



MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No.
24590-HLW-MV-HDH-VSL-00003



Project:	RPP-WTP	P&ID:	24590-HLW-M6-HDH-00002
Project No:	24590	Vessel Drawing	24590-HLW-MV-HDH-00003
Project Site:	Hanford		
Description:	Waste Neutralization Vessel		

Reference Data

Charge Vessels (Tag Numbers)	N/A	ISSUED BY RPP-WTP PDC
Pulsejet Mixers / Agitators (Tag Numbers)	N/A	
RFDs/Pumps (Tag Numbers)	N/A	

Design Data

Quality Level	CM	Fabrication Specs	24590-WTP-3PS-MV00-T0001		
Seismic Category	SC-III	Design Code	ASME VIII Div 1		
Service/Contents	0.5 M Cerium Nitrate, 1M Nitric Acid, 30% Hydrogen Peroxide, 5M NaOH, Demin Water	Code Stamp	Yes		
Design Specific Gravity	1.03	NB Registration	Yes		
Maximum Operating Volume	gal 4650 (Note 4)	Weights (lbs)	<u>Empty</u>	<u>Operating</u>	<u>Test</u>
Total Volume	gal 5315 (Note 4) actual	Estimated	17,500	58,000	62,000
Environmental Qualification	N/A	Actual *			

Inside Diameter	inch	84	Wind Design	None	
Length/Height (TL-TL)	inch	204	Snow Design	None	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design
					24590-WTP-3PS-MV00-T0002 24590-WTP-3PS-FB01-T0001
Internal Pressure	psig	Atm	15	N/A	Seismic Base Moment * ft*lb
External Pressure	psig	5.8	FV	N/A	Postweld Heat Treat None
Temperature	°F	122	237	N/A	Corrosion Allowance Inch 0.04
Min. Design Metal Temp.	°F	59			Hydrostatic Test Pressure * psig

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	SA-240 304 (Note 2)	See Drawing	Auxiliary
Shell	SA-240 304 (Note 2)	See Drawing	Primary
Bottom Head	SA-240 304 (Note 2)	See Drawing	Primary
Support	SA-240 304 (Note 2)	See Drawing	N/A
Jacket/Coils/Half-Pipe Jacket	SA-240 304 (Note 2)	See Drawing	N/A
Internals	SA-240 304 (Note 2)	See Drawing	Thermowells Primary
Pipe	SA-312 TP304 (Note 2)	See Drawing	Note 1
Forgings/ Bar stock	SA-182 F304 (Note 2)	See Drawing	N/A
Bolting/Gaskets	SA193 B8 CLASS 2, SPIRAL WOUND GRAPHITE FILLED	N/A	N/A

Miscellaneous Data

Orientation	Vertical	Support Type	Skirt
Insulation Function	Not Applicable	Insulation Material	Not Applicable
Insulation Thickness (inch)	Not Applicable	Internal Finish	Note 3
		External Finish	Note 3

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

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Remarks

* To be determined by the vendor.

Note 1: Nozzle necks below max. operating level are primary, others auxiliary.

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

Note 3: Welds descaled as laid.

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

Notes 5 through 8: Deleted \triangle ₅

Note 9: Contents of this document are dangerous waste permit affecting.

Note 10: Revision 5 Add radionuclide disclaimer and EN&S review check box. Updated heat transfer summary. \triangle ₅

Equipment Cyclic Data Sheet

Component Plant Item Number:	HDH-VSL-00003
Component Description	Parent Vessel
<i>The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.</i>	
Materials of Construction	SA-240-304 with 0.030 % carbon.
Design Life	40 Years
Component Function and Life Cycle Description	The parent vessel is cyclically loaded and discharged in batch operation. In each batch operation, 2,037 gallons of liquid content is loaded and discharged.

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	FV	15	10	Nominal assumption
Operating Pressure	psig	-5.8	0	14600	
Operating Temperature	°F	59	212	14600	
Contents Specific Gravity		1.03	1.18	14600	
Contents Level	inch	14	192	14600	
Localized Features					
Nozzles N06/N06A, N07/N07A, N29/N29A, N30/N30A		59	212	Cycles: 87,600 (6 per day, 1 hour each cycle) Assume vessel temperature is at 59° F	
Nozzle Loads		Nozzles shall be designed or reinforced to meet the Loads in 24590-WTP-3PS-MV00-T0001, Table A-2			

Notes for Cyclic Data

- **Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.**
- **Nozzles N06/N06A, N07/N07A, N29/N29A, N30/N30A, and associated piping connected to ejectors shall be fatigue assessed/analyzed for pressure/temperature cycles over 40 years from 0 psig at 59°F to 109 psig at 358°F temperature. The pressure cycles shall coincide with temperature cycles.**
- **Nozzles N04, N32, are spares**
- **Heat Transfer summary for vessel: \triangle ₅**
 - A. Cell Ambient Temperature: Min. 59° F, Max. 95° F**
 - B. Only one ejector can operate at a time due to system limitations, steam rack only supports one ejector.**



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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 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.

