MECHANICAL SYSTEMS DATA SHEET: VESSEL

PLANT ITEM No. R10486409

24590-PTF-MV-UFP-VSL-00062B

Project:	RPP-WTP	P&ID:	24590-PTF-M6-UFP-P0004/P0005/P0006/P0015
Project No:	24590	Process Calculation:	DELETED 1
Project Site:	Hanford	Vessel Drawing	24590-PTF-MV-UFP-P0006
Description:	Ultrafilter Permeate Collection Vessel 1		ISSUED BY RPP-WTP PDC

Reference Data

Charge Vessels (Tag Numbers)	UFP-VSL-00035, UFP-VSL-00036, UFP-VSL-00075, UFP-VSL-00037, UFP-VSL-00051, UFP-VSL-00083
Pulsejet Mixers / Agitators (Tag Numbers)	UFP-PJM-00039, UFP-PJM-00040, UFP-PJM-00041, UFP-PJM-00042, UFP-PJM-00043, UFP-PJM-00051
RFDs/Pumps (Tag Numbers)	UFP-RFD-00031, UFP-RFD-00032, UFP-RFD-00033, UFP-RFD-00034, UFP-RFD-00039, UFP-RFD-00047

Design Data

Quality Level		QL-1		Fabrication Specs	24590-WTP-3PS-MV00-TP001 1		
Seismic Category		SC-I		Design Code	ASME VIII Div 1		
Service/Contents		Radioactive Liquid		Code Stamp	Yes		
Design Specific Gravity		1.26		NB Registration	Yes		
Maximum Operating Volume	gal	30,072		Weights (lbs)	Empty	Operating	Test
Total Volume	gal	34,700		Estimated	95,300	417,000	385,000
				Actual *	100,000 1	427,800 1	398,100 1

Inside Diameter	inch	180			Wind Design	Not Required	
Length/Height (TL-TL)	inch	255			Snow Design	Not Required	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	24590-WTP-3PS-MV00-TP002 24590-WTP-3PS-SS90-T0001	
Internal Pressure	psig	ATM	15	N/A	Seismic Base Moment *	ft*lb	
External Pressure	psig	0.217 1	10.29	N/A	Postweld Heat Treat	Not Required	
Temperature	°F	86	120	N/A	Corrosion Allowance	Inch	0.04
Min. Design Metal Temp	°F	40			Hydrostatic Test Pressure *	psig	

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

1/25/05

EXPIRES 12/10/06

This Bound Document Contains a total of 6 sheets.

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
1	2/17/05	Issued for Permitting Use				
0	10/8/03	Issued for Permitting Use	J. Jackson	C. Slater	C. Slater	M. Hoffmann

	MECHANICAL SYSTEMS DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-UFP-VSL-00062B

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	SA 240 316 Note 1	See Drawing	Auxiliary (See Note 6) 1
Shell	SA 240 316 Note 1	See Drawing	Primary (See Note 6) 1
Bottom Head	SA 240 316 Note 1	See Drawing	Primary (See Note 6) 1
Support	SA 240 304 Note 1	See Drawing	N/A
Jacket/Coils/Half-Pipe Jacket	N/A	N/A	N/A
Internals	SA 240 316 Note 1	See Drawing	Thermowells Primary
Pipe Nozzles	SA 312 TP316 Note 1	See Drawing	Primary (See Note 6) 1
Forgings/ Bar stock	SA 182 F316 Note1	See Drawing	N/A
Wash Ring Pipe	SA 312 TP316 Note 1	See Drawing	N/A
Bolting/ Gaskets	N/A	N/A	N/A

Miscellaneous Data

Orientation	Vertical	Support Type	Skirt
Insulation Function	Not Applicable	Insulation Material	Not Applicable
Insulation Thickness (inch)	Not Applicable	Internal Finish	Note 2 1
		External Finish	Note 2 1

Remarks

* To be determined by the vendor.

Note 1. Maximum 0.030% carbon.

Note 2. Welds de-scaled as laid.

