	9.7E6	Conservative
<b>Localized Features</b>					
Nozzles	N/A				
Supports		Buoyant	Loaded	9.7E6	

**Cyclic Data Notes - PJMs**

- **Cycle increase:** The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.
- **This vessel will be heated 8340 times over the 40 year life of the plant, per UFP batch cycle.** 



**MECHANICAL DATASHEET: VESSEL**

PLANT ITEM No.  
24590-PTF-MV-UFP-VSL-00001B

**Equipment Cyclic Data Sheet – Steam Spargers**

Component Plant Item Number:	<i>There is no Component Plant Item Number associated with Nozzles N70 and N71.</i>
Component Description	<b>Steam Spargers</b>

*The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.*

Materials of Construction	<b>Hastelloy</b>					
Design Life	<b>40 Years</b>					
Component Function and Life Cycle Description	<i>The Steam Spargers will heat the process fluid until it gets up to temperature for digestion and will sustain this temperature for the time required to complete digestion. It will take up to approximately 9 hrs to heat and up to 16 hrs to digest (24590-WTP-RPT-ENG-08-016). The Steam Sparger is pressurized by air until the vessel is full and the steam is introduced. The vessel is heated up this occurs 12120 cycles. After vessel is heated the Steam Sparger is again pressured by air.</i>					
<b>Load Type</b>	Min Steam	Max Steam	Min Air	Max Air	Number of Cycles	Comment
Design Pressure      psig	<b>-FV</b>	<b>160</b>	<b>-2.0</b>	<b>150</b>	<b>10</b>	<i>Nominal assumption for testing. Minimum design pressure is full vacuum for potential steam collapse.</i>
Design Temp.          °F	<b>50</b>	<b>375</b>	<b>50</b>	<b>140</b>	<b>N/A</b>	
Operating Pressure    psig	<b>-1.5</b>	<b>111/76</b>	<b>-1.5</b>	<b>150/51</b>	<b>12120</b>	<i>See EC-Note 2 below for Max Steam and Max Air Values. Conservative Cyclic Assumption, see EC-Note 3 below.</i>
Operating Temp        °F	<b>50</b>	<b>343/320</b>	<b>50</b>	<b>135/80</b>	<b>12120</b>	<i>See EC-Note 2 below for Max Steam and Max Air Values. Conservative Cyclic Assumption, see EC-Note 3 below.</i>
Contents Specific Gravity	<b>0.0</b>	<b>3.81</b> SG air		<b>11.0</b> SG air	<b>12120</b>	<i>Per Process Stream Properties, 24590-WTP-RPT-ENG-07-007, Rev. 0A, Table 4-18. Cycles per the Conservative Assumption, see notes below. The worst case is the pipe gets flooded, vessel SG used.</i>
Contents Specific Gravity w / liquid	<b>1.2</b> 	<b>1.5</b>		<b>.</b>		
<b>Localized Features</b>						
Nozzles: <b>N70, N71</b> 	<b>59°F</b>	<b>375°F</b>			<b>12120</b>	



## MECHANICAL DATASHEET: VESSEL

PLANT ITEM No.  
24590-PTF-MV-UFP-VSL-00001B

### Cyclic Data Notes - Steam Spargers

**EC-Note 1:** Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.

**EC-Note 2:** The Steam lines are controlled by a Steam Control Valve (on the HPS-RK-17) upstream of the vessel. According to 24590-PTF-M6C-UFP-00021 the pressure drop across that valve will vary from 24 psi to 59 psi.

Therefore, with an upstream pressure prior to the valve of 135 psig (per the normal pressure of line 24590-PTF-PP-UFP-DB-03119-S11C-06-01 from both P&ID Line Lists 24590-PTF-M6X-UFP-00388 and 24590-PTF-M6X-UFP-00389 the range of pressure the Steam Sparger will see for normal operations will be from 111 psig (135 psig - 24 psig) to 76 psig (135 psig - 59 psig). The steam temperature is determined from the steam table for the correspondent pressure of 111 psig or 76 psig.

The Max Temperature and Max Pressure for the air purge cycle of the Steam Sparger System are per the PSA supply lines as defined in Notes 5 and 6 of P&ID Line Lists 24590-PTF-M6X-UFP-00388 and 24590-PTF-M6X-UFP-00389 respectively.

The Normal Temperature and Normal Pressure for the air purge cycle of the Steam Sparger System are per the normal values given for line 24590-PTF-PP-UFP-GQ-64454-S11C-011/2-01 in P&ID Line Lists 24590-PTF-M6X-UFP-00388 and 24590-PTF-M6X-UFP-00389.

The steam and air used in the Sparger operation varies over a short range during operation. These values are to be used such as to give the highest loading on the system/vessel. The pressure and temperatures values are shown in pairs at the extremes and should be used together, i.e. 111 psig and 343 F.

Minimum values are based on the vessel's minimum pressures and temperatures.

**EC-Note 3:** Conservative Cyclic Assumption is based on the following:

Cycles to Heat the Vessel

This vessel will be heated 12120 times over the 40 year life of the plant, per UFP batch cycle.  $\triangle_{12}$

Cycles to Maintain the Vessel Temperature

The steam nozzles are not planned to be cycled on/off for the temperature control valve on the steam supply line. Both of the semi-circle steam sparge rings are to be used for heat up of the vessel contents. Once the vessel contents reach digestion temperature, one of the semi-circle steam sparge ring will be shut off and purged with air. The remaining semi-circle steam sparge ring will be operated at reduced steam flowrate to maintain the temperature set point (see calculation 24590-PTF-MCC-UFP-00004 for steam flow rate requirements). Therefore, the cycles to maintain the vessel temperature is the same as the heating cycle, 12120 cycles.

The specific volume of the steam at 111 psig is 3.5 ft<sup>3</sup>/lb the density of air at 70 F is 0.075 lb/ft<sup>3</sup> the specific gravity is then:  $(1/3.5)/0.075 = 3.81$  in SG.

The specific gravity of air at 150 psig is then found by: The density of air at 70 F and 0 psig 0.075 lb/ft<sup>3</sup> and at 80 F and 150 psig 0.824 lb/ft<sup>3</sup> calculating  $0.824 / 0.075 = 11.0$  the SG<sub>air</sub>.

The sparger system is to be operated such: Air is to be used to keep the liquid out of the sparger during vessel filling and draining. After vessel is filled the air is replaced by steam through the sparger to heat the liquid to 194 F. One of the spargers is returned to air service after the liquid reaches 194 F. One of the spargers is used throttled back to maintain liquid temperature.

The Specific gravity of the vessel liquid is not significantly changed during the process, however the specific gravity of each batch can vary as noted above.

**EC-Note 4.** External design pressure under the jacket shall be rated for the jacket internal design pressure plus vessel external design pressure to account for ventilation fan pressure. External design pressure of 2.0 psig is based on a normal operating pressure of -35 in WG (1.26 psig) with an additional margin (see 24590-PTF-M6C-PVP-00017).  $\triangle_{12}$



## MECHANICAL DATASHEET: VESSEL

PLANT ITEM No.  
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### Design Considerations for Loads Induced by Pulse Jet Mixers (PJMs)

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Pulse Jet Mixers (PJMs) are designed to mix the vessel contents using a liquid jet discharge. PJMs are driven by compressed air. The mixing is required to enhance heat transfer, to break up hydrogen-containing particles, and to homogenize the solution. Normally, the PJMs are operated simultaneously within the parent vessel.

The PJMs operate in the following three cycles: Suction, Drive, and Vent. During the suction cycle a vacuum is created in the PJM headspace and the level within the PJM rises to fill the PJM. During the drive cycle the PJM is pressurized and liquid is discharged. During the vent cycle, the pressure in the headspace approaches atmospheric and the level within the PJM is allowed to reach equilibrium.

Vessel components shall be designed to withstand loading induced by PJM operations as described herein.

**Normal Operations:** Liquid flows around internal structures within the parent vessel producing hydrodynamic loads such as drag and vortex shedding.

To mitigate the dynamic effects, the following pipe sizes dipped internal to the vessel are required to have a minimum first natural frequency that is double the vortex shedding frequency:

Nominal Pipe Size	Minimum First Natural Frequency
1 inch	14 Hz*
2 inch	8.0 Hz*
3 inch	5.0 Hz**

\* See 24590-WTP-MVC-50-00001, Section 8.1.5.2

\*\* By extrapolation from 1 inch and 2 inch

**Overblow Condition:** Occasionally the drive cycle lasts too long and compressed air is discharged from the PJM. Overblows can also occur during system calibration. One or multiple PJMs may overblow at any time. These conditions induce acoustic and bubble rise loads on structures.

All internal components shall be designed for the combination of normal operational hydrodynamic loads and overblow loads. Single overblows (SOB) are assumed to act concurrently with the seismic event, however multiple overblows (MOB) are not assumed to act concurrently with the seismic event. Figure 1 (below) provides the acoustic load intensity that encompasses both SOB and MOB.

### Hydrodynamic Loads Due to PJM Operations

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Normal operation imposes a cyclical load ranging between -0.15 and 0.25 psi in the radial direction and -0.15 to 0.15 psi in the vertical direction for  $9.7E6$  cycles. The hydrodynamic pressure applies 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.



**MECHANICAL DATASHEET: VESSEL**

PLANT ITEM No.  
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**PJM Overblow Loads** 12

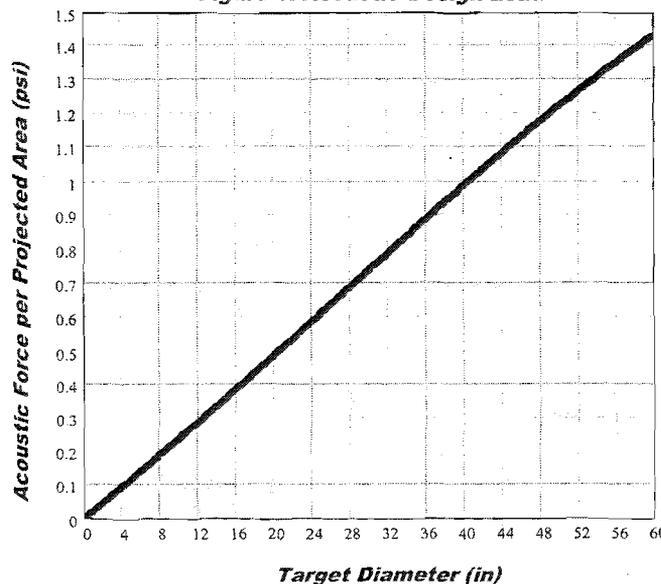
**Discussion:** During normal operation, pulse jet mixers (PJMs) mix the fluid by pulling in (suction) and pushing out (drive) fluid. During an upset condition, designated as an 'overblow', air is discharged following the drive cycle of one or more PJMs. The load consists of acoustic pressure (2Hz to 200Hz) developed in the first 200ms of the event and a load due to the bubble rising through the fluid.

The acoustic load and the bubble load are design loads as defined by ASME B&PVC, Section VIII, Division 1, UG-22, applied statically. The acoustic load is not added to the bubble rise load because they occur at different times during the overblow event.

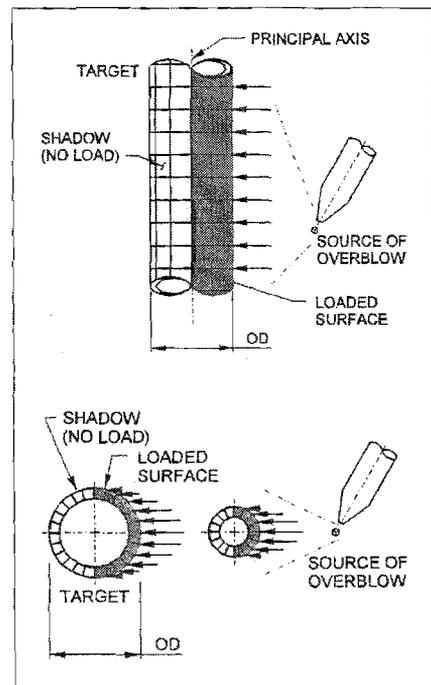
Acoustic Load

- The acoustic design load in Figure 1 is applied to the visible (as viewed from the overblow origin) surface of cylindrical targets such as pipes, charge vessels, and PJMs. The load is applied in the direction normal to the principal axis of the target as illustrated in Figure 2. Note: The intended net effective load on the target is equal to the projected (i.e. cross-sectional) area of the object times the acoustic design load (psi) indicated in Figure 1.
- Each target is considered independent of the surrounding targets: e.g. the surrounding targets do not impede the acoustic wave by casting a shadow, as illustrated in Figure 2.
- The load is not applied to small supports such as gussets, brackets, tabs, clamps, and bolts because they are rigid and the pressure drop across the target is negligible.
- When the vessel contains multiple PJMs, the load from one PJM is independent of the load from other PJMs. The loads are not additive for multiple overblows.
- No internal components shall be placed within 5 PJM nozzle diameters ( $5 * 4 \text{ in} = 20 \text{ in}$ ) of a spherical zone centered at any overblowing PJM nozzle.

**Figure 1: Acoustic Design Load**



**Figure 2: Load Application**



The following data is required to determine the load:

- Target Diameter
- Target Principal Axis
- Overblow Source Coordinates

Number of Acoustic Cycles

1000 events X 40 cycles/event for a total of 40,000 acoustic cycles.

Bubble Rise Load

A vertical force per projected area of 1.7 psi is applied to the surfaces in the 36-inch diameter cylindrical zone centered at the overblowing PJM(s). The bubble can be at any elevation above the overblowing PJM and only affects one zone (36-inch diameter region) at a time. When there are multiple PJMs in a vessel (MOB), each PJM has it's own bubble. To simplify analysis the bubble can be applied in a continuous cylindrical zone above each PJM top head.

Number Bubble Rise Cycles

1000 events X 1 cycle/event for a total of 1000 cycles.



**MECHANICAL DATASHEET: VESSEL**

**PLANT ITEM No.**  
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**Nozzle Loads**



Nozzle	Design Nozzle Press (psig) (Note H)	Design Nozzle Temp (F) (Note H & Note I)	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N02	170	230	3"	Weight	52	84	52	119	75	75
				Seismic	284	189	284	819	1227	1227
				Thermal	70	60	156	190	563	380
N04	15	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	40	30	50	50	100	100
N05	15	230	6"	Weight	N05 is parent nozzle, nozzle loads are applied via N05A, N05B, N05C					
				Seismic						
				Thermal						
N05A (Note E)	15	230	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	10	10	20	20	30	30
N05B (Note E)	100	230	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	10	10	20	20	30	30
N05C (Note E)	100	230	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	10	10	20	20	30	30
N07	75	230	4"	Weight	87	359	87	216	135	201
				Seismic	480	436	480	1537	2310	2581
				Thermal	120	100	204	951	720	720
N11	169	230	3"	Weight	52	104	52	119	75	84
				Seismic	376	350	284	819	1227	1544
				Thermal	70	255	90	190	380	380
N13	125	230	3"	Weight	52	110	52	119	75	75
				Seismic	284	250	284	819	1227	1227
				Thermal	70	236	90	190	380	380
N15	15	230	3"	Weight	52	84	52	119	75	75
				Seismic	284	189	284	819	1227	1227
				Thermal	70	60	90	190	380	380
N16	125	230	3"	Weight	52	84	52	119	75	75
				Seismic	284	189	284	819	1227	1227
				Thermal	70	60	90	190	380	380
N18	15	230	6"	Weight	210	335	210	497	311	311
				Seismic	1160	438	1160	2545	3820	3820
				Thermal	1258	1740	1167	2990	2973	1702
N19	15	230	8"	Weight	234	373	234	741	464	464
				Seismic	1285	858	1285	5159	7732	7732
				Thermal	340	310	460	1380	2740	2740
N22	15	230	1.5"	Weight	35	47	35	40	40	40
				Seismic	105	103	105	159	240	240
				Thermal	20	20	30	30	60	60



**MECHANICAL DATASHEET: VESSEL**

**PLANT ITEM No.**  
**24590-PTF-MV-UFP-VSL-00001B**

Nozzle	Design Nozzle Press (psig) (Note H)	Design Nozzle Temp (F) (Note H & Note I)	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N23	170	230	3"	Weight	52	144	52	119	75	75
				Seismic	284	289	284	819	1227	1227
				Thermal	70	185	90	190	380	416
N24	125	230	3"	Weight	52	106	52	119	75	75
				Seismic	354	298	284	1223	1227	1437
				Thermal	70	233	90	190	380	380
N28	75	230	4"	Weight	87	154	87	216	135	135
				Seismic	480	320	480	1537	2310	2310
				Thermal	120	100	150	369	720	720
N30	75	230	4"	Weight	87	269	87	216	135	135
				Seismic	480	320	480	1537	2310	2310
				Thermal	120	147	441	1838	720	720
N35	190	230	3"	Weight	52	99	52	119	118	124
				Seismic	284	189	284	819	1297	1227
				Thermal	70	60	90	190	380	380
N37	124	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	502	415	415
				Thermal	40	38	50	50	100	100
N38	124	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	40	33	64	123	100	100
N39	124	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	52	352	237	489	100	100
N40	124	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	40	82	50	50	100	100
N41	124	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	56	128	89	201	100	100
N42	124	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	343	415	415
				Thermal	40	34	50	50	100	100
N43	124	230	2"	Weight	50	60	50	75	75	75
				Seismic	268	140	186	277	415	809
				Thermal	40	86	50	56	100	100
N44	124	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	40	30	50	50	100	100
N47	125	230	2"	Weight	50	89	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	40	30	50	50	100	100
N48	125	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	40	118	50	198	100	100



**MECHANICAL DATASHEET: VESSEL**

**PLANT ITEM No.**  
**24590-PTF-MV-UFP-VSL-00001B**

Nozzle	Design Nozzle Press (psig) (Note H)	Design Nozzle Temp (F) (Note H & Note I)	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N49	125	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	175	207	361	415	415
				Thermal	40	30	50	62	100	100
N51	170	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	292	415	415
				Thermal	40	30	50	50	100	100
N52	170	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	357	415	415
				Thermal	40	76	50	117	100	100
N53	125	230	3"	Weight	52	142	52	119	75	75
				Seismic	292	189	544	1834	1227	1278
				Thermal	70	60	90	190	380	380
N54	15	230	8"	Weight	234	373	234	660	413	1280
				Seismic	4673	4813	5037	9625	14000	17500
				Thermal	340	3030	460	1100	2250	17290
N55	15	230	6"	Weight	210	335	210	473	296	296
				Seismic	1160	350	350	2800	4204	4204
				Thermal	320	2030	610	2349	1620	1626
N56 spare	15	230	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	40	30	87	172	100	100
N57 spare	15	230	2"	Weight	50	60	50	75	75	75
				Seismic	429	123	186	277	415	415
				Thermal	40	30	50	50	100	100
N58 (Note F)	35	230	6"	Weight	210	335	210	598	374	374
				Seismic	1160	775	1160	4240	6367	6367
				Thermal	280	250	380	1030	2050	2050
N59	35	230	6"	Weight	210	335	210	401	251	251
				Seismic	1160	775	1160	2121	3183	3183
				Thermal	280	250	380	691	1374	1374
N60	15	230	3"	Weight	52	143	52	119	75	296
				Seismic	284	189	284	819	1227	1227
				Thermal	87	60	90	190	380	380
N61	15	230	24"	Weight	Manway					
				Seismic						
				Thermal						
N62	169	230	3"	Weight	100	150	100	200	200	200
				Seismic	284	189	284	819	1227	1227
				Thermal	66	58	88	190	380	380
N63	170	230	2"	Weight	50	60	50	75	75	75
				Seismic	205	123	186	282	613	350
				Thermal	40	30	50	150	75	75



**MECHANICAL DATASHEET: VESSEL**

**PLANT ITEM No.**  
24590-PTF-MV-UFP-VSL-00001B

Nozzle	Design Nozzle Press (psig) (Note H)	Design Nozzle Temp (F) (Note H & Note I)	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N65	15	230	6"	Weight	N65 is parent nozzle, nozzle loads are applied via N65A, N65B, N65C					
				Seismic						
				Thermal						
N65A (Notes E&J)	15	230	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	10	10	20	20	30	30
N65B (Notes E&J)	100	230	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	10	10	20	20	30	30
N65C (Notes E&J)	100	230	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	10	10	20	20	30	30
N70 (Note K)	160	375	4"	Weight	87	359	87	216	135	224
				Seismic	586	436	480	2534	2310	3890
				Thermal	120	147	441	1838	720	720
N71 (Note K)	160	375	4"	Weight	87	359	87	216	135	224
				Seismic	586	436	480	2534	2310	3890
				Thermal	120	147	441	1838	720	720
N72 (Note L)	124	230	2"	Weight	50	62	50	75	75	75
				Seismic	268	140	186	732	415	809
				Thermal	56	352	237	489	100	168
N73 (Note L)	124	230	2"	Weight	50	62	50	75	75	75
				Seismic	268	140	186	732	415	809
				Thermal	56	352	237	489	100	168
N74 (Note L)	124	230	2"	Weight	50	62	50	75	75	75
				Seismic	268	140	186	732	415	809
				Thermal	56	352	237	489	100	168
N75 (Note L)	124	230	2"	Weight	50	62	50	75	75	75
				Seismic	268	140	186	732	415	809
				Thermal	56	352	237	489	100	168
N76	15	230	8"	Weight	475	750	475	1500	950	950
				Seismic	1313	875	1313	5163	7744	7744
				Thermal	600	550	800	2400	4800	4800
N77	15	230	8"	Weight	475	750	475	1500	950	950
				Seismic	1313	875	1313	5163	7744	7744
				Thermal	600	550	800	2400	4800	4800



**MECHANICAL DATASHEET: VESSEL**

**PLANT ITEM No.**  
**24590-PTF-MV-UFP-VSL-00001B**

**Notes for Nozzle Loads**

- A. *Direction of load application for shell nozzles is per diagrams in 24590-WTP-3PS-MV00-T0001 Appendix A.*
- B. *For nozzles in head: x = North/South, y = Vertical, and z = East/West - Vessel 0° defined as north.*
- C. *Deleted*
- D. *Nozzle loads shown are to be used in place of those specified in 24590-WTP-3PS-MV00-T0001 – do not apply thermal reduction factors.*
- E. *Values provided at plate on top of parent nozzle.*
- F. *Values provided at jacket, not at skirt penetration.*
- G. *All Pretreatment RGM Seismic Piping Nozzle loads from Plant Design have a 1.75 load factor applied to all seismic loads to address coupling effects between the flexible vessels and piping in accordance with the Seismic Classification and Evaluation for the Pretreatment Facility Piping and Vessels 24590-WTP-RPT-ENG-09-040. (BNI use only, see 24590-WTP-GPG-ENG-0150 for nozzle load management). *
- H. *Design Pressures and Temperatures to be used to qualify the nozzles only. *
- I. *Nozzle temperatures that are equal or less than vessel design temperature shall use the vessel design temperature as the bounding temperature to perform the nozzle analysis. Nozzle temperatures that are greater than the vessel design temperature shall be used to analyze the hot nozzles. *
- J. *Instrumentation bubbler nozzle loads for N65A, N65B, and N65C are based on instrumentation bubbler nozzle loads from N05A, N05B, and N05C. *
- K. *Maximum enveloped nozzle loads from all UFP-VSL-1A/B 4" nozzles applied to N70 and N71. *
- L. *Maximum enveloped loads from UFP-VSL-1A/B (N37 thru N44) applied to N72 thru N75. *



Equipment Identification			
Full Component Tag Number or BNI Stock Code Number	24590-PTF-MV-UFP-VSL-00001B		Safety Classification <input checked="" type="checkbox"/> SC <input type="checkbox"/> SS <input type="checkbox"/> APC-PAM All subcomponents are SC
Equipment Datasheet Number	24590-PTF-MVD-00002		
Description	Ultrafiltration Feed Preparation Vessel		Seismic Category <input checked="" type="checkbox"/> SC-I <input type="checkbox"/> SC-II <input type="checkbox"/> SC-III <input type="checkbox"/> SC-IV <input type="checkbox"/> SC-III Seismic Interaction only All subcomponents are design to SC-I
Location (Facility / Building and Room No.)	PTF, Column Lines J/13.5, 0'-0" Elevation, Room P-0104		
Safety Function(s)	UFP-VSL-00001B (parent vessel) is considered a high active process vessel credited to prevent spills of large quantities of high activity process liquid and provide primary confinement for radioactive releases. Pulse Jet Mixers (PJMs) provide a mixing function in the vessel to prevent hydrogen accumulation. Reference: 24590-WTP-PSAR-ESH-01-002-02		
Equipment Safety Function Type	<input checked="" type="checkbox"/> Passive Mechanical	<input type="checkbox"/> Active Mechanical	<input type="checkbox"/> Electrical
Seismic Safety Function <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Seismic Operability Requirements <input checked="" type="checkbox"/> During Seismic Event <input checked="" type="checkbox"/> After Seismic Event <input type="checkbox"/> None		

Equipment Environmental Qualification (EEQ)				
(Parameter values stated in this section do not include process conditions or operation induced conditions)				
Classification of Environment <input type="checkbox"/> Mild <input checked="" type="checkbox"/> Harsh		Qualified Life (years) <input checked="" type="checkbox"/> 40 <input type="checkbox"/> Other		
Parameter Type/Units	Parameter Value	Parameter Duration (number)	Duration Units	WTP Source Document Number
<b>Normal Ambients</b>				
High Temperature (°F)	113	Note a	Years	24590-PTF-U0D-W16T-00001, E-Note 1
Low Temperature (°F)	59	Note b	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
High Relative Humidity (%RH)	90	Note c	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
Low Relative Humidity (%RH)	5	Note c	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
High Pressure (in.-w.g.)	0 (E-Note 2)	Note d	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
Low Pressure (in.-w.g.)	(-) 1.4 (E-Note 2)	Note d	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
Radiation Dose Rate (mRad/hr)	533000 (E-Note 4)	40 (E-Note 7)	Years (Note e-1)	24590-PTF-U0D-W16T-00001, E-Note 1
Plant/Process Induced Vibration	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Additional Normal Ambient Information:	N/A			



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

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## Equipment Environmental Qualification (EEQ) (continued)

Parameter Type/Units	Parameter Value	Parameter Duration (number)	Duration Units	WTP Source Document Number
<b>Abnormal Ambients</b>				
High Temperature (°F)	127	8	hours / year	24590-PTF-U0D-W16T-00001, E-Note 1
Low Temperature (°F)	40	Note b	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
High Relative Humidity (%RH)	100c	Note c	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
Low Relative Humidity (%RH)	6	Note c	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
High Pressure (in.-w.g)	4 (E-Note 2)	Note d	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
Low Pressure (in.-w.g)	(-) 7.3 (E-Note 2)	Note d	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
Radiation Dose Rate (mR/hr)	533000 (E-Note 4)	0 (E-Note 7)	Years (Note e-1)	24590-PTF-U0D-W16T-00001, E-Note 1
Exposure to Wet Sprinkler System	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		hours	24590-PTF-U0D-W16T-00001, E-Note 1
Additional Abnormal Ambient Information	N/A			
<b>Design Basis Events (DBE) Ambients</b>				
High Temperature (°F)	135	1000	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Low Temperature (°F)	40	Note b	N/A	24590-PTF-U0D-W16T-00001, E-Note 1
High Relative Humidity (%RH)	100c	40	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Low Relative Humidity (%RH)	6	1000	hours	24590-PTF-U0D-W16T-00001, E-Note 1
High Pressure (in.-w.g)	4 (E-Note 2)	8	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Low Pressure (in.-w.g)	(-) 7.3 (E-Note 2)	1000	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Radiation Dose Rate (mR/hr)	533000 (E-Note 4)	0	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Submergence	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (E-Note 5)	N/A	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Chemical/Spray Exposure	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	12.5	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Additional DBE Information	N/A			

<b>DBE Chemical Exposure Details</b>
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<b>DBE Chemical Exposure Details</b>	
DBE Chemical Types / Concentrations	Process Rad Condensate Nitric Acid 2M Sodium Hydroxide 2M Sodium Permanganate 1M Strontium Nitrate 1M Water Neutral Solution (RLD45), 77°F, pH 7.0 Sodium Hydroxide (PVP04), 77°F, pH 12.0 Sodium Hydroxide (UFP26), 77°F, pH 14.5 Sodium Hydroxide (PVP02), 77°F, pH 15.0 Sodium Hydroxide (UFP01), 77°F, pH 15.5 Sodium Hydroxide (UFP04), 77°F, pH 15.5 Sodium Hydroxide (PVP06), 79°F, pH 12.5 Sodium Hydroxide (UFP33), 84°F, pH 14.5 Sodium Hydroxide (FRP13), 110°F, pH 14.5 Sodium Hydroxide, (HLP09), 113°F, pH 13.5 Sodium Hydroxide (HLP11), 113°F, pH 14.5 Sodium Hydroxide (HLP12), 113°F, pH 15.0 Sodium Hydroxide (HLP13), 113°F, pH 15.0 Sodium Hydroxide (TCP05), 120°F, pH 15.0 Sodium Hydroxide (FEP19), 121°F, pH 15.0 Sodium Hydroxide (FRP14), 191°F, pH 15.0

<b>Electrical Interfaces Supporting the Safety Function</b>	
Power Supply Voltage (VAC, VDC)	N/A
Power Supply Frequency (Hz)	N/A
Power Connection Method	N/A
I/O Signals to/from Equipment	N/A
I/O Connection Method	N/A

<b>Mechanical Interfaces</b>	
Mounting Configuration (orientation)	Vertical Mounted, Skirt
Mounting Method (bolts, welds, etc.)	Welded skirt to ring beam welded to embedment plates. Embedment plate details per 24590-PTF-DD-S13T-00036, 24590-PTF-DD-S13T-00039, 24590-PTF-DD-S13T-00043, and 24590-PTF-DD-S13T-00045 provided to the vendor in the material requisition
Auxiliary Devices	Pules Jet Mixers: UFP-PJM-00045, UFP-PJM-00046, UFP-PJM-00047, UFP-PJM-00048, UFP-PJM-00049, UFP-PJM-00050, UFP-PJM-00101, UFP-PJM-00102, UFP-PJM-00112, UFP-PJM-00113, UFP-PJM-00114, UFP-PJM-00115



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<b>Equipment Seismic Qualification (ESQ)</b>				
Parameter	Title	Reference/Document Number	Version / Revision	Remarks
WTP Seismic Design Specification	Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks	24590-WTP-3PS-SS90-T0001	2	N/A
	Engineering Specification for Seismic Qualification Criteria for Pressure Vessels	24590-WTP-3PS-MV00-T0002	3	
Specified Seismic Load Parameters	Seismic Analysis of Pretreatment Building - WSGM In-Structure Response Spectra (ISRS)	24590-PTF-S0C-S15T-00057	A	CCN 158079; WSGM ISRS Curves: 67, 68, 69

<b>Equipment Qualification Notes and Additional Information</b>
<p>a) For thermal aging, the high normal temperature shall be assumed to subsist for 40 years less the duration of the high abnormal temperature. For any lesser qualified life, the normal and abnormal condition durations shall be assigned proportionally. The abnormal temperature is stated to subsist for a certain number of hours per year. It shall be taken to subsist for this number of hours for each year of the qualified life.</p> <p>b) The ability to provide the safety function at the low normal temperature, the low abnormal temperature or the low DBE temperature (whichever be the lowest) shall be established by test, analysis, or operating experience. The thermal aging at these respective low temperatures will be conservatively covered by the thermal aging per item a) above. Therefore, no duration is assigned for the low temperatures.</p> <p>c) The ability to provide the safety function at the extremes of the normal and abnormal humidity conditions, taking into consideration the high and the low normal and high and low abnormal, shall be established by test, analysis, or operating experience. No duration is assigned for the normal and abnormal humidity conditions.</p> <p>d) If the performance of the safety function of the equipment is affected by ambient pressure, the ability to provide the safety function at the extremes of the normal and abnormal pressure conditions, taking into consideration the high and the low normal and the high and low abnormal pressures, shall be established by test, analysis, or operating experience. No duration is assigned to the normal and abnormal pressure conditions.</p> <p>e) (1) If the abnormal radiation dose rate is the same as the normal radiation dose rate, the normal radiation dose rate shall be assumed to subsist for 40 years, or any lesser qualified life, and the duration of the abnormal radiation dose rate is "0."            (2) If the abnormal radiation dose rate is higher than the normal radiation dose rate, the abnormal radiation dose rate shall be assumed to subsist for 40 years, or any lesser qualified life, and the duration of the normal radiation dose rate is "0."</p> <p>f) The DBE conditions shall be taken to subsist for the stated number of hours following the qualified life of the equipment.</p> <p>g) Spray due to fire sprinkler actuation shall be taken to occur once over the entire qualified life duration for a period of 2 hours, even if the qualified life is a period less than 40 years. If spray qualification is provided for DBE conditions (whether for water or chemical spray), then separate qualification for the fire sprinkler spray need not be provided.</p> <p>h) The values stated in this EQD are the ambients and do not include the thermodynamic and radiation conditions imposed by the process fluids, self-heating, etc. The data pertaining to process fluid and service induced parameters are to be taken into account where significant, such as in thermal aging analyses. These data can be obtained from the equipment data sheets or the Equipment Specification.</p> <p>i) Equipment that is to be installed in inaccessible locations must be qualified to a 40-year life without the need for maintenance or replacement.</p>



# EQUIPMENT QUALIFICATION DATASHEET (EQD)

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### Equipment Qualification Notes and Additional Information

- E-Note 1: BNI (BUYER) shall perform Equipment Environmental Qualification in accordance with 24590-WTP-DC-ENG-06-001, Design Criteria for Environmental and Natural Phenomena Hazard Qualification of Equipment.
- E-Note 2: Where pressure is given in inches of water column (in-w.c.) in the source document, it is generally assumed that this is in reference to atmospheric pressure and is therefore equivalent to inches of water gage (in-w.g.).
- E-Note 3: BNI (BUYER) shall perform Equipment Seismic Qualification in accordance with the listed parameters and the applicable specification requirements.
- E-Note 4: Radiation Dose Rates are for determining shielding requirements only for the black cell and are not at the source (vessel). Since the vessel is all metallic and the source has no neutron components for material embrittlement, the dose rates are of no concern on the vessel or its subcomponents.
- E-Note 5: Flood height is 2.08 ft above the floor, bottom of vessel is above this level therefore, no submergence evaluation is required.
- E-Note 6: Environmental data shown are for the room only.
- E-Note 7: Normal, Abnormal, and DBE dose rates are the same, therefore, abnormal & DBE doses do not add to total integrated dose based on normal dose rates over 40 years.

#### DOE Radioactive Materials Disclaimer:

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

Screening / Evaluation Required? If yes per 24590-WTP-GPP-SREG-002, E&NS signature required below	X	Yes	No
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# EQUIPMENT QUALIFICATION DATASHEET (EQD)

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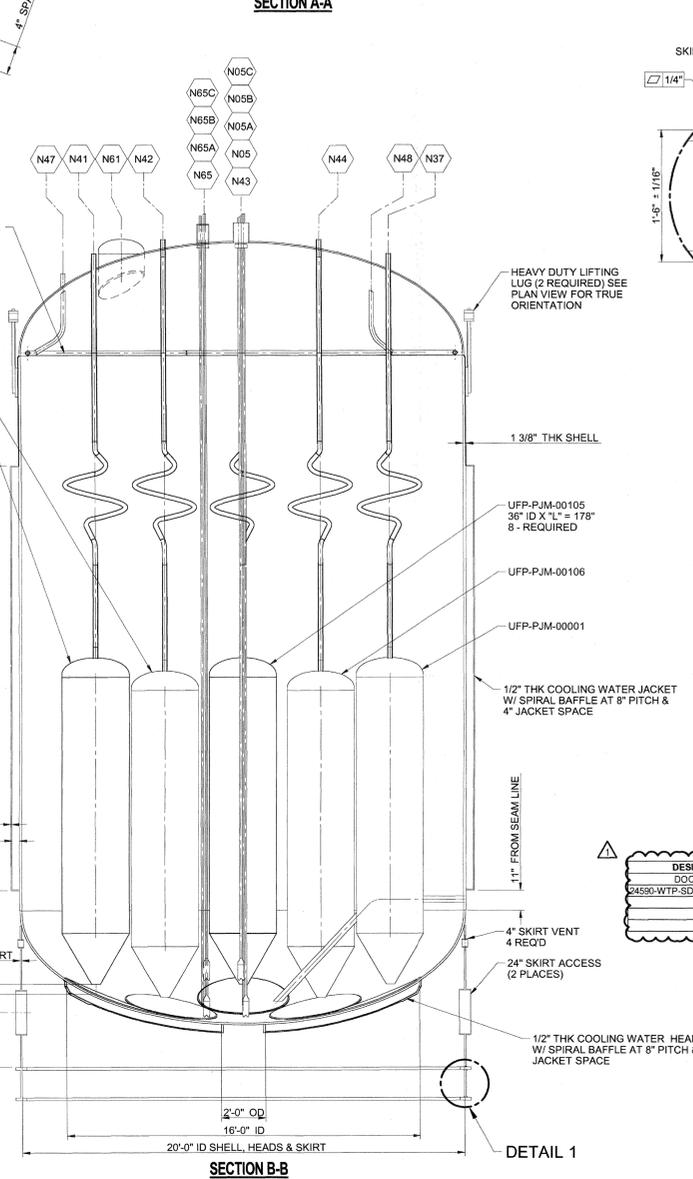
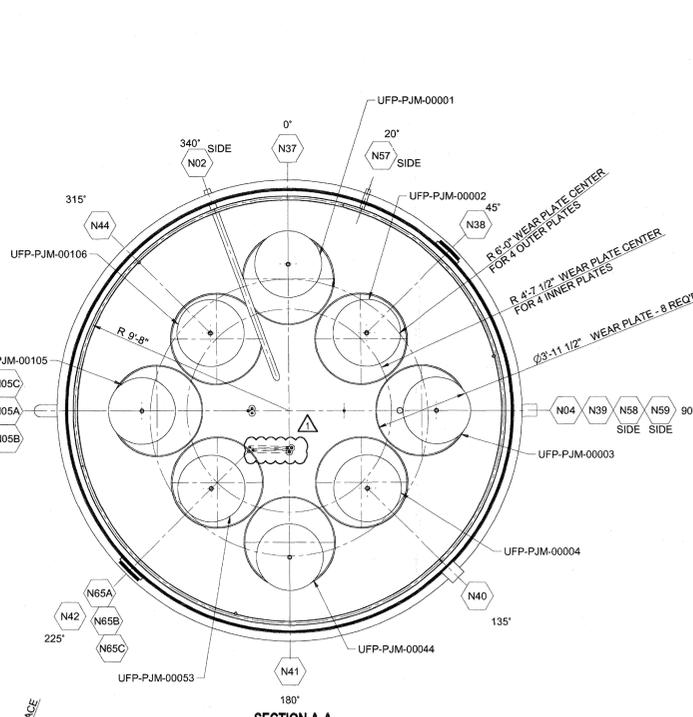
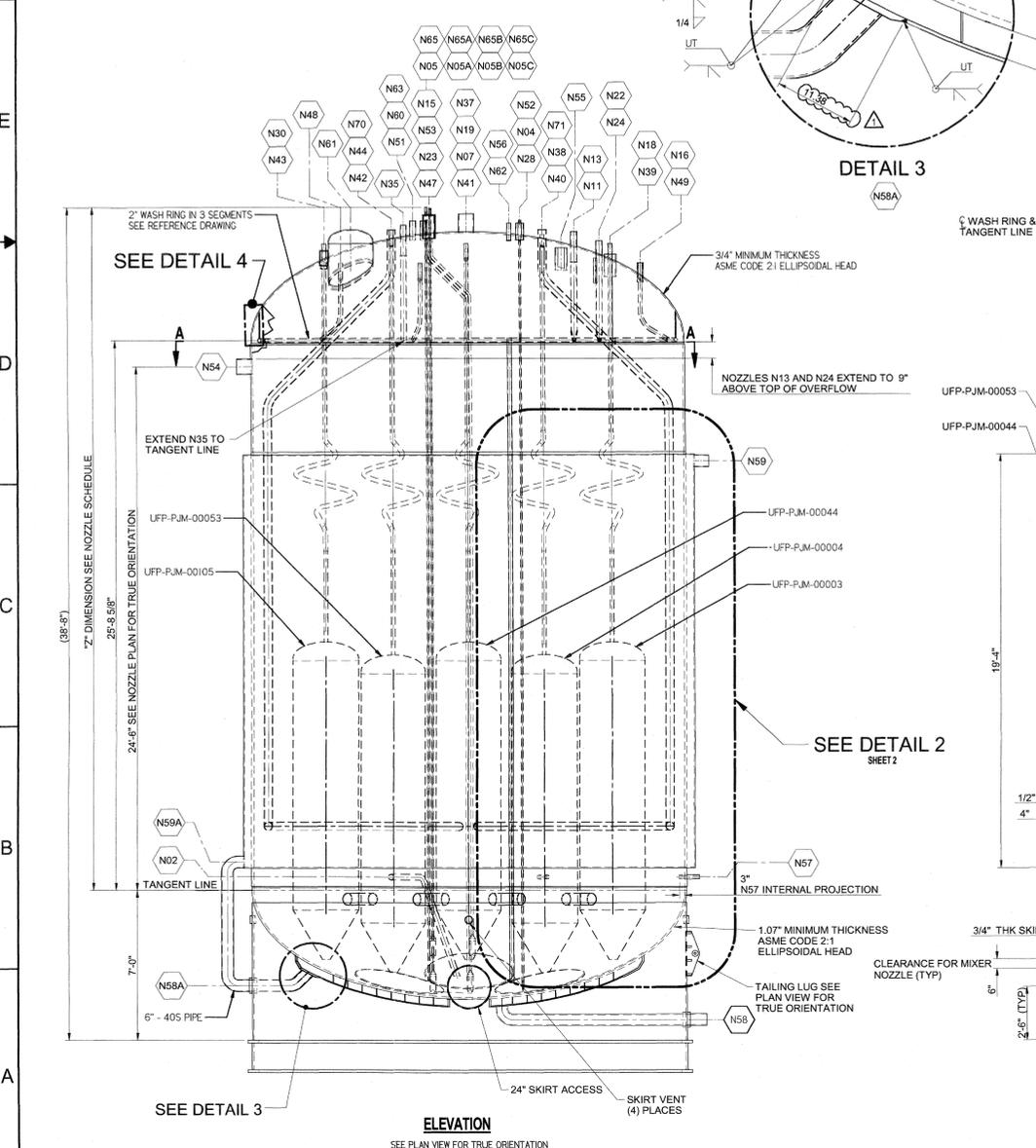
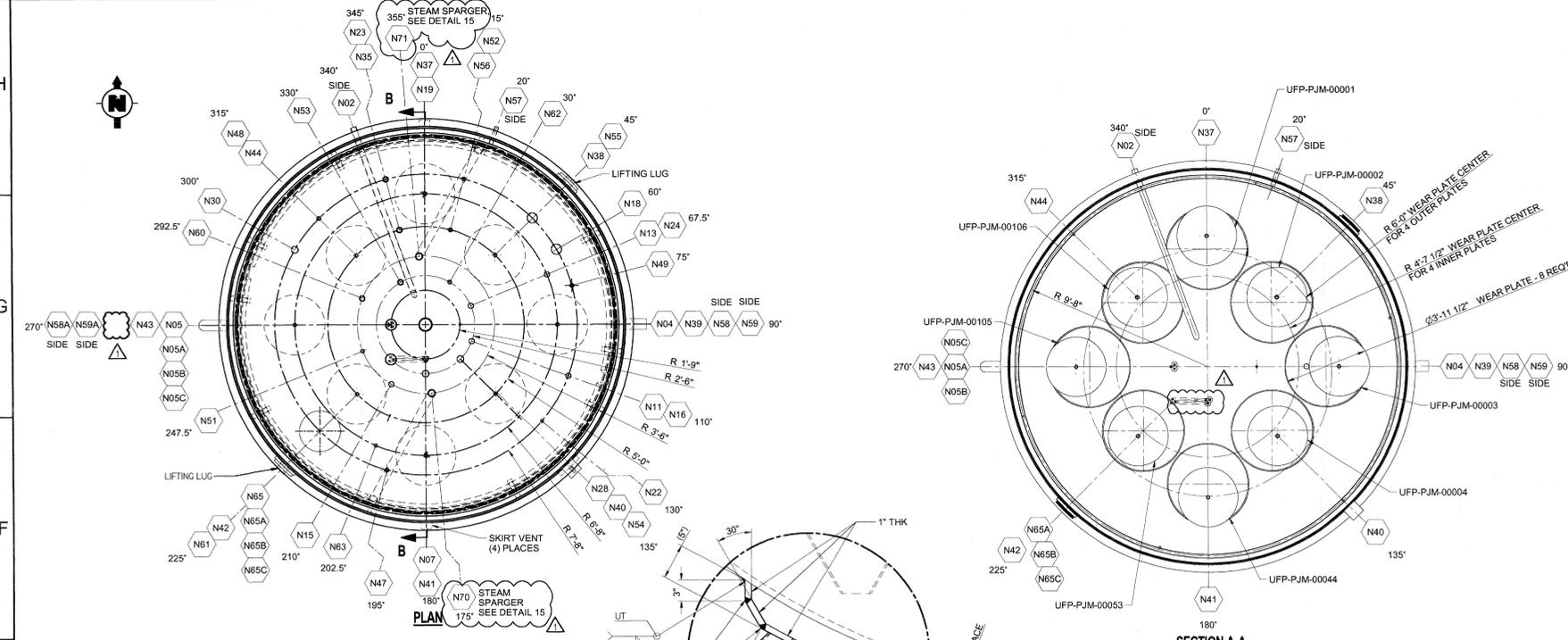
### Approval

Rev	Description	Vessel Engineer	Checked	System Engineer	Reviewed/MET	E&NS	Approved	Date
0	Issue for Purchase	H.K	US/CS	P.A	JJ	N/A	SK	10/20/02
1	Revised as noted	HK	PA/CS	MA	JJ	N/A	MWH	8/18/03
2	Revised as Noted	HK	PA/CS	MA	RES	N/A	MWH	11/14/03
3	Revised as Noted	H Khurana	P Aviguetero C Slater	M. Askar	J. Julyk	N/A	C. Morley for M Hoffmann	2/5/04
4	Added hydrodynamic loads and other revisions as noted.	H Khurana	P Aviguetero C Slater	M. Askar	J. Julyk	N/A	M Hoffmann	9/8/04
5	Added wear plates as noted.	H Khurana	P Aviguetero C Slater	M. Askar	J. Julyk	N/A	M Hoffmann	10/3/04
6	Added note 14 & 15, deleted note 10, revised note 12, added P&ID reference and changes as noted. Incorporated SDDR # 24590-WTP-SDDR-PROC-05-00227 by reference.	H Khurana	P Aviguetero C Slater	M. Askar	J. Julyk	N/A	M Hoffmann	03/02/05
7	Revised Notes on page 2 & 3 as noted	H Khurana	MAP for C/S	M. Askar	RES	N/A	M Hoffmann	07/28/05
8	Revised per note 17 on page 2 and as noted.	H.Khurana	Jl Polani	M. Askar	C. Slater D. Adler	N/A	J. Julyk	10/28/05
9	Revised per Note 21, due to revised load conditions, new load conditions for MOB, single overblow, and revised process conditions	M Seed	W Wilcox	D Vo	B Makadia	G Hendricks	J Julyk	03/20/08
10	Revised per Note 29 & 30. Added Steam Spargers.	M Seed	R Peters	D Vo	R Davis	J Hinckley	J Julyk	01/16/09
11	Revised as noted by revision triangles. Added Nozzle Pressure and Temperature to Nozzle Table. Renumbered Equipment Qualification Notes to E-Note xyz for clarity to EQ Sections. Updated Cyclic data for Sparger	M Seed	D Harris	D Vo	D Adler / MET R P Hills / EQ	J Hinckley	J Julyk	08/24/09
12	Revised per Note 31 (Notes/Remarks section, page 2) and as noted by revision triangles. Supersedes 24590-PTF-MVD-UFP-P0002, Rev 2.	J Grusetski <i>J Grusetski</i>	M Seed <i>M Seed</i>	<del>D Evans</del> D. Vo <i>D. Vo</i> D. Vo <i>D. Vo</i>	D Adler <i>D Adler</i>	<del>R Lanning</del> <i>R Lanning</i> J. Hinckley <i>J. Hinckley</i>	J Julyk <i>J Julyk</i>	<i>5/20/11</i>

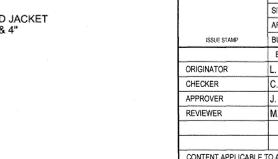
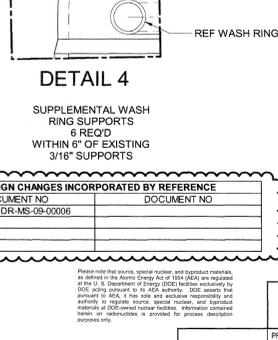
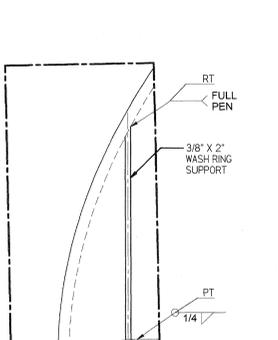
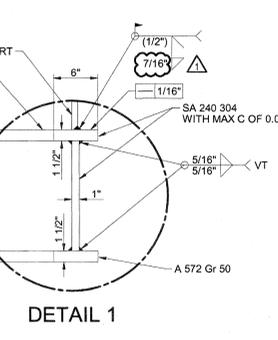
Data	Document #	Rev	Document Title
Quality Level	24590-PTF-M6-UFP-00001001	0	<i>P&amp;ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001A</i>
	24590-PTF-M6-UFP-00001004	0	<i>P&amp;ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001B</i>
Seismic Category	24590-PTF-M6-UFP-00001001	0	<i>P&amp;ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001A</i>
	24590-PTF-M6-UFP-00001004	0	<i>P&amp;ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001B</i>
Design Specific Gravity	24590-WTP-RPT-ENG-07-007	0	<i>Process Stream Properties / Section 4.18</i>
Max Operating Volume	24590-PTF-M6C-UFP-00004	E 	<i>Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B, / Sheet 31</i> 
Total Volume	24590-PTF-M6C-UFP-00004	E 	<i>Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B, / Sheet 25</i> 
Inside Diameter	24590-PTF-M6C-UFP-00004	E 	<i>Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B, / Sheet 2</i> 
Length TL-TL	24590-PTF-M6C-UFP-00004	E 	<i>Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B, / Sheet 31</i> 
Operating Pressure Parent Vessel (external)	24590-PTF-M6C-PVP-00017	A	<i>HADCRT Analysis of PTF PVP System at various Operating Scenarios / (see sheet 14 - the PVP scrubber inlet is controlled to 35 in-wg) External pressure of 1.5 psig is based on a normal operating pressure of -35 in WG (1.26 psig) with an additional margin. (24590-PTF-M5-V17T-00021001 &amp; 00021004 indicate the process flow diagrams)</i>
Operating Pressure Parent Vessel (internal)	N/A		Maximum value possible, assuming fans off, is atmospheric pressure
Design Pressure Parent Vessel (internal)	24590-WTP-DB-ENG-01-001	1P	<i>Basis of Design / Section 16.4.2.1</i>
Design Pressure Parent Vessel (external)	24590-PTF-M6C-PVP-00017	A	<i>HADCRT Analysis of PTF PVP System at various Operating Scenarios / External design pressure of 2.0 psig is based on a normal operating pressure of -35 in WG (1.26 psig) with an additional margin</i>
Jacket Design Pressure (internal) 	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs/ use 35 psig</i>
	24590-PTF-M6C-10-00008	A	<i>Overpressure Protection Evaluation for PTF Vessel Jackets/ Section 8</i>
Operating Temp (parent vessel) 	24590-WTP-RPT-ENG-07-007	0	<i>Process Stream Properties Report</i>
Design Temp (parent vessel) 	24590-WTP-RPT-ENG-07-007	0	<i>Process Stream Properties Report</i>
Sparger Operation/Design	24590-PTF-M6X-UFP-00386	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034002, Rev 0</i>
	24590-PTF-M6X-UFP-00387	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034003, Rev 0</i>
	24590-PTF-M6X-UFP-00388	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034004, Rev 0</i>
	24590-PTF-M6X-UFP-00389	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034005, Rev 0</i>
Jacket Design Temp 	24590-PTF-MVC-UFP-00007	C	<i>Design of Cooling Jacket for the Ultrafiltration Feed Preparation Vessels (UFP-VSL-00001A/B)</i>
Corrosion Allowance, Erosion Allowance 	24590-PTF-N1D-UFP-00005	5	<i>Corrosion Evaluation UFP-VSL-00001A/B</i>
	24590-WTP-M0C-50-00004	E	<i>Wear Allowance for WTP Waste Slurry Systems (24590-WTP-M0E-50-00014)</i>
Materials of Construction 	24590-PTF-N1D-UFP-00005	5	<i>Corrosion Evaluation UFP-VSL-00001A/B</i>
Design Pressure (PJM) 	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs (24590-PTF-MVE-10-00012)</i>
	24590-WTP-M6C-50-00011	A	<i>Pulse Jet Mixer Internal Pressures and Thrust / Section 8</i>

Data	Document #	Rev	Document Title
Operating Pressure (PJM) 	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs (24590-PTF-MVE-10-00012)</i>
	24590-WTP-M6C-50-00011	A	<i>Pulse Jet Mixer Internal Pressures and Thrust / Section 8</i>
Operating Temperature (PJM)	N/A		same as parent vessel
Cyclic Data (Vessel) 	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs</i>
	24590-PTF-M6C-PVP-00017	A	<i>HADCRT Analysis of PTF PVP System at various Operating Scenarios</i>
Cyclic Data (PJM)	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs (24590-PTF-MVE-10-00012)</i> 
Cyclic Data (Steam Spargers) 	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs (24590-PTF-MVE-10-00005)</i>
Operating conditions (Air)	24590-PTF-M6X-UFP-00386	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034002, Rev 0</i>
	24590-PTF-M6X-UFP-00387	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034003, Rev 0</i>
	24590-PTF-M6X-UFP-00388	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034004, Rev 0</i>
	24590-PTF-M6X-UFP-00389	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034005, Rev 0</i>
Operating Conditions (Steam)	24590-PTF-M6X-UFP-00386	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034002, Rev 0</i>
	24590-PTF-M6X-UFP-00387	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034003, Rev 0</i>
	24590-PTF-M6X-UFP-00388	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034004, Rev 0</i>
	24590-PTF-M6X-UFP-00389	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00034005, Rev 0</i>
Hydrodynamic Loads	24590-WTP-MVC-50-00001	A	<i>Hydrodynamic Loads for Normal PJM Operation in Vessels with Newtonian Fluids</i>
Single PJM Overblow Loads 	24590-WTP-MVC-50-00011	B	<i>Pulse Jet Mixer Overblow Vessel Loads</i>
PJM Overblow Loads 	24590-WTP-MVC-50-00011	B	<i>Pulse Jet Mixer Overblow Vessel Loads</i>
Single Overblow cycles 	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs (24590-PTF-MVE-10-00004)</i>
Multiple Overblow Cycles 	24590-PTF-MVC-10-00003	C	<i>PTF Vessel Cyclic Datasheet Inputs (24590-PTF-MVE-10-00004)</i>
Nozzle Loads	CCN 126187	N/A	<i>Nozzle Loads for UFP-VSL-00001A</i>
	CCN 126188	N/A	<i>Nozzle Loads for UFP-VSL-00001B</i>
	CCN 202057	N/A	<i>Supplemental Design Nozzle Loads for UFP-VSL-00001A/B</i>
	 CCN 230860	N/A	<i>Supplemental Nozzle Design Loads for UFP-VSL-00001A</i>
	 CCN 230861	N/A	<i>Supplemental Nozzle Design Loads for UFP-VSL-00001B</i>
Equipment Environmental Qualification (EEQ) 	24590-PTF-U0D-W16T-00001	2	<i>PTF Room Environment Datasheet (24590-PTF-U0N-W16T-00007)</i>

Data	Document #	Rev	Document Title
Nozzle Design Pressures and Temperatures 	24590-PTF-M6X-UFP-00288	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00001001, Rev 0 UFP-VSL-1A (psig change N18 24590-PTF-M80T-00015 and psig change N51/N52 24590-PTF-M6LN-M80T-00039)</i>
	24590-PTF-M6X-UFP-00291	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00001002, Rev 0 UFP-VSL-1A</i>
	24590-PTF-M6X-UFP-00429	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00015002, Rev 0 UFP-VSL-1A</i>
	24590-PTF-M6WX-UFP-00027007	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00027007, Rev 0 UFP-VSL-1A</i>
	24590-PTF-M6X-UFP-00306	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00001004, Rev 0 UFP-VSL-1B (psig change N51/52 24590-PTF-M6LN-M80T-00039)</i>
	24590-PTF-M6X-UFP-00301	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00001005, Rev 0 UFP-VSL-1B</i>
	24590-PTF-M6WX-UFP-00007007	0	<i>MS Line List for P&amp;ID 24590-PTF-M6-UFP-00007007, Rev 1 UFP-VSL-1B</i>
	24590-PTF-M6X-PWD-00113	2	<i>Pipeline List for P&amp;ID 24590-PTF-M6-PWD-00046, Rev 2 UFP-VSL-1B</i>
Nozzle Load Management 	24590-WTP-GPG-ENG-0150	0	<i>Plant Design/Mechanical Systems Equipment Interfaces: Terminal End Equipment / CCN 229865</i>



NOZZLE	SIZE	SCHED WALL	OUTLET	SERVICE/REMARKS	"Z" DIM	REF DWG-DET	CONNECTION
N02	3"	80S	OUTLET	TEMPERATURE	NA	DET 14 & 24590-WTP-MV-M99T-00016001 DET 3	3"-40S
N04	2"	160S	INSTRUMENTATION	BALANCE	31'-2"	DET 11 & 24590-WTP-MV-M99T-00016003 DET 26	3/4"-10S
N05	6"	80S	DENSITY	DENSITY	31'-2"	24590-WTP-MV-M99T-00016003 DET 26	N/A
N05A	1"	160S	LEVEL	LEVEL	31'-6"	24590-WTP-MV-M99T-00016003 DET 26	1"-40S
N05B	1"	160S	LEVEL	LEVEL	31'-7"	24590-WTP-MV-M99T-00016003 DET 26	1"-40S
N05C	1"	160S	LEVEL	LEVEL	31'-8"	24590-WTP-MV-M99T-00016003 DET 26	1"-40S
N07	4"	80S	INLET	INLET	31'-3"	24590-WTP-MV-M99T-00016001 DET 2	4"-40S
N11	3"	80S	INLET	INLET	31'-1"	24590-WTP-MV-M99T-00016001 DET 2	3"-40S
N13	3"	80S	INLET	INLET	31'-1"	24590-WTP-MV-M99T-00016001 DET 3	3"-40S
N15	3"	80S	INLET AIR PURGE (PASSIVE)	INLET AIR PURGE (PASSIVE)	30'-11"	24590-WTP-MV-M99T-00016001 DET 1	3"-40S
N16	3"	80S	SAMPLE RETURN	SAMPLE RETURN	29'-6"	24590-WTP-MV-M99T-00016001 DET 2	3"-40S
N18	6"	80S	INLET	INLET	29'-8"	24590-WTP-MV-M99T-00016001 DET 2	6"-40S
N19	8"	80S	OUTLET/VESSEL VENT	OUTLET/VESSEL VENT	31'-5"	24590-WTP-MV-M99T-00016001 DET 1	8"-10S
N22	1 1/2"	80S	FORCED AIR PURGE	FORCED AIR PURGE	29'-6"	24590-WTP-MV-M99T-00016001 DET 1	1 1/2"-40S
N23	3"	80S	INLET	INLET	29'-6"	24590-WTP-MV-M99T-00016001 DET 2	3"-40S
N24	3"	80S	INLET WITH DIP PIPE	INLET WITH DIP PIPE	30'-1"	24590-WTP-MV-M99T-00016001 DET 3	3"-40S
N28	4"	80S	INLET	INLET	31'-3"	24590-WTP-MV-M99T-00016001 DET 2	4"-40S
N30	4"	80S	INLET	INLET	29'-8"	24590-WTP-MV-M99T-00016001 DET 2	4"-40S
N35	3"	80S	INLET WITH DIP PIPE	INLET WITH DIP PIPE	30'-7"	24590-WTP-MV-M99T-00016001 DET 3	3"-40S
N37	2"	160S	AIR/VACUUM TO UFP-PJM-00001	AIR/VACUUM TO UFP-PJM-00001	30'-0"	24590-WTP-MV-M99T-00016001 DET 3	2"-40S
N38	2"	160S	AIR/VACUUM TO UFP-PJM-00002	AIR/VACUUM TO UFP-PJM-00002	30'-7"	24590-WTP-MV-M99T-00016001 DET 3	2"-40S
N39	2"	160S	AIR/VACUUM TO UFP-PJM-00003	AIR/VACUUM TO UFP-PJM-00003	30'-0"	24590-WTP-MV-M99T-00016001 DET 3	2"-40S
N40	2"	160S	AIR/VACUUM TO UFP-PJM-00004	AIR/VACUUM TO UFP-PJM-00004	30'-7"	24590-WTP-MV-M99T-00016001 DET 3	2"-40S
N41	2"	160S	AIR/VACUUM TO UFP-PJM-00044	AIR/VACUUM TO UFP-PJM-00044	30'-0"	24590-WTP-MV-M99T-00016001 DET 3	2"-40S
N42	2"	160S	AIR/VACUUM TO UFP-PJM-00053	AIR/VACUUM TO UFP-PJM-00053	30'-7"	24590-WTP-MV-M99T-00016001 DET 3	2"-40S
N43	2"	160S	AIR/VACUUM TO UFP-PJM-00105	AIR/VACUUM TO UFP-PJM-00105	30'-0"	24590-WTP-MV-M99T-00016001 DET 3	2"-40S
N44	2"	160S	AIR/VACUUM TO UFP-PJM-00106	AIR/VACUUM TO UFP-PJM-00106	30'-7"	24590-WTP-MV-M99T-00016001 DET 3	2"-40S
N47	2"	80S	INLET TO WASH RING	INLET TO WASH RING	29'-6"	24590-WTP-MV-M99T-00016001 DET 3	2"-40S
N48	2"	80S	INLET TO WASH RING	INLET TO WASH RING	29'-6"	24590-WTP-MV-M99T-00016001 DET 3	2"-40S
N49	2"	80S	INLET TO WASH RING	INLET TO WASH RING	29'-6"	24590-WTP-MV-M99T-00016001 DET 3	2"-40S
N51	2"	80S	INLET	INLET	30'-10"	24590-WTP-MV-M99T-00016001 DET 2	2"-80S
N52	2"	80S	INLET	INLET	29'-6"	24590-WTP-MV-M99T-00016001 DET 2	2"-80S
N53	3"	80S	INLET	INLET	31'-1"	24590-WTP-MV-M99T-00016001 DET 2	3"-40S
N54	8"	40S	OUTLET/OVERFLOW	OUTLET/OVERFLOW	NA	24590-WTP-MV-M99T-00016001 DET 1	8"-40S
N55	6"	80S	SPARE	SPARE	29'-8"	24590-WTP-MV-M99T-00016001 DET 2	CAPPED
N56	2"	160S	SPARE	SPARE	30'-7"	24590-WTP-MV-M99T-00016001 DET 2	CAPPED
N57	2"	160S	SPARE	SPARE	NA	24590-WTP-MV-M99T-00016001 DET 3	CAPPED
N58	6"	40S	CHILLED WATER JACKET IN, BOT	CHILLED WATER JACKET IN, BOT	NA	24590-WTP-MV-M99T-00016001 DET 1	6"-10S
N58A	6"	40S	CHILLED WATER JACKET OUT, BOT	CHILLED WATER JACKET OUT, BOT	NA	DETAL 3 & 24590-WTP-MV-M99T-00016001 DET 1	6"-10S
N59	6"	40S	CHILLED WATER JACKET OUT, TOP	CHILLED WATER JACKET OUT, TOP	NA	24590-WTP-MV-M99T-00016001 DET 1	6"-10S
N59A	6"	40S	CHILLED WATER JACKET IN, SIDE	CHILLED WATER JACKET IN, SIDE	NA	24590-WTP-MV-M99T-00016001 DET 1	6"-10S
N60	3"	80S	INLET	INLET	30'-11"	24590-WTP-MV-M99T-00016001 DET 2	3"-40S
N61	24"	PLATE	MANWAY	MANWAY	29'-10"	24590-WTP-MV-M99T-00017 DET 1	24"-CAPPED
N62	3"	80S	INLET	INLET	31'-7"	24590-WTP-MV-M99T-00016001 DET 2	3"-40S
N63	3"	80S	INLET	INLET	30'-0"	24590-WTP-MV-M99T-00016001 DET 2	2"-40S
N65	6"	80S	INSTRUMENTATION	INSTRUMENTATION	31'-2"	24590-WTP-MV-M99T-00016003 DET 26	N/A
N65A	1"	160S	BALANCE	BALANCE	31'-6"	24590-WTP-MV-M99T-00016003 DET 26	1"-40S
N65B	1"	160S	DENSITY	DENSITY	31'-7"	24590-WTP-MV-M99T-00016003 DET 26	1"-40S
N65C	1"	160S	LEVEL	LEVEL	31'-8"	24590-WTP-MV-M99T-00016003 DET 26	1"-40S
N70	4"	1/2"	STEAM SPARGER	STEAM SPARGER	30'-11"	SEE DETAIL 13, SHEET 3	4"-40S
N71	4"	1/2"	STEAM SPARGER	STEAM SPARGER	30'-11"	SEE DETAIL 19, SHEET 3	4"-40S



**GENERAL NOTES:**

- FOR DIP LEGS USE 2" BOTTOM HEAD CLEARANCE.
- "Z" DIMENSION MEASURED FROM BOTTOM TANGENT LINE TO NOZZLE FACE.
- BASE PLATE BEAM TO BE SHIPPED AHEAD OF VESSEL TO FIELD CONSTRUCTION FOR INSTALLATION BY OTHERS.
- THIS IS A BLACK CELL VESSEL.
- THE CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.
- THIS DOCUMENT CONTAINS INFORMATION PERTAINING TO AN ACCIDENT ANALYSIS CALCULATION AND RECEIVES A SCREENING FROM EXAMS, IN ACCORDANCE WITH PROCEDURES, ANYTIME THE DOCUMENT IS MODIFIED.
- SUPPORT COLLARS TO HAVE 118" NOMINAL GAP ALL AROUND NOZZLES OR PIPES.
- SHEETS 2 & 3 PROVIDE INFORMATION TO PLACE SUPPORTS.
- SUPPLIER TO UTILIZE THE SUPPORT SIZES, CONFIGURATION AND LOCATIONS AS PROVIDED.
- TOLERANCE FOR LOCATION OF PJM SUPPORTS IS ± 1/2" AND ± 5". TOLERANCE FOR THE SUPPORT RINGS IS ± 2".
- ON PIPING AND PJM SUPPORTS RT IS THE PREFERRED METHOD OF NDE BUT UT IS ACCEPTABLE FOR THOSE JOINTS WHERE RT CANNOT BE PERFORMED.
- EXACT POSITION AND ANGLE OF THIS SUPPORT PIPE (DETAIL 18) DETERMINED BY VENDOR.
- THIS DRAWING SUPERSEDES 24590-PTF-MV-UFP-0001 REV 3, AND INCLUDES INFORMATION FROM THE FOLLOWING CHANGE DOCUMENTS:
  - 24590-PTF-MV-UFP-00031
  - 24590-PTF-MV-UFP-00032
  - 24590-PTF-MV-UFP-00038
  - 24590-PTF-MV-UFP-00026
  - 24590-PTF-MV-UFP-00028
  - 24590-PTF-MV-UFP-00029
  - 24590-PTF-MV-UFP-00030
  - 24590-PTF-MV-UFP-00031
  - 24590-PTF-MV-UFP-00032
  - 24590-PTF-MV-UFP-00033
  - 24590-PTF-MV-UFP-00034
  - 24590-PTF-MV-UFP-00035
  - 24590-PTF-MV-UFP-00036
  - 24590-PTF-MV-UFP-00037
  - 24590-PTF-MV-UFP-00038
  - 24590-PTF-MV-UFP-00039
  - 24590-PTF-MV-UFP-00040
  - 24590-PTF-MV-UFP-00041
  - 24590-PTF-MV-UFP-00042
  - 24590-PTF-MV-UFP-00043
  - 24590-PTF-MV-UFP-00044
  - 24590-PTF-MV-UFP-00045
  - 24590-PTF-MV-UFP-00046
  - 24590-PTF-MV-UFP-00047
  - 24590-PTF-MV-UFP-00048
  - 24590-PTF-MV-UFP-00049
  - 24590-PTF-MV-UFP-00050
  - 24590-PTF-MV-UFP-00051
  - 24590-PTF-MV-UFP-00052
  - 24590-PTF-MV-UFP-00053
  - 24590-PTF-MV-UFP-00054
  - 24590-PTF-MV-UFP-00055
  - 24590-PTF-MV-UFP-00056
  - 24590-PTF-MV-UFP-00057
  - 24590-PTF-MV-UFP-00058
  - 24590-PTF-MV-UFP-00059
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  - 24590-PTF-MV-UFP-00196
  - 24590-PTF-MV-UFP-00197
  - 24590-PTF-MV-UFP-00198
  - 24590-PTF-MV-UFP-00199
  - 24590-PTF-MV-UFP-00200
- INCORPORATED THE RESULTS FROM CALC 24590-PTF-MV-UFP-00022. NOTE THAT THE INCORPORATION OF THIS CALC MODIFIED THE PRECEDING DCN INCORPORATION.
- ALL PIPING SHALL BE FULL PENETRATION WELDED.
- 15 WEAR PLATE TO BE 1/2" THK.
- 16 VENDOR TO DETERMINE FINAL DESIGN.
- 17 ALL ACCESSIBLE WELDS ARE TO BE FULLY VOLUMETRICALLY CHECKED (RT OR VT) OR AS NOTED IN WELD SYMBOL. ALSO, ALL WELDS ARE TO BE VT AND PT.
- 18 REVISED PER THE RESULTS OF CALCULATION 24590-PTF-MV-UFP-00022 REV B, 24590-PTF-MV-UFP-00019, AND VENDOR COMMENTS.