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

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Approval

Rev	Description	Vessel Engr	Checker	System Engr	E&NS	Reviewer	Approval	Date
0	Issued for Purchase	C. Slater	T. Galioto/ C. Slater	K. Minton	N/A	D. Yarbrough	M. Hoffmann	01/22/04
1	Issued for Supplemental Information to Vendor	B. Balakrishnan	T. Galioto/ C. Slater	U. Olivas	N/A	J. Rouse/ E. Isern	M. Hoffmann	11/30/04
2	Issued for Supplemental Information to Vendor	S. L. Lee	S. Cross/ C. Slater	U. Olivas	N/A	R. Peters/ E. Isern/ D. Adler	M. Hoffmann	04/11/05
3	Revised as Noted	S. L. Lee	R. Peter	S. Cross	N/A	E. Isern	M. Hoffman	5/27/05
4	Revised as Noted Incorporated 24590-HLW-MVN-HDH-00009 24590-WTP-M6N-M80T-00002 24590-WTP-M6N-M80T-00005	R. Wight	M. Seed	M. Kufahl	B. Dubiel	J. Julyk	J. Julyk	10/26/10
5	Revised as Noted	R. Wight <i>R. Wight</i>	M. Seed <i>M. Seed</i>	R. Peters <i>R. Peters</i>	B. Dubiel <i>B. Dubiel</i>	NA	D. Wilsey <i>D. Wilsey</i>	5/6/11

Attachment 1: Page 1 of 2

REFERENCES for Data Sheet: 24590-HLW-MVD-HDH-00003, Rev. 5

(For BNI Use Only)

Component Tag No(s): 24590-HLW-MV-HDH-VSL-00003

Data	Document #	Rev	Document Title
Quality Level	24590-HLW-M6-HDH-00002	4	<i>P&ID HLW Canister Decontamination Handling System (CM)</i>
Seismic Category	24590-HLW-M6-HDH-00002	4	<i>P&ID HLW Canister Decontamination Handling System (III)</i>
	24590-WTP-PSAR-ESH-01-002-04	04S	<i>Preliminary Documented Safety Analysis; HLW Facility Specific Information (Table 3A-10)</i>
Design Specific Gravity	24590-HLW-M4C-HDH-00001 (See Note 2)	2	<i>HLW Canister Decontamination Mass and Heat Balance (1.03) - Table 8.6, Stream 20</i>
Total Volume	24590-CM-POA-MVA0-00018-01-00002	00D	<i>COMPRESS Pressure Vessel Design Calculations (5315 gallons) p. 206</i>
Operating Volume	24590-HLW-M6C-HDH-00001	C	<i>HLW Waste Neutralization Vessel HDH-VSL-00003 Sizing Calculation (4650 gal)</i>
Inside Diameter	24590-HLW-M6C-HDH-00001	C	<i>HLW Waste Neutralization Vessel HDH-VSL-00003 Sizing Calculation (7')</i>
Length TL-TL	24590-HLW-MV-HDH-00003	1	<i>Equipment Assembly Waste Neutralization Vessel HDH-VSL-00003</i>
Design Pressure (internal & external)	24590-HLW-MVC-30-00001	B	<i>HLW Vessel Cyclic Datasheet Inputs (internal 1: external FV)</i>
Operating Pressure (internal & external)	24590-HLW-MVC-HDH-00005	A	<i>HDH Vessel and Tank Process data (external -5.8 psi: internal ATM)</i>
Operating Temp	24590-HLW-M4C-HDH-00001	1	<i>HLW Canister Decontamination Mass and Heat Balance (122.3 dF)</i>
Design Temp (max)	24590-WTP-GPG-M-017	8	<i>Design Parameters & Test Pressures for Equipment & Piping (Section 3.2 Operating Temperature + 25°F is 237°F)</i>
	24590-HLW-MVC-30-00001	B	<i>HLW Vessel Cyclic Datasheet Inputs (internal 1: external FV)</i>
Design Temp (min)	24590-WTP-DB-ENG-01-001	1P	<i>Basis of Design (59°F)</i>
Corrosion Allowance, Erosion allowance	24590-HLW-N1D-HDH-00005	4	<i>Corrosion Evaluation (0.04)</i>
Materials of Construction	24590-HLW-N1D-HDH-00005	4	<i>Corrosion Evaluation (304, Max 0.030% C)</i>
Cyclic Data (Vessel)	24590-HLW-MVC-30-00001 (See Note 2)	B	<i>HLW Vessel Cyclic Datasheet Inputs</i>
Nozzle Loads	24590-WTP-3PS-MV00-T0001	4	<i>Pressure Vessel Design and Fabrication, Section 3.7 and Table A-2</i>
Nozzle Design Temperatures and Pressures	24590-HLW-MVC-30-00001	B	<i>HLW Vessel Cyclic Datasheet Inputs</i>
	24590-HLW-M6X-HDH-00004	4	<i>Line List for 24590-HLW-M6-HDH-00002, Rev. 4</i>
Process Chemicals	24590-HLW-MVC-HDH-00005	4	<i>HDH Vessel and Tank Process Data Calculation</i>
Ejector Transfers/Steam Rack	24590-HLW-J3-HDH-00001 thru 00015 and 01001 thru 01010	0	<i>HDH System Logic Diagrams</i>
Cell Ambient Temperature	24590-HLW-U0D-W16T-00001	1	<i>HLW Room EEQ Data</i>

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REFERENCES for Data Sheet: 24590-HLW-MVD-HDH-00003, Rev. 5

Component Tag No(s): 24590-HLW-MV-HDH-VSL-00003

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Notes:

Note 1: Wind and snow design do not apply. This vessel is located in room H-B035, at the -14' level of the High Level Waste Facility.

Note 2: The specific gravity for cyclic data is taken from the cyclic data calculation dated 2007. The value of 1.18 is conservative and will be used for cyclic evaluation. The Mass and heat balance for the system 24590-HLW-M4C-HDH-00001 dated December 2010 shows that 83 gallons of 5M sodium hydroxide at 1.19 specific gravity is added to 2000 gallons of neutralizing waste in the last process step, resulting in a specific gravity of 1.03. This more accurate number is used for design specific gravity.