MECHANICAL SYSTEMS DATA SHEET: VESSEL

PLANT ITEM No.
24590-PTF-MV-UFP-VSL-00002B

R11376342

Project:	***RPP-WTP***	P&ID:	***24590-PTF-M6-UFP-00003001, 00003002, 00010007, 00022001, 00022002; 24590-PTF-M6-HLP-00010002***
Project No:	***24590*** 11	Calculations:	***Attachment 1***
Project Site:	***Hanford***	Vessel Drawing	***24590-PTF-MV-UFP-00004/00017/00018***
Description:	***Ultrafiltration Feed Vessel*** 11	Reports/ other Documents	***Attachment 1***

ISSUED BY RPP-WTP PDC

Reference Data 11

Charge Vessels (Tag Numbers)	***N/A***
Pulse jet Mixers / Agitators (Tag Numbers)	***UFP-PJM-00012, UFP-PJM-00013, UFP-PJM-00014, UFP-PJM-00015, UFP-PJM-00016, UFP-PJM-00017***
RFDs/Pumps (Tag Numbers)	***N/A***

Design Data 11

Quality Level	***Q (See Note 16)***	Fabrication Specs	***24590-WTP-3PS-MV00-T0001***			
Seismic Category	***SC-I (See Note 16)***	Design Code	***ASME Section VIII Division 1***			
Service/Contents	***Radioactive Liquid***	Code Stamp	***Yes***			
Design Specific Gravity	***1.6***	NB Registration	***Yes***			
Maximum Operating Volume gal	***35,404 (Note 22)***	Weights (lbs)	Empty	Operating	Test	
Total Volume gal	***39,629 (Note 22)***	**Estimated (Note 20)**	***185,000***	***658,000***	***503,000***	
Equipment Qualification	***See EQD Sections***					

Inside Diameter	inch	***168***					Wind Design	***Not Required***
Length/Height (TL-TL)	inch	***369***					Snow Design	***Not Required***
		Vessel Operating	Vessel Design	Coil/Jacket Design	Sparger Operation	Sparger Design	Seismic Design	***24590-WTP-3PS-MV00-T0002*** ***24590-WTP-3PS-SS90-T0001***
Internal Pressure	psig	***ATM***	***15***	***35***	***135***	***160***		
External Pressure	psig	***1.5 (Note 3)***	***2 (Note 3)***	***0***	***ATM***	***15***	Postweld Heat Treat	***Not Required***
Temperature	°F	***194***	***230***	***230 max (Note 11)***	***358***	***375***	Corrosion Allowance ***(Note 19)***	Inch ***0.040 for all wetted surfaces including jacket***
Min. Design Metal Temp.	°F	***40***						

Materials of Construction 11

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SA 240 304 Note 1***	***See Drawing***	***Auxiliary (note 8)***
Shell	***SA 240 304 Note 1***	***See Drawing***	***Primary (note 8)***
Bottom Head	***SA 240 304 Note 1***	***See Drawing***	***Primary (note 8)***
Support	***SA 240 304 Note 1***	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***SA 240 304 Note 1***	***See Drawing***	***N/A***
Internals	***SA 240 304 Note 1***	***See Drawing***	***Thermowells Primary***
Pipe Nozzles	***SA 312 TP304 Note 1***	***See Drawing***	***Primary (note 8)***
Forgings/ Bar stock	***SA 182 F304 Note 1***	***See Drawing***	***N/A***
Wash Ring Pipe	***SA 312 TP304 Note 1***	***See Drawing***	***N/A***
Steam Spargers	***SB 622 (seamless) UNS N10276***	***See Drawing***	***Auxiliary (Note 8 & 12)***
Bolting/Gaskets	***N/A***	***N/A***	***N/A***
Pulse Jet Mixer Nozzles	***Cast Stellite 12, SA-240-304 Shroud (Note 1)***	***See Drawing***	***N/A***
Recirculation Nozzles	***SA 312 TP304***	***N/A***	***N/A***
PJM Cluster Fill / PJM Nozzle Fill	***See Note 13***	***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 2: Welds descaled as laid. Grind smooth shell welds under the jacket.

11 ***Note 3:*** External design pressure for shell areas under the jacket shall be rated for the jacket internal design pressure plus 2.0 psig (negative) 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 additional margin.(see 24590-PTF-M6C-PVP-00017).

Note 4: Deleted.

Note 5: Contents of this document are Dangerous Waste Permit affecting.

11 ***Note 6:*** Delete.

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: Not used.

Note 10: Deleted.

11 ***Note 11:*** Vessel is heated to 194 °F and maintained at that temperature for roughly 8 to 16 hours digestion period. Little to no coolant flow through cooling jacket during that period of time occurs, (see 24590-WTP-RPT-ENG-06-014).

Note 12: The material for Nozzles N12 and N27 and the steam sparger riser and ring pipe connected to these nozzles shall be SB-622 UNS No. N10276 (Hastelloy 276). Also, the material for the steam sparger ring support shall be SB-622 (or SB-575) UNS No. 10276. For each hole area on the steam sparger ring, a weld deposit buildup with Stellite 21 shall be provided.

