



R10977392

**MECHANICAL DATA SHEET: HEME**

PLANT ITEM No.

**24590-HLW-MV-HOP-HEME-00001 (A&B); 24590-HLW-MV-HOP-HEME-00002 (A&B)**

ISSUED BY  
RPP-WTP-PDC

Project:	<b>RPP-WTP</b>	P&ID:	<b>24590-HLW-M6-HOP-00009, 20009</b>	5
Project No:	<b>24590</b>	Process Data Sheet:	<b>Deleted</b>	
Project Site:	<b>Hanford</b>	Vessel Drawing:	<b>24590-HLW-MV-HOP-00002001, 2002, 2003</b>	5
		Calculation:	<b>HLW-M4C-HOP-00011, HLW-M4C-30-00003, HLW-MKC-HOP-00011</b>	
Description:	<b>HLW Primary Offgas HEME</b>			

**Reference Data**

Charge Vessels (Tag Numbers)	<b>None</b>
Pulsejet Mixers / Agitators (Tag Numbers)	<b>None</b>
RFDs/Pumps (Tag Numbers)	<b>None</b>

**Design Data**

Quality Level	<b>Q (Note 6)</b>		Fabrication Specs	<b>24590-WTP-3PS-MV00-T0001; See Notes 9 &amp; 10</b>			5
Seismic Category	<b>SC III</b>		Design Code	<b>ASME VIII Div 1, (See Notes 3 &amp; 4)</b>			
Service/Contents	<b>Radioactive Mist &amp; Particulate</b>		Code Stamp	<b>Yes</b>			
Design Specific Gravity	<b>1</b>		NB Registration	<b>Yes</b>			
Maximum Operating Volume	gal	<b>0</b>	Weights (lbs)	<u>Empty</u>	<u>Operating</u>	<u>Test</u>	
Total Volume	gal	<b>2349</b>	Estimated	<b>37,690</b>	<b>37,690</b>	<b>57,615</b>	
Environmental Qualification	<b>See Attachment 1</b>		Actual *				

Inside Diameter	inch	<b>66</b>	Wind Design	<b>N/A</b>					
Length/Height (TL-TL)	inch	<b>146</b>	Snow Design	<b>N/A</b>					
			Seismic Design	<b>24590-WTP-3PS-MV00-T0002</b>					
Internal Pressure	psig	<b>ATM</b>	Vessel Operating	<b>15</b>	Coil/Jacket Design	<b>N/A</b>	Seismic Base Moment *	ft*lb	
External Pressure	psig	<b>4</b>	Vessel Design	<b>FV</b>		<b>N/A</b>	Postweld Heat Treat	<b>Not Required</b>	
Temperature	°F	<b>117</b>		<b>200</b>		<b>N/A</b>	Corrosion Allowance	Inch	<b>0.04</b>
Min. Design Metal Temp.	°F	<b>32</b>					Hydrostatic Test Pressure *	psig	
Dangerous Waste Permit Affecting		<b>Yes</b>							

**Materials of Construction**

Component	Material	Minimum Thickness / Size	Containment
Top Head	<b>SB 688 (N08367)</b>	<b>See Drawing</b>	<b>Primary</b>
Shell	<b>SB 688 (N08367)</b>	<b>See Drawing</b>	<b>Primary</b>
Bottom Head	<b>SB 688 (N08367)</b>	<b>See Drawing</b>	<b>Primary</b>
Support	<b>SA 240 304 (Note 2)</b>	<b>See Drawing</b>	<b>N/A</b>
Jacket/Coils/Half-Pipe Jacket	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
Internals	<b>SB 688/SB 462/SB 690 (N08367)</b>	<b>See Drawing</b>	<b>N/A</b>
Pipe *	<b>SB 690 or SB 675 (N08367)</b>	<b>See Drawing</b>	<b>Primary</b>
Forgings/ Bar stock	<b>SB 564 or SB 366 (N08367)</b>	<b>See Drawing</b>	<b>N/A</b>
Gaskets	<b>EPDM</b>	<b>N/A</b>	<b>N/A</b>
Bolting	<b>See drawing</b>	<b>N/A</b>	<b>N/A</b>

\* 10" diameter pipe can be procured as SB688-86 with dimensional specifications in accordance with SA358-83 per 24590-WTP-SDDR-M-05-00446.

**Miscellaneous Data**

Orientation	<b>Vertical</b>	Support Type	<b>Skirt</b>
Insulation Function	<b>None</b>	Insulation Material	<b>None</b>
Insulation Thickness (inch)	<b>None</b>	Internal Finish	<b>Welds descaled as laid</b>
		External Finish	<b>Welds descaled as laid</b>



**MECHANICAL DATA SHEET: HEME**

PLANT ITEM No.

