MECHANICAL DATASHEET: VESSEL

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

Project:	***RPP-WTP***	P&IDs:	***24590-PTF-M6-UFP-00001001, 00001002, 00007007, 00008007, 00015002***
Project No:	***24590***	Calculations:	***24590-PTF-M6C-UFP-00004, 24590-PTF-MVC-10-00003, 24590-WTP-MVC-50-00001, 24590-PTF-M6C-PVP-00017, 24590-PTF-M6C-UFP-00021, 24590-PTF-MVE-10-00003, 24590-PTF-MCC-UFP-00004***
Project Site:	***Hanford***	Vessel Drawings	***24590-PTF-MV-UFP-00001001, 00001002, 00001003***
Description:	***Ultrafiltration Feed Preparation Vessel***	Reports	***24590-WTP-RPT-ENG-07-007, 24590-PTF-N1D-UFP-00005, 24590-WTP-RPT-M-06-003, 24590-WTP-RPT-M-04-0002, 24590-PTF-M6X-UFP-00148, 24590-PTF-M6X-UFP-00174, 24590-PTF-M6X-UFP-00288, 24590-PTF-M6X-UFP-00291, 24590-PTF-M6X-UFP-00386, 24590-PTF-M6X-UFP-00387, 24590-PTF-M6X-UFP-00429***

R11105799

Reference Data

Charge Vessels (Tag Numbers)	***DELETED***
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***
RFDs/Pumps (Tag Numbers)	***DELETED***

Design Data

Quality Level	***Q (See Note 18)***		Fabrication Specs	***24590-WTP-3PS-MV00-T0001***		
Seismic Category	***SC-I***		Design Code	***ASME VIII Div 1***	ISSUED BY RPP-WTP PDC	
Service/Contents	***Radioactive Liquid***		Code Stamp	***Yes***		
Design Specific Gravity	***1.5***		NB Registration	***Yes***		
Maximum Operating Volume	***64,562*** gal		Weights (lbs)	Empty	Operating	Test
Total Volume	***75,594*** gal		Estimated	***224,440***	***1,073,530***	***888,340***
Environmental Qualification	***See EQD Section***					

Inside Diameter	inch	***240***					Wind Design	***Not Required***	
Length/Height (TL-TL)	inch	***308.6 (Note 19)***					Snow Design	***Not Required***	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Sparger Operation	Sparger Design	Seismic Design	***24590-WTP-3PS-MV00-T0002***	
Internal Pressure	psig	***ATM***	***15***	***35***	***135***	***160***			
External Pressure	psig	***1.5 (Note 3)***	***2.0 (Note 3)***	***0.0***	***Vessel Internal Pressure (OP)***	***Vessel Internal Pressure (Design)***	Postweld Heat Treat	***Not Required***	
Temperature (Note 30)	°F	***194***	***212***	***212***	***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 (see Note 8)***
Shell	***SA 240 316 Note 1***	***See Drawing***	***Primary (see Note 8)***
Bottom Head	***SA 240 316 Note 1***	***See Drawing***	***Primary (see 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	***SA 240 316 Note 1***	***See Drawing***	***Thermowells Primary***
Pipe Nozzles	***SA 312 TP316 Note 1, Note 1b***	***See Drawing***	***Primary (see 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 (see Note 8)***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***

Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Note 2***
		External Finish	***Note 2***

Notes/Remarks

Note 1. Maximum 0.030% carbon.

Note 1a. Cooling water jacket on the vessel shell is SA 240 304 0.030% max carbon per 24590-WTP-SDDR-PROC-05-00227.

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 as per Report No. 24590-WTP-RPT-M-04-0007 Rev. 0 dated Nov. 01, 2004.

Note 11. Deleted.

Note 12. Seller shall provide wear plates for erosion control on the bottom head.

Note 13. Ensure that an additional 0.087" is available for erosion in the lower 4" of the interior conical surface of the pulse jet mixers.

Note 14. All hydrodynamic and overblow loads shall be included with seismic analysis as per this data sheet.

Note 15. Deleted

Note 16. Deleted

Note 17. Revision 8 of this data sheet incorporates the CCN 129149 / 128549. The CCN added the words "in the form of overblow pressures" to the note shown on the overblow graph and further revised the note below the graph as noted herein.

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

Note 19. The 308.6" TL-TL length is the actual dimension provided by as-builds.

Note 20. Corrosion allowance for jacket shall be 0.04 inch, corrosion allowance for the Steam Spargers shall also be 0.040 inch, which includes 0.024 inch corrosion allowance and 0.016 inch general erosion allowance. Corrosion/erosion allowance for the steam sparger holes shall be 0.031".

Note 21. Changed to 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, 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.

11 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. Removed 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.

11 Note 30. Operating and Design temperatures revised based on DOE contract change - reference CCN 187535 and P&ID Line list 24590-PTF-M6X-UFP-00288.

Functional/Safety Requirements

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 (PJMs) provide a mixing function in the vessel to prevent hydrogen accumulation. Vessel level instrumentation provides level monitoring to prevent overflows and ensure proper headspace volumes are maintained for hydrogen dilution. In order to meet the above functions the vessel and internals shall be designed and fabricated in accordance with ASME Section VIII and must remain in the elastic range of the material for all defined load combinations.