11 ***Note 13:*** (a) The intent is to provide a concrete mix with low chlorides, low moisture, low porosity and inhibits corrosion. The concrete formulation and blending should follow the relevant paragraphs in ASTM C 94 Option B. The Portland cement should be Type I/II conforming to ASTM C 150. Coarse aggregates shall be no larger than 3/4" diameter. The coarse and fine aggregates should be tested for chloride content using ASTM C 1152 and requiring less than 0.01% (100 ppm) acid-soluble chloride, and by limiting the water chloride content to less than 200 ppm. The concrete mix shall include chemical admixtures, follow ASTM C494 for control over admixtures. A final report, see ASTM C494 Section 19, shall be submitted, the report is required to have a precision statement.
Additional WTP requirements:

- Do not use blast furnace slag in the concrete.
- To reduce the permeability, the water-to-cement ratio shall be low, lower than 0.40%, using a Type F admixture in quantities that have no adverse effects on fresh and hardened properties.
- To reduce the corrosion, an admixture shall be used, calcium nitrate is to be added at a concentration no more than 32 lb/yd^3.
- Use Type F fly ash and silica fume, to reduce porosity, add in quantities to minimize porosity with no adverse effects on fresh and hardened properties.
- The concrete is to fill the entire cluster volume up to the bottom of the fill nozzle. Concrete shall be poured in a manner that allows for the even distribution of aggregate and mechanically vibrated to assure no major pockets or voids. Concrete is to be poured through more than one nozzle, in lifts. The seam between lifts is not important.
  - Because of the unique geometry and inability to rework or repair the concrete, assurance that the fill is complete and 100% filled via in-process observance, boroscope or other methods. Fill report shall be provided.
  - Curing: The concrete shall be thoroughly cured (at least 30 days) before the shroud is closed.
  - The seller shall submit mix design and complete procedure for concreting for buyer's approval.
  - The concrete fill can be purchased commercial

(b). Fill gap completely between PJM shroud and stellite nozzles with Aremco 646-N Ceramacast (or equal), see CCN 156345 for procedure.

11 ***Note 14:*** Deleted.

Note 15: Deleted.

11 ***Note 16:*** The whole vessel (including all the internals and the cooling jacket) to be designed, fabricated, tested to Design Level 1 (L-1) and Black Cell requirements as defined in 24590-WTP-3PS-MV00-T0001.

Note 17: Changed quality level, operating external pressure, added Data Reference, revised Note 3, deleted Note 11 and Note15, added Note 16 and Note 17, added functional/safety requirements, change to parent vessel cyclic data, change PJM cyclic data, added E&NS table and signature, added section for "Hydrodynamic Loads -Pulse Jet Mixers", added section for "Multiple Overblow Loading - PJMs". added Section for Nozzle Loads, added EQ section. If any Sections contain a revision triangle next to the Section heading, it means the entire section has been revised or is new - the entire section must be reviewed for changes/additions, change to hydrodynamic loads for normal operations, change to PJM cyclic data. Added Attachment 1 for BNI use only.

11 ***Note 18:*** Revised the following: Note 3, Note 11, Note 13 and Note 16. Design Considerations for Loads Induced by Pulse jet Mixers (PJMs), Hydrodynamic Loads Due to PJM Operations, PJM Overblow Loads. Notes for Nozzle Loads, Equipment Qualification data to new form. Added the Steam Sparging System, deleted Note 14.

11 ***Note 19:*** Localized bottom Head Erosion = 0.877 in and PJM Outlet Nozzle Erosion = 0.485 in, (reference 24590-WTP-M0C-50-00004, Rev 00E, Table 10-7).

11 ***Note 20:*** Vendor to supply final as-built vessel empty and test weights.

11 ***Note 21:*** Localized corrosion/erosion allowance for the Steam Sparger holes is 0.02 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.

11 ***Note 22:*** Vessel volumes are approximate and do not account for the manufacturing tolerances, nozzles and displacements of internals.

Seismic 11

Seismic analysis to be combined with operating conditions. When considering Seismic Loads they are only to be combined with Operating Conditions, not Design Conditions (Reference, 24590-WTP-RPT-M-07-007). The vessel is located in the Pretreatment facility, Room P-0104. The ISRS Information related to Room P-0104 of the PreTreat Facility is in figures 21E, 22E and 24E of 24590-PTF S0C-S15T-00057.

Equipment Cyclic Data Sheet-Parent Vessel 11

Component Plant Item Number:	*24590-PTF-MV-UFP-VSL-00002B*
Component Description	*Parent*

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 304 with 0.030 % max carbon.*
Design Life	*40 Years*
Component Function and Life Cycle Description	*The system receives waste from Ultrafiltration Feed Preparation Vessels. This vessel is a high solids vessel. The waste is heated using direct steam injection and is cooled using the vessel cooling jacket and an external heat exchanger. Solids will be kept suspended using the pulse jet mixers and air spargers.*

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*-2 (-37)*	*15*	*10*	*Nominal assumption for testing. Input values shown in parentheses are for the parent vessel shell directly under cooling jacket. Jacket design pressure is +35 psig.*
Operating Pressure	psig	*-1.5 (-36.5)* *-1.5 (-36.5)*	*0* *2.8*	*7.0E6* *40*	*Maximum Operating (vessel connected to PVP header)* *Loss of Power(assume normal operations at -1.5 psig then power loss and pressure spike to 2.8 psig). Use jacket design pressure for vessel shell covered by jacket.*
Operating Temperature	°F	*59 (50)*	*194*	*5150*	*Input values shown in parentheses are for the parent vessel shell directly under cooling jacket. Jacket minimum temperature is 50°F.*
Contents Specific Gravity		*1.0*	*1.6*	*5150*	*Liquid varies from water to slurry*
Contents Level	inch	*0*	*395*	*5150*	
Localized Features					
Cooling Jacket (operating conditions)		*50°F chilled water inlet temp*	*50°F chilled water outlet temp*	*5150*	*Parent vessel contents are heated to 194°F with the cooling water flow shut off. After 8 to 16 hour digestion period the cooling water is returned at 50°F until the vessel contents are cooled to 77°F. (24590-WTP-RPT-ENG-06-014)*
Hot Nozzles		*59*	*358*	*5150*	*N12 and N27 are Steam Sparger inlets.*