HOLDS:  
 1 DELETED  
 2 DELETED

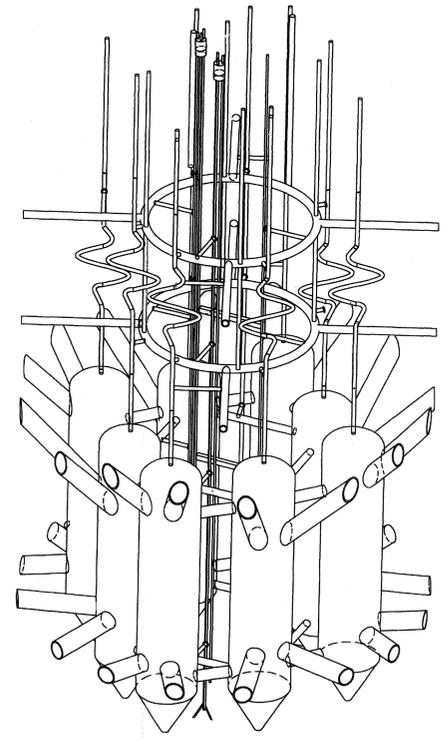
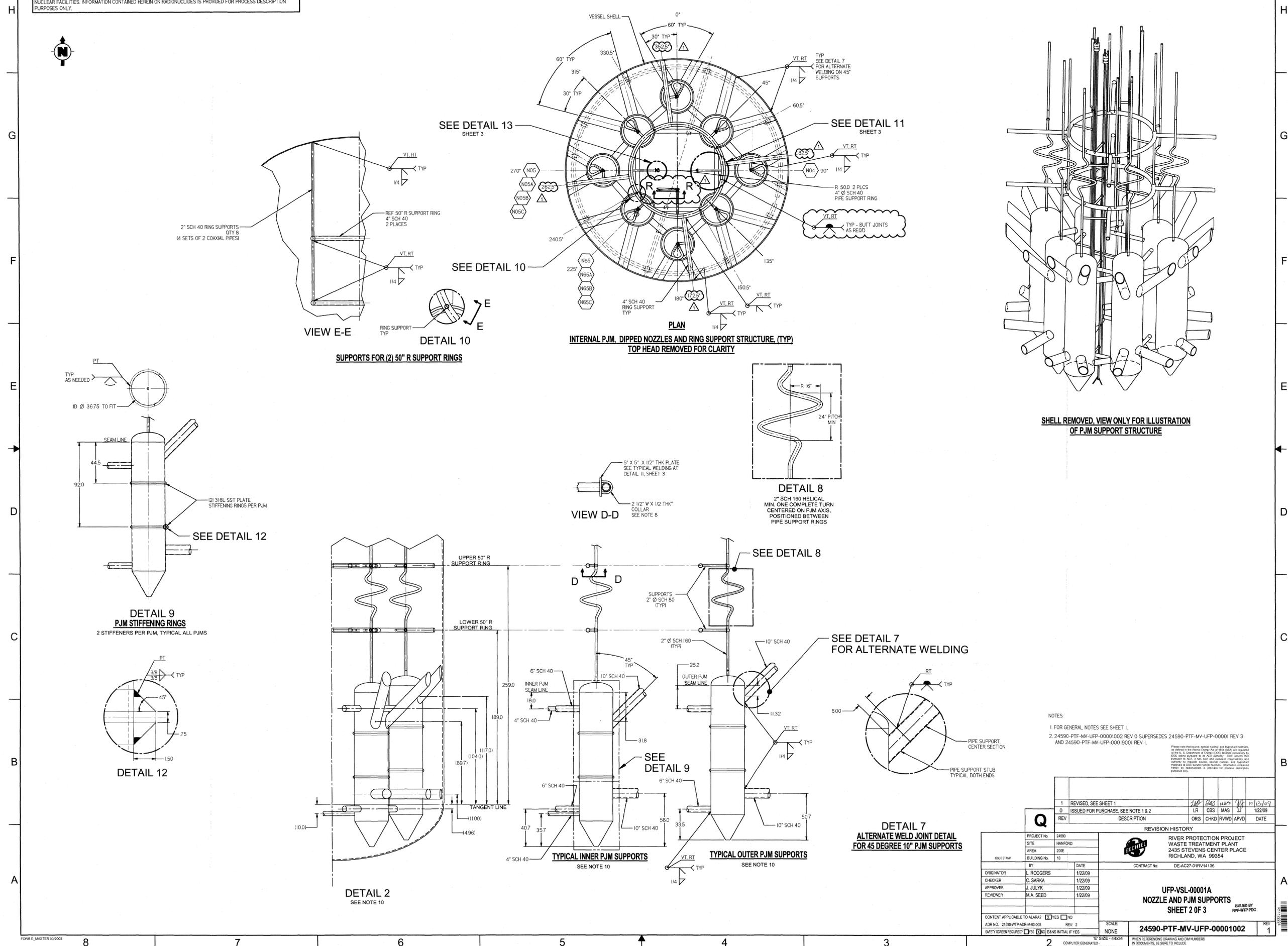
THIS DRAWING TO BE READ IN CONJUNCTION WITH MECHANICAL DATA SHEET 24590-PTF-MV-UFP-00001

DWG NO	TITLE
24590-PTF-MV-UFP-0001001	EQUIPMENT ASSY ULTRAFILTRATION FEED PREP VESSEL UFP-VSL-00001A SHEET 1 OF 3
24590-PTF-MV-UFP-0001002	UFP-VSL-00001A NOZZLE AND PJM SUPPORTS SHEET 2 OF 3
24590-PTF-MV-UFP-0001003	UFP-VSL-00001A NOZZLE AND PJM SUPPORTS SHEET 3 OF 3

DWG NO	REFERENCE DRAWINGS	TITLE
24590-PTF-MV-UFP-0001001	P&ID PTF ULTRAFILTRATION PROCESS SYSTEM	
24590-PTF-MV-UFP-0001002	P&ID PTF ULTRAFILTRATION PROCESS SYSTEM BUBBLERS	
24590-PTF-MV-UFP-0001003	P&ID PTF ULTRAFILTRATION PROCESS SYSTEM PLANT WASH	
24590-PTF-MV-UFP-0001004	P&ID PTF ULTRAFILTRATION PROCESS SYSTEM VESSEL PJM	
24590-PTF-MV-UFP-0001005	P&ID PTF ULTRAFILTRATION PROCESS SYSTEM VESSEL PJM	
24590-WTP-MV-M99T-00001	PRESSURE VESSEL TOLERANCES STANDARD DETAILS	
24590-WTP-MV-M99T-00002	PULSE JET MIXERS STANDARD DETAILS	
24590-WTP-MV-M99T-00003	THERMOWELL CONNECTION STANDARD DETAILS	
24590-WTP-MV-M99T-00004	LIFTING LUGS STANDARD DETAILS	
24590-WTP-MV-M99T-00005	TAILING LUG STANDARD DETAILS	
24590-WTP-MV-M99T-00006	WASH RINGS STANDARD DETAILS	
24590-WTP-MV-M99T-00007	WASH RINGS STANDARD DETAILS	
24590-WTP-MV-M99T-00008	WASH RINGS STANDARD DETAILS	
24590-WTP-MV-M99T-00009	WASH RINGS STANDARD DETAILS	
24590-WTP-MV-M99T-00010	WASH RINGS STANDARD DETAILS	
24590-WTP-MV-M99T-00011	WASH RINGS STANDARD DETAILS	
24590-WTP-MV-M99T-00012	WASH RINGS STANDARD DETAILS	
24590-WTP-MV-M99T-00013	WASH RINGS STANDARD DETAILS	
24590-WTP-MV-M99T-0001		

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.

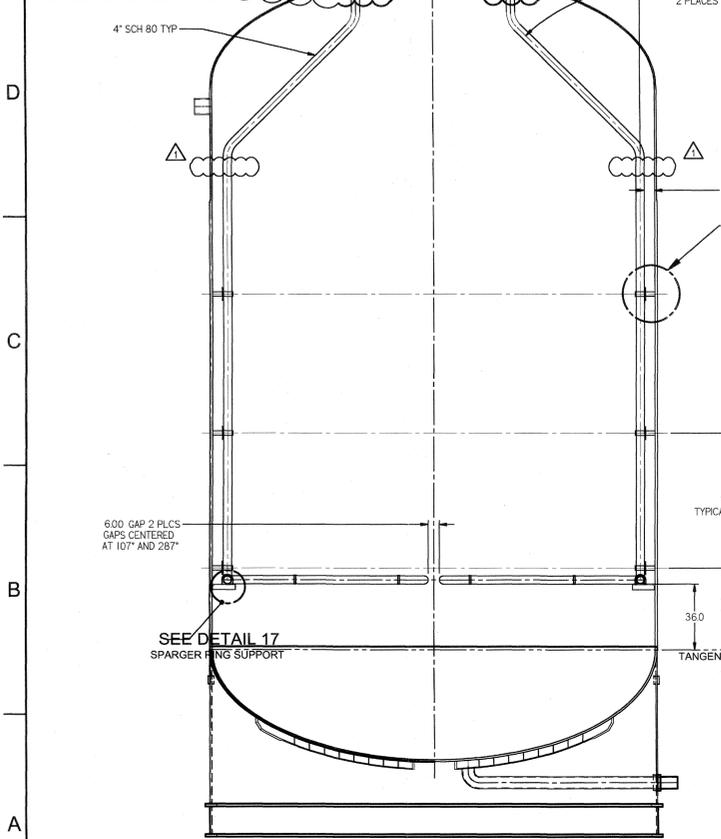
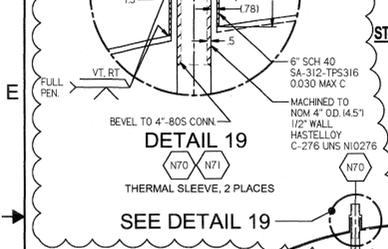
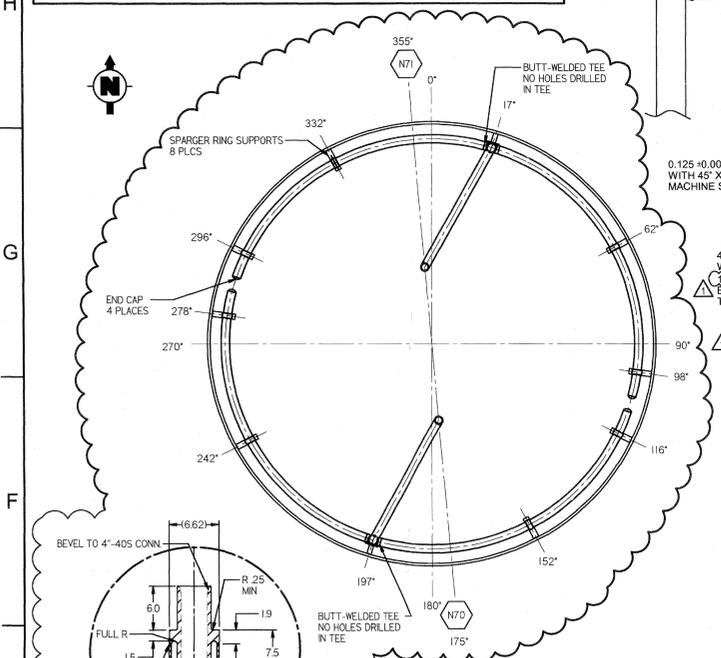


SHELL REMOVED, VIEW ONLY FOR ILLUSTRATION OF P.J.M. SUPPORT STRUCTURE

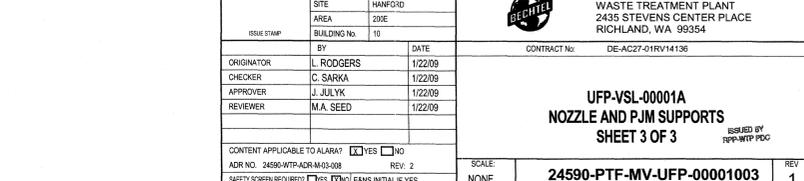
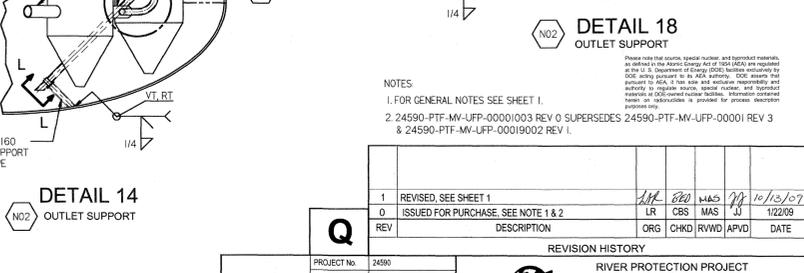
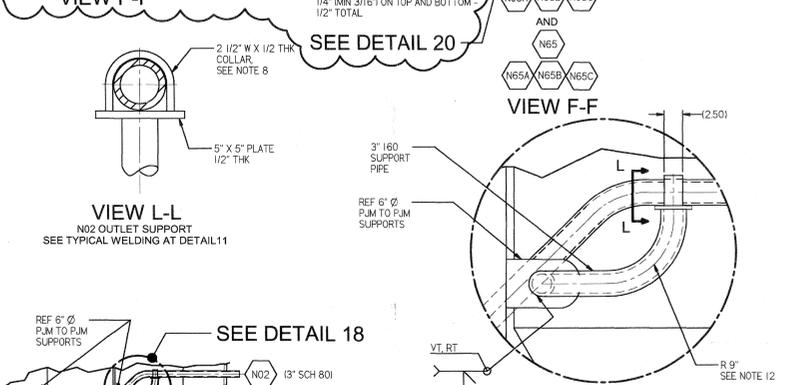
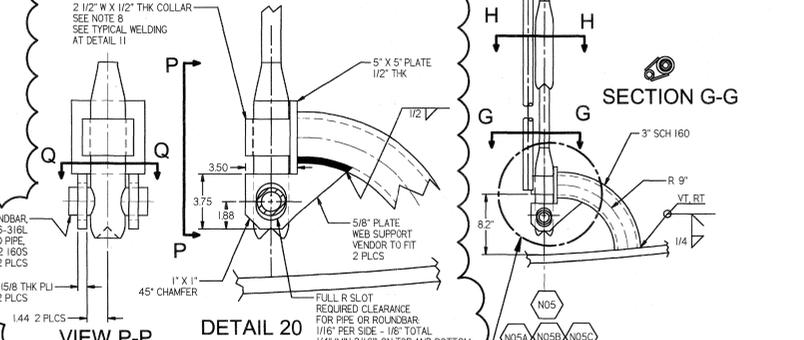
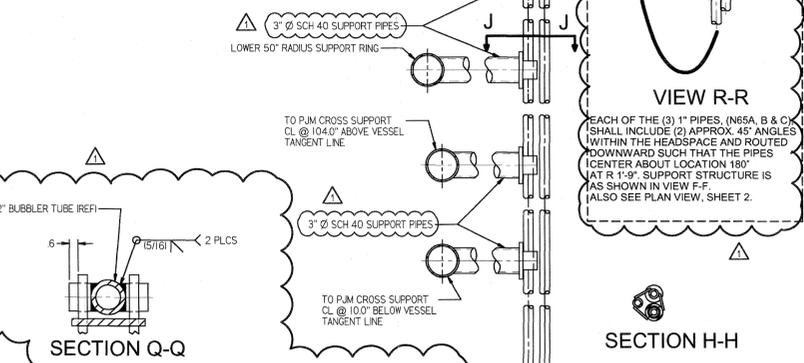
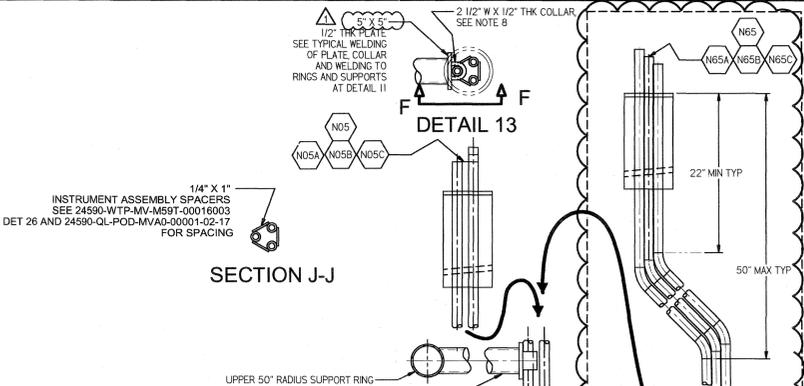
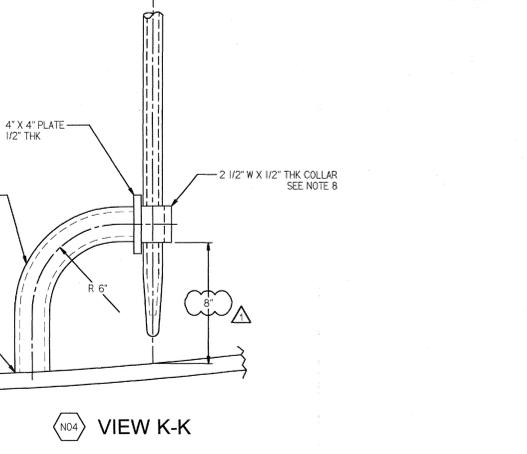
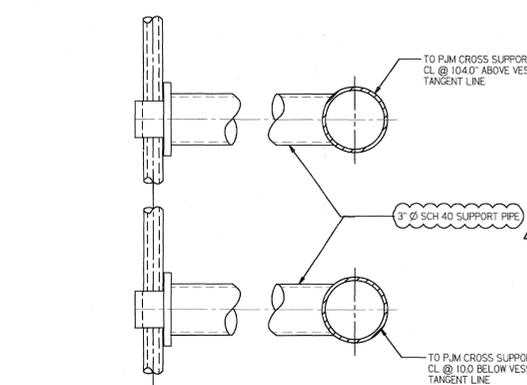
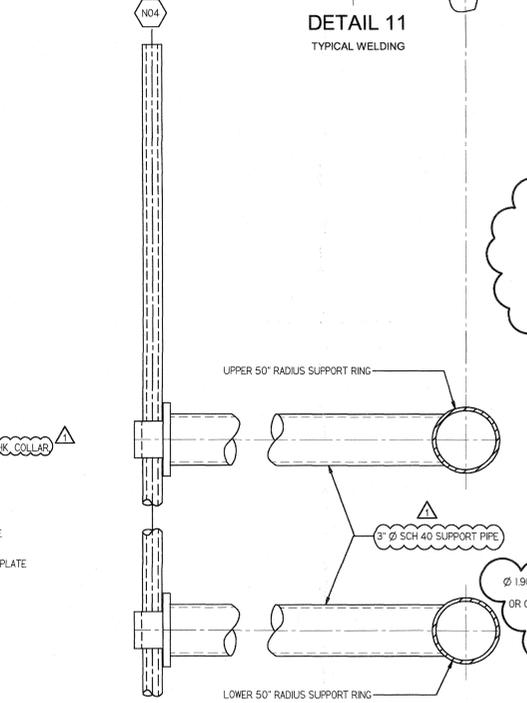
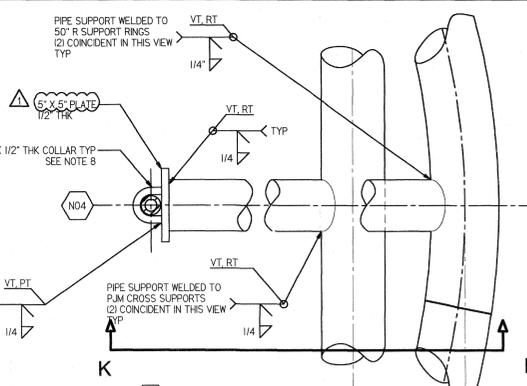
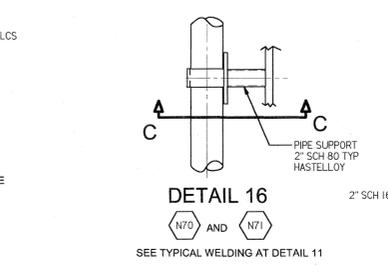
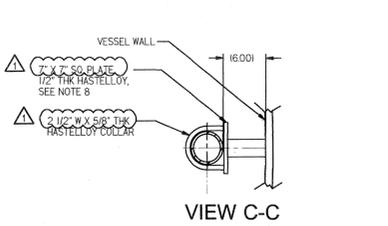
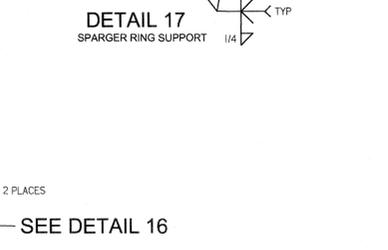
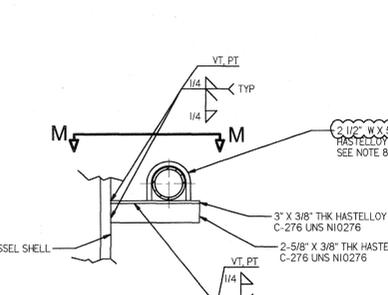
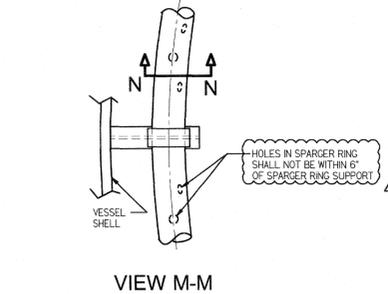
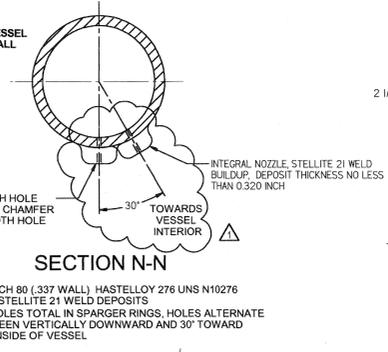
- NOTES:
- FOR GENERAL NOTES SEE SHEET 1.
  - 24590-PTF-MV-UFP-00001002 REV 0 SUPERSEDES 24590-PTF-MV-UFP-00001 REV 3 AND 24590-PTF-MV-UFP-00019001 REV 1.

REVISION HISTORY		RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354	
1	REVISED, SEE SHEET 1	LR	10/12/09
0	ISSUED FOR PURCHASE, SEE NOTE 1 & 2	CBS	1/22/09
REV	DESCRIPTION	ORG	CHKD
CONTRACT No: DE-AC27-01RV14136			
PROJECT No: 24590		DATE: 1/22/09	
SITE: HANFORD		CHECKER: C. SARMA	
AREA: 200E		APPROVER: J. JULYK	
BUILDING No: 10		REVIEWER: M.A. SEED	
BY: L. RODGERS		SCALE: NONE	
ORIGINATOR: L. RODGERS		24590-PTF-MV-UFP-00001002	
CHECKER: C. SARMA		REV 2	
APPROVER: J. JULYK		SAFETY SCREEN REQUIRED: YES	
REVIEWER: M.A. SEED		E SIZE - 44x34	
CONTENT APPLICABLE TO ALARA? YES		SCALE: NONE	
ADR NO. 24590-WTP-ADR-M-03-008		MANUAL DESIGN CHANGES NOT PERMITTED	
REV 2		WHEN REFERENCING DRAWING AND DIM NUMBERS IN DOCUMENTS BE SURE TO INCLUDE DASHES BETWEEN ELEMENTS	
SAFETY SCREEN REQUIRED: YES		REV 1	

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**ELEVATION  
STEAM SPARGER RING & SUPPORTS  
DETAIL 15**  
SEE PLAN VIEW FOR TRUE ORIENTATION



NOTES  
1. FOR GENERAL NOTES SEE SHEET 1.  
2. 24590-PTF-MV-UFP-00001003 REV 0 SUPERSEDES 24590-PTF-MV-UFP-00001 REV 3 & 24590-PTF-MV-UFP-00019002 REV 1.

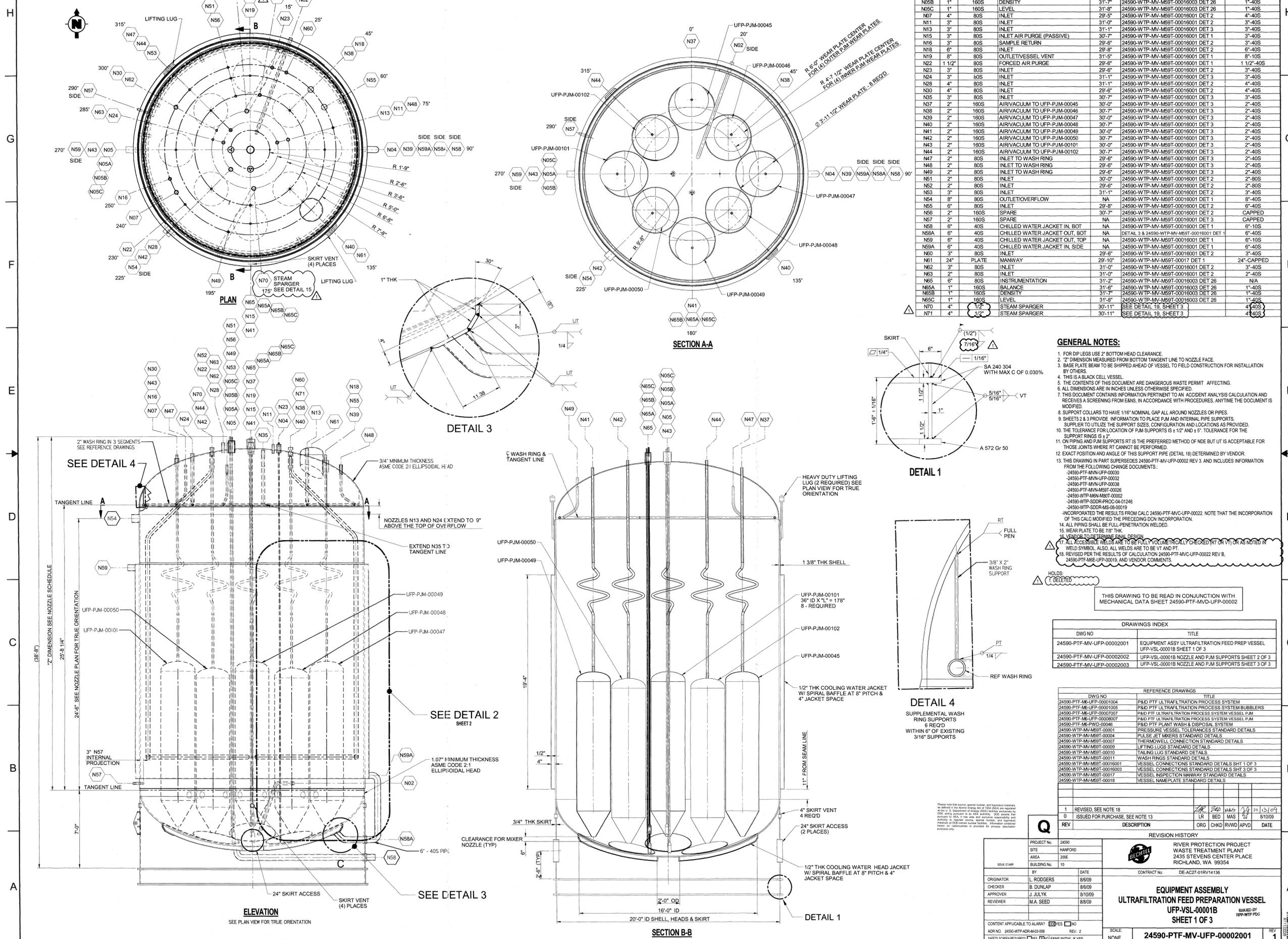
REV	DESCRIPTION	ORG	CHKD	RWVD	APVD	DATE
1	REVISED, SEE SHEET 1					10/13/07
0	ISSUED FOR PURCHASE, SEE NOTE 1 & 2					1/22/09

REVISION HISTORY	
PROJECT NO.	24590
SITE	HANFORD
AREA	200E
BUILDING NO.	10
BY	L. RODGERS
DATE	1/22/09
CHECKER	C. SARKA
DATE	1/22/09
APPROVER	J. JULYK
DATE	1/22/09
REVIEWER	M.A. SEED
DATE	1/22/09

REVISION HISTORY	
PROJECT NO.	24590
SITE	HANFORD
AREA	200E
BUILDING NO.	10
BY	L. RODGERS
DATE	1/22/09
CHECKER	C. SARKA
DATE	1/22/09
APPROVER	J. JULYK
DATE	1/22/09
REVIEWER	M.A. SEED
DATE	1/22/09

CONTRACT NO. DE-AC27-01RV14136  
**UFP-VSL-00001A  
NOZZLE AND PUM SUPPORTS  
SHEET 3 OF 3**  
ISSUED BY RPP-WFP PDC

SCALE: NONE  
**24590-PTF-MV-UFP-00001003**  
REV 1



NOZZLE	SIZE	SCHEDULE	SERVICE/REMARKS	"Z" DIM	REF DWG DET	CONNECTION
N02	3"	80S	OUTLET	NA	DET 14 & 24590-WTP-MV-M59T-00018001 DET 3	3"-40S
N04	2" OD	160S	TEMPERATURE	31'-2"	DET 11 & 24590-WTP-MV-M59T-000070001 ASSY 1 DET 1	3/4"-10S
N05	6"	80S	INSTRUMENTATION	31'-2"	24590-WTP-MV-M59T-00016003 DET 26	N/A
N05A	1"	160S	BALANCE	31'-6"	24590-WTP-MV-M59T-00016003 DET 26	1"-40S
N05B	1"	160S	DENSITY	31'-7"	24590-WTP-MV-M59T-00016003 DET 26	1"-40S
N05C	1"	160S	LEVEL	31'-8"	24590-WTP-MV-M59T-00016003 DET 26	1"-40S
N07	4"	80S	INLET	29'-5"	24590-WTP-MV-M59T-00018001 DET 2	4"-40S
N11	3"	80S	INLET	31'-0"	24590-WTP-MV-M59T-00016001 DET 2	3"-40S
N13	3"	80S	INLET	31'-1"	24590-WTP-MV-M59T-00016001 DET 3	3"-40S
N15	3"	80S	INLET AIR PURGE (PASSIVE)	30'-7"	24590-WTP-MV-M59T-00016001 DET 1	3"-40S
N16	3"	80S	SAMPLE RETURN	29'-6"	24590-WTP-MV-M59T-00016001 DET 2	3"-40S
N18	6"	80S	INLET	29'-8"	24590-WTP-MV-M59T-00016001 DET 2	6"-40S
N19	8"	80S	OUTLET/ESSEL VENT	31'-5"	24590-WTP-MV-M59T-00016001 DET 1	8"-10S
N22	1 1/2"	80S	FORCED AIR PURGE	29'-6"	24590-WTP-MV-M59T-00016001 DET 1	1 1/2"-40S
N23	3"	80S	INLET	29'-6"	24590-WTP-MV-M59T-00016001 DET 2	3"-40S
N24	3"	80S	INLET	31'-1"	24590-WTP-MV-M59T-00016001 DET 3	3"-40S
N28	4"	80S	INLET	31'-1"	24590-WTP-MV-M59T-00016001 DET 2	4"-40S
N30	4"	80S	INLET	29'-6"	24590-WTP-MV-M59T-00016001 DET 2	4"-40S
N35	3"	80S	INLET	30'-7"	24590-WTP-MV-M59T-00016001 DET 3	3"-40S
N37	2"	160S	AIR/VACUUM TO UFP-PJM-00045	30'-0"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
N38	2"	160S	AIR/VACUUM TO UFP-PJM-00046	30'-7"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
N39	2"	160S	AIR/VACUUM TO UFP-PJM-00047	30'-0"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
N40	2"	160S	AIR/VACUUM TO UFP-PJM-00048	30'-7"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
M41	2"	160S	AIR/VACUUM TO UFP-PJM-00049	30'-0"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
M42	2"	160S	AIR/VACUUM TO UFP-PJM-00050	30'-7"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
M43	2"	160S	AIR/VACUUM TO UFP-PJM-00101	30'-0"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
M44	2"	160S	AIR/VACUUM TO UFP-PJM-00102	30'-7"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
M47	2"	80S	INLET TO WASH RING	29'-6"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
M48	2"	80S	INLET TO WASH RING	29'-6"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
M49	2"	80S	INLET TO WASH RING	29'-6"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
M51	2"	80S	INLET	30'-0"	24590-WTP-MV-M59T-00016001 DET 2	2"-80S
M52	2"	80S	INLET	29'-6"	24590-WTP-MV-M59T-00016001 DET 2	2"-80S
N63	3"	80S	INLET	31'-1"	24590-WTP-MV-M59T-00016001 DET 2	3"-40S
N64	8"	80S	OUTLET/OVERFLOW	NA	24590-WTP-MV-M59T-00016001 DET 1	8"-40S
N65	6"	80S	INLET	29'-8"	24590-WTP-MV-M59T-00016001 DET 2	6"-40S
N66	2"	160S	SPARE	30'-7"	24590-WTP-MV-M59T-00016001 DET 2	CAPPED
N67	2"	160S	SPARE	NA	24590-WTP-MV-M59T-00016001 DET 2	CAPPED
N68	6"	40S	CHILLED WATER JACKET IN, BOT	24590-WTP-MV-M59T-00016001 DET 1	6"-10S	
N68A	6"	40S	CHILLED WATER JACKET OUT, BOT	DET 14 & 24590-WTP-MV-M59T-00016001 DET 1	6"-40S	
N69	6"	40S	CHILLED WATER JACKET OUT, TOP	NA	24590-WTP-MV-M59T-00016001 DET 1	6"-10S
N69A	6"	40S	CHILLED WATER JACKET IN, SIDE	NA	24590-WTP-MV-M59T-00016001 DET 1	6"-40S
N60	3"	80S	INLET	29'-6"	24590-WTP-MV-M59T-00016001 DET 2	3"-40S
N61	24"	PLATE	MANWAY	29'-10"	24590-WTP-MV-M59T-00017 DET 1	24"-CAPPED
N62	3"	80S	INLET	31'-0"	24590-WTP-MV-M59T-00016001 DET 2	3"-40S
N63	2"	80S	INLET	31'-0"	24590-WTP-MV-M59T-00016001 DET 2	2"-80S
N65	6"	80S	INSTRUMENTATION	31'-2"	24590-WTP-MV-M59T-00016003 DET 28	N/A
N65A	1"	160S	BALANCE	31'-6"	24590-WTP-MV-M59T-00016003 DET 26	1"-40S
N65B	1"	160S	DENSITY	31'-7"	24590-WTP-MV-M59T-00016003 DET 26	1"-40S
N65C	1"	160S	LEVEL	31'-8"	24590-WTP-MV-M59T-00016003 DET 26	1"-40S
N70	4"	1/2"	STEAM SPARGER	30'-11"	SEE DETAIL 19, SHEET 3	4"-40S
N71	4"	1/2"	STEAM SPARGER	30'-11"	SEE DETAIL 19, SHEET 3	4"-40S

- GENERAL NOTES:**
- FOR D/P LEGS USE 2" BOTTOM HEAD CLEARANCE.
  - "Z" DIMENSION MEASURED FROM BOTTOM TANGENT LINE TO NOZZLE FACE.
  - BASE PLATE BEAM TO BE SHIPPED AHEAD OF VESSEL TO FIELD CONSTRUCTION FOR INSTALLATION BY OTHERS.
  - THIS IS A BLACK CELL VESSEL.
  - THE CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
  - ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.
  - THIS DOCUMENT CONTAINS INFORMATION PERTINENT TO AN ACCIDENT ANALYSIS CALCULATION AND RECEIVES A SCREENING FROM EENS, IN ACCORDANCE WITH PROCEDURES. ANYTIME THE DOCUMENT IS MODIFIED.
  - SUPPORT COLLARS TO HAVE 1/16" NOMINAL GAP ALL AROUND NOZZLES OR PIPES.
  - SHEETS 2 & 3 PROVIDE INFORMATION TO PLACE P & M AND INTERNAL PIPE SUPPORTS. SUPPLIER TO UTILIZE THE SUPPORT SIZES, CONFIGURATION AND LOCATIONS AS PROVIDED.
  - THE TOLERANCE FOR LOCATION OF P & M SUPPORTS IS ± 1/16" AND ± 5". TOLERANCE FOR THE SUPPORT RINGS IS ± 2".
  - ON PIPING AND P & M SUPPORTS RT IS THE PREFERRED METHOD OF NDE BUT UT IS ACCEPTABLE FOR THOSE JOINTS WHERE RT CANNOT BE PERFORMED.
  - EXACT POSITION AND ANGLE OF THIS SUPPORT PIPE (DETAIL 18) DETERMINED BY VENDOR.
  - THIS DRAWING IN PART SUPERSEDES 24590-PTF-MV-UFP-00002 REV 3 AND INCLUDES INFORMATION FROM THE FOLLOWING CHANGE DOCUMENTS:  
 -24590-PTF-MV-UFP-00003  
 -24590-PTF-MV-UFP-00002  
 -24590-PTF-MV-M59T-00006  
 -24590-WTP-MV-M59T-00002  
 -24590-WTP-SODR-PROC-04-01246  
 -24590-WTP-SODR-MS-000019  
 -INCORPORATED THE RESULTS FROM CALC 24590-PTF-MV-UFP-00002. NOTE THAT THE INCORPORATION OF THIS CALC MODIFIED THE PRECEDING DCM INCORPORATION.
  - ALL PIPING SHALL BE FULL PENETRATION WELDED.
  - WEAR PLATE TO BE 7/16" THK.
  - VENDOR TO DETERMINE FINAL DESIGN.
  - ALL ACCESSIBLE WELDS ARE TO BE FULLY VOLUMETRICALLY CHECKED (RT OR VT) OR AS NOTED IN WELD SYMBOL. ALSO, WELDS ARE TO BE VT AND PT.
  - REVISOR PER THE RESULTS OF CALCULATION 24590-PTF-MV-UFP-00002 REV 3, 24590-PTF-M59T-00019, AND VENDOR COMMENTS.

THIS DRAWING TO BE READ IN CONJUNCTION WITH MECHANICAL DATA SHEET 24590-PTF-MVD-UFP-00002

DWG NO	TITLE
24590-PTF-MV-UFP-00002001	EQUIPMENT ASSY ULTRAFILTRATION FEED PREP VESSEL
24590-PTF-MV-UFP-00002002	UFP-VSL-00001B NOZZLE AND P & M SUPPORTS SHEET 2 OF 3
24590-PTF-MV-UFP-00002003	UFP-VSL-00001B NOZZLE AND P & M SUPPORTS SHEET 3 OF 3

DWG NO	TITLE
24590-PTF-MV-UFP-00001004	P&M PTF ULTRAFILTRATION PROCESS SYSTEM
24590-PTF-MV-UFP-00001005	P&M PTF ULTRAFILTRATION PROCESS SYSTEM BUBBLERS
24590-PTF-MV-UFP-00007007	P&M PTF ULTRAFILTRATION PROCESS SYSTEM VESSEL P & M
24590-PTF-MV-UFP-00008007	P&M PTF ULTRAFILTRATION PROCESS SYSTEM VESSEL P & M
24590-PTF-MV-UFP-00009004	P&M PTF PLANT WASH & DISPOSAL SYSTEM
24590-WTP-MV-M59T-00001	PRESSURE VESSEL TOLERANCE STANDARD DETAILS
24590-WTP-MV-M59T-00004	PUL SEC JET MIMERS STANDARD DETAILS
24590-WTP-MV-M59T-00007	THERMOWELL CONNECTION STANDARD DETAILS
24590-WTP-MV-M59T-00010	LIFTING LUGS STANDARD DETAILS
24590-WTP-MV-M59T-00011	TAILING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00011	WASH RINGS STANDARD DETAILS
24590-WTP-MV-M59T-00016001	VESSEL CONNECTIONS STANDARD DETAILS SHT 1 OF 3
24590-WTP-MV-M59T-00016003	VESSEL CONNECTIONS STANDARD DETAILS SHT 2 OF 3
24590-WTP-MV-M59T-00017	VESSEL INSPECTION MANWAY STANDARD DETAILS
24590-WTP-MV-M59T-00018	VESSEL NAMEPLATE STANDARD DETAILS

REV	DESCRIPTION	ORG	CHKD	RWD	APVD	DATE
1	REVISED, SEE NOTE 18					10/13/09
0	ISSUED FOR PURCHASE, SEE NOTE 13					8/10/09

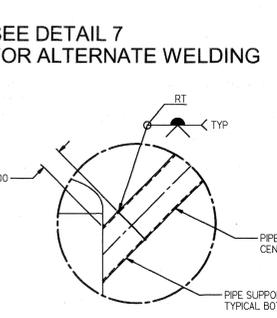
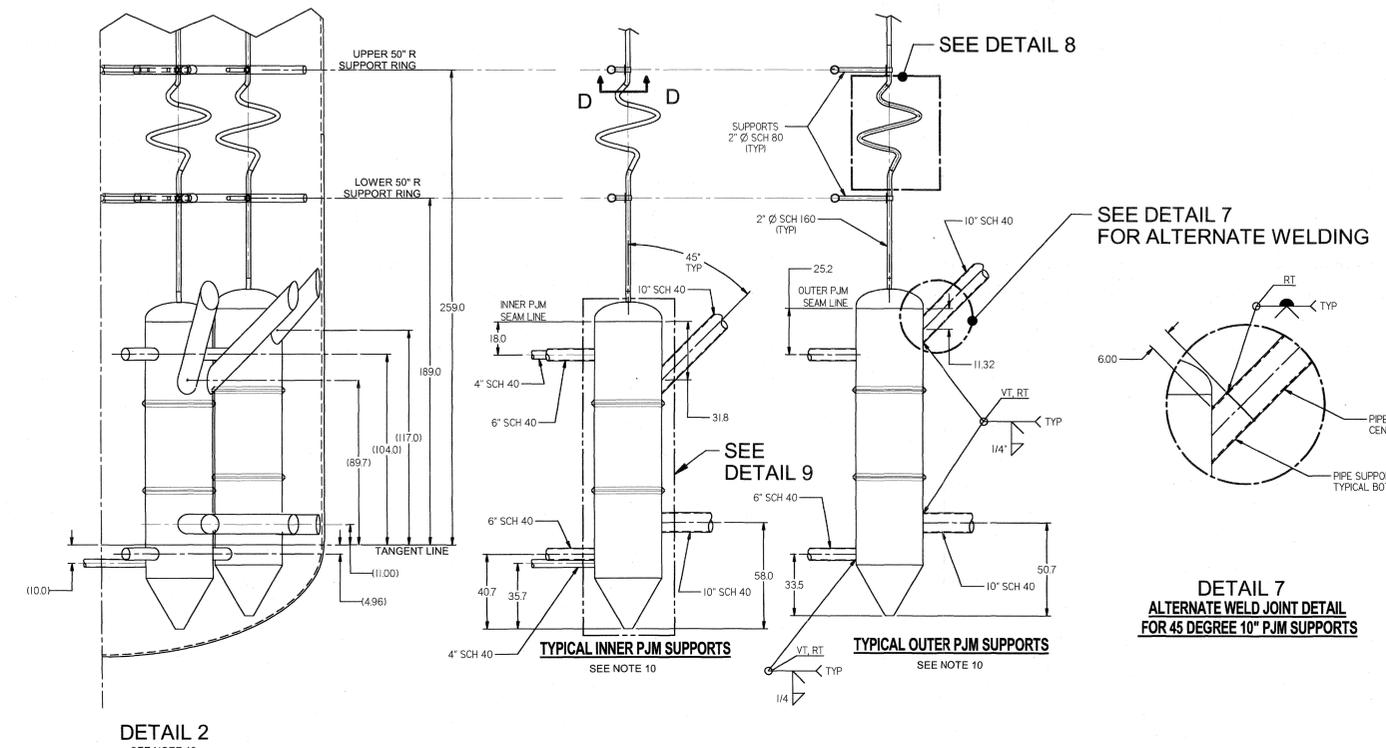
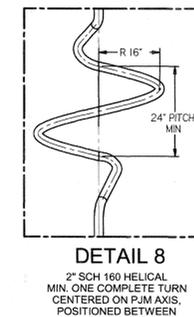
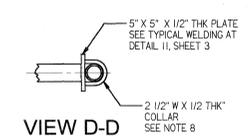
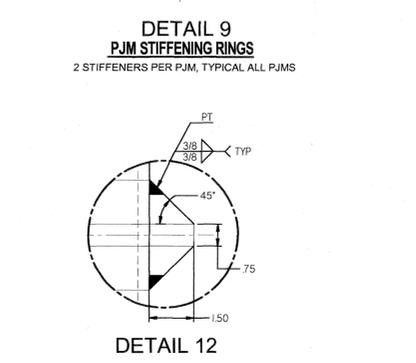
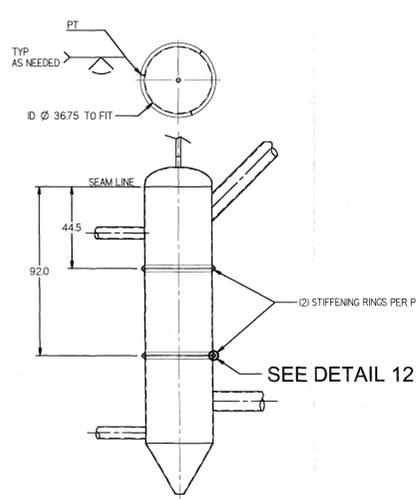
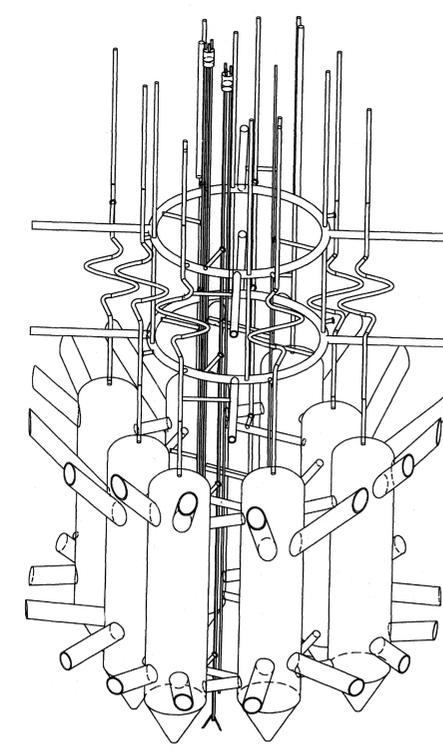
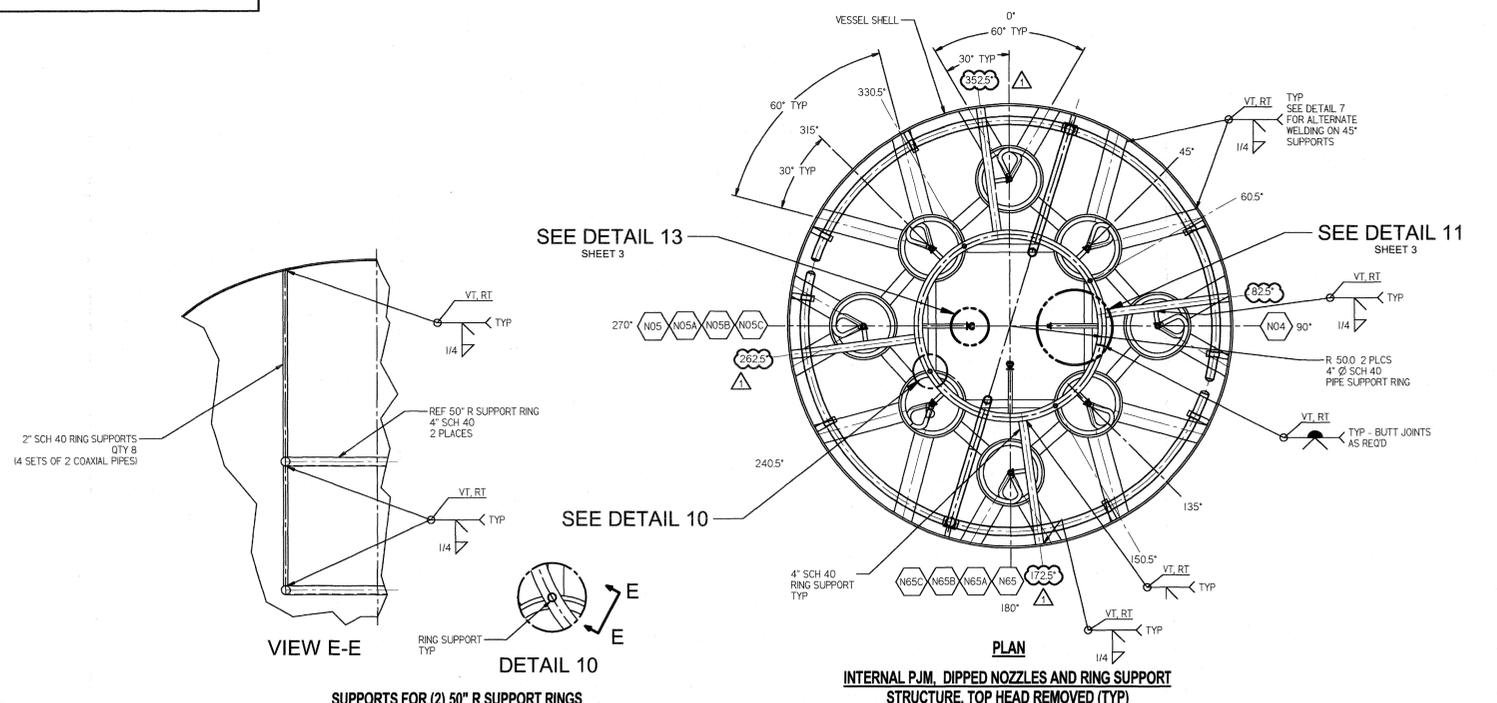
REVISION HISTORY

PROJECT No:	24590	RIVER PROTECTION PROJECT
SITE:	HANFORD	WASTE TREATMENT PLANT
AREA:	200E	2435 STEVENS CENTER PLACE
BUILDING No:	10	RICHLAND, WA 99354
ORIGINATOR:	B. RODGERS	DATE: 8/10/09
CHECKER:	B. DUNLAP	DATE: 8/10/09
APPROVER:	J. JULYK	DATE: 8/10/09
REVIEWER:	M.A. SEED	DATE: 8/10/09

**EQUIPMENT ASSEMBLY**  
**ULTRAFILTRATION FEED PREPARATION VESSEL**  
 UFP-VSL-00001B  
 SHEET 1 OF 3

SCALE: NONE  
 24590-PTF-MV-UFP-00002001  
 REV: 1

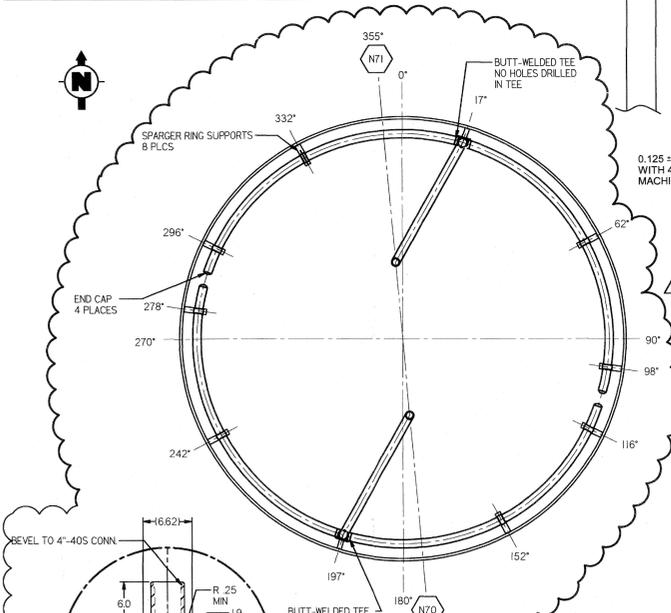
PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA) ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS THAT PURSUANT TO THE AEA IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY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



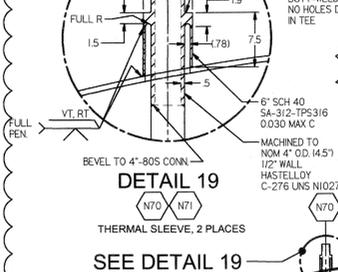
NOTES:  
1. FOR GENERAL NOTES SEE SHEET 1.  
2. 24590-PTF-MV-UFP-00002002 REV 0 SUPERSEDES 24590-PTF-MV-UFP-00002 REV 3.

Revision history table with columns for REV, DESCRIPTION, ORG, CHKD, RWD, APVD, DATE. Includes project information for RIVER PROTECTION PROJECT WASTE TREATMENT PLANT and UFP-VSL-00001B NOZZLE AND PJM SUPPORTS SHEET 2 OF 3.

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 RADIOISOTOPES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

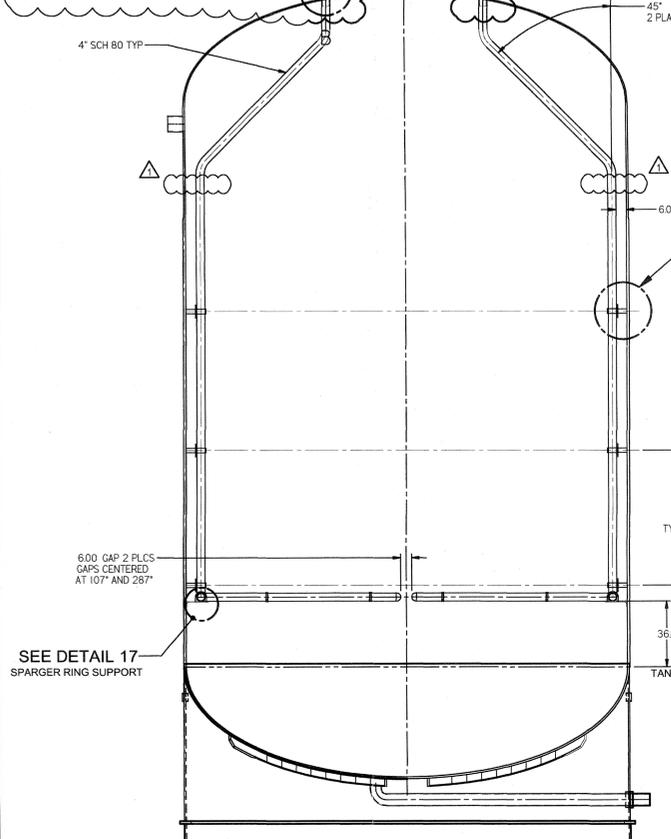


PLAN STEAM SPARGER RING & SUPPORTS



DETAIL 19

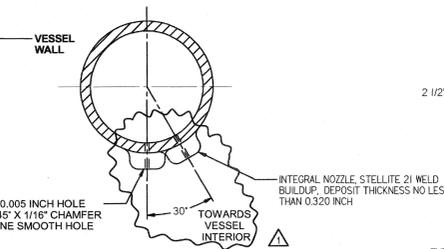
SEE DETAIL 19



ELEVATION STEAM SPARGER RING & SUPPORTS

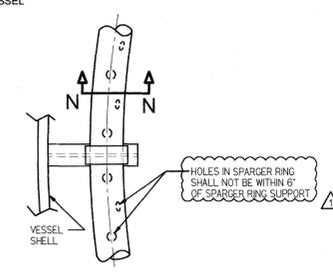
DETAIL 15

SEE PLAN VIEW FOR TRUE ORIENTATION

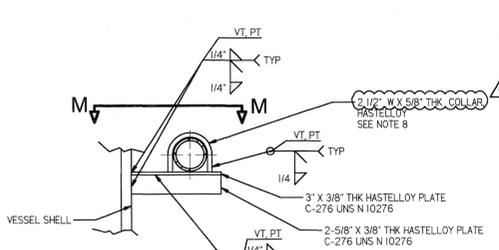


SECTION N-N

4" @ SCH 80 (.337 WALL) HASTELLOY 276 UNS N10276 WITH STELLITE 21 WELD DEPOSITS  
140 HOLES TOTAL IN SPARGER RINGS, HOLES ALTERNATE BETWEEN VERTICALLY DOWNWARD AND 30° TOWARD THE INSIDE OF VESSEL

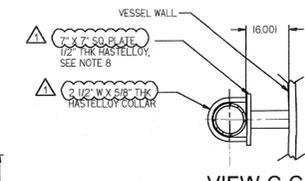


VIEW M-M

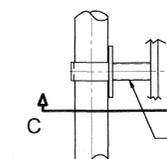


DETAIL 17

SPARGER RING SUPPORT

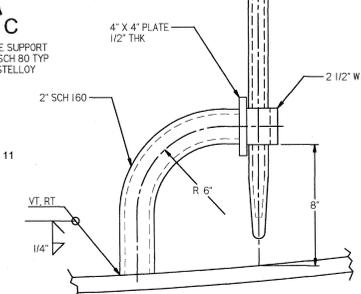


VIEW C-C

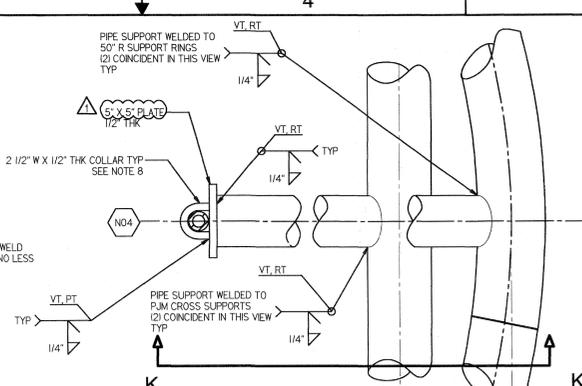


DETAIL 16

SEE TYPICAL WELDING AT DETAIL 11

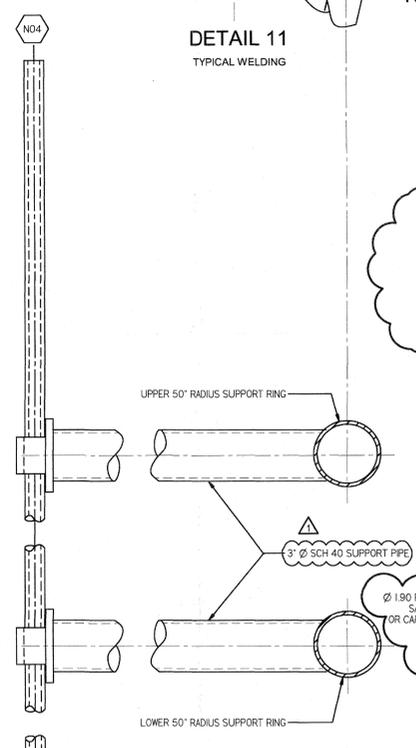


VIEW K-K



DETAIL 11

TYPICAL WELDING



SECTION Q-Q

VIEW P-P

DETAIL 20

SEE DETAIL 20

VIEW L-L

SEE TYPICAL WELDING AT DETAIL 11

VIEW F-F

SEE DETAIL 20

VIEW E-E

SEE DETAIL 20

VIEW D-D

SEE DETAIL 20

VIEW C-C

SEE DETAIL 20

VIEW B-B

SEE DETAIL 20

VIEW A-A

SEE DETAIL 20

VIEW H-H

SEE DETAIL 20

VIEW G-G

SEE DETAIL 20

VIEW J-J

SEE DETAIL 20

VIEW I-I

SEE DETAIL 20

VIEW K-K

SEE DETAIL 20

VIEW L-L

SEE DETAIL 20

VIEW M-M

SEE DETAIL 20

VIEW N-N

SEE DETAIL 20

VIEW O-O

SEE DETAIL 20

VIEW P-P

SEE DETAIL 20

VIEW Q-Q

SEE DETAIL 20

VIEW R-R

SEE DETAIL 20

VIEW S-S

SEE DETAIL 20

VIEW T-T

SEE DETAIL 20

VIEW U-U

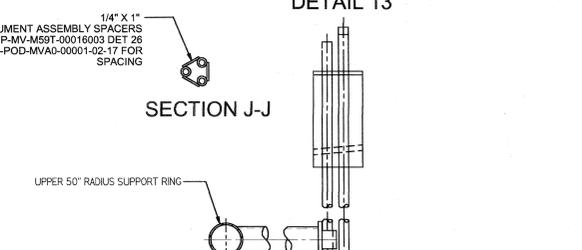
SEE DETAIL 20

VIEW V-V

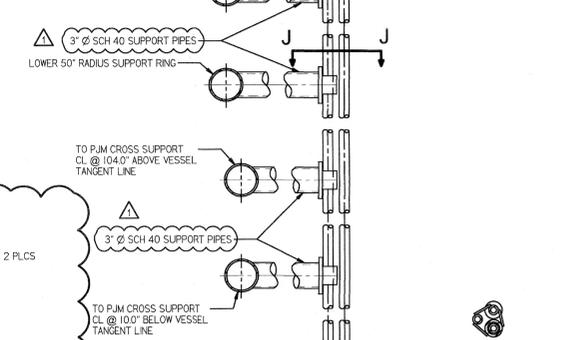
SEE DETAIL 20

VIEW W-W

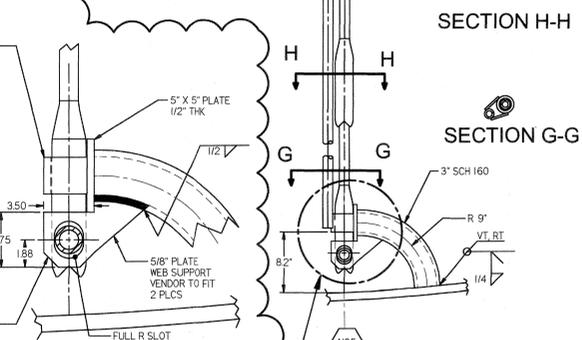
SEE DETAIL 20



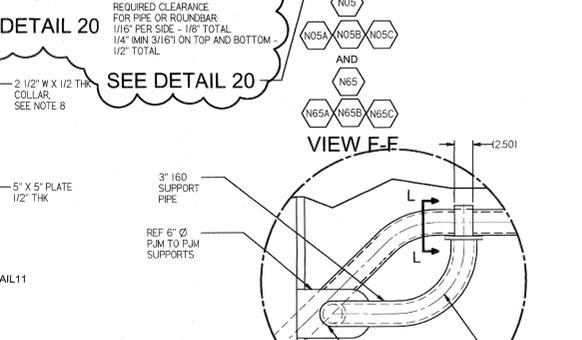
SECTION J-J



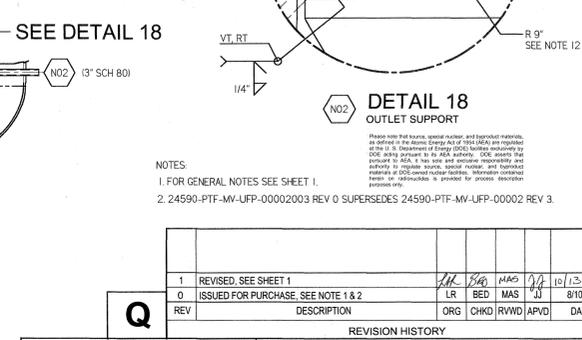
SECTION H-H



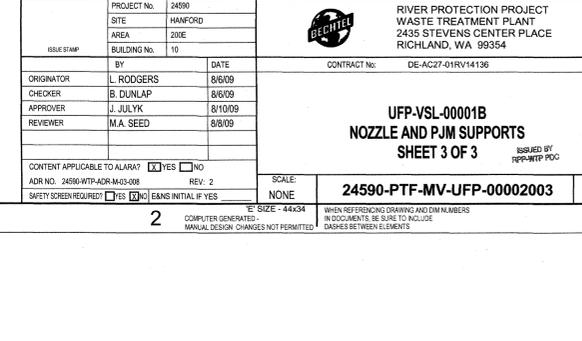
SECTION G-G



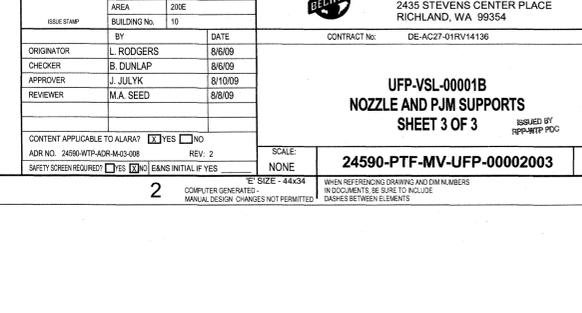
SECTION F-F



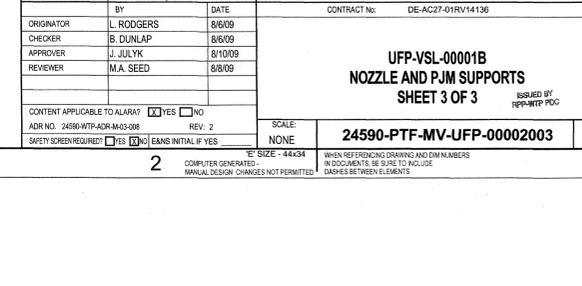
SECTION E-E



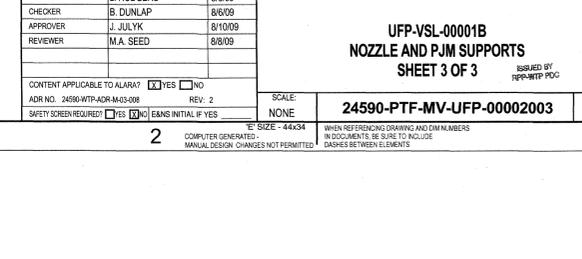
SECTION D-D



SECTION C-C



SECTION B-B



SECTION A-A

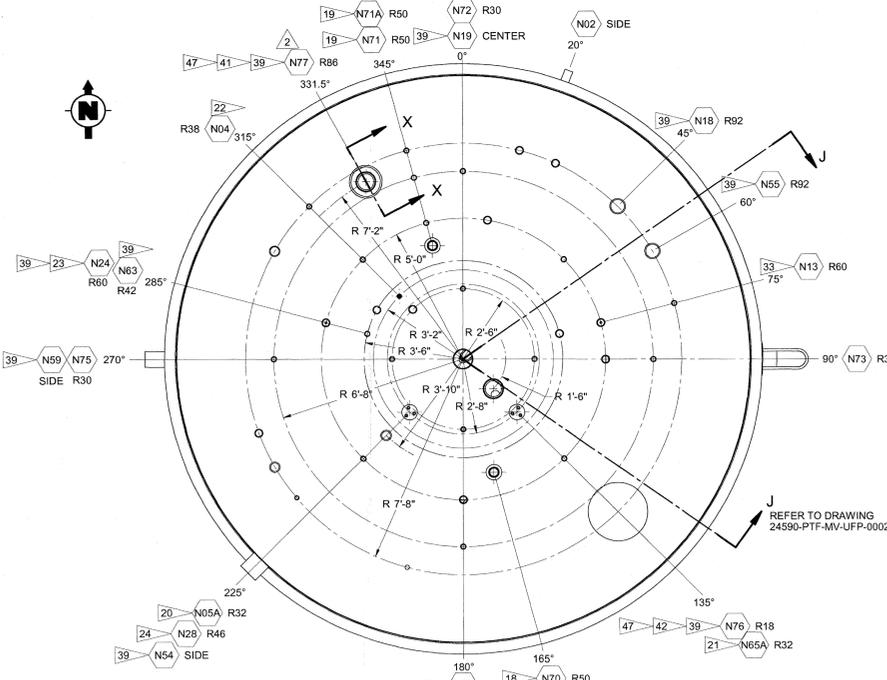
Revision history table with columns for REV, DESCRIPTION, ORG, CHKD, RWD, APVD, DATE. Includes entries for 'REVISED, SEE SHEET 1' and 'ISSUED FOR PURCHASE, SEE NOTE 1 & 2'.

