



**MECHANICAL SYSTEMS DATA SHEET: VESSEL**

R10463346

PLANT ITEM No.  
**24590-PTF-MV-FEP-VSL-00017A**

Project:	<b>RPP-WTP</b>	P&ID:	<b>24590-PTF-M6-FEP-P0001</b>
Project No:	<b>24590</b>	Process Calculation:	<b>Deleted</b> <sup>2</sup>
Project Site:	<b>Hanford</b>	Vessel Drawing	<b>24590-PTF-MV-FEP-P0001</b>
Description:	<b>Waste Feed Evaporator Feed Vessel</b>		

ISSUED BY  
RPP-WTP PDC

**Reference Data**

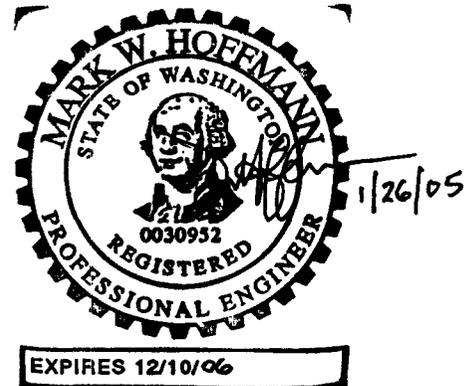
Charge Vessels Tag Numbers	<b>Deleted</b>
Pulsejet Mixers / Agitators Tag Numbers	<b>FEP-PJM-00001 Thru -00007 and FEP-PJM-00017</b>
RFDs/Pumps Tag Numbers	<b>Deleted</b>

**Design Data**

Quality Level	<b>QL-1</b>		Fabrication Specs	<b>24590-WTP-3PS-MV00-TP001</b>		
Seismic Category	<b>SC-1</b>		Design Code	<b>ASME VIII Div 1</b>		
Service/Contents	<b>Radioactive Liquid</b>		Code Stamp	<b>Yes</b>		
Design Specific Gravity	<b>1.27</b>		NB Registration	<b>Yes</b>		
Maximum Operating Volume	gal	<b>71,292</b>	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	<b>85,496</b>	Estimated	<b>160,000</b>	<b>936,000</b>	<b>874,000</b>
			Actual *	<b>164,200</b> <sup>2</sup>	<b>928,700</b> <sup>2</sup>	<b>903,700</b> <sup>2</sup>

Inside Diameter	inch	<b>264</b>			Wind Design	<b>Not Required</b>	
Length/Height (TL-TL)	inch	<b>273</b>			Snow Design	<b>Not Required</b>	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	<b>24590-WTP-3PS-MV00-TP002 24590-WTP-3PS-SS90-T0001</b>	
Internal Pressure	psig	<b>Atm</b> <sup>2</sup>	<b>15</b>	<b>NIA</b>	Seismic Base Moment *	ft*lb	
External Pressure	psig	<b>0.123</b> <sup>2</sup>	<b>10</b>	<b>NIA</b>	Postweld Heat Treat	<b>Not Required</b>	
Temperature	°F	<b>212</b>	<b>237</b>	<b>NIA</b>	Corrosion Allowance	Inch	<b>0.04 (Notes 9, 10)</b> <sup>2</sup>
Min. Design Metal Temp.	°F	<b>40</b>			Hydrostatic Test Pressure *	psig	

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



This Bound Document Contains a total of 4 sheets.

2	<sup>2/1/05</sup> <del>1/26/05</del> <sup>2/1/05</sup>	Issued for Permitting Use				
1	3/19/04	Issued for Permitting Use	K. Brightman	H. Khurana	C. Slater	M. Hoffmann
0	10/29/02	Issued for Permitting Use	J. Jackson	C. Slater	N/A	M. Hoffmann
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PLANT ITEM No.  
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## Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	SA 240 316 Note 1	See Drawing	Primary (See Note 6)
Shell	SA 240 316 Note 1	See Drawing	Primary (See Note 6)
Bottom Head	SA 240 316 Note 1	See Drawing	Primary (See Note 6)
Support	SA 240 304 Note 1	See Drawing	NIA
Jacket/Coils/Half-Pipe Jacket	NIA	NIA	NIA
Internals	SA 240 316 Note 1	See Drawing	Thermowell Primary
Pipe Nozzles	SA 312 TP316 Seamless Note 1	See Drawing	Primary (See Note 6)
Forgings/ Bar stock	SA 182 F316 Note 1	See Drawing	NIA
Gaskets	NIA	NIA	NIA
Bolting	NIA	NIA	NIA

## Miscellaneous Data

Orientation	Vertical	Support Type	Skirt
Insulation Function	Not Applicable	Insulation Material	Not Applicable
Insulation Thickness (inch)	Not Applicable	Internal Finish	Note 3
		External Finish	Note 3

## Remarks

\* To be determined by the vendor.

