MECHANICAL DATA SHEET: VESSEL

R10637275

PLANT ITEM No.
24590-PTF-MV-FRP-VSL-00002A

Project:	RPP-WTP	P&ID:	24590-PTF-M6-FRP-00001
Project No:	24590	Calculations:	24590-PTF-MVC-FRP-00001, 24590-PTF-MTC-FRP-00001 10
Project Site:	Hanford	Vessel Drawing	24590-PTF-M2-FRP-00001
Description:	Waste Feed Receipt Vessel		

ISSUED BY
RPP-WTP PDC

Reference Data

Charge Vessels (Tag Numbers)	
Pulsejet Mixers / Agitators (Tag Numbers)	FRP-PJM-00061, FRP-PJM-00062, FRP-PJM-00063, FRP-PJM-00064, FRP-PJM-00065, FRP-PJM-00066, FRP-PJM-00067, FRP-PJM-00068, FRP-PJM-00069, FRP-PJM-00070, FRP-PJM-00071, FRP-PJM-00072
RFDs/Pumps (Tag Numbers)	

Design Data

Quality Level		See Drawing	Fabrication Specs	24590-WTP-3PS-MV00-T0001		
Seismic Category		SC-I	Design Code	ASME VIII Div 1		
Service/Contents		Radioactive Liquid	Code Stamp	Yes		
Design Specific Gravity		1.46	NB Registration	Yes		
Maximum Design Volume	gal	406,800 (Note 6)	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	474,000 (Note 6)	Estimated	592,900	5,550,000 (Note 3)	4,550,000
Viscosity	cP	1.58 min / 21 max	Actual ** 10	589,800	5,370,000	4,540,000
Environmental Qualification 10		N/A				

Inside Diameter	inch	564			Wind Design	Not Required	
Length/Height (TL-TL)	inch	322			Snow Design	Not Required	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	24590-WTP-3PS-SS90-T0001 24590-WTP-3PS-MV00-T0002	
Internal Pressure	psig	ATM	15	NA	Seismic Base Moment ** 10	ft*lb	46,070,000
External Pressure	psig	0.123	2.5	NA	Post weld Heat Treat	Not Required	
Temperature	°F	215	240	NA	Corrosion Allowance	inch	0.04 (Note 11)
Min. Design Metal Temp.	°F	5			Hydrostatic Test Pressure *	psig	19.5

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	SA 240 316 (Note 2)	See Drawing	Auxiliary (Note 1)
Shell	SA 240 316 (Note 2)	See Drawing	Primary (Note 1)
Bottom Head	SA 240 316 (Note 2)	See Drawing	Primary (Note 1)
Support (Skirt)	SA 240 304 (Note 2)	See Drawing	N/A
Internals	SA 240 316 / SA 479 316 (Note 2)	See Drawing	Thermocouples Primary (Note 1)
Pipe	SA 312 TP316 Smls (Notes 2 & 7)	See Drawing	Note 1
Forgings/ Bar stock	SA 182 F316 (Note 2)	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 4
		External Finish	Welds Descaled as Laid

* As determined by the vendor. 10

** The actual weights and the seismic base moment 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. 10

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.

Note 2: Maximum carbon content of 0.030% for all welded components.

Note 3: Operating weight includes weight of liquid filled to top of overflow nozzle.

Note 4: Descale all internal welds as laid, grind smooth and blend all startsistops, high spots, and crevices, finish welds as required for NDE purposes.

Note 5: Revised PJM operating pressure and number of cycles per CCN 053810, specified content viscosity.

Note 6: Vessel volumes are approximate and do not account for manufacturing tolerances, nozzles, and displacement of internals.

Note 7: Welded pipe may be used for 14" NPS PJM supports per 24590-WTP-SDDR-PROC-03-0154.

Note 8: This vessel is located in a Black Cell.

Note 9: Contents of this document are Dangerous Waste Permit affecting (internal use only).

Note 10: Piping and piping support configurations shall be designed to preclude natural frequencies less than 7.0 Hz.