Project information table including PROJECT No. (24590), SITE (HANFORD), AREA (20E), BUILDING No. (10), ORIGINATOR (L. RODGERS), CHECKER (B. DUNLAP), APPROVER (J. JULYK), REVIEWER (M.A. SEED), and CONTRACT No. (DE-AC27-01RV14136).

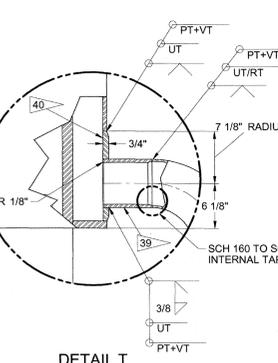
Document information table including UFP-VSL-00001B NOZZLE AND PJM SUPPORTS SHEET 3 OF 3, SCALE (NONE), and 24590-PTF-MV-UFP-00002003.

NOZZLE SCHEDULE UFP-VSL-00001A						
NOZZLE	SIZE	SCHEDWALL	SERVICE/REMARKS	Z DIM	REF DWG-DET	CONNECTION
N72	2"	160S	AIR/VACUUM TO UFP-PJM-00108	371"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
N73	2"	160S	AIR/VACUUM TO UFP-PJM-00109	371"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
N74	2"	160S	AIR/VACUUM TO UFP-PJM-00110	371"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
N75	2"	160S	AIR/VACUUM TO UFP-PJM-00111	371"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
N76	8"	160S	CAMERA PORT	373"	24590-PTF-MV-UFP-00027001 SECTION X-X	8"-40S
N77	8"	160S	CAMERA PORT	357"	24590-PTF-MV-UFP-00027001 SECTION X-X	8"-40S
N78			NOT USED			
N79			NOT USED			

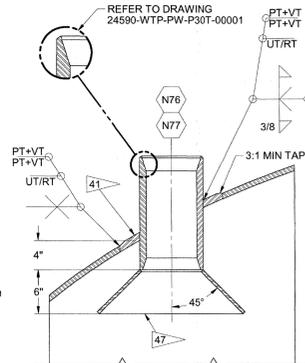
NOZZLE SCHEDULE UFP-VSL-00001B						
NOZZLE	SIZE	SCHEDWALL	SERVICE/REMARKS	Z DIM	REF DWG-DET	CONNECTION
N72	2"	160S	AIR/VACUUM TO UFP-PJM-00112	371"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
N73	2"	160S	AIR/VACUUM TO UFP-PJM-00113	371"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
N74	2"	160S	AIR/VACUUM TO UFP-PJM-00114	371"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
N75	2"	160S	AIR/VACUUM TO UFP-PJM-00115	371"	24590-WTP-MV-M59T-00016001 DET 3	2"-40S
N76	8"	160S	CAMERA PORT	373"	24590-PTF-MV-UFP-00027001 SECTION X-X	8"-40S
N77	8"	160S	CAMERA PORT	357"	24590-PTF-MV-UFP-00027001 SECTION X-X	8"-40S
N78			NOT USED			
N79			NOT USED			



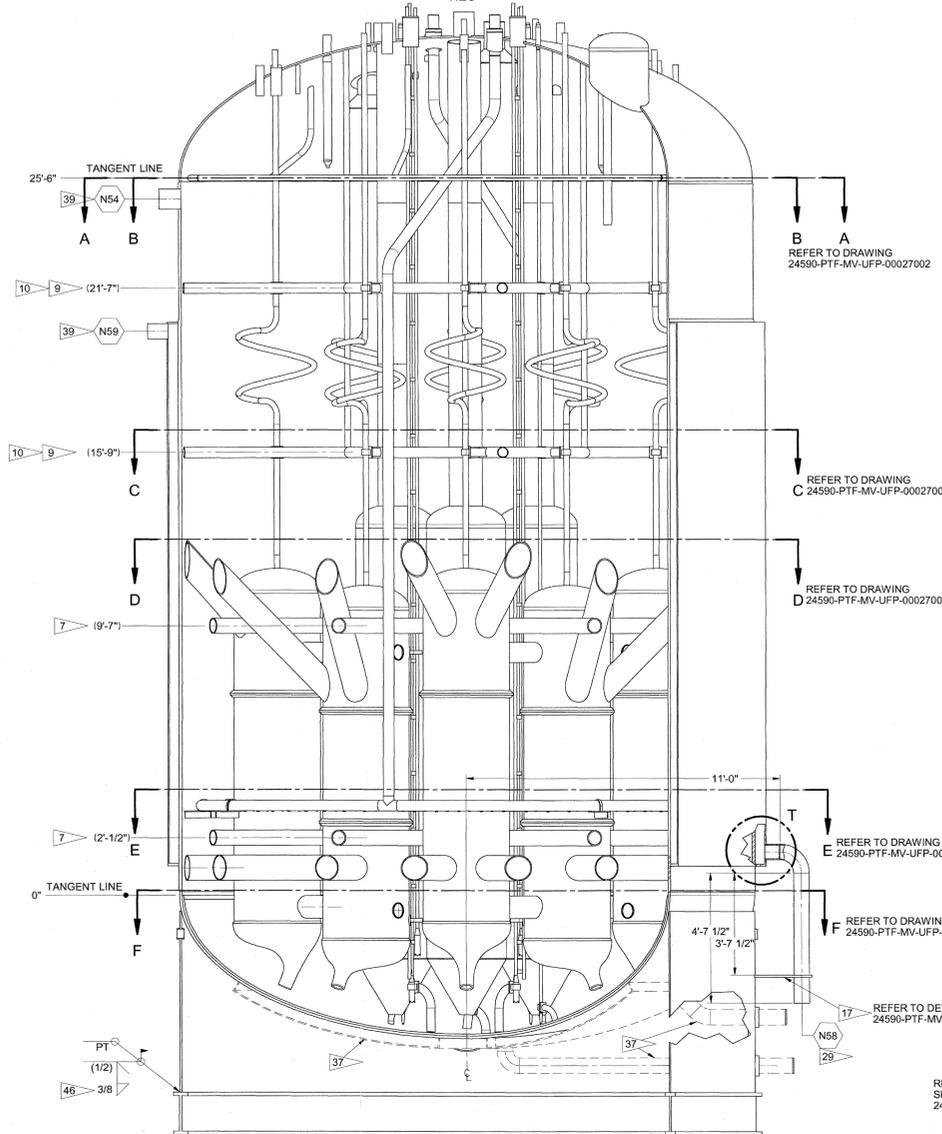
PLAN UFP-VSL-00001B  
1:25



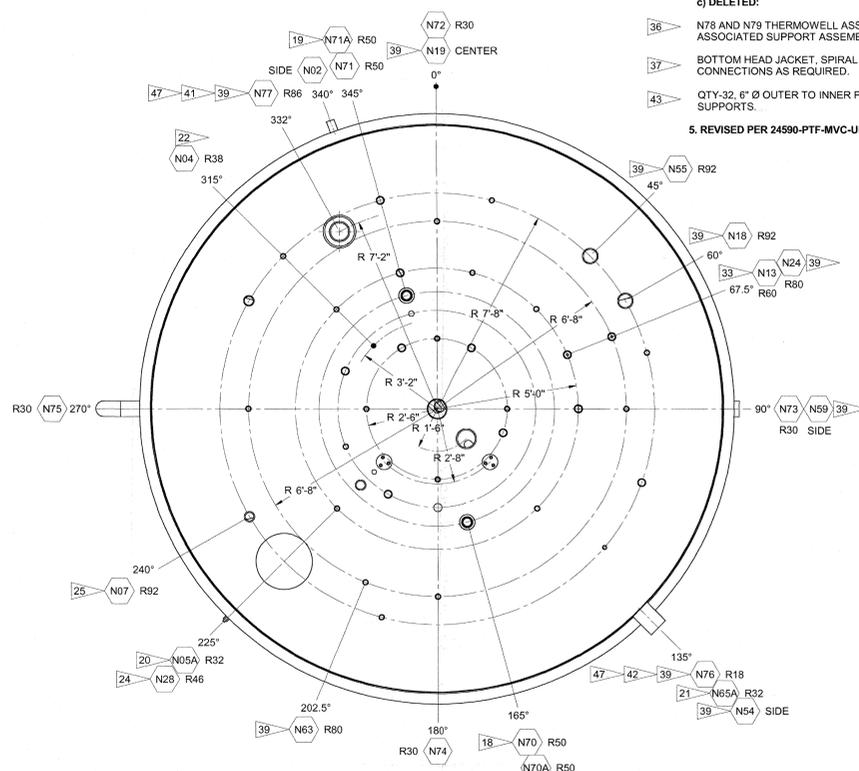
DETAIL T  
1:8



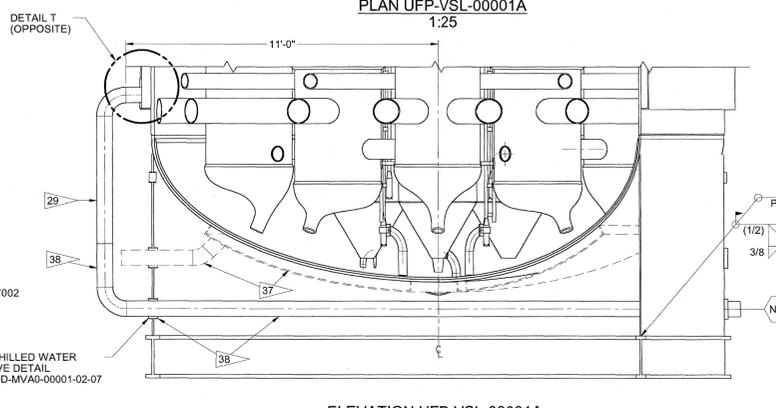
SECTION X-X  
1:8



ELEVATION UFP-VSL-00001B  
1:25



PLAN UFP-VSL-00001A  
1:25



ELEVATION UFP-VSL-00001A  
1:25

NOTES-CONTINUED:

4. ADDED/REVISED/DELETED

a) ADDED:

- 38 6" SCH 40S PIPING, LONG R ELBOW AND SKIRT SLEEVE FOR CONNECTION WITH EXISTING JACKET AS REQD -00001A ONLY.
- 40 INSERT PLATE FOR NOZZLE N58.
- 41 1" THK INTEGRAL REINFORCING PAD WITH MIN 3/8" BACK WELD ON NOZZLE N77.
- 42 MIN 3/8" EXTERNAL BACK WELD ON NOZZLE N76.
- 44 QTY-16, 8" Ø SCH 80, 32" Ø PULSE JET MIXER SUPPORTS OVER EXISTING ELEVATION. ALTER POSITION RELATIVE TO PUMP SUCTION OUTLET, -00001A.
- 45 QTY-16, 8" Ø SCH 80, 32" Ø PULSE JET MIXER SUPPORTS ON RAISED ELEVATION. ALTER POSITION RELATIVE TO PUMP SUCTION OUTLET, -00001A.
- 47 QTY-4, 3/8" THK CAMERA PORT CONE.

b) REVISED:

- 33 N13 PITCH RADIUS.
- 34 INTERCONNECTING SPACERS FOR INSTRUMENT BUBBLER ASSEMBLY.
- 35 30" Ø PULSE JET MIXER NOZZLE CONFIGURATION.
- 39 NOZZLE N18, N19, N54, N55, N58, N59, N63, N76, N77 AND N24 TO PIPE SCH 160S.
- 46 SKIRTING BEAM WELD SIZE.

c) DELETED:

- 36 N78 AND N79 THERMOWELL ASSEMBLIES AND ASSOCIATED SUPPORT ASSEMBLIES.
- 37 BOTTOM HEAD JACKET, SPIRAL BAFFLES, PIPING AND CONNECTIONS AS REQUIRED.
- 43 QTY-32, 6" Ø OUTER TO INNER PULSE JET MIXER SUPPORTS.

5. REVISED PER 24590-PTF-MVC-UFP-00022 REV. C.

NOTES: CHANGES APPLY TO BOTH VESSELS UNLESS OTHERWISE NOTED

1. ADDED/REVISED/DELETED

- 1 NOZZLE N72 AND 32" Ø N72 UFP-PJM ASSEMBLY.
- 2 NOZZLE N73 AND 32" Ø N73 UFP-PJM ASSEMBLY.
- 3 NOZZLE N74 AND 32" Ø N74 UFP-PJM ASSEMBLY.
- 4 NOZZLE N75 AND 32" Ø N75 UFP-PJM ASSEMBLY.
- NOZZLE N76.
- NOZZLE N77.
- 5 NOT USED.
- 6 NOT USED.
- 7 QTY-32, 6" Ø SCH 80S, LATERAL SUPPORTS FOR 32" Ø UFP-PJM ASSEMBLIES.
- 8 QTY-8, 14" Ø, 375 WALL, VERTICAL SUPPORT FOR 32" Ø UFP-PJM ASSEMBLIES.
- 9 QTY-16, INSTRUMENTATION DIP TUBE SUPPORT ASSEMBLIES.
- 10 QTY-8, THERMOWELL DIP TUBE SUPPORT ASSEMBLIES.
- 11 QTY-2, THERMOWELL DIP TUBE BOTTOM HEAD SUPPORT ASSEMBLY.
- 12 QTY-8, 36" Ø PJM OFFSET NOZZLE METAL CASTING FOR 60/80 PITCH RADII.
- 13 QTY-8, 36" Ø PJM OFFSET NOZZLE METAL CASTING FOR 80/80 PITCH RADII.
- 14 WEAR PLATE ELLIPSOIDAL LINER, 1" THICK AFTER FORMING.
- 15 NOT USED.
- 16 NOT USED.
- 17 QTY-1, N58 SKIRT MOUNTED PIPE GUIDE SUPPORT, -00001B ONLY.

b) REVISED:

- 18 N70 AND N70A ORIENTATION, PITCH RADIUS AND INTERNAL PIPE ROUTING.
- 19 N71 AND N71A ORIENTATION, PITCH RADIUS AND INTERNAL PIPE ROUTING.
- 20 N05 ORIENTATION AND PITCH RADIUS.
- 21 N65 ORIENTATION AND PITCH RADIUS.
- 22 N04 ORIENTATION AND PITCH RADIUS.
- 23 N24 PITCH RADIUS, UFP-VSL-00001B ONLY.
- 24 N28 ORIENTATION AND PITCH RADIUS, UFP-VSL-00001A ONLY AND PITCH RADIUS ON UFP-VSL-00001B ONLY.
- 25 N07 ORIENTATION AND PITCH RADIUS, UFP-VSL-00001A ONLY.
- 26 N02 INTERNAL PIPING ARRANGEMENT (PUMP SUCTION).
- 27 N02 BOTTOM HEAD PIPE SUPPORT.
- 28 INSTRUMENT ASSEMBLY DIP TUBE CLEARANCE DIMENSION AND BOTTOM HEAD SUPPORT SUB-ASSEMBLY WITHOUT SIDE BARS/ PLATES.
- 29 NOZZLE ARRANGEMENT FOR N58 FOR CONNECTION TO SIDE JACKET.

c) DELETED:

- 30 QTY-16, PULSE JET MIXER WEAR PLATES.
- 31 QTY-16, INNER TO INNER PULSE JET MIXER SUPPORT PIPES.
- 32 NOT USED.

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

3. HOLD NOTES: FINAL INSTALLATION OF PJM NOZZLE CONES TO PJM SHELL IS ON HOLD PENDING FINAL DESIGN RELEASE FROM BNI.

REFERENCE DRAWINGS	
DRAWING NUMBER	TITLE
24590-PTF-MV-UFP-00001001	EQUIPMENT ASSY ULTRAFILTRATION FEED PREP VESSEL UFP-VSL-00001A SHEET 1 OF 3
24590-PTF-MV-UFP-00001002	UFP-VSL-00001A NOZZLE AND PJM SUPPORTS SHEET 2 OF 3
24590-PTF-MV-UFP-00001003	UFP-VSL-00001A NOZZLE AND PJM SUPPORTS SHEET 3 OF 3
24590-PTF-MV-UFP-00002001	EQUIPMENT ASSY ULTRAFILTRATION FEED PREP VESSEL UFP-VSL-00001B SHEET 1 OF 3
24590-PTF-MV-UFP-00002002	UFP-VSL-00001B NOZZLE AND PJM SUPPORTS SHEET 2 OF 3
24590-PTF-MV-UFP-00002003	UFP-VSL-00001B NOZZLE AND PJM SUPPORTS SHEET 3 OF 3
DRAWING INDEX	
DWG NO	TITLE
24590-PTF-MV-UFP-00027001	UFP-VSL-00001A AND UFP-VSL-00001B MIXING ASSESSMENT EQUIPMENT CHANGES PLAN, ELEVATION AND SECTION VIEWS
24590-PTF-MV-UFP-00027002	UFP-VSL-00001A AND UFP-VSL-00001B MIXING ASSESSMENT EQUIPMENT CHANGES SECTION AND DETAIL VIEWS
24590-PTF-MV-UFP-00027003	UFP-VSL-00001A AND UFP-VSL-00001B MIXING ASSESSMENT EQUIPMENT CHANGES SECTION AND DETAIL VIEWS
24590-PTF-MV-UFP-00027004	UFP-VSL-00001A AND UFP-VSL-00001B MIXING ASSESSMENT EQUIPMENT CHANGES CAST NOZZLE PROPOSAL

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 RADIOISOTOPES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV	DESCRIPTION	ORG	CHKD	RWVD	APVD	DATE
0	ISSUED FOR PURCHASE WITH HOLD NOTES REMOVED	JHR	PT	11	11	5/25/11

ISSUED BY		PROJECT NO.		DATE	
RPM/WFP PDC		24590		5/25/11	
ISSUE STAMP		SITE		5/25/11	
		AREA		5/25/11	
		BUILDING NO.		5/25/11	
		10			

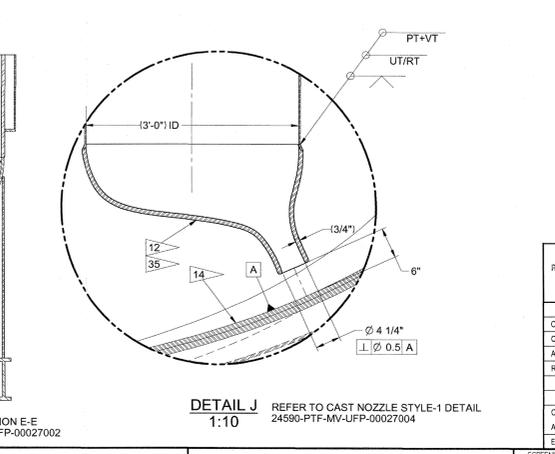
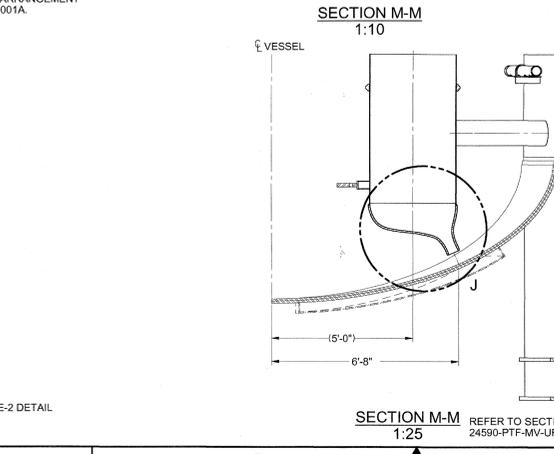
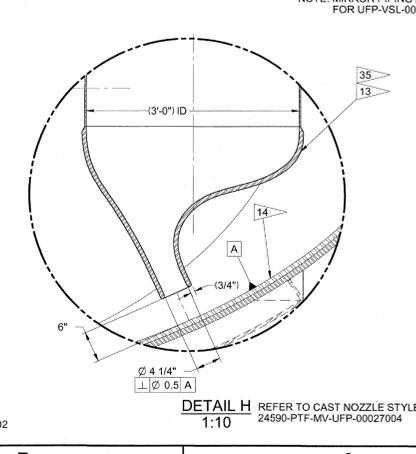
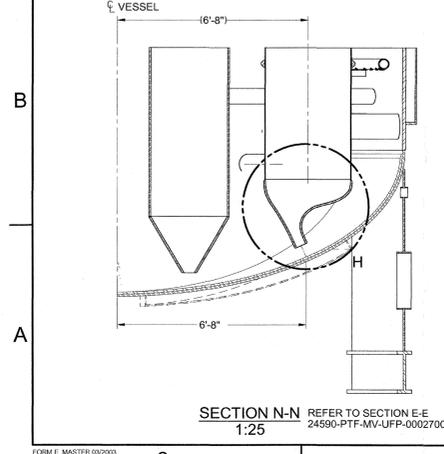
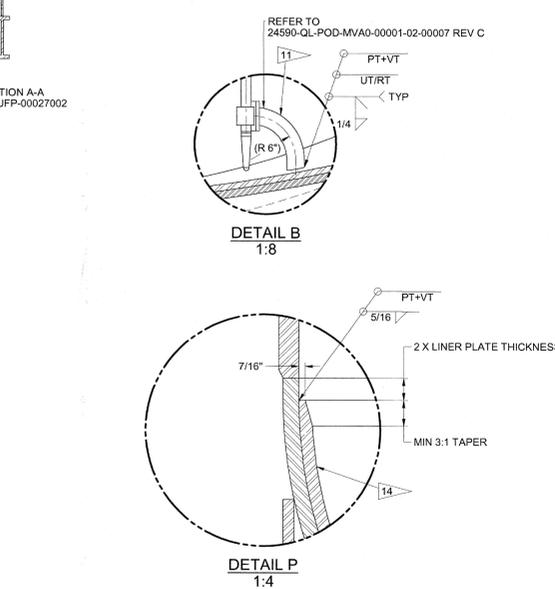
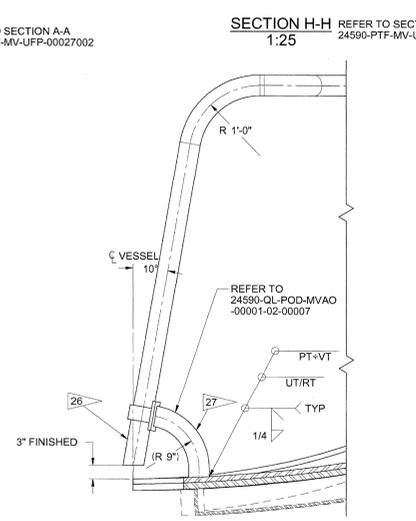
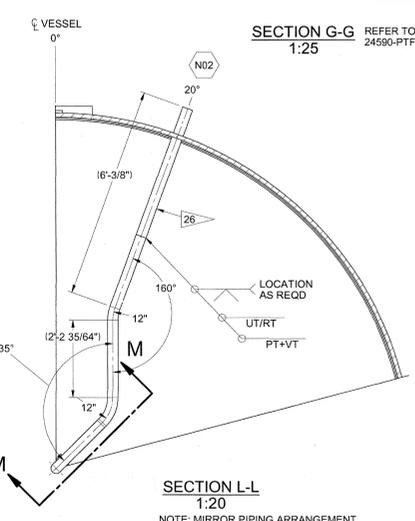
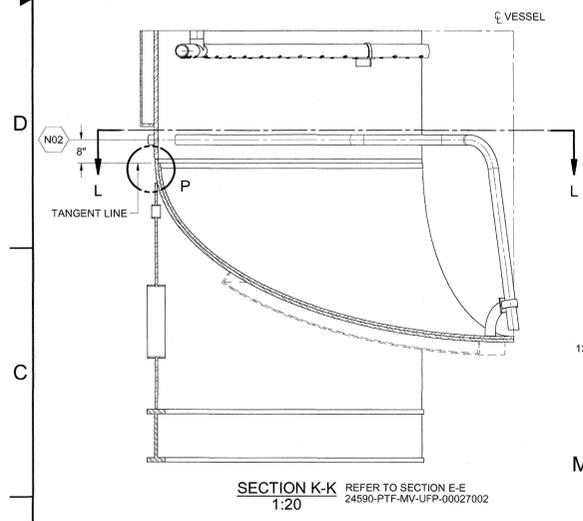
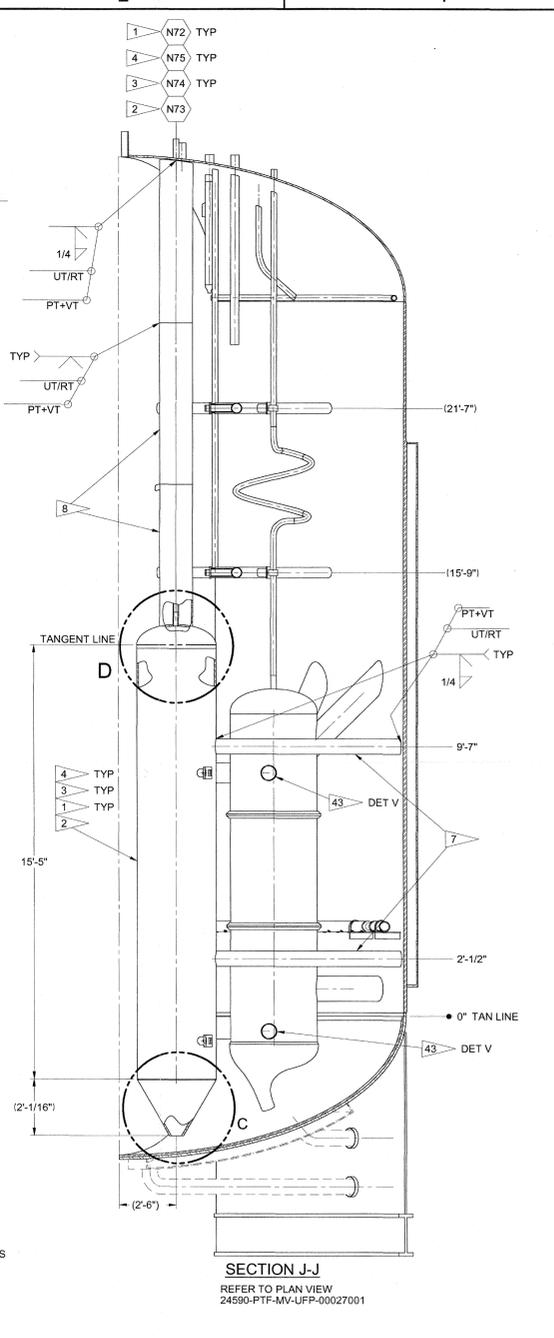
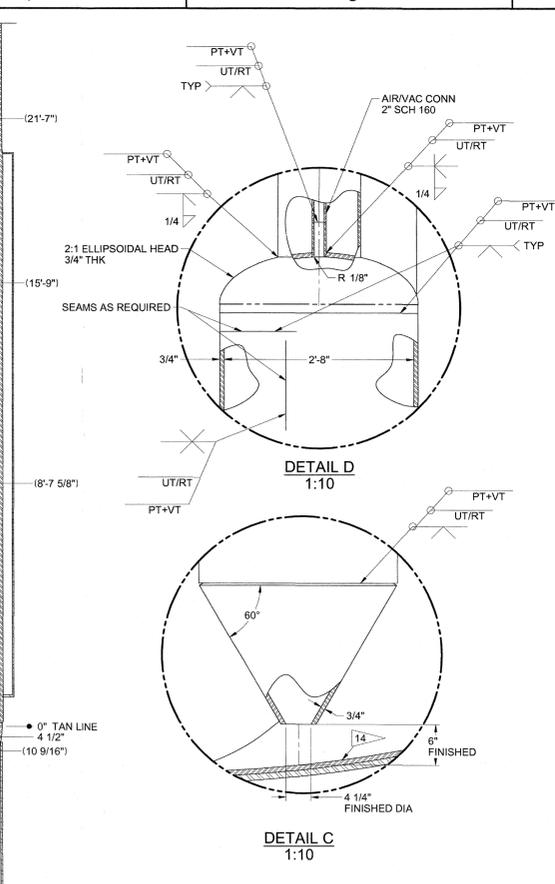
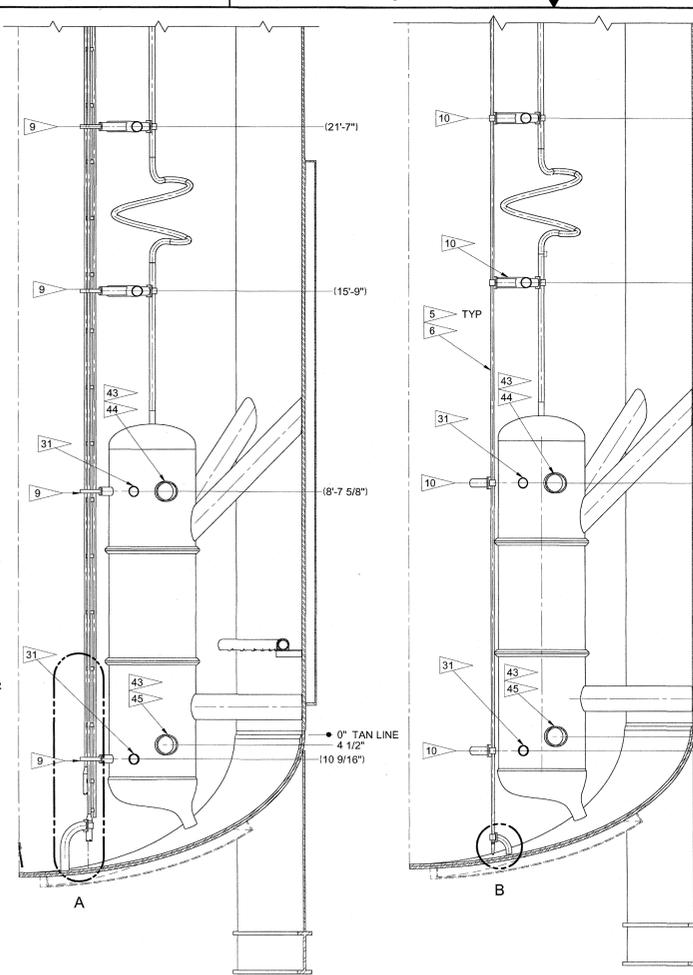
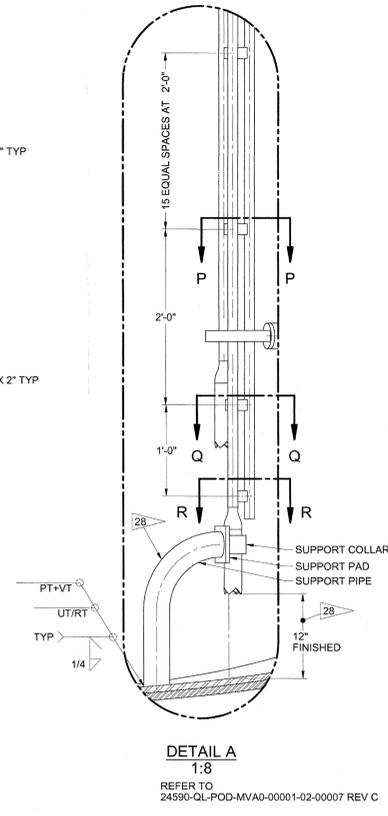
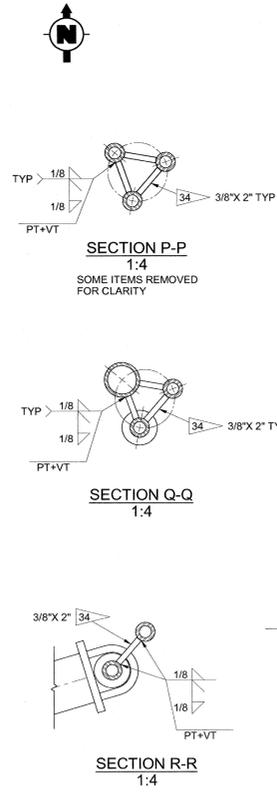
CONTRACT NO.		RIVER PROTECTION PROJECT WASTE TREATMENT PLANT	
DE-AC22-01RV14138		2435 STEVENS CENTER PLACE RICHLAND, WA 99354	
UFP-VSL-00001A AND UFP-VSL-00001B		MIXING ASSESSMENT EQUIPMENT CHANGES	
PLAN, ELEVATION AND SECTION VIEWS		24590-PTF-MV-UFP-00027001	

SCALE	AS SHOWN	REV	0
24590-PTF-MV-UFP-00027001	AS SHOWN	REV: 2	0



H  
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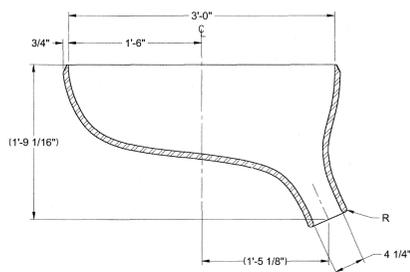
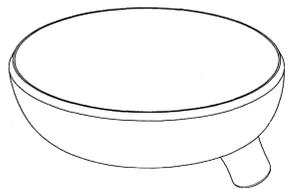
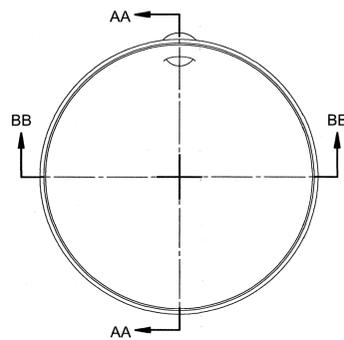
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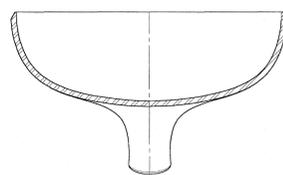
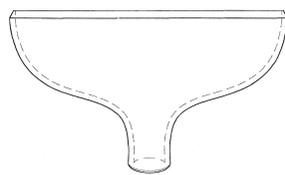
**NOTE:**  
1. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.

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.

ISSUED BY RPM/WTP/PGC	PROJECT No. 24590	SITE HANFORD	DATE 5/25/11
ISSUE STAMP	AREA 200E	BUILDING No. 10	DATE 5/25/11
ORIGINATOR J. [Signature]	BY J. [Signature]	DATE 5/25/11	DATE 5/25/11
CHECKER J. [Signature]	APPROVER J. [Signature]	DATE 5/25/11	DATE 5/25/11
REVIEWER J. [Signature]	DATE 5/25/11	DATE 5/25/11	DATE 5/25/11
CONTENT APPLICABLE TO ALARA? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	ADR No. 24590-WTP-ADR-M-03-008	REV. 2	SCALE AS SHOWN
ENS SCREENING REQUIRED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	ENS INITIAL IF YES <input checked="" type="checkbox"/>	MANUAL DESIGN CHANGES NOT PERMITTED	SCALE AS SHOWN
ISSUED FOR PURCHASE WITH HOLD NOTES REMOVED		ORG CHKD RWD APVD	DATE 5/25/11
REVISION HISTORY		CONTRACT No. DE-AC27-01RV14136	
RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354		24590-PTF-MV-UFP-00027003	
UFP-VSL-00001A AND UFP-VSL-00001B MIXING ASSESSMENT EQUIPMENT CHANGES SECTION AND DETAIL VIEWS		REV 0	



SECTION AA-AA



SECTION BB-BB

**STYLE-1  
CAST NOZZLE**  
NOTE: VOID VOLUME - 43 GALLONS  
REFER TO DETAIL J  
24590-PTF-MV-UFP-00027003

**CASTING SPECIFICATION / NOTES:**

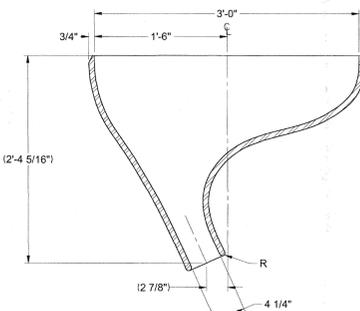
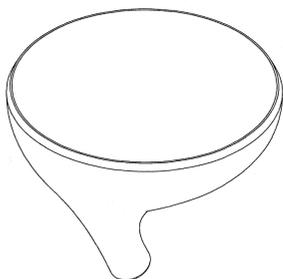
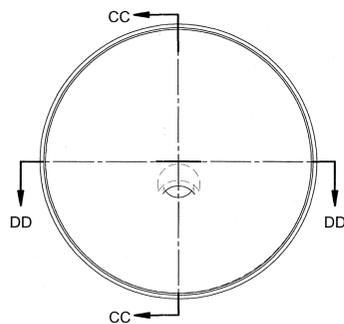
- MATERIAL SPECIFICATION: HASTELLOY C-22 GR CX2MW (AOD) (UNS N26022), SOLUTION ANNEALED PER ASTM A494 AND TABLE 2.
- CASTINGS SHALL BE DELIVERED IN THE HEAT TREATED CONDITION, CLEAN AND FREE OF INVESTMENT AND CORE MATERIALS. CLEANING SHALL BE PERFORMED BY ABRASIVE GRINDING OR HYDRO BLAST CLEANING. PROCEDURES TO BE PROVIDED FOR BUYER REVIEW AND APPROVAL.
- THE CASTING END SHALL BE PREPARED FOR WELDING, MACHINED, VISUALLY AND PENETRANT INSPECTED.
- CHEMICAL ANALYSIS AND MECHANICAL PROPERTY TESTING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A 781.
- SURFACE FINISH TO BE 300-400 RMS.
- RADIOGRAPHIC TESTING (RT) AND PENETRANT TESTING (PT) ON ALL SURFACES SHALL BE IN ACCORDANCE WITH ANSI B16.34.
- VISUAL INSPECTION IN ACCORDANCE WITH ASTM A802.
- WELD REPAIR PROCEDURES SHALL BE GENERATED AND APPROVED BY THE BUYER BASED ON A894 SUPPLEMENTAL REQUIREMENT S22, AND PARAGRAPHS 22.1.2 AND 22.1.3 ONLY. WELD AND WELDER QUALIFICATION TEST PLATES SHALL BE PRODUCED FROM A CASTING OF THE MASTER HEAT AND SOLUTION ANNEALED. SUFFICIENT MATERIAL FOR A MINIMUM OF (3) U-BEND SAMPLES SHALL BE PROVIDED AND A MINIMUM OF (2) 5" X 3 1/4" FOR BUYER ARCHIVES. ALL BEND TEST SAMPLES SHALL ALSO BE ARCHIVED.

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.

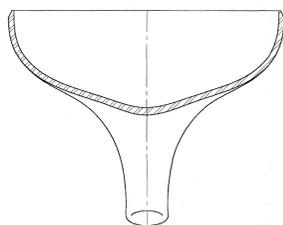
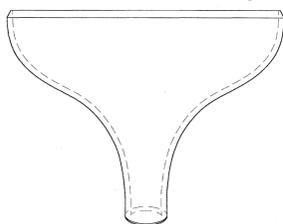
**NOTE:**

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SECTION CC-CC



SECTION DD-DD

**STYLE-2  
CAST NOZZLE**  
NOTE: VOID VOLUME - 43 GALLONS  
REFER TO DETAIL H  
24590-PTF-MV-UFP-00027003

ISSUED FOR PURCHASE		DATE	5/25/11
REV	DESCRIPTION	ORG	CHKD
0			
REVISION HISTORY			
ISSUED BY	PROJECT No.	24590	
RPP/WTP/PDD	SITE	HANFORD	
ORIGINATOR	AREA	200E	
CHECKER	BUILDING No.	10	
APPROVER	BY	DATE	5/25/11
REVIEWER	DATE	5/25/11	5/25/11
CONTENT APPLICABLE TO ALARA? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		SCALE	
ADN No. 24590-WTP-ADR-M-03-008		NONE	
EANS SCREENING REQUIRED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		COMPUTER GENERATED	
EANS INITIAL IF YES		MANUAL DESIGN CHANGES NOT PERMITTED	
24590-PTF-MV-UFP-00027004		REV 0	



Quarter Ending March 30, 2012

24590-PTF-PCN-ENV-11-010

**Hanford Facility RCRA Permit Modification Notification Form**

Unit:  
**Waste Treatment and Immobilization Plant**

Permit Part:  
**Part III, Operating Unit 10**

**Description of Modification:**

The purpose of this Class 1 prime modification is to update and replace the following P&IDs for the FRP Pumps FRP-PMP-00001 and -00002A and Utility Systems PSA Racks in Appendix 8.2 of the Dangerous Waste Permit. The seven P&IDs incorporated into the permit are being replaced with 47 P&IDs as indicated in the table below. The additional drawings are the result of converting each of the source drawings into multiple sheets in an effort to provide clearer representation of the pumps and PSA racks, including additional details for instrumentation and logic controls.

Appendix 8.2			
Replace:		With:	
24590-PTF-M6-FRP-00003, Rev. 3			24590-PTF-M6-FRP-00003001 Rev. 0
			24590-PTF-M6-FRP-00003002 Rev. 0
			24590-PTF-M6-FRP-00003003 Rev. 0
			24590-PTF-M6-FRP-00003004 Rev. 0
			24590-PTF-M6-FRP-00003005 Rev. 0
24590-PTF-M6-FRP-00005, Rev. 3			24590-PTF-M6-FRP-00005001 Rev. 0
			24590-PTF-M6-FRP-00005002 Rev. 0
			24590-PTF-M6-FRP-00005003 Rev. 0
			24590-PTF-M6-FRP-00005004 Rev. 0
			24590-PTF-M6-FRP-00005005 Rev. 0
			24590-PTF-M6-FRP-00005006 Rev. 0
			24590-PTF-M6-FRP-00005007 Rev. 0
24590-PTF-M6-FRP-00006, Rev. 3			24590-PTF-M6-FRP-00006001 Rev. 0
			24590-PTF-M6-FRP-00006002 Rev. 0
			24590-PTF-M6-FRP-00006003 Rev. 0
			24590-PTF-M6-FRP-00006004 Rev. 0
			24590-PTF-M6-FRP-00006005 Rev. 0
			24590-PTF-M6-FRP-00006006 Rev. 0
			24590-PTF-M6-FRP-00006007 Rev. 0
24590-PTF-M6-FRP-00007, Rev. 3			24590-PTF-M6-FRP-00007001 Rev. 0
			24590-PTF-M6-FRP-00007002 Rev. 0
			24590-PTF-M6-FRP-00007003 Rev. 0
			24590-PTF-M6-FRP-00007004 Rev. 0
			24590-PTF-M6-FRP-00007005 Rev. 0
			24590-PTF-M6-FRP-00007006 Rev. 0
			24590-PTF-M6-FRP-00007007 Rev. 0
24590-PTF-M6-FRP-00017, Rev. 0			24590-PTF-M6-FRP-00017001 Rev. 0
			24590-PTF-M6-FRP-00017002 Rev. 0
			24590-PTF-M6-FRP-00017003 Rev. 0
			24590-PTF-M6-FRP-00017004 Rev. 0
			24590-PTF-M6-FRP-00017005 Rev. 0
			24590-PTF-M6-FRP-00017006 Rev. 0
			24590-PTF-M6-FRP-00017007 Rev. 0
24590-PTF-M6-FRP-00018, Rev. 0			24590-PTF-M6-FRP-00018001 Rev. 0
			24590-PTF-M6-FRP-00018002 Rev. 0

Quarter Ending March 30, 2012

24590-PTF-PCN-ENV-11-010

		24590-PTF-M6-FRP-00018003 Rev. 0
		24590-PTF-M6-FRP-00018004 Rev. 0
		24590-PTF-M6-FRP-00018005 Rev. 0
		24590-PTF-M6-FRP-00018006 Rev. 0
		24590-PTF-M6-FRP-00018007 Rev. 0
		24590-PTF-M6-FRP-00019001 Rev. 0
		24590-PTF-M6-FRP-00019002 Rev. 0
		24590-PTF-M6-FRP-00019003 Rev. 0
	24590-PTF-M6-FRP-00019, Rev. 0	24590-PTF-M6-FRP-00019004 Rev. 0
		24590-PTF-M6-FRP-00019005 Rev. 0
		24590-PTF-M6-FRP-00019006 Rev. 0
		24590-PTF-M6-FRP-00019007 Rev. 0

This modification requests Ecology approval and incorporation into the permit the specific changes to the P&IDs that are indicated by revision notes and clouds. The P&IDs include changes provided in applicable document change forms (e.g., DCN, SCN, SDDR, FCN, FCR, etc.) that were submitted to Ecology in accordance with Condition III.10.C.9.h. In addition, these P&IDs include changes associated with the resolution to comments on change documents since the issuance of the last revision of the permitted documents.

Significant changes to the P&IDs are summarized below:

- Converted drawing from a single sheet to multi-sheet drawings
- Modified, deleted, and added notes, holds, and references
- Modified, identified, and added support/utility system lines, valves, in-line components, instruments, and logic controls
- Incorporated changes from change documentation identified in the Notes section on each drawing

This modification requests Ecology approval and incorporation of the following list of outstanding change documents into the permit. Although not yet incorporated into the revised documents attached to this PCN, this list of outstanding DCNs are intended to be incorporated into this modification:

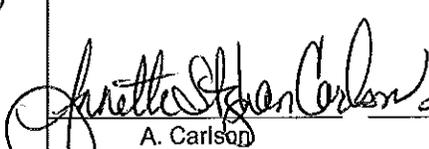
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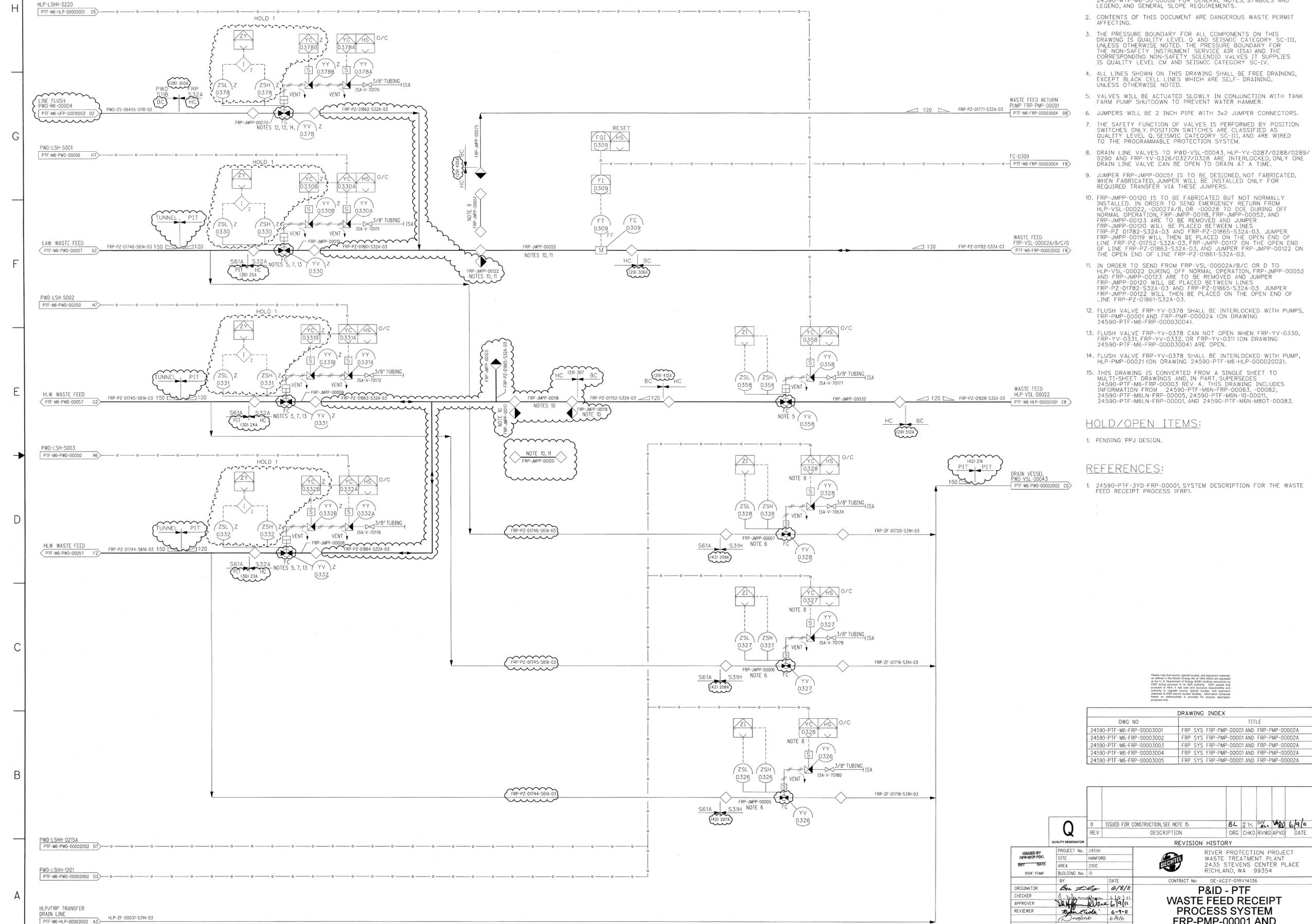
WAC 173-303-830 Modification Class:	Class 1	Class <sup>1</sup> 1	Class 2	Class 3
Please mark the Modification Class:		X		

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

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

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

Modification Approved/Concur: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> Denied (state reason below) Reason for denial:	Reviewed by Ecology:  A. Carlson Date: 2-29-12
--	---



NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- VALVES WILL BE ACTUATED SLOWLY IN CONJUNCTION WITH TANK FARM PUMP SHUTDOWN TO PREVENT WATER HAMMER.
- JUMPERS WILL BE 2 INCH PIPE WITH 3x2 JUMPER CONNECTORS.
- THE SAFETY FUNCTION OF VALVES IS PERFORMED BY POSITION SWITCHES ONLY. POSITION SWITCHES ARE CLASSIFIED AS QUALITY LEVEL Q, SEISMIC CATEGORY SC-III, AND ARE WIRED TO THE PROGRAMMABLE PROTECTION SYSTEM.
- DRAIN LINE VALVES TO PWD-VSL-00043, HLP-VV-0287/0288/0289/0290 AND FRP-VV-0326/0327/0328 ARE INTERLOCKED, ONLY ONE DRAIN LINE VALVE CAN BE OPEN TO DRAIN AT A TIME.
- JUMPER FRP-JMPP-0001 IS TO BE DESIGNED, NOT FABRICATED, WHEN FABRICATED, JUMPER WILL BE INSTALLED ONLY FOR REQUIRED TRANSFER VIA THESE JUMPERS.
- FRP-JMPP-00120 IS TO BE FABRICATED BUT NOT NORMALLY INSTALLED. IN ORDER TO SEND EMERGENCY RETURN FROM HLP-VSL-00022, -00027A/B, OR -00028 TO DDC DURING OFF NORMAL OPERATION, FRP-JMPP-00118, FRP-JMPP-00052, AND FRP-JMPP-00123 ARE TO BE REMOVED AND JUMPER FRP-JMPP-00120 WILL BE PLACED BETWEEN LINES FRP-PZ-01782-S32A-03 AND FRP-PZ-01865-S32A-03. JUMPER FRP-JMPP-00119 WILL THEN BE PLACED ON THE OPEN END OF LINE FRP-PZ-01752-S32A-03, FRP-JMPP-00117 ON THE OPEN END OF LINE FRP-PZ-01863-S32A-03, AND JUMPER FRP-JMPP-00122 ON THE OPEN END OF LINE FRP-PZ-01861-S32A-03.
- IN ORDER TO SEND FROM FRP-VSL-00002A/B/C OR D TO HLP-VSL-00022 DURING OFF NORMAL OPERATION, JUMPER FRP-JMPP-00123 ARE TO BE REMOVED AND JUMPER FRP-JMPP-00120 WILL BE PLACED BETWEEN LINES FRP-PZ-01782-S32A-03 AND FRP-PZ-01865-S32A-03. JUMPER FRP-JMPP-00122 WILL THEN BE PLACED ON THE OPEN END OF LINE FRP-PZ-01861-S32A-03.
- FLUSH VALVE FRP-VV-0378 SHALL BE INTERLOCKED WITH PUMPS, FRP-PMP-00001 AND FRP-PMP-00002A (ON DRAWING 24590-PTF-M6-FRP-00003004).
- FLUSH VALVE FRP-VV-0378 CAN NOT OPEN WHEN FRP-VV-0330, FRP-VV-0331, FRP-VV-0332, OR FRP-VV-0311 (ON DRAWING 24590-PTF-M6-FRP-00003004) ARE OPEN.
- FLUSH VALVE FRP-VV-0378 SHALL BE INTERLOCKED WITH PUMP, HLP-PMP-00021 (ON DRAWING 24590-PTF-M6-HLP-00002002).
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00003 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6-FRP-00003, -00002, 24590-PTF-M6-FRP-00005, 24590-PTF-M6-FRP-00001, 24590-PTF-M6-FRP-00002, AND 24590-PTF-M6-FRP-00003.

HOLD/OPEN ITEMS:

- PENDING PPJ DESIGN.

REFERENCES:

- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR THE WASTE FEED RECEIPT PROCESS (FRP).

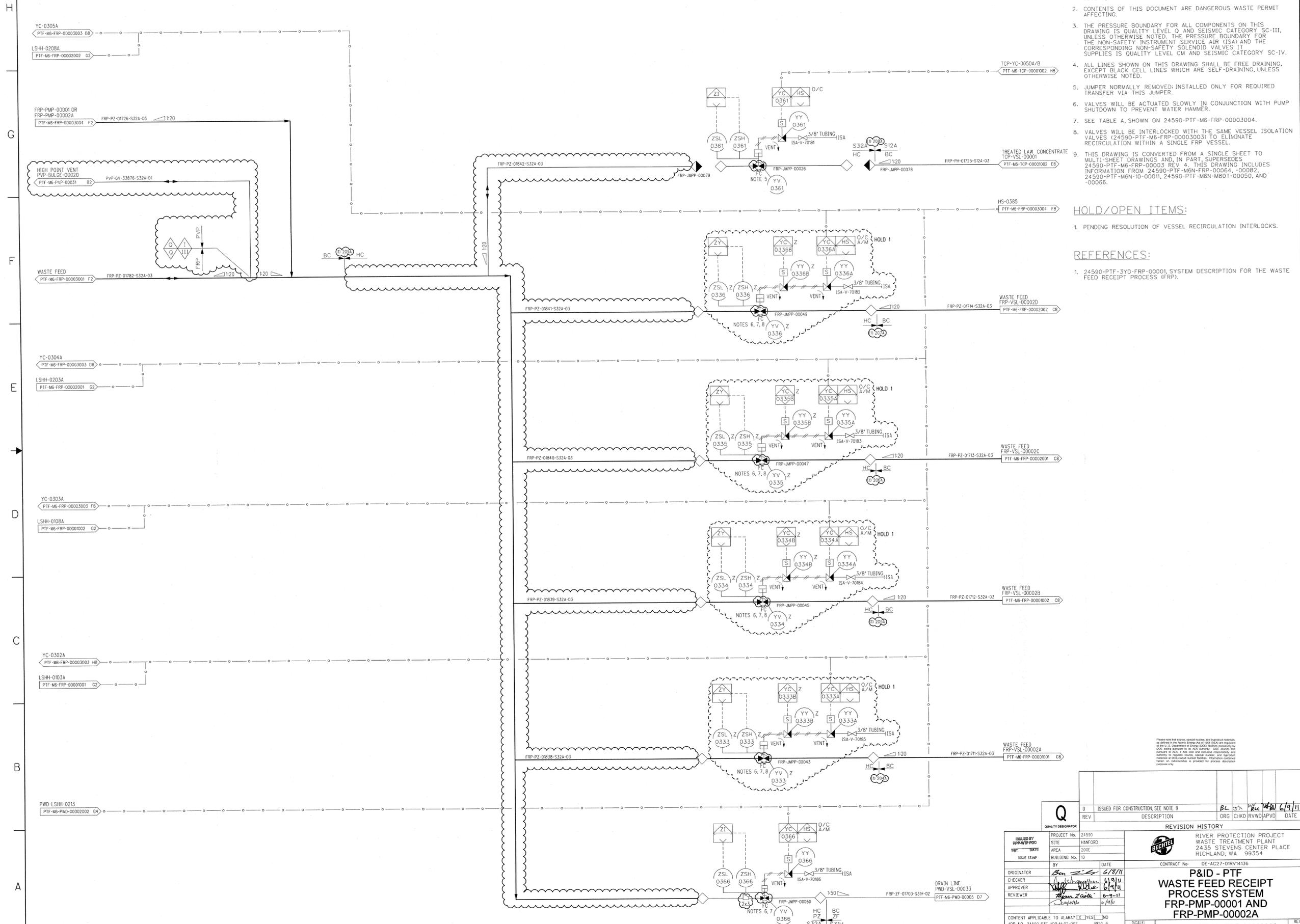
Please note that the owner, special holder, and licensee materials are not to be used in the design of any part of the project. The design of any part of the project is the responsibility of the licensee. The licensee shall be responsible for the design of any part of the project. The licensee shall be responsible for the design of any part of the project. The licensee shall be responsible for the design of any part of the project.

DRAWING INDEX	
DWG NO	TITLE
24590-PTF-M6-FRP-00003001	FRP SYS FRP-PMP-00001 AND FRP-PMP-00002A
24590-PTF-M6-FRP-00003002	FRP SYS FRP-PMP-00001 AND FRP-PMP-00002A
24590-PTF-M6-FRP-00003003	FRP SYS FRP-PMP-00001 AND FRP-PMP-00002A
24590-PTF-M6-FRP-00003004	FRP SYS FRP-PMP-00001 AND FRP-PMP-00002A
24590-PTF-M6-FRP-00003005	FRP SYS FRP-PMP-00001 AND FRP-PMP-00002A

REV	DESCRIPTION	ORG	CHKD	RWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 15	BL	JK	WJ	WJ	6/9/11

REVISION HISTORY	
ORIGINATOR	BY: <i>Ben Ziegler</i> DATE: 6/8/11
CHECKER	DATE: 6/9/11
APPROVER	DATE: 6/9/11
REVIEWER	DATE: 6/9/11

PROJECT No:	24590
SITE:	HANFORD
AREA:	200C
BUILDING No. 10:	
CONTRACT No:	DE-AC27-01R14136
<b>P&amp;ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM FRP-PMP-00001 AND FRP-PMP-00002A</b>	
SCALE:	NONE
24590-PTF-M6-FRP-00003001	REV 0



NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- JUMPER NORMALLY REMOVED; INSTALLED ONLY FOR REQUIRED TRANSFER VIA THIS JUMPER.
- VALVES WILL BE ACTUATED SLOWLY IN CONJUNCTION WITH PUMP SHUTDOWN TO PREVENT WATER HAMMER.
- SEE TABLE A, SHOWN ON 24590-PTF-M6-FRP-00003004.
- VALVES WILL BE INTERLOCKED WITH THE SAME VESSEL ISOLATION VALVES (24590-PTF-M6-FRP-00003003) TO ELIMINATE RECIRCULATION WITHIN A SINGLE FRP VESSEL.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00003 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-FRP-00064, -00082, 24590-PTF-M6N-10-00011, 24590-PTF-M6N-MB0T-00050, AND -00066.

HOLD/OPEN ITEMS:

- PENDING RESOLUTION OF VESSEL RECIRCULATION INTERLOCKS.

REFERENCES:

- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR THE WASTE FEED RECEIPT PROCESS (FRP).

Please note that source, special, and standard materials, as specified in the notes, general notes, and equipment schedule, are the property of the U.S. Department of Energy (DOE) and are loaned to you by DOE. You agree to return them to DOE upon completion of your project. It is your responsibility to ensure that all materials are returned to DOE in good condition. If you have any questions, please contact the DOE Project Manager. An acknowledgment is provided for process execution purposes only.

