R10613725

MECHANICAL SYSTEMS DATA SHEET: VESSEL

PLANT ITEM No. *24590-PTF-MV-PWD-VSL-00033*

Project	*RPP-WTP*	P&ID	*24590-PTF-M6-PWD-P0002*
Project No	*24590*	Calculation 3	*24590-PTF-MVC-PWD-00029, 24590-PTF-MVC-PWD-00021* 3
Project Site	*Hanford*	Vessel Drawing	*24590-PTF-MV-PWD-P0001001*
Description	*Ultimate Overflow Vessel*		ISSUED BY RPP-WTP PDC

Reference Data

Charge Vessels (Tag Numbers)	*PWD-VSL-00131, PWD-VSL-00132*
Pulsejet Mixers / Agitators (Tag Numbers)	*PWD-PJM-00031, PWD-PJM-00032, PWD-PJM-00033, PWD-PJM-00034, PWD-PJM-00035, PWD-PJM-00036, PWD-PJM-00037, PWD-PJM-00038*
RFDs/Pumps (Tag Numbers)	*PWD-RFD-00131, PWD-RFD-00132*

Design Data

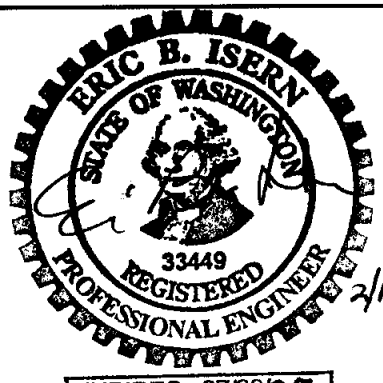
Quality Level		*QL-1*	Fabrication Specs	*24590-WTP-3PS-MV00-TP001*		
Seismic Category		*SC-I*	Design Code	*ASME VIII Div 1*		
Service/Contents		*Radioactive Liquid*	Code Stamp	*Yes*		
Design Specific Gravity		*1.57*	NB Registration	*Yes*		
Operating Volume	gal	*29,580*	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	*41,650*	Estimated	*115,400*	*503,700*	*465,000*
Environmental Qualifications		*N/A*	Actual ** 3	*129,000*	*517,500* 3	*499,600* 3

Inside Diameter	inch	*288*			Wind Design	*Not Required*	
Length/Height (TL-TL)	inch	*89*			Snow Design	*Not Required*	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	*24590-WTP-3PS-SS90-T0001* *24590-WTP-3PS-MV00-TP002*	
Internal Pressure	psig	*0*	*15*	*N/A*	Seismic Base Moment *	ft*lb	
External Pressure	psig	*0.22*	*FV*	*N/A*	Postweld Heat Treat	*Not Required*	
Temperature	°F	*218*	*225*	*N/A*	Corrosion Allowance	Inch	*0.08 (Notes 7,8)*
Min. Design Metal Temp.	°F	*0*			Hydrostatic Test Pressure *	Psig	*19.5*

* As determined by the vendor. 3

** The actual weights shown herein are based on the original seismic data and these figures are subject to change, based on the new loads, obtained from the seismic redesign. 3

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



2/13/06

EXPIRES: 07/28/07

This Bound Document Contains a total of 6 sheets

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
3	2/26/06	Issued for Permitting Use	C. Thompson	B. Makadia/L. Han	C. Slater	J. Julyk
2	3/28/05	Issued for Permitting Use	C. Thompson	H. Khurana	C. Slater	M. Hoffmann
1	12/22/03	Issued for Permitting Use	J. Jackson	R. Simmons	C. Slater	M. Hoffmann
0	10/03/03	Issued for Permitting Use	J. Jackson	C. Slater	N/A	S. Kirk

	MECHANICAL SYSTEMS DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-PWD-VSL-00033

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	SA 240 316 with max. Carbon of 0.030 %	See Drawing	Auxiliary (Note 1)
Shell	SA 240 316 with max. Carbon of 0.030 %	See Drawing	Primary (Note 1)
Bottom Head	SA 240 316 with max. Carbon of 0.030 %	See Drawing	Primary (Note 1)
Support	SA 240 304 with max. Carbon of 0.030 % (Note 3)	See Drawing	N/A
Jacket/Coils/Half-Pipe Jacket	N/A	N/A	N/A
Internals	SA240 316 with max. Carbon of 0.030 %	See Drawing	Thermowell Primary (Note 1)
Pipe	SA312 TP316 Seamless with max. Carbon of 0.030%	See Drawing	See Note 1
Forgings/ Bar stock	SA182 F316/SA 479 316 with max. Carbon of 0.030%	See Drawing	As Note-1 for Nozzle Necks
Gaskets	N/A	N/A	N/A
Bolting	N/A	N/A	N/A

Miscellaneous Data

Orientation	Vertical	Support Type	Skirt
Insulation Function	Not Applicable	Insulation Material	Not Applicable
Insulation Thickness (inch)	Not Applicable	Weld Surface Finish	De-scaled as laid

Remarks

Note 1: All welds forming part of the primary and auxiliary containments, including the nozzle attachment welds shall be subjected to 100% volumetric examination. Radiography is the preferred method of volumetric testing. If it is considered impractical to perform radiographic examination, the Seller may propose ultrasonic examinations.