Note 11: Seller shall ensure that an additional 0.044" is available for erosion in the spherical portion of the bottom head and shall report the minimum thickness required for all specified loading conditions, exclusive of erosion and corrosion allowances. 9ND128549 9A10128105

Note 12: Revision 10 of this data sheet incorporates the CCN 129149. The CCN added the words "in the form of overblow pressures", to the note shown above the overblow loads graph and further revised the note below the graph, as noted herein on sheet 3 of 5. Added calculation 24590-PTF-MTC-FRP-00001 and Environmental Qualification on Sheet 1. Added the note identified by ** on sheet 1.

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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

Plant Item Number:	***24590-PTF-MV-FRP-VSL-00002A***
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 maximum carbon content of 0.030%***
Design Life	***40 years***
Component Function and Life Cycle Description	***This vessel receives and stores waste in a batch transfer from off-site tanks. It shall be designed to be filled to the maximum content level over a period of one day. Additionally, this vessel will be subjected to fluid dynamic forces from the operation of the pulse jet mixers during the process of suspending the solids in the waste feed. This vessel is washed down not more than once per year.***

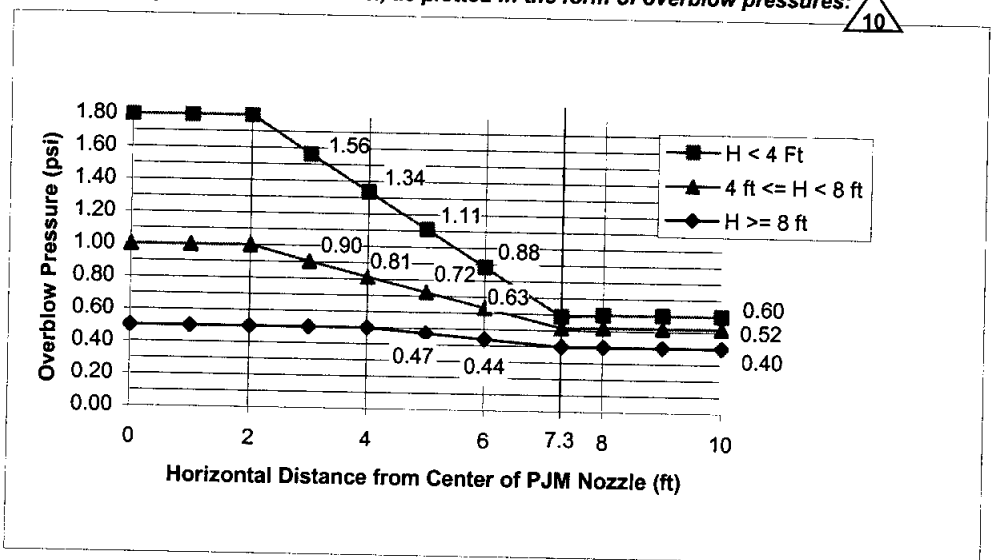
Load Type		Range		Number of Cycles	Comment
Design Pressure	psig	***-2.5***	***15***	***10***	***Nominal assumption for testing***
Operating Pressure	psig	***-0.123***	***0***	***5100***	
Operating Temperature	°F	***50***	***215***	***5100***	
Contents Specific Gravity		***1.0***	***1.46***	***5100***	
Contents Level	inch	***32***	***402***	***5100***	***Liquid level measured from crown of bottom head***
Localized Features					
Nozzles					
Supports		***Same as vessel***		***Number of cycles same as vessel***	

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.

Normal operation imposes a cyclical load ranging between -0.05 and 0.12 psi in the radial direction and -0.01 to 0.10 psi in the vertical direction for 8.0 x 10^5 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.

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: 10



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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 pulse jet mixer may overblow 1000 cycles. Reference CCN 125541 dated 07/27/05.