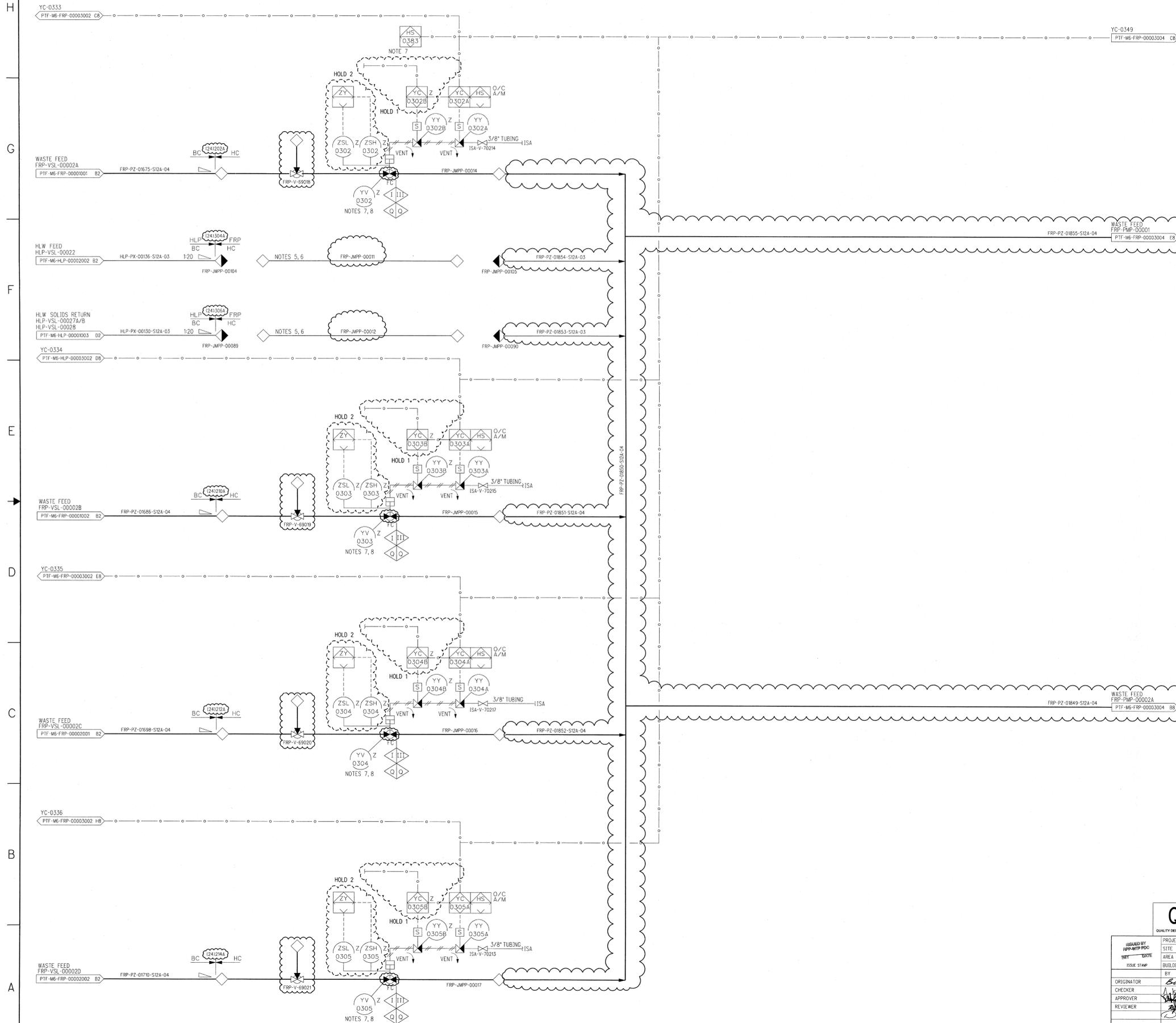
QUALITY DESIGNATOR		REVISION HISTORY	
Q	ISSUED FOR CONSTRUCTION, SEE NOTE 9	REV	DESCRIPTION
0		1	REVISED FOR CONSTRUCTION, SEE NOTE 9
1		2	REVISED FOR CONSTRUCTION, SEE NOTE 9
2		3	REVISED FOR CONSTRUCTION, SEE NOTE 9
3		4	REVISED FOR CONSTRUCTION, SEE NOTE 9
4		5	REVISED FOR CONSTRUCTION, SEE NOTE 9
5		6	REVISED FOR CONSTRUCTION, SEE NOTE 9
6		7	REVISED FOR CONSTRUCTION, SEE NOTE 9
7		8	REVISED FOR CONSTRUCTION, SEE NOTE 9
8		9	REVISED FOR CONSTRUCTION, SEE NOTE 9
9		10	REVISED FOR CONSTRUCTION, SEE NOTE 9

ISSUED BY	PROJECT No.	24590
FRP-WTP POC	SITE	HANFORD
DATE	AREA	200E
ISSUE STAMP	BUILDING No.	10
BY	DATE	6/7/11
CHECKER	DATE	6/7/11
APPROVER	DATE	6/7/11
REVIEWER	DATE	6/7/11

CONTRACT No.	DE-AC27-08R14136
RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354	
P&ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM FRP-PMP-00001 AND FRP-PMP-00002A	
SCALE:	AS SHOWN
DATE:	6/7/11
REV:	0



NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- JUMPER NORMALLY REMOVED; INSTALLED ONLY FOR REQUIRED TRANSFER VIA THIS JUMPER.
- WHEN FRP-JMPP-00011 OR -00012 ARE INSTALLED, FRP-JMPP-00038 (SHOWN ON 24590-PTF-M6-FRP-00003004) MUST BE REMOVED. WHEN FRP-JMPP-00038 IS UNINSTALLED, THE JUMPERS FRP-JMPP-00110/00111 ARE INSTALLED TO CLOSE OFF THE FLUSHLINE TO FRP-JMPP-00002A.
- SEE TABLE A, SHOWN ON 24590-PTF-M6-FRP-00003004.
- VALVES WILL BE INTERLOCKED WITH THE SAME VESSEL INLET VALVES (24590-PTF-M6-FRP-00003002) TO ELIMINATE RECIRCULATION WITHIN A SINGLE FRP VESSEL.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00003 PTF 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-FRP-00063, -00065, 00075, -00082, 24590-PTF-M6PR-10-00008, 24590-PTF-M6-MBT-00062, -00107, AND 24590-PTF-M6N-10-00011.

HOLD/OPEN ITEMS:

- PENDING PPJ DESIGN.
- PENDING RESOLUTION OF VESSEL RECIRCULATION INTERLOCK.

REFERENCES:

- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR THE WASTE FEED RECEIPT PROCESS (FRP).

Please note that special, special order, and imported materials, as defined in the Atomic Energy Act of 1954 (AEA) are regulated by the U.S. Department of Energy (DOE) and are not subject to the DOE Atomic Energy Act. The DOE Atomic Energy Act does not apply to materials that are not subject to the AEA. If you are not a DOE contractor, you may not be able to obtain these materials. Information contained herein is unclassified, in part, and is provided for general information purposes only.

<p>ISSUED FOR CONSTRUCTION, SEE NOTE 9</p>		<p>BL J.K. PK. M. C. L. G. H.</p>
<p>QUALITY DESIGNATOR</p>	<p>REVISION HISTORY</p>	<p>DATE</p>
<p>ISSUED BY: FRP-M6-FRP-00003003</p> <p>DATE: 6/18/11</p> <p>ISSUE STAMP:</p>	<p>PROJECT No: 24590</p> <p>SITE: HANFORD</p> <p>AREA: 2006</p> <p>BUILDING No: 10</p>	<p>CONTRACT No: DE-AC27-01RV14136</p> <p>RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354</p>
<p>ORIGINATOR: Ben Z. L. G. H.</p> <p>CHECKER: Ben Z. L. G. H.</p> <p>APPROVER: Ben Z. L. G. H.</p> <p>REVIEWER: Ben Z. L. G. H.</p>	<p>DATE: 6/18/11</p> <p>DATE: 6/19/11</p> <p>DATE: 6/9/11</p> <p>DATE: 6/9/11</p>	<p>SCALE: NONE</p> <p>REV: 6</p>
<p>CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>ADR NO. 24590-PTF-ADR-M-007</p> <p>EMG SCREENING REQUIRED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO (EAS INITIAL IF YES)</p>	<p>COMPUTER GENERATED - MANUAL</p> <p>REVISIONS NOT PERMITTED</p>	<p>24590-PTF-M6-FRP-00003003</p> <p>REV 0</p>

TABLE A

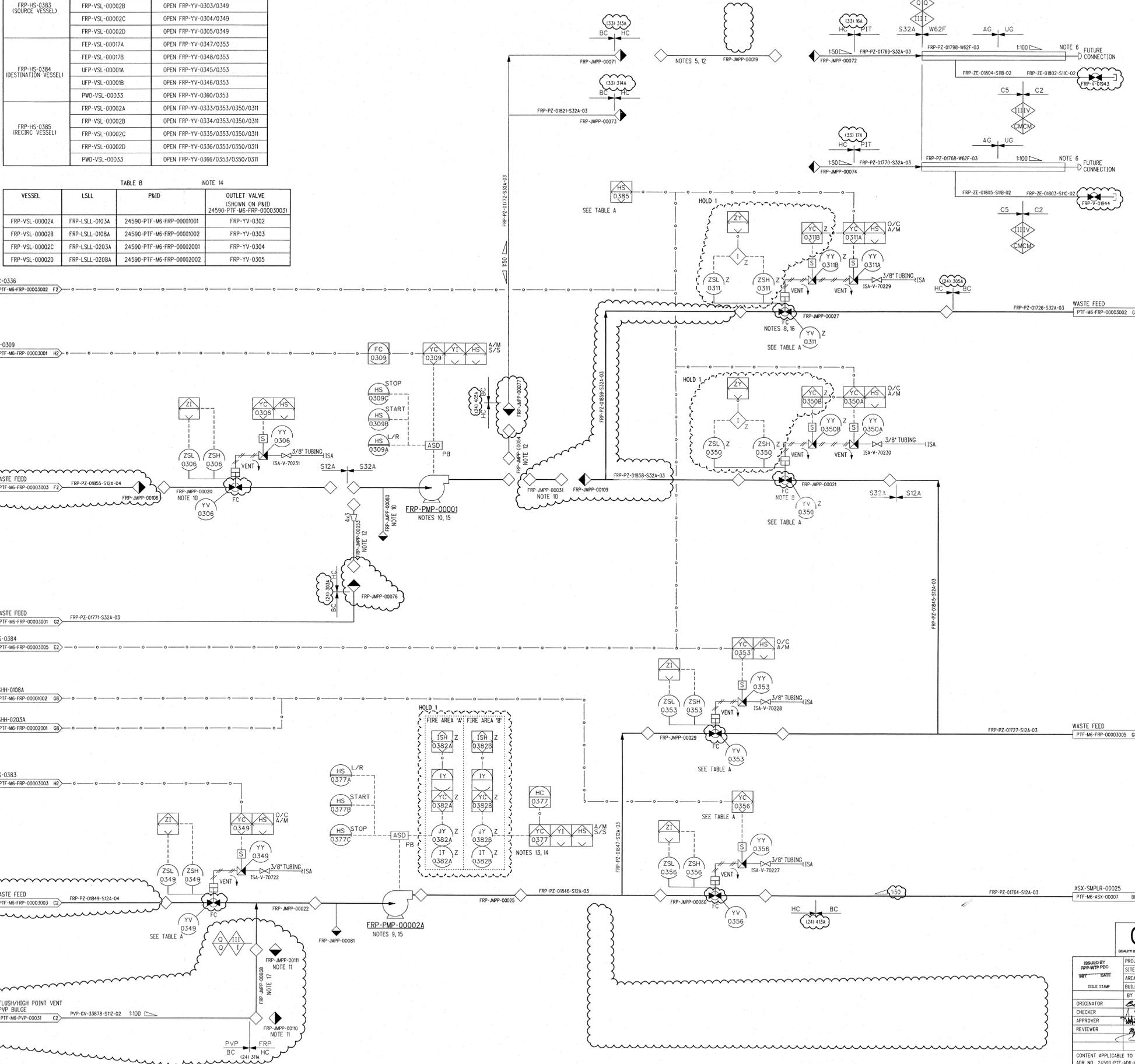
HANDSWITCH	OPERATOR SELECTION	AUTOMATIC FUNCTION
FRP-HS-0383 (SOURCE VESSEL)	FRP-VSL-00002A	OPEN FRP-VY-0302/0349
	FRP-VSL-00002B	OPEN FRP-VY-0303/0349
	FRP-VSL-00002C	OPEN FRP-VY-0304/0349
FRP-HS-0384 (DESTINATION VESSEL)	FRP-VSL-00002A	OPEN FRP-VY-0302/0349
	FRP-VSL-00002B	OPEN FRP-VY-0303/0349
	FRP-VSL-00002C	OPEN FRP-VY-0304/0349
FRP-HS-0385 (RECIRC VESSEL)	FRP-VSL-00002A	OPEN FRP-VY-0302/0349
	FRP-VSL-00002B	OPEN FRP-VY-0303/0349
	FRP-VSL-00002C	OPEN FRP-VY-0304/0349

TABLE B

VESSEL	LSLL	P&ID	OUTLET VALVE (SHOWN ON P&ID)
FRP-VSL-00002A	FRP-LSLL-0103A	24590-PTF-M6-FRP-0000001	FRP-VY-0302
FRP-VSL-00002B	FRP-LSLL-0108A	24590-PTF-M6-FRP-00001002	FRP-VY-0303
FRP-VSL-00002C	FRP-LSLL-0203A	24590-PTF-M6-FRP-00002001	FRP-VY-0304
FRP-VSL-00002D	FRP-LSLL-0208A	24590-PTF-M6-FRP-00002002	FRP-VY-0305

FRP-PMP-00001  
WASTE FEED RETURN PUMP  
100 GPM @ 379 PSI TDH  
100 HP

FRP-PMP-00002A  
WASTE FEED TRANSFER PUMP  
150 GPM @ 119 PSI TDH  
34 HP



- NOTES:
- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
  - CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
  - THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
  - ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
  - FUTURE JUMPER CONNECTION. JUMPER TO BE DESIGNED ONLY AND NORMALLY BLANKED AT THE HOT CELL WALL. JUMPER WILL BE DESIGNED TO BE USED TO CONNECT LINE FRP-PZ-01772-S32A-03 TO LINE FRP-PZ-01769-S32A-03 OR TO CONNECT LINE FRP-PZ-01821-S32A-03 TO FRP-PZ-01770-S32A-03 AS REQUIRED. PROVIDE AIR AND ELECTRICAL SUPPLY FOR FUTURE JUMPER CONNECTION.
  - SPARE LINES FOR FUTURE CONNECTIONS SHALL BE CAPPED 5 FEET FROM THE FOUNDATION OF THE PRETREATMENT FACILITY.
  - REFER TO DRAWING 24590-PTF-M6-PSW-00009002, FOR PUMP SEAL WATER DISTRIBUTION.
  - THE SAFETY FUNCTION OF VALVES IS PERFORMED BY POSITION SWITCHES ONLY. POSITION SWITCHES ARE CLASSIFIED AS QUALITY LEVEL Q, SEISMIC CATEGORY SC-III, AND ARE WIRED TO THE PROGRAMMABLE PROTECTION SYSTEM.
  - ITS TIMER LIMITS PUMP RUN TIME.
  - INSTALLED ONLY ON AN AS-NEEDED BASIS.
  - WHEN FRP-JMPP-00011 OR -00012 (SHOWN ON DRAWING 24590-PTF-M6-FRP-00003003) ARE INSTALLED FRP-JMPP-00038 MUST BE REMOVED. WHEN FRP-JMPP-00038 IS UNINSTALLED, THE JUMPERS FRP-JMPP-0010/0011 ARE INSTALLED TO CLOSE OFF THE FLUSH LINE TO FRP-PMP-00002A.
  - JUMPERS FRP-JMPP-00053, -00054 AND -00019 ARE TO BE INSTALLED ONLY FOR REQUIRED TRANSFER VIA THESE JUMPERS.
  - ON PUMP NOT RUNNING SIGNAL ALL VALVES IN THE PUMP FLOW PATHS ARE PULSED CLOSED.
  - FRP-PMP-00002A OVERRIDE STOPS ON ANY TANK LO LO LEVEL CONDITION COINCIDENT WITH THE TANK OUTLET VALVE BEING OPEN. SEE TABLE B.
  - FLUSH VALVE FRP-VY-0378 (24590-PTF-M6-FRP-00003001) SHALL BE INTERLOCKED WITH PUMPS, FRP-PMP-00001 AND 00002A.
  - FLUSH VALVE FRP-VY-0378 (24590-PTF-M6-FRP-00003001) CAN NOT OPEN WHEN FRP-VY-0311 IS OPEN.
  - REMOVAL OF FRP-JMPP-00038 PROVIDES VESSEL HEEL DILUTION/CLEANOUT PUMP HLP-PMP-00022 FLUSH CONNECTION, VIA FLEXIBLE JUMPER, FOR PWD-VSL-00015 AND -00016 EMPTYING OPERATIONS IN SUPPORT OF DECOMMISSIONING. SEE 24590-PTF-M6-HLP-00029001.
  - THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00003 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6-FRP-00003, -00005, -00074, -00075, -00082, 24590-PTF-M6LN-FRP-00013, -00014, 24590-PTF-M6LN-M80T-00066, 24590-PTF-M6LN-M80T-00035, AND 24590-PTF-M6LN-0-00011.

- HOLD/OPEN ITEMS:
- PENDING PPJ DESIGN.
- REFERENCES:
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR THE WASTE FEED RECEIPT PROCESS (FRP).

QUALITY DESIGNATOR

ISSUED BY	PROJECT No.	24590
CHECKER	SITE	HANFORD
APPROVER	DATE	2006
REVIEWER	BUILDING No.	10
DATE	DATE	6/8/11
DATE	DATE	6/17/11
DATE	DATE	6/21/11
DATE	DATE	6/19/11

CONTRACT No: DE-AC27-01RV14336

RIVER PROTECTION PROJECT  
WASTE TREATMENT PLANT  
2435 STEVENS CENTER PLACE  
RICHLAND, WA 99354

P&ID - PTF  
WASTE FEED RECEIPT  
PROCESS SYSTEM  
FRP-PMP-00001 AND  
FRP-PMP-00002A

24590-PTF-M6-FRP-00003004

SCALE: NONE

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 18	BL	JK	PL	WJ	6/8/11

FORM ELS-504-DGN 02/2009

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GSP-REQ-002

SCALE: NONE

COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

6/8/2011 4:14:00 PM

R11363998

NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- JUMPER INSTALLED FOR COLD COMMISSIONING/STARTUP ONLY. JUMPER TO BE BLANKED DURING NORMAL OPERATION.
- STARTUP SIMULANT LINE IS ROUTED FROM THE TRUCK UNLOADING AREA IN THE WET CHEM FACILITY TO THE PRETREATMENT FACILITY. THIS LINE WILL BE USED ONLY DURING COLD COMMISSIONING.
- SEE TABLE A, SHOWN ON DRAWING 24590-PTF-M6-FRP-00003004.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00003 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-FRP-00064, -00065, -00078, -00082, -00084, 24590-PTF-M6N-M6OT-00060, -00065, 24590-PTF-M6N-10-00011, AND 24590-PTF-M6LN-FRP-00012.

HOLD/OPEN ITEMS:

- LAYOUT OF THE STARTUP SIMULANT LINE FROM WET CHEMICAL FACILITY ARE ON HOLD PENDING FURTHER DEVELOPMENT.

REFERENCES:

- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR THE WASTE FEED RECEIPT PROCESS (FRP).

WASTE FEED  
FRP-PMP-00002A  
PTF-M6-FRP-00003004 C2

FEP-LSHH-0103A  
PTF-M6-FEP-00001001 E2

FEP-LSHH-0108A  
PTF-M6-FEP-00001002 E2

UFP-LSHH-0107  
PTF-M6-UFP-00001002 C2

UFP-LSHH-0207  
PTF-M6-UFP-00001005 C2

PWD-LSHH-0213  
PTF-M6-PWD-00002002 G4

HIGH POINT VENT  
PVP-BULGE-00020  
PVP-GV-33877-S102-01  
PTF-M6-PVP-000031 B2

WASTE FEED  
FEP-VSL-00017A  
PTF-M6-FEP-00001001 E8

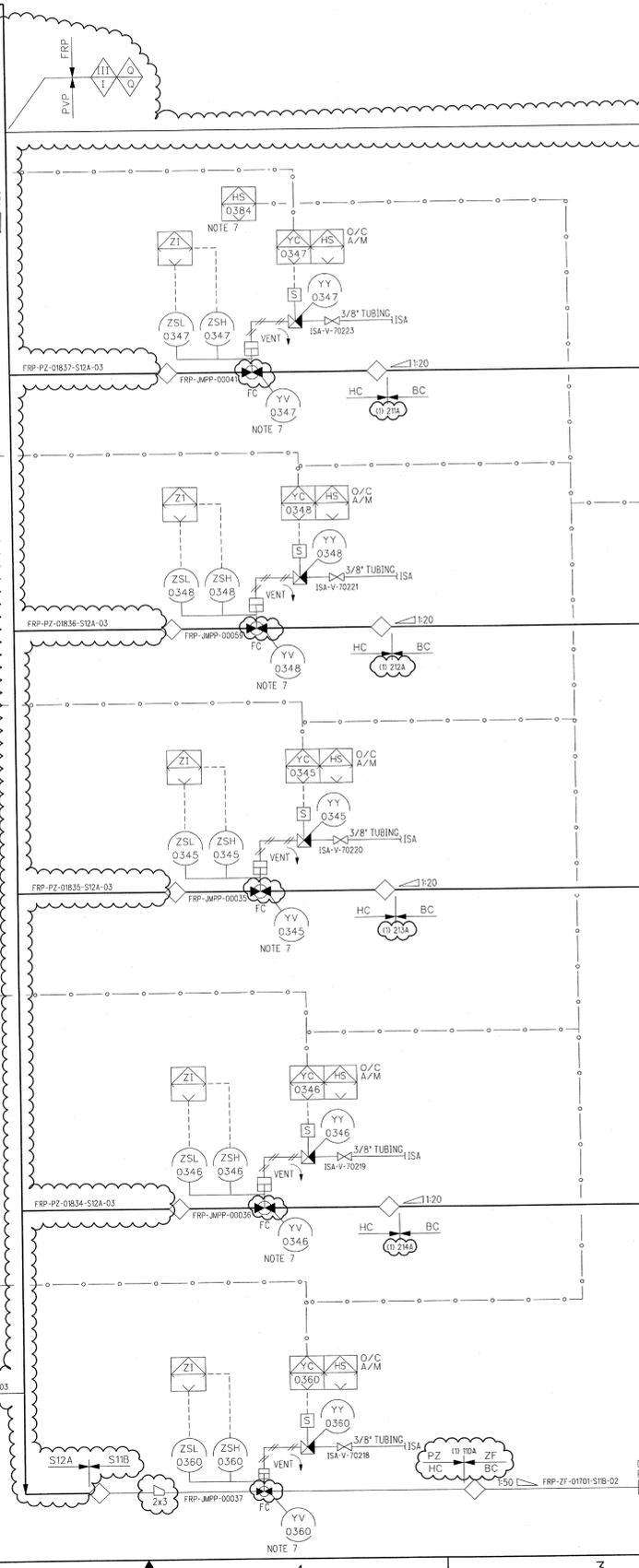
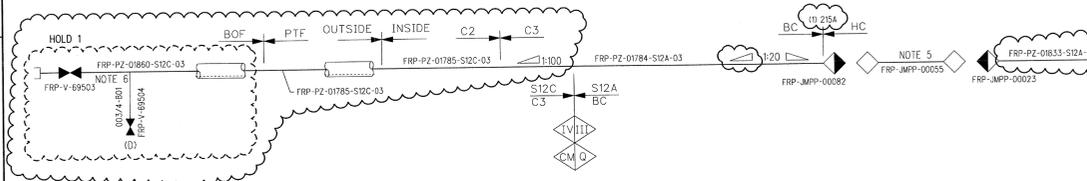
YC-0353  
PTF-M6-FRP-00003004 D8

WASTE FEED  
FEP-VSL-00017B  
PTF-M6-FEP-00001002 E8

WASTE FEED  
UFP-VSL-00001A  
PTF-M6-UFP-00001001 C8

WASTE FEED  
UFP-VSL-00001B  
PTF-M6-UFP-00001004 C8

DRAIN LINE  
PWD-VSL-00033  
PTF-M6-PWD-00005 D7



Please note the source, serial number, and approval status, as required by the Atomic Energy Act of 1954 and the regulations of the U.S. Department of Energy (DOE) which are incorporated by reference into this drawing. DOE issues the authority to operate, source, serial number, and barcodes on this drawing. The information is provided for process description purposes only.

ISSUED FOR CONSTRUCTION SEE NOTE 8		BL	TK	JK	WJ	6/9/11
REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0						

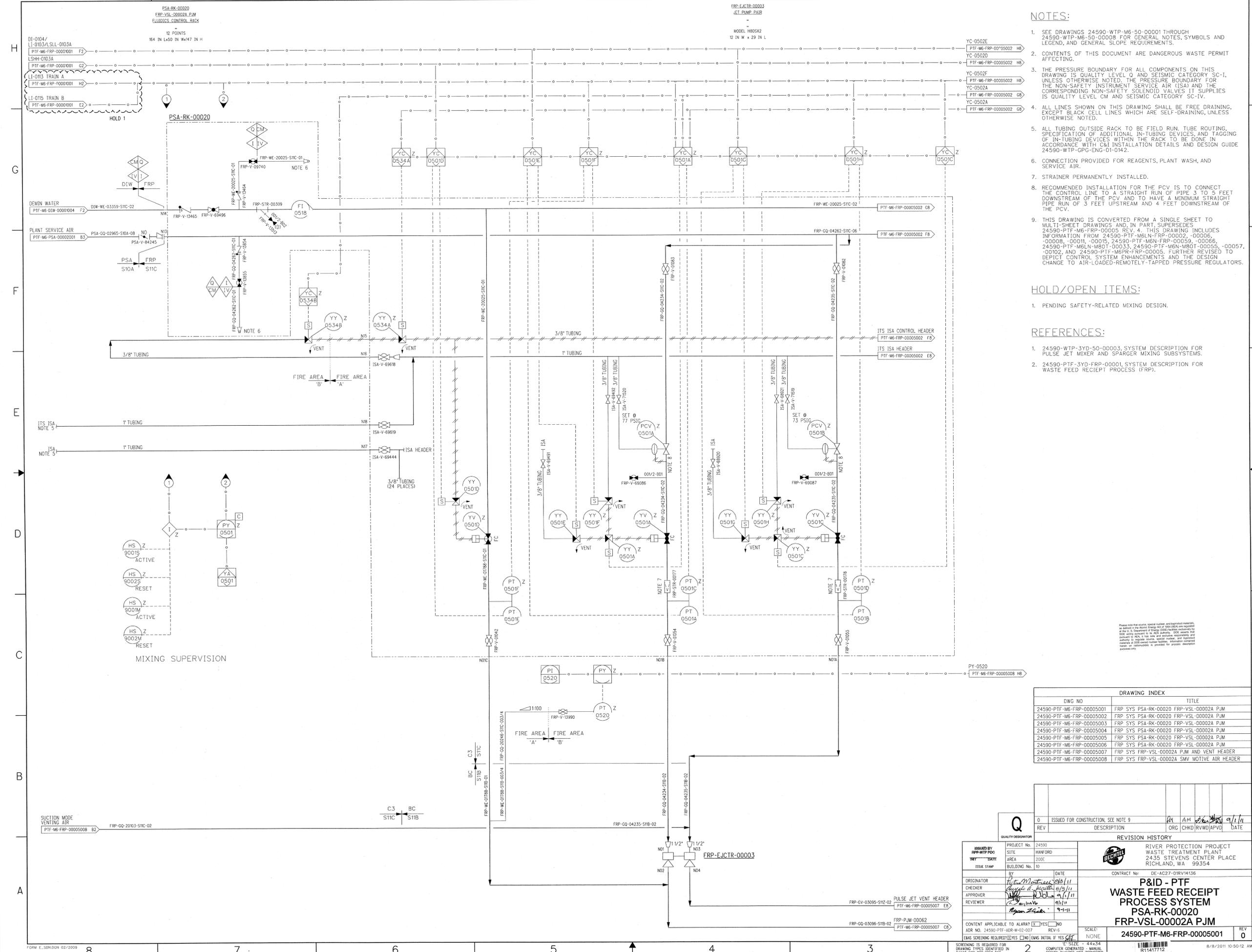
  

REVISION HISTORY	
ISSUED BY	PROJECT No. 24590
CHECKED BY	SITE HANFORD
APPROVED BY	AREA 200E
REVIEWER	BUILDING No. 10
	DATE
ORIGINATOR	6/8/11
CHECKER	6/8/11
APPROVER	6/9/11
REVIEWER	6/9/11
	6/9/11

RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2455 STEVENS CENTER PLACE RICHLAND, WA 99354	
CONTRACT No.	DE-AC27-01RV14136
<b>P&amp;ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM FRP-PMP-00001 AND FRP-PMP-00002A</b>	
<b>24590-PTF-M6-FRP-00003005</b>	
SCALE:	REV: 6
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED	REV: 0

24590-PTF-M6-FRP-00005001



NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- ALL TUBING OUTSIDE RACK TO BE FIELD RUN. TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPC-ENG-01-0142.
- CONNECTION PROVIDED FOR REAGENTS, PLANT WASH, AND SERVICE AIR.
- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00005 REV. 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6LN-FRP-00005, -00006, -00008, -00011, -00015, 24590-PTF-M6N-FRP-00005, -00006, 24590-PTF-M6LN-M801-00033, 24590-PTF-M6N-M801-00055, -00057, -00102, AND 24590-PTF-M6PR-FRP-00005. FURTHER REVISED TO DEFECT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

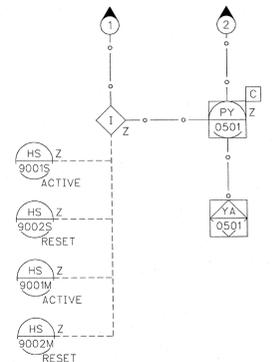
HOLD/OPEN ITEMS:

- PENDING SAFETY-RELATED MIXING DESIGN.

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

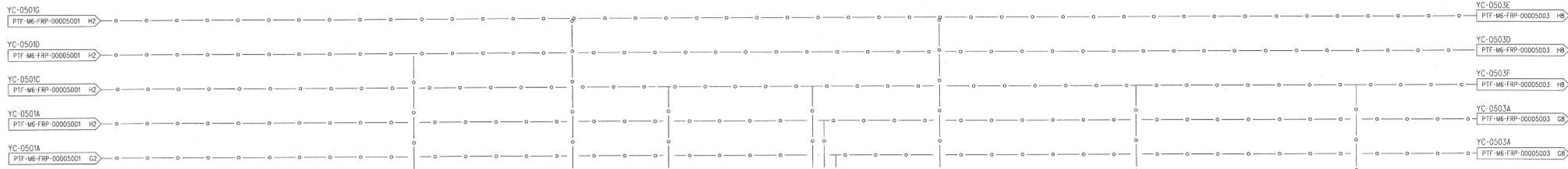
MIXING SUPERVISION



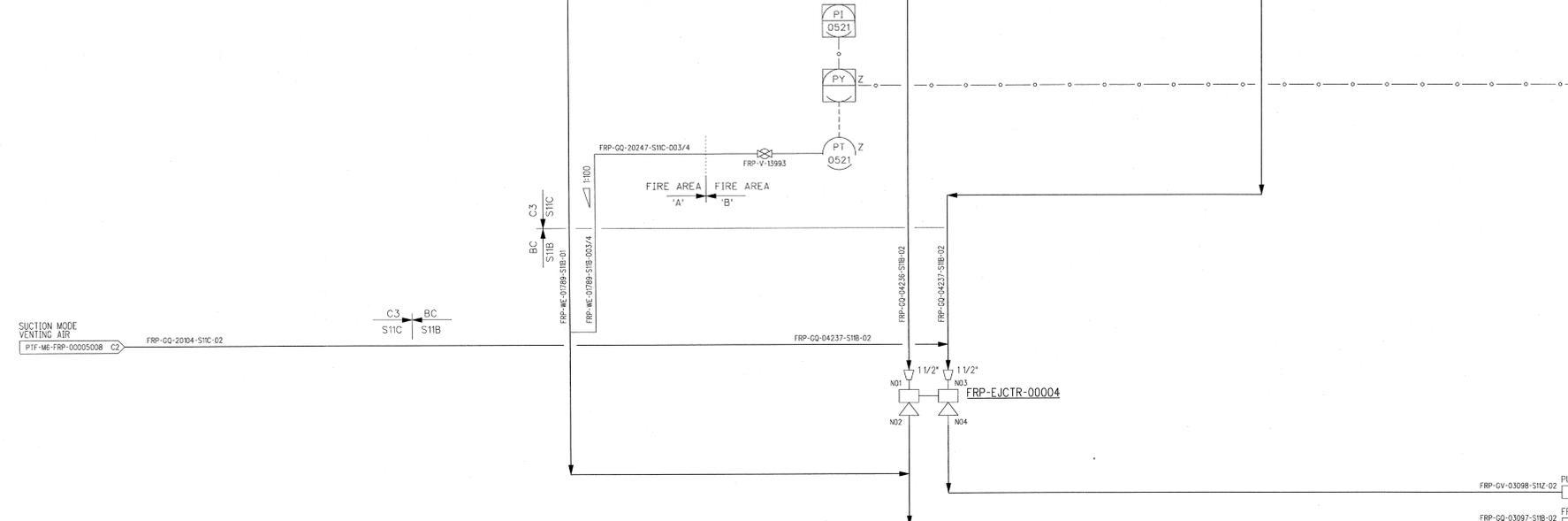
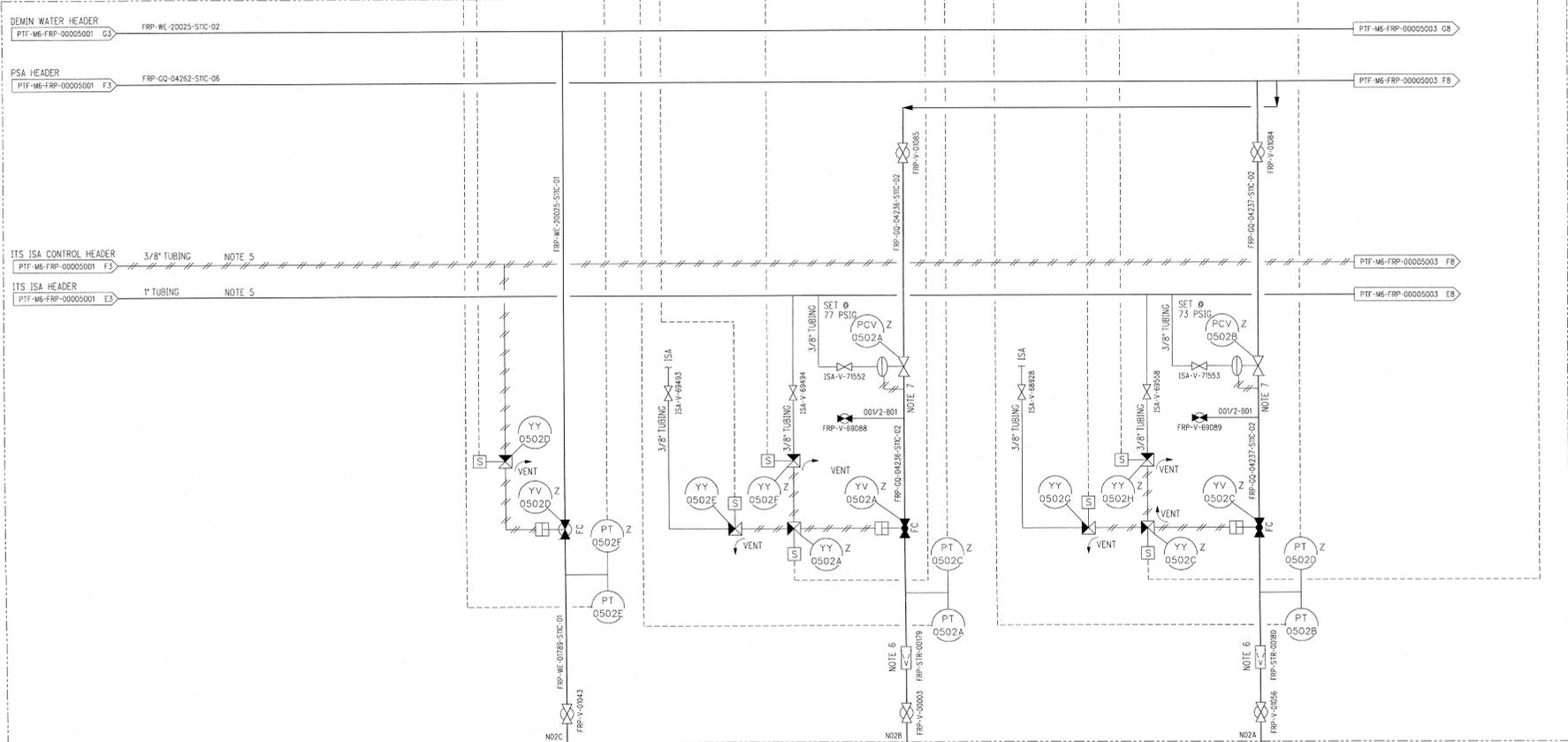
DWG NO	TITLE
24590-PTF-M6-FRP-00005001	FRP SYS PSA-RK-00020 FRP-VSL-00002A PJM
24590-PTF-M6-FRP-00005002	FRP SYS PSA-RK-00020 FRP-VSL-00002A PJM
24590-PTF-M6-FRP-00005003	FRP SYS PSA-RK-00020 FRP-VSL-00002A PJM
24590-PTF-M6-FRP-00005004	FRP SYS PSA-RK-00020 FRP-VSL-00002A PJM
24590-PTF-M6-FRP-00005005	FRP SYS PSA-RK-00020 FRP-VSL-00002A PJM
24590-PTF-M6-FRP-00005006	FRP SYS PSA-RK-00020 FRP-VSL-00002A PJM
24590-PTF-M6-FRP-00005007	FRP SYS FRP-VSL-00002A PJM AND VENT HEADER
24590-PTF-M6-FRP-00005008	FRP SYS FRP-VSL-00002A SMV MOTIVE AIR HEADER

<p><b>Q</b></p> <p>ISSUED FOR CONSTRUCTION, SEE NOTE 9</p> <p>REV DESCRIPTION ORG CHKD (R/W) (APPV) DATE</p>		<p>REVISION HISTORY</p> <p>PROJECT No. 24590</p> <p>SITE HANFORD</p> <p>AREA 200E</p> <p>BUILDING No. 80</p> <p>CONTRACT No. DE-AC27-07-ORW14136</p> <p>RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354</p>	
<p>ISSUED BY: FRP-WTP POC</p> <p>DATE: 9/1/11</p> <p>DATE: 9/1/11</p> <p>DATE: 9/1/11</p> <p>DATE: 9/1/11</p>		<p><b>P&amp;ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM PSA-RK-00020 FRP-VSL-00002A PJM</b></p> <p>SCALE: NONE</p> <p>24590-PTF-M6-FRP-00005001</p> <p>REV 0</p>	

FRP-FJCTR-00004  
JET PUMP PAIR  
MODEL H805X2  
12 IN W x 29 IN L



PSA-RK-00020



NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
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- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
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HOLD/OPEN ITEMS:

NONE

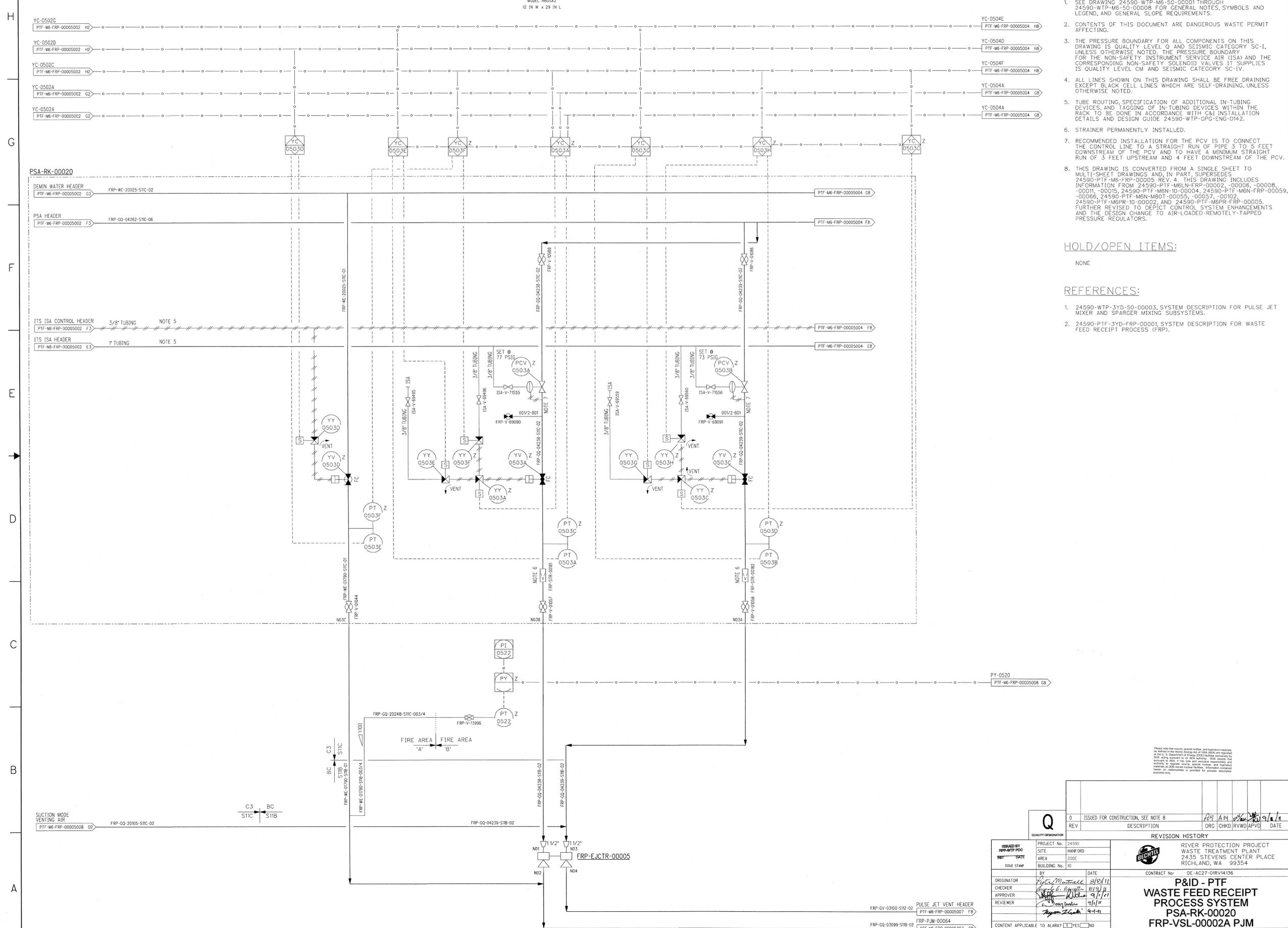
REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note that certain special notes and approvals are required as defined in the Safety Energy and Other (SEAO) section of the U.S. Department of Energy (DOE) Regulatory Guide 1.102, which is incorporated by reference into this drawing. DOE approval is required for all changes to this drawing. The authority to approve special notes and approvals remains at the discretion of the project manager. All changes to this drawing must be approved by the project manager.

QUALITY ORGANIZATION		REVISION HISTORY	
REV	DESCRIPTION	ORG	CHKD/RVWD/APVD
0	ISSUED FOR CONSTRUCTION, SEE NOTE 8	AM	9/11/11
ISSUED BY: PTF-M6-FRP-00005002		PROJECT No: 24590	
DATE: 9/11/11		SITE: HANFORD	
ISSUE STAMP: [Stamp]		AREA: 200E	
ORIGINATOR: [Signature]		BUILDING No: 10	
CHECKER: [Signature]		DATE: 9/11/11	
APPROVER: [Signature]		CONTRACT No: DE-AC27-01RV14136	
REVIEWER: [Signature]		RIVER PROTECTION PROJECT	
FRP-GV-03098-S11Z-02		2435 STEVENS CENTER PLACE	
FRP-GQ-03097-S11B-02		RICHLAND, WA 99354	
FRP-PJM-00063		P&ID - PTF	
PTF-M6-FRP-00005007		WASTE FEED RECEIPT	
		PROCESS SYSTEM	
		PSA-RK-00020	
		FRP-VSL-00002A PJM	
CONTENT APPLICABLE TO ALARA? [ ] YES [ ] NO		SCALE: NONE	
DRAWING NO: 24590-PTF-M6-FRP-00005002		24590-PTF-M6-FRP-00005002	
REVISION: 5		REV: 0	
SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPG-SPEC-002		COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED	

FRP-EJCTR-00005  
JET PUMP PAIR  
MODEL H805X2  
12 IN W x 29 IN L



NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
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- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
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HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note that safety, general notes, and operation manuals, as defined in the AutoCAD Properties of this ISA are retained as part of the AutoCAD Properties of this ISA and are retained by DOE with respect to its ISA safety. DOE assets are provided to AEC, in the form and manner requested, and shall be the property of the recipient. All trademarks and other marks are trademarks or registered trademarks of their respective owners. All other marks are trademarks or registered trademarks of their respective owners. All other marks are trademarks or registered trademarks of their respective owners.

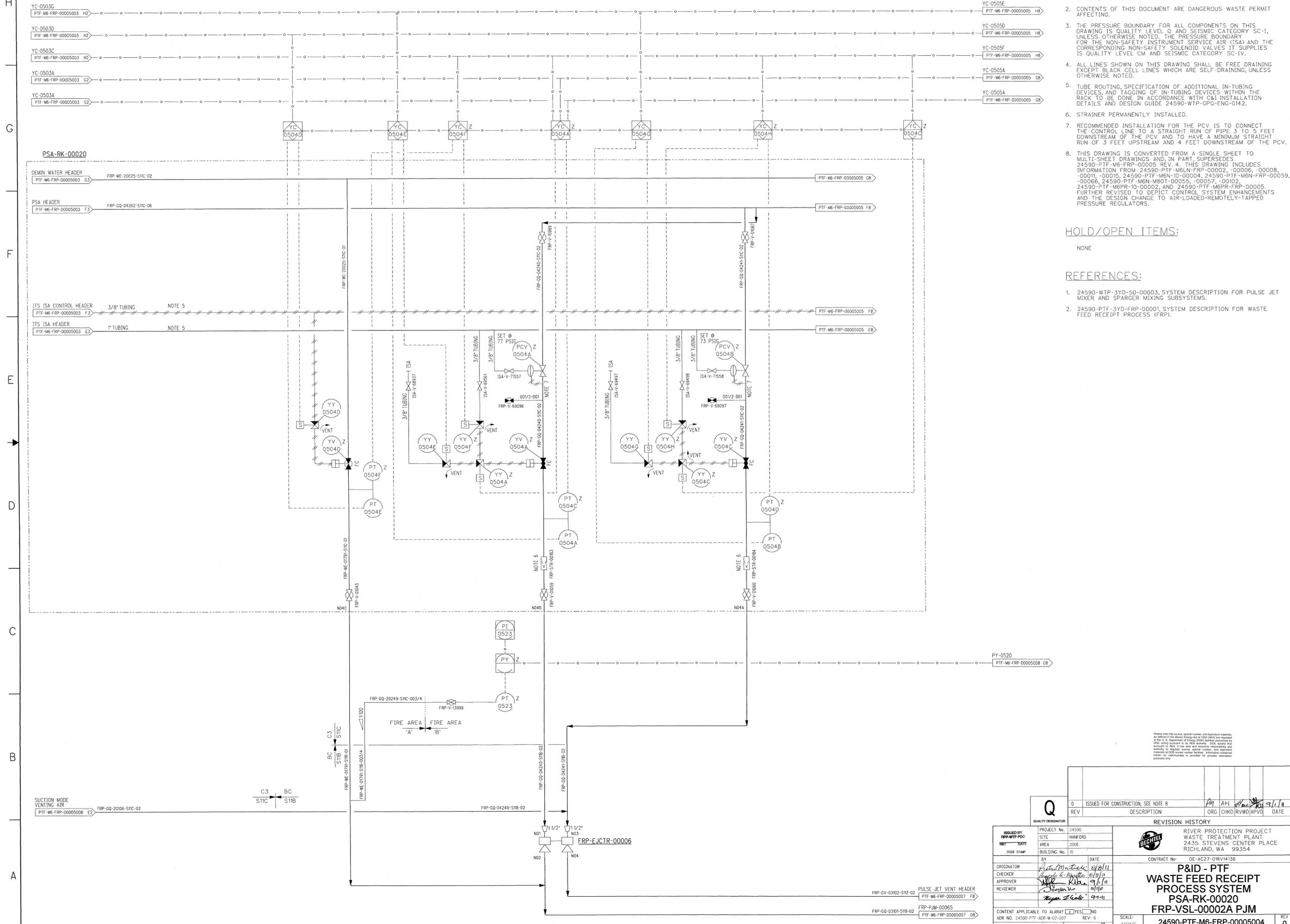
ISSUED FOR CONSTRUCTION, SEE NOTE 8		1/24 AM 9/11/11
REV	DESCRIPTION	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 8	1/24 AM 9/11/11

REVISION HISTORY			
REV	DESCRIPTION	CHKD	RWD/APVD
0	ISSUED FOR CONSTRUCTION, SEE NOTE 8		

ISSUED BY	PROJECT No.	24590
DATE	SITE	HANFORD
ISSUE STAMP	AREA	200E
	BUILDING No.	10
ORIGINATOR	BY	DATE
CHECKER		
APPROVER		
REVIEWER		

CONTRACT No.	DE-AC27-01RV14136
RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354	
P&ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM PSA-RK-00020 FRP-VSL-00002A PJM	
CONTENT APPLICABLE TO ALABAMA	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
ADR NO. 24590-PTF-ADR-M-02-007	REV. 5
SCALE:	NONE
EMG SCREENING REQUIRED/YES/NO	EMG INITIAL, IF YES/AT
SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-SPR-SPEC-002	COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

FRP-EJCTR-00006  
JET PUMP PAIR  
MODEL H80SX2  
12 IN W x 29 IN L



NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I. UNLESS OTHERWISE NOTED, THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
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- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
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HOLD/OPEN ITEMS:

NONE

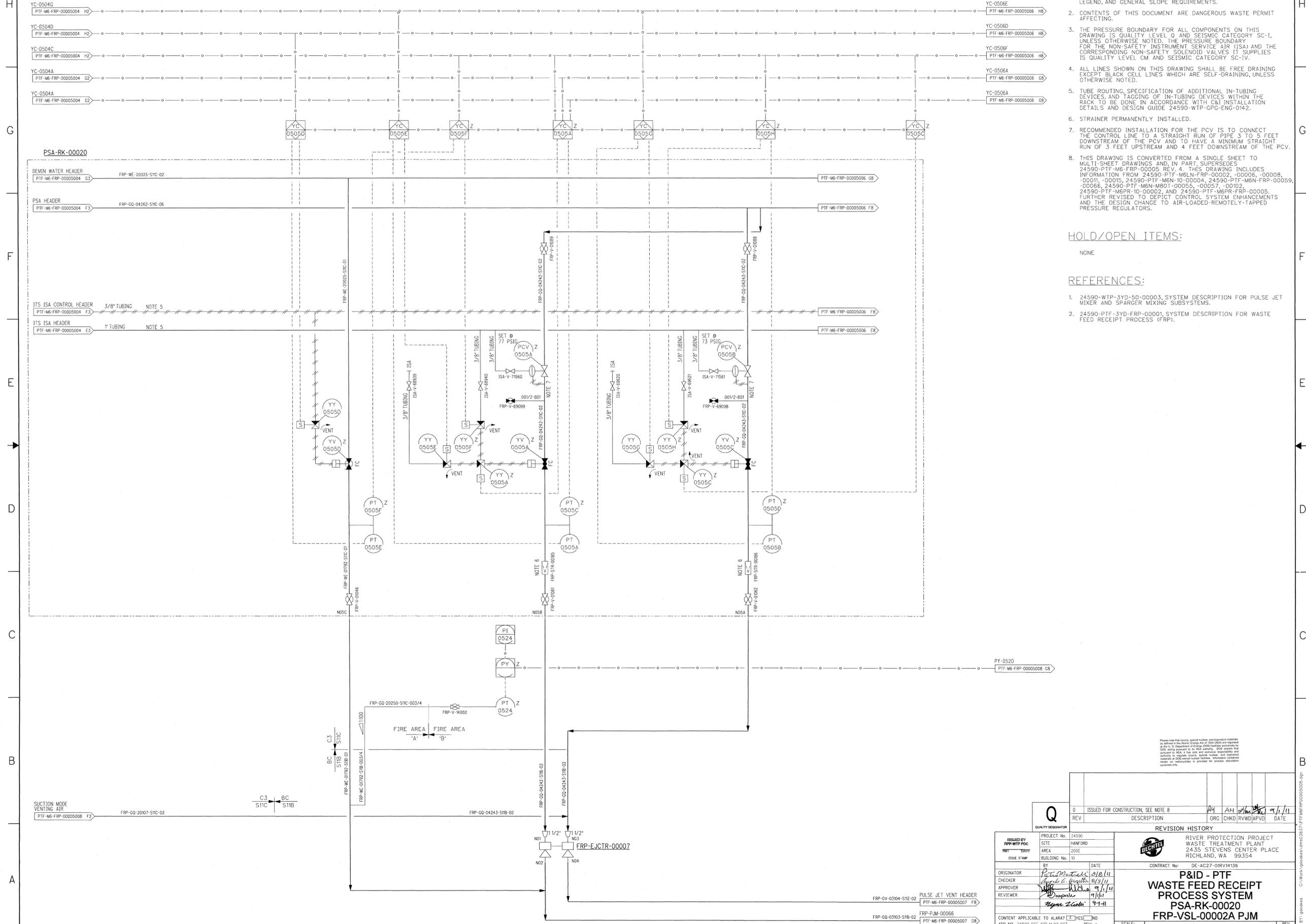
REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note that source, serial number, and approval signatures, as indicated by the above change key (SC) shall not be replaced by the U.S. Department of Energy (DOE) without approval by DOE using authority to be ADR activity. DOE retains the authority to require source, serial number, and approval signatures of DOE-owned nuclear facilities. Information contained on this document is provided for process description purposes only.

<p><b>Q</b></p> <p>ISSUED FOR CONSTRUCTION, SEE NOTE B</p>		<p>9/1/19</p>
<p>REV</p>	<p>DESCRIPTION</p>	<p>ORG</p>
<p>REVISION HISTORY</p>		
<p>ORIGINATOR</p>	<p>CHECKER</p>	<p>APPROVER</p>
<p>REVIEWER</p>	<p>DATE</p>	<p>DATE</p>
<p>CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>ADR NO. 24590-PTF-ADR-M-02-007 REV: 6</p> <p>SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SPEC-002</p>		
<p>PROJECT No.</p>	<p>SITE</p>	<p>AREA</p>
<p>BUILDING No. 10</p>	<p>ISSUE</p>	<p>CONTRACT No.</p>
<p>DE-AC27-01RV14136</p>		
<p><b>P&amp;ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM</b></p>		
<p><b>PSA-RK-00020</b></p>		
<p><b>FRP-VSL-00002A PJM</b></p>		
<p>SCALE:</p>	<p>REV:</p>	<p>DATE</p>
<p>NONE</p>	<p>0</p>	<p>9/1/19</p>
<p>24590-PTF-M6-FRP-00005004</p>		

FRP-EJCTR-00007  
JET PUMP PAIR  
MODEL H80SX2  
12 IN W x 29 IN L



NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
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- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
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HOLD/OPEN ITEMS:

NONE

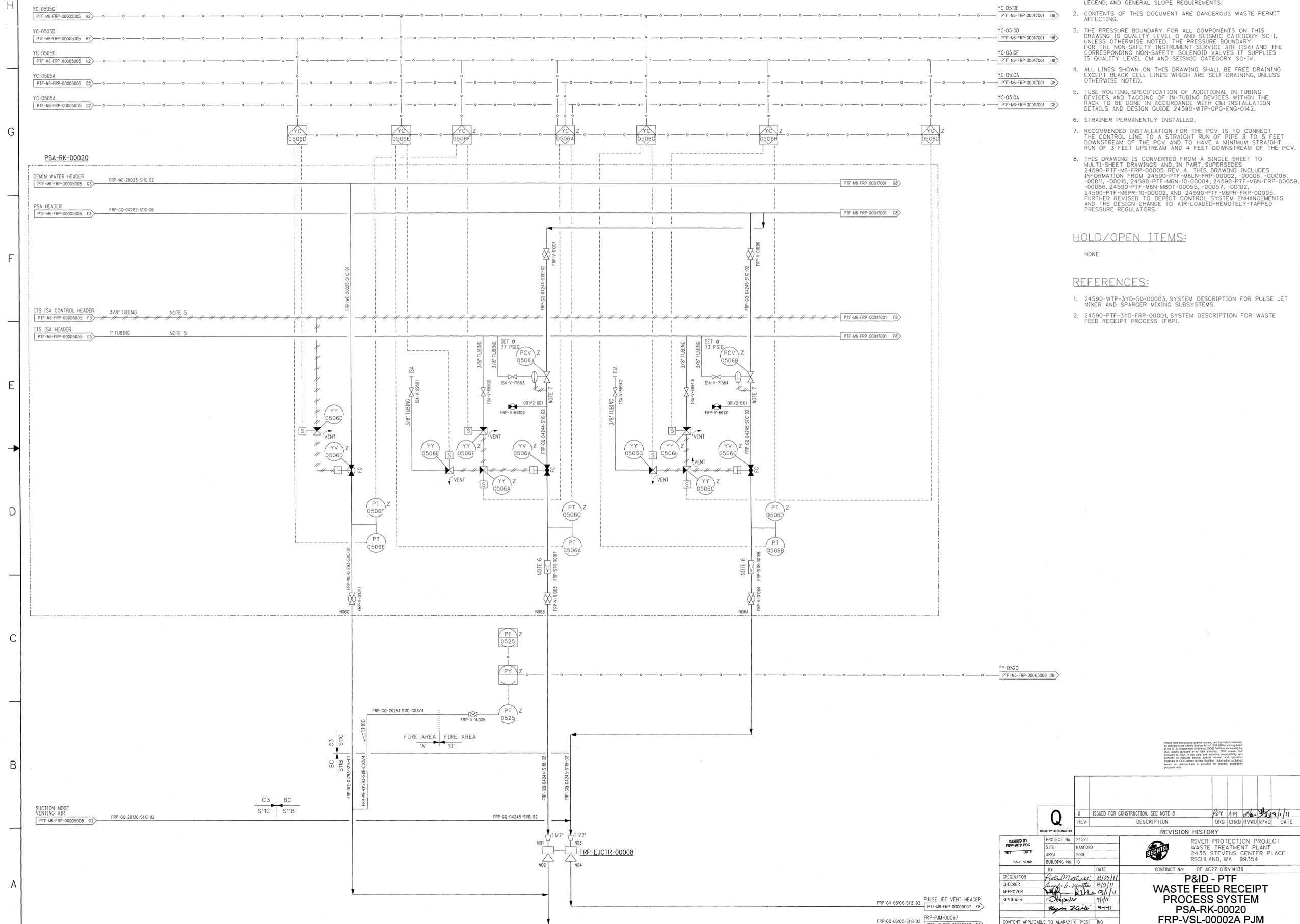
REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note that source, special order, and logbook materials are indicated by the source, special order, and logbook materials in this drawing. It is the responsibility of the user to ensure that all materials are properly identified and that all materials are properly identified and that all materials are properly identified.

<p>Q</p> <p>ISSUED FOR CONSTRUCTION, SEE NOTE 8</p> <p>REV: 0</p>		<p>AM</p> <p>9/1/11</p>														
<p>REVISION HISTORY</p> <table border="1"> <thead> <tr> <th>REV</th> <th>DESCRIPTION</th> <th>ORG</th> <th>CHKD</th> <th>RWD</th> <th>APVD</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>ISSUED FOR CONSTRUCTION, SEE NOTE 8</td> <td>AM</td> <td></td> <td></td> <td></td> <td>9/1/11</td> </tr> </tbody> </table>			REV	DESCRIPTION	ORG	CHKD	RWD	APVD	DATE	0	ISSUED FOR CONSTRUCTION, SEE NOTE 8	AM				9/1/11
REV	DESCRIPTION	ORG	CHKD	RWD	APVD	DATE										
0	ISSUED FOR CONSTRUCTION, SEE NOTE 8	AM				9/1/11										
<p>PROJECT No: 24590</p> <p>SITE: HANFORD</p> <p>AREA: 200E</p> <p>BUILDING No: 30</p>		<p>CONTRACT No: DE-AC27-08RV1136</p>														
<p>RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354</p>																
<p>P&amp;ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM PSA-RK-00020 FRP-VSL-00002A PJM</p>																
<p>24590-PTF-M6-FRP-00005005</p>		<p>REV: 0</p>														

FRP-EJCTR-00008  
JET PUMP PAIR  
MODEL H80SK2  
12 IN W x 29 IN L



NOTES:

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- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00005 REV. 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-FRP-00002, -00006, -00008, -00011, -00015, 24590-PTF-M6N-10-00004, 24590-PTF-M6N-FRP-00059, -00066, 24590-PTF-M6N-M80T-00065, -00067, -00102, 24590-PTF-M6PR-10-00002, AND 24590-PTF-M6PR-FRP-00005. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please contact vendor upon receipt and inspection of materials as defined in the Material Control Act of 1968 (MCA) and required by the U.S. Department of Energy (DOE) before using the DOE safety program to the MCA activity. DOE safety program is required to MCA. It has not been determined whether the materials are DOE-owned nuclear facilities. Information contained herein or incorporated in provided by vendor, contractor personnel only.

<b>Q</b> QUALITY CONTROL ISSUED FOR CONSTRUCTION, SEE NOTE 8 01/21/11	REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
<b>REVISION HISTORY</b> PROJECT No: 24590 SITE: HANFORD AREA: 200E BUILDING No: 10 CONTRACT No: DE-AC27-01RV14136 RIVER PROTECTION PROJECT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354 <b>P&amp;ID - PTF          WASTE FEED RECEIPT          PROCESS SYSTEM          PSA-RK-00020          FRP-VSL-00002A PJM</b> 24590-PTF-M6-FRP-00005006 SCALE: NONE REV: 0							
ORIGINATOR: Peter M... 8/18/11 CHECKER: Andy L... 8/18/11 APPROVER: [Signature] 9/1/11 REVIEWER: [Signature] 9/1/11 DATE: 9-1-11	CONTENT APPLICABLE TO ALARA? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO ADR. NO. 24590-PTF-M6-FRP-00005006 REV. 6 SMS SCREENING REQUIRED? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> SMS INITIAL IF YES <input type="checkbox"/> YES <input type="checkbox"/> NO SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPG-SPEC-002 COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED R11417717 8/7/2011 10:50:04 AM						

FRP-PJM-00062 PULSE JET MIXER	FRP-PJM-00063 PULSE JET MIXER	FRP-PJM-00064 PULSE JET MIXER	FRP-PJM-00065 PULSE JET MIXER	FRP-PJM-00066 PULSE JET MIXER	FRP-PJM-00067 PULSE JET MIXER
1614 GAL					
54 IN (D) X 195 IN (D/L)					

NOTES:

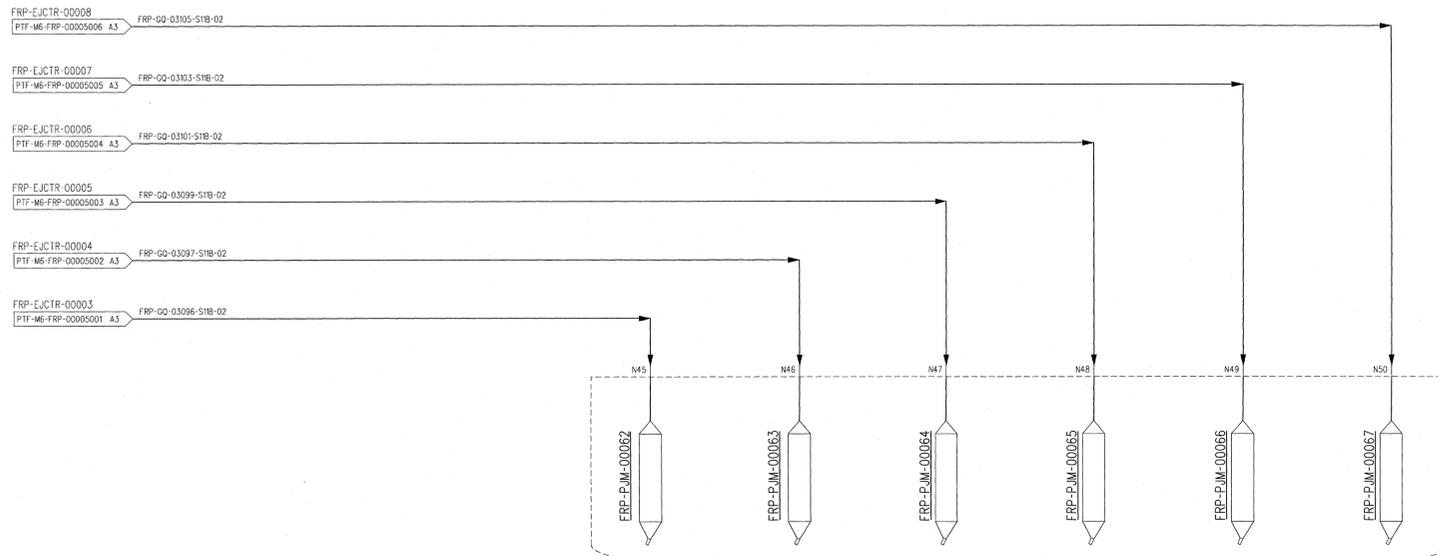
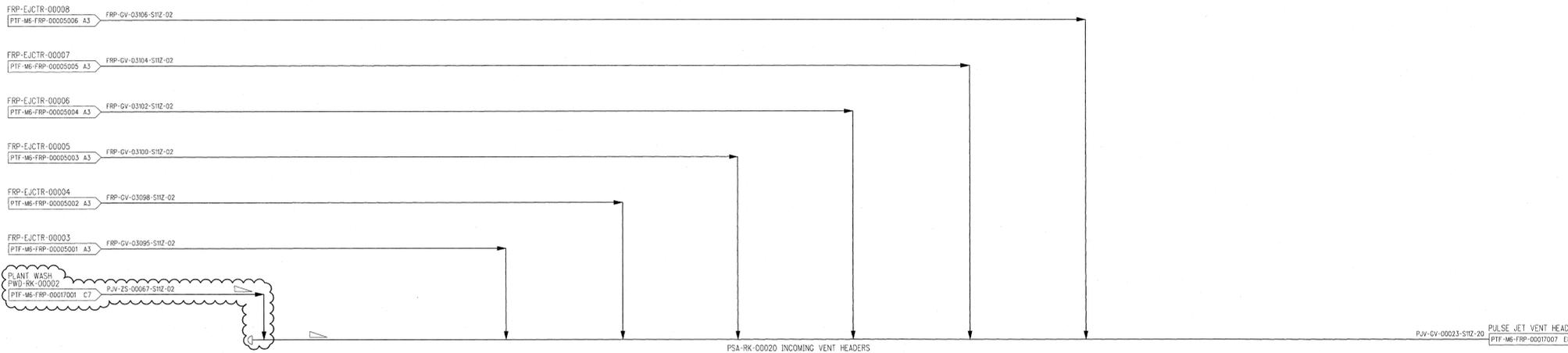
- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-1, UNLESS OTHERWISE NOTED.
- ALL LINES SHOWN ON THIS DRAWING ARE BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- REFER TO DRAWING 24590-PTF-M6-FRP-00001001 FOR PROCESS VESSEL.
- THE BALANCE OF THE PJM FOR FRP-VSL-00002A CONTINUE ON 24590-PTF-M6-FRP-00017007.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00005 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-10-00004, 24590-PTF-M6N-M6OT-00055 AND 24590-PTF-M6PR-10-00002. RECONCILED CONFLICTING SLOPE CALLOUTS.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).