Seismic 11

Seismic analysis to be combined with operating conditions, single PJM overblow, and any sloshing loads imposed. Sloshing loads on vessel shell and internals are calculated per ASCE 4-98. Analysis to consider worst case seismic loads on the vessel proper and on the vessel internals.

Equipment Cyclic Data Sheet – Parent Vessel

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

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

Materials of Construction	*ASME SA240 316 with 0.030 % max. Carbon*
Design Life	*40 Years*
Component Function and Life Cycle Description	*The system receives waste feed from the Waste Feed Evaporation Process System (FEP), 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* *-1.5*	*0* *2.8*	*7.0E6* *40*	*The vessel will remain at constant pressure depending upon the HVAC plant*
Operating Temp	°F	*50*	*194*	*12120* 11	
Contents Specific Gravity		*1.0*	*1.5*	*12120* 11	*Stress range is for empty to full* 11
Contents Level	inch	*0*	*350*	*12120* 11	

Notes

- ***Cycle increase: Increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***
- 11 ***This vessel will be heated 12,120 times over the 40 year life of the plant, per UFP batch cycle, ECCN 24590-PTF-MVE-10-00003.***

Equipment Cyclic Data Sheet - PJMs

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*
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 design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The PJM supports shall be designed to cycle between fully buoyant (PJM empty and parent vessel full) and fully loaded (PJM full and parent vessel empty) states. Thrust 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*	*35*	*100*	*Nominal assumption for testing*
Operating Pressure	psig	*FV*	*25*	*1.3E7*	
Operating Temperature	°F	*50*	*194*	*12120* 11	*Same as Parent Vessel*
Contents Specific Gravity		*1.0*	*1.5*	*12120* 11	*Same as Parent Vessel*
Contents Level	inch	*Empty*	*Flooded*	*1.3E7*	
Thrust	lbf	*-400*	*400*	*1.3E7*	*Conservative*
Localized Features					
Nozzles		*N/A*			
Supports		*Buoyant*	*Loaded*	*1.3E7*	

Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***
- 11 ***This vessel will be heated 12,120 times over the 40 year life of the plant, per UFP batch cycle, ECCN 24590-PTF-MVE-10-00003.***

Equipment Cyclic Data Sheet – Steam Spargers 11

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

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

Materials of Construction		*Hastelloy*					
Design Life		*40 Years*					
Component Function and Life Cycle Description		*The Steam Spargers will heat the process fluid until it gets up to temperature for digestion and will sustain this temperature for the time required to complete digestion. It will take up to approximately 9 hrs to heat and up to 16 hrs to digest (24590-WTP-RPT-ENG-08-016). The Steam Sparger is pressurized by air until the vessel is full and the steam is introduced. The vessel is heated up this occurs 12120 cycles. After vessel is heated the Steam Sparger is again pressured by air.*					
Load Type		Min Steam	Max Steam	Min Air	Max Air	Number of Cycles	Comment
Design Pressure	psig	*-2.0*	*160*	*-2.0*	*150*	*10*	*Nominal assumption for testing*
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*		*Per Process Stream Properties, 24590-WTP-RPT-ENG-07-007, Rev. 0, Table 4-18, page 87. Cycles per the Conservative Assumption, see notes below.*
Contents Specific Gravity w / liquid		*1.0*	*1.5*				*The worst case is the pipe gets flooded, vessel SG used*

Equipment Cyclic Data Sheet Notes 11

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-PDF-M6X-UFP-00386 and 24590-PDF-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-PDF-M6X-UFP-00386 and 24590-PDF-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 12,120 times over the 40 year life of the plant, per UFP batch cycle, ECCN 24590-PTF-MVE-10-00003.

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, 12,120 cycles.

The specific volume of the steam at 111 psig is 3.5 ft^3/lb the density of air at 70 F is 0.075 lb/ft^3 the specific gravity is then: (1/3.5)/0.075 = 3.81 in SG_{air}.

The specific gravity of air at 150 psig is then found by: The density of air at 70 F and 0 psig 0.075 lb/ft^3 and at 80 F and 150 psig 0.824 lb/ft^3 calculating 0.824 / 0.075 = 11.0 the SG_{air}.

The sparger system is to be operated such: Air is to be used to keep the liquid out of the sparger during vessel filling and draining. After vessel is filled the air is replaced by steam through the sparger to heat the liquid to 194 F. One of the spargers is returned to air service after the liquid reaches 194 F. One of the spargers is used throttled back to maintain liquid temperature.

The Specific gravity of the vessel liquid is not significantly changed during the process, however the specific gravity of each batch can vary as noted above.