Note 2: Vessel supports shall be designed to restrain the vessel in a fully buoyant state.

Note 3: Ring beam bottom flange material shall be A 572 Gr. 50.

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

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

Note 6: Deleted per report # 24590-WTP-RPT-M-04-0007 Rev. 0 dated Nov. 1, 2004. △3

Note 7: Seller shall ensure that an additional 0.083" is available for erosion in the bottom head and shall report the minimum thickness required for all specified loading conditions, exclusive of erosion and corrosion allowances. △3

Note 8: Seller shall ensure that an additional 0.053" is available for erosion in the interior conical surface of the pulse jet mixers. △3

Note 9: Required data for thermal stress analysis for nozzles exposed to higher temperatures.

- Cell ambient temperature = 113°F
- Headspace temperature or Operating temperature = 218°F
- Ambient and headspace natural convection heat transfer coefficients = 0.895 Btu/hr ft²°F for vessel head and 0.852 Btu/hr ft²°F for vessel shell
- Inlet fluid transfer frequency and mass flow rate for nozzle N39.

  Steam max temperature = 352°F

  Transfer frequency = 1 transfer/month

  Steam mass flow rate = 1,399 lb/hr

Note 10: Deleted. △3

Note 11: Revision 3 of this data sheet incorporates CCN #'s 129149, 128549 and revises notes 7, 8 and 10 shown above. The CCN's added the words "...in the form of overblow pressures:", to the paragraph above the graph and further revised the note below the graph, as noted herein on sheet 4 of 6. Revised sheet 1 of 6 as noted, revised row 2 to read "Calculation". △3

	MECHANICAL SYSTEMS DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-PWD-VSL-00033

Equipment Cyclic Data Sheet

Plant Item Number	*24590-PTF-MV-PWD-VSL-00033*
Component Description	*Parent Vessel*

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

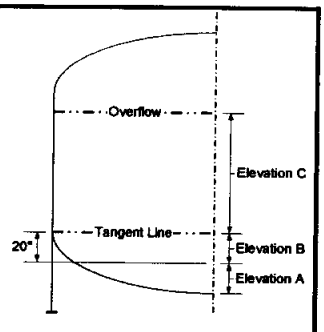
Materials of Construction	*SA 240 316 with max. Carbon of 0.030%*
Design Life	*40 years*
Component Function and Life Cycle Description	*The primary function of the Ultimate Overflow Vessel are to:* • *Collect gravity drains, and line flushes* • *Collect overflows from Pretreatment Facility process vessels.* • *Receive pit sump emptying ejector discharge* *The vessel is normally emptied once every fifty days. Washdown is not more than once per year.*

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*15*	*10*	*Nominal assumption*
Operating Pressure	psig	*-0.22*	*0*	*292*	
Operating Temperature	°F	*59*	*218*	*292*	*Uniform material temperature range, not between two points*
Contents Specific Gravity		*1.0*	*1.57*	*NA*	
Contents Level	inch	*Empty*	*Flooded*	*292*	*Coincident with pressure cycles*
Localized Features					
Nozzles		*Within 50°F of operating temperature range*		*As above*	