FRP-VSL-00002A  
6 OF 12 PJM PSA-RK-00020  
NOTES 5, 6

Please note that owner, field notes and approval records, as defined in the Atomic Energy Act of 1954 (AEA) are required at the U.S. Department of Energy (DOE) facilities and must be made available to the AEA. DOE requests that contractors to AEA, if not sure and require responsibility and liability to require specific, unique number, and formatted materials at DOE server number facilities. Information contained herein is disseminated as provided by process description purposes only.

<b>Q</b> QUALITY DESIGNATOR		PROJECT No: 24590 SITE: HANFORD AREA: 200E BUILDING No: 10	RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354
ISSUED FOR CONSTRUCTION, SEE NOTE 7 0 REV	AM 9/6/11	DE-AC27-01RV14136 CONTRACT No:	RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354
ORIGINATOR: <i>[Signature]</i> CHECKER: <i>[Signature]</i> APPROVER: <i>[Signature]</i> REVIEWER: <i>[Signature]</i>	DATE: 7/20/11 7/20/11 9/1/11 9-1-11	RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354	RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354
CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO ADR NO. 24590-PTF-ADR-M-02-007 REV: 6 EMS SCREENING REQUIRED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> EMS INITIAL IF YES <input type="checkbox"/>	SCALE: NONE 24590-PTF-M6-FRP-00005007 REV 0	RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354	RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354





ERP-EJCTR-00024  
JET PUMP PAIR  
MODEL 1805X2  
12 IN W X 29 IN L

NOTES:

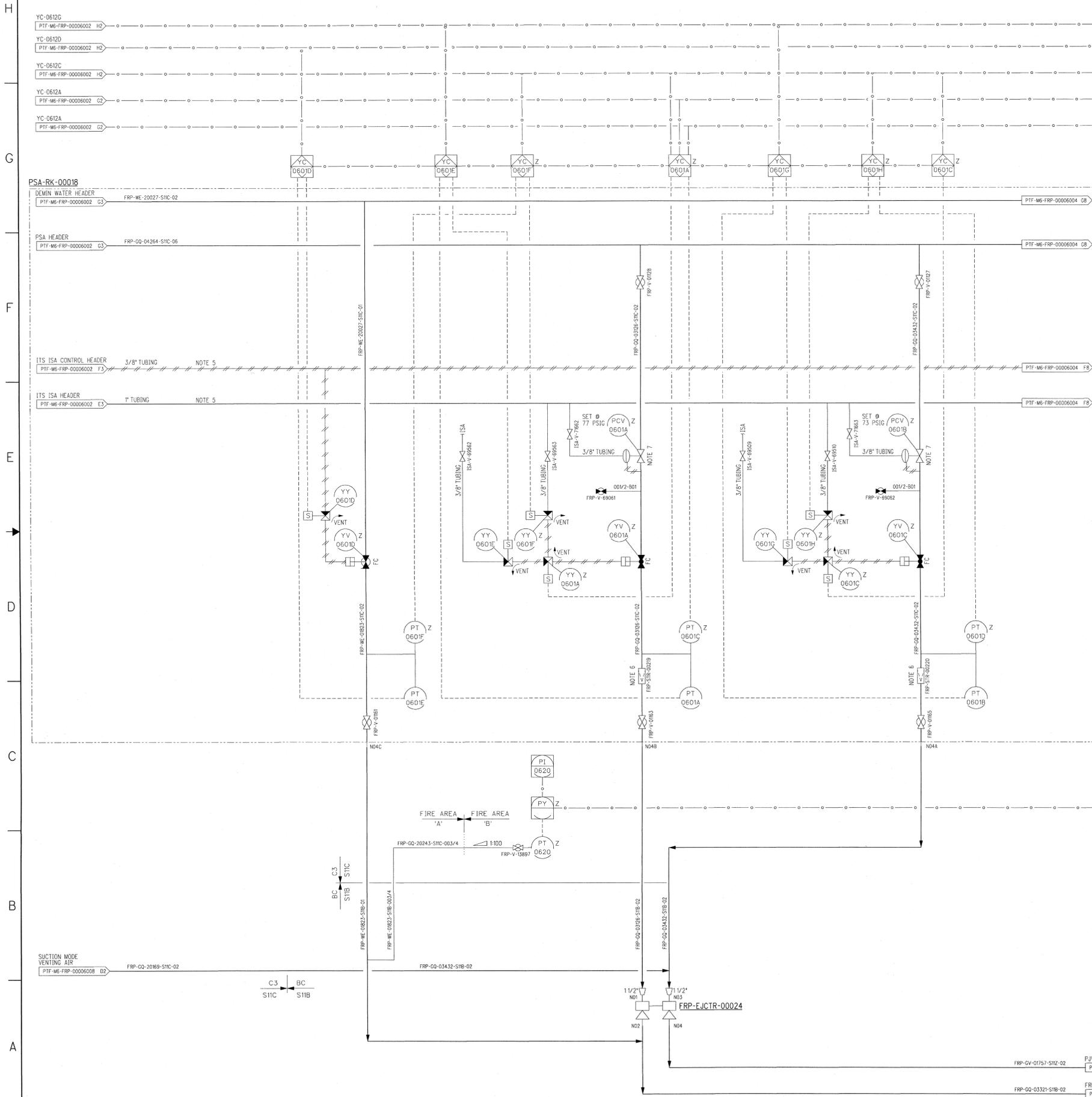
- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (NISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH CSI INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00006 REV. 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6LN-FRP-00002, -00004, -00011, -00015, 24590-PTF-M6LN-M801-00033, 24590-PTF-M6LN-FRP-00051, -00065, -00085, AND 24590-PTF-M6LN-M801-00057, -00102, AND 24590-PTF-M6PR-FRP-00005. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED, REMOTELY-TAPPED PRESSURE REGULATORS.

HOLD/OPEN ITEMS:

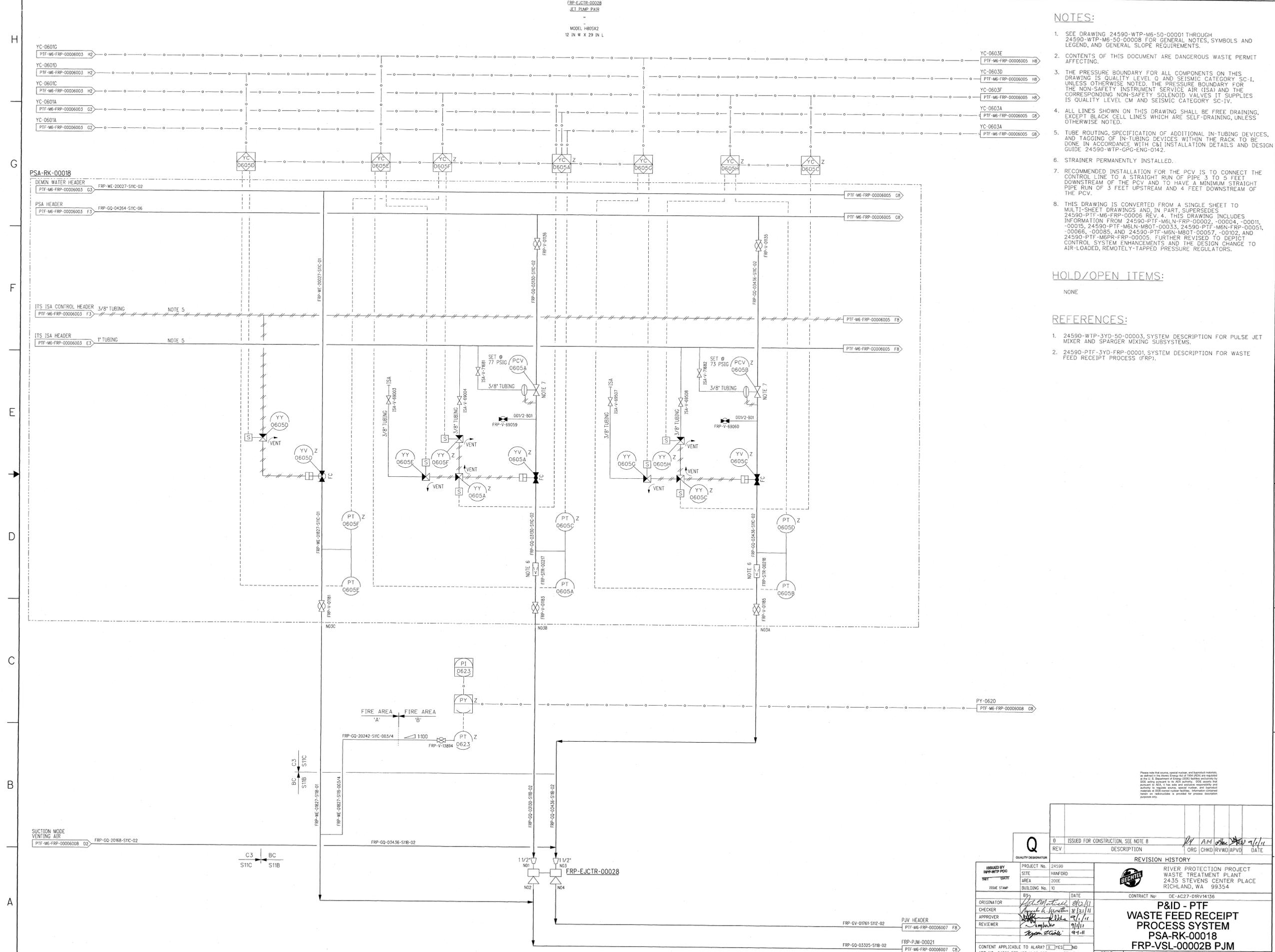
NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).



ISSUED BY: RPP-WTP-PDC		PROJECT No: 24590	DE-AC27-01RV14136
DATE: 8/11/11		SITE: HANFORD	RIVER PROTECTION PROJECT
ISSUE STAMP:		AREA: 200E	WASTE TREATMENT PLANT
BUILDING No: 0		24590-PTF-M6-FRP-00006003	2435 STEVENS CENTER PLACE
ORIGINATOR: RPP-WTP-PDC		DATE: 8/11/11	RICHLAND, WA 99354
CHECKER: RPP-WTP-PDC		DATE: 8/11/11	CONTRACT No: DE-AC27-01RV14136
APPROVER: RPP-WTP-PDC		DATE: 8/11/11	<b>P&amp;ID - PTF</b>
REVIEWER: RPP-WTP-PDC		DATE: 8/11/11	<b>WASTE FEED RECEIPT</b>
		DATE: 8/11/11	<b>PROCESS SYSTEM</b>
		DATE: 8/11/11	<b>PSA-RK-00018</b>
		DATE: 8/11/11	<b>FRP-VSL-00002B PJM</b>
CONTENT APPLICABLE TO ALABAMA? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		SCALE: NONE	24590-PTF-M6-FRP-00006003
ADR NO. 24590-PTF-ADR-M-02-007 REV: 6		SCALE: NONE	REV: 0
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EMTS INITIAL IF YES: SAH		SCALE: NONE	8/11/2011 2:46:50 PM



NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL 0 AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL 0M AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
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HOLD/OPEN ITEMS:

NONE

REFERENCES:

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- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

These notes that name, specify material and technical materials as defined in the Atomic Energy Act of 1954 (AEA) are required by the U.S. Department of Energy (DOE) and are not to be used in any other project. The user is responsible for ensuring that the information is accurate and complete. The user is also responsible for ensuring that the information is not used in any other project. The user is also responsible for ensuring that the information is not used in any other project.

ISSUED FOR CONSTRUCTION, SEE NOTE 8		REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE																							
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ISSUED BY		PROJECT No.	RIVER PROTECTION PROJECT																												
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ISSUE STAMP	BUILDING No. 10		RICHLAND, WA 99354																												
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<table border="1"> <tr> <th>CONTENT APPLICABLE TO ALARA</th> <th>YES</th> <th>NO</th> </tr> <tr> <td>PTF-M6-FRP-00006007</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>		CONTENT APPLICABLE TO ALARA	YES	NO	PTF-M6-FRP-00006007	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<table border="1"> <tr> <th>SCALE</th> <th>SCALE</th> </tr> <tr> <td>PTF-M6-FRP-00006007</td> <td>NONE</td> </tr> </table>		SCALE	SCALE	PTF-M6-FRP-00006007	NONE	<table border="1"> <tr> <th>REVISION HISTORY</th> <th>DATE</th> </tr> <tr> <td>PTF-M6-FRP-00006007</td> <td>8/12/11</td> </tr> </table>		REVISION HISTORY	DATE	PTF-M6-FRP-00006007	8/12/11	<table border="1"> <tr> <th>SCALE</th> <th>SCALE</th> </tr> <tr> <td>PTF-M6-FRP-00006007</td> <td>NONE</td> </tr> </table>		SCALE	SCALE	PTF-M6-FRP-00006007	NONE	<table border="1"> <tr> <th>REVISION HISTORY</th> <th>DATE</th> </tr> <tr> <td>PTF-M6-FRP-00006007</td> <td>8/12/11</td> </tr> </table>		REVISION HISTORY	DATE	PTF-M6-FRP-00006007	8/12/11
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PTF-M6-FRP-00006007	8/12/11																														
<table border="1"> <tr> <th>SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPG-REC-002</th> <th>YES</th> <th>NO</th> </tr> <tr> <td>PTF-M6-FRP-00006007</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>		SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPG-REC-002	YES	NO	PTF-M6-FRP-00006007	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<table border="1"> <tr> <th>SCALE</th> <th>SCALE</th> </tr> <tr> <td>PTF-M6-FRP-00006007</td> <td>NONE</td> </tr> </table>		SCALE	SCALE	PTF-M6-FRP-00006007	NONE	<table border="1"> <tr> <th>PROJECT No.</th> <th>24590</th> </tr> <tr> <th>SITE</th> <th>MANFORD</th> </tr> <tr> <th>AREA</th> <th>2006</th> </tr> <tr> <th>BUILDING No.</th> <th>10</th> </tr> </table>					PROJECT No.	24590	SITE	MANFORD	AREA	2006	BUILDING No.	10					
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PTF-M6-FRP-00006007	<input checked="" type="checkbox"/>	<input type="checkbox"/>																													
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PTF-M6-FRP-00006007	8/12/11																														
<table border="1"> <tr> <th>SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPG-REC-002</th> <th>YES</th> <th>NO</th> </tr> <tr> <td>PTF-M6-FRP-00006007</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>		SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPG-REC-002	YES	NO	PTF-M6-FRP-00006007	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<table border="1"> <tr> <th>SCALE</th> <th>SCALE</th> </tr> <tr> <td>PTF-M6-FRP-00006007</td> <td>NONE</td> </tr> </table>		SCALE	SCALE	PTF-M6-FRP-00006007	NONE	<table border="1"> <tr> <th>REVISION HISTORY</th> <th>DATE</th> </tr> <tr> <td>PTF-M6-FRP-00006007</td> <td>8/12/11</td> </tr> </table>					REVISION HISTORY	DATE	PTF-M6-FRP-00006007	8/12/11									
SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPG-REC-002	YES	NO																													
PTF-M6-FRP-00006007	<input checked="" type="checkbox"/>	<input type="checkbox"/>																													
SCALE	SCALE																														
PTF-M6-FRP-00006007	NONE																														
REVISION HISTORY	DATE																														
PTF-M6-FRP-00006007	8/12/11																														

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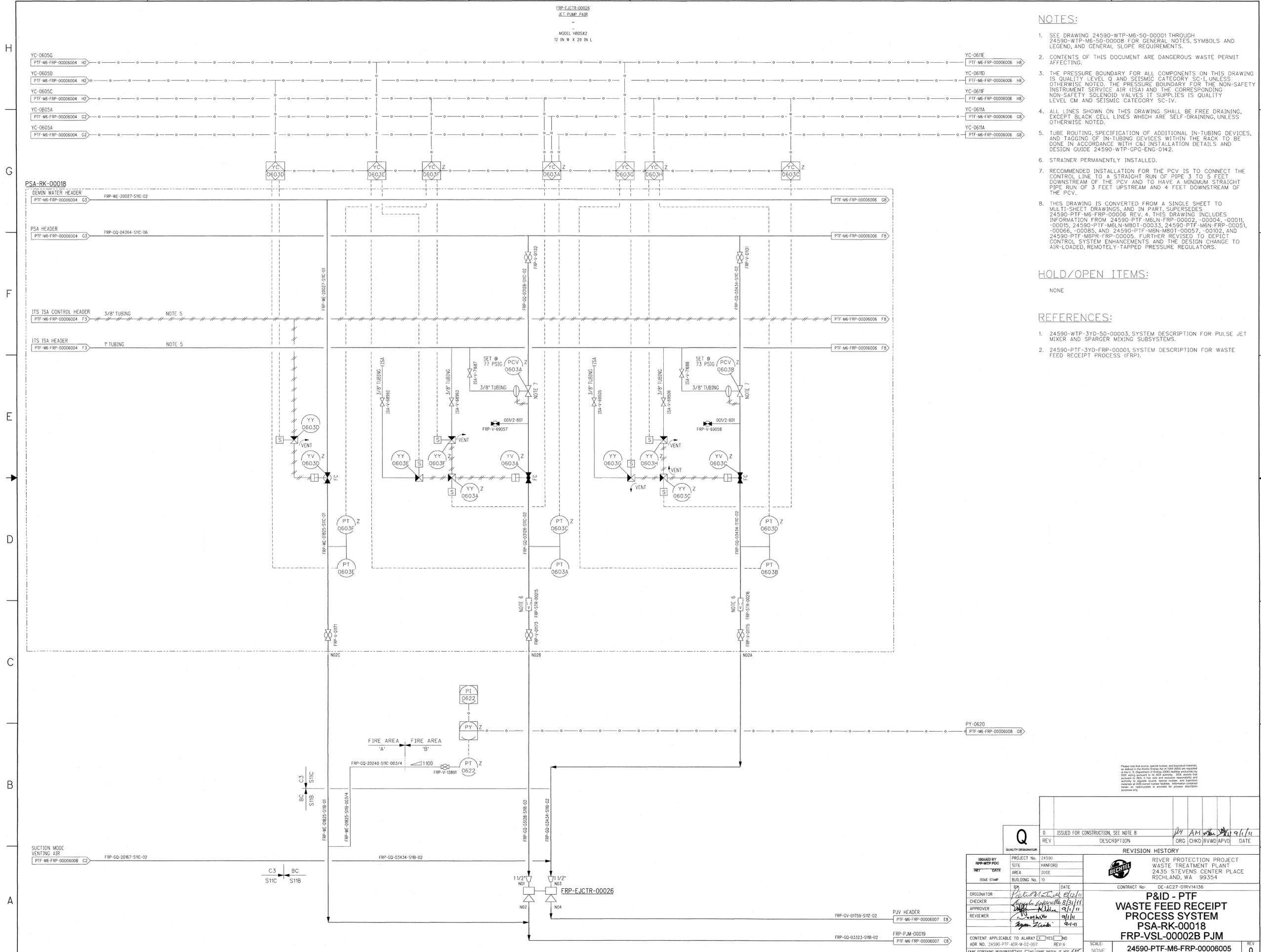
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NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-1, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS, AND IN PART, SUPERSEDES 24590-PTF-M6-FRP-00006 REV. 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6-FRP-00002, -00004, -00011, -00015, 24590-PTF-M6-FRP-00033, 24590-PTF-M6-FRP-00051, -00066, -00085, AND 24590-PTF-M6-FRP-00057, -00102, AND 24590-PTF-M6-FRP-00005. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED, REMOTELY-TAPPED PRESSURE REGULATORS.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note the source, model number and approval status of all equipment used in this drawing. The manufacturer's name and model number shall be indicated on all equipment. The manufacturer's name and model number shall be indicated on all equipment. The manufacturer's name and model number shall be indicated on all equipment.

<b>Q</b> QUALITY DESIGNATION		0 ISSUED FOR CONSTRUCTION, SEE NOTE 8 1 REVISED	ORG: JH CHKD: AM RVD: JH APVD: JH DATE: 9/11/11
REVISION HISTORY			
ISSUED BY: FRP-WTP-PDC INTY: DATE: 9/11/11 ISSUE STAMP:	PROJECT No: 24590 SITE: HANFORD AREA: 200E BUILDING No: 10	CONTRACT No: DE-AC27-01RV14136 RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354	
ORIGINATOR: [Signature] CHECKER: [Signature] APPROVER: [Signature] REVIEWER: [Signature]	DATE: 9/11/11 DATE: 9/11/11 DATE: 9/11/11 DATE: 9/11/11	<b>P&amp;ID - PTF          WASTE FEED RECEIPT          PROCESS SYSTEM          PSA-RK-00018          FRP-VSL-00002B PJM</b>	
CONTENT APPLICABLE TO ALABAMA: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO ADR NO. 24590-PTF-ADR-M-02-007 REV: 6 FMS SCREENING REQUIRED: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> N/A E-MAIL INITIAL IF YES: SA	SCALE: NONE 24590-PTF-M6-FRP-00006005	REV: 0	REV: 0



FRP-PJM-00027 PULSE_JET_MIXER 1514 GAL 54 IN (D) X 195 IN (L)	FRP-PJM-00019 PULSE_JET_MIXER 1514 GAL 54 IN (D) X 195 IN (L)	FRP-PJM-00021 PULSE_JET_MIXER 1514 GAL 54 IN (D) X 195 IN (L)	FRP-PJM-00017 PULSE_JET_MIXER 1514 GAL 54 IN (D) X 195 IN (L)	FRP-PJM-00028 PULSE_JET_MIXER 1514 GAL 54 IN (D) X 195 IN (L)	FRP-PJM-00018 PULSE_JET_MIXER 1514 GAL 54 IN (D) X 195 IN (L)
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NOTES:

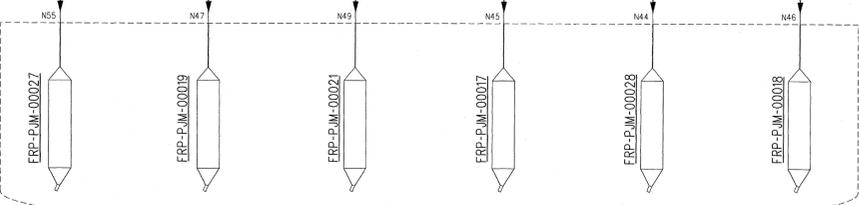
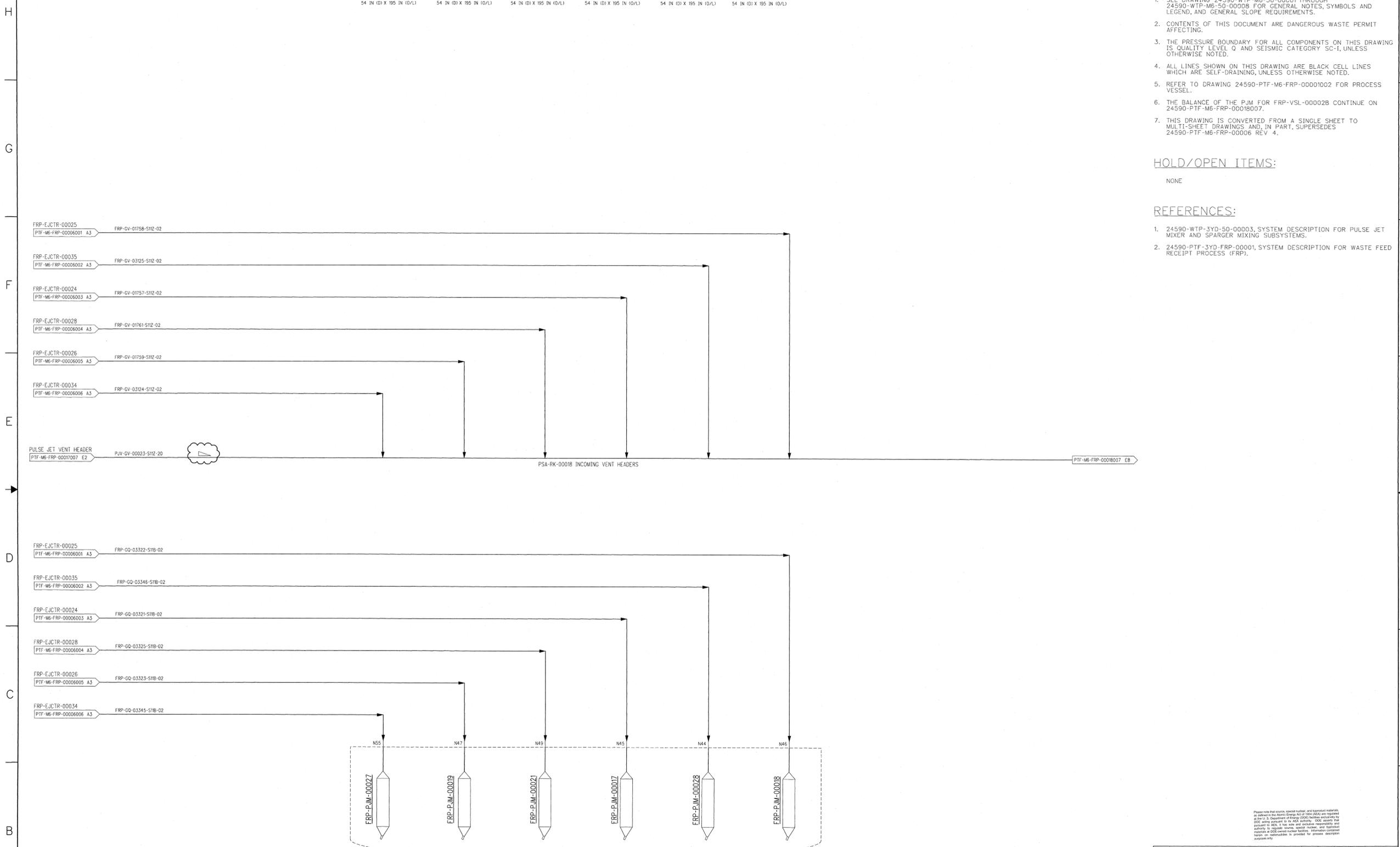
- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-1, UNLESS OTHERWISE NOTED.
- ALL LINES SHOWN ON THIS DRAWING ARE BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- REFER TO DRAWING 24590-PTF-M6-FRP-00001002 FOR PROCESS VESSEL.
- THE BALANCE OF THE PJM FOR FRP-VSL-00002B CONTINUE ON 24590-PTF-M6-FRP-00018007.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00006 REV 4.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

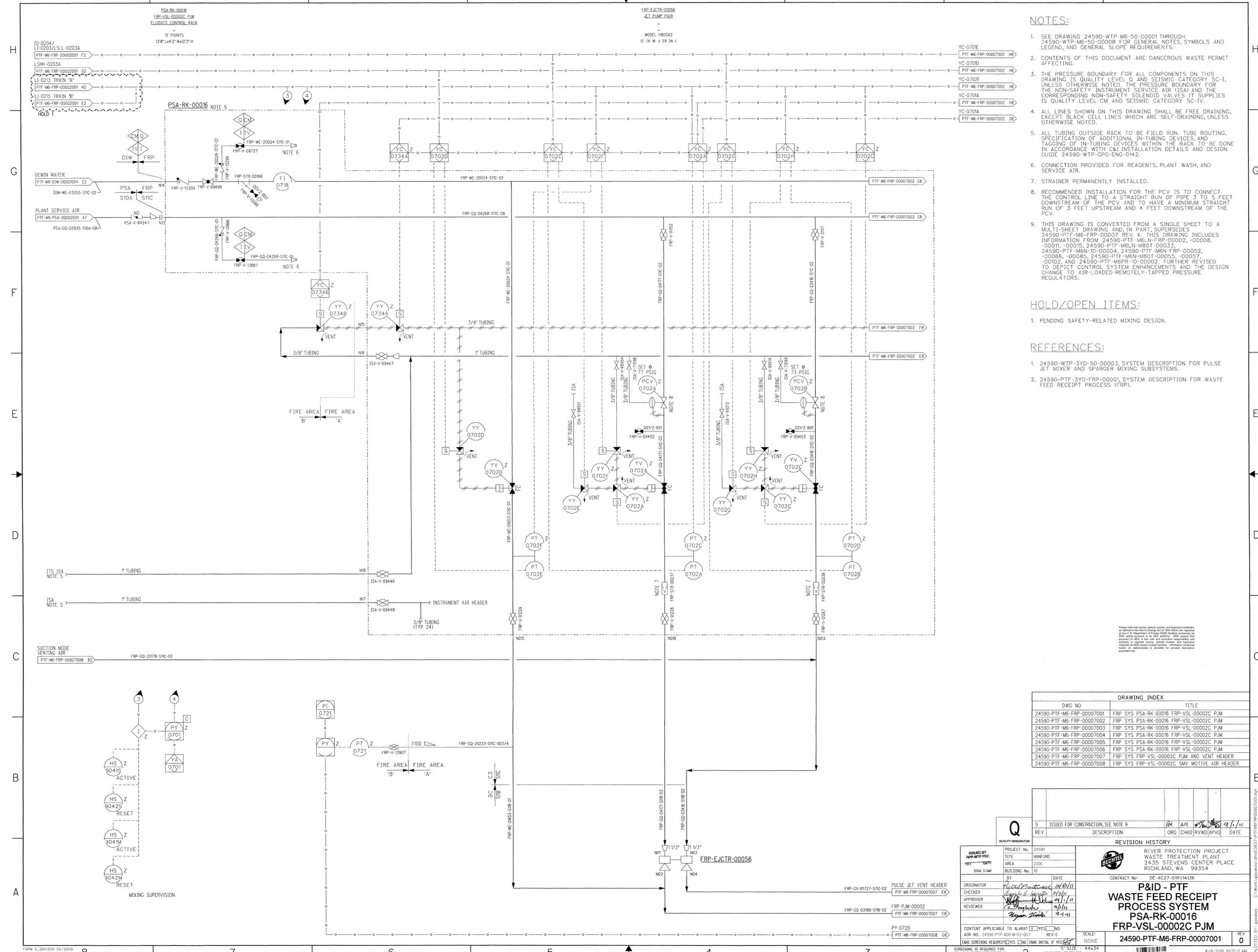
- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).



FRP-VSL-00002B  
6 OF 12 PJM PSA-RK-00018  
NOTES 5,6

Please note that source, special number, and approval numbers as defined in the Atomic Energy Act of 1954 (AEA) are required at the U.S. Department of Energy (DOE) facilities exclusively for DOE activities and are not required for other DOE activities. DOE activities are subject to AEA. It has not been determined whether the activities described in this drawing are DOE activities. If they are, the activities must be approved by DOE. Information contained herein is disseminated in accordance with the provisions of DOE Order 424.1. Information contained herein is disseminated in accordance with the provisions of DOE Order 424.1.

<b>Q</b> ISSUED FOR CONSTRUCTION, SEE NOTE 7 REV: 0 DESCRIPTION: 24590-PTF-M6-FRP-00006007 ORG: AH CHKD: [Signature] RVWD: [Signature] APVD: [Signature] DATE: 8/11/11		RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354 CONTRACT No: DE-AC27-DIRV14135
<b>REVISION HISTORY</b>		
ISSUED BY: RPP-WTP-PDC DATE: 8/11/11 ISSUE STAMP: [Stamp]	PROJECT No: 24590 SITE: HANFORD AREA: 200E BUILDING No: 10 BY: [Signature] DATE: 8/11/11	CHECKER: [Signature] APPROVER: [Signature] REVIEWER: [Signature]
<b>P&amp;ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM FRP-VSL-00002B PJM AND VENT HEADER</b>		
CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO ADR NO. 24590-PTF-ADR-M-02-07 SCREENING REQUIRED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO EMS INITIAL IF YES:		SCALE: NONE 24590-PTF-M6-FRP-00006007 REV: 0



NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- ALL TUBING OUTSIDE RACK TO BE FIELD RUN, TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GP-ENG-0142.
- CONNECTION PROVIDED FOR REAGENTS, PLANT WASH, AND SERVICE AIR.
- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00007 REV. 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6-FRP-00002, -00008, -00011, -00015, 24590-PTF-M6-FRP-00003, 24590-PTF-M6-FRP-00004, 24590-PTF-M6-FRP-00005, -00006, -00008, 24590-PTF-M6-FRP-00005, -00007, -00010, AND 24590-PTF-M6-FRP-10-00002. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

HOLD/OPEN ITEMS:

- PENDING SAFETY-RELATED MIXING DESIGN.

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note that valves, special valves, and hazardous materials, as defined by the American Society of Mechanical Engineers (ASME) and the U.S. Department of Energy (DOE) are shown on this drawing. The user is responsible for ensuring that the correct materials are used in accordance with the applicable codes and standards. The user is also responsible for ensuring that the correct materials are used in accordance with the applicable codes and standards. The user is also responsible for ensuring that the correct materials are used in accordance with the applicable codes and standards.

DWG NO	TITLE
24590-PTF-M6-FRP-00007001	FRP SYS PSA-RK-00016 FRP-VSL-00002C PJM
24590-PTF-M6-FRP-00007002	FRP SYS PSA-RK-00016 FRP-VSL-00002C PJM
24590-PTF-M6-FRP-00007003	FRP SYS PSA-RK-00016 FRP-VSL-00002C PJM
24590-PTF-M6-FRP-00007004	FRP SYS PSA-RK-00016 FRP-VSL-00002C PJM
24590-PTF-M6-FRP-00007005	FRP SYS PSA-RK-00016 FRP-VSL-00002C PJM
24590-PTF-M6-FRP-00007006	FRP SYS PSA-RK-00016 FRP-VSL-00002C PJM
24590-PTF-M6-FRP-00007007	FRP SYS PSA-RK-00016 FRP-VSL-00002C PJM AND VENT HEADER
24590-PTF-M6-FRP-00007008	FRP SYS PSA-RK-00016 FRP-VSL-00002C PJM AND VENT HEADER

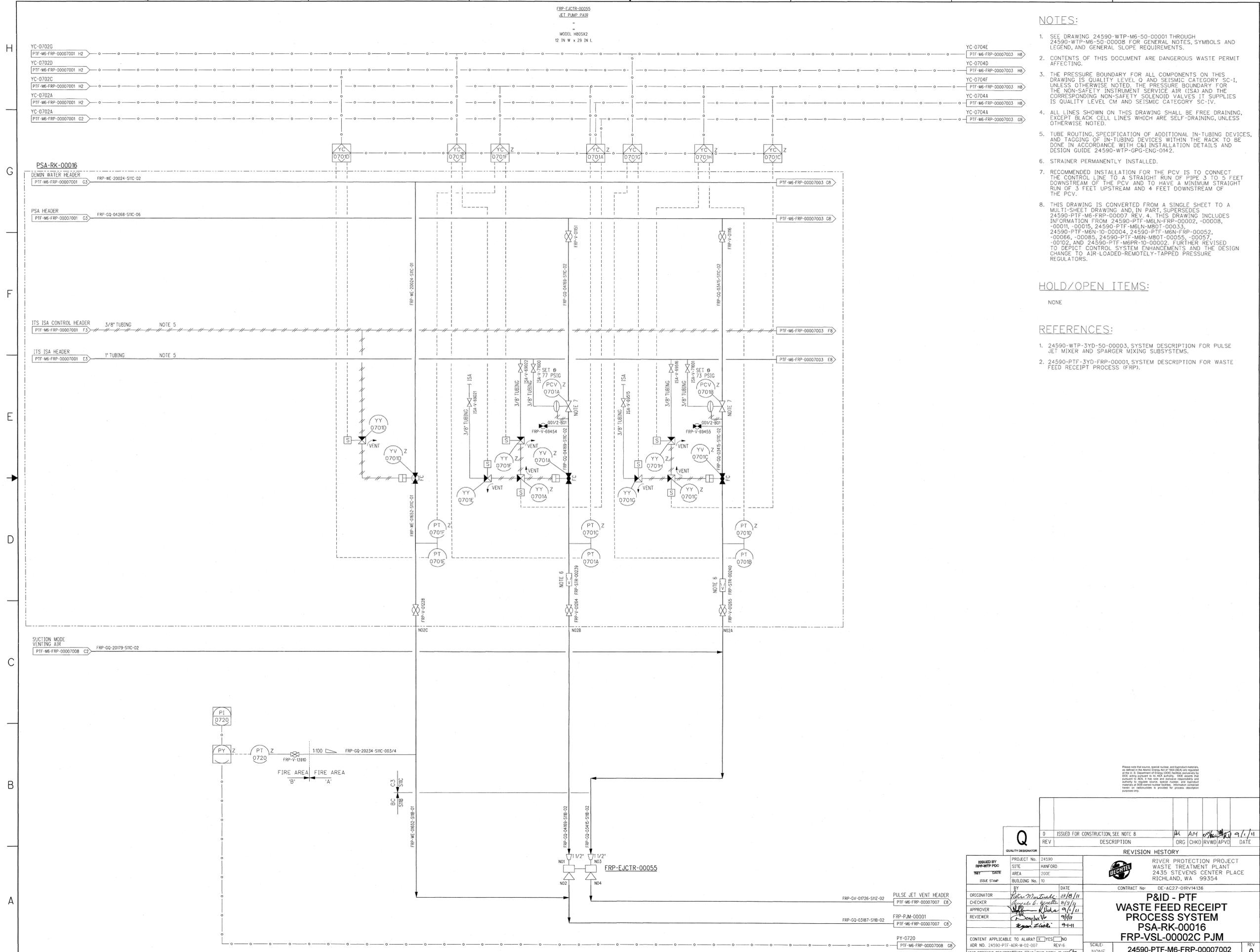
**Q**  
QUALITY DESIGNATOR

ISSUED BY	PROJECT NO.	DATE
PTF-M6-FRP-00007001	24590	08/11/11
DATE	SITE	NAME/ORD
ISSUE STAMP	AREA	24538 STEVENS CENTER PLACE
	BUILDING NO. 10	RICHLAND, WA 99354
ORIGINATOR	BY	DATE
CHECKER	DATE	DATE
APPROVER	DATE	DATE
REVIEWER	DATE	DATE

REV	DESCRIPTION	ORG	CHKD	RWD	APPVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 9	AM	AM	AM	AM	9/1/11

REVISION HISTORY	
CONTRACT NO.	DE-AC27-09R14136
<b>P&amp;ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM</b>	
<b>PSA-RK-00016</b>	
<b>FRP-VSL-00002C PJM</b>	
SCALE:	NONE
24590-PTF-M6-FRP-00007001	REV: 0



- NOTES:**
- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
  - CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
  - THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
  - ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
  - TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
  - STRAINER PERMANENTLY INSTALLED.
  - RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
  - THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00007 REV. 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6LN-FRP-00002, -00008, -00011, -00015, 24590-PTF-M6LN-M80T-00033, 24590-PTF-M6N-10-00004, 24590-PTF-M6N-FRP-00052, -00066, -00085, 24590-PTF-M6N-M80T-00055, -00057, -00102, AND 24590-PTF-M6R-10-00002. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

**HOLD/OPEN ITEMS:**  
NONE

- REFERENCES:**
- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
  - 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

<b>Q</b> ISSUED FOR CONSTRUCTION SEE NOTE 8 REV: 01/11 DESCRIPTION: P&ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM ORG: AM CHKD: [Signature] RVD: [Signature] DATE: 01/11		<b>REVISION HISTORY</b> PROJECT No: 24590 SITE: HANFORD AREA: 200E BUILDING No: 10 CONTRACT No: DE-AC27-01RV14136 RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354	
ISSUED BY: [Signature] CHECKER: [Signature] APPROVER: [Signature] REVIEWER: [Signature]		DATE: 01/11 DATE: 01/11 DATE: 01/11 DATE: 01/11	
CONTENT APPLICABLE TO ALARA? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO SCALE: NONE SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-FRP-00001		REVISION: 01/11 SCALE: NONE COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED R11417693 8/8/2011 10:51:10 AM	

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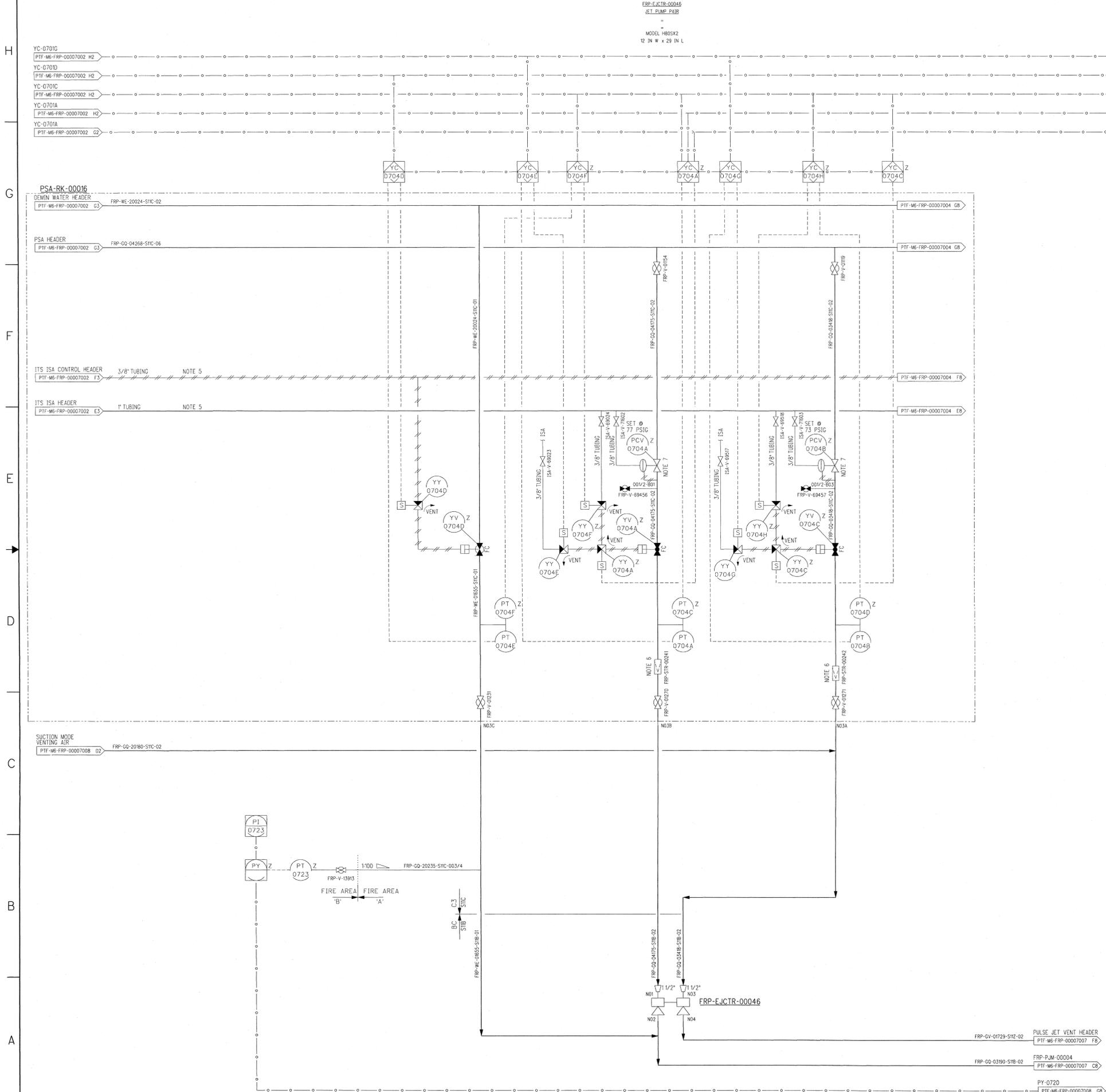
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NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I. UNLESS OTHERWISE NOTED, THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00007 REV. 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6LN-FRP-00002, -00008, -00011, -00015, 24590-PTF-M6LN-MBOT-00033, 24590-PTF-M6LN-10-00004, 24590-PTF-M6LN-FRP-00052, -00066, -00086, 24590-PTF-M6LN-MBOT-00055, -00057, -00102, AND 24590-PTF-M6LN-10-00002 FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

HOLD/OPEN ITEMS:

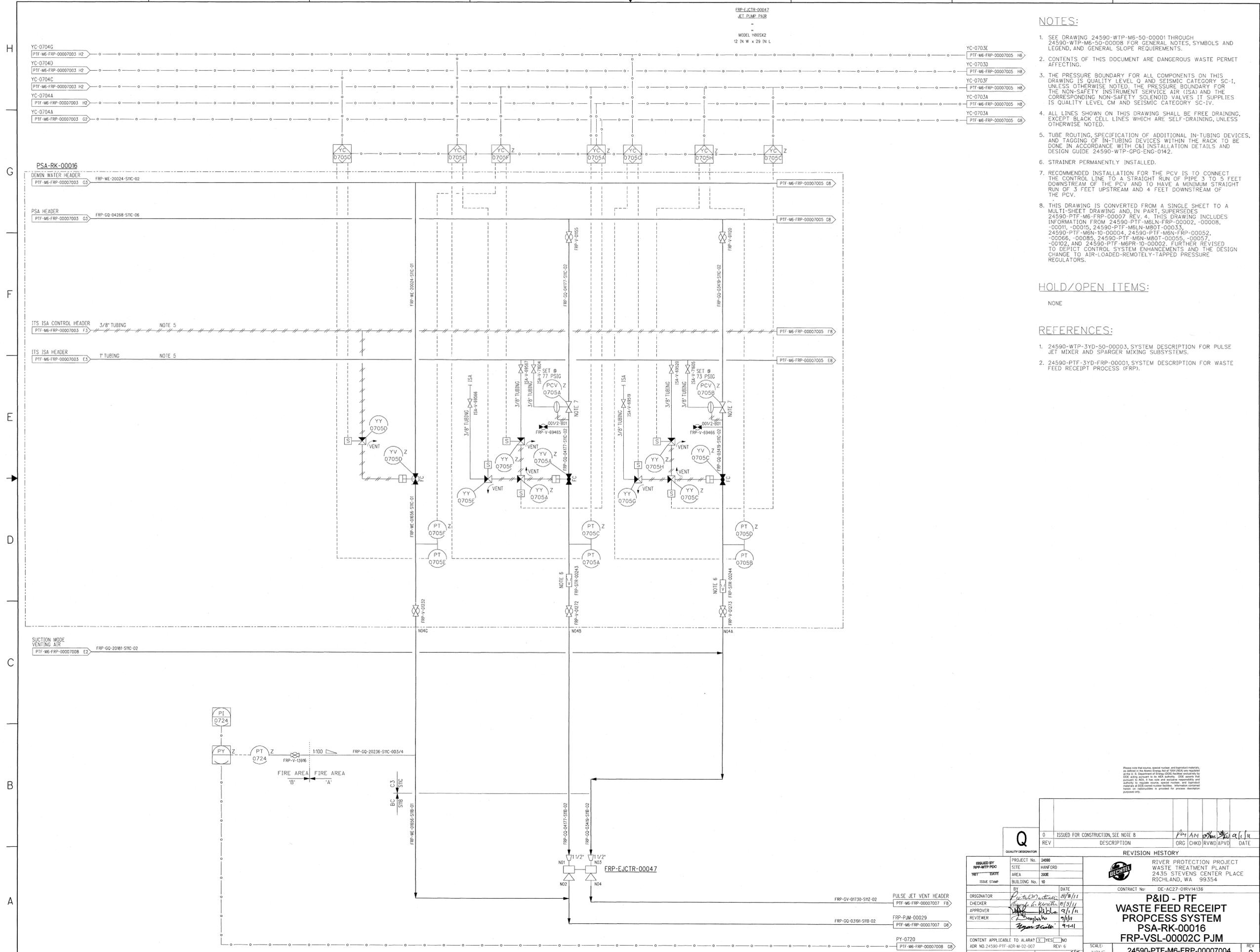
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REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note that valves, special valves, and special materials, as defined in the Material Schedule and/or P&ID notes are required for this drawing. The user is responsible for ensuring that the correct materials are used. The user is responsible for ensuring that the correct materials are used. The user is responsible for ensuring that the correct materials are used.

<b>Q</b> ISSUED FOR CONSTRUCTION SEE NOTE 8 REV: 01 AM 9/11/11 DATE: 9/11/11		<b>REVISION HISTORY</b> RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354	
PROJECT No: 24590 SITE: MANFORD AREA: 200E BUILDING No: 10	CONTRACT No: DE-AC27-09RV14136 <b>P&amp;ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM</b> <b>PSA-RK-00016</b> <b>FRP-VSL-00002C PJM</b>	SCALE: NONE 24590-PTF-M6-FRP-00007003 REV: 0	SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPG-SPEC-002 COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED 8/9/2011 10:51:09 AM R11417694



- NOTES:**
- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
  - CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
  - THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
  - ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
  - TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
  - STRAINER PERMANENTLY INSTALLED.
  - RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
  - THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00007 REV. 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6-FRP-00002, -00008, -00011, -00015, 24590-PTF-M6-FRP-00033, 24590-PTF-M6-FRP-10-00004, 24590-PTF-M6-FRP-00052, -00056, -00058, 24590-PTF-M6-FRP-00055, -00057, -00102, AND 24590-PTF-M6-FRP-10-00002. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

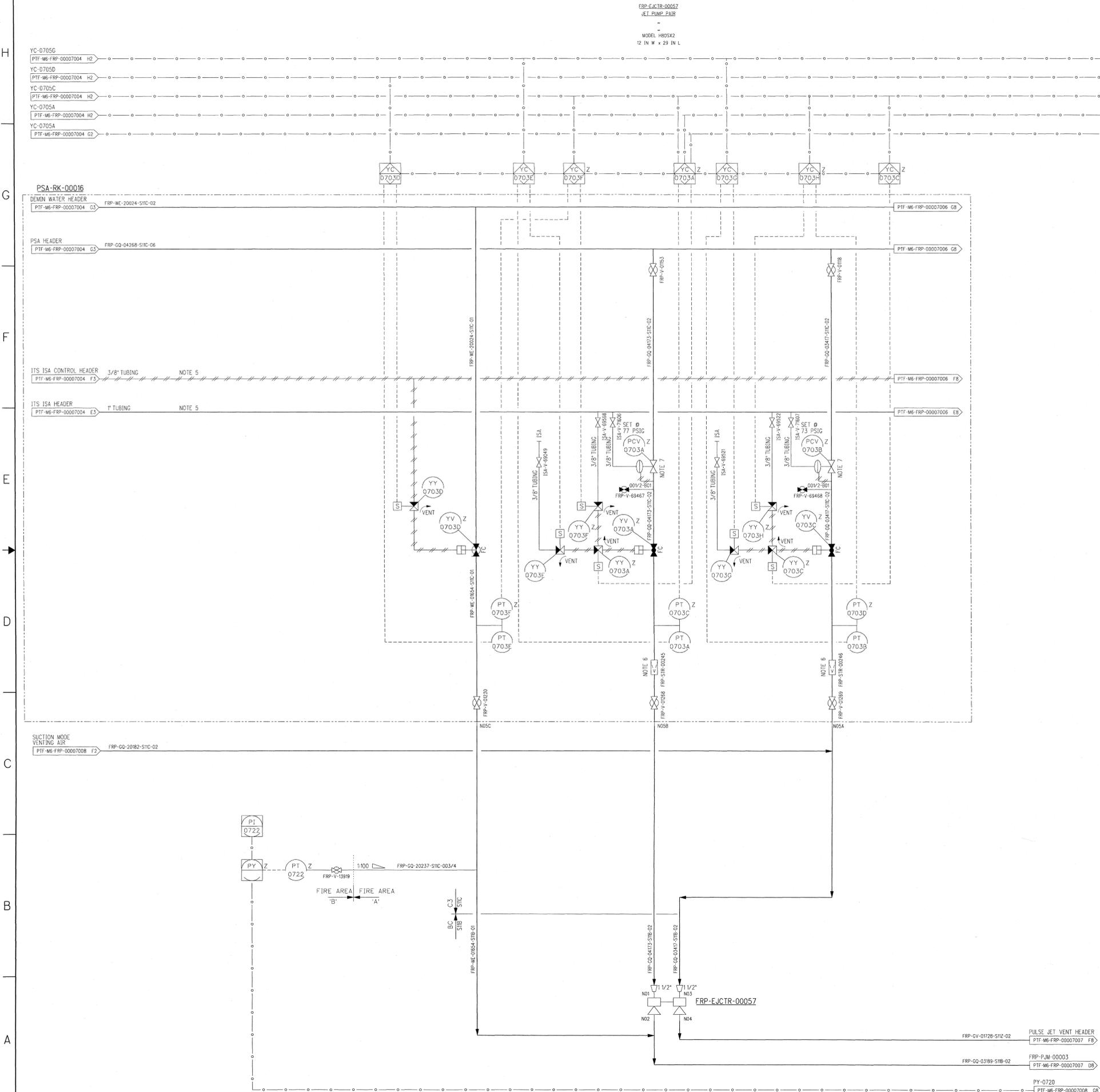
**HOLD/OPEN ITEMS:**

NONE

**REFERENCES:**

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

<p><b>Q</b> QUALITY DESIGNATOR</p>		<p>0 ISSUED FOR CONSTRUCTION SEE NOTE 8</p>	<p>1/24/11</p>
<p>ISSUED BY: FRP-WTP-000</p>	<p>DATE: 1/24/11</p>	<p>DESCRIPTION: P&amp;ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM</p>	<p>DATE: 1/24/11</p>
<p>ORIGINATOR: PTF-M6-FRP-00007007</p>	<p>CHECKER: PTF-PJM-00029</p>	<p>APPROVER: PTF-M6-FRP-00007007</p>	<p>DATE: 1/24/11</p>
<p>REVISION HISTORY</p>	<p>REVISION HISTORY</p>	<p>REVISION HISTORY</p>	<p>REVISION HISTORY</p>
<p>CONTRACT No: DE-AC27-09V14356</p>	<p>PROJECT No: 24590</p>	<p>SITE: HANFORD</p>	<p>AREA: 200E</p>
<p>ISSUE STAMP</p>	<p>BUILDING No: 10</p>	<p>DATE: 1/24/11</p>	<p>DATE: 1/24/11</p>
<p>CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p>	<p>SCALE: NONE</p>	<p>REV: 6</p>	<p>REV: 0</p>
<p>DRW NO: 24590-PTF-M6-FRP-0007004</p>	<p>SCALE: NONE</p>	<p>REV: 6</p>	<p>REV: 0</p>
<p>24590-PTF-M6-FRP-0007004</p>	<p>SCALE: NONE</p>	<p>REV: 6</p>	<p>REV: 0</p>



NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GP-ENG-0142.
- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00007 REV. 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-FRP-00002, -00008, -00011, -00015, 24590-PTF-M6N-M80T-00033, 24590-PTF-M6N-10-00004, 24590-PTF-M6N-FRP-00052, -00055, -00056, -00058, 24590-PTF-M6N-M80T-00055, -00057, -00059, AND 24590-PTF-M6FR-10-00002 FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

<p>ISSUED BY: FRP-PTF PJC</p> <p>DATE: 8/11/11</p>		<p>PROJECT No: 24590</p> <p>SITE: HANFORD</p> <p>AREA: 200E</p> <p>BUILDING No: 10</p>		<p>ISSUED FOR CONSTRUCTION SEE NOTE 8</p> <p>DESCRIPTION: PULSE JET VENT HEADER</p> <p>DATE: 8/11/11</p>	
<p>ORIGINATOR: PTF-M6-FRP-00007007 FB</p> <p>CHECKER: PTF-M6-FRP-00007007 FB</p> <p>APPROVER: PTF-M6-FRP-00007007 FB</p> <p>REVIEWER: PTF-M6-FRP-00007007 FB</p>		<p>REVISION HISTORY</p> <p>REV 0: ISSUED FOR CONSTRUCTION SEE NOTE 8</p>		<p>CONTRACT No: DE-AC27-01RV14136</p> <p>RIVER PROTECTION PROJECT</p> <p>WASTE TREATMENT PLANT</p> <p>2435 STEVENS CENTER PLACE</p> <p>RICHLAND, WA 99354</p>	
<p>CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>ADR NO. 24590-PTF-45R-W-02-007</p> <p>ENS SCREENING REQUIRED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>ENS INITIAL, IF YES: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p>		<p>SCALE: NONE</p> <p>24590-PTF-M6-FRP-00007005</p>		<p>REV 0</p>	



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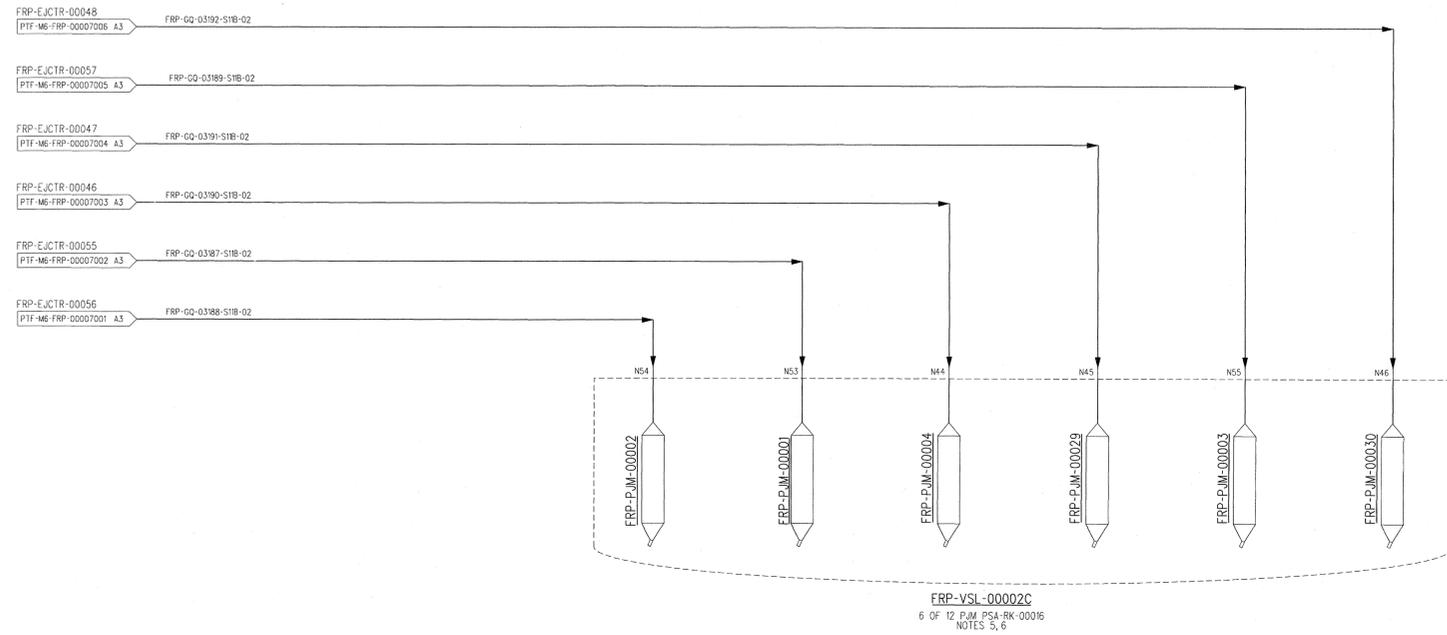
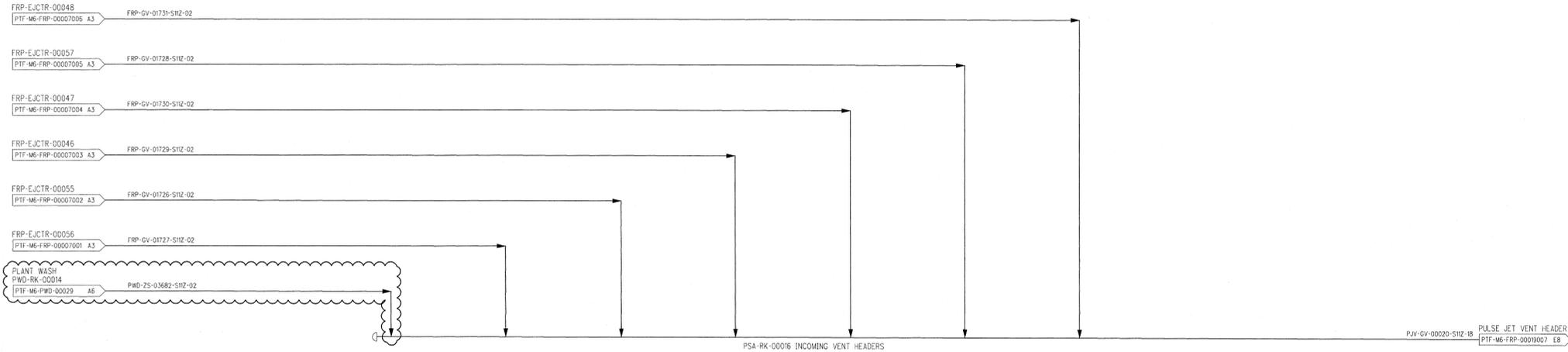
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NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-1, UNLESS OTHERWISE NOTED.
- ALL LINES SHOWN ON THIS DRAWING ARE BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- REFER TO DRAWING 24590-PTF-M6-FRP-00002001 FOR PROCESS VESSEL.
- THE BALANCE OF THE PJM FOR FRP-VSL-00002C CONTINUE ON 24590-PTF-M6-FRP-00019007.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00007 REV. 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-10-00004, 24590-PTF-M6N-M8T-00055, AND 24590-PTF-M6PR-10-00002.

HOLD/OPEN ITEMS:

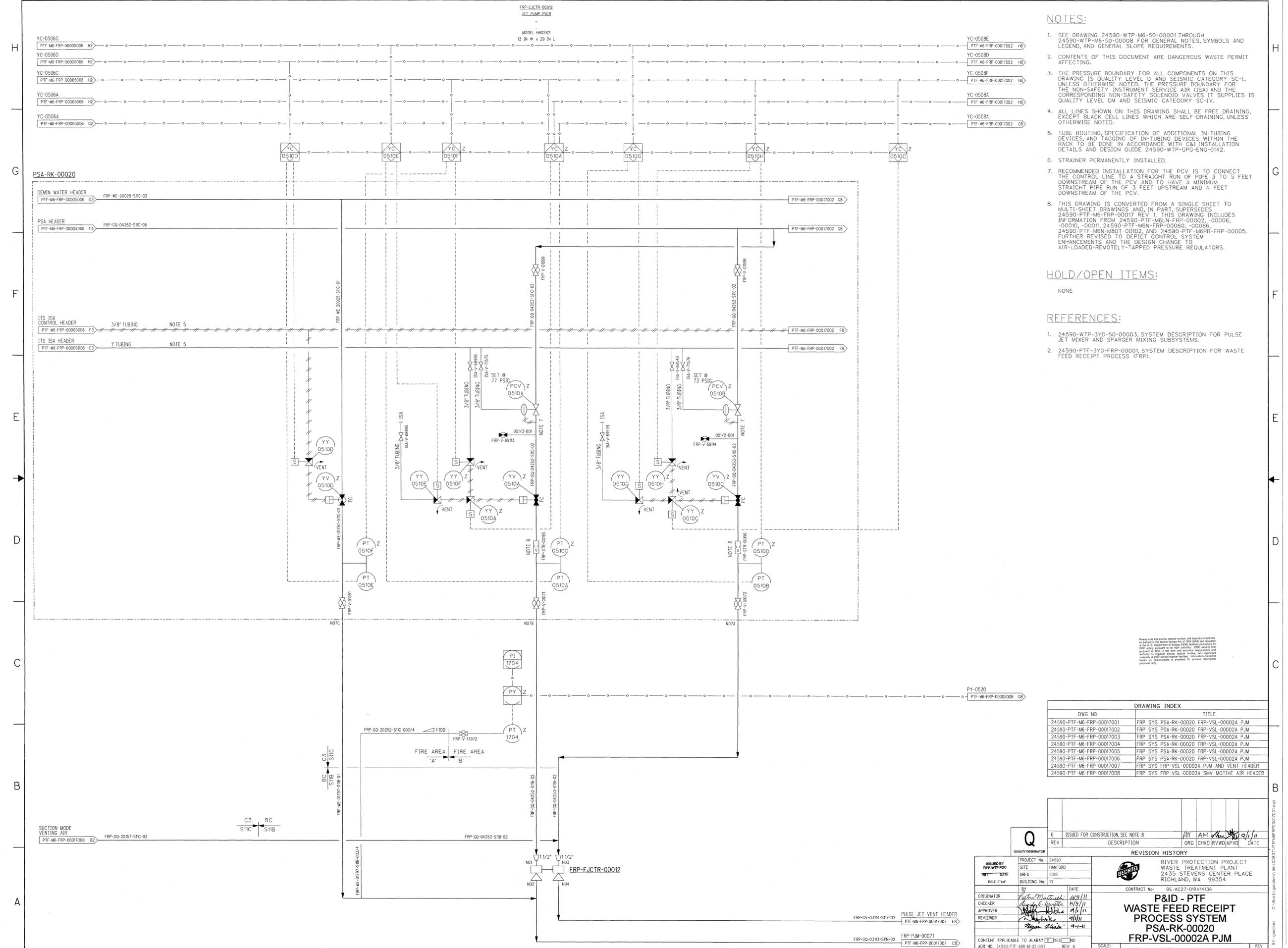
NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note that source, special order, and fabricated materials, as indicated in this drawing, may not be available at the time of construction. It is the responsibility of the contractor to verify the availability of these materials and to provide for alternate materials if necessary. The contractor shall be responsible for providing the necessary information to the design engineer to allow for the substitution of materials. The design engineer shall be responsible for providing the necessary information to the contractor to allow for the substitution of materials.