Notes

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

Remarks (Continued From Sheet 1)

Equipment Cyclic Data Sheet

Component Plant Item Number:	***24590-PTF-MV-FRP-PJM-00061, 24590-PTF-MV-FRP-PJM-00062, 24590-PTF-MV-FRP-PJM-00063, 24590-PTF-MV-FRP-PJM-00064, 24590-PTF-MV-FRP-PJM-00065, 24590-PTF-MV-FRP-PJM-00066, 24590-PTF-MV-FRP-PJM-00067, 24590-PTF-MV-FRP-PJM-00068, 24590-PTF-MV-FRP-PJM-00069, 24590-PTF-MV-FRP-PJM-00070, 24590-PTF-FRP-MV-PJM-00071, 24590-PTF-MV-FRP-PJM-00072***
Component Description:	***Pulse Jet Mixer Vessels (PJM)***

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 maximum carbon content of 0.030%***
Design Life	***40 years***
Component Function and Life Cycle Description	***These 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 pressure and the minimum pressure plus the external static head imposed by the parent vessel.*** ***The PJM supports shall be designed to cycle between the following loading conditions depending on the liquid level in the parent vessel:*** ***Fully Buoyant*** — ***Parent vessel full and PJM empty*** • ***Design for buoyancy + PJM thrust – PJM weight*** ***PJM Weight*** — ***Parent vessel full and PJM full or*** ***Parent vessel nearly empty and PJM empty*** • ***Design for PJM weight*** ***Fully Loaded*** — ***Parent vessel nearly empty and PJM full*** • ***Design for PJM weight + liquid weight***

Load Type		Range		Number of Cycles	Comment
Design Pressure	psig	***FV***	***80***	***10***	***Nominal assumption for testing***
Operating Pressure	psig	***FV***	***30***	***8.0 X 10^6***	***Operating pressure = 22 psig + 8 psig design margin***
Operating Temp	°F	***50***	***215***	***<100***	
Contents Specific Gravity		***1.0***	***1.46***	***<1000***	
Contents Level	inch	***Empty***	***Flooded***	***8.0 X 10^6***	
PJM Thrust	lbf	***0***	***330***	***8.0 X 10^6***	
Localized Features					
Supports		***Fully Buoyant***	***PJM Weight***	***3.31 X 10^6***	***The parent vessel is operating at greater than 75% capacity and the PJMs are cycling between empty and full for the indicated number of cycles.***
		Fully Buoyant	***Fully Loaded***	***1.38 X 10^6***	***The parent vessel is operating at between 25 and 50% capacity and the PJMs are cycling between empty and full for the indicated number of cycles.***
		PJM Weight	***Fully Loaded***	***3.31 X 10^6***	***The parent vessel is operating at less than 25% capacity and the PJMs are cycling between empty and full for the indicated number of 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 DATA SHEET: VESSEL	PLANT ITEM No. 24590-PTF-MV-FRP-VSL-00002A

Approval

Rev	Description	System Engr	Vessel Engr	Checked	Approved	Date
0	Issue for Purchase	Y. Hovanski	R. Simmons	C. Slater/CEC	S. Kirk	4/18/02
1	Revised as Noted	Y. Hovanski	R. Simmons	C. Corriveau	S. Kirk	6/02/02
2	Revised Cyclical Data	Y. Hovanski	R. Simmons	C. Slater	S. Kirk	8/29/02
3	Revised as Noted, Deleted Charge Vessels	Y. Hovanski	R. Simmons	CS / JJ	M.Hoffmann	12/13/02
4	Revised per Note 5	Y. Hovanski	R. Simmons	CS / JJ	M.Hoffmann	5/16/03
5	Revised per Note 7	Y. Hovanski	R. Simmons	CS / JJ	M.Hoffmann	11/3/03
6	Added Black Cell Requirements	R. Rider	R. Simmons	YH/CS/JJ	M. Hoffmann	4/5/04
7	Added Material Specification for Internal Supports and Hydrodynamic Loads	R. Rider	R. Simmons	YH/RT/JJ D. Adler	M. Hoffmann	6/23/04
8	Revised Hydrodynamic Loading Criteria	R. Rider	R. Simmons	YH/CS/JJ	M. Hoffmann	7/13/04
9	Revised Hydrodynamic Loading Criteria	R. Rider	R. Simmons	CS/JJ	M. Hoffmann	7/20/04
10	Revised per Note 12 on sheet 2 of 5.					10/28/05