**Note 1:** Maximum carbon content 0.030 %

**Note 2:** Deleted

**Note 3:** Welds descaled as laid.

**Note 4:** Vessel volumes are approximate and do not account for the manufacturing tolerances, nozzles, and displacement of internals.

**Note 5:** This vessel is in Black Cell.

**Note 6:** All welds forming part of the primary and auxiliary containment including nozzle attachment welds shall be subjected to 100% volumetric examination.

**Note 7:** Contents of this document are Dangerous Waste Permit affecting.

**Note 8:** Deleted <sup>2</sup>

**Note 9:** BNI shall ensure that an additional 0.094" is available for erosion in the bottom head and shall report the minimum thickness required for all specified loading conditions, exclusive of erosion and corrosion allowances. <sup>2</sup>

**Note 10:** BNI shall ensure that an additional 0.060" is available for erosion in the lower 4" of the interior conical surface of the pulse jet mixers. <sup>2</sup>

**Note 11:** All hydrodynamic and overblow loads are for BNI internal use only and are to be disregarded by the seller. <sup>2</sup>



# MECHANICAL SYSTEMS DATA SHEET: VESSEL

PLANT ITEM No.  
24590-PTF-MV-FEP-VSL-00017A

## Equipment Cyclic Data Sheet

Component Plant Item Number	24590-PTF-MV-FEP-VSL-000017A
Component Description	Waste Feed Evaporator Feed Vessel

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	ASME SA240 316 with 0.030 % max. Carbon
Design Life	40 years
Component Function and Life Cycle Description	This vessel operates with two modes, filling and emptying. It is filled in 6.7 hours and emptied in 16.7 hours. Washdown is once a year.

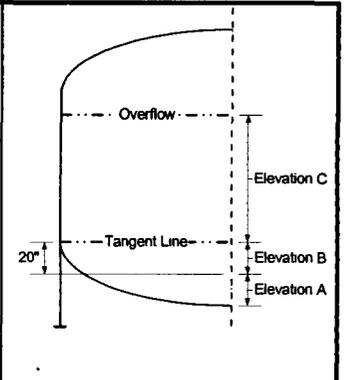
Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	-10	15	10	Nominal assumption
Operating Pressure	psig	-0.123	0	15,491	
Operating Temp	°F	59	212	15,491	Uniform material temperature range, not between two points.
Contents Specific Gravity		1.12	1.27	15,491	
Contents Level	inch	30	303	15,491	Liquid level measured from crown of bottom head
<b>Localized Features</b>					
Nozzles	Within 50° F of Vessel operating Temp		As above		

### Hydrodynamic Loading <sup>2</sup>

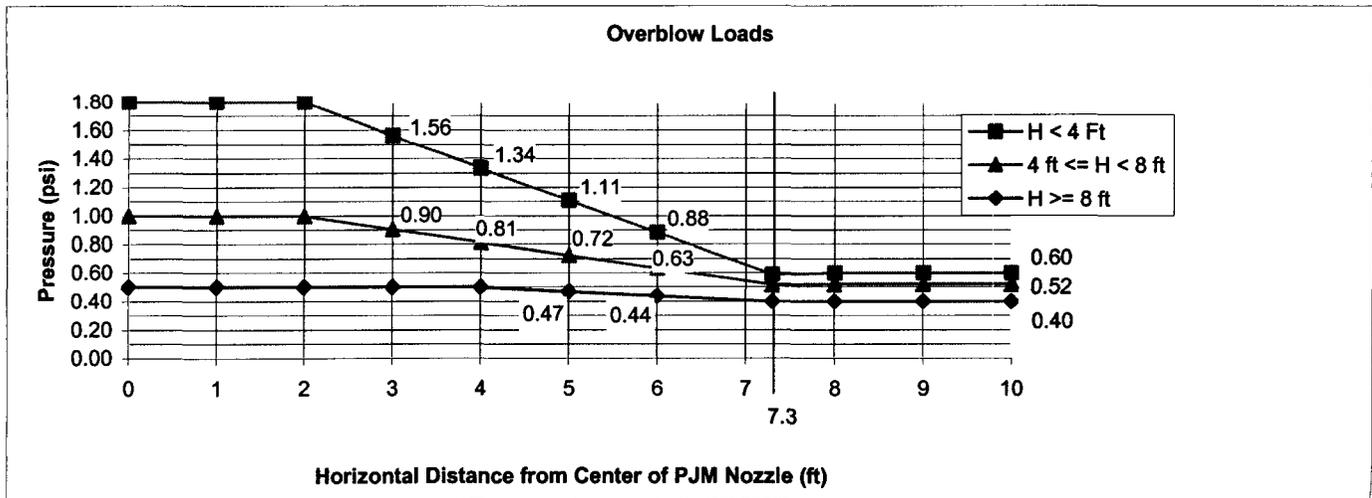
In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overflow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed for the combination of the normal operational hydrodynamic loads and overflow loads, and this load combination is also to be assumed to act concurrently with seismic loads.