Cyclic Data Notes- Parent Vessel 11

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***
- ***Deleted***
- ***Hot Nozzles N12 and N27 are for Steam Sparger.***
- ***Cooling Jacket outlet temperature is taken as the coolest temperature possible at the outlet for the more conservative structural response.***

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 (11)

Component Plant Item Number:	*UFP-PJM-00012, UFP-PJM-00013, UFP-PJM-00014, UFP-PJM-00015, UFP-PJM-00016, UFP-PJM-00017*
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 304 with 0.030 % 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 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 load shall be applied only to the fully buoyant state. Assume the parent vessel is full for 50% of the number of PJM cycles.*

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*80*	*100*	*24590-PTF-MVC-10-00003 & 24590-PTF-M6-UFP-00010001, 00010002, 00010003 - ITS pressure set at 75 psig. Not to be used concurrent with seismic or other occasional loads*
Operating Pressure	psig	*FV*	*52*	*9.0E6*	*24590-QL-POA-MPE0-00002-25-02 & 24590-PTF-MVC-10-00003 (25% contingency added)*
Operating Temperature	°F	*59*	*194*	*5150*	*Same as Parent Vessel*
Contents Specific Gravity		*1.0*	*1.6*	*5150*	*Same as Parent Vessel*
Contents Level	inch	*Empty*	*Flooded*	*9.0E6*	
Thrust	lbf	*-420*	*420*	*9.0E6*	
Localized Features					
Nozzles					
Supports		*Buoyant*	*Loaded*	*9.0E6*	

Cyclic Data Notes- PJM

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

Equipment Cyclic Data Sheet – Steam Spargers 11

Component Plant Item Number:	*There is no Component Plant Item Number associated with Nozzles N12 and N27*
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 C-276 (UNS N10276)*			
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 from 8 to 16 hrs to digest, (24590-WTP-RPT-ENG-06-014). The Steam Sparger is pressurized by air until the vessel is full and steam is introduced. The vessel heating occurs 5150 times in the life of the vessel (40 years). When steam heating is no longer required the Steam Spargers are again pressured by air.*			
Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*160*	*10*	*Nominal assumption for testing. Pressures are for steam which bounds the air pressure design pressures.*
Operating Pressure	psig	*FV*	*135*	*5150*	
Operating Temp	°F	*59*	*358*	*5150*	*Steam operating pressures bound air values. 358 °F is saturation temperature at 135 psig. Minimum temperature same as parent vessel. Steam temperature bounds air maximum temperatures.*
Contents Specific Gravity		*Air*	*Steam*	*5150*	*Air pressure will be used to keep slurry out of pipe.*

Cyclic Data Notes- Steam Spargers 11

- *Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*
- *Recommended corrosion allowance 0.040 inch (includes 0.024 inch corrosion allowance and 0.016 inch general erosion allowance.*
- *Localized corrosion/erosion allowance for the Steam Sparger holes is 0.031 inches. (reference CCN 233172).*
- *This vessel will experience 5150 heated batch cycles over the 40 year life of the plant.*

Design Considerations for Loads Induced by Pulse Jet Mixers (PJMs) 11

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	7.4 Hz*
2 inch	4.0 Hz*
3 inch	2.74 Hz**

* See 24590-WTP-MVC-50-00006, Section 8.1.1.2
** 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 11

Normal operation imposes a cyclical load ranging between 0.040 and -0.059 psi in the radial direction and 0.150 to-0.024 psi in the vertical direction for 9.0E6 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 ⚠11

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 <u>not</u> 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.***
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 total of 1000 cycles.***

Figure 1: Acoustic Design Load

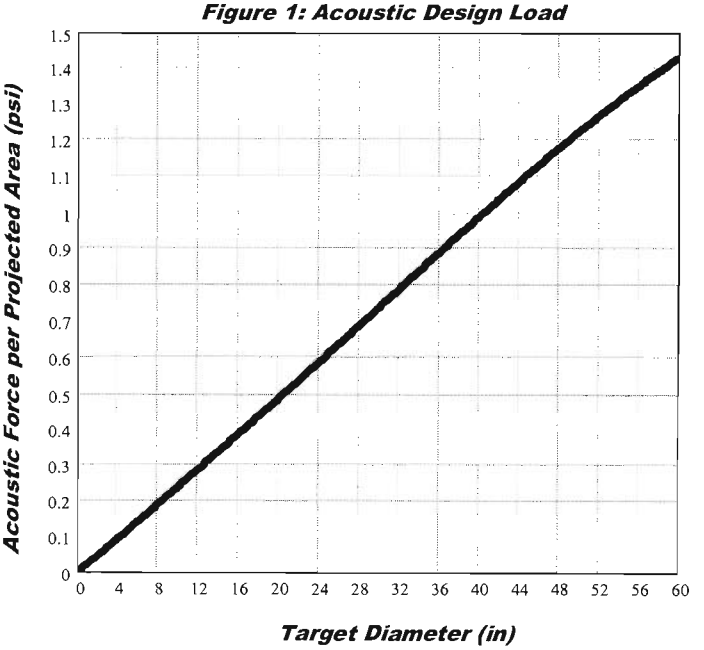
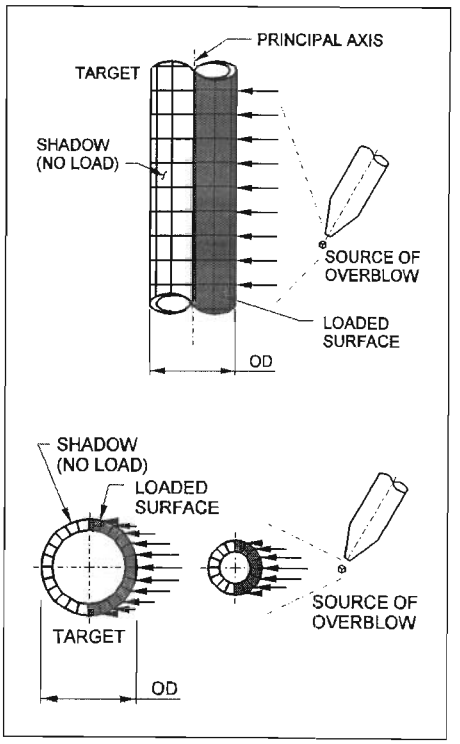