Hydrodynamic Loading - Pulse Jet Mixers (PJMs)

Pulse Jet Mixers (PJMs) are designed to blow the fluid in the vessel in the form of a jet that induces agitation and mixing in the fluid. The mixing is required for various reasons: to enhance the heat transfer from the fluid to the cooling jackets and to release hydrogen from the fluid are examples. PJMs work on pressurized air to drive the fluid out of the PJM and into the vessel, this is called the "drive" phase. After the drive phase, all PJMs are normally simultaneously refilled with the vessel slurry via either a suction applied to each PJM internal headspace or (when slurry temperature is highly elevated) via gravity refill. The end of the drive phase is controlled such that the PJM does not empty completely. However, a condition can exist in which the PJM continues to blow during the drive phase, ejecting air after all the fluid is expelled. This condition is called a PJM overblow. This can occur with a single PJM overblowing or if more than one PJM overblows, it is called Multiple Overblow (MOB). Fluid motion during single overblow or MOB in a vessel causes hydrodynamic loads on the internal vessel components in the form of increased pressure. This fluid motion is cyclic based on the number of drive phases imposed by the PJMs. There are several types of hydrodynamic loads that the vessel internals will be designed for: 1) Normal operations, 2) Single PJM Overblow, and 3) Multiple PJM Overblow. The vessel internals shall be designed and supported for all three of these load conditions. The following tables and graphs indicate the required pressure/forces to apply to the vessel internals along with the number of cycles for each condition.

Normal Operations

Discussion:

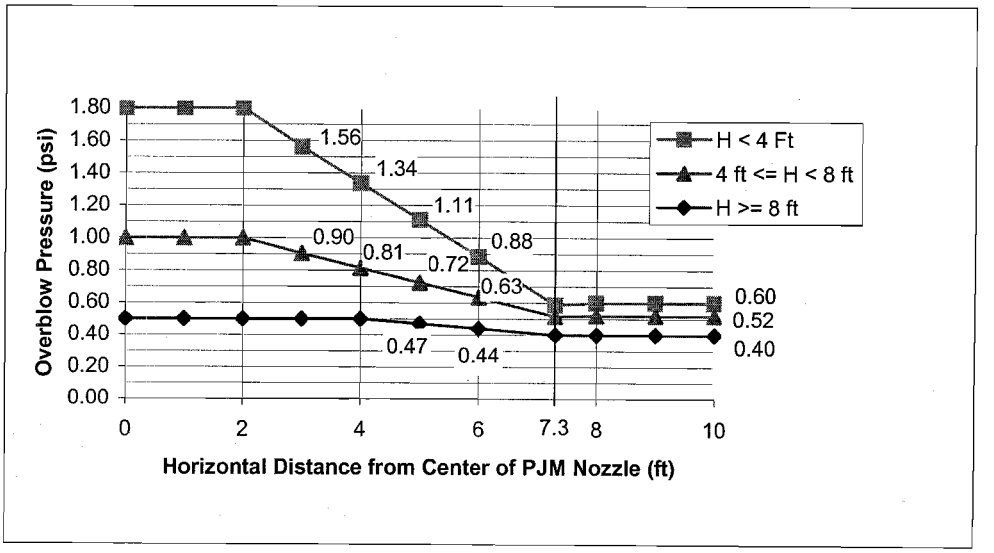
In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overblow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed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

Normal Operation:

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 1.3E7 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.

Single Overblow Loading- PJMs

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



For all vessel internal components other than the overblowing pulse jet mixer, the overblow forces shall be applied a). in the vertical direction, and b). in the horizontal direction, radiating from the centerline of the overblowing pulse jet mixer. For the overblowing pulse jet mixer, the force shall be applied in the vertical upward direction only. The overblow force on all components, including the structures and supports, shall be calculated by applying the overblow pressure at the location of the nearest surface of the component and to the projected area of the component, facing the appropriate direction. The normal force component, specified for the normal pulse jet mixer operation condition, is not applicable to the overblow condition. Any single PJM may overblow but the total number of cycles for all PJM single overblow events is 2000 cycles. This load combination acts concurrently with seismic loads.

Multiple Overblow Loading- PJMs

Multiple PJM Overblow (MOB) loads vary as a function of the horizontal distance from the center of the overblowing pulse jet mixer nozzle and the elevation 'H' above the overblowing pulse jet mixer nozzle up to the overflow level as plotted in the form of overblow pressures. Multiple application of the Single PJM Overblow loading forms the basis for the MOB loads. Usage of the above Single Overblow graph along with Report # 24590-WTP-RPT-M-06-003 (Summary Report: Hydrodynamic Loads for PJM Multiple Overblow Condition) is required to determine the forces on each vessel internal component (targets) due to MOB. (Note: this report will be provided in the Material Requisition Package). This load condition does not act concurrently with seismic loads, but will be included with other normal operating load conditions. The number of cycles applied to MOBs is 400 cycles.