ISSUED FOR CONSTRUCTION, SEE NOTE 7		DATE: 01/11/11
REV	DESCRIPTION	ORG (CHKD) (RVWD) (APVD)
0		
REVISION HISTORY		
ISSUED BY: RPP/WTP/POC	PROJECT No: 24590	SITE: HANFORD
DATE: 01/11/11	AREA: 200E	BUILDING No: 10
ORIGINATOR: [Signature]	DATE: 01/11/11	CONTRACT No: DE-AC27-01RV14136
CHECKER: [Signature]	DATE: 01/11/11	<b>P&amp;ID - PTF</b>
APPROVER: [Signature]	DATE: 01/11/11	<b>WASTE FEED RECEIPT</b>
REVIEWER: [Signature]	DATE: 01/11/11	<b>PROCESS SYSTEM</b>
		<b>FRP-VSL-00002C PJM</b>
		<b>AND VENT HEADER</b>
CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	SCALE: NONE	REV: 0
ADR NO. 24590-PTF-ADR-M-02-007	SCALE: NONE	REV: 0
EMG SCREENING REQUIRED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	SCALE: NONE	REV: 0
EMG INITIAL IF YES: [Signature]	SCALE: NONE	REV: 0
SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002	SCALE: NONE	REV: 0
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED	SCALE: NONE	REV: 0



- NOTES:**
- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
  - CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
  - THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
  - ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
  - TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH CSI INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-OPG-ENG-0142.
  - STRAINER PERMANENTLY INSTALLED.
  - RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
  - THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00017 REV 1. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6LN-FRP-00002, -00006, -00010, -00011, 24590-PTF-M6LN-FRP-00060, -00066, 24590-PTF-M6LN-801-00102, AND 24590-PTF-M6LN-FRP-00005. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

**HOLD/OPEN ITEMS:**

NONE

- REFERENCES:**
- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
  - 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note that source, sponsor number, and project number are defined in the source drawing. All ISA labels are required to be unique to the ISA activity. Do not modify the project ID, ISA, or any other information that is used to identify the ISA activity. Information contained herein is for informational purposes only. Information contained herein is not to be used for any other purpose without the prior written permission of the project manager.

DWG NO	TITLE
24590-PTF-M6-FRP-00017001	FRP SYS PSA-RK-00020 FRP-VSL-00002A PJM
24590-PTF-M6-FRP-00017002	FRP SYS PSA-RK-00020 FRP-VSL-00002A PJM
24590-PTF-M6-FRP-00017003	FRP SYS PSA-RK-00020 FRP-VSL-00002A PJM
24590-PTF-M6-FRP-00017004	FRP SYS PSA-RK-00020 FRP-VSL-00002A PJM
24590-PTF-M6-FRP-00017005	FRP SYS PSA-RK-00020 FRP-VSL-00002A PJM
24590-PTF-M6-FRP-00017006	FRP SYS PSA-RK-00020 FRP-VSL-00002A PJM
24590-PTF-M6-FRP-00017007	FRP SYS PSA-RK-00020 PUM AND VENT HEADER
24590-PTF-M6-FRP-00017008	FRP SYS FRP-VSL-00002A SMV MOTIVE AIR HEADER

<p><b>Q</b> ISSUED FOR CONSTRUCTION, SEE NOTE 8</p>		<p>REV 0</p>
<p>PROJECT No. 24590 SITE HANFORD AREA 200E BUILDING No. 10</p>		<p>DATE 8/9/11 BY [Signature]</p>
<p>ISSUED BY [Signature] DATE 8/9/11 CHECKER [Signature] APPROVER [Signature] REVIEWER [Signature]</p>		<p>CONTRACT No. DE-AC27-09W14136 RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354</p>
<p>CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO ADR NO. 24590-PTF-ADR-M-02-007 REV: 6</p>		<p>SCALE: NONE E SIZE 4.4x3.4 COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED</p>
<p>24590-PTF-M6-FRP-00017001</p>		<p>REV 0</p>

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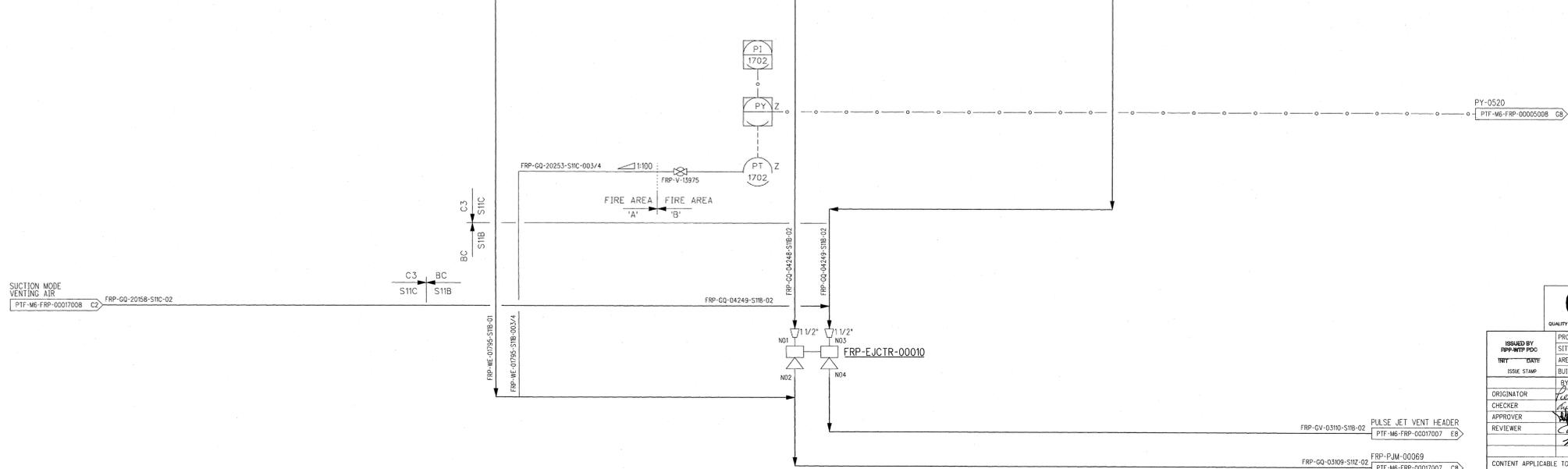
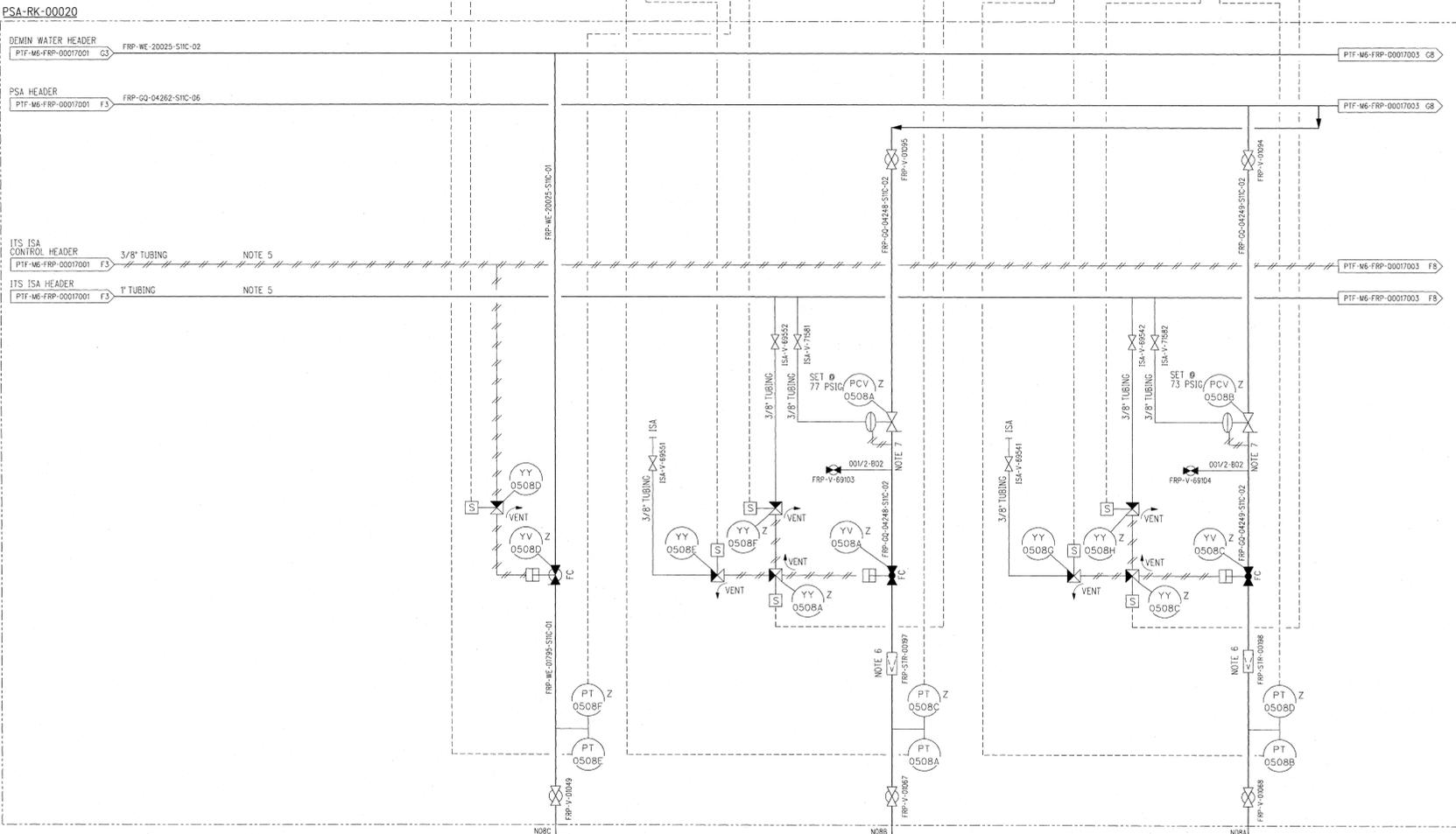
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FRP-EJCTR-0000  
JET PUMP PAIR  
MODEL 1805X2  
12 IN W x 29 IN L



NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00017 REV. 1. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-FRP-00002, -00006, -00010, -00011, 24590-PTF-M6N-FRP-00060, -00066, 24590-PTF-M6N-M80T-00102, AND 24590-PTF-M6PR-FRP-00005. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note that items special order and transport material as defined in the Airco Energy Act of 1994 (AEA) are regulated as Class 2, Division of Group 2 (D2) highly flammable by DOT and subject to 49 CFR 172.101. DOT labels for transport to AEA, if not safe and secure, hazardous and subject to special handling, special order, and special handling in accordance with the Airco Energy Act of 1994 (AEA) are included in this drawing. Information contained herein is intended to be used for process design only.

<p>ISSUED BY: PTF-WTP POC</p> <p>DATE: 06/11/11</p> <p>ISSUE STAMP: [Signature]</p>		<p>PROJECT No: 24590</p> <p>SITE: HANFORD</p> <p>AREA: 200E</p> <p>BUILDING No: 10</p>		<p>0 ISSUED FOR CONSTRUCTION, SEE NOTE 8</p> <p>REV: [Signature]</p>															
<p>ORIGINATOR: [Signature]</p> <p>CHECKER: [Signature]</p> <p>APPROVER: [Signature]</p> <p>REVIEWER: [Signature]</p>		<p>CONTRACT No: DE-AC27-09RV14136</p> <p>RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354</p>		<p>REVISION HISTORY</p> <table border="1"> <thead> <tr> <th>REV</th> <th>DESCRIPTION</th> <th>ORG</th> <th>CHKD</th> <th>RWD</th> <th>APVD</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>ISSUED FOR CONSTRUCTION, SEE NOTE 8</td> <td></td> <td></td> <td></td> <td></td> <td>6/11/11</td> </tr> </tbody> </table>		REV	DESCRIPTION	ORG	CHKD	RWD	APVD	DATE	0	ISSUED FOR CONSTRUCTION, SEE NOTE 8					6/11/11
REV	DESCRIPTION	ORG	CHKD	RWD	APVD	DATE													
0	ISSUED FOR CONSTRUCTION, SEE NOTE 8					6/11/11													
<p>CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>ADR NO. 24590-PTF-ADR-M-02-007 REV: 6</p> <p>EMC SCREENING REQUIRED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>EMIS INITIAL IF YES: [Signature]</p>		<p>SCALE: NONE</p> <p>24590-PTF-M6-FRP-00017002</p>		<p>REV: 6</p> <p>REV: 6</p> <p>8/8/2011 10:50:41 AM</p>															

FRP-EJCTR-00009  
JET PUMP PAIR  
MODEL 1805V2  
12 IN W x 29 IN L



NOTES:

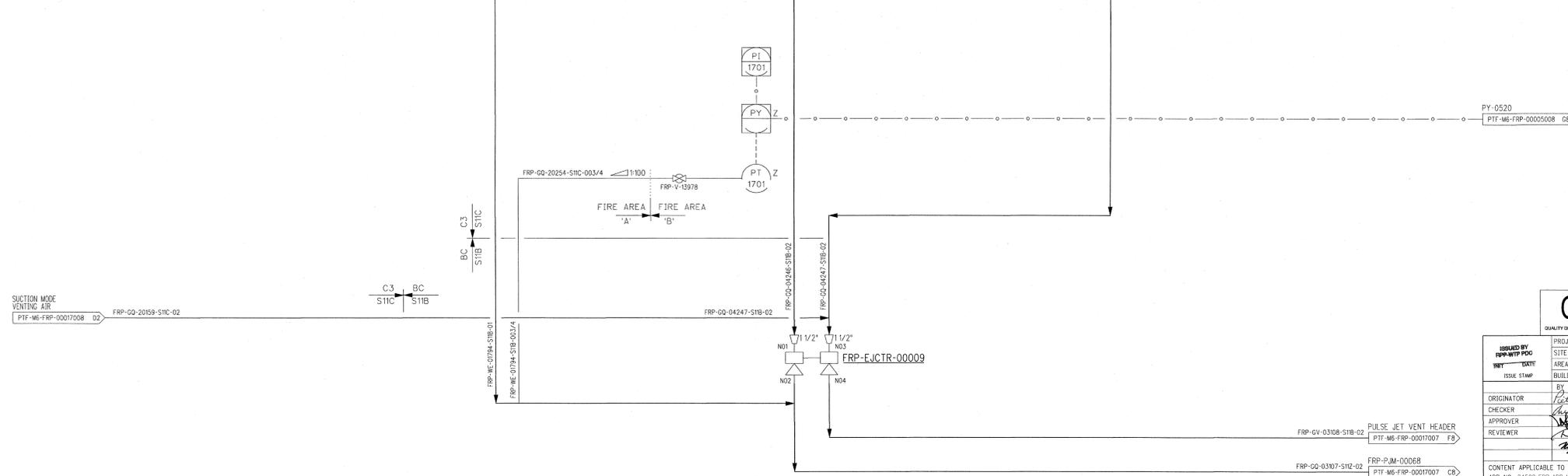
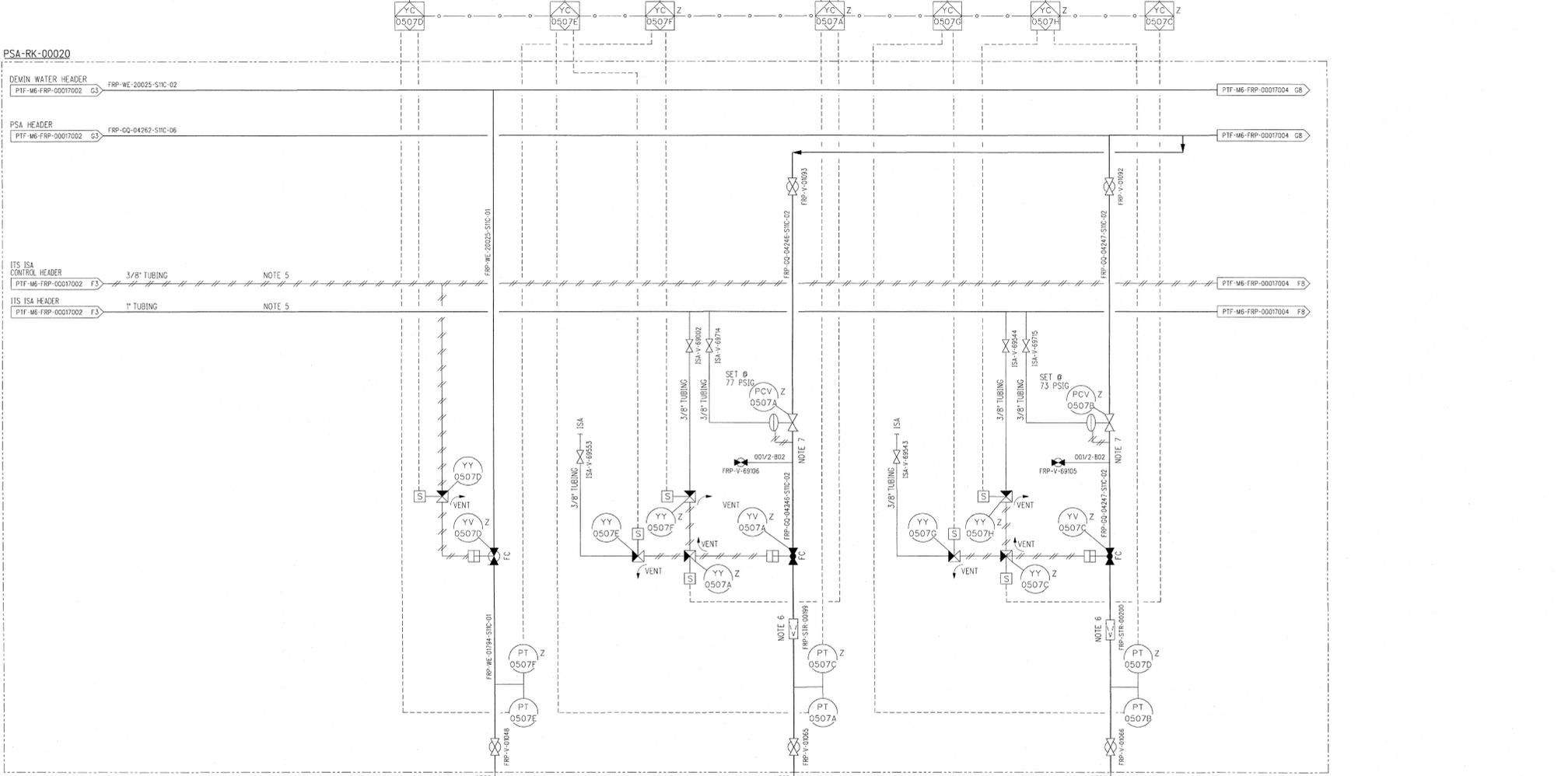
- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
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- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
- STRAINER IS PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00017 REV 1. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6LN-FRP-00002, -00006, -00010, -00011, 24590-PTF-M6N-FRP-00060, -00066, 24590-PTF-M6N-M601-00002, AND 24590-PTF-M6PR-FRP-00005. FURTHER REVISED TO DEFICIT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

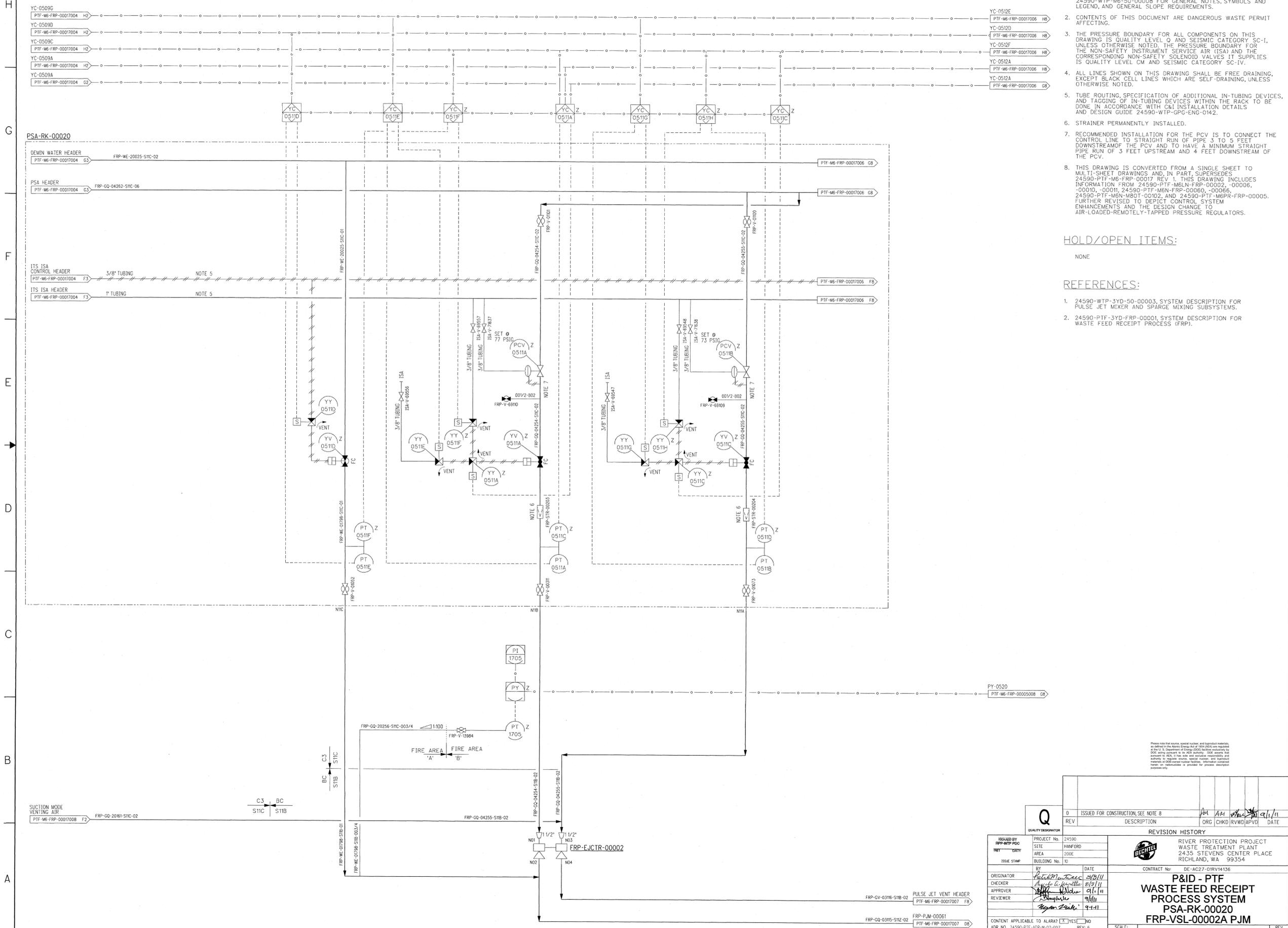


Please note the source, serial number and expiration date of all safety-critical components. The U.S. Department of Energy (DOE) requires that all safety-critical components be identified by their manufacturer's name, model number, and serial number. This information is required for the safety of the facility and is used for regulatory compliance. Information contained herein is not intended to be used for process design purposes only.

<p><b>Q</b></p> <p>ISSUED FOR CONSTRUCTION, SEE NOTE 8</p>		<p>PROJECT No. 24590</p> <p>SITE HANFORD</p> <p>AREA 200E</p> <p>BUILDING No. 30</p>	<p>DATE 8/31/11</p> <p>BY [Signature]</p>														
<p>REVISION HISTORY</p> <table border="1"> <thead> <tr> <th>REV</th> <th>DESCRIPTION</th> <th>ORG</th> <th>CHKD</th> <th>RVD</th> <th>APVD</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>ISSUED FOR CONSTRUCTION, SEE NOTE 8</td> <td></td> <td></td> <td></td> <td></td> <td>8/31/11</td> </tr> </tbody> </table>		REV	DESCRIPTION	ORG	CHKD	RVD	APVD	DATE	0	ISSUED FOR CONSTRUCTION, SEE NOTE 8					8/31/11	<p>CONTRACT No. DE-AC27-01RV14136</p> <p>RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354</p>	
REV	DESCRIPTION	ORG	CHKD	RVD	APVD	DATE											
0	ISSUED FOR CONSTRUCTION, SEE NOTE 8					8/31/11											
<p>ORIGINATOR [Signature]</p> <p>CHECKER [Signature]</p> <p>APPROVER [Signature]</p> <p>REVIEWER [Signature]</p>		<p>SCALE: NONE</p> <p>REV: 6</p>															
<p>CONTENT APPLICABLE TO ALARMS <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>ADR NO. 24590-FRP-ADR-M-02-007</p> <p>EMTS SCREENING REQUIRED <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO [EAS INITIAL IF YES]</p>		<p>SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SRES-002</p> <p>COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED</p>															
<p>FRP-PJM-00068</p> <p>PTF-M6-FRP-00017007</p>		<p>24590-PTF-M6-FRP-00017003</p> <p>REV 0</p>															



FRP-E-JCTR-00002  
JET PUMP PAIR  
MODEL 1805X2  
12 IN W x 29 IN L



NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (NISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPC-ENG-0142.
- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00017 REV 1. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6LN-FRP-00002, -00006, -00010, -00011, 24590-PTF-M6N-FRP-00000, -00006, 24590-PTF-M6N-W80T-00102, AND 24590-PTF-M6PR-FRP-00005. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

HOLD/OPEN ITEMS:

NONE

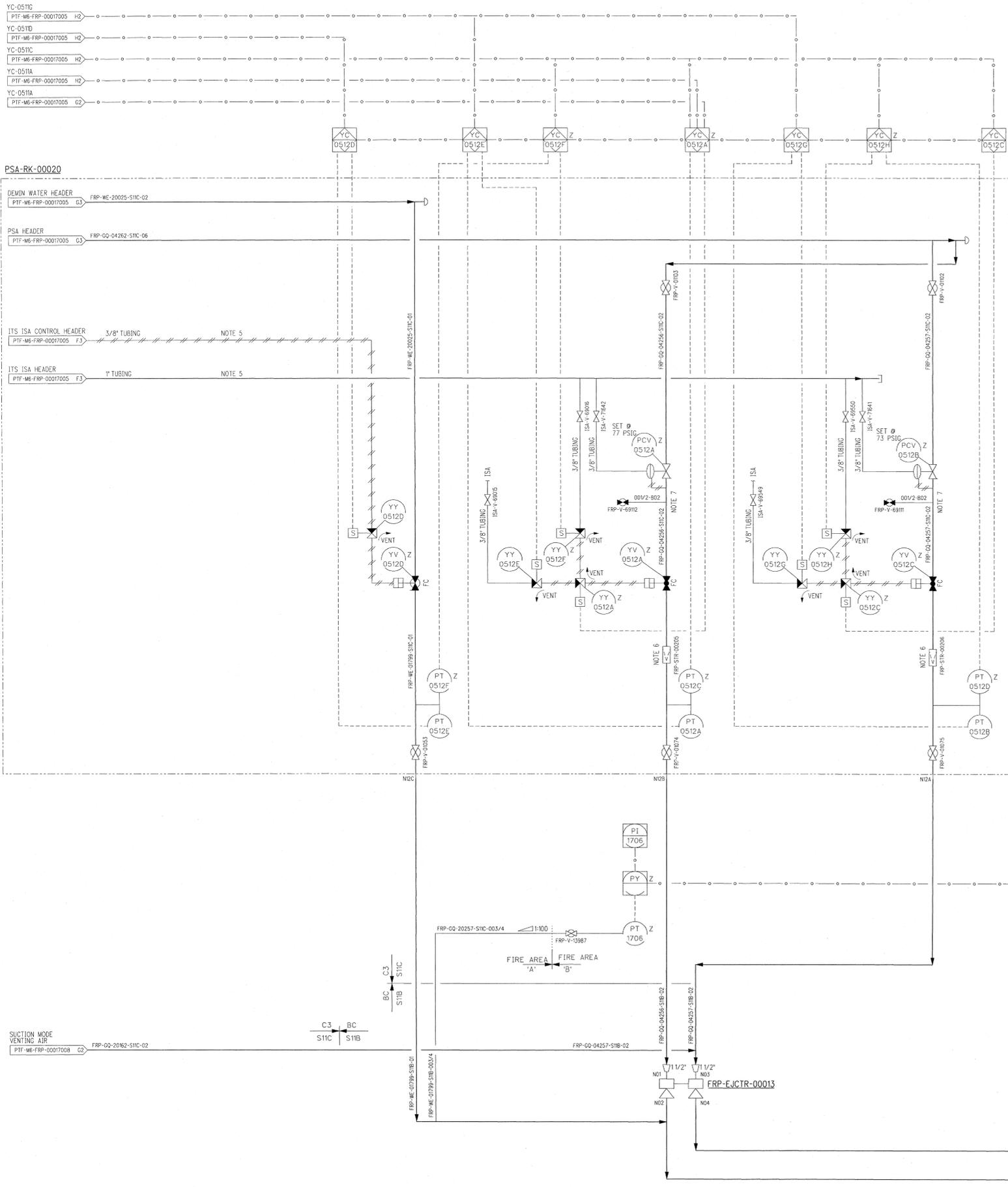
REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGE MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note the name, grade, number, and product materials, as defined by the Material Safety Data Sheet (MSDS) are required to be used in accordance with the applicable regulatory requirements. Do not use materials that are not listed in the MSDS. Do not use materials that are not listed in the MSDS. Do not use materials that are not listed in the MSDS. Do not use materials that are not listed in the MSDS.

<p>ISSUED FOR CONSTRUCTION SEE NOTE 8</p>		<p>DATE: 8/11/11</p>
<p>PROJECT No: 24590</p>	<p>SITE: HANFORD</p>	<p>AREA: 200E</p>
<p>ORIGINATOR: <i>[Signature]</i></p>	<p>CHECKER: <i>[Signature]</i></p>	<p>APPROVER: <i>[Signature]</i></p>
<p>REVISION HISTORY</p>	<p>CONTRACT No: DE-AC27-01RV14136</p>	<p>DATE: 8/11/11</p>
<p>REVISION: 0</p>	<p>DESCRIPTION: ISSUED FOR CONSTRUCTION SEE NOTE 8</p>	<p>DATE: 8/11/11</p>
<p>SCALE: NONE</p>	<p>REVISION: 0</p>	<p>DATE: 8/11/11</p>
<p>24590-PTF-M6-FRP-00017005</p>	<p>P&amp;ID - PTF WASTE FEED RECEIPT PSA-RK-00020 FRP-VSL-00002A PJM</p>	<p>8/8/2011 10:50:35 AM</p>

FRP-EJCTR-00013  
JET PUMP PULS  
MODEL 1805X2  
12 IN W X 29 IN L



NOTES:

- 1. SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I. UNLESS OTHERWISE NOTED, THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
5. TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GP-ENG-0142.
6. STRAINER PERMANENTLY INSTALLED.
7. RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
8. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00017 REV. 1. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-FRP-00002, -00006, -00010, -00011, 24590-PTF-M6N-FRP-00060, -00066, 24590-PTF-M6N-M801-00102, AND 24590-PTF-M6FR-FRP-00005. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 1. 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
2. 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please refer to the design, material, and equipment specifications, as indicated by the notes, Change Act of (ISA) and as required by the U.S. Department of Energy (DOE) and the Environmental Protection Agency (EPA) for the design and construction of the facility. The design and construction of the facility shall be in accordance with the applicable codes and standards, including but not limited to, ASME, API, and other applicable codes and standards. The design and construction of the facility shall be in accordance with the applicable codes and standards, including but not limited to, ASME, API, and other applicable codes and standards. The design and construction of the facility shall be in accordance with the applicable codes and standards, including but not limited to, ASME, API, and other applicable codes and standards.

Quality Assurance table with columns for REV, DESCRIPTION, DRG, CHKD, RVD, APVD, DATE. Includes revision history table and project information: PROJECT No: 24590, SITE: HANFORD, AREA: 200E, BUILDING No: 10, CONTRACT No: DE-AC27-01RV14136, RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354. P&ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM PSA-RK-00020 FRP-VSL-00002A PJM 24590-PTF-M6-FRP-00017006

FRP-PJM-00071 PULSE_JET MIXER 1614 GAL 54 IN (D) X 195 IN (D/L)	FRP-PJM-00069 PULSE_JET MIXER 1614 GAL 54 IN (D) X 195 IN (D/L)	FRP-PJM-00068 PULSE_JET MIXER 1614 GAL 54 IN (D) X 195 IN (D/L)	FRP-PJM-00070 PULSE_JET MIXER 1614 GAL 54 IN (D) X 195 IN (D/L)	FRP-PJM-00061 PULSE_JET MIXER 1614 GAL 54 IN (D) X 195 IN (D/L)	FRP-PJM-00072 PULSE_JET MIXER 1614 GAL 54 IN (D) X 195 IN (D/L)
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NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-1, UNLESS OTHERWISE NOTED.
- ALL LINES SHOWN ON THIS DRAWING ARE BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- REFER TO DRAWING 24590-PTF-M6-FRP-00001001 FOR PROCESS VESSEL.
- THE BALANCE OF THE PJM FOR FRP-VSL-00002A CONTINUE ON 24590-PTF-M6-FRP-00005007.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00017 REV 1.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

H

G

F

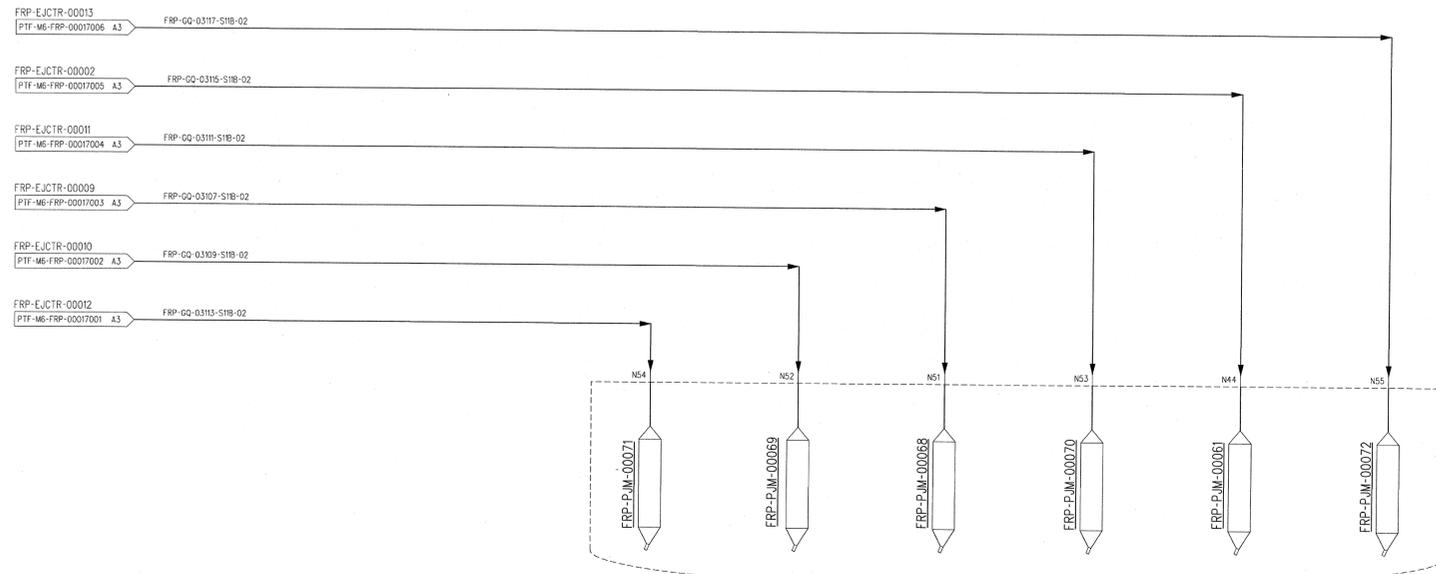
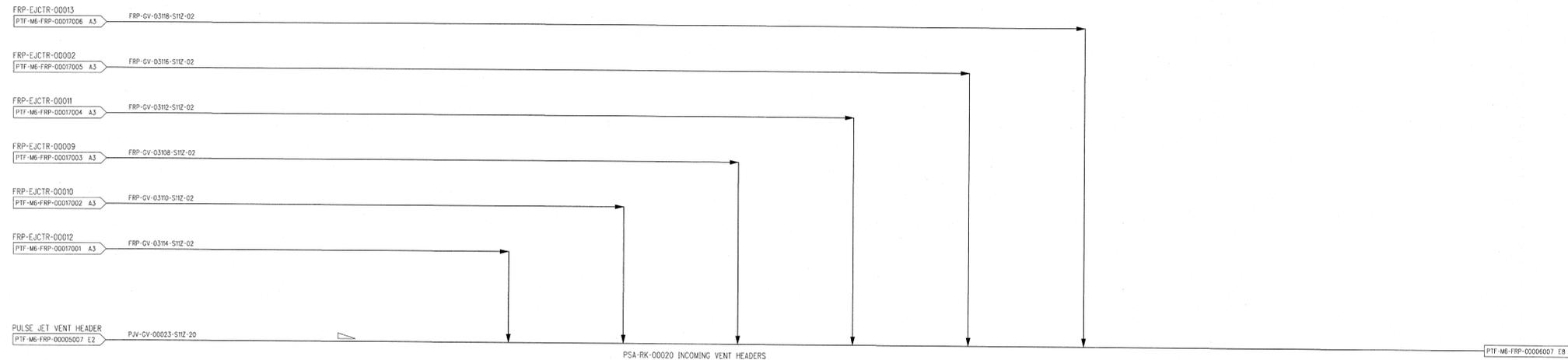
E

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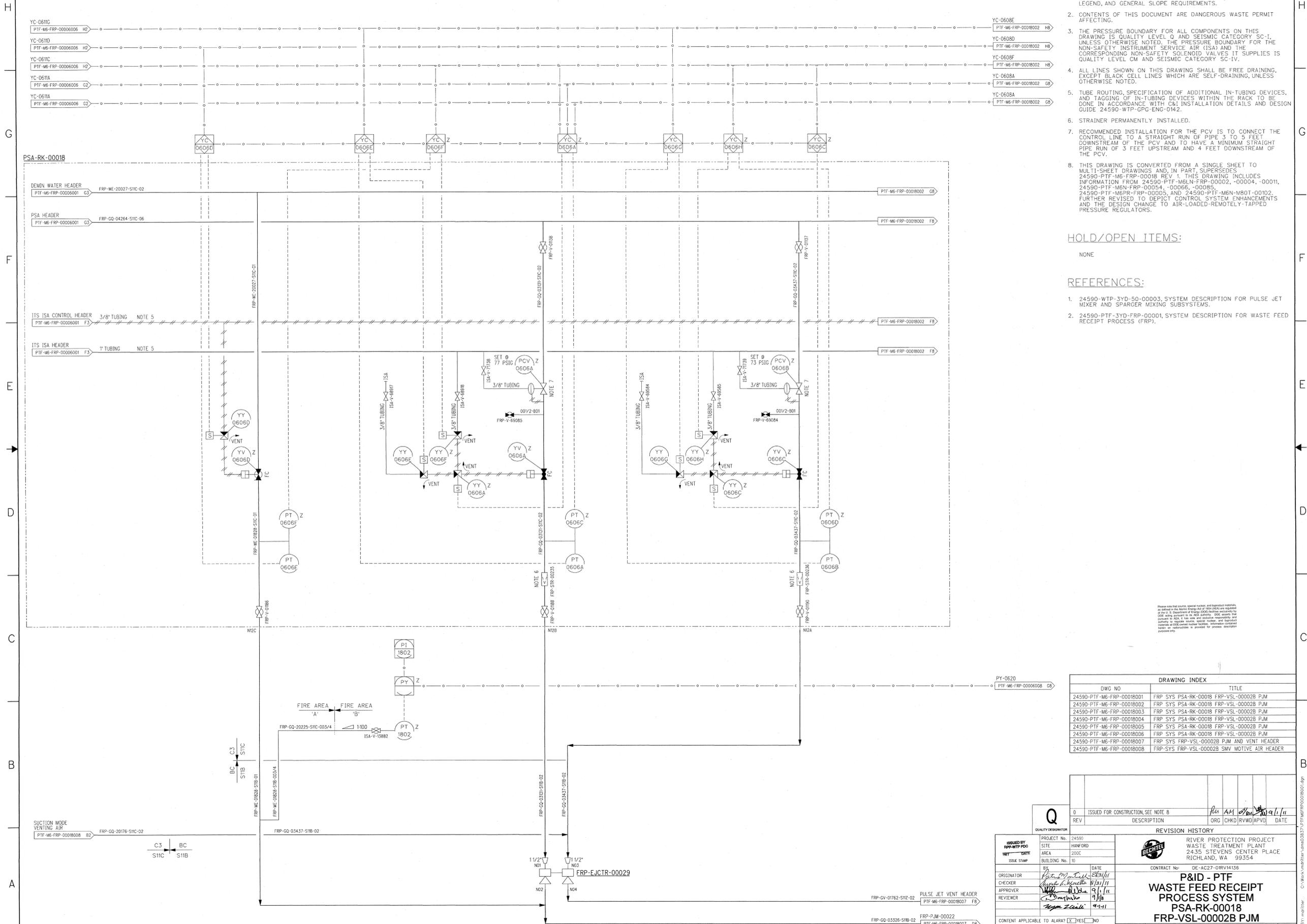


Please note that certain special material and equipment materials, as defined in the Atomic Energy Act of 1954 (AEA) are regulated by the U.S. Department of Energy (DOE) and are not to be used in the design of nuclear facilities unless they are specifically approved by DOE. The design of nuclear facilities is subject to the Atomic Energy Act of 1954 (AEA) and the regulations promulgated thereunder. Information contained herein or submitted in connection with this drawing is for informational purposes only.

Q	0	ISSUED FOR CONSTRUCTION, SEE NOTE 7	24	04	09/11
REV		DESCRIPTION	ORG	CHKD	REV'D

ISSUED BY FRP-WTP PDC	PROJECT No. 24590	REVISION HISTORY	
DATE ISSUE STAMP	SITE HANFORD	RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354	
ORIGINATOR CHECKER APPROVER REVIEWER	AREA 200E BUILDING No. 10	CONTRACT No. DE-AC27-01R14136	
BY DATE	DATE	P&ID - PTF WASTE FEED RECEIPT PROCESS SYTEM FRP-VSL-00002A PJM AND VENT HEADER	
24590-PTF-M6-FRP-00017007	9/1/11	24590-PTF-M6-FRP-00017007	
CONTENT APPLICABLE TO ALARMA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	ADR NO. 24590-PTF-ADR-M-02-007	SCALE: NONE	REV 0
SCREENING IS REQUIRED FOR DRAWING THIS IDENTIFIED IN 24590-WTP-OPP-SEC-002	2	COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED	REV 0

FRP-EJCTR-00029  
JET PUMP FAIR  
MODEL 1805X2  
12 IN W x 29 IN L



- NOTES:**
- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
  - CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
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  - ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
  - TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
  - STRAINER PERMANENTLY INSTALLED.
  - RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
  - THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00018 REV 1. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-FRP-00002, -00004, -00011, 24590-PTF-M6N-FRP-00054, -00066, -00085, 24590-PTF-M6PR-FRP-00005, AND 24590-PTF-M6N-M801-00102. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

**HOLD/OPEN ITEMS:**

NONE

**REFERENCES:**

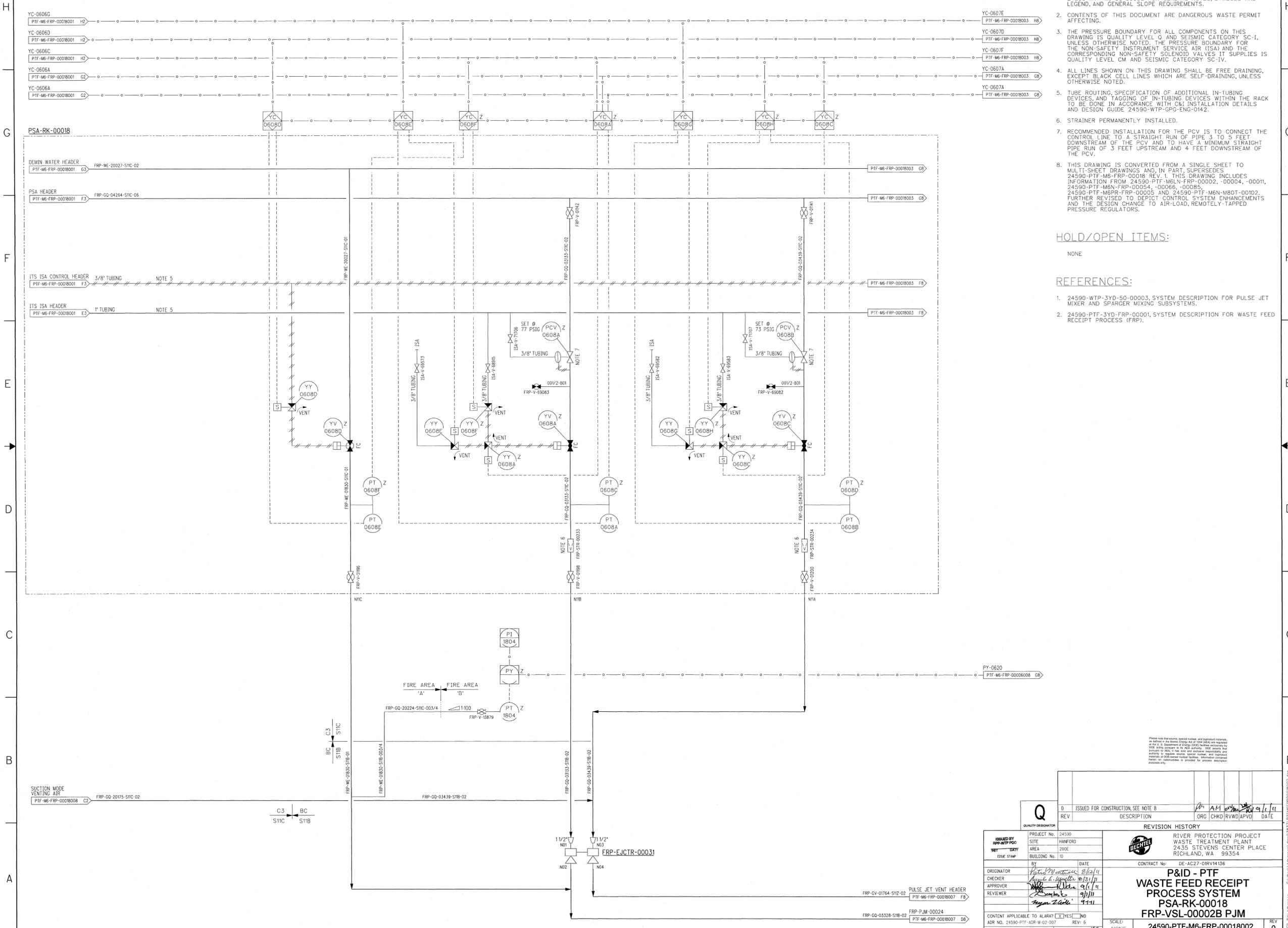
- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note that certain symbols, codes and abbreviations are used in this drawing. These symbols, codes and abbreviations are defined in the drawing legend. All symbols, codes and abbreviations are subject to change without notice. The user is responsible for verifying the accuracy of the symbols, codes and abbreviations used in this drawing. The user is also responsible for verifying the accuracy of the symbols, codes and abbreviations used in this drawing. The user is also responsible for verifying the accuracy of the symbols, codes and abbreviations used in this drawing.

DRAWING INDEX	
DWG NO	TITLE
24590-PTF-M6-FRP-00018001	FRP SYS PSA-RK-00018 FRP-VSL-00002B PJM
24590-PTF-M6-FRP-00018002	FRP SYS PSA-RK-00018 FRP-VSL-00002B PJM
24590-PTF-M6-FRP-00018003	FRP SYS PSA-RK-00018 FRP-VSL-00002B PJM
24590-PTF-M6-FRP-00018004	FRP SYS PSA-RK-00018 FRP-VSL-00002B PJM
24590-PTF-M6-FRP-00018005	FRP SYS PSA-RK-00018 FRP-VSL-00002B PJM
24590-PTF-M6-FRP-00018006	FRP SYS PSA-RK-00018 FRP-VSL-00002B PJM
24590-PTF-M6-FRP-00018007	FRP SYS FRP-VSL-00002B PJM AND VENT HEADER
24590-PTF-M6-FRP-00018008	FRP SYS FRP-VSL-00002B SMV MOTIVE AIR HEADER

<p><b>Q</b> ISSUED FOR CONSTRUCTION, SEE NOTE 8</p>		<p>REV: 0</p>
<p>DESCRIPTION: RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354</p>		<p>DATE: 8/30/2011 2:44:59 PM</p>
<p>REVISION HISTORY</p>		<p>SCALE: NONE</p>
<p>PROJECT No: 24590 SITE: HANFORD AREA: 200E BUILDING No: 10</p>		<p>CONTRACT No: DE-AC27-01RV14136</p>
<p>ORIGINATOR: <i>[Signature]</i> DATE: 8/31/11 CHECKER: <i>[Signature]</i> DATE: 8/31/11 APPROVER: <i>[Signature]</i> DATE: 9/1/11 REVIEWER: <i>[Signature]</i> DATE: 9/1/11</p>		<p>COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED</p>
<p>CONTENT APPLICABLE TO ALABAMA: YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> ADR NO. 24590-PTF-ADR-M-02-007 REV: 6 EMG SCREENING REQUIRED: YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> INITIAL IF YES: <i>[Signature]</i></p>		<p>REV: 0</p>
<p>24590-PTF-M6-FRP-00018001</p>		<p>8/30/2011 2:44:59 PM</p>

FRP-EJCTR-00033  
JET\_PUMP\_P188  
MODEL 1805X2  
12 IN W x 29 IN L



NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
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- STRAINER PERMANENTLY INSTALLED.
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HOLD/OPEN ITEMS:

NONE

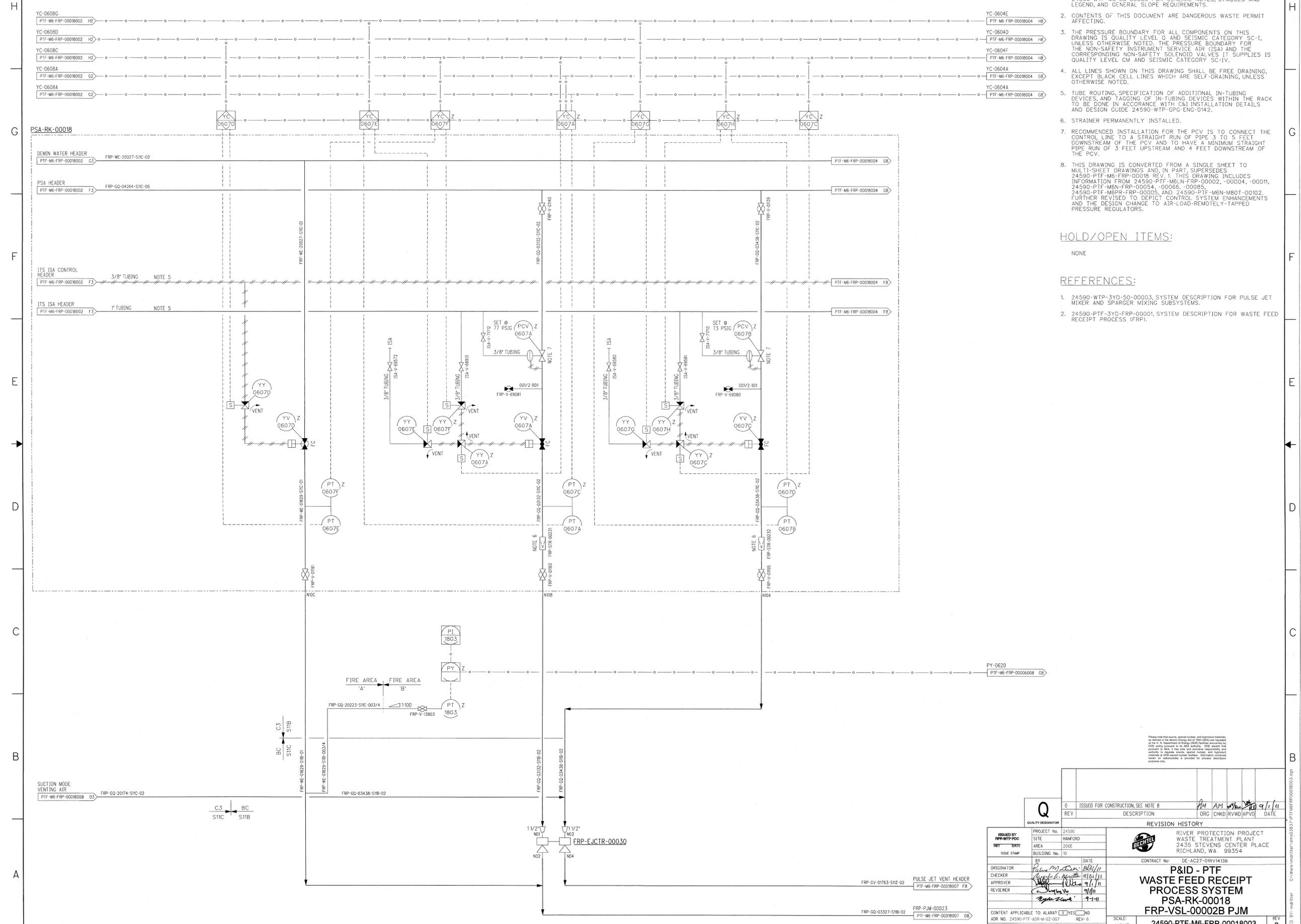
REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note that source, special order, and approved materials, as defined in the General Notes, shall be used in accordance with the Department of Energy (DOE) Radiation Regulatory Commission (NRC) license. The licensee shall be responsible for ensuring that all materials are properly stored, handled, and disposed of in accordance with applicable regulations. Information contained herein on radioactivity is provided for general information only.

ISSUED FOR CONSTRUCTION, SEE NOTE 8		REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE																								
<table border="1"> <thead> <tr> <th colspan="4">REVISION HISTORY</th> </tr> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> <th>BY</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>8/12/11</td> <td>ISSUED FOR CONSTRUCTION, SEE NOTE 8</td> <td>AM</td> </tr> </tbody> </table>									REVISION HISTORY				NO.	DATE	DESCRIPTION	BY	1	8/12/11	ISSUED FOR CONSTRUCTION, SEE NOTE 8	AM												
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REV:	0																															
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COMPUTER GENERATED	MANUAL																															
DESIGN CHANGES NOT PERMITTED																																

FRP-EJCTR-00030  
JET PUMP PAIR  
MODEL 1805K2  
12 IN W x 29 IN L



NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
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- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00018 REV. 1. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6-N-FRP-00002, -00004, -00011, 24590-PTF-M6-N-FRP-00054, -00066, -00085, 24590-PTF-M6PR-FRP-00005, AND 24590-PTF-M6N-M80T-00102. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOAD-REMOTELY-TAPPED PRESSURE REGULATORS.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note that source, special nuclear, and isotopic materials as defined in the Atomic Energy Act of 1954 (AEA) are regulated by the U.S. Department of Energy (DOE) through agreement by DOE and the contractor. It is the contractor's responsibility to ensure that all materials are properly handled, stored, and disposed of in accordance with applicable regulations. The contractor shall be responsible for obtaining all necessary permits and licenses for the handling, storage, and disposal of these materials. The contractor shall also be responsible for ensuring that all personnel are properly trained and qualified to handle these materials. The contractor shall also be responsible for ensuring that all equipment and facilities are properly maintained and operated in accordance with applicable regulations. The contractor shall also be responsible for ensuring that all records are properly maintained and available for review. The contractor shall also be responsible for ensuring that all safety and health hazards are properly identified and controlled. The contractor shall also be responsible for ensuring that all environmental impacts are properly assessed and mitigated. The contractor shall also be responsible for ensuring that all quality control measures are properly implemented and maintained. The contractor shall also be responsible for ensuring that all project goals and objectives are properly achieved. The contractor shall also be responsible for ensuring that all project risks are properly identified and managed. The contractor shall also be responsible for ensuring that all project costs are properly controlled and reported. The contractor shall also be responsible for ensuring that all project schedules are properly maintained and updated. The contractor shall also be responsible for ensuring that all project communications are properly maintained and updated. The contractor shall also be responsible for ensuring that all project documentation is properly maintained and updated. The contractor shall also be responsible for ensuring that all project information is properly protected and controlled. The contractor shall also be responsible for ensuring that all project resources are properly managed and utilized. The contractor shall also be responsible for ensuring that all project performance is properly monitored and evaluated. The contractor shall also be responsible for ensuring that all project issues are properly identified and resolved. The contractor shall also be responsible for ensuring that all project risks are properly identified and managed. The contractor shall also be responsible for ensuring that all project costs are properly controlled and reported. The contractor shall also be responsible for ensuring that all project schedules are properly maintained and updated. The contractor shall also be responsible for ensuring that all project communications are properly maintained and updated. The contractor shall also be responsible for ensuring that all project documentation is properly maintained and updated. The contractor shall also be responsible for ensuring that all project information is properly protected and controlled. The contractor shall also be responsible for ensuring that all project resources are properly managed and utilized. The contractor shall also be responsible for ensuring that all project performance is properly monitored and evaluated. The contractor shall also be responsible for ensuring that all project issues are properly identified and resolved.

ISSUED FOR CONSTRUCTION, SEE NOTE 8		DATE	9/1/11
REV	DESCRIPTION	ORG	CHKD
0		AM	AM

REVISION HISTORY			
NO.	DESCRIPTION	DATE	BY
1	ISSUED FOR CONSTRUCTION, SEE NOTE 8	9/1/11	AM

ISSUED BY	PROJECT NO.	24590
DATE	SITE	MANFORD
ISSUE STAMP	AREA	200E
	BUILDING NO.	10
ORIGINATOR	BY	DATE
CHECKER	APPROVER	9/1/11
REVIEWER	DATE	9/1/11
	DATE	9/1/11

CONTRACT NO.	DE-AC27-01RV14136
RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354	
P&ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM PSA-RK-00018 FRP-VSL-00002B PJM	
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24590-PTF-M6-FRP-00018003	REV 0

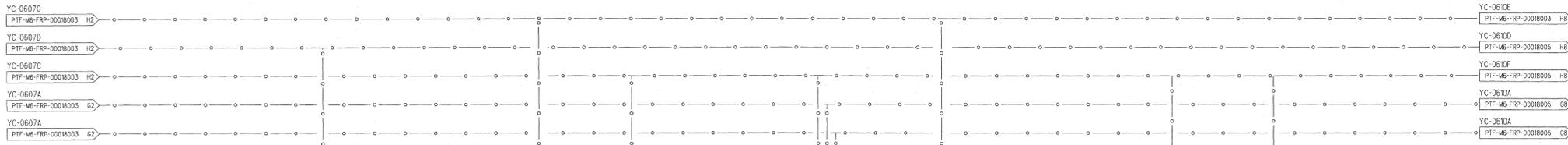
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SCREENING IS REQUIRED FOR DRAWING: YES IDENTIFIED IN 24590-WTP-GPP-SREC-002

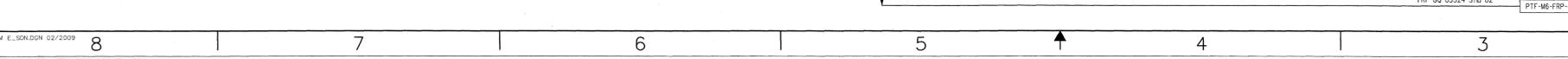
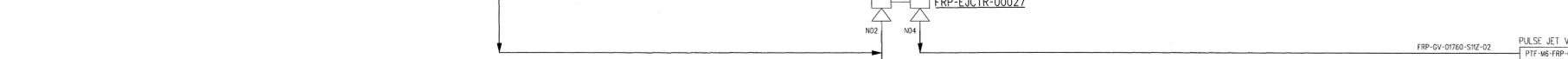
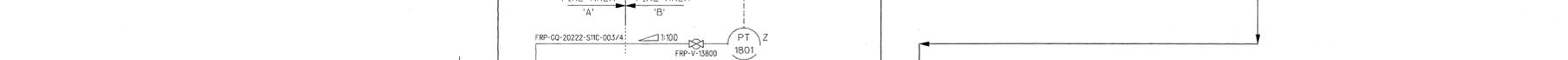
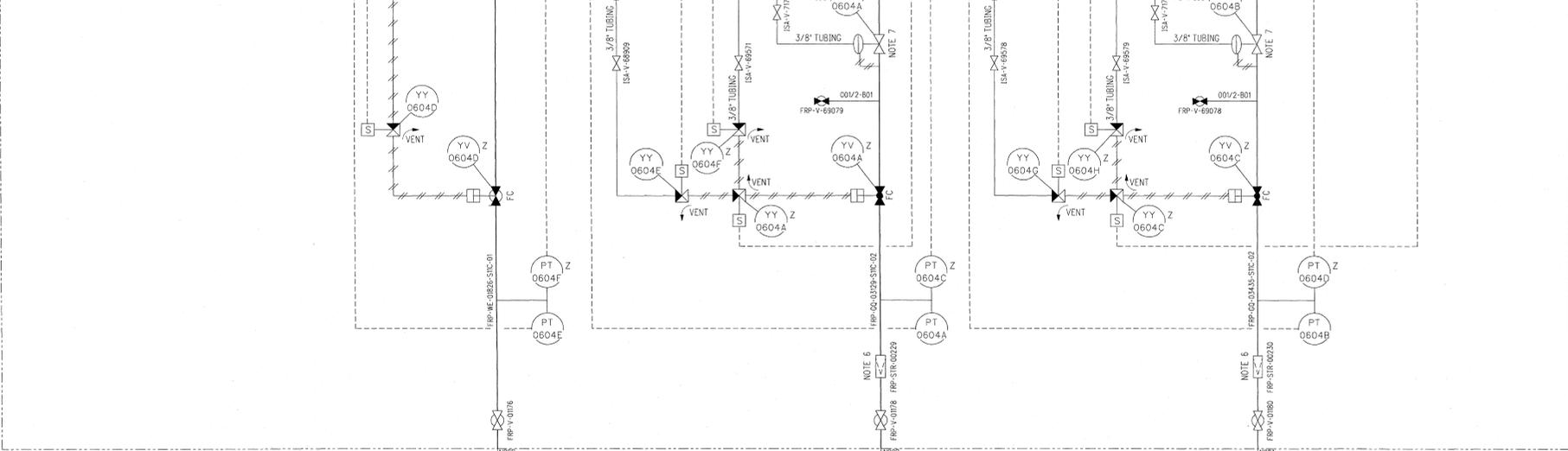
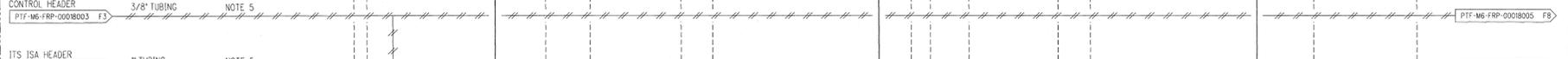
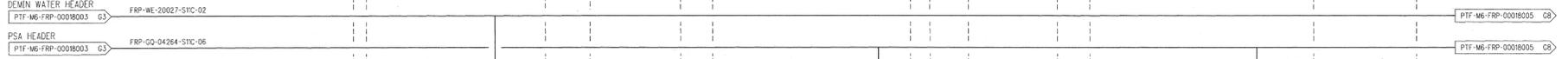
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

8/30/2011 2:51:34 PM

ERP-EJCTR-00027  
JET PUMP PAIR  
MODEL 1805K2  
12 IN W X 29 IN L



PSA-RK-00018



NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
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- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00018 REV. 1. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6-FRP-00002, -00004, -00011, 24590-PTF-M6-FRP-00054, -00066, -00085, 24590-PTF-M6-FRP-00005, AND 24590-PTF-M6-FRP-00102. FURTHER REVISED TO DEFECT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOAD-REMOTELY-TAPPED PRESSURE REGULATORS.

