



MECHANICAL DATASHEET: VESSEL

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



R11229230

Project:	RPP-WTP	P&IDs:	\triangle_{12} 24590-PTF-M6-UFP-00001001, 00001002, 00015002, 00027007
Project No:	24590	Calculations:	\triangle_{12} Attachment 1
Project Site:	Hanford	Vessel Drawings	\triangle_{12} 24590-PTF-MV-UFP-00001001, 00001002, 00001003
Description:	Ultrafiltration Feed Preparation Vessel	Reports	\triangle_{12} Attachment 1

Reference Data

Charge Vessels (Tag Numbers)	N/A
Pulsejet Mixers / Agitators (Tag Numbers)	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
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 \triangle_{12}	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	75119 \triangle_{12}	Estimated	\triangle_{12} 220,440	1,152,000	833,400
Equipment Qualification	See EQD Section					

Inside Diameter	inch	240					Wind Design	Not Required
Length/Height (TL-TL)	inch	303.6 \triangle_{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 <i>(Note 3)</i>	2.0 <i>(Note 3)</i>	0.0	Vessel Internal Pressure (OP) <i>(EC Note 2)</i>	Vessel Internal Pressure (Design) <i>(EC Note 2)</i>	Postweld Heat Treat	Not Required
Temperature	°F	194	230 \triangle_{12}	230 \triangle_{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 \triangle_{12}	SA 494 TP CX2MW (Cast Cones) SA 240 TP 316 (Fabricated Cones)	See Drawing See Drawing	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)
		External Finish	(Note 2)



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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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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.				
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.**



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.



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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.				
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 12120 times over the 40 year life of the plant, per UFP batch cycle. 12



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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 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 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. The worst case is the pipe gets flooded, vessel SG used.
Contents Specific Gravity w / liquid		1.2 \triangle_{12}	1.5				
Localized Features							
Nozzles: N70, N71	\triangle_{12}	59°F	375°F			12120	



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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 ft³/lb the density of air at 70 F is 0.075 lb/ft³ 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/ft³ and at 80 F and 150 psig 0.824 lb/ft³ 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). \triangle_{12}



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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.



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PJM Overblow Loads 12

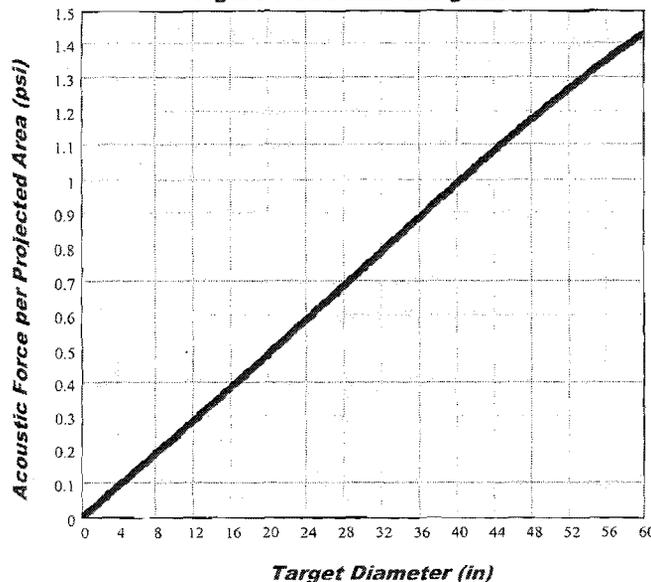
Discussion: During normal operation, pulse jet mixers (PJMs) mix the fluid by pulling in (suction) and pushing out (drive) fluid. During an upset condition, designated as an 'overblow', air is discharged following the drive cycle of one or more PJMs. The load consists of acoustic pressure (2Hz to 200Hz) 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 in = 20 in) of a spherical zone centered at any overblowing PJM nozzle.

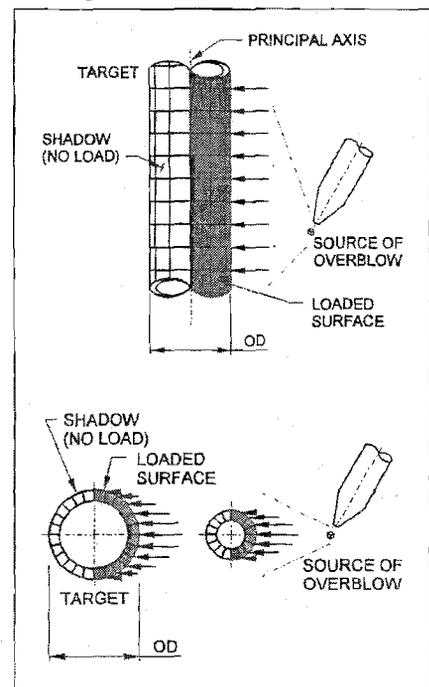
Figure 1: Acoustic Design Load



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 (MOE), 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.