Nozzle Loads

Nozzle	Design Nozzle Press (psig) 11	Design Nozzle Temp (°F) 11	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N02	170	212	3"	Weight	52	138	52	160	75	204
				Seismic	162	108	162	468	701	701
				Thermal	134	58	228	190	380	380
N04	15	113	2" OD	Weight	50	60	50	75	75	75
				Seismic	106	70	106	158	237	237
				Thermal	33	29	44	49	97	97
N05	15	212	6"	Weight	N05 is parent nozzle, nozzle loads are applied via N05A, N05B, N05C					
				Seismic						
				Thermal						
N05A (Note E)	15	212	1"	Weight	15	20	15	20	20	20
				Seismic	30	20	30	37	55	55
				Thermal	9	8	12	11	22	22
N05B (Note E)	100	212	1"	Weight	15	20	15	20	20	20
				Seismic	30	20	30	37	55	55
				Thermal	9	8	12	12	22	22
N05C (Note E)	100	212	1"	Weight	15	20	15	20	20	20
				Seismic	30	20	30	37	55	55
				Thermal	9	8	12	12	22	22
N07	75	185	4"	Weight	87	262	87	216	135	135
				Seismic	335	189	274	1448	1320	2223
				Thermal	113	131	150	360	720	720
N11	169	120	3"	Weight	52	203	52	119	75	75
				Seismic	162	146	162	544	701	701
				Thermal	66	76	88	303	380	380
N13	125	125	3"	Weight	52	131	52	119	75	89
				Seismic	269	213	382	898	701	701
				Thermal	66	58	88	190	380	380
N15	15	212	3"	Weight	52	84	52	119	75	75
				Seismic	162	108	162	468	701	701
				Thermal	66	58	88	190	380	380
N16	125	155	3"	Weight	52	84	52	119	75	75
				Seismic	162	108	162	468	701	701
				Thermal	66	58	88	190	380	380
N18	230	138	6"	Weight	210	612	210	598	374	374
				Seismic	663	449	663	2423	3638	3638
				Thermal	524	1086	375	1593	2046	2046
N19	15	212	8"	Weight	234	373	234	741	464	464
				Seismic	734	490	734	2948	4418	4418
				Thermal	340	303	455	1378	2740	2740
N22	15	212	1 1/2"	Weight	35	35	35	40	40	40
				Seismic	60	40	60	91	137	137
				Thermal	19	17	25	28	55	55

Nozzle	Design Nozzle Press (psig) 11	Design Nozzle Temp (°F) 11	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N23	170	170	3"	Weight	52	148	52	119	75	75
				Seismic	192	119	162	665	701	1018
				Thermal	66	58	88	388	380	380
N24	125	125	3"	Weight	52	164	52	119	75	75
				Seismic	228	683	551	2297	701	701
				Thermal	66	136	88	213	380	380
N28	75	185	4"	Weight	87	146	87	216	135	135
				Seismic	274	183	274	878	1320	1320
				Thermal	113	100	150	360	720	720
N30	75	185	4"	Weight	87	346	87	216	135	224
				Seismic	274	249	274	1337	1320	1320
				Thermal	113	100	150	360	720	720
N35	190	194	3"	Weight	52	86	52	119	75	75
				Seismic	162	108	162	468	741	701
				Thermal	66	58	88	190	380	380
N37	124	140	2"	Weight	50	60	50	75	75	75
				Seismic	106	70	106	158	237	237
				Thermal	45	118	44	125	97	168
N38	124	140	2"	Weight	50	60	50	75	75	75
				Seismic	106	70	106	158	237	237
				Thermal	33	42	51	186	97	97
N39	124	140	2"	Weight	50	60	50	75	75	75
				Seismic	106	70	106	158	237	237
				Thermal	33	114	70	252	97	97
N40	124	140	2"	Weight	50	60	50	75	75	75
				Seismic	106	70	106	418	237	237
				Thermal	33	81	44	49	97	97
N41	124	140	2"	Weight	50	60	50	75	75	75
				Seismic	106	70	106	158	237	237
				Thermal	45	118	44	125	97	168
N42	124	140	2"	Weight	50	60	50	75	75	75
				Seismic	106	70	106	158	237	237
				Thermal	33	69	68	254	97	97
N43	124	140	2"	Weight	50	62	50	75	75	75
				Seismic	106	70	106	158	237	237
				Thermal	33	29	44	126	97	97
N44	124	140	2"	Weight	50	60	50	75	75	75
				Seismic	106	70	106	158	237	237
				Thermal	33	48	47	179	97	97
N47	170	175	2"	Weight	50	87	50	75	75	75
				Seismic	106	70	106	158	237	269
				Thermal	33	29	44	112	97	97
N48	170	175	2"	Weight	50	72	50	75	75	75
				Seismic	106	70	106	158	237	237
				Thermal	33	33	45	185	97	97