HOLD/OPEN ITEMS:

NONE

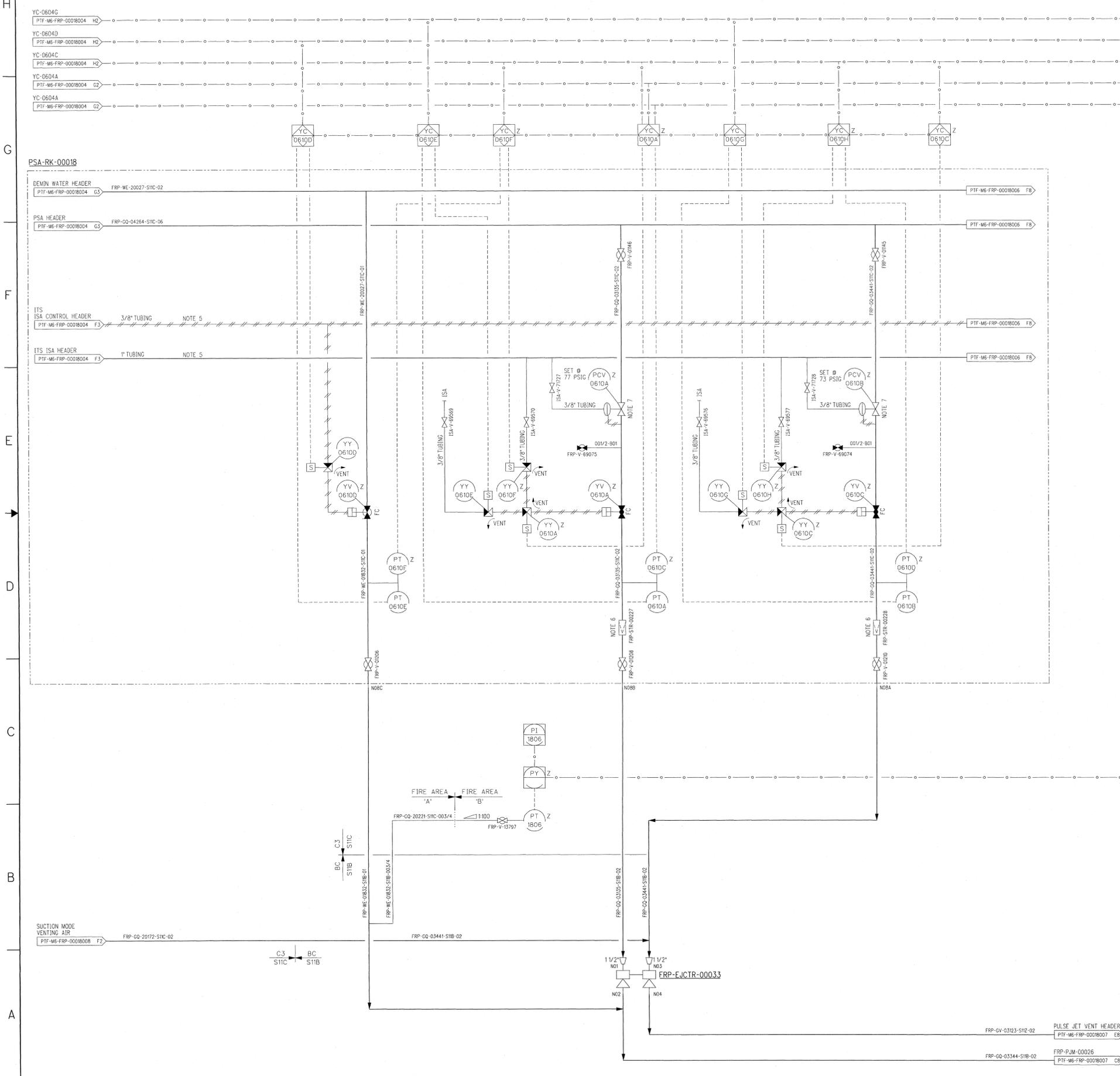
REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE SET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note that neither specific names nor product materials are shown in this drawing. It is the responsibility of the contractor to verify that the materials and equipment used are of the same quality and quantity as specified in the drawing. The contractor shall be responsible for obtaining the necessary permits and approvals for the installation and operation of the equipment shown in this drawing.

<p><b>Q</b></p> <p>ISSUED FOR CONSTRUCTION, SEE NOTE 8</p>		<p>DATE: 9/1/11</p> <p>BY: AN</p>														
<p>REVISION HISTORY</p> <table border="1"> <thead> <tr> <th>REV</th> <th>DESCRIPTION</th> <th>ORG</th> <th>CHKD</th> <th>RVWD</th> <th>APVD</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>ISSUED FOR CONSTRUCTION, SEE NOTE 8</td> <td></td> <td></td> <td></td> <td></td> <td>9/1/11</td> </tr> </tbody> </table>			REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE	0	ISSUED FOR CONSTRUCTION, SEE NOTE 8					9/1/11
REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE										
0	ISSUED FOR CONSTRUCTION, SEE NOTE 8					9/1/11										
<p>PROJECT No. 24590</p> <p>SITE HANFORD</p> <p>AREA 200E</p> <p>BUILDING No. 10</p> <p>DATE 8/12/11</p> <p>ORIGINATOR [Signature]</p> <p>CHECKER [Signature]</p> <p>APPROVER [Signature]</p> <p>REVIEWER [Signature]</p>	<p>CONTRACT No. DE-AC27-01RV14136</p> <p>RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354</p> <p><b>P&amp;ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM PSA-RK-00018 FRP-VSL-00002B PJM</b></p>	<p>SCALE: NONE</p> <p>REV: 6</p> <p>REV: 0</p>														
<p>CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>ADR NO. 24590-PTF-ADR-M-02-007</p> <p>EMG SCREENING REQUIRED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>EMG INITIAL, IF YES: [ ]</p> <p>COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED</p>																

FRP-E-JCTR-00033  
JET PUMP PAIR  
MODEL H805X2  
12 IN W x 29 IN L



NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
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- STRAINER PERMANENTLY INSTALLED.
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HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

YC-0609E  
PTF-M6-FRP-00018006 H8

YC-0609D  
PTF-M6-FRP-00018006 H8

YC-0609F  
PTF-M6-FRP-00018006 H8

YC-0609A  
PTF-M6-FRP-00018006 C8

YC-0609B  
PTF-M6-FRP-00018006 C8

PTF-M6-FRP-00018006 F8

PTF-M6-FRP-00018006 F8

PTF-M6-FRP-00018006 F8

PTF-M6-FRP-00018006 F8

PTF-M6-FRP-00018006 F8

PY-0620  
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FRP-GV-03123-S1Z-02 PULSE JET VENT HEADER  
PTF-M6-FRP-00018007 E8

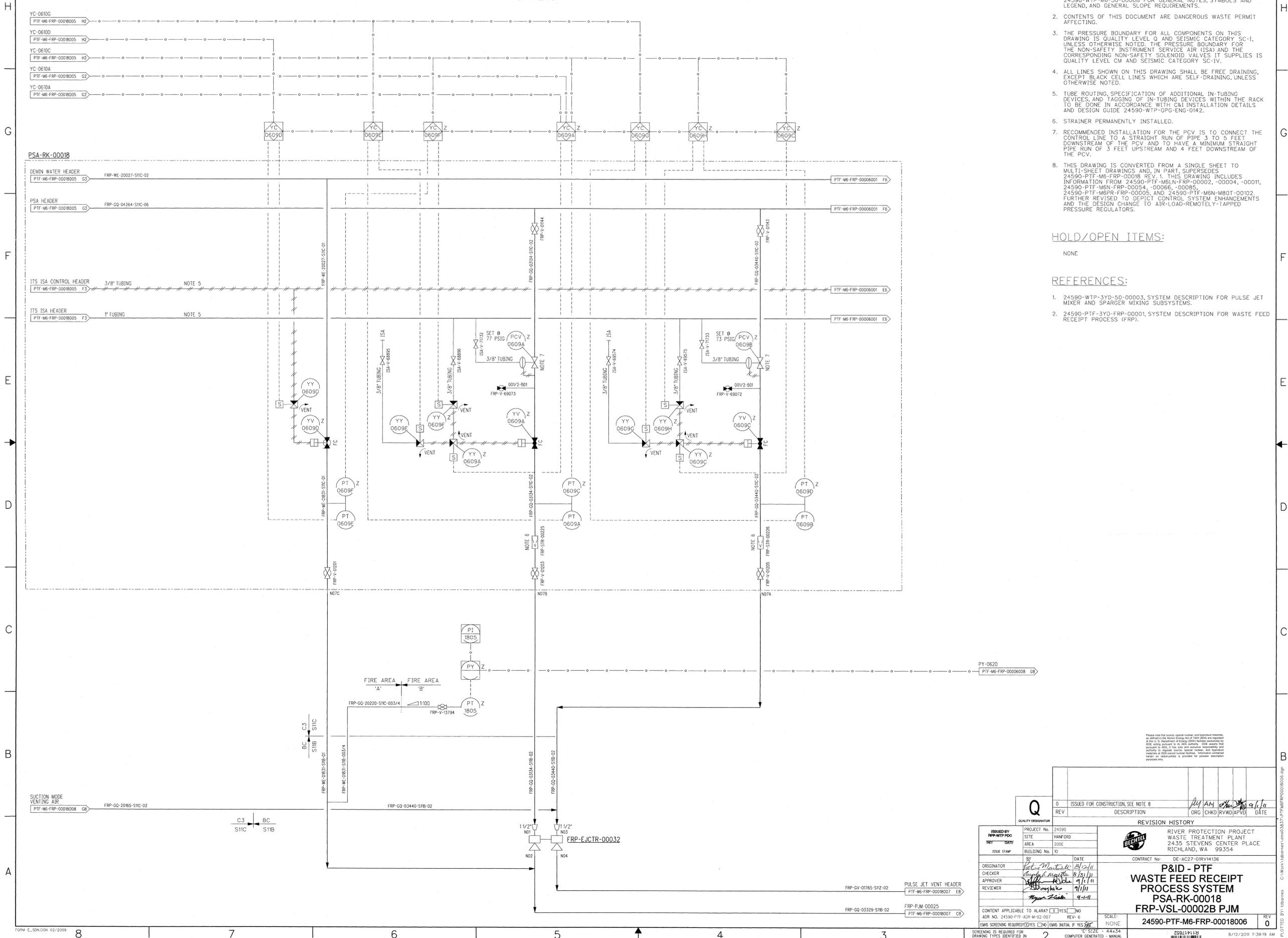
FRP-PJM-00026  
PTF-M6-FRP-00018007 C8

Please note that source, special valves, and equipment materials are indicated in the notes. Drawing title and project number are indicated at the top. A legend of symbols is provided at the bottom. The drawing is subject to change without notice. Information contained herein is not intended to be used for any purpose other than that for which it was prepared.

ISSUED BY FRP-WTP PDC	PROJECT No.	24590
	SITE	HANFORD
DATE	AREA	200E
ISSUE Stamp	BUILDING No.	10
ORIGINATOR	DATE	
CHECKER	DATE	
APPROVER	DATE	
REVIEWER	DATE	
CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
ADR NO. 24590-PTF-ADR-M-02-007 REV: 6		
SCALE: 1/4"=1'-0"		
EMG SCREENING REQUIRED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
COMPUTER GENERATED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		

Q	0	ISSUED FOR CONSTRUCTION, SEE NOTE 8	REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE																		
<table border="1"> <tr> <th colspan="2">REVISION HISTORY</th> </tr> <tr> <td>PROJECT No.</td> <td>24590</td> </tr> <tr> <td>SITE</td> <td>HANFORD</td> </tr> <tr> <td>AREA</td> <td>200E</td> </tr> <tr> <td>BUILDING No.</td> <td>10</td> </tr> <tr> <td>CONTRACT No.</td> <td>DE-AC27-01RVM136</td> </tr> <tr> <td colspan="2"> <b>P&amp;ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM PSA-RK-00018 FRP-VSL-00002B PJM</b> </td> </tr> <tr> <td>PROJECT No.</td> <td>24590-PTF-M6-FRP-00018005</td> </tr> <tr> <td>REV</td> <td>0</td> </tr> </table>										REVISION HISTORY		PROJECT No.	24590	SITE	HANFORD	AREA	200E	BUILDING No.	10	CONTRACT No.	DE-AC27-01RVM136	<b>P&amp;ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM PSA-RK-00018 FRP-VSL-00002B PJM</b>		PROJECT No.	24590-PTF-M6-FRP-00018005	REV	0
REVISION HISTORY																											
PROJECT No.	24590																										
SITE	HANFORD																										
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PROJECT No.	24590-PTF-M6-FRP-00018005																										
REV	0																										

FRP-EJCTR-00032  
JET PUMP PAIR  
MODEL H805K2  
12 IN W X 29 IN L



NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
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HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note that source, special number, and product number as defined in the Atomic Energy Act of 1954 (AEA) are registered at the U.S. Department of Energy (DOE) and are the property of DOE. Any person who uses, reproduces, or disseminates any information from this drawing without the express written permission of DOE is in violation of the AEA. It is the policy of DOE to ensure the safety and security of nuclear facilities, information contained herein, and the protection of the public. Information contained herein is not to be used for any other purpose without the express written permission of DOE.

<p><b>Q</b></p> <p>ISSUED FOR CONSTRUCTION, SEE NOTE 8</p>		<p>REV</p> <p>DESCRIPTION</p> <p>ORG CHKD RWD/APVD</p> <p>DATE</p>
<p>REVISION HISTORY</p>		
<p>ISSUED BY: FRP-WTP-PDC</p> <p>DATE: 8/12/11</p>	<p>PROJECT No: 24590</p> <p>SITE: HANFORD</p> <p>AREA: 200E</p> <p>BUILDING No: 10</p>	<p>CONTRACT No: DE-AC27-01RV14136</p> <p>RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354</p>
<p>ORIGINATOR: <i>Pat Martelli</i></p> <p>CHECKER: <i>Angela M. ...</i></p> <p>APPROVER: <i>W. ...</i></p> <p>REVIEWER: <i>W. ...</i></p>	<p>DATE: 8/12/11</p> <p>DATE: 9/1/11</p> <p>DATE: 9-1-11</p>	<p>P&amp;ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM PSA-RK-00018 FRP-VSL-00002B PJM</p>
<p>CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>ADR NO. 24590-PTF-ADR-M-02-007</p> <p>EMIS SCREENING REQUIRED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>EMIS INITIAL IF YES: <i>SA</i></p>	<p>SCALE: NONE</p> <p>24590-PTF-M6-FRP-00018006</p>	<p>REV: 6</p> <p>REV: 0</p>



NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
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- REFER TO DRAWING 24590-PTF-M6-FRP-00001002 FOR PROCESS VESSEL.
- THE BALANCE OF THE PJM FOR FRP-VSL-00002B CONTINUE ON 24590-PTF-M6-FRP-00006007.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00018 REV 1.

HOLD/OPEN ITEMS:

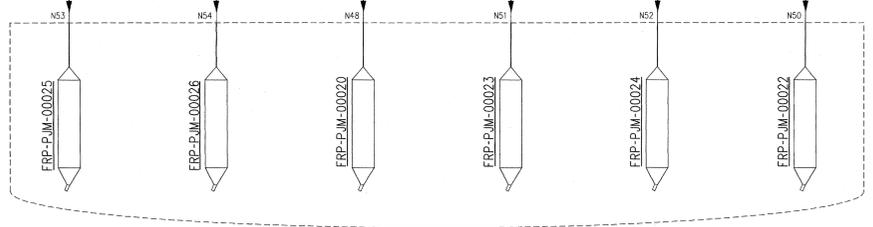
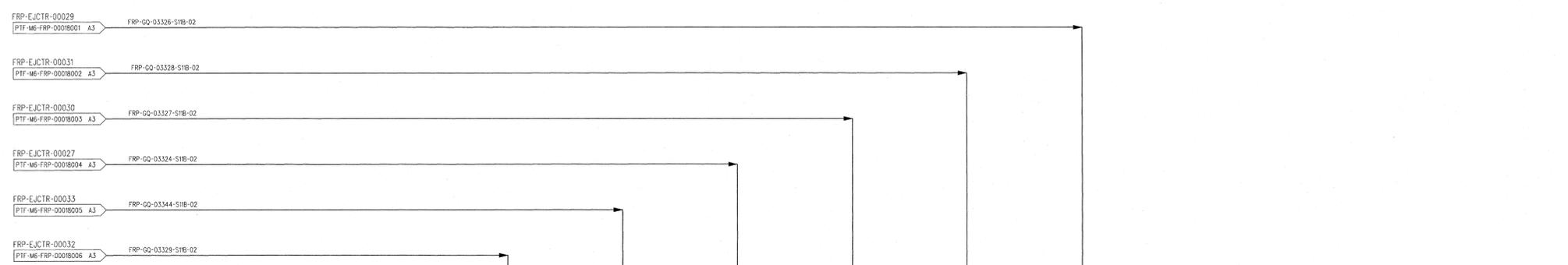
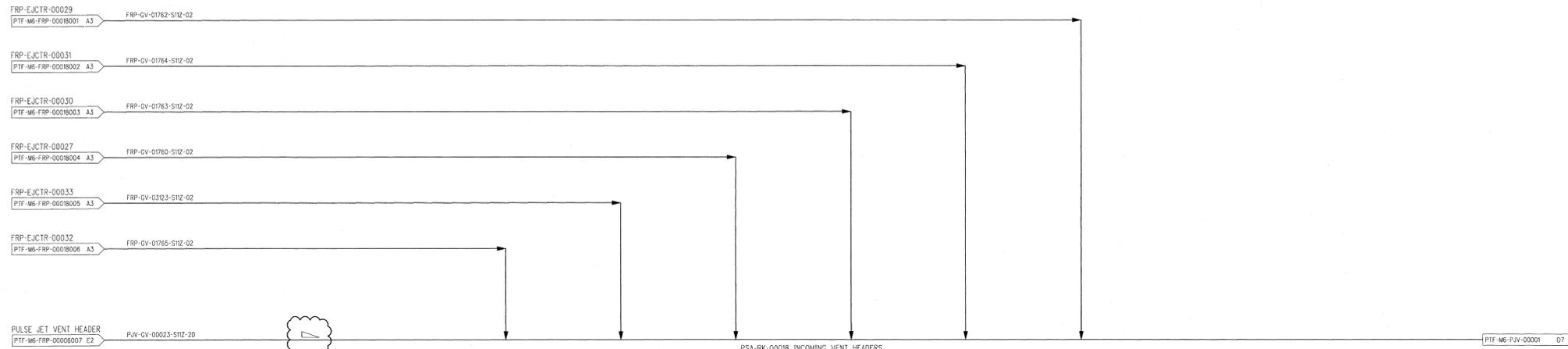
NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

H  
G  
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E  
D  
C  
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A

H  
G  
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E  
D  
C  
B  
A



FRP-VSL-00002B  
6 OF 12 PJM PSA-RK-00018  
NOTES 5, 6

Please note that certain special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA) are regulated as defined in the Department of Energy (DOE) regulations promulgated by the DOE under the authority of the AEA, 10 CFR 401.2 and 401.6, and are subject to the requirements of 10 CFR 401.2 and 401.6, and are subject to the requirements of 10 CFR 401.2 and 401.6, and are subject to the requirements of 10 CFR 401.2 and 401.6.

<b>Q</b> ISSUED FOR CONSTRUCTION SEE NOTE 7 REV DESCRIPTION ORG CHKD [RVWD] [APVD] DATE		PROJECT No. 24590 SITE HANFORD AREA 200E BUILDING No. 10	
ORIGINATOR: <i>John M. ...</i> CHECKER: <i>...</i> APPROVER: <i>...</i> REVIEWER: <i>...</i>		CONTRACT No. DE-AC27-01RV14136 <b>P&amp;ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM FRP-VSL-00002B PJM AND VENT HEADER</b> 24590-PTF-M6-FRP-00018007	
CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO ADR NO. 24590-PTF-ADR-M-02-007 REV. 6 EHS SCREENING REQUIRED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO [EHS INITIAL IF YES]		SCALE: NONE 24590-PTF-M6-FRP-00018007 REV 0	
SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GRP-SPEC-002		COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED 8/12/2011 7:40:37 AM PLOTTED BY: labarbes	

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NOTES:

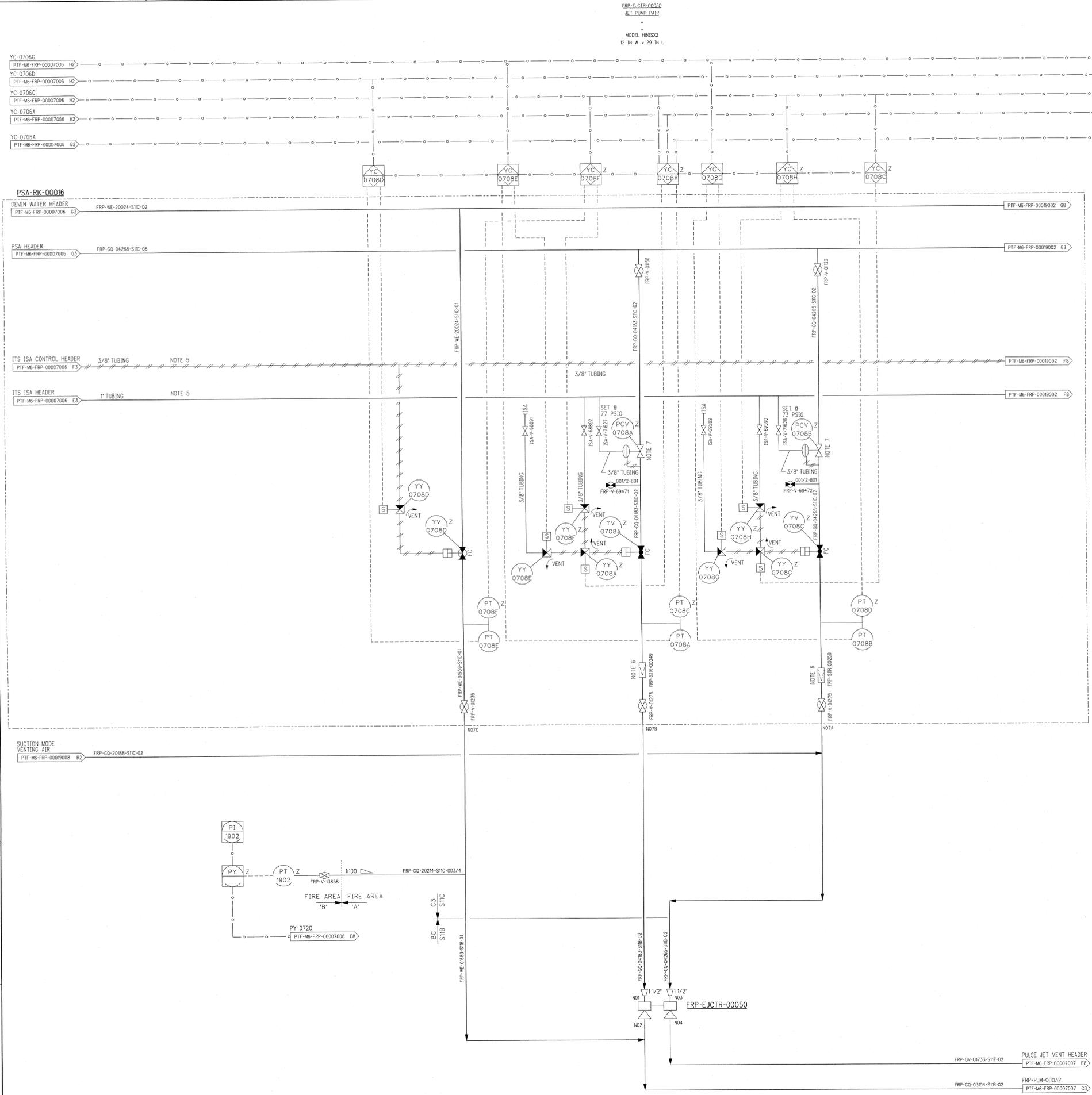
- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL D AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00019 REV. 1. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-FRP-00055, -00066, -00086, 24590-PTF-M6N-FRP-00007, -00010, -00011, AND 24590-PTF-M6N-M80T-00102. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR THE WASTE FEED RECEIPT PROCESS (FRP).



YC-0710E  
PTF-M6-FRP-00019002 HB

YC-0710D  
PTF-M6-FRP-00019002 HB

YC-0710F  
PTF-M6-FRP-00019002 HB

YC-0710A  
PTF-M6-FRP-00019002 HB

YC-0710A  
PTF-M6-FRP-00019002 GB

PTF-M6-FRP-00019002 GB

PTF-M6-FRP-00019002 GB

PTF-M6-FRP-00019002 FB

PTF-M6-FRP-00019002 FB

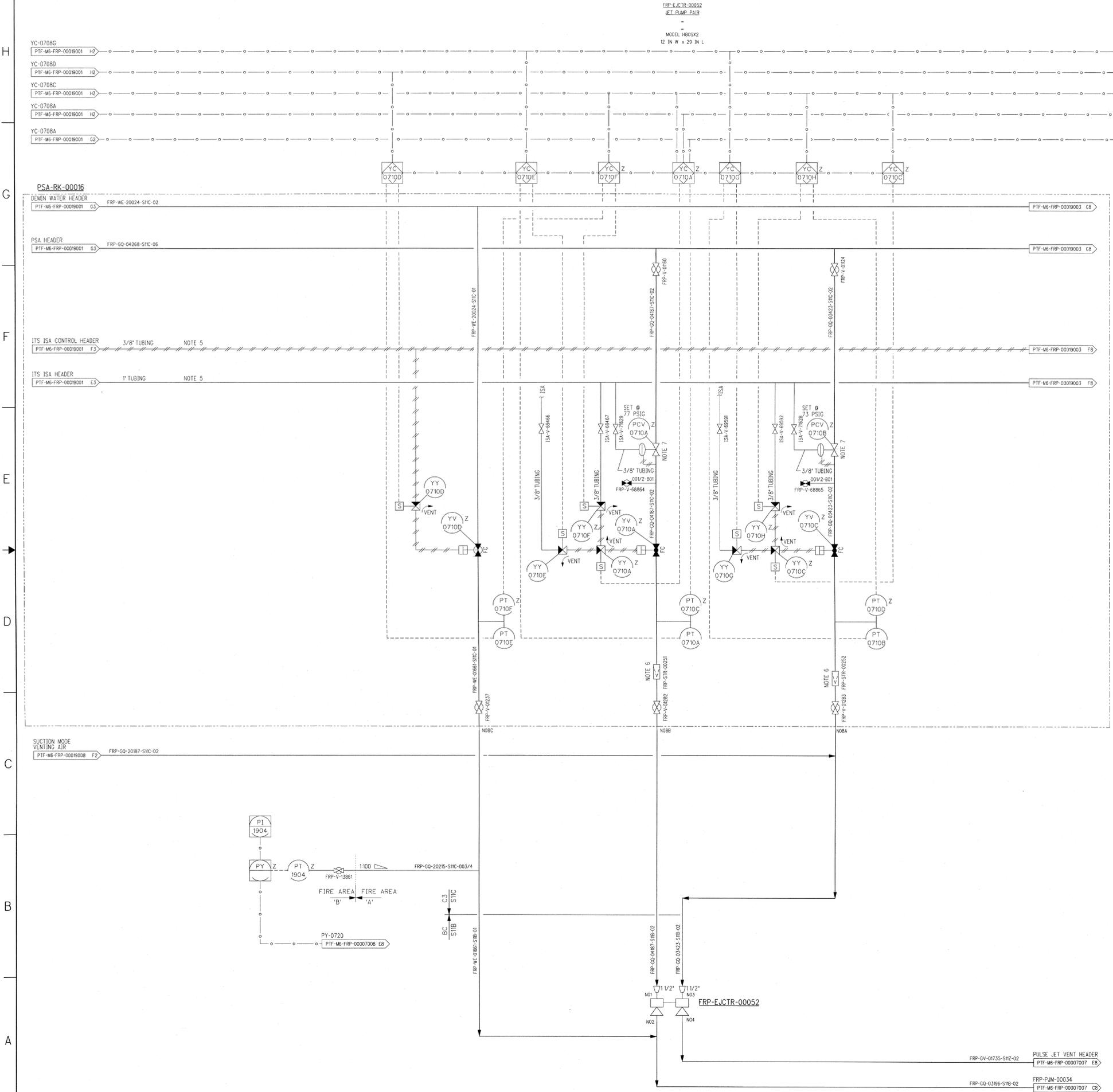
Please note that manual, special order, and optional materials are not included in the scope of this drawing. All materials are required to be of the same quality as specified in the drawing. The manufacturer of any material or equipment shown on this drawing is not responsible for the design or construction of the system. The manufacturer of any material or equipment shown on this drawing is not responsible for the design or construction of the system.

DWG NO	TITLE
24590-PTF-M6-FRP-00019001	FRP SYS PSA-RK-00016 FRP-VSL-00002C PJM
24590-PTF-M6-FRP-00019002	FRP SYS PSA-RK-00016 FRP-VSL-00002C PJM
24590-PTF-M6-FRP-00019003	FRP SYS PSA-RK-00016 FRP-VSL-00002C PJM
24590-PTF-M6-FRP-00019004	FRP SYS PSA-RK-00016 FRP-VSL-00002C PJM
24590-PTF-M6-FRP-00019005	FRP SYS PSA-RK-00016 FRP-VSL-00002C PJM
24590-PTF-M6-FRP-00019006	FRP SYS PSA-RK-00016 FRP-VSL-00002C PJM
24590-PTF-M6-FRP-00019007	FRP-VSL-00002C PJM AND VENT HEADER
24590-PTF-M6-FRP-00019008	FRP-VSL-00002C SMV MOTIVE AIR HEADER

REV	DESCRIPTION	ORG	CHKD	RWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 8					9/1/11

QUALITY ASSURANCE		REVISION HISTORY	
ISSUED BY	PROJECT NO.	DATE	CONTRACT NO.
CHKD BY	SITE		
DATE	AREA		
BUILDING NO.			
BY	DATE		
ORIGINATOR			
CHECKER			
APPROVER			
REVIEWER			

CONTENT APPLICABLE TO ALARAY?  YES  NO  
 ADR NO. 24590-PTF-ADR-M-02-007 REV. 4  
 [THIS SCREENING REQUIRED]  YES  NO INITIAL # YES/NO  
 SCALE: NONE  
 24590-PTF-M6-FRP-00019001  
 R1417701  
 8/30/2011 2:58:20 PM  
 PLOTTED BY: mdrftr



NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF PCV.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00019 REV. 1. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-FRP-00055, -00066, -00085, 24590-PTF-M6N-FRP-00002, -00010, -00011, AND 24590-PTF-M6N-M801-00102. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

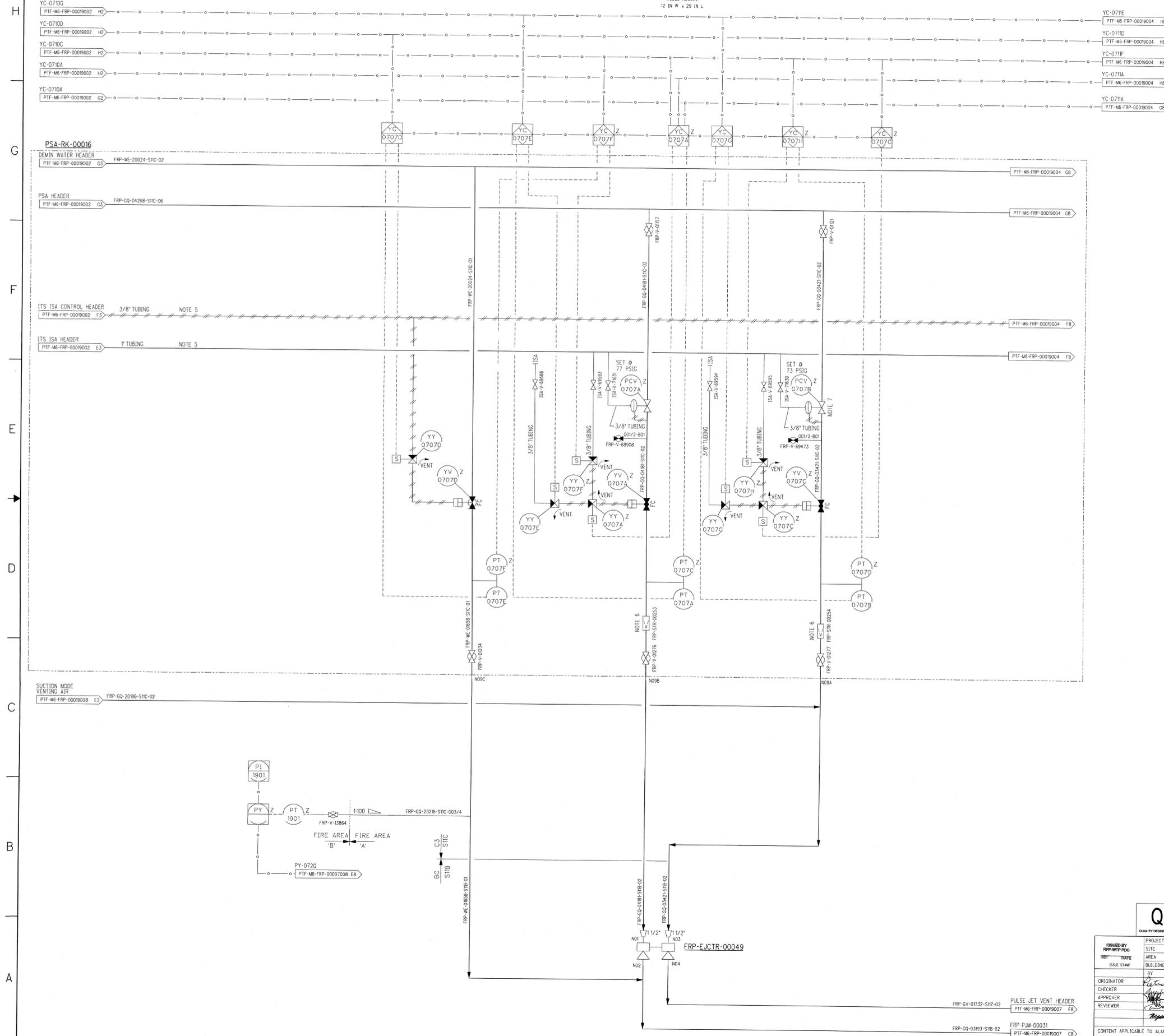
HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-FRP-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR THE WASTE FEED RECEIPT PROCESS (FRP).

<b>Q</b> ISSUED FOR CONSTRUCTION, SEE NOTE 8 REV: 0 DESCRIPTION: RIVER PROTECTION PROJECT WASTE TREATMENT PLANT AREA: 200E BUILDING No: 10 CONTRACT No: DE-AC27-01RV14138 DATE: 9/1/11																	
PROJECT No: 24590 SITE: HANFORD AREA: 200E BUILDING No: 10 CONTRACT No: DE-AC27-01RV14138 P&ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM PSA-RK-0016 FRP-VSL-00002C PJM SCALE: NONE 24590-PTF-M6-FRP-00019002 REV: 0	REVISION HISTORY <table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> <th>ORG</th> <th>CHKD</th> <th>RVND</th> <th>APVD</th> <th>DATE</th> </tr> <tr> <td>0</td> <td></td> <td>ISSUED FOR CONSTRUCTION, SEE NOTE 8</td> <td></td> <td></td> <td></td> <td></td> <td>9/1/11</td> </tr> </table>	NO.	DATE	DESCRIPTION	ORG	CHKD	RVND	APVD	DATE	0		ISSUED FOR CONSTRUCTION, SEE NOTE 8					9/1/11
NO.	DATE	DESCRIPTION	ORG	CHKD	RVND	APVD	DATE										
0		ISSUED FOR CONSTRUCTION, SEE NOTE 8					9/1/11										
ISSUED BY: PTF-M6-FRP-00019002 DATE: 9/1/11 CHECKER: [Signature] APPROVER: [Signature] REVIEWER: [Signature]	PROJECT No: 24590 SITE: HANFORD AREA: 200E BUILDING No: 10 CONTRACT No: DE-AC27-01RV14138 P&ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM PSA-RK-0016 FRP-VSL-00002C PJM SCALE: NONE 24590-PTF-M6-FRP-00019002 REV: 0																



NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
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- STRAINER PERMANENTLY INSTALLED.
- RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00019004 REV 1. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-FRP-000055, -000066, -000085, 24590-PTF-M6N-FRP-00002, -00010, -00011, AND 24590-PTF-M6N-WB01-00102. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

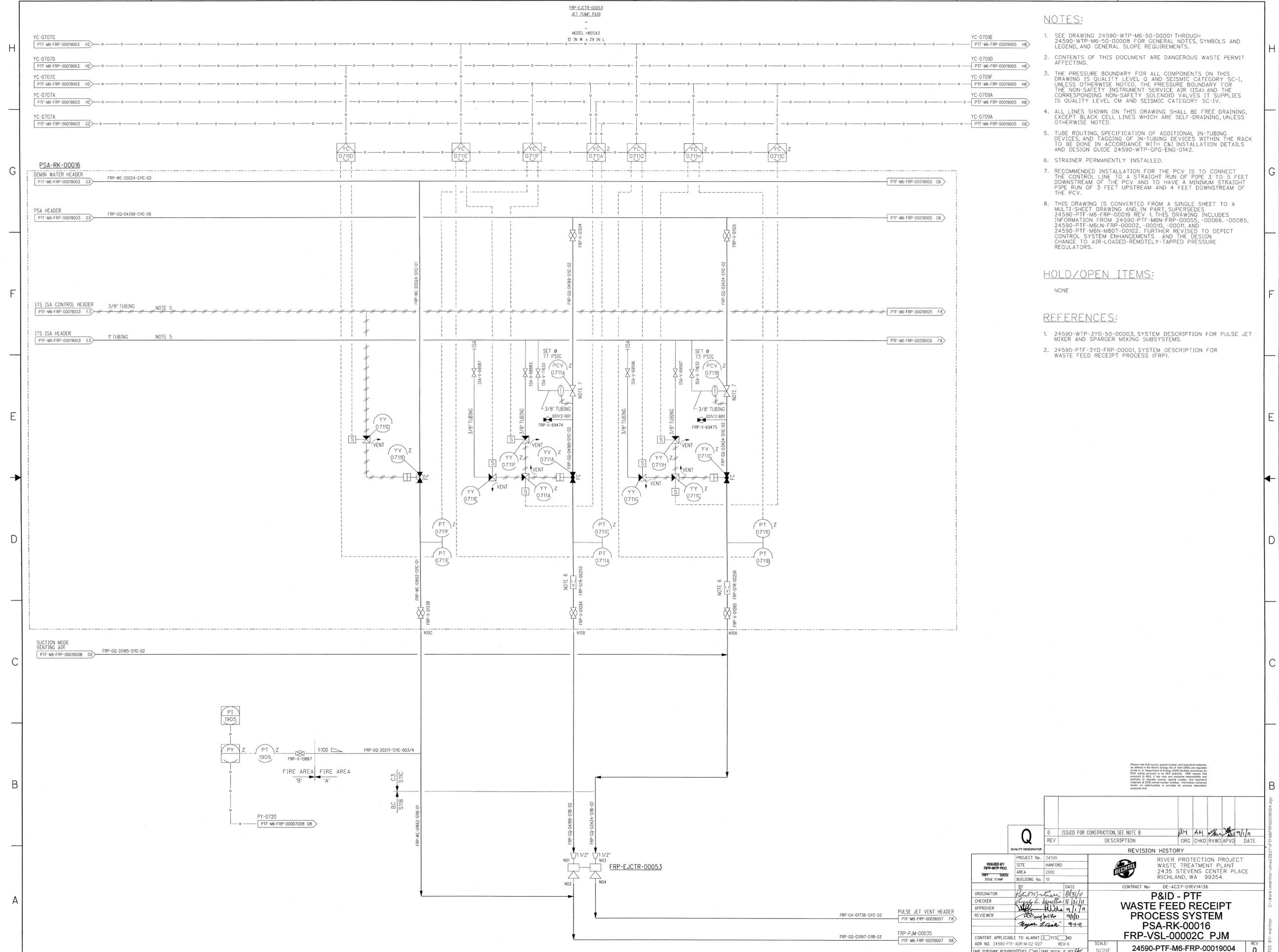
HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

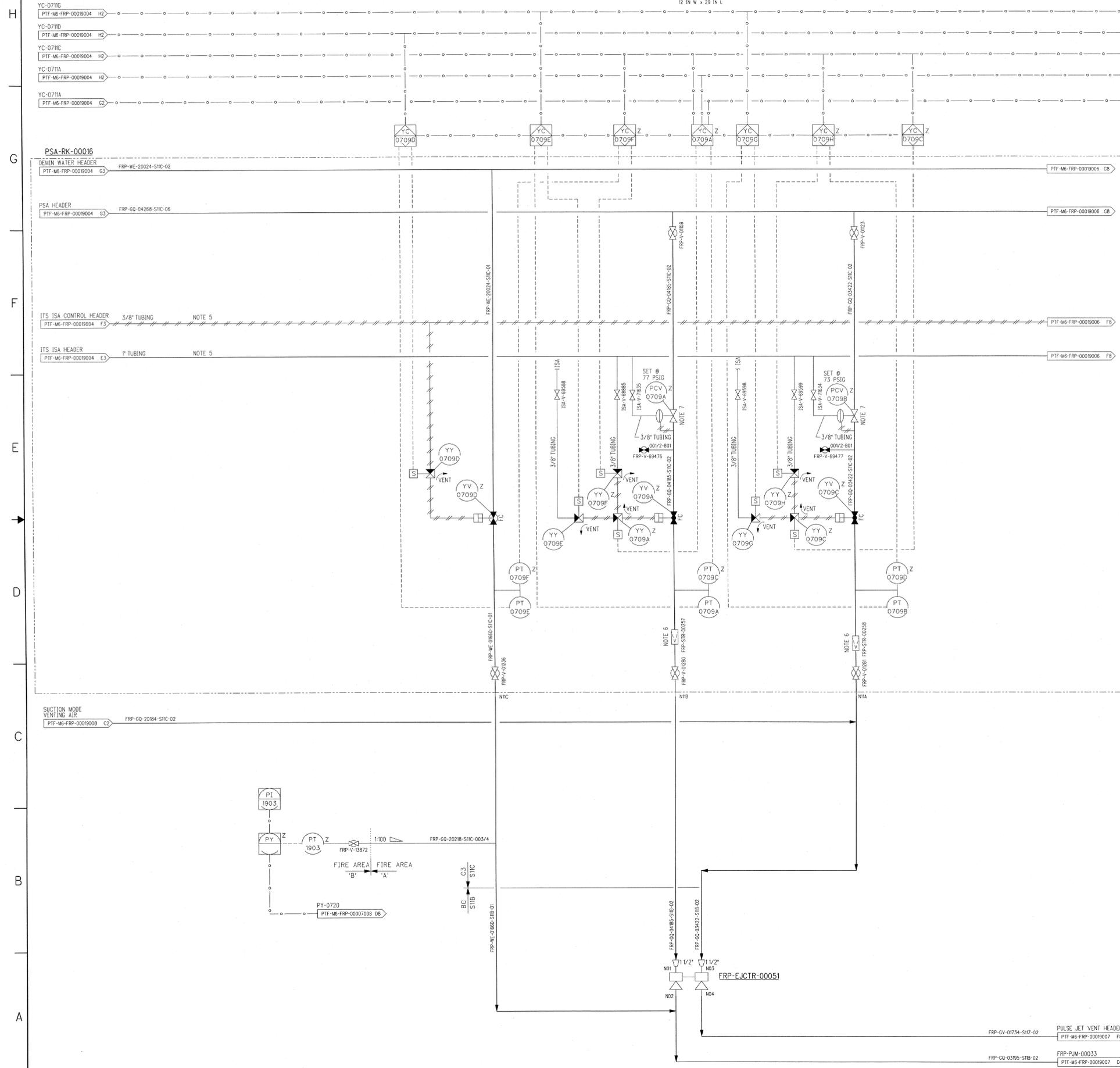
<b>Q</b> QUALITY DESIGNATOR		PROJECT No. 24590 SITE HANFORD AREA 200E BUILDING No. 10		RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354	
ISSUED FOR CONSTRUCTION SEE NOTE 8 0 AM 9/1/14		REVISION HISTORY		CONTRACT No. DE-AC27-01R14136	
ORIGINATOR: Peter Masten CHECKER: [Signature] APPROVER: [Signature] REVIEWER: [Signature]		DATE: 9/1/14 DATE: 9/1/14 DATE: 9/1/14		P&ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM PSA-RK-00016 FRP-VSL-00002C PJM	
CONTENT APPLICABLE TO ALABAMA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO ADR NO. 24590-PTF-ADR-M-02-007 REV 6		SCALE: NONE		24590-PTF-M6-FRP-00019003	
SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPG-SRES-002		E' SIZE 44x34 COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED		8/8/2011 10:50:28 AM R11417703	



- NOTES:**
- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
  - CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
  - THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
  - ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
  - TUBE ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH E&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
  - STRAINER PERMANENTLY INSTALLED.
  - RECOMMENDED INSTALLATION FOR THE PCV IS TO CONNECT THE CONTROL LINE TO A STRAIGHT RUN OF PIPE 3 TO 5 FEET DOWNSTREAM OF THE PCV AND TO HAVE A MINIMUM STRAIGHT PIPE RUN OF 3 FEET UPSTREAM AND 4 FEET DOWNSTREAM OF THE PCV.
  - THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00019 REV 1. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-FRP-00005, -00006, -00008, 24590-PTF-M6N-FRP-00010, -00011, -00012 AND 24590-PTF-M6N-M80T-00102. FURTHER REVISED TO DEPICT CONTROL SYSTEM ENHANCEMENTS AND THE DESIGN CHANGE TO AIR-LOADED-REMOTELY-TAPPED PRESSURE REGULATORS.

- HOLD/OPEN ITEMS:**
- NONE
- REFERENCES:**
- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
  - 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

<p><b>Q</b> QUALITY DESIGNATOR</p>		<p>0 ISSUED FOR CONSTRUCTION, SEE NOTE 8</p>		<p>REV: 01/11</p>
<p>ISSUED BY: PTF-M6-FRP-00019007</p>		<p>PROJECT No. 24590</p>		<p>DATE: 01/11</p>
<p>CHECKER: [Signature]</p>		<p>SITE: HANFORD</p>		<p>DATE: 01/11</p>
<p>APPROVER: [Signature]</p>		<p>AREA: 200E</p>		<p>DATE: 01/11</p>
<p>REVIEWER: [Signature]</p>		<p>BUILDING No. 10</p>		<p>DATE: 01/11</p>
<p>CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p>		<p>CONTRACT No. DE-AC27-01R14136</p>		<p>DATE: 01/11</p>
<p>DRAWING TYPE IDENTIFIED IN 24590-WTP-GPG-SPEC-002</p>		<p>RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354</p>		<p>DATE: 01/11</p>
<p>SCALE: NONE</p>		<p><b>P&amp;ID - PTF WASTE FEED RECEIPT PROCESS SYSTEM PSA-RK-00016 FRP-VSL-00002C PJM</b></p>		<p>DATE: 01/11</p>
<p>24590-PTF-M6-FRP-00019004</p>		<p>SCALE: 4.4 x 3.4</p>		<p>DATE: 01/11</p>
<p>DESIGN CHANGES NOT PERMITTED</p>		<p>8/30/2011 3:02:01 PM</p>		<p>DATE: 01/11</p>



NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I. UNLESS OTHERWISE NOTED, THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
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HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEMS.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

Please note that this drawing, special notes, and approval records, as defined in the Atomic Energy Act of 1954 (AEA) are regulated under the U.S. Department of Energy (DOE) license provisions by license number 24590-PTF-M6-FRP-00019. This drawing is the property of BECHTEL and is loaned to you for your use only. It is not to be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the prior written permission of BECHTEL. Information contained herein is confidential and is to be controlled in accordance with the provisions of the license.

REVISION HISTORY		REVISION HISTORY	
REV	DESCRIPTION	ORG	CHKD/RVWD/APVD
0	ISSUED FOR CONSTRUCTION, SEE NOTE 8	AM	9/1/11

ISSUED BY PTF-M6-FRP-00019005	PROJECT No. 24590	RIVER PROTECTION PROJECT	
DATE 9/1/11	SITE HANFORD	WASTE TREATMENT PLANT	
BY [Signature]	AREA 200E	2435 STEVENS CENTER PLACE	
CHECKER [Signature]	BUILDING No. 30	RICHLAND, WA 99354	
APPROVER [Signature]	DATE 9/1/11	CONTRACT No. DE-AC27-01RV14136	
REVIEWER [Signature]	DATE 9-1-11	P&ID - PTF	
		WASTE FEED RECEIPT	
		PROCESS SYSTEM	
		PSA-RK-00016	
		FRP-VSL-00002C PJM	
CONTENT APPLICABLE TO ALARMS <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	SCALE NONE	24590-PTF-M6-FRP-00019005	
FOR NO. 24590-PTF-M6-FRP-00019 REV 1	REVISIONS	REV 0	
ENS SCREENING REQUIRED <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	ENS INITIAL IF YES <input type="checkbox"/>	R11417708	



FRP-PJM-00032 PULSE_JET_MIXER 154 GAL 54 IN (ID) X 195 IN (OD) L	FRP-PJM-00034 PULSE_JET_MIXER 154 GAL 54 IN (ID) X 195 IN (OD) L	FRP-PJM-00031 PULSE_JET_MIXER 154 GAL 54 IN (ID) X 195 IN (OD) L	FRP-PJM-00035 PULSE_JET_MIXER 154 GAL 54 IN (ID) X 195 IN (OD) L	FRP-PJM-00033 PULSE_JET_MIXER 154 GAL 54 IN (ID) X 195 IN (OD) L	FRP-PJM-00036 PULSE_JET_MIXER 154 GAL 54 IN (ID) X 195 IN (OD) L
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NOTES:

- SEE DRAWING 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DRAWING ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-1, UNLESS OTHERWISE NOTED.
- ALL LINES SHOWN ON THIS DRAWING ARE BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
- REFER TO DRAWING 24590-PTF-M6-FRP-00002001 FOR PROCESS VESSEL.
- THE BALANCE OF THE PJM FOR FRP-VSL-00002C CONTINUE ON 24590-PTF-M6-FRP-00007007.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-PTF-M6-FRP-00019 1.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-WTP-3YD-50-00003, SYSTEM DESCRIPTION FOR PULSE JET MIXER AND SPARGER MIXING SUBSYSTEM.
- 24590-PTF-3YD-FRP-00001, SYSTEM DESCRIPTION FOR WASTE FEED RECEIPT PROCESS (FRP).

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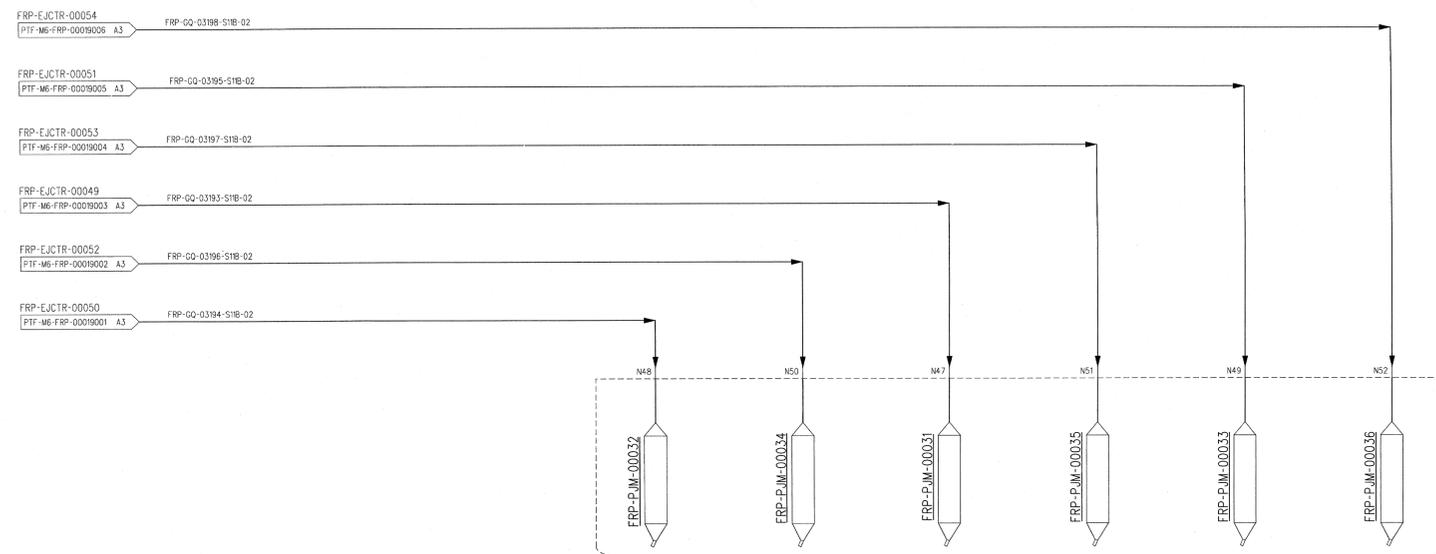
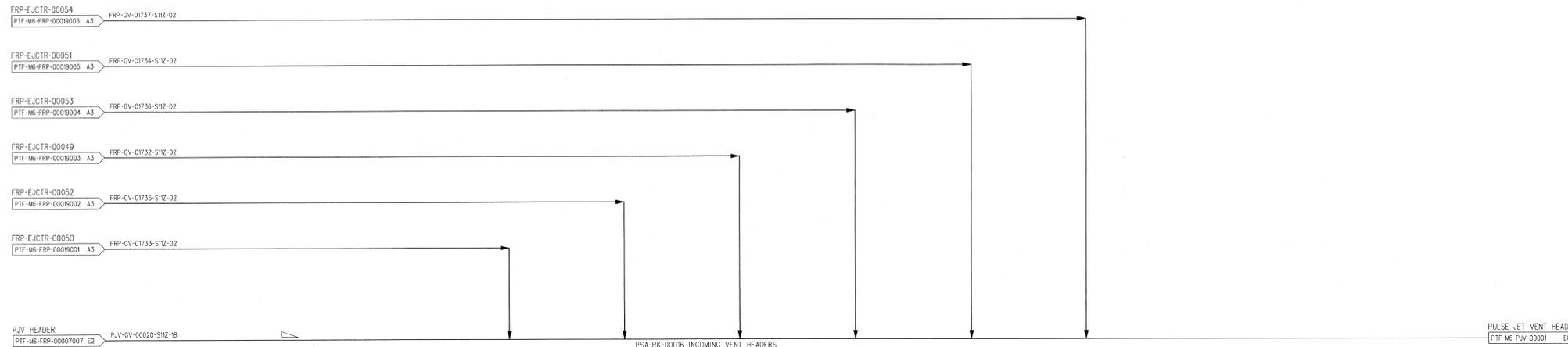
C

B

B

A

A



FRP-VSL-00002C  
6 OF 12 PJM, PSA, RK-00016  
NOTES 5, 6

Please note that certain special materials and equipment materials are covered by the Atomic Energy Act of 1954 (AEA) and regulated by the U.S. Department of Energy (DOE). Material produced by DOE using payment to the AEA authority. DOE assets and materials to AEA, in the use and disposition, are required to be reported to the AEA. The information contained herein is disseminated in accordance with the provisions of the AEA. Information contained herein is disseminated in accordance with the provisions of the AEA.

<b>Q</b> QUALITY DESIGNATION	PROJECT NO. 24590 RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354														
	CONTRACT NO. DE-AC27-01RV14136 <b>P&amp;ID - PTF          WASTE FEED RECEIPT          PROCESS SYSTEM          FRP-VSL-00002C PJM AND          VENT HEADER</b>														
ISSUED BY: [Signature] DATE: 7/20/11 CHECKER: [Signature] DATE: 9/1/11 APPROVER: [Signature] DATE: 9/1/11 REVIEWER: [Signature] DATE: 9/1/11	REVISION HISTORY <table border="1"> <tr> <th>REV</th> <th>DESCRIPTION</th> <th>ORG</th> <th>CHKD</th> <th>RVWD</th> <th>APVD</th> <th>DATE</th> </tr> <tr> <td>0</td> <td>ISSUED FOR CONSTRUCTION, SEE NOTE 7</td> <td></td> <td></td> <td></td> <td></td> <td>9/1/11</td> </tr> </table>	REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE	0	ISSUED FOR CONSTRUCTION, SEE NOTE 7					9/1/11
REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE									
0	ISSUED FOR CONSTRUCTION, SEE NOTE 7					9/1/11									
CONTENT APPLICABLE TO ALARA? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO ADR NO. 24590-PTF-ADR-M-02-007 SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002	SCALE: NONE 24590-PTF-M6-FRP-00019007 7/29/2011 9:45:48 AM PLOTTED BY: eeweb														

Quarter Ending 12/31/2011

24590-LAW-PCN-ENV-11-001

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**Hanford Facility RCRA Permit Modification Notification Form**

**Part III, Operating Unit 10**

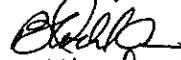
**Waste Treatment and Immobilization Plant**

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Index

Page 2 of 3: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant  
Replace Piping and Instrumentation Diagrams (P&ID) for LAW Melter Process System (LMP) in Appendix 9.2  
of the Dangerous Waste Permit (DWP).

Submitted by Co-Operator:

  
BT Allen for D Busche  
D. M. Busche

9/23/11  
Date

Reviewed by ORP Program Office:

  
D. L. Noyes  
Date

Quarter Ending 12/31/2011

24590-LAW-PCN-ENV-11-001

### Hanford Facility RCRA Permit Modification Notification Form

Unit:

**Waste Treatment and Immobilization Plant**

Permit Part:

**Part III, Operating Unit 10**Description of Modification:

The purpose of this Class 1 prime modification is to update the P&IDs for the LAW LMP System in Appendix 9.2 of the DWP.

The following P&IDs are being submitted to replace the P&IDs currently in Appendix 9.2. The increase in the number of drawings submitted results from converting the source drawings into two or more drawings to provide a clearer representation of the LMP System, including additional details on instrumentation and logic controls. A number of drawings included in this modification are Confidential Business Information (CBI).

## Appendix 9.2

Replace:	With:
24590-LAW-M6-LMP-00001, Rev. 2	24590-LAW-M6-LMP-00001001, Rev. 0 (CBI)
24590-LAW-M6-LMP-00002, Rev. 2	24590-LAW-M6-LMP-00002001, Rev. 0 (CBI)
	24590-LAW-M6-LMP-00002002, Rev. 0 (CBI)
24590-LAW-M6-LMP-00003, Rev. 4	24590-LAW-M6-LMP-00003001, Rev. 0
24590-LAW-M6-LMP-00005, Rev. 2	24590-LAW-M6-LMP-00005001, Rev. 0 (CBI)
24590-LAW-M6-LMP-00007, Rev. 3	24590-LAW-M6-LMP-00007001, Rev. 0
	24590-LAW-M6-LMP-00007002, Rev. 0
24590-LAW-M6-LMP-00008, Rev. 3	24590-LAW-M6-LMP-00008001, Rev. 0
24590-LAW-M6-LMP-00010, Rev. 3	24590-LAW-M6-LMP-00010001, Rev. 0
24590-LAW-M6-LMP-00012, Rev. 5	24590-LAW-M6-LMP-00012001, Rev. 0
24590-LAW-M6-LMP-00013, Rev. 5	24590-LAW-M6-LMP-00013001, Rev. 0
	24590-LAW-M6-LMP-00013002, Rev. 0
24590-LAW-M6-LMP-00031, Rev. 2	24590-LAW-M6-LMP-00031001, Rev. 0 (CBI)
24590-LAW-M6-LMP-00032, Rev. 2	24590-LAW-M6-LMP-00032001, Rev. 0 (CBI)
	24590-LAW-M6-LMP-00032002, Rev. 0 (CBI)
24590-LAW-M6-LMP-00033, Rev. 4	24590-LAW-M6-LMP-00033001, Rev. 0
24590-LAW-M6-LMP-00035, Rev. 2	24590-LAW-M6-LMP-00035001, Rev. 0 (CBI)
24590-LAW-M6-LMP-00037, Rev. 3	24590-LAW-M6-LMP-00037001, Rev. 0
	24590-LAW-M6-LMP-00037002, Rev. 0
24590-LAW-M6-LMP-00038, Rev. 3	24590-LAW-M6-LMP-00038001, Rev. 0
24590-LAW-M6-LMP-00040, Rev. 3	24590-LAW-M6-LMP-00040001, Rev. 0
24590-LAW-M6-LMP-00042, Rev. 5	24590-LAW-M6-LMP-00042001, Rev. 0
24590-LAW-M6-LMP-00043, Rev. 5	24590-LAW-M6-LMP-00043001, Rev. 0
	24590-LAW-M6-LMP-00043002, Rev. 0

This modification requests Ecology approval and incorporation into the permit the specific changes to these P&IDs that are indicated by revision notes and clouds. The referenced P&IDs include changes provided in applicable document change forms (e.g., DCN, SCN, SDDR, FCN, FCR, etc.) that were submitted to Ecology in accordance with Condition III.10.C.9.h. In addition, the P&IDs include changes associated with the resolution to comments on change documents since the issuance of the last revision of the permitted drawing.

Quarter Ending 12/31/2011

24590-LAW-PCN-ENV-11-001

The following types of changes apply to the LMP P&IDs:

- Drawing converted from a single sheet to multi-sheet drawings
- Modified, deleted, and added notes and references
- Expanded instruments and logic controls information
- Incorporated change notices as specified in Revision Notes

This modification requests Ecology approval and incorporation of the following list of outstanding change documents into the permit. Although not yet incorporated into the revised documents attached to this PCN, this list of outstanding DCNs are intended to be incorporated into this modification:

24590-LAW-M6-LMP-00008001

- 24590-LAW-M6N-LMP-00078

24590-LAW-M6-LMP-00010001

- 24590-LAW-M6N-LMP-00078

24590-LAW-M6-LMP-00038001

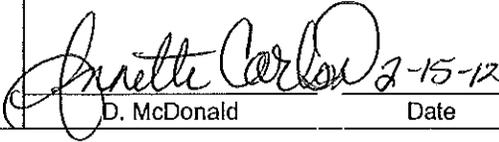
- 24590-LAW-M6N-LMP-00078

24590-LAW-M6-LMP-00040001

- 24590-LAW-M6N-LMP-00078

WAC 173-303-830 Modification Class:	Class 1	Class <sup>1</sup> 1	Class 2	Class 3
Please mark the Modification Class:		X		

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

Modification Approved/Concur: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> Denied (state reason below) Reason for denial:	Reviewed by Ecology:  D. McDonald Date 2-15-12
--	--

This information has been identified as **CONFIDENTIAL BUSINESS INFORMATION**

Per the Department of Ecology's April 1, 2009, letter "Re: Certification of Confidential Business Information for the Waste Treatment Plant," under the criteria of 43.21A.160 RCW and WAC 173-303-810 (15), the following document and associated changes are granted confidentiality and are exempt from public review:

**Document Number:** 24590-LAW-M6-LMP-00001001, Rev. 0

**Title:** *P&ID – LAW Melter Process System Melter 1 Agitation – Zone 1 & Zone 2 and LMP-RK-00040A/B*

This information has been identified as **CONFIDENTIAL BUSINESS INFORMATION**

Per the Department of Ecology's April 1, 2009, letter "Re: Certification of Confidential Business Information for the Waste Treatment Plant," under the criteria of 43.21A.160 RCW and WAC 173-303-810 (15), the following document and associated changes are granted confidentiality and are exempt from public review:

**Document Number:** 24590-LAW-M6-LMP-00002001, Rev. 0

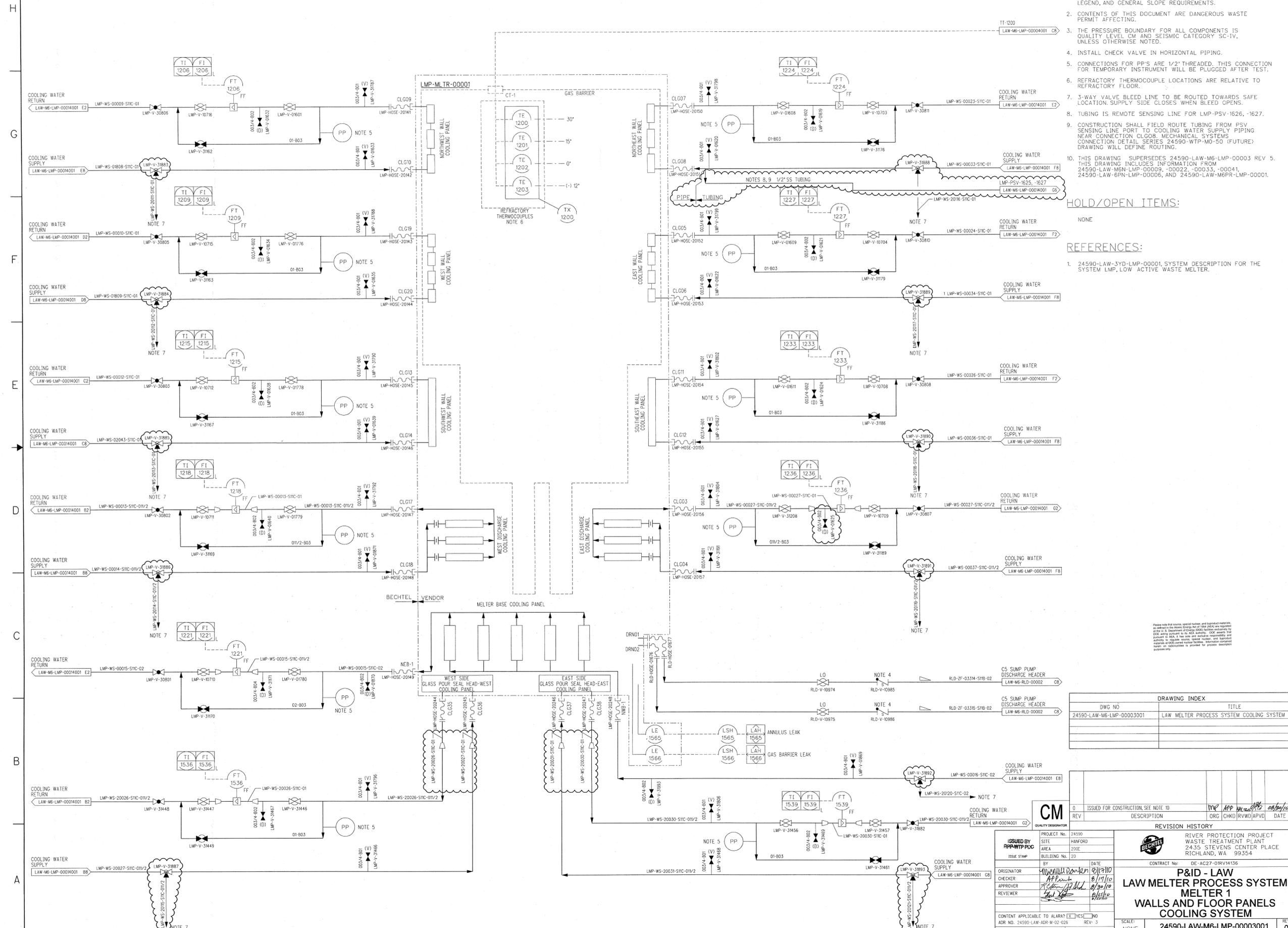
**Title:** *P&ID – LAW Melter Process System Melter 1- Agitation Zone 3 & Level Detection  
LMP-RK-00040B and PPJ-RK-00001*

This information has been identified as **CONFIDENTIAL BUSINESS INFORMATION**

Per the Department of Ecology's April 1, 2009, letter "Re: Certification of Confidential Business Information for the Waste Treatment Plant," under the criteria of 43.21A.160 RCW and WAC 173-303-810 (15), the following document and associated changes are granted confidentiality and are exempt from public review:

**Document Number:** 24590-LAW-M6-LMP-00002002, Rev. 0

**Title:** *P&ID – LAW Melter Process System Melter 1- Agitation Zone 3 & Level Detection and LMP-RK-00040C*



**NOTES:**

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
- INSTALL CHECK VALVE IN HORIZONTAL PIPING.
- CONNECTIONS FOR PP'S ARE 1/2" THREADED. THIS CONNECTION FOR TEMPORARY INSTRUMENT WILL BE PLUGGED AFTER TEST.
- REFRACTORY THERMOCOUPLE LOCATIONS ARE RELATIVE TO REFRACTORY FLOOR.
- 3-WAY VALVE BLEED LINE TO BE ROUTED TOWARDS SAFE LOCATION. SUPPLY SIDE CLOSURE WHEN BLEED OPENS.
- TUBING IS REMOTE SENSING LINE FOR LMP-PSV-1625, -1627.
- CONSTRUCTION SHALL FIELD ROUTE TUBING FROM PSV SENSING LINE PORT TO COOLING WATER SUPPLY PIPING NEAR CONNECTION CLOG08. MECHANICAL SYSTEMS CONNECTION DETAIL SERIES 24590-WTP-M0-50 (FUTURE) DRAWING WILL DEFINE ROUTING.
- THIS DRAWING SUPERSEDES 24590-LAW-M6-LMP-00003 REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6-LMP-00001, -00002, -00033, -00041, 24590-LAW-M6-LMP-00005, AND 24590-LAW-M6-LMP-00001.