Figure 2: Load Application



The following data is required to determine the load:

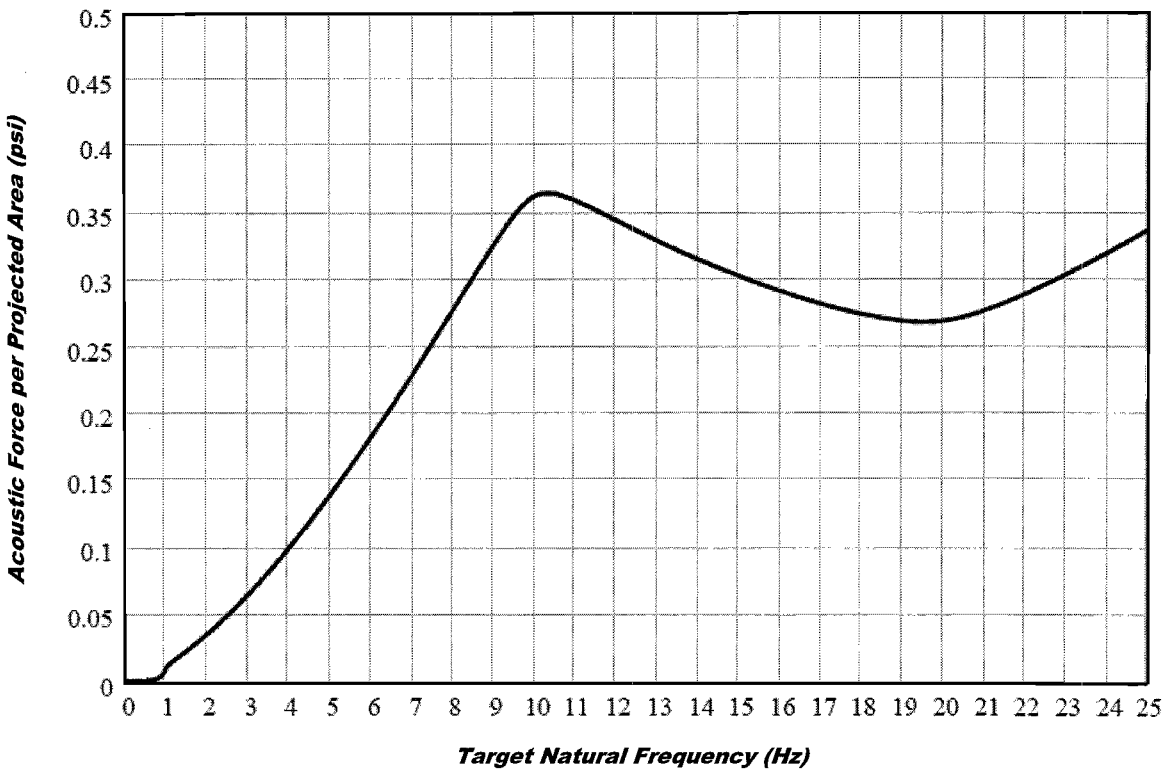
- ***Target Diameter***
- ***Target Principal Axis***
- ***Overblow Source Coordinates***

PJM Cluster Overblow Load 11

Discussion: *The acoustic design pressure on the cluster is determined from equation 5-8 in 24590-WTP-MVC-50-00011, Rev B. The worst-case orientation of the load needs to be determined by the user.*

Acoustic Load	***The following is the load magnitude for the PJM Cluster in HLP-VSL-00027A/B/28 with an outer radius of 89.5 inches measured to the outer most radii of the cluster. Follow the steps described below:*** ***1. Isolate the PJM Cluster and supports from parent vessel*** ***2. Run a modal analysis and determine the first frequency*** ***3. Use Figure 3 (below) to find the acoustic force per projected area*** ***4. Apply the static load in the same orientation as indicated in Figure 2 (above)***
Number of Acoustic Cycles	***1000 events X 40 cycles/event***

Figure 3: Acoustic Design Pressure on Cluster



Nozzle Loads (11)