**24590-HLW-MV-HOP-HEME-00001 (A&B); 24590-HLW-MV-HOP-HEME-00002 (A&B)**

**Remarks**

\* To be determined by the vendor.  
**Note 1: Deleted.**  
**Note 2: SA 240 304 stainless steel material shall have carbon content of 0.030% maximum. Non-welded items are excluded from this requirement.**  
**Note 3: PUREX nozzles are excluded from the scope of ASME Code Section VIII, Division 1 in accordance with paragraph U-1 (e)(1).**  
**Note 4: Piping systems connected to the SBS will meet leakage requirements per ASME B31.3 paragraph 319.1.1(b).**  
**Note 5: Deleted.**  
**Note 6: Vessel to be designed and fabricated to L-2 requirements defined in 24590-WTP-3PS-MV00-T0001.**  
**Note 7: 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.**  
**Note 8: Renumbered Note 8 in Rev. 4 to describe changes, deleted reference to process data sheets, added calculation numbers, added dangerous waste affecting block, provided references for Notes 9 & 10, added revision triangle to footnote for Materials of Construction, added reference for vendor submittal affected by 24590-WTP-SDDR-PROC-05-00235, and updated reference for safety function on EQ data sheet.**

\* **Note 9: The nozzle loads for N01 and N02 are as follows per 24590-WTP-SDDR-PROC-05-00235 and included in vendor submittal 24590-QL-POA-MV00-00005-04-00005:**



Jumper Pipe Size	Load Type	Forces			Moments		
		Fx (lb)	Fy (lb)	Fz (lb)	Mx (ft -lb)	My (ft-lb)	Mz (ft-lb)
N01 & N02	Weight	361	578	361	2210	1380	1380
	Seismic	513	656	1109	2655	1932	1626
	Thermal @ 200 °F	519	622	859	2540	2180	1540
	Thermal @ 117 °F	186	166	250	915	788	554

\* **Note 10: Use the following nozzle loads in lieu of the nozzle loads specified in 24590-WTP-3PS-MV00-T0001 per CCN 172654 (see 24590-WTP-3PS-MV00-T0001 for axis orientation):**



**Minimum Nozzle Forces and Moments Due to HLW Jumpers at Jumper Connection (CCN172654):**

Jumper Pipe Size	Load Type	Forces			Moments		
		Fx (lb)	Fy (lb)	Fz (lb)	Mx (ft -lb)	My (ft-lb)	Mz (ft-lb)
2 in	Weight	30	150	30	100	20	100
	Seismic	100	140	100	225	200	225
	Thermal	200	80	200	250	200	250

**Equipment Cyclic Data Sheet**

Plant Item Number:	<b>24590-HLW-MV-HOP-HEME-00001 (A&amp;B); 24590-HLW-MV-HOP-HEME-00002 (A&amp;B)</b>
Component Description	<b>Vessel</b>
<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	<b>SB 688 N08367 (6% Mo alloy)</b>
Design Life	<b>40 Years</b>



**MECHANICAL DATA SHEET: HEME**

PLANT ITEM No.  
**24590-HLW-MV-HOP-HEME-00001 (A&B); 24590-HLW-MV-HOP-HEME-00002 (A&B)**

Component Function and Life Cycle Description	<i>The HEME is a semi-passive device designed for removal of radioactive mists and dissolved solids from the melter offgas. Removal is accomplished by flowing the offgas through a glass fiber filter bed. The operation is basically steady state with the exception of routine maintenance periods. Routine maintenance would be the change out of a Melter. This is expected to occur every 5 years. During the change out the HEME's would be isolated and allowed to remain at ambient temperature (59 - 113 ° F). Cyclic data included herein is more conservative and bounding than data included in 24590-HLW-MVC-30-00001.</i>
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Load Type	Min	Max	Number of Cycles	Comment
Design Pressure      psig	<b>FV</b>	<b>15</b>	<b>0</b>	<b>No known mechanism to pressurize</b>
Operating Pressure      psig	<b>-4</b>	<b>0</b>	<b>50</b>	<b>Maximum pressure excursion in 5 years (isolating and opening up vessel)</b>
Operating Temperature      °F	<b>70</b>	<b>200</b>	<b>50</b>	<b>Maximum temperature excursions in 5 years (switch over to bypass line). Normal operating temperature is 117 °F.</b>
Contents Specific Gravity	<b>1</b>	<b>1</b>	<b>10</b>	<b>Maximum fill and drain events in 5 years.</b>
Contents Level      inch	<b>0</b>	<b>169</b>	<b>20</b>	
<b>Localized Features</b>	Temperature Range (°F)		Number of Cycles / Comment	
N/A				

**Notes**

- **Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.**
- **The total volume is approximate and does not account for manufacturing tolerances, nozzles, and displacement of internals.**

Safety Screening/Evaluation Required? If yes per 24590-WTP-GPP-SREG-002, E&NS Signature below	Yes	<b>X</b>	No
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**Approval**

Rev	Description	System Engr	Vessel Engr	Checked	E&NS	Approved	Date
<b>0</b>	<b>Issued for Purchase</b>	M.S.	M.A.	W.D. C.S.	N/A	W.E. M.H.	4/18/03
<b>1</b>	<b>Issued for Purchase</b>	R. Peters	M. Arampalam	M. Studd	N/A	J. Pullen	4/1/04
<b>2</b>	<b>Issued for Purchase; Incorporates 24590-WTP-SDDR-PROC-05-00316</b>	R. Peters	M. Arampalam	R. Casassa	N/A	J. Pullen	6/24/05
<b>3</b>	<b>Issued for Purchase; added EEQ data, DWP affecting, NDE requirements</b>	M. O'Neil	R. Peters	S. Jain	C. Meng	J. Julyk	1/29/08
<b>4</b>	<b>Added jumper loads for 2" diameter nozzles, Notes 7 &amp; 8 and incorporated SDDR 24590-WTP-SDDR-PROC-05-00235</b>	M. O'Neil	R. Peters	M. Seed	C. Meng	J. Julyk	6/16/08
<b>5</b>	<b>See Note 8.</b>	A. Coulam <i>AC</i>	R. Peters <i>R.PETERS</i>	M. Seed <i>M.Seed</i>	C. Meng