**HOLD/OPEN ITEMS:**

NONE

**REFERENCES:**

- 24590-LAW-3YD-LMP-00001, SYSTEM DESCRIPTION FOR THE SYSTEM LMP, LOW ACTIVE WASTE MELTER.

Please note that special material and special materials are defined in the General Notes and Specifications. All materials shall be furnished in accordance with the requirements of the contract and the applicable codes and standards. The contractor shall be responsible for obtaining all necessary permits and approvals for the installation and operation of the system. The contractor shall be responsible for the safety of the installation and operation of the system.

DRAWING INDEX	
DWG NO	TITLE
24590-LAW-M6-LMP-00003001	LAW MELTER PROCESS SYSTEM COOLING SYSTEM

**CM**  
ISSUED FOR CONSTRUCTION, SEE NOTE 10

REV	DESCRIPTION	ORG	CHKD	RWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 10	APP	WJ	WJ	WJ	8/23/10

REVISION HISTORY	
PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20
DATE	8/17/10
ORIGINATOR	APP
CHECKER	WJ
APPROVER	WJ
REVIEWER	WJ
CONTRACT No.	DC-AC27-01R14136
<b>P&amp;ID - LAW LAW MELTER PROCESS SYSTEM MELTER 1 WALLS AND FLOOR PANELS COOLING SYSTEM</b>	
SCALE:	NONE
PROJECT No.	24590-LAW-M6-LMP-00003001
REV	0

This information has been identified as **CONFIDENTIAL BUSINESS INFORMATION**

Per the Department of Ecology's April 1, 2009, letter "Re: Certification of Confidential Business Information for the Waste Treatment Plant," under the criteria of 43.21A.160 RCW and WAC 173-303-810 (15), the following document and associated changes are granted confidentiality and are exempt from public review:

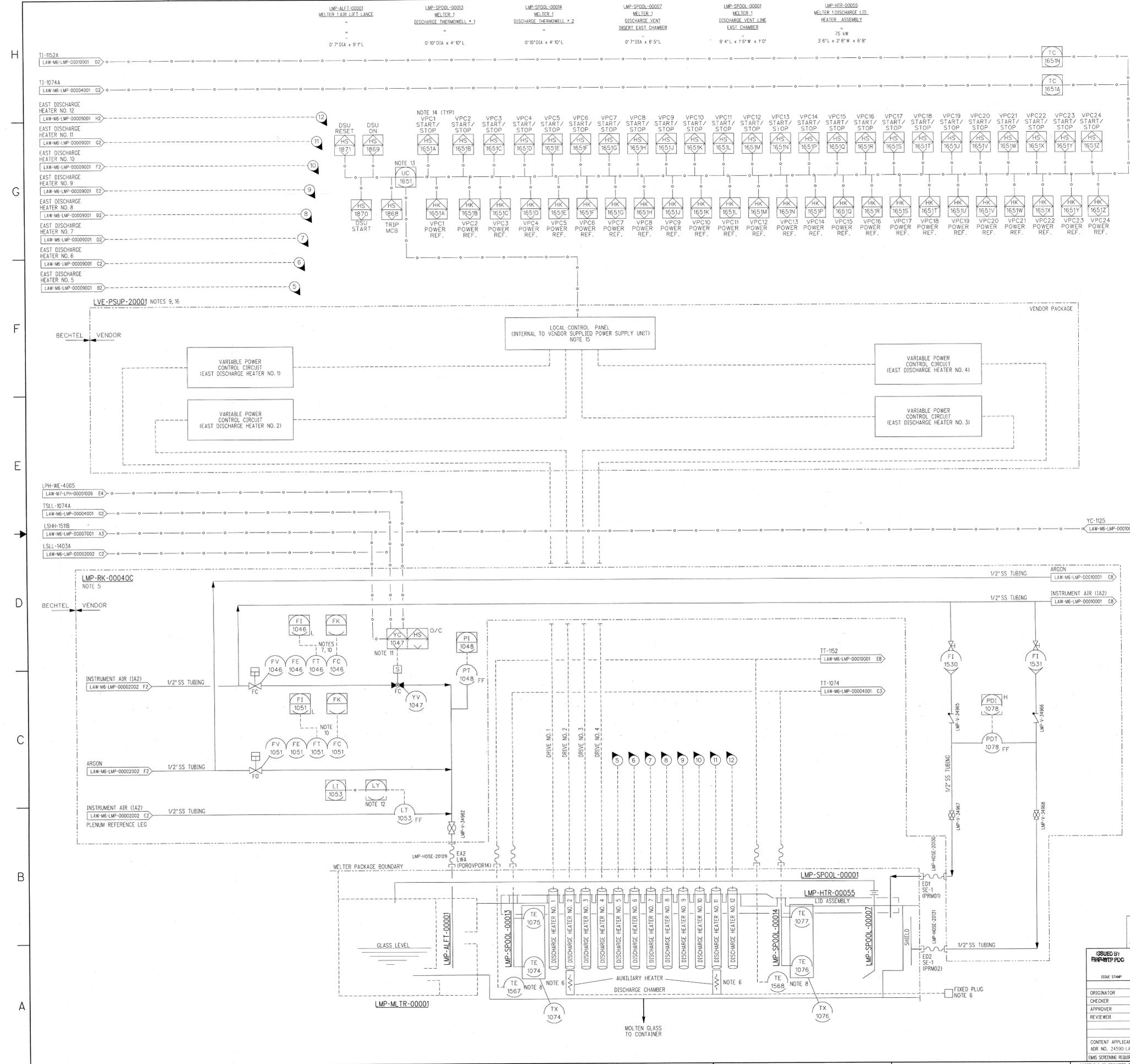
**Document Number:** 24590-LAW-M6-LMP-00005001, Rev. 0

**Title:** *P&ID – LAW Melter Process System Melter 1 Electrode Extension Cooling & Glass/Plenum Temperatures*









NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
- ALL INSTRUMENTS AND VALVING FOR AIR LIFT SHOULD BE LOCATED AS CLOSE AS POSSIBLE TO THE SHIELD WALL TO REDUCE LINE CAPACITANCE AND AIR LIFT SURGING.
- DISCHARGE AUXILIARY HEATERS PREWIRED TO PLUG FOR USE, AS REQUIRED BY OPERATIONS.
- WHEN VALVE LMP-YV-1047 IS NOT OPEN, SETPOINT TO LMP-FC-1046 IS FORCED TO ZERO PERCENT.
- TE-1567 AND TE-1568 ARE INTEGRAL WITH AUXILIARY HEATER AND ARE NOT REPLACEABLE.
- FOR ELECTRICAL SUPPLY DESIGN SEE DRAWING 24590-LAW-E1-LVE-00031.
- FLOW CONTROL (FC) IS INTEGRAL TO THE VALVE. ACTUAL SETPOINT PROVIDED FROM ICM.
- HIGH HIGH WEIGHT FROM MECHANICAL HANDLING LOAD CELL LPH-WE-4005 (REPRESENTING HIGH LEVEL IN CONTAINER) CLOSES VALVE LMP-YV-1047 TO SHUT THE EAST CHAMBER DISCHARGE.
- LMP-DI-1404 ON P&ID 24590-LAW-M6-LMP-00002002 IS BACK UP TO CALCULATING ALTERNATE LEVEL IN LMP-LI-1053.
- DISCHARGE HEATER POWER SUPPLY OPERATION IS INITIATED AND OPERATIONAL STATUS IS MONITORED FROM THE FACILITY CONTROL SYSTEM TAG REPRESENTS MULTIPLE CONTROL AND INDICATING PARAMETERS FOR ALL EAST AND WEST DISCHARGE CHAMBER HEATERS AVAILABLE TO FACILITY OPERATOR. CONTROL SIGNAL ORIGINATES FROM AVERAGE DISCHARGE CHAMBER TEMPERATURES.
- EACH HEATER VPC HAS A START/STOP HAND SWITCH AND A REFERENCE AUTO/MANUAL STATION. EAST CHAMBER HEATERS ARE VPC1 THROUGH VPC12. WEST CHAMBER HEATERS ARE VPC13 THROUGH VPC24.
- POWER SUPPLY SEPARATELY CONTROLS BOTH THE EAST AND WEST DISCHARGE CHAMBERS.
- FOR PACKAGE DETAILS, SEE DRAWING 24590-CM-POA-EY00-00002-03-00005.
- THIS DRAWING SUPERSEDES 24590-LAW-M6-LMP-00008 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-LMP-00022, AND -00058.

HOLD/OPEN ITEMS:

NONE

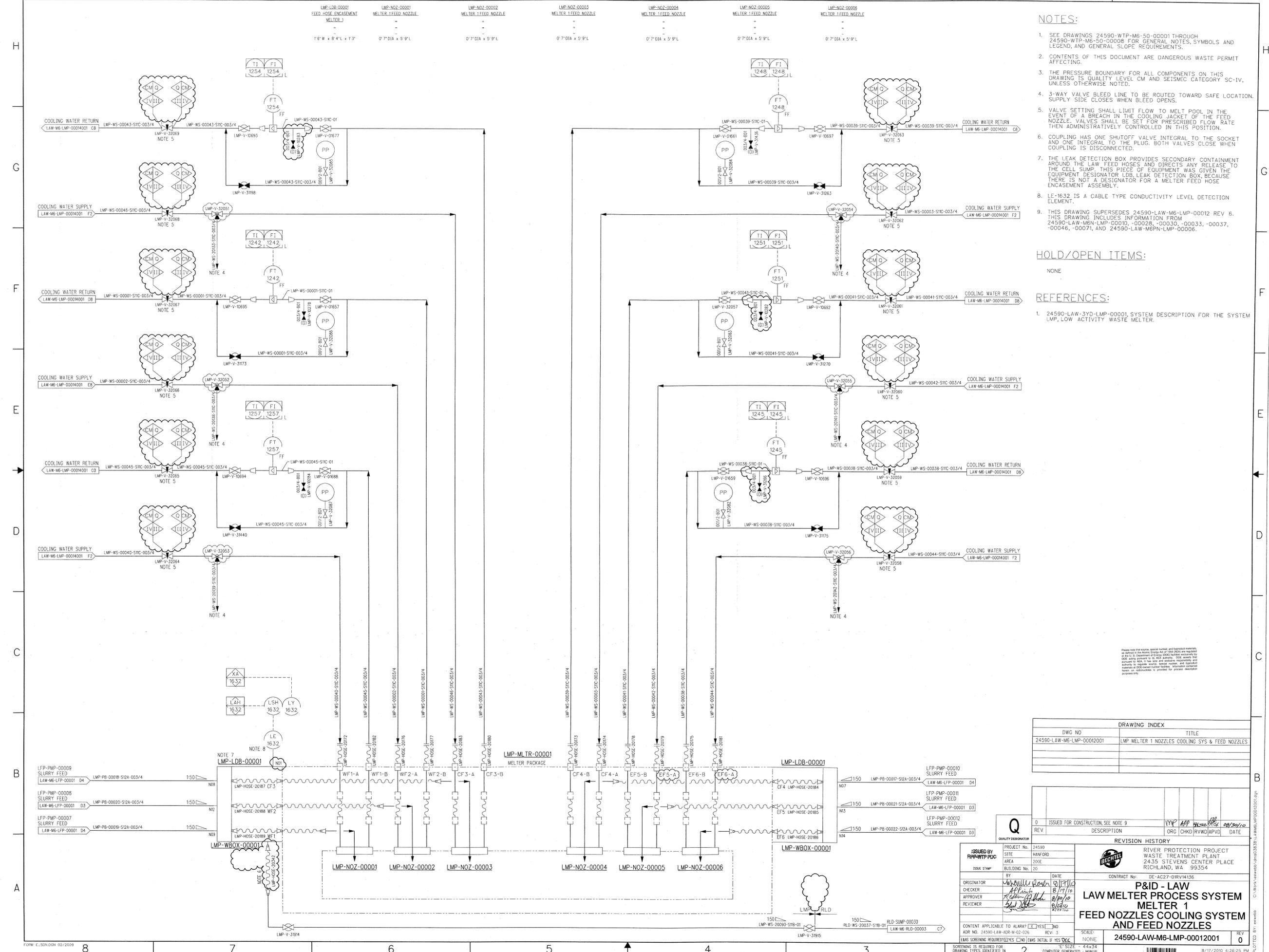
REFERENCES:

- 24590-LAW-3YD-LMP-00001. SYSTEM DESCRIPTION FOR THE SYTEM LMP, LOW ACTIVITY WASTE MELTER.

DRAWING INDEX	
DWG NO	TITLE
24590-LAW-M6-LMP-00008001	LAW MELTER PROCESS SYSTEM

CM QUALITY DESIGNATOR

ISSUED BY: <b>PRM/WTP PDC</b>	PROJECT No: 24590	DATE: 8/23/10
ISSUE STAMP:	SITE: HANFORD	APPROVER: <i>[Signature]</i>
ORIGINATOR: <i>[Signature]</i>	AREA: 200E	REVIEWER: <i>[Signature]</i>
CHECKER: <i>[Signature]</i>	BUILDING No: 20	DATE: 8/23/10
APPROVER: <i>[Signature]</i>	CONTRACT No: DE-AC27-01RV14136	REVISION HISTORY:
REVIEWER: <i>[Signature]</i>	DESCRIPTION: RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354	REV: 0
CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	SCALE: NONE	DATE: 8/23/2010 9:30:44 AM
DRIVING PHYS IDENTIFIED IN 24590-WTP-LMP-00002	24590-LAW-M6-LMP-00008001	REV: 3
SCREENING REQUIRED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	EMIS INITIAL IF YES: <i>[Initials]</i>	COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED



NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
- 3-WAY VALVE BLEED LINE TO BE ROUTED TOWARD SAFE LOCATION. SUPPLY SIDE CLOSURE WHEN BLEED OPENS.
- VALVE SETTING SHALL LIMIT FLOW TO MELT POOL IN THE EVENT OF A BREACH IN THE COOLING JACKET OF THE FEED NOZZLE. VALVES SHALL BE SET FOR PRESCRIBED FLOW RATE THEN ADMINISTRATIVELY CONTROLLED IN THIS POSITION.
- COUPLING HAS ONE SHUTOFF VALVE INTEGRAL TO THE SOCKET AND ONE INTEGRAL TO THE PLUG. BOTH VALVES CLOSE WHEN COUPLING IS DISCONNECTED.
- THE LEAK DETECTION BOX PROVIDES SECONDARY CONTAINMENT AROUND THE LAW FEED HOSES AND DIRECTS ANY RELEASE TO THE CELL SUMP. THIS PIECE OF EQUIPMENT WAS GIVEN THE EQUIPMENT DESIGNATOR LDB, LEAK DETECTION BOX, BECAUSE THERE IS NOT A DESIGNATOR FOR A MELTER FEED HOSE ENCASUREMENT ASSEMBLY.
- LE-1632 IS A CABLE TYPE CONDUCTIVITY LEVEL DETECTION ELEMENT.
- THIS DRAWING SUPERSEDES 24590-LAW-M6-LMP-00012 REV 6. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6-LMP-00010, -00028, -00030, -00033, -00037, -00046, -00071, AND 24590-LAW-M6-PN-LMP-00006.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-LAW-3YD-LMP-00001 SYSTEM DESCRIPTION FOR THE SYSTEM LMP, LOW ACTIVITY WASTE MELTER.

These notes are for your information and are not to be used as a substitute for the design. The design is the responsibility of the design engineer. The design engineer is responsible for the design and the design engineer is responsible for the design. The design engineer is responsible for the design. The design engineer is responsible for the design.

DRAWING INDEX	
DWG NO	TITLE
24590-LAW-M6-LMP-00012001	LMP MELTER 1 NOZZLES COOLING SYS & FEED NOZZLES

REVISION HISTORY	
REV	DESCRIPTION
0	ISSUED FOR CONSTRUCTION, SEE NOTE 9

ISSUED BY RPP-WTP-PCC	PROJECT No. 24590
ISSUE STAMP	SITE HANFORD
ORIGINATOR M. W. W. W.	AREA 200E
CHECKER M. W. W. W.	BUILDING No. 20
APPROVER M. W. W. W.	DATE 8/17/10
REVIEWER M. W. W. W.	CONTRACT No. DE-AC27-01RV14136

RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354	
P&ID - LAW LAW MELTER PROCESS SYSTEM MELTER 1 FEED NOZZLES COOLING SYSTEM AND FEED NOZZLES	
SCALE NONE	REV 0
24590-LAW-M6-LMP-00012001	



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B  
A

LMP-HX-00001 MELTER LID COOLING LOOP PLATE HEAT EXCHANGER  
50,000 BTU/H  
29IN L x 27IN W x 46 IN H

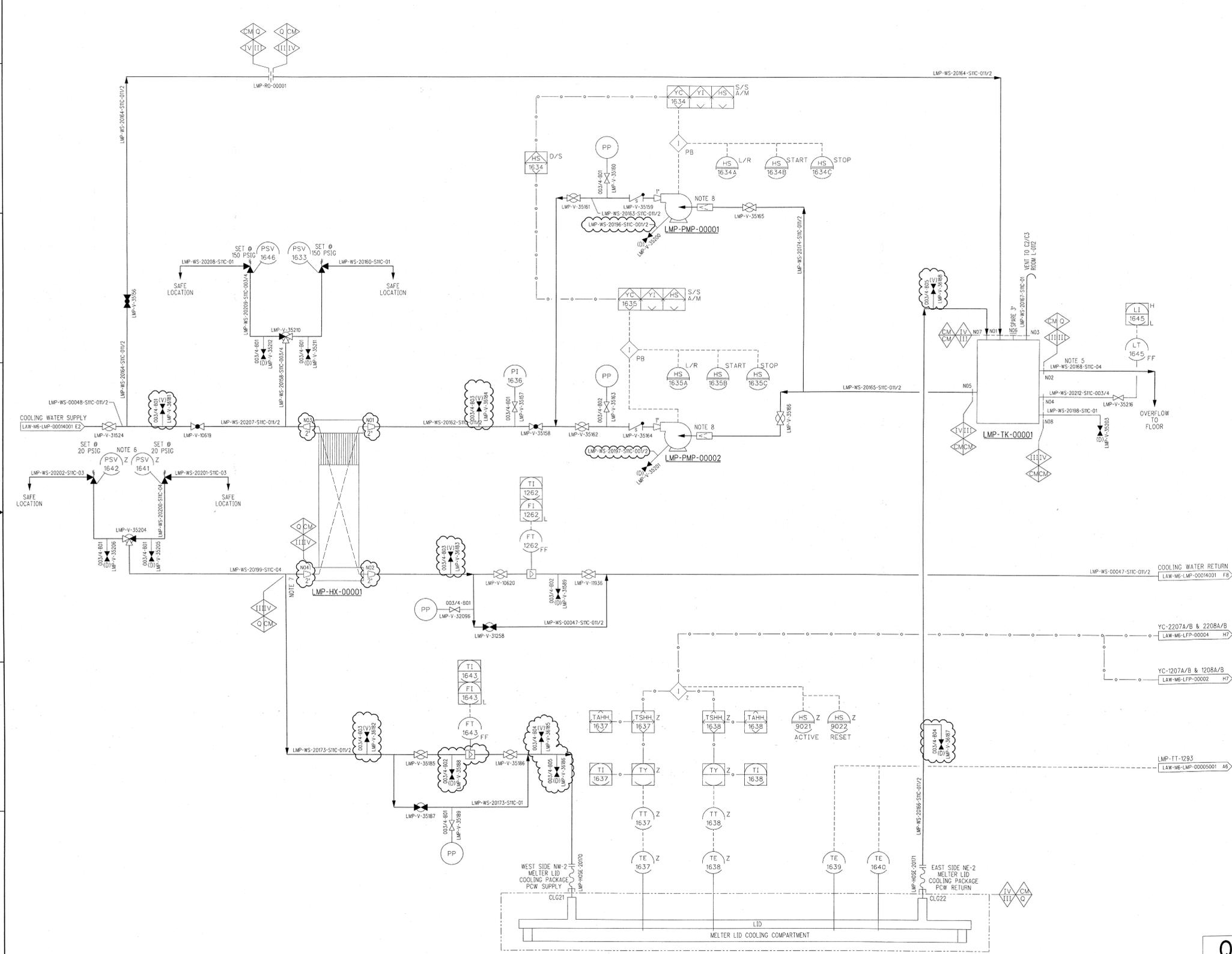
LMP-PMP-00001 MELTER LID COOLING LOOP PUMP  
25 GPM @ 35 FT TDH  
1HP

LMP-PMP-00002 MELTER LID COOLING LOOP PUMP  
25 GPM @ 35 FT TDH  
1HP

LMP-TK-00001 MELTER LID COOLING LOOP MAKEUP WATER TANK  
56 GAL MOV  
30 IN DIA x 46 IN H

- NOTES:**
- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
  - CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
  - THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
  - ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
  - TANK OVERFLOW LINE IS NOT SUPPORTED BY TANK.
  - SETPOINT AND PHYSICAL LOCATION OF PSV MAINTAINS MELTER LID BELOW 14.5 PSIG.
  - LOCATE LMP-WS-20173-SIC-01 1/2 BRANCH LESS THAN 6 FEET FROM HEAT EXCHANGER OUTLET NO4. PLACE CENTERLINE OF PSV NO MORE THAN 2.5 FT ABOVE 3 FT ELEVATION FLOOR.
  - PROVIDE REMOVABLE PIPING SPOOL FOR STARTUP STRAINER, STRAINER WILL BE REMOVED PRIOR TO STARTUP.
  - THIS DRAWING IS CONVERTED FROM A SINGLE SHEET DRAWING TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-LAW-M6-LMP-00013 REV 6. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-LMP-00005, -00042, -00071, -00075, 24590-LAW-M6N-20-00003, 24590-WTP-SDDR-ML-09-00035, AND 24590-WTP-SDDR-MS-10-00024.

- HOLD/OPEN ITEMS:**
- NONE
- REFERENCES:**
- 24590-LAW-3YD-LMP-00001, SYSTEM DESCRIPTION FOR THE SYSTEM LMP, LOW ACTIVITY WASTE MELTER.



Please note that the owner, designee, and contractor are responsible for the design and construction of the system. The designee is responsible for the design and construction of the system. The contractor is responsible for the construction of the system. The owner is responsible for the operation and maintenance of the system. The designee is responsible for the design and construction of the system. The contractor is responsible for the construction of the system. The owner is responsible for the operation and maintenance of the system.

<b>Q</b> QUALITY ORGANIZATION ISSUED BY: R/WTP POC TITLE: VPM	0	ISSUED FOR CONSTRUCTION, SEE NOTE 9	MP	1/10/10	08/30/10
	REV	DESCRIPTION	ORG	[CHKD]	[RWD]
<b>REVISION HISTORY</b> PROJECT No: 24590 SITE: HANFORD AREA: 200E BUILDING No: 20 CONTRACT No: DE-AC27-01RV14136 RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354 <b>P&amp;ID - LAW          LAW MELTER PROCESS SYSTEM          MELTER LID          MELTER LID          COOLING LOOP</b>					
ORIGINATOR: [Signature] CHECKER: [Signature] APPROVER: [Signature] REVIEWER: [Signature]	DATE: 8/19/10 DATE: 8/30/10 DATE: 8/30/10 DATE: 8/30/10	CONTENT APPLICABLE TO ALARA? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO DRAWING SCREENING REQUIRED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO DRAWING TYPE IDENTIFIED IN 24590-WTP-REQ-002			
SCALE: NONE 24590-LAW-M6-LMP-00013002		REVISION HISTORY 0			

This information has been identified as **CONFIDENTIAL BUSINESS INFORMATION**

Per the Department of Ecology's April 1, 2009, letter "Re: Certification of Confidential Business Information for the Waste Treatment Plant," under the criteria of 43.21A.160 RCW and WAC 173-303-810 (15), the following document and associated changes are granted confidentiality and are exempt from public review:

**Document Number:** 24590-LAW-M6-LMP-00031001, Rev. 0

**Title:** *P&ID – LAW Melter Process System Melter 2 - Agitation Zone 1 & Zone 2*

This information has been identified as **CONFIDENTIAL BUSINESS INFORMATION**

Per the Department of Ecology's April 1, 2009, letter "Re: Certification of Confidential Business Information for the Waste Treatment Plant," under the criteria of 43.21A.160 RCW and WAC 173-303-810 (15), the following document and associated changes are granted confidentiality and are exempt from public review:

**Document Number:** 24590-LAW-M6-LMP-00032001, Rev. 0

**Title:** *P&ID – LAW Melter Process System Melter 2 - Agitation Zone 3 & Level Detection  
LMP-RK-00041B and PPJ-RK-00002*

This information has been identified as **CONFIDENTIAL BUSINESS INFORMATION**

Per the Department of Ecology's April 1, 2009, letter "Re: Certification of Confidential Business Information for the Waste Treatment Plant," under the criteria of 43.21A.160 RCW and WAC 173-303-810 (15), the following document and associated changes are granted confidentiality and are exempt from public review:

**Document Number:** 24590-LAW-M6-LMP-00032002, Rev. 0

**Title:** *P&ID – LAW Melter Process System Melter 2 - Agitation Zone 3 & Level Detection  
LMP-RK-00041C*



This information has been identified as **CONFIDENTIAL BUSINESS INFORMATION**

Per the Department of Ecology's April 1, 2009, letter "Re: Certification of Confidential Business Information for the Waste Treatment Plant," under the criteria of 43.21A.160 RCW and WAC 173-303-810 (15), the following document and associated changes are granted confidentiality and are exempt from public review:

**Document Number:** 24590-LAW-M6-LMP-00035001, Rev. 0

**Title:** *P&ID – LAW Melter Process System Melter 2 Electrode Extension Cooling & Glass/Plenum Temperatures*

H

G

F

E

D

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B

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H

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F

E

D

C

B

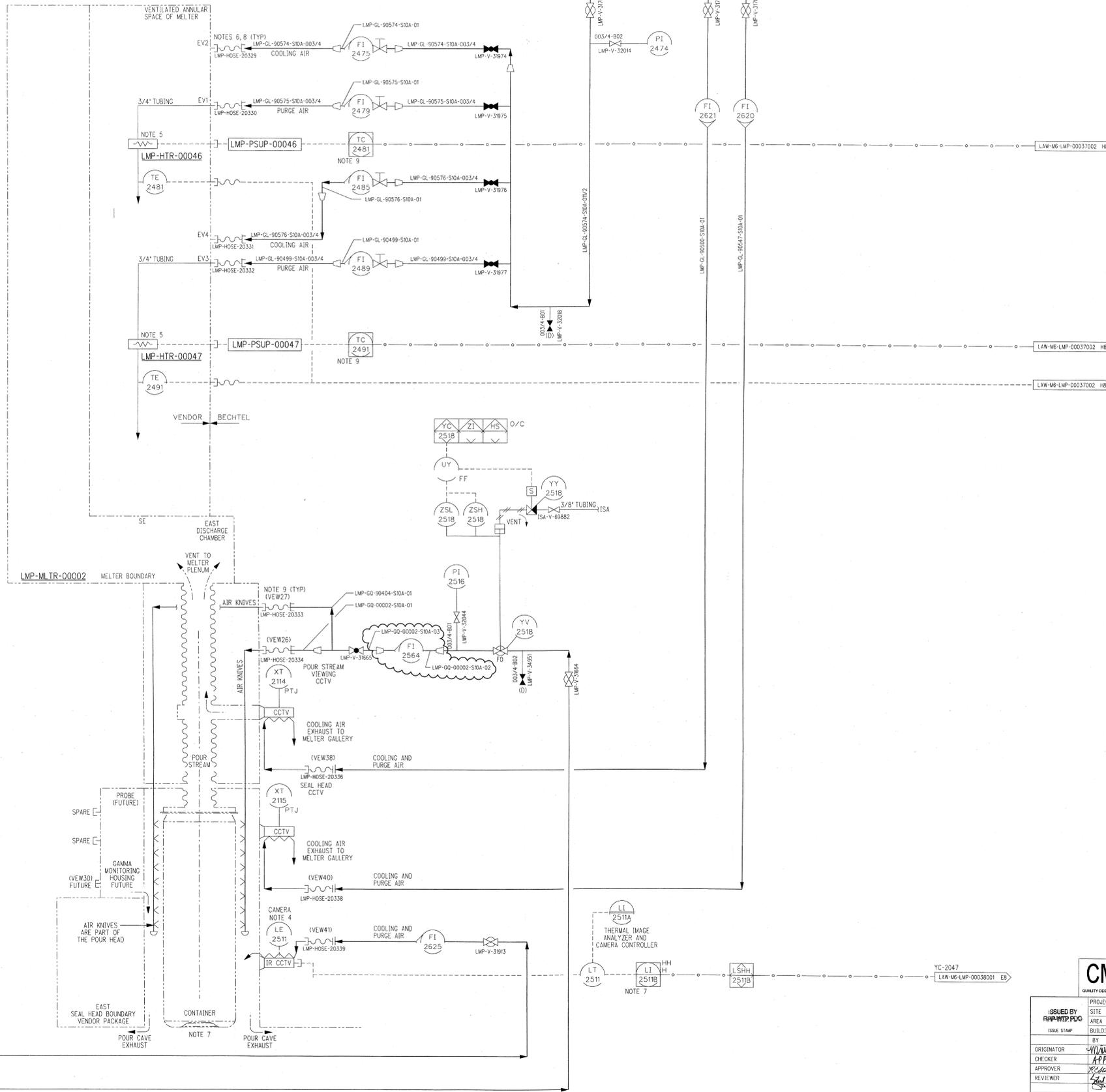
A

LMP-HTR-00046  
MELTER #2 PLENUM CAMERA  
PURGE AIR  
HEATER/CONTROLLER  
6 KW

LMP-HTR-00047  
MELTER #2 PLENUM CAMERA  
PURGE AIR  
HEATER/CONTROLLER  
6 KW

LAW-M6-LMP-00037002 H0

LMP-GL-90547-SIDA-02



NOTES:

- SEE DRAWINGS 24590-WTP-M6-S0-00001 THROUGH 24590-WTP-M6-S0-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
- THE IR CAMERA DETECTS GLASS LEVEL (THERMAL TRANSITION REGION) ON CONTAINER.
- AIR PRE-HEAT FOR FUTURE CCTV VIEW PORT.
- AIR FOR FUTURE PLENUM CCTV.
- HIGH HIGH LEVEL FROM THE THERMAL IMAGE SYSTEM AUTOMATICALLY SHOTS DOWN THE MELTER DISCHARGE THE LAW CONTAINER POUR HANDLING SYSTEM LPH-WE-4605 (LOAD CELL) AT LPH-ELEV-00003 (WEST POUR CAVE ELEVATOR) PROVIDES SECONDARY HIGH HIGH LEVEL MONITORING TO PREVENT OVERFILL, SEE DRAWING 24590-LAW-M7-LPH-00001011. LPH-WE-5205 (LOAD CELL) AT LPH-ELEV-00004 (EAST POUR CAVE ELEVATOR) PROVIDES SECONDARY HIGH HIGH LEVEL MONITORING TO PREVENT OVERFILL, SEE DRAWING 24590-LAW-M7-LPH-00001013.
- SERVICE SIDE OF FLEX CONNECTION IS FEMALE CAMLOCK BY PLANT EQUIPMENT GROUP.
- ON HIGH HIGH TEMPERATURE, THE CONTROLLER OUTPUT IS SET TO 0%.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-LAW-M6-LMP-00007 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-LMP-00035, AND -00062.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-LAW-3YD-LMP-00001, SYSTEM DESCRIPTION FOR THE SYSTEM LMP, LOW ACTIVITY WASTE MELTER.

Please note that source, special order, and typical notations, as indicated by the drawing, are not to be taken as a guarantee of the U.S. Department of Energy (DOE) liability for the DOE waste cleanup program. DOE accepts no liability for the design, construction, operation, or maintenance of the waste treatment plant, and the contractor shall be responsible for the design, construction, operation, and maintenance of the waste treatment plant. The contractor shall be responsible for the design, construction, operation, and maintenance of the waste treatment plant. The contractor shall be responsible for the design, construction, operation, and maintenance of the waste treatment plant.

DRAWING INDEX	
DWG NO	TITLE
24590-LAW-M6-LMP-00037001	MELTER PROCESS SYS MONITORING INSTRUMENTATION
24590-LAW-M6-LMP-00037002	MELTER PROCESS SYS MONITORING INSTRUMENTATION

REV	DESCRIPTION	ORG	CHKD	RWVD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 10	APP	CHKD	RWVD	APVD	08/30/10

ISSUED BY		REVISION HISTORY	
PROJECT No.	24590	CONTRACT No.	DE-ACC27-DIRV14136
SITE	HANFORD	ISSUE No.	20
AREA	200E	ORIGINATOR	MANUAL Rev 01/17/10
BUILDING No.	20	CHECKER	APP 8/18/10
BY		APPROVER	APP 8/30/10
DATE		REVIEWER	APP 8/31/10
SCALE		CONTENT APPLICABLE TO ALARA?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
SCALE		ADR NO.	24590-LAW-ADR-M-02-026
SCALE		REV.	3
SCALE		SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-SFP-REG-002	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
SCALE		COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED	

**CM**  
QUALITY DESIGNATOR

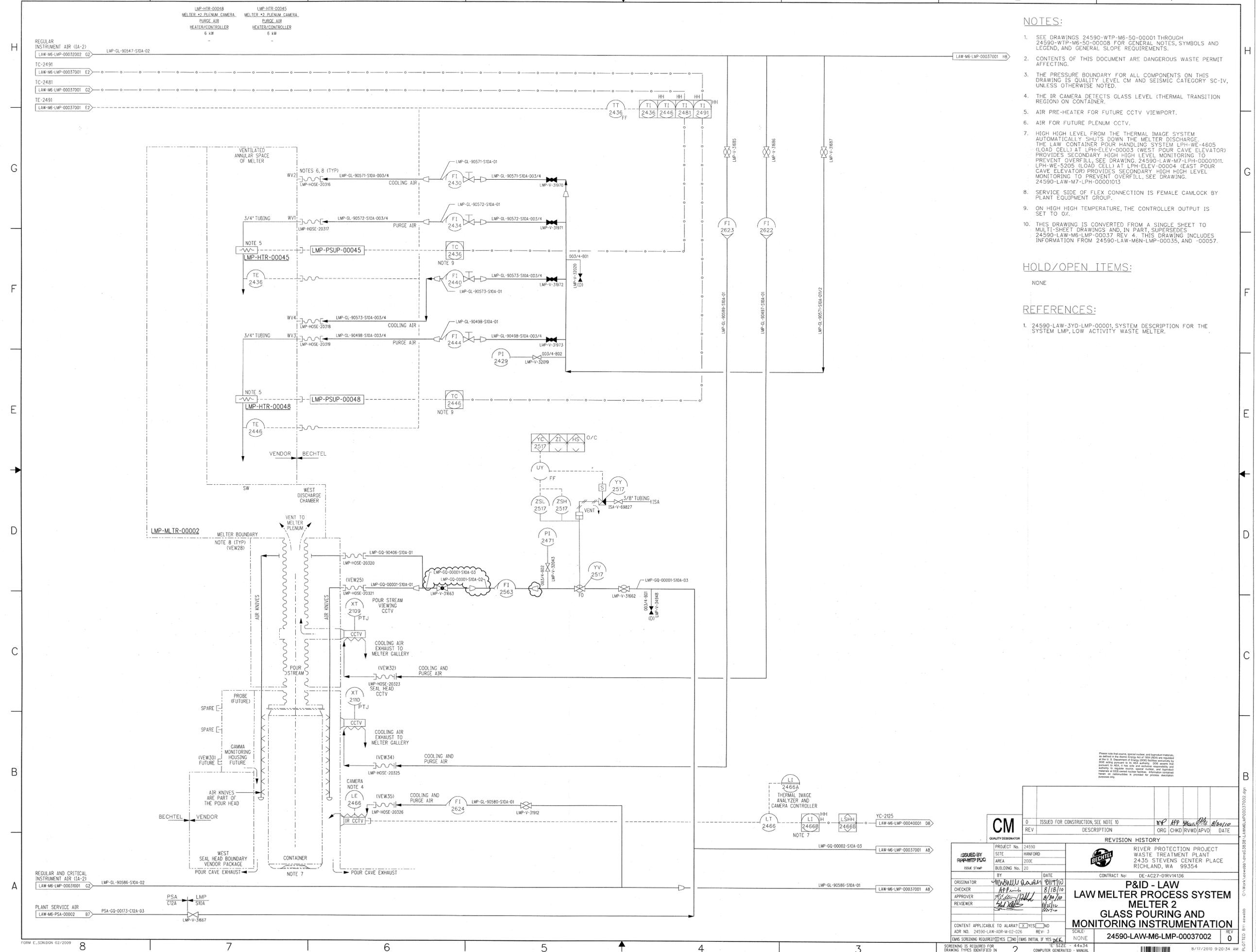
**RIVER PROTECTION PROJECT  
WASTE TREATMENT PLANT  
2435 STEVENS CENTER PLACE  
RICHLAND, WA 99354**

**P&ID - LAW  
LAW MELTER PROCESS SYSTEM  
MELTER 2  
GLASS POURING AND  
MONITORING INSTRUMENTATION**

24590-LAW-M6-LMP-00037001

8/17/2010 9:13:19 AM  
R11270967

PLOTTED BY: ceeab



NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
- THE IR CAMERA DETECTS GLASS LEVEL (THERMAL TRANSITION REGION) ON CONTAINER.
- AIR PRE-HEATER FOR FUTURE CCTV VIEWPORT.
- AIR FOR FUTURE PLENUM CCTV.
- HIGH HIGH LEVEL FROM THE THERMAL IMAGE SYSTEM AUTOMATICALLY SHUTS DOWN THE MELTER DISCHARGE. THE LAW CONTAINER POUR HANDLING SYSTEM LPH-WE-4605 (LOAD CELL) AT LPH-ELEV-00003 (WEST POUR CAVE ELEVATOR) PROVIDES SECONDARY HIGH HIGH LEVEL MONITORING TO PREVENT OVERFILL, SEE DRAWING 24590-LAW-M7-LPH-0000101. LPH-WE-5005 (LOAD CELL) AT LPH-ELEV-00004 (EAST POUR CAVE ELEVATOR) PROVIDES SECONDARY HIGH HIGH LEVEL MONITORING TO PREVENT OVERFILL, SEE DRAWING 24590-LAW-M7-LPH-0000103.
- SERVICE SIDE OF FLEX CONNECTION IS FEMALE CAMLOCK BY PLANT EQUIPMENT GROUP.
- ON HIGH HIGH TEMPERATURE, THE CONTROLLER OUTPUT IS SET TO 0%.
- THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-LAW-M6-LMP-00037 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-LMP-00035, AND -00057.

HOLD/OPEN ITEMS:

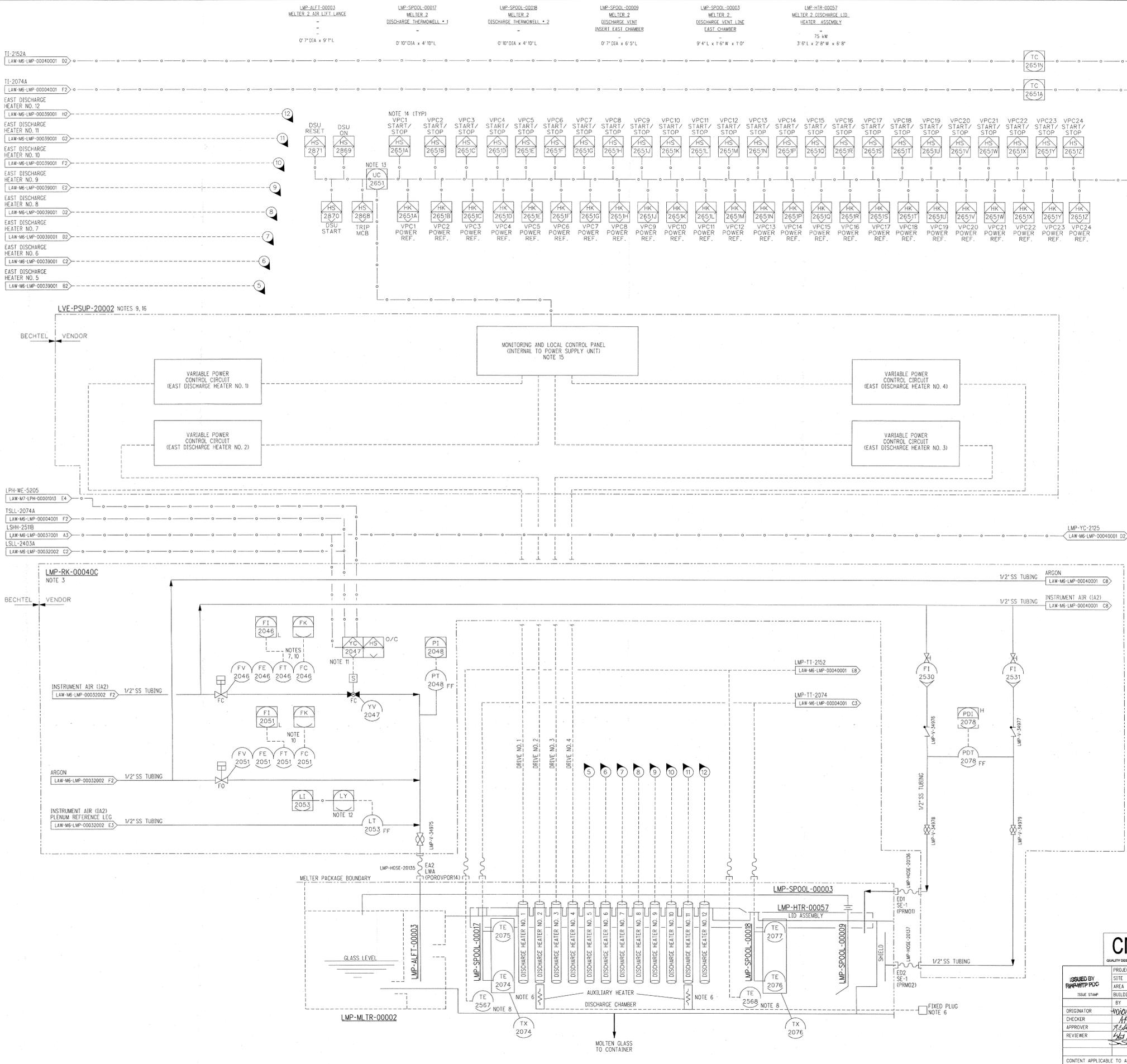
NONE

REFERENCES:

- 24590-LAW-3YD-LMP-00001, SYSTEM DESCRIPTION FOR THE SYSTEM LMP, LOW ACTIVITY WASTE MELTER.

Please refer to the source, special notices, and legend materials, or drawings for the correct Energy Act or 10 CFR, as required by the U.S. Department of Energy (DOE), unless otherwise specified. DOE drawings are not to be used without the authority of the DOE. This drawing and associated information are the property of the U.S. Department of Energy and are not to be distributed, copied, or reproduced in any form or by any means without the express written permission of the U.S. Department of Energy.

<b>CM</b> QUALITY DESIGNATOR	0	ISSUED FOR CONSTRUCTION, SEE NOTE 10	VP APP	WAS	APR	2010
	REV	DESCRIPTION	ORG	CHKD	RWVD	APVD
REVISION HISTORY						
PROJECT No. 24590 SITE HANFORD AREA 200E BUILDING No. 20						
CONTRACT No. DE-AC27-01RV14136 RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 STEVENS CENTER PLACE RICHLAND, WA 99354						
<b>P&amp;ID - LAW</b> <b>LAW MELTER PROCESS SYSTEM</b> <b>MELTER 2</b> <b>GLASS POURING AND</b> <b>MONITORING INSTRUMENTATION</b>						
24590-LAW-M6-LMP-00037002						
SCALE: NONE REVISION: 3						
SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-APP-286-002						
4x3.4 COMPUTER GENERATED MANUAL DESIGN CHANGES NOT PERMITTED						



NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
- ALL INSTRUMENTS AND VALVING FOR AIR LIFT SHOULD BE LOCATED AS CLOSE AS POSSIBLE TO THE SHIELD WALL TO REDUCE LINE CAPACITANCE AND AIR LIFT SURGING.
- DISCHARGE AUXILIARY HEATERS PREWIRED TO PLUG FOR USE, AS REQUIRED BY OPERATIONS.
- WHEN VALVE LMP-VV-2047 IS NOT OPEN, SETPOINT TO LMP-FC-2046 IS FORCED TO ZERO PERCENT.
- TE-2567 AND TE-2568 ARE INTEGRAL WITH AUXILIARY HEATER AND ARE NOT REPLACEABLE.
- FOR ELECTRICAL SUPPLY DESIGN SEE DRAWING 24590-LAW-EF-LVE-00031.
- FLOW CONTROL (FC) IS INTEGRAL TO THE VALVE. ACTUAL SETPOINT PROVIDED FROM ION.
- HIGH HIGH WEIGHT FROM MECHANICAL HANDLING LOAD CELL LPH-WE-5205 (REPRESENTING HIGH LEVEL IN CONTAINER) CLOSES VALVE LMP-VV-2047 TO SHUT THE EAST CHAMBER DISCHARGE.
- LMP-DI-2404 ON P&ID 24590-LAW-M6-LMP-00032002 IS USED IN CALCULATION OF ALTERNATE LEVEL LMP-LI-2053.
- DISCHARGE HEATER POWER SUPPLY OPERATION IS INITIATED AND OPERATIONAL STATUS IS MONITORED FROM THE FACILITY CONTROL SYSTEM. TAG REPRESENTS MULTIPLE CONTROL AND INDICATING PARAMETERS FOR ALL EAST AND WEST DISCHARGE CHAMBER HEATERS AVAILABLE TO FACILITY OPERATOR. CONTROL SIGNAL ORIGINATES FROM AVERAGE DISCHARGE CHAMBER TEMPERATURES.
- EACH HEATER VPC HAS A START/STOP HAND SWITCH AND A POWER REFERENCE AUTO/MANUAL STATION. EAST CHAMBER HEATERS ARE VPC1 THROUGH VPC12. WEST CHAMBER HEATERS ARE VPC13 THROUGH VPC24.
- POWER SUPPLY SEPARATELY CONTROLS BOTH THE EAST AND WEST DISCHARGE CHAMBERS.
- FOR PACKAGE DETAILS, SEE DRAWING 24590-CM-POA-EY00-00002-03-00005.
- THIS DRAWING SUPERSEDES 24590-LAW-M6-LMP-00038 REV. 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6-LMP-00022, AND -00063.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-LAW-3YD-LMP-00001 SYSTEM DESCRIPTION FOR THE SYSTEM LMP, LOW ACTIVITY WASTE MELTER.

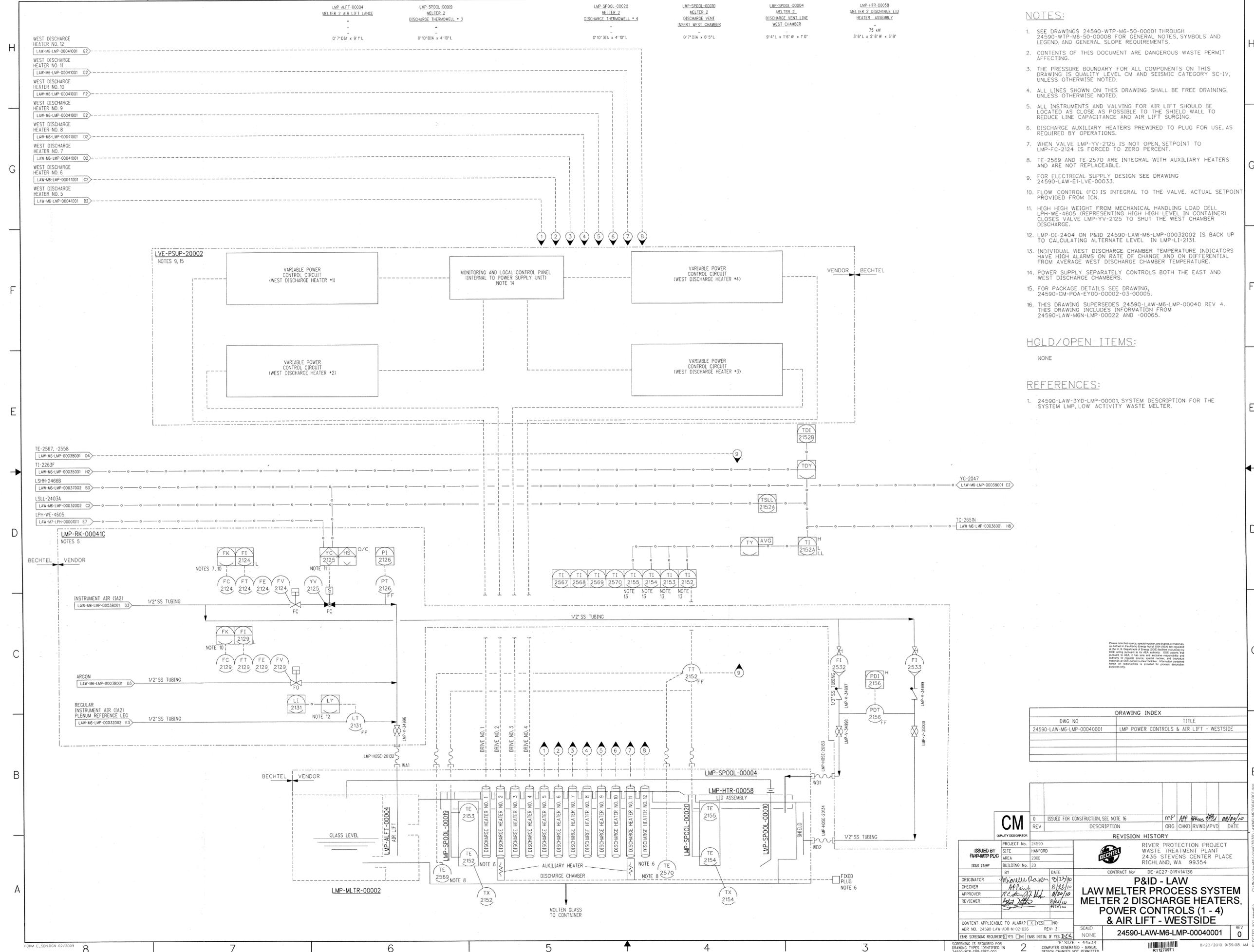
Please note that unless specifically noted, all drawings are the property of the U.S. Department of Energy (DOE) and are not to be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the prior written permission of the U.S. Department of Energy.

DRAWING INDEX	
DWG NO	TITLE
24590-LAW-M6-LMP-00038001	LAW MELTER PROCESS SYSTEM

REV	DESCRIPTION	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 17	08/20/10

REVISION HISTORY	
ISSUED BY	DATE
CHECKER	DATE
APPROVER	DATE
REVIEWER	DATE

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	2D
CONTRACT No.	DE-AC22-01RV14136
<b>P&amp;ID - LAW MELTER PROCESS SYSTEM MELTER 2 DISCHARGE HEATERS, POWER CONTROLS (1-4) &amp; AIR LIFT - EASTSIDE</b>	
SCALE:	NONE
NO.:	24590-LAW-M6-LMP-00038001
REV:	0



NOTES:

- SEE DRAWINGS 24590-WTP-M6-50-0001 THROUGH 24590-WTP-M6-50-0008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
- CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
- THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
- ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
- ALL INSTRUMENTS AND VALVING FOR AIR LIFT SHOULD BE LOCATED AS CLOSE AS POSSIBLE TO THE SHIELD WALL TO REDUCE LINE CAPACITANCE AND AIR LIFT SURGING.
- DISCHARGE AUXILIARY HEATERS PREWIRED TO PLUG FOR USE, AS REQUIRED BY OPERATIONS.
- WHEN VALVE LMP-YV-2125 IS NOT OPEN, SETPOINT TO LMP-FC-2124 IS FORCED TO ZERO PERCENT.
- TE-2569 AND TE-2570 ARE INTEGRAL WITH AUXILIARY HEATERS AND ARE NOT REPLACEABLE.
- FOR ELECTRICAL SUPPLY DESIGN SEE DRAWING 24590-LAW-E1-LVE-00033.
- FLOW CONTROL (FC) IS INTEGRAL TO THE VALVE. ACTUAL SETPOINT PROVIDED FROM ICN.
- HIGH HIGH WEIGHT FROM MECHANICAL HANDLING LOAD CELL LPH-WE-4605 (REPRESENTING HIGH HIGH LEVEL IN CONTAINER) CLOSES VALVE LMP-YV-2125 TO SHUT THE WEST CHAMBER DISCHARGE.
- LMP-DI-2404 ON P&ID 24590-LAW-M6-LMP-00032002 IS BACK UP TO CALCULATING ALTERNATE LEVEL IN LMP-LI-2131.
- INDIVIDUAL WEST DISCHARGE CHAMBER TEMPERATURE INDICATORS HAVE HIGH ALARMS ON RATE OF CHANGE AND ON DIFFERENTIAL FROM AVERAGE WEST DISCHARGE CHAMBER TEMPERATURE.
- POWER SUPPLY SEPARATELY CONTROLS BOTH THE EAST AND WEST DISCHARGE CHAMBERS.
- FOR PACKAGE DETAILS SEE DRAWING 24590-CM-POA-EY00-00002-03-00005.
- THIS DRAWING SUPERSEDES 24590-LAW-M6-LMP-00040 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-LMP-00022 AND -00065.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

- 24590-LAW-3YD-LMP-00001, SYSTEM DESCRIPTION FOR THE SYSTEM LMP, LOW ACTIVITY WASTE MELTER.

Please note that this drawing, symbol number and legend are subject to change without notice and are not to be used for construction or procurement of materials without the written approval of the design engineer. The design engineer is not responsible for the accuracy of the data used in this drawing. The design engineer is not responsible for the accuracy of the data used in this drawing. The design engineer is not responsible for the accuracy of the data used in this drawing.

DRAWING INDEX	
DWG NO	TITLE
24590-LAW-M6-LMP-00040001	LMP POWER CONTROLS & AIR LIFT - WESTSIDE

<b>CM</b> QUALITY DESIGNATOR	PROJECT No. 24590 SITE HANFORD AREA 200E BUILDING No. 20	RIVER PROTECTION PROJECT WASTE TREATMENT PLANT 2435 SIEVENS CENTER PLACE RICHLAND, WA 99354
	ISSUED BY: <b>FWP-WTP-PLC</b> REVISION: 0 DESCRIPTION: ISSUED FOR CONSTRUCTION SEE NOTE 16 DATE: 08/29/10	REVISION HISTORY REVISION: 0 DESCRIPTION: ISSUED FOR CONSTRUCTION SEE NOTE 16 DATE: 08/29/10
ORIGINATOR: <i>[Signature]</i> CHECKER: <i>[Signature]</i> APPROVER: <i>[Signature]</i> REVIEWER: <i>[Signature]</i>	DATE: 8/29/10 DATE: 8/29/10 DATE: 8/29/10	SCALE: NONE REVISION: 0 24590-LAW-M6-LMP-00040001









State of Washington Department of Ecology  
Ms. Valerie Peery, Public Disclosure Coordinator  
3100 Port of Benton Blvd.  
Richland, WA 99354

CCN: 239278

**SEP 29 2011**

Dear Ms. Peery:

**CONTRACT NO. DE-AC27-01RV14136 – REQUEST FOR CERTIFICATION OF RECORDS AS CONFIDENTIAL**

- References:
- 1) CCN 203145, Letter, from Ms. J. A. Hedges, Ecology, to Ms. S. J. Olinger, ORP, *Final Permit Decision on the April 20 through June 5, 2009, Comment Period for the Hanford Waste Treatment and Immobilization Plant Dangerous Waste Permit (WTP Permit)*, dated July 31, 2009.
  - 2) CCN 192388, Letter, from Ms. S. J. Olinger, ORP, to Ms. J. A. Hedges, Ecology, *Washington State Department of Ecology (Ecology) Request - Length of Time to Maintain Confidential Business Information, 09-ESQ-106*, dated March 27, 2009.

BNI is requesting the Certification of Records as Confidential for the following documents:

1. *P&ID - LAW Melter Process System Melter 1 Agitation Zone 1 & Zone 2 and LMP-RK-00040A/B*, 24590-LAW-M6-LMP-00001001, Rev. 0
2. *P&ID - LAW Melter Process System Melter 1 Agitation Zone 3 & Level Detection LMP-RK-00040B and PPJ-RK-00001*, 24590-LAW-M6-LMP-00002001, Rev. 0
3. *P&ID - LAW Melter Process System Melter 1 Agitation Zone 3 & Level Detection and LMP-RK-00040C*, 24590-LAW-M6-LMP-00002002, Rev. 0
4. *P&ID - LAW Melter Process System Melter 1 Electrode Extension Cooling & Glass/Plenum Temperatures*, 24590-LAW-M6-LMP-00005001, Rev. 0
5. *P&ID - LAW Melter Process System Melter 2 Agitation Zone 1 & Zone 2*, 24590-LAW-M6-LMP-00031001, Rev. 0
6. *P&ID - LAW Melter Process System Melter 2 Agitation Zone 3 & Level Detection LMP-RK-00041B and PPJ-RK-00002*, 24590-LAW-M6-LMP-00032001, Rev. 0
7. *P&ID - LAW Melter Process System Melter 2 Agitation Zone 3 & Level Detection LMP-RK-00041C*, 24590-LAW-M6-LMP-00032002, Rev. 0
8. *P&ID - LAW Melter Process System Melter 2 Electrode Extension Cooling & Glass/Plenum Temperatures*, 24590-LAW-M6-LMP-00035001, Rev. 0

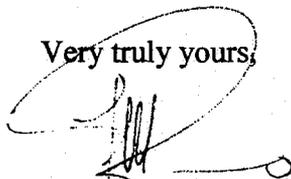
This select group of piping and instrumentation diagrams (P&ID) represent the enhanced versions of the P&IDs previously approved by the Director as "Confidential Business Information" (CBI) in the LAW-018 permit package. This permit package was approved by the State of Washington Department of Ecology on July 31, 2009 (Reference 1).

The basis or justification for this request is provided as follows. The LAW melter design by Duratek Inc. (Duratek), and used by BNI contains intellectual property that is proprietary to Duratek. "Limited Rights Legend - April 2001" appears on confidential documents submitted to BNI by Duratek. BNI has transferred data from confidential Duratek submittals into the documents cited above (which were prepared and issued by BNI). These BNI documents contain the statement "Limited Rights Legend - April 2001" and subsequent pages are labeled as "Proprietary Data". In addition, each page containing proprietary data includes a statement regarding CBI. The Proprietary Data/CBI designation indicates that technical data includes trade secrets developed by private expense, such as design procedures or techniques, chemical composition of materials, or manufacturing methods, processes, or treatments, including minor modifications thereof, provided that such data: (1) are not generally known or available from other sources without obligation concerning their confidentiality; (2) have not been made available by the owner to others without obligation concerning their confidentiality; and (3) are not already available to the Government without obligation concerning their confidentiality.

As provided in reference 2, BNI requests that information deemed Proprietary Data/CBI remains confidential until Duratek dictates that BNI is no longer required to protect the information as such. As stated in the proprietary legend shown on the affected P&IDs, Duratek would lose a technical advantage thus compromising their competitive position if information delivered to BNI as Proprietary Data/CBI were released to the public or a competitor. No other State or Federal agency has made a confidentiality determination.

If you have any questions or comments regarding this request, please contact Mr. Barry Curn at 371-2791 or Mr. Brad Erlandson at 371-2182.

Very truly yours,



F. M. Russo  
Project Director

DCR/paf

cc:

Bradford, R. W.	WTP	MS14-3C
Busche, D. M.	WTP	MS17-A
Clements, W. T.	WTP	MS7-A
Curn, B. L.	WTP	MS16-A
Dunkirk, J. H.	WTP	MS14-3C
Erlandson, B. G.	WTP	MS16-A
Fisher, P. A.	WTP	MS16-A
Huffman, L. A.	ORP	H6-60
Knutson, D. E.	DOE-WTP	H6-60
Robertson, D. C.	WTP	MS16-A
Russo, F. M.	WTP	MS14-3C
Ryan, G. W.	WTP	MS17-A
Sommer, D. J.	ORP	H6-60
PADC w/a	WTP	MS19-A



STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY

PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000

711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

October 28, 2011

11-NWP-126

Mr. Scott Samuelson, Manager  
Office of River Protection  
United States Department of Energy  
PO Box 450, MSIN: H6-60  
Richland, Washington 99352

Mr. Frank Russo, Project Director  
Bechtel National, Inc.  
2435 Stevens Center Place, MSIN: H4-02  
Richland, Washington 99354

**Re: Certification of Confidential Business Information for the Waste Treatment Plant**

Dear Mr. Samuelson and Mr. Russo:

The Washington State Department of Ecology (Ecology) grants your request for confidentiality regarding the following documents and associated document change notices.

- 24590-LAW-M6-LMP-00001001, Revision 0, Piping and Instrumentation Diagrams (P&ID) - *LAW Melter Process System Melter 1 Agitation Zone 1 & Zone 2 and LMP-RK-00040A/B.*
- 24590-LAW-M6-LMP-00002001, Revision 0, P&ID - *LAW Melter Process System Melter 1 Agitation Zone 3 & Level Detection LMP-RK-00040B and PPJ-RK-00001.*
- 24590-LAW-M6-LMP-00002002, Revision 0, P&ID - *LAW Melter Process System Melter 1 Agitation Zone 3 & Level Detection and LMP-RK-00040C.*
- 24590-LAW-M6-LMP-00005001, Revision 0, P&ID - *LAW Melter Process System Melter 1 Electrode Extension Cooling & Glass/Plenum Temperatures.*
- 24590-LAW-M6-LMP-00031001, Revision 0, P&ID - *LAW Melter Process System Melter 2 Agitation Zone 1 & Zone 2.*
- 24590-LAW-M6-LMP-00032001, Revision 0, P&ID - *LAW Melter Process System Melter 2 Agitation Zone 3 & Level Detection LMP-RK-00041B and PPJ-RK-00002.*
- 24590-LAW-M6-LMP-00032002, Revision 0, P&ID - *LAW Melter Process System Melter 2 Agitation Zone 3 & Level detection LMP-RK-00041C.*
- 24590-LAW-M6-LMP-00035001, Revision 0, P&ID - *LAW Melter Process System Melter 2 Electrode Extension Cooling & Glass/Plenum Temperatures.*

Mr. Samuelson and Mr. Russo  
October 28, 2011  
Page 2

11-NWP-126

Your request meets the confidential information criteria of the Revised Code of Washington (RCW) 43.21A.160 statute and corresponding regulations in Washington Administrative Code Chapter 173-303-810(15). Our grant of this confidentiality request applies to all portions and all revisions of the documents listed on page 1 of this letter.

Ecology will review your certification at each renewal of the *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste* (approximately every 10 years). At that time, we may require that you submit a new request for confidentiality. We will also review the certification if we receive information indicating that the criteria in RCW 43.21A.160 is no longer met.

If there are any questions, please contact Suzanne Dahl, Tank Waste Treatment Section Manager in our Nuclear Waste Program, at (509) 372-7892.

Sincerely,



Ted Sturdevant  
Director

Reference: Letter CCN: 239278, received October 4, 2011, from F. M. Russo, BNI, to V. Peery, Ecology, "Contract No. DE-AC27-01RV14136 – Request for Certification of Records as Confidential"

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Administrative Record: Waste Treatment Plant (TSD #H-0-8)  
BNI Correspondence Control  
Environmental Portal  
Hanford Operating Record General File  
USDOE-ORP Correspondence Control