Hydrodynamic Loading

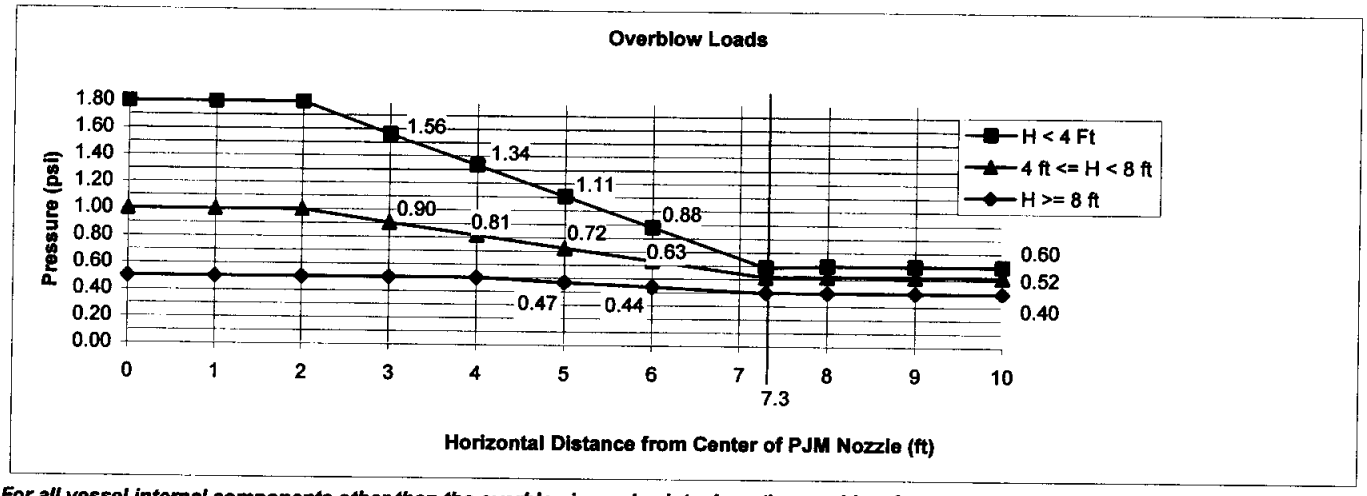
In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overblow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed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

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



Normal Operation Hydrodynamic Pressure Range, psi						Number of Cycles
Elevation A		Elevation B		Elevation C		
Radial	Vertical	Radial	Vertical	Radial	Vertical	
-0.15 to 0.25	*-0.15 to 0.15*	*-0.05 to 0.12*	*-0.15 to 0.15*	*-0.03 to 0.10*	*-0.06 to 0.15*	*16.6 X 10^6*

Overblow loads vary as a function of the 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: △3



For all vessel internal components other than the overblowing pulse jet mixer, the overblow forces shall be applied a) in the vertical upward 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 pulse jet mixer may overblow 1000 cycles. Reference CCN 125541 dated 07/27/05. △3

Notes

- *Cycle increase: Increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.*
- *Nozzle N39 shall be fatigue assessed/analyzed for 500 temperature/pressure cycles from 0 psig at 59°F to 15 psig at 352°F, the pressure cycles shall coincide with the temperature cycles. See Note 9, on Page 2.*

Equipment Cyclic Data Sheet

Plant Item Number:	*PWD-VSL-00131, PWD-VSL-00132*
Component Description	*Charge Vessels*

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

Materials of Construction	*SA 240 316 with max. Carbon of 0.030 %*
Design Life	*40 years*
Component Function and Life Cycle Description	*These charge vessels are cyclically loaded using vacuum to fully fill the charge vessel with process liquid and compressed air to fully empty the charge vessel. The charge vessels are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum design pressure and the minimum design pressure plus the external static head imposed by the parent vessel. The charge vessel supports shall be designed to cycle between fully buoyant (charge vessel empty and parent vessel full) and fully loaded (charge vessel full and parent vessel empty).*

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*55*	*10*	*Nominal assumption*
Operating Pressure	psig	*FV*	*30*	*18,100*	
Operating Temperature	°F	*59*	*218*	*292*	*Pressure cycles to be at 218 °F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points.*
Contents Specific Gravity		*1.0*	*1.57*	*N/A*	
Contents Level	inch	*Empty*	*Flooded*	*18,100*	*Coincident with pressure cycles*
Localized Features					
Supports		*As above*		*As above with contents level changing coincident with pressure cycles.*	

Notes

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

	MECHANICAL SYSTEMS DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-PWD-VSL-00033

Equipment Cyclic Data Sheet

Plant Item Number:	*PWD-PJM-00031, PWD-PJM-00032, PWD-PJM-00033, PWD-PJM-00034, PWD-PJM-00035, PWD-PJM-00036, PWD-PJM-00037, PWD-PJM-00038*
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	*SA 240 316 with max. Carbon of 0.030 %*
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) in addition to thrust.*

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	*FV*	*85*	*10*	*Nominal assumption*
Operating Pressure	psig	*FV*	*60*	*16.6 x 10^6*	
Operating Temperature	°F	*59*	*218*	*16.6 x 10^6*	*Pressure cycles to be at 218 °F and non-coincident with temperature cycles. The range given is uniform material temperature range, not between adjacent points.*
Contents Specific Gravity		*1.0*	*1.57*	*N/A*	*Nominal assumption*
Contents Level	inch	*Empty*	*Flooded*	*16.6 x 10^6*	*Coincident with pressure cycles*
Thrust Load	lbf	*0*	*262*	*16.6 x 10^6*	*Coincident with pressure cycles*
Localized Features					
Supports		*As above*		*As above with contents level changing coincident with pressure cycles.*	

Notes

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