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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



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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	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 <input checked="" type="checkbox"/> SC <input type="checkbox"/> SS
Equipment Datasheet Number	24590-PTF-MVD-UFP-00001		<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)s 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
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)	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			



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Equipment Environmental Qualification (EEQ) (continued)

Parameter Type/Units	Parameter Value	Parameter Duration (number)	Duration Units	WTP Source Document Number
Abnormal Ambients				
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			
Design Basis Events (DBE) Ambients				
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			

DBE Chemical Exposure Details



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DBE Chemical Exposure Details	
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

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-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



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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	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

Equipment Qualification Notes and Additional Information
<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>



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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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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	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>	D Evans D Vo 5/20/11 <i>Douglas Vb</i>	D Adler <i>[Signature]</i>	R Lanning 5/20/11 <i>[Signature]</i> J. Hinckley	J Julyk <i>[Signature]</i>	5/20/11

Data	Document #	Rev	Document Title
Quality Level	24590-PTF-M6-UFP-00001001	0	P&ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001A
	24590-PTF-M6-UFP-00001004	0	P&ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001B
Seismic Category	24590-PTF-M6-UFP-00001001	0	P&ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001A
	24590-PTF-M6-UFP-00001004	0	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 	Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B, / Sheet 31 
Total Volume	24590-PTF-M6C-UFP-00004	E 	Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B, / Sheet 25 
Inside Diameter	24590-PTF-M6C-UFP-00004	E 	Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B, / Sheet 2 
Length TL-TL	24590-PTF-M6C-UFP-00004	E 	Vessel Sizing Calculations for Ultrafiltration Feed Preparation Vessels UFP-VSL-00001A/B, / Sheet 31 
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) 	24590-PTF-MVC-10-00003	C	PTF Vessel Cyclic Datasheet Inputs/ use 35 psig
	24590-PTF-M6C-10-00008	A	Overpressure Protection Evaluation for PTF Vessel Jackets/ Section 8
Operating Temp (parent vessel) 	24590-WTP-RPT-ENG-07-007	0	Process Stream Properties Report
Design Temp (parent vessel) 	24590-WTP-RPT-ENG-07-007	0	Process Stream Properties Report
Sparger Operation/Design	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
Jacket Design Temp 	24590-PTF-MVC-UFP-00007	C	Design of Cooling Jacket for the Ultrafiltration Feed Preparation Vessels (UFP-VSL-00001A/B)
Corrosion Allowance, Erosion Allowance 	24590-PTF-N1D-UFP-00005	5	Corrosion Evaluation UFP-VSL-00001A/B
	24590-WTP-M0C-50-00004	E	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) 	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

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&ID 24590-PTF-M6-UFP-00034002, Rev 0</i>
	24590-PTF-M6X-UFP-00387	0	<i>MS Line List for P&ID 24590-PTF-M6-UFP-00034003, Rev 0</i>
	24590-PTF-M6X-UFP-00388	0	<i>MS Line List for P&ID 24590-PTF-M6-UFP-00034004, Rev 0</i>
	24590-PTF-M6X-UFP-00389	0	<i>MS Line List for P&ID 24590-PTF-M6-UFP-00034005, Rev 0</i>
Operating Conditions (Steam)	24590-PTF-M6X-UFP-00386	0	<i>MS Line List for P&ID 24590-PTF-M6-UFP-00034002, Rev 0</i>
	24590-PTF-M6X-UFP-00387	0	<i>MS Line List for P&ID 24590-PTF-M6-UFP-00034003, Rev 0</i>
	24590-PTF-M6X-UFP-00388	0	<i>MS Line List for P&ID 24590-PTF-M6-UFP-00034004, Rev 0</i>
	24590-PTF-M6X-UFP-00389	0	<i>MS Line List for P&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&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&ID 24590-PTF-M6-UFP-00001002, Rev 0 UFP-VSL-1A</i>
	24590-PTF-M6X-UFP-00429	0	<i>MS Line List for P&ID 24590-PTF-M6-UFP-00015002, Rev 0 UFP-VSL-1A</i>
	24590-PTF-M6WX-UFP-00027007	0	<i>MS Line List for P&ID 24590-PTF-M6-UFP-00027007, Rev 0 UFP-VSL-1A</i>
	24590-PTF-M6X-UFP-00306	0	<i>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)</i>
	24590-PTF-M6X-UFP-00301	0	<i>MS Line List for P&ID 24590-PTF-M6-UFP-00001005, Rev 0 UFP-VSL-1B</i>
	24590-PTF-M6WX-UFP-00007007	0	<i>MS Line List for P&ID 24590-PTF-M6-UFP-00007007, Rev 1 UFP-VSL-1B</i>
	24590-PTF-M6X-PWD-00113	2	<i>Pipeline List for P&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>