Note 3. Deleted

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

Note 5. This vessel is in a Black Cell. 1

Note 6. All welds forming part of the primary and auxiliary containment including nozzle attachment welds shall be subjected to 100% volumetric examination. 1

Note 7. Contents of this document are Dangerous Waste Permit affecting. 1

Note 8. Deleted 1

Note 9. All hydrodynamic and overblow loads are for BNI internal use only and are to be disregarded by the seller. 1

	MECHANICAL SYSTEMS DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-UFP-VSL-00062B

Equipment Cyclic Data Sheet

Component Plant Item Number:	*PTF-MV-UFP-VSL-00062B*
Component Description	*Ultrafilter Permeate Collection Vessel (Parent Vessel)* 1

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

Materials of Construction	*ASME SA 240 316 with max. carbon of 0.030%*
Design Life	*40 Years*
Component Function and Life Cycle Description	*This vessel collects permeate from the Ultrafiltration modules. The permeate is transferred from this vessel to the Cesium Ion Exchange Process System, vessel CXP-VSL-00001, for further processing. The permeate is also sampled to check for solids in this vessel. The vessel is filled over a period of approximately 32 hours. An operating cycle for this vessel, filled then emptied, is approximately 48 hours.*

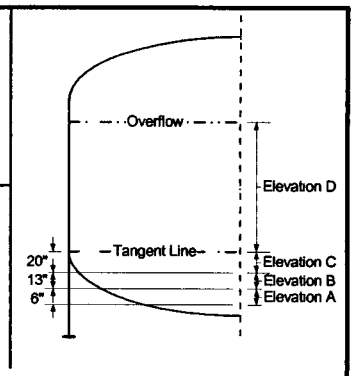
Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*-10.29*	*15*	*10*	*Nominal assumption for testing*
Operating Pressure	psig	*-0.217*	*0.000*	*N/A*	*The vessel will remain under constant pressure depending upon the HVAC plant*
Operating Temp	°F	*68*	*86*	*10,400*	
Contents Specific Gravity		*1.00*	*1.26*	*10,400*	
Contents Level	inch	*27*	*288*	*10,400*	
Localized Features					
Nozzles		*Within 9°F of operating temperature range.*		*As above*	

Notes

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

Hydrodynamic Loading 1

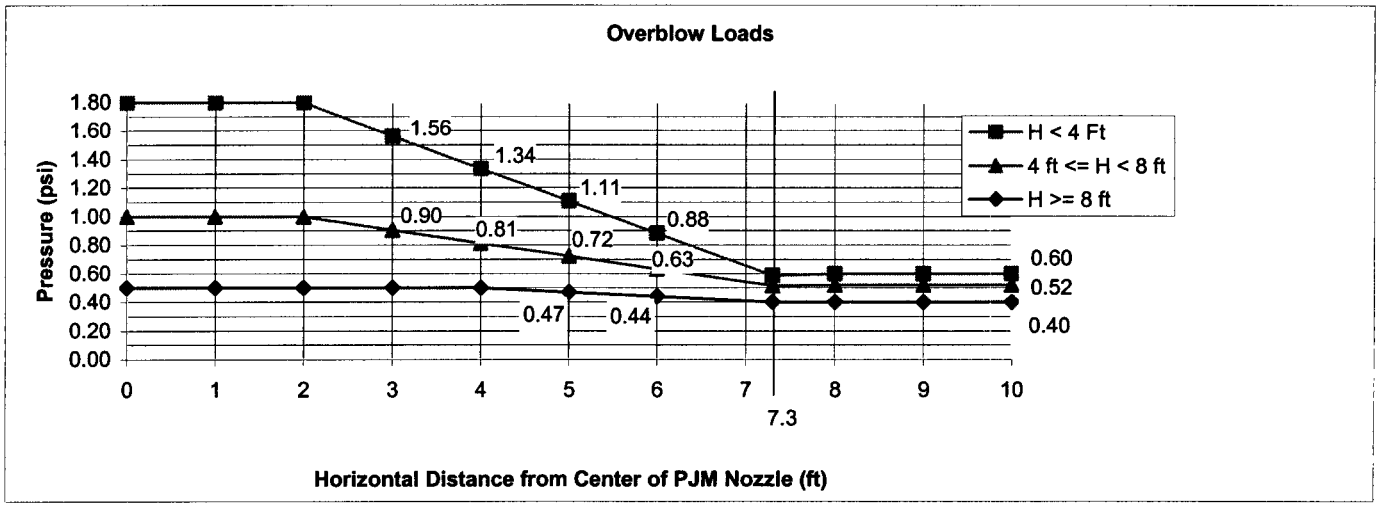
In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overblow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed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