The following table indicates the normal hydrodynamic pressure at ranges of elevations in the vessel and the number of design cycles for each condition. The hydrodynamic forces cycle between the indicated pressure ranges applied across the projected area of the component. Positive hydrodynamic forces act in the radial, outward direction and the vertical, upward direction. Apply the radial load simultaneously in the radial direction and normal to the radial direction in the horizontal plane.

Normal Operation Hydrodynamic Pressure Range, psi						Number of Cycles
Elevation A		Elevation B		Elevation C		
Radial	Vertical	Radial	Vertical	Radial	Vertical	
-0.15 to 0.25	-0.15 to 0.15	-0.05 to 0.12	-0.15 to 0.15	-0.03 to 0.10	-0.06 to 0.15	7.9 X 10 <sup>6</sup>



Overflow loads vary as a function of the horizontal distance from the center of the overblowing pulse jet mixer nozzle and the elevation 'H' above the overblowing pulse jet mixer nozzle up to the overflow level as plotted:



The overflow pressure shall only be applied to the projected area of the overblowing pulse jet mixer in the vertical, upward direction and to all surrounding components in the horizontal plane, radiating from the overblowing pulse jet mixer. Any single pulse jet mixer may overflow 100 cycles. <sup>2</sup>

### Notes

1. Cycle increase: Increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted. <sup>2</sup>



**MECHANICAL SYSTEMS DATA SHEET: VESSEL**

**PLANT ITEM No.**  
**24590-PTF-MV-FEP-VSL-00017A**

**Equipment Cyclic Data Sheet**

Component Plant Item Number	<i>PTF-MP-FEP-PJM-00001 Thru -00007 and PTF-MP-FEP-PJM-00017</i>
Component Description	<i>Pulse Jet Mixers</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>ASME SA240 316 with 0.030 % max. Carbon</i>
Design Life	<i>40 years</i>
Component Function and Life Cycle Description	<i>These pulse jet mixers (PJMs) are cyclically loaded using vacuum to fully fill the PJM with process liquid and compressed air to fully empty the PJM. The PJMs are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The PJM supports shall be designed to cycle between fully buoyant (PJM empty and parent vessel full) and fully loaded (PJM full and parent vessel empty) states. Thrust load shall be applied only to the fully buoyant state. Assume the parent vessel is full for 50% of the number of PJM cycles.</i> $\Delta_2$

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	<i>FV</i>	<i>80</i>	<i>10</i>	<i>Nominal assumption</i>
Operating Pressure	psig	<i>FV</i>	<i>72.5</i>	<i>7.9 X 10<sup>6</sup></i>	
Operating Temperature	°F	<i>59</i>	<i>212</i>	<i>&lt;100</i>	<i>Pressure cycles to be at 212°F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points.</i>
Contents Specific Gravity		<i>1.12</i>	<i>1.27</i>	<i>&lt;1000</i>	
Contents Level	inch	<i>Empty</i>	<i>Flooded</i>	<i>7.9 X 10<sup>6</sup></i>	
Thrust $\Delta_2$	lbf	<i>0</i>	<i>275</i>	<i>7.9 X 10<sup>6</sup></i>	
<b>Localized Features</b>					
Nozzles					
Supports		<i>Buoyant / Loaded</i>		<i>7.9 X 10<sup>6</sup></i>	

**Notes**

*Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*