Nozzle	Design Nozzle Press (psig) [11]	Design Nozzle Temp (°F) [11]	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N49	170	175	2"	Weight	50	99	50	75	75	75
				Seismic	106	122	106	242	237	242
				Thermal	33	29	44	152	97	97
N51	124	175	2"	Weight	50	60	50	75	75	75
				Seismic	106	70	106	245	237	246
				Thermal	33	38	44	64	97	97
N52	124	175	2"	Weight	50	60	50	75	75	75
				Seismic	106	70	106	158	237	237
				Thermal	99	29	106	209	183	97
N53	125	150	3"	Weight	52	143	52	119	75	75
				Seismic	162	108	162	468	701	701
				Thermal	129	58	88	190	380	396
N54	15	212	8"	Weight	234	492	234	741	464	1098
				Seismic	1228	1186	2128	2948	12158	6362
				Thermal	340	354	455	1372	2740	2740
N55	15	212	6"	Weight	210	461	210	598	374	374
				Seismic	663	600	1270	2423	3638	4751
				Thermal	280	1184	390	1023	2046	3042
N56	15	212	2"	Weight	50	111	50	75	75	75
				Seismic	106	70	106	213	237	237
				Thermal	33	29	44	49	97	97
N57	15	212	2"	Weight	50	105	50	75	75	230
				Seismic	106	70	106	158	237	237
				Thermal	148	30	44	49	97	97
N58 (Note F)	35	140	6"	Weight	210	335	210	598	374	374
				Seismic	663	443	663	2423	3638	3638
				Thermal	280	250	375	1023	2046	2046
N59	35	140	6"	Weight	210	459	210	598	374	644
				Seismic	663	466	663	2423	3638	3638
				Thermal	280	250	375	1098	2046	2046
N60	15	212	3"	Weight	52	84	52	119	75	75
				Seismic	162	108	162	492	950	701
				Thermal	76	190	88	530	380	380
N61	15	212	24"	Weight	Manway					
				Seismic						
				Thermal						
N62	169	120	3" [11]	[11] Weight	100	150	100	200	200	200
				[11] Seismic	162	108	162	468	701	701
				[11] Thermal	66	58	88	190	380	380
N63	170	150	2"	Weight	50	60	50	75	75	75
				Seismic	184	70	106	159	237	382
				Thermal	33	29	44	49	97	97
N65	15	212	6"	Weight	N65 is parent nozzle, nozzle loads are applied via N65A, N65B, N65C					
				Seismic						
				Thermal						

Nozzle	Design Nozzle Press (psig) 11	Design Nozzle Temp (°F) 11	Size	Load Type	Loads - lbs			Moments - ft-lbs		
					Fx	Fy	Fz	Mx	My	Mz
N65A (Note E)	15	212	1"	Weight	15	20	15	20	20	20
				Seismic	30	20	30	37	55	55
				Thermal	9	8	12	12	22	22
N65B (Note E)	100	212	1"	Weight	15	20	15	20	20	20
				Seismic	30	20	30	37	55	55
				Thermal	9	8	12	12	22	22
N65C (Note E)	100	212	1"	Weight	15	20	15	20	20	20
				Seismic	30	20	30	37	55	55
				Thermal	9	8	12	12	22	22
N70	160	375	4"	Weight	87	359	87	216	135	224
				Seismic	335	249	274	1448	1320	2223
				Thermal	120	131	150	360	720	720
N71	160	375	4"	Weight	87	359	87	216	135	224
				Seismic	335	249	274	1448	1320	2223
				Thermal	120	131	150	360	720	720

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.

EQUIPMENT QUALIFICATION DATASHEET (EQD)

Equipment Identification

Component Tag Number	24590-PTF-MV-UFP-VSL-00001A	Safety Classification	☒ SC ☐ SS ☐ APC ☐ SDC ☐ SDS ☐ RRC All subcomponents are SC
Manufacturer / Supplier	Northwest Copper Works		
Requisition Number	24590-QL-MRE-MVA0-00001		
Model	Custom	Seismic Category	☒ SC-I ☐ SC-II ☐ SC-III ☐ SC-IV All subcomponents are design to SC-I
Description (Include descriptive text [e.g., location, elevation])	Ultrafiltration Feed Preparation Vessel, Pre-Treatment Column Lines J/11.5, 0'-0" Elevation		
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 (PJMs) provide a mixing function in the vessel to prevent hydrogen accumulation.		

Seismic Safety Function	☒ Yes ☐ No	Room Number(s):	P-0106, Pre-Treatment Facility
Maintenance Accessible	☐ Yes ☒ No	Method of Maintenance Access:	☐ Remote ☐ Hands On ☒ None
Seismic Operability Requirements:	☒ During Seismic Event	☒ After Seismic Event	
ITS Equipment Type:	☒ Passive Mechanical	☐ Active Mechanical	☐ Electrical

Equipment Environmental Qualification (EEQ)

Environment ⚠ ☐ Mild ☐ Harsh Contamination Class: C5 Radiation Class: R5	Hi Rad Service ☒ Yes ☐ No	Design Life (yrs) ☒ 40 ☐ Other ____