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

Normal Operation Hydrodynamic Pressure Range, psi								Number of Cycles
Elevation A		Elevation B		Elevation C		Elevation D		
Radial	Vertical	Radial	Vertical	Radial	Vertical	Radial	Vertical	
-0.09 to 0.29	*-0.74 to 0.48*	*-0.02 to 0.22*	*-0.01 to 0.40*	*-0.05 to 0.12*	*-0.01 to 0.40*	*-0.03 to 0.10*	*-0.01 to 0.40*	*20.7×10^6*

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



The overblow pressure shall only be applied to the projected area of the overblowing pulse jet mixer in the vertical, upward direction and to all surrounding components in the horizontal plane, radiating from the overblowing pulse jet mixer. Any single pulse jet mixer may overblow 100 cycles. 1

Notes

- ***Cycle increase: Increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*** 1

	MECHANICAL SYSTEMS DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-UFP-VSL-00062B

Equipment Cyclic Data Sheet

Component Plant Item Number:	*PTF-MV-UFP-VSL-00035, PTF-MV-UFP-VSL-00036, PTF-MV-UFP-VSL-00037, PTF-MV-UFP-VSL-00051, PTF-MV-UFP-VSL-00075, PTF-MV-UFP-VSL-00083*
Component Description	*Charge Vessels for the following RFDs UFP-RFD-00031, UFP-RFD-00032, UFP-RFD-00033, UFP-RFD-00034, UFP-RFD-00039, UFP-RFD-00047*

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

Materials of Construction	*ASME SA240 316 with max. Carbon of 0.030%* 1
Design Life	*40 Years*
Component Function and Life Cycle Description	*These charge vessels are cyclically loaded using vacuum to fully fill the charge vessel with process liquid and compressed air to fully empty the charge vessel. The charge vessels are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The charge vessel supports shall be designed to cycle between fully buoyant (charge vessel empty and parent vessel full) and fully loaded (charge vessel full and parent vessel empty).* 1

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*80*	*10*	*Nominal assumption for testing*
Operating Pressure	psig	*FV*	*72.5*	*10,400*	
Operating Temperature	°F	*68*	*86*	*10,400*	*Parent vessel will be operating normally at a temperature of 77°F*
Contents Specific Gravity		*1.00*	*1.26*	*10,400*	
Contents Level	inch	*Empty*	*Flooded*	*10,400*	
Localized Features					
Nozzles		*Within 9°F of operating temperature range.*		*As above.*	
Supports		*Buoyant*	*Loaded*	*10,400*	

Notes

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

	MECHANICAL SYSTEMS DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-UFP-VSL-00062B

Equipment Cyclic Data Sheet

Component Plant Item Number:	*UFP-PJM-00039, UFP-PJM-00040, UFP-PJM-00041, UFP-PJM-00042, UFP-PJM-00043, UFP-PJM-00051*
Component Description	*Pulse Jet Mixers*

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

Materials of Construction	*ASME SA240 316 with max. Carbon of 0.030%* 1
Design Life	*40 Years*
Component Function and Life Cycle Description	*These pulse jet mixers (PJMs) are cyclically loaded using vacuum to fully fill the PJM with process liquid and compressed air to fully empty the PJM. The PJMs are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The PJM supports shall be designed to cycle between fully buoyant (PJM empty and parent vessel full) and fully loaded (PJM full and parent vessel empty) states. Thrust load shall be applied only to the fully buoyant state. Assume the parent vessel is full for 50% of the number of PJM cycles.* 1

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*80*	*10*	*Nominal assumption for testing*
Operating Pressure	psig	*FV*	*72.5*	*2.07×10^7* 1	
Operating Temperature	°F	*68*	*86*	*10,400*	*Parent Vessel will operating normally at a temperature of 77 °F*
Contents Specific Gravity		*1.0*	*1.26*	*2.07×10^7* 1	
Contents Level	inch	*Empty*	*Flooded*	*2.07×10^7* 1	
Thrust 1	lbf	*0*	*330*	*2.07×10^7*	
Localized Features					
Nozzles		*Within 9°F of operating temperature range.*		*As above*	
Supports		*Buoyant*	*Loaded*	*2.07×10^7*	

Notes

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