Nozzle	Nozzle Press (psig) (Note E)	Nozzle Temp (F°) (Note E)	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N01	113	120	3"	Weight	52	480	52	95	60	250
				Seismic	481	455	284	655	980	613
				Thermal	171	153	229	398	798	798
N02	15	212	8"	Weight	234	744	234	1069	394	1224
				Seismic	2251	1607	2795	4384	9622	6571
				Thermal	893	795	1193	3060	6114	6114
N03	145	212	12"	Weight	364	1033	364	2033	1275	2517
				Seismic	2501	1327	2067	13781	20738	20738
				Thermal	2082	1185	1778	9300	18600	18600
N05	190	194	3"	Weight	52	84	52	111	70	70
				Seismic	284	189	284	768	1152	263
				Thermal	171	350	229	468	938	1200
N07	170	150	2"	Weight	50	85	50	51	51	51
				Seismic	186	123	186	396	285	285
				Thermal	114	100	152	116	232	232
N09	170	175	2"	Weight	50	100	50	60	60	60
				Seismic	186	123	186	263	131	525
				Thermal	114	300	164	75	75	450
N10	170	175	2"	Weight	50	67	50	54	54	54
				Seismic	186	149	186	131	413	298
				Thermal	114	100	152	250	242	242
N11	15	212	3"	Weight	52	88	52	63	39	39
				Seismic	746	189	336	700	1488	963
				Thermal	171	195	229	850	200	150
N12	160	375	4"	Weight	87	249	87	279	125	603
				Seismic	770	385	480	1509	2147	2147
				Thermal	310	299	450	878	1757	1757
N13	124	140	2"	Weight	50	114	50	75	75	75
				Seismic	186	438	186	277	415	672
				Thermal	114	100	152	169	337	337
N14	124	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	506	415
				Thermal	114	100	152	169	337	337
N15	124	140	2"	Weight	50	60	50	75	75	75
				Seismic	273	163	186	277	445	415
				Thermal	114	179	152	169	337	337
N16	124	140	2"	Weight	50	127	50	75	75	75
				Seismic	186	322	186	277	415	557
				Thermal	114	100	152	169	337	337
N17	124	140	2"	Weight	50	106	50	65	65	124
				Seismic	186	422	186	273	361	940
				Thermal	114	100	152	147	293	293

Nozzle	Nozzle Press (psig) (Note E)	Nozzle Temp (F°) (Note E)	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N18	124	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	294	777	415
				Thermal	114	100	152	169	337	337
N20	197	212	2"	Weight	50	75	50	59	59	59
				Seismic	186	123	186	175	327	175
				Thermal	114	143	152	400	266	350
N23	15	212	24"	Weight	**Manway**					
				Seismic						
				Thermal						
N24	169	120	3"	Weight	52	315	52	110	69	69
				Seismic	284	301	284	761	1139	1139
				Thermal	171	225	229	562	928	928
N25	15	212	8"	Weight	234	373	234	741	464	464
				Seismic	1285	858	1285	5159	7732	7732
				Thermal	893	795	1193	3600	7193	7193
N26	112	120	3"	Weight	52	297	52	116	73	73
				Seismic	284	284	284	802	1201	1201
				Thermal	171	153	229	488	978	978
N27	160	375	4"	Weight	87	249	87	279	125	603
				Seismic	770	385	480	1509	2147	2147
				Thermal	310	299	450	878	1757	1757
N34	145	212	3"	Weight	52	108	52	110	69	143
				Seismic	284	268	284	761	1139	1139
				Thermal	171	153	400	463	928	928
N38	100	212	6"	Weight	N38 is parent nozzle, nozzle loads are applied via N38A, N38B, N38C					
				Seismic						
				Thermal						
N38A (Note D)	15	212	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	30	26	40	38	77	77
N38B (Note D)	100	212	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	30	26	40	38	77	77
N38C (Note D)	100	212	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	30	26	40	38	77	77
N41	15	113	2" OD	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N44	30	138	2"	Weight	50	60	50	100	52	52
				Seismic	186	123	382	438	289	289
				Thermal	114	100	152	118	235	235

Nozzle	Nozzle Press (psig) (Note E)	Nozzle Temp (F°) (Note E)	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N45	140	212	10"	Weight	279	1024	264	950	1200	2600
				Seismic	1771	1159	5392	10238	3150	6738
				Thermal	953	1356	1268	8650	1450	1450
N48	35	140	6"	Weight	210	335	210	376	235	235
				Seismic	1160	775	1160	2671	4009	4009
				Thermal	735	654	983	1691	3383	3383
N49	35	140	6"	Weight	210	335	210	376	235	235
				Seismic	1160	775	1160	2671	4009	4009
				Thermal	735	654	983	1691	3383	3383
N51	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N52	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N53	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N54	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N55	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N56	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N57	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N58	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N59	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N60	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N61	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337

Nozzle	Nozzle Press (psig) (Note E)	Nozzle Temp (F°) (Note E)	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N62	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N63	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N64	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N65	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N66	150	140	2"	Weight	50	60	50	75	75	75
				Seismic	186	123	186	277	415	415
				Thermal	114	100	152	169	337	337
N69	100	212	6"	Weight	N69 is parent nozzle, nozzle loads are applied via N69A, N69B, N69C					
				Seismic						
				Thermal						
N69A (Note D)	15	212	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	30	26	40	38	77	77
N69B (Note D)	100	212	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	30	26	40	38	77	77
N69C (Note D)	100	212	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	30	26	40	38	77	77
N70	100	212	6"	Weight	N70 is parent nozzle, nozzle loads are applied via N70A, N70B, N70C					
				Seismic						
				Thermal						
N70A (Note D)	15	212	1"	Weight	15	23	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	30	26	40	38	77	77
N70B (Note D)	100	212	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	30	26	40	38	77	77
N70C (Note D)	100	212	1"	Weight	15	20	15	20	20	20
				Seismic	53	35	53	65	96	96
				Thermal	30	26	40	38	77	77
N76	15	212	8"	Weight	475	750	475	1500	950	950
				Seismic	1313	875	1313	5163	7744	7744
				Thermal	600	550	800	2400	4800	4800

Nozzle	Nozzle Press (psig) (Note E)	Nozzle Temp (F°) (Note E)	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N77	15	212	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 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. Nozzle loads shown are to be used in place of those specified in 24590-WTP-3PS-MV00-T0001 -- do not apply any thermal reduction factors.

D. Values provided at plate on top of parent nozzle.

E. Design Pressure and Temperatures to be used for Nozzle Qualification only. 11

F. Use Vessel internal pressures and temperatures for nozzle design

11 *G. All Pretreatment RGM Seismic Piping Nozzles 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, Rev 0 for nozzle load management).*

H. HPAV nozzles loads are provided from the Vessel Analysis Group to Plant Design via a CCN to communicate the results of the Stress Analysis Calculation in which HPAV nozzles have been identified requiring evaluation. 11

Equipment Identification				
Full Component Tag Number or BNI Stock Code Number	24590-PTF-MV-UFP-VSL-00002B			Safety Classification ☒ SC ☐ SS ☐ APC-PAM
Equipment Datasheet Number	24590-PTF-MVD-UFP-00015			
Description	Ultrafiltration Feed Vessel for the Ultrafiltration Process System (UFP)			Seismic Category ☒ SC-I ☐ SC-II ☐ SC-III ☐ SC-IV ☐ SC-III Seismic Interaction only
Location (Facility / Building and Room No.)	Located in PTF Room P-0104, Elev. 0'-0", colume lines J/ 16			
Safety Function(s)	UFP-VSL-00002A (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. Reference: 24590-WTP-PSAR-ESH-01-002-02,Section 4.3.5. Pulse Jet Mixers (PJMs) provide a mixing function in the vessel to provent hydrogen accumulation. Air sparger piping provides air to mix solids and dilute hydrogen to prevent hydrogen accumulation. Vessel level instrumentation which includes the bubbler tubes, provides level monitoring to prevent overflows of non-Newtonian fluids into Newtonian overflow vessles and ensure proper headspace volumes are maintained for hydrogen dilution. Reference: 24590-WTP-PSAR-ESH-01-002-02, Section 4.3.4			
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 3)	Years (Note e-1)	24590-PTF-U0D-W16T-00001, E-Note 1

EQUIPMENT QUALIFICATION DATASHEET (EQD)

Equipment Environmental Qualification (EEQ) *(continued)*

Parameter Type/Units	Parameter Value	Parameter Duration (number)	Duration Units	WTP Source Document Number
Normal Ambients				
Plant/Process Induced Vibration	☐ Yes ☒ No			
Additional Normal Ambient Information:	N/A			
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 3)	Years (Note e-2)	24590-PTF-U0D-W16T-00001, E-Note 1
Exposure to Wet Sprinkler System	☐ Yes ☒ No	N/A	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)	1000	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 (E-Note 3)	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 Soduim Hydroxide (FRP13), 110 F, pH 14.5 Sodium Hydroxide (HLP09), 113 F, pH 13.5 Souium 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)	A vertical vessel with a support skirt, mounted on the base ring beam, which is welded to the embed plate.
Mounting Method (bolts, welds, etc.)	Welded skirt to ring beam welded to embedment plates. Embedment plate details per 24590-PTF-DD-S13T-00039, 24590-PTF-DD-S13T-00036, 24590-PTF-DD-S13T-00043, 24590-PTF-DD-S13T-00045 provided to the vendor in the material requisition.
Auxiliary Devices	UFP-PJM-00012, UFP-PJM-00013, UFP-PJM-00014, UFP-PJM-00015, UFP-PJM-00016, UFP-PJM-00017

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.	4590-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 Spectre (ISRS)	24590-PTF-S0C-S15T-00057	A	Seismic Response Spectra Curves: Figures , 21E, 22E and 24E. CCN 185271

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.

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: Supplier (SELLER) shall perform Equipment Seismic Qualification in accordance with the listed parameters and the applicable specification requirements.
E-Note 4: Normal environmental conditions shall be taken to exist over a 40 year period less the duration for which abnormal conditions exist. DBE durations are in addition to the normal and abnormal durations. Further, whenever the normal, abnormal, and DBE radiation dose rates are the same, the normal radiation dose integrated over 40 years adequately accounts for dose during the abnormal and DBE conditions and hence the Abnormal and DBE radiation dose duration are shown as 0.
E-Note 5: The flood height of 2.08 ft does not create a submergence issue with this vessel.

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	System Engineer	Vessel Engineer	Checked	Reviewed/ MET	E&NS	Approved	Date
0	Issued for Purchase	M. Askar	HK	US/RDS	J. Julyk	N/A	MWH	05/06/03
1	Revised as Noted	M. A	HK	CS	JJ	N/A	MWH	08/18/03
2	Revised as Noted	M. A	HK	PA/CS	RES	N/A	MWH	11/14/03
3	Revised as Noted	M. A	HK	PA/CS	JJ	N/A	MWH	02/05/04
4	Revised as Noted	M. Askar	H. Khurana	P. Aviguetero C. Slater	J. Julyk	N/A	M. Hoffmann	05/10/04
5	Revised as Noted	M. Askar	H. Khurana	P. Aviguetero C. Slater	J. Julyk	N/A	M. Hoffmann	03/10/05
6	Deleted note 10 on page 2	M. Askar	H. Khurana	SC/ C. Slater	J. Julyk	N/A	M. Hoffmann	04/12/05
7	Revised concrete for cluster fill per note 13. Revised overblow condition loads. Number of overblow cycles revised to 1000 from 100.	M. Askar	H. Khurana	C. Slater	RES	N/A	M. Hoffmann	06/30/05
8	Revised per note 14 on page2 and as noted.	M. Askar	H. Khurana	JRP/APP	DA/CS	N/A	J. Julyk	10/22/05
9	Revised as noted. Incorporated SDDR #24590-WTP-SDDR-M-06-00129.	J.Medina	H. Khurana	JRP/APP	CS/RES	N/A	J. Julyk	04/04/06
10	Revised per Note 17 on page 2.	D. Vo	M Seed	R Peters	D. Adler	C. Lindquist	J Julyk	4/14/09
11	Revised per Note 18 and as noted by revision triangles. Supersedes 24590-PTF-MVD-UFP-P0015, Rev 2	Doug VO	B DUNLAP	B. Makadia	D. Adler	S.Hinckley	J Julyk	5/20/11

REFERENCE for Data Sheet 24590-PTF-MVD-UFP-00014/00015, Rev 11 (For BNI Use Only)
Vessel Tags: UFP-VSL-00002A/B

Data	Document #	Rev	Document Title/ Comments
Quality Level	24590-PTF-M6-UFP-00002001 24590-PTF-M6-UFP-00003001	0 0	*P&ID PTF Ultrafiltration Process System Feed Vessel UFP-VSL-00002A* *P&ID PTF Ultrafiltration Process System Feed Vessel UFP-VSL-00002B*
Seismic Category	24590-PTF-M6-UFP-00002001 24590-PTF-M6-UFP-00003001	0 0	*P&ID PTF Ultrafiltration Process System Feed Vessel UFP-VSL-00002A* *P&ID PTF Ultrafiltration Process System Feed Vessel UFP-VSL-00002B*
Design Specific Gravity	24590-WTP-RPT-ENG-07-007	A	*Process Stream Properties*
Max Operating Volume	24590-PTF-M6C-UFP-00008	D	*Vessel Sizing Calculation for UFP Ultrafiltration Vessels UFP-VSL-00002A/B*
Total Volume	24590-PTF-M6C-UFP-00008	D	*Vessel Sizing Calculation for UFP Ultrafiltration Vessels UFP-VSL-00002A/B*
Inside Diameter	24590-PTF-M6C-UFP-00008	D	*Vessel Sizing Calculation for UFP Ultrafiltration Vessels UFP-VSL-00002A/B*
Length TL-TL	24590-PTF-M6C-UFP-00008	D	*Vessel Sizing Calculation for UFP Ultrafiltration Vessels UFP-VSL-00002A/B*
Operating Pressure (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.
Operating Pressure (internal)		N/A	*Maximum value possible assuming fans off is atmospheric pressure*
Design Pressure (internal)	24590-WTP-DB-ENG-01-001	01P	*Basis of Design/* use 15 psig
Design Pressure (external)	24590-PTF-M6C-PVP-00017	A	*HADCRT Analysis of PTF PVP System at Various Operating Scenarios/* use operating with 30% margin
Jacket Design Pressure (internal)	24590-PTF-MVC-10-00003 24590-PTF-M6C-10-00008	C 00A	*PTF Vessel Cyclic Datasheet Inputs/ (* 24590-PTF-MVE-10-00012*)* *Overpressure Protection Evaluation for PTF Process Vessel Cooling Jackets /* For the Cooling Jacket pressure parameter(35psig).
Operating Temp	24590-WTP-RPT-ENG-07-007	A	*Process Stream Properties/* Table 4-18
Design Temp	24590-WTP-RPT-ENG-07-007	A	*Process Stream Properties/* Table 4-18
Jacket Design Temp	24590-PTF-MVC-UFP-00006	E	*Design of Cooling Jacket for Ultrafiltration feed Vessels UFP-2A/2B* 50°F for chilled water inlet Same as parent vessel assuming little or no flow during steam heating - 212°F
Corrosion Allowance, Erosion allowance	24590-PTF-N1D-UFP-00003	5	*Corrosion Evaluation UFP-VSL-00002A/B*
Materials of Construction	24590-PTF-MV-UFP-00003 24590-PTF-MV-UFP-00004	4 4	*Equipment Assembly Ultra filtration Feed Vessel UFP-VSL-00002A* *Equipment Assembly Ultra filtration Feed Vessel UFP-VSL-00002B*
Design Pressure (PJM)	24590-PTF-MVC-10-00003	C	*PTF Vessel Cyclic Datasheet Inputs* (24590-PTF-MVE-10-00012)
Operating Pressure (PJM)	24590-PTF-MVC-10-00003	C	*PTF Vessel Cyclic Datasheet Inputs /*additional margin added (25%) (24590-PTF-MVE-10-00012)
Operating Temperature (PJM)			*Same as parent vessel*
Cyclic Data (Vessel)	24590-PTF-MVC-10-00003 24590-PTF-MVC-UFP-00006	C E	*PTF Vessel Cyclic Datasheet Inputs* (24590-PTF-MVE-10-00005) *Design of Cooling Jacket for Ultrafiltration feed Vessels UFP-2A/2B* / cooling jacket temperatures (min, max)
Cyclic Data (PJM)	24590-PTF-MVC-10-00003	C	*PTF Vessel Cyclic Datasheet Inputs /* used for number of cycles (24590-PTF-MVE-10-00012*)*

REFERENCE for Data Sheet 24590-PTF-MVD-UFP-00014/00015, Rev 11 (For BNI Use Only)
Vessel Tags: UFP-VSL-00002A/B

Data	Document #	Rev	Document Title/ Comments
Cyclic Data (Steam Spargers)	24590-WTP-RPT-ENG-06-014	0	*Technical Report-Design Evaluations Supporting Resolution of External Flowsheet Review Team (EFRT).* use for digestion time of 8 hours.
	24590-PTF-MVC-10-00003	C	*PTF Vessel Cyclic Datasheet Inputs*
	24590-PTF-M6C-UFP-00022	A	*Sizing of Steam Sparger Rings and Associated Piping for UFP-VSL-00002A/B* / for steam pressure of 71 psig see Figure 1 on sheet 15, (saturation temp of 316 F for P= 71 psig)
	24590-PTF-M6X-UFP-00298	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00002001* / used 160 psig for design pressure for high pressure steam lines, for UFP-VSL-00002A only.
	24590-PTF-M6X-UFP-00499	0	*MS Line List for P&ID 24590-PTF-M6-UFP-00003001* / used 160 psig for design pressure for high pressure steam lines, for UFP-VSL-00002B only.
Hydrodynamic Loads	24590-WTP-MVC-50-00006	A	*Hydrodynamic Loads for Normal PJM Operation in Vessels with non-Newtonian Fluids* / use for pressure
	24590-PTF-MVC-10-00003	C	PTF Vessel Cyclic Datasheet Inputs / used for number of cycles (24590-PTF-MVE-10-00012)
Single PJM Overblow Loads	24590-WTP-MVC-50-00011	B	*Pulse Jet Mixer Overblow Vessel Loads*
Single Overblow cycles	24590-PTF-MVC-10-00003	C	*PTF Vessel Cyclic Datasheet Inputs (*24590-PTF-MVE-10-00004*)*
Multiple Overblow Cycles	24590-PTF-MVC-10-00003	C	*PTF Vessel Cyclic Datasheet Inputs (*24590-PTF-MVE-10-00004)
Nozzle Loads *(UFP-VSL-00002A only)*	CCN 230862	N/A	*Supplemental Nozzle Design Loads for UFP-VSL-00002A*
	CCN 124015	N/A	*Nozzle Design Loads for UFP-VSL-00002A*
	CCN 227905	N/A	*UFP-VSL-00002A Nozzle N08 Design Loads*
Nozzle Loads *(UFP-VSL-00002B only)*	CCN 230863	N/A	*Supplemental Nozzle Design Loads for UFP-VSL-00002B*
	CCN 124016	N/A	*Nozzle Design Loads for UFP-VSL-00002B*
Nozzle Design Temp - Design Pressure *(UFP-VSL-00002A only)*	24590-PTF-M6X-UFP-00298	0	*MS Line List for 24590-PTF-M6-UFP-00002001 UFP-VSL-00002A*
	24590-PTF-M6X-UFP-00302	0	*MS Line List for 24590-PTF-M6-UFP-00002002 UFP-VSL-00002A*
	24590-PTF-M6X-UFP-00221	0	*MS Line List for 24590-PTF-M6-UFP-00010007 UFP-VSL-00002A*
	24590-PTF-M6X-UFP-00256	0	*MS Line List for 24590-PTF-M6-UFP-00021001 UFP-VSL-00002A*
	24590-PTF-M6X-UFP-00257	0	*MS Line List for 24590-PTF-M6-UFP-00021002 UFP-VSL-00002A*
	24590-PTF-M6X-HLP-00343	0	*MS Line List for 24590-PTF-M6-HLP-00010003-HLP-VSL-00002A*
Nozzle Design Temp - Design Pressure *(UFP-VSL-00002B only)*	24590-PTF-M6X-UFP-00499	0	*MS Line List for 24590-PTF-M6-UFP-00003001 UFP-VSL-00002B*
	24590-PTF-M6X-UFP-00500	0	*MS Line List for 24590-PTF-M6-UFP-00003002 UFP-VSL-00002B*
	24590-PTF-M6X-UFP-00221	0	*MS Line List for 24590-PTF-M6-UFP-00010007 UFP-VSL-00002B*
	24590-PTF-M6X-UFP-00261	0	*MS Line List for 24590-PTF-M6-UFP-00022001 UFP-VSL-00002B*
	24590-PTF-M6X-UFP-00262	0	*MS Line List for 24590-PTF-M6-UFP-00022002 UFP-VSL-00002B*
	24590-PTF-M6X-HLP-00338	0	*MS Line List for 24590-PTF-M6-HLP-00010002 HLP-VSL-00002B*
Equipment Environmental Qualification (EEQ)	24590-PTF-U0D-W16T-00001	2	*PTF Room Environment Data Sheet (*24590-PTF-U0N-W16T-00007*)*
Nozzle Load Management	24590-WTP-GPG-ENG-0150	0	*Plant Design/Mechanical System Equipment Interfaces: Terminal End Equipment / CCN 229865*