Parameter Type/Units	Parameter Value	Time Duration (number)	Time Units	WTP Document Number (BUYER)	Submittal Number (SELLER)
Normal					
Normal High Temperature (°F)	113	40	yrs	24590-PTF-U0D-W16T-00001	E-Note 1
Normal Low Temperature (°F)	59	40	yrs	24590-PTF-U0D-W16T-00001	E-Note 1
Normal High Relative Humidity (%RH)	100	40	yrs	24590-PTF-U0D-W16T-00001	E-Note 1
Normal Low Relative Humidity (%RH)	5	40	yrs	24590-PTF-U0D-W16T-00001	E-Note 1
Normal High Pressure (in.-w.g.)	0 (E-Note 2)	40	yrs	24590-PTF-U0D-W16T-00001	E-Note 1
Normal Low Pressure (in.-w.g.)	(-) 1.4 (E-Note 2)	40	yrs	24590-PTF-U0D-W16T-00001	E-Note 1
Normal Radiation Dose Rate (mR/hr)	255000 (E-Note 4)	40 (E-Note 7)	yrs	24590-PTF-U0D-W16T-00001	E-Note 1
Vibration Magnitude (g)	N/A	N/A	N/A	N/A	N/A
Vibration Frequency (Hz)	N/A	N/A	N/A	N/A	N/A
Additional Normal Information:	N/A				

Equipment Environmental Qualification (EEQ) *(continued)*

Parameter Type/Units	Parameter Value	Time Duration (number)	Time units	WTP Document Number (BUYER)	Submittal Number (SELLER)
Abnormal					
Abnormal High Temperature (°F)	128	8	hrs/yr	24590-PTF-U0D-W16T-00001	E-Note 1
Abnormal Low Temperature (°F)	40	8	hrs/yr	24590-PTF-U0D-W16T-00001	E-Note 1
Abnormal High Relative Humidity (%RH)	100	24	hrs/yr	24590-PTF-U0D-W16T-00001	E-Note 1
Abnormal Low Relative Humidity (%RH)	6	72	hrs/yr	24590-PTF-U0D-W16T-00001	E-Note 1
Abnormal High Pressure (in.-w.g.)	4 (E-Note 2)	8	hrs/yr	24590-PTF-U0D-W16T-00001	E-Note 1
Abnormal Low Pressure (in.-w.g.)	(-) 7.3 (E-Note 2)	8	hrs/yr	24590-PTF-U0D-W16T-00001	E-Note 1
Abnormal Radiation Dose Rate (mR/hr)	255000 (E-Note 4)	0 (E-Note 7)	yrs	24590-PTF-U0D-W16T-00001	E-Note 1
Wet Sprinkler System Present	No	N/A	N/A	24590-PTF-U0D-W16T-00001	E-Note 1
Additional Abnormal Information	N/A				
Design Basis Events (DBE)					
DBE High Temperature (°F)	138	1000	hrs	24590-PTF-U0D-W16T-00001	E-Note 1
DBE Low Temperature (°F)	40	1000	hrs	24590-PTF-U0D-W16T-00001	E-Note 1
DBE High Relative Humidity (%RH)	100	482	hrs	24590-PTF-U0D-W16T-00001	E-Note 1
DBE Low Relative Humidity (%RH)	4	1000	hrs	24590-PTF-U0D-W16T-00001	E-Note 1
DBE High Pressure (in.-w.g.)	4 (E-Note 2)	1000	hrs	24590-PTF-U0D-W16T-00001	E-Note 1
DBE Low Pressure (in.-w.g.)	(-) 7.3 (E-Note 2)	1000	hrs	24590-PTF-U0D-W16T-00001	E-Note 1
DBE Radiation Dose Rate (mR/hr)	255000 (E-Note 4)	0 (E-Note 7)	yrs	24590-PTF-U0D-W16T-00001	E-Note 1
Flood Height (ft)	2.08	1000	hrs	24590-PTF-U0D-W16T-00001	E-Note 1
Submergence (ft)	N/A (E-Note 5)	N/A	N/A	N/A	N/A
Chemical/Spray Exposure	Yes	1000	hrs	24590-PTF-U0D-W16T-00001	E-Note 1
Additional DBE Information	N/A				

DBE Chemical Exposure Details	
DBE Chemical Types/Concentrations	Sodium Hydroxide (19M) Sodium Permanganate (1M) Strontium Nitrate (1M)

Interfaces (Electrical)	
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

Interfaces (Mechanical)	
Mounting Configuration (orientation)	Vertical Mounted, Skirt, Located at 0'-0" in the Pre-Treatment Facility, Column Lines J and 11.5
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, 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, Auxiliary Devices are located within the vessel.

Equipment Seismic Qualification (ESQ)

Parameter	Title	Reference/Document Number	Version / Revision	Remarks
WTP Seismic Design Specification (BUYER)	Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks Engineering Specification for Seismic Qualification Criteria for Pressure Vessels	24590-WTP-3PS-SS90-T0001 24590-WTP-3PS-MV00-T0002	Rev 2 Rev 2	N/A
Specified Seismic Load (BUYER)	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
Design Seismic Load (SELLER	N/A	N/A	N/A	E-Note 3
Qualification Method (SELLER)	N/A	N/A	N/A	Dynamic Analysis utilizing response spectra curves
Qualification Report Number (SELLER)	N/A	N/A	N/A	E-Note 3
Submittal Number (BUYER)	N/A	N/A	N/A	N/A

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 Equipment Seismic and Environmental Qualification.

E-Note 2: Where pressure is given in inches of water column (in-w.c.) in the source document, it is generally assumed that this is in reference to atmospheric pressure and is therefore equivalent to inches of water gage (in-w.g.).

E-Note 3: BNI (BUYER) shall perform Equipment Seismic Qualification in accordance with the listed parameters and the applicable specification requirements.

E-Note 4: Radiation Dose Rates are for determining shielding requirements only for the black cell and are not at the source (vessel). Since the vessel is all metallic and the source has no neutron components for material embrittlement, the dose rates are of no concern on the vessel or its subcomponents.

E-Note 5: Flood height is 2.08 ft above the floor, bottom of vessel is above this level therefore, no submergence evaluation is required.

E-Note 6: Environmental data shown are for the room only.

E-Note 7: Normal, Abnormal, and DBE dose rates are the same, therefore, abnormal & DBE doses do not add to total integrated dose based on normal dose rates over 40 years.

DOE Radioactive Materials Disclaimer:

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

Screening / Evaluation Required? If yes per 24590-WTP-GPP-SREG-002, E&NS signature required below	X	Yes		No

Approval

Rev	Description	System Engineer	Vessel Engineer	Checked	Reviewed	E&NS	Approved	Date
0	Issue for Purchase	P.A	H.K	US/CS	JJ	N/A	SK	10/20/02
1	Revised as noted	MA	HK	PA/CS	JJ	N/A	MWH	8/18/03
2	Revised as Noted	MA	HK	PA/CS	RES	N/A	MWH	11/14/03
3	Revised as Noted	M. Askar	H Khurana	P Aviguetero C Slater	J. Julyk	N/A	C. Morley for M Hoffmann	2/5/04
4	Added hydrodynamic loads and other revisions as noted.	M. Askar	H Khurana	P Aviguetero C Slater	J. Julyk	N/A	M Hoffmann	9/8/04
5	Added wear plates as noted.	M. Askar	H Khurana	P Aviguetero C Slater	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.	M. Askar	H Khurana	P Aviguetero C Slater	J. Julyk	N/A	M Hoffmann	03/02/05
7	Revised Notes on page 2 & 3 as noted	M. Askar	H. Khurana	MAP for C/S	RES	N/A	M Hoffmann	07/28/05
8	Revised per note 17 on page 2 and as noted.	M. Askar	H. Khurana	Jl Polani	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	D Vo	M Seed	W Wilcox	B Makadia	G Hendricks	J Julyk	03/20/08
10	Revised per Note 29 & 30. Added Steam Spargers.	D Vo	M Seed	R Peters	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	D Vo DVVo	M Seed MASeed	D Harris	D Adler RPHills	J Hinckley	J Julyk 3/24/09	

ATTACHMENT 1: Page 1 of 2
REFERENCES for Data Sheets: 24590-PTF-MVD-UFP-00001 / 00002 (For BNI Use only)
Vessel Tag #'s: UFP-VSL-00001A / 00001B

Data	Document #	Rev	Document Title
Quality Level	24590-PTF-M6-UFP-00001001 24590-PTF-M6-UFP-00001004	0 0	*P&ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001A* *P&ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001B*
Seismic Category	24590-PTF-M6-UFP-00001001 24590-PTF-M6-UFP-00001004	0 0	*P&ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001A* *P&ID PTF Ultrafiltration Process System Feed Preparation Vessel UFP-VSL-00001B*
Design Specific Gravity	24590-WTP-RPT-ENG-07-007	0	*Process Stream Properties* / Section 4.18
Max Operating Volume	24590-PTF-M6C-UFP-00004	D	*Vessel Sizing Calculations for Ultrafiiltration Feed Preparation Vessels UFP-VSL-00001A/B,* / Sheet 25
Total Volume	24590-PTF-M6C-UFP-00004	D	*Vessel Sizing Calculations for Ultrafiiltration Feed Preparation Vessels UFP-VSL-00001A/B,* / Sheet 19
Inside Diameter	24590-PTF-M6C-UFP-00004	D	*Vessel Sizing Calculations for Ultrafiiltration Feed Preparation Vessels UFP-VSL-00001A/B,* / Sheet 24
Length TL-TL	24590-PTF-M6C-UFP-00004	D	*Vessel Sizing Calculations for Ultrafiiltration Feed Preparation Vessels UFP-VSL-00001A/B,* / Sheet 24
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		*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	A	*PTF Vessel Cyclic Datasheet Inputs/* use 35 psig
Operating Temp (parent vessel)	CCN 187535	NA	DOE contract change from 100 C to 90 C, 90 degrees C is equivalent to 194 F
Design Temp (parent vessel)	CCN 187535	NA	DOE contract change from 100 C to 90 C for max operating condition use 100 C for design, 100 C equals 212F
Sparger Operation/Design	24590-PTF-M6X-UFP-00386 24590-PTF-M6X-UFP-00387 24590-PTF-M6X-UFP-00388 24590-PTF-M6X-UFP-00389	0 0 0 0	*MS Line List for 24590-PTF-M6-UFP-00034002* *MS Line List for 24590-PTF-M6-UFP-00034003* *MS Line List for 24590-PTF-M6-UFP-00034004* *MS Line List for 24590-PTF-M6-UFP-00034005*
Jacket Design Temp	N/A		Same as vessel
Corrosion Allowance, Erosion allowance	24590-PTF-N1D-UFP-00005	5	*Corrosion Evaluation UFP-VSL-00001A/B*
Materials of Construction	24590-PTF-N1D-UFP-00005	5	*Corrosion Evaluation UFP-VSL-00001A/B*
Design Pressure (PJM)	24590-PTF-M6X-UFP-00174 24590-PTF-M6X-UFP-00148	0 0	*MS Line List for P&ID 24590-PTF-M6-UFP-00008007* *MS Line List for P&ID 24590-PTF-M6-UFP-00007007*

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

Data	Document #	Rev	Document Title
Operating Pressure (PJM)	24590-QL-POA-MPE0-00002-25-03	00C	*PJM Datasheet JPP's* / PJM air pressure is 20 psig plus a 25% additional margin for 25 psig
Operating Temperature (PJM)	N/A		same as parent vessel
Cyclic Data (Vessel)	24590-PTF-MVC-10-00003 24590-PTF-MVE-10-00003 CCN 187535	C NA N/A	*PTF Vessel Cyclic Datasheet Inputs* *ECCN to incorporate steam sparging cycles* DOE contract change from 100 C to 90 C, 90 degrees C is equivalent to 194°F, use of 194°F for max operating temperature in place of the value in 24590-PTF-MVC-10-00003
Cyclic Data (PJM)	24590-PTF-MVC-10-00003 CCN 187535	A N/A	*PTF Vessel Cyclic Datasheet Inputs/* sheet B-2 DOE contract change from 100 C to 90 C, 90 degrees C is equivalent to 194°F, use of 194°F for max operating temperature in place of the value in 24590-PTF-MVC-10-00003
Cyclic Data (Steam Spargers)	24590-PTF-MVE-10-00003	N/A	*ECCN to incorporate steam sparging cycles*
Operating conditions (Air)	24590-PTF-M6X-UFP-00386 24590-PTF-M6X-UFP-00387 24590-PTF-M6X-UFP-00388 24590-PTF-M6X-UFP-00389	0 0 0 0	*MS Line List for 24590-PTF-M6-UFP-00034002* *MS Line List for 24590-PTF-M6-UFP-00034003* *MS Line List for 24590-PTF-M6-UFP-00034004* *MS Line List for 24590-PTF-M6-UFP-00034005*
Operating Conditions (Steam)	24590-PTF-M6X-UFP-00386 24590-PTF-M6X-UFP-00387 24590-PTF-M6X-UFP-00388 24590-PTF-M6X-UFP-00389	0 0 0 0	*MS Line List for 24590-PTF-M6-UFP-00034002* *MS Line List for 24590-PTF-M6-UFP-00034003* *MS Line List for 24590-PTF-M6-UFP-00034004* *MS Line List for 24590-PTF-M6-UFP-00034005*
Hydrodynamic Loads	24590-WTP-MVC-50-00001	A	*Hydrodynamic Loads for Normal PJM Operation in Vessels with Newtonian Fluids*
Single PJM Overblow Loads	24590-WTP-MVC-50-00008	A	*Hydrodynamic Loads for PJM Overblow in Vessels with Non-Newtonian Fluids*
Single Overblow cycles	24590-PTF-MVE-10-00004	N/A	*Add PJM Overblow Frequency Assumption* / 2000 cycles used for conservatism
Multiple Overblow	24590-WTP-RPT-M-06-003	0	Summary Report: Hydrodynamic Loads for PJM Multiple Overblow Condition
Multiple Overblow Cycles	24590-PTF-MVE-10-00004	N/A	*Add PJM Overblow Frequency Assumption* / 400 cycles used for MOBs
Nozzle Loads	CCN 126187 CCN 126188 CCN 202057	N/A N/A N/A	Nozzle Loads for UFP-VSL-00001A Nozzle Loads for UFP-VSL-00001B Supplemental Design Nozzle Loads for UFP-VSL-00001A/B
Nozzle Design Pressures and Temperatures	24590-PTF-M6X-UFP-00148 24590-PTF-M6X-UFP-00174 24590-PTF-M6X-UFP-00288 24590-PTF-M6X-UFP-00291 24590-PTF-M6X-UFP-00429 24590-PTF-M6X-UFP-00301 24590-PTF-M6X-UFP-00306 24590-PTF-M6X-PWD-00113	0 0 0 0 0 0 0 2	MS LINE LIST FOR P&ID 24590-PTF-M6-UFP-00007007, REV. 0 MS LINE LIST FOR P&ID 24590-PTF-M6-UFP-00008007, REV. 0 MS LINE LIST FOR 24590-PTF-M6-UFP-00001001, REV. 0 MS LINE LIST FOR 24590-PTF-M6-UFP-00001002, REV. 0 MS LINE LIST FOR 24590-PTF-M6-UFP-00001005, REV. 0 MS LINE LIST FOR 24590-PTF-M6-UFP-00001004, REV. 0 PIPELINE LIST FOR P&ID 24590-PTF-M6-PWD-00046, REV. 2