MECHANICAL DATASHEET: VESSEL

PLANT ITEM No.
24590-PTF-MV-UFP-VSL-00001B

R11229231

Project:	***RPP-WTP***	P&IDs: 12	***24590-PTF-M6-UFP-00001004, 00001005, 00007007, 24590-PTF-M6-PWD-00046***
Project No:	***24590***	Calculations: 12	***Attachment 1***
Project Site:	***Hanford***	Vessel Drawings 12	***24590-PTF-MV-UFP-00002001, 00002002, 00002003***
Description:	***Ultrafiltration Feed Preparation Vessel***	Reports 12	***Attachment 1***

ISSUED BY RPP-WTP PDC

Reference Data

Charge Vessels (Tag Numbers)	***N/A***
Pulsejet Mixers / Agitators (Tag Numbers)	***UFP-PJM-00045, UFP-PJM-00046, UFP-PJM-00047, UFP-PJM-00048, UFP-PJM-00049, UFP-PJM-00050, UFP-PJM-00101, UFP-PJM-00102, UFP-PJM-00112, UFP-PJM-00113, UFP-PJM-00114, UFP-PJM-00115***
RFDs/Pumps (Tag Numbers)	***N/A***

Design Data

Quality Level		***Q (See Note 18)***	Fabrication Specs	***24590-WTP-3PS-MV00-T0001***		
Seismic Category		***SC-I***	Design Code	***ASME Section VIII Division 1***		
Service/Contents		***Radioactive Liquid***	Code Stamp	***Yes***		
Design Specific Gravity		***1.5***	NB Registration	***Yes***		
Maximum Operating Volume	gal	***64066*** 12	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	***75119*** 12	Estimated 12	***220,440***	***1,152,000***	***833,400***
Environmental Qualification		***See EQD Section***				

Inside Diameter	inch	***240***					Wind Design	***Not Required***
Length/Height (TL-TL)	inch	***303.6*** 12					Snow Design	***Not Required***
		Vessel Operating	Vessel Design	Coil/Jacket Design	Sparger Operating	Sparger Design	Seismic Design	***24590-WTP-3PS-MV00-T0002***
Internal Pressure	psig	***ATM***	***15***	***35***	***135***	***160***		
External Pressure	psig	***1.5 (Note 3)***	***2.0 (Note 3)***	***0.0***	***Vessel Internal Pressure (OP) (EC Note 2)***	***Vessel Internal Pressure (Design) (EC Note 2)***	Postweld Heat Treat	***Not Required***
Temperature	°F	***194***	***230*** 12	***230*** 12	***358***	***375***	Corrosion Allowance	Inch ***0.040 (Note 12, 13, 20)***
Min. Design Metal Temp.	°F	***40***						

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SA 240 316 (Note 1)***	***See Drawing***	***Auxiliary (Note 8)***
Shell	***SA 240 316 (Note 1)***	***See Drawing***	***Primary (Note 8)***
Bottom Head	***SA 240 316 (Note 1)***	***See Drawing***	***Primary (Note 8)***
Support	***SA 240 304 (Note 1)***	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***SA 240 316 (Note 1, Note 1a)***	***See Drawing***	***N/A***
Internals (UNO)	***SA 240 316 (Note 1)***	***See Drawing***	
Pipe Nozzles	***SA 312 TP316 (Note 1, Note 1b)***	***See Drawing***	***Primary (Note 8)***
Forgings/ Bar stock	***SA 182 F316 (Note 1)***	***See Drawing***	***N/A***
Wash Ring Pipe	***SA 312 TP316 (seamless) (Note 1)***	***See Drawing***	***N/A***
Bolting/Gaskets	***N/A***	***N/A***	***N/A***
Wear Plates	***SA 240 316 (Note 1)***	***See Drawing***	***N/A***
Steam Spargers	***SB 622 (seamless) UNS N10276***	***See Drawing***	***Auxiliary (Note 8)***
PJM Cone 12	***SA 494 TP CX2MW (Cast Cones)***	***See Drawing***	***N/A***
	SA 240 TP 316 (Fabricated Cones)	***See Drawing***	***N/A***

Miscellaneous Data

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

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.* 12

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.* 12

Note 11. *Deleted.*

Note 12. *Seller shall provide wear plates for erosion control on the bottom head. Minimum wear plate thickness is 0.478"* 12

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.* 12

Note 14. *Deleted.* 12

Note 15. *Deleted.*

Note 16. *Deleted.*

Note 17. *Deleted.* 12

Note 18. *Vessel to be designed, fabricated, tested to Q, L-1 and Black Cell requirements defined in 24590-WTP-3PS-MV00-T0001.* 12

Note 19. *Deleted* 12

Note 20. *Corrosion allowance for jacket shall be 0.040 inch.* 12

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.* 12

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* # *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.* 12

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.* 12

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	MECHANICAL DATASHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-UFP-VSL-00001B

Equipment Cyclic Data Sheet – Parent Vessel 12

Component Plant Item Number:	*24590-PTF-MV-UFP-VSL-00001B*
Component Description	*Ultrafiltration Feed Preparation Vessel*

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

Materials of Construction		*ASME SA240 316 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.*			
Load Type		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*	
Localized Features					
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.*** 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 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.

Equipment Cyclic Data Sheet - PJMs 12

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.*			
Load Type		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*
Localized Features					
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.*** 12

Equipment Cyclic Data Sheet – Steam Spargers

Component Plant Item Number:	*There is no Component Plant Item Number associated with Nozzles N70 and N71.*
Component Description	*Steam Spargers*

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

Materials of Construction	*Hastelloy*
Design Life	*40 Years*
Component Function and Life Cycle Description	*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.*

Load Type		Min Steam	Max Steam	Min Air	Max Air	Number of Cycles	Comment
Design Pressure	psig	*-FV*	*160*	*-2.0*	*150*	*10*	*Nominal assumption for testing. Minimum design pressure is full vacuum for potential steam collapse.*
Design Temp.	°F	*50*	*375*	*50*	*140*	*N/A*	
Operating Pressure	psig	*-1.5*	*111/76*	*-1.5*	*150/51*	*12120*	*See EC-Note 2 below for Max Steam and Max Air Values. Conservative Cyclic Assumption, see EC-Note 3 below.*
Operating Temp	°F	*50*	*343/320*	*50*	*135/80*	*12120*	*See EC-Note 2 below for Max Steam and Max Air Values. Conservative Cyclic Assumption, see EC-Note 3 below.*
Contents Specific Gravity		*0.0*	*3.81 SG air*		*11.0 SG air*	*12120*	*Per Process Stream Properties, 24590-WTP-RPT-ENG-07-007, Rev. 0A, Table 4-18. Cycles per the Conservative Assumption, see notes below.*
Contents Specific Gravity w / liquid		*1.2* △12	*1.5*				*The worst case is the pipe gets flooded, vessel SG used.*
Localized Features							
Nozzles: *N70, N71* △12		*59°F*	*375°F*			*12120*	

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. △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^3/lb the density of air at 70 F is 0.075 lb/ft^3 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^3 and at 80 F and 150 psig 0.824 lb/ft^3 calculating 0.824 / 0.075 = 11.0 the SG_{air}.

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). △12

Design Considerations for Loads Induced by Pulse Jet Mixers (PJMs) 12

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 12

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.

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 in = 20 in) of a spherical zone centered at any overblowing PJM nozzle.***

Figure 1: Acoustic Design Load

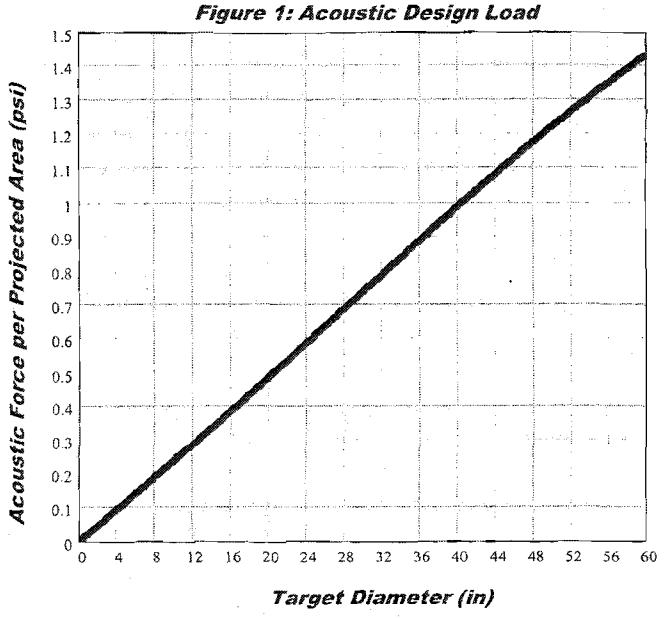
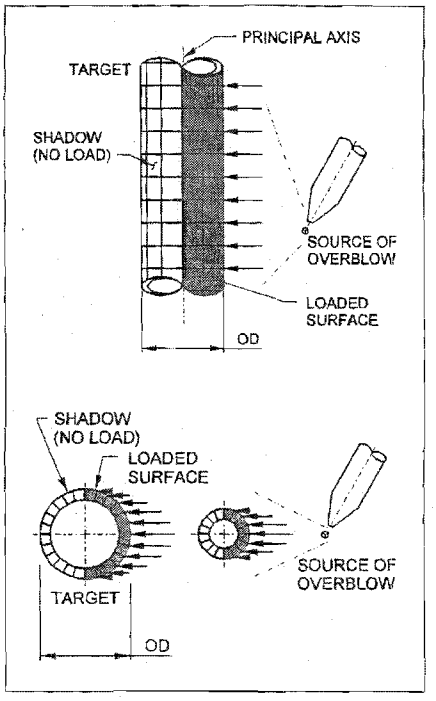


Figure 2: Load Application



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.***

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	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

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

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

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

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).* 12
H. *Design Pressures and Temperatures to be used to qualify the nozzles only.* 12
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.* 12
J. *Instrumentation bubbler nozzle loads for N65A, N65B, and N65C are based on instrumentation bubbler nozzle loads from N05A, N05B, and N05C.* 12
K. *Maximum enveloped nozzle loads from all UFP-VSL-1A/B 4" nozzles applied to N70 and N71.* 12
L. *Maximum enveloped loads from UFP-VSL-1A/B (N37 thru N44) applied to N72 thru N75.* 12

Equipment Identification		
Full Component Tag Number or BNI Stock Code Number	24590-PTF-MV-UFP-VSL-00001B	Safety Classification ☒ SC ☐ SS ☐ APC-PAM All subcomponents are SC
Equipment Datasheet Number	24590-PTF-MVD-00002	
Description	Ultrafiltration Feed Preparation Vessel	Seismic Category ☒ SC-I ☐ SC-II ☐ SC-III ☐ SC-IV ☐ 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	☒ Passive Mechanical	☐ Active Mechanical ☐ Electrical
Seismic Safety Function ☒ Yes ☐ No	Seismic Operability Requirements ☒ During Seismic Event	☒ After Seismic Event ☐ None

Equipment Environmental Qualification (EEQ)

(Parameter values stated in this section do not include process conditions or operation induced conditions)

Classification of Environment ☐ Mild ☒ Harsh

Qualified Life (years) ☒ 40 ☐ Other

Parameter Type/Units	Parameter Value	Parameter Duration (number)	Duration Units	WTP Source Document Number
Normal Ambients				
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	☐ Yes ☒ No			
Additional Normal Ambient Information:	N/A			

Equipment Environmental Qualification (EEQ) *(continued)*

Parameter Type/Units	Parameter Value	Parameter Duration (number)	Duration Units	WTP Source Document Number
Abnormal Ambients				
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	☐ Yes ☒ No		hours	24590-PTF-U0D-W16T-00001, E-Note 1
Additional Abnormal Ambient Information	N/A			
Design Basis Events (DBE) Ambients				
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	☐ Yes ☒ No (E-Note 5)	N/A	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Chemical/Spray Exposure	☒ Yes ☐ No	12.5	hours	24590-PTF-U0D-W16T-00001, E-Note 1
Additional DBE Information	N/A			

DBE Chemical Exposure Details

DBE Chemical Exposure Details	
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

Electrical Interfaces Supporting the Safety Function	
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

Mechanical Interfaces	
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

Equipment Seismic Qualification (ESQ)				
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 Engineering Specification for Seismic Qualification Criteria for Pressure Vessels	24590-WTP-3PS-SS90-T0001 24590-WTP-3PS-MV00-T0002	2 3	N/A
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

Equipment Qualification Notes and Additional Information

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.

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.

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.

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.

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."

f) The DBE conditions shall be taken to subsist for the stated number of hours following the qualified life of the equipment.

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.

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.

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.

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

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	JI 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 5/20/11	D Adler / MET R P Hills / EQ	J Hinckley 5/20/11	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	M Seed	~~D Evans~~ D. Vo Vb	D Adler	~~R Lanning~~ J. Hinckley	J Julyk 5/20/11	

ATTACHMENT 1: Page 1 of 3
REFERENCES for Data Sheets: 24590-PTF-MVD-UFP-00001 / 00002 Rev 12 (For BNI Use only)
Vessel Tag #'s: UFP-VSL-00001A / 00001B

Data	Document #	Rev	Document Title
Quality Level	24590-PTF-M6-UFP-00001001 24590-PTF-M6-UFP-00001004	0 0	*P&ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001A* *P&ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001B*
Seismic Category	24590-PTF-M6-UFP-00001001 24590-PTF-M6-UFP-00001004	0 0	*P&ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001A* *P&ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001B*
Design Specific Gravity	24590-WTP-RPT-ENG-07-007	0	*Process Stream Properties* / Section 4.18
Max Operating Volume	24590-PTF-M6C-UFP-00004	E 12	*Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B,* / Sheet 31 12
Total Volume	24590-PTF-M6C-UFP-00004	E 12	*Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B,* / Sheet 25 12
Inside Diameter	24590-PTF-M6C-UFP-00004	E 12	*Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B,* / Sheet 2 12
Length TL-TL	24590-PTF-M6C-UFP-00004	E 12	*Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B,* / Sheet 31 12
Operating Pressure Parent Vessel (external)	24590-PTF-M6C-PVP-00017	A	*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 & 00021004 indicate the process flow diagrams)
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	*Basis of Design* / Section 16.4.2.1
Design Pressure Parent Vessel (external)	24590-PTF-M6C-PVP-00017	A	*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
Jacket Design Pressure (internal) 12	24590-PTF-MVC-10-00003 24590-PTF-M6C-10-00008	C A	*PTF Vessel Cyclic Datasheet Inputs/* use 35 psig *Overpressure Protection Evaluation for PTF Vessel Jackets/* Section 8
Operating Temp (parent vessel) 12	24590-WTP-RPT-ENG-07-007	0	*Process Stream Properties Report*
Design Temp (parent vessel) 12	24590-WTP-RPT-ENG-07-007	0	*Process Stream Properties Report*
Sparger Operation/Design	24590-PTF-M6X-UFP-00386 24590-PTF-M6X-UFP-00387 24590-PTF-M6X-UFP-00388 24590-PTF-M6X-UFP-00389	0 0 0 0	*MS Line List for P&ID 24590-PTF-M6-UFP-00034002, Rev 0* *MS Line List for P&ID 24590-PTF-M6-UFP-00034003, Rev 0* *MS Line List for P&ID 24590-PTF-M6-UFP-00034004, Rev 0* *MS Line List for P&ID 24590-PTF-M6-UFP-00034005, Rev 0*
Jacket Design Temp 12	24590-PTF-MVC-UFP-00007	C	*Design of Cooling Jacket for the Ultrafiltration Feed Preparation Vessels* (UFP-VSL-00001A/B)
Corrosion Allowance, Erosion Allowance 12	24590-PTF-N1D-UFP-00005 24590-WTP-M0C-50-00004	5 E	*Corrosion Evaluation UFP-VSL-00001A/B* *Wear Allowance for WTP Waste Slurry Systems* (24590-WTP-M0E-50-00014)
Materials of Construction	24590-PTF-N1D-UFP-00005	5	*Corrosion Evaluation UFP-VSL-00001A/B*
Design Pressure (PJM) 12	24590-PTF-MVC-10-00003 24590-WTP-M6C-50-00011	C A	*PTF Vessel Cyclic Datasheet Inputs* (24590-PTF-MVE-10-00012) *Pulse Jet Mixer Internal Pressures and Thrust* / Section 8

REFERENCES for Data Sheets: 24590-PTF-MVD-UFP-00001 / 00002 Rev 12 (For BNI Use only)
Vessel Tag #'s: UFP-VSL-00001A / 00001B

Data	Document #	Rev	Document Title
Operating Pressure (PJM) 12	24590-PTF-MVC-10-00003	C	*PTF Vessel Cyclic Datasheet Inputs* (24590-PTF-MVE-10-00012)
	24590-WTP-M6C-50-00011	A	*Pulse Jet Mixer Internal Pressures and Thrust* / Section 8
Operating Temperature (PJM)	N/A		same as parent vessel
Cyclic Data (Vessel) 12	24590-PTF-MVC-10-00003	C	*PTF Vessel Cyclic Datasheet Inputs*
	24590-PTF-M6C-PVP-00017	A	*HADCRT Analysis of PTF PVP System at various Operating Scenarios*
Cyclic Data (PJM)	24590-PTF-MVC-10-00003	C	*PTF Vessel Cyclic Datasheet Inputs* (24590-PTF-MVE-10-00012) 12
Cyclic Data (Steam Spargers) 12	24590-PTF-MVC-10-00003	C	*PTF Vessel Cyclic Datasheet Inputs* (24590-PTF-MVE-10-00005)
Operating conditions (Air)	24590-PTF-M6X-UFP-00386	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00034002, Rev 0*
	24590-PTF-M6X-UFP-00387	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00034003, Rev 0*
	24590-PTF-M6X-UFP-00388	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00034004, Rev 0*
	24590-PTF-M6X-UFP-00389	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00034005, Rev 0*
Operating Conditions (Steam)	24590-PTF-M6X-UFP-00386	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00034002, Rev 0*
	24590-PTF-M6X-UFP-00387	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00034003, Rev 0*
	24590-PTF-M6X-UFP-00388	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00034004, Rev 0*
	24590-PTF-M6X-UFP-00389	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00034005, Rev 0*
Hydrodynamic Loads	24590-WTP-MVC-50-00001	A	*Hydrodynamic Loads for Normal PJM Operation in Vessels with Newtonian Fluids*
Single PJM Overblow Loads 12	24590-WTP-MVC-50-00011	B	*Pulse Jet Mixer Overblow Vessel Loads*
PJM Overblow Loads 12	24590-WTP-MVC-50-00011	B	*Pulse Jet Mixer Overblow Vessel Loads*
Single Overblow cycles 12	24590-PTF-MVC-10-00003	C	*PTF Vessel Cyclic Datasheet Inputs* (24590-PTF-MVE-10-00004)
Multiple Overblow Cycles 12	24590-PTF-MVC-10-00003	C	*PTF Vessel Cyclic Datasheet Inputs* (24590-PTF-MVE-10-00004)
Nozzle Loads	CCN 126187	N/A	*Nozzle Loads for UFP-VSL-00001A*
	CCN 126188	N/A	*Nozzle Loads for UFP-VSL-00001B*
	CCN 202057 12	N/A	*Supplemental Design Nozzle Loads for UFP-VSL-00001A/B*
	CCN 230860 12	N/A	*Supplemental Nozzle Design Loads for UFP-VSL-00001A*
	CCN 230861 12	N/A	*Supplemental Nozzle Design Loads for UFP-VSL-00001B*
Equipment Environmental Qualification (EEQ) 12	24590-PTF-U0D-W16T-00001	2	*PTF Room Environment Datasheet* (24590-PTF-U0N-W16T-00007)

REFERENCES for Data Sheets: 24590-PTF-MVD-UFP-00001 / 00002 Rev 12 (For BNI Use only)
Vessel Tag #'s: UFP-VSL-00001A / 00001B

Data	Document #	Rev	Document Title
Nozzle Design Pressures and Temperatures 12	24590-PTF-M6X-UFP-00288	0	*MS Line List for P&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)
	24590-PTF-M6X-UFP-00291	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00001002, Rev 0 UFP-VSL-1A*
	24590-PTF-M6X-UFP-00429	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00015002, Rev 0 UFP-VSL-1A*
	24590-PTF-M6WX-UFP-00027007	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00027007, Rev 0 UFP-VSL-1A*
	24590-PTF-M6X-UFP-00306	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00001004, Rev 0 UFP-VSL-1B* (psig change N51/52 24590-PTF-M6LN-M80T-00039)
	24590-PTF-M6X-UFP-00301	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00001005, Rev 0 UFP-VSL-1B*
	24590-PTF-M6WX-UFP-00007007	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00007007, Rev 1 UFP-VSL-1B*
	24590-PTF-M6X-PWD-00113	2	*Pipeline List for P&ID 24590-PTF-M6-PWD-00046, Rev 2 UFP-VSL-1B*
Nozzle Load Manaagement 12	24590-WTP-GPG-ENG-0150	0	*Plant Design/Mechanical Systems Equipment Interfaces: Terminal End Equipment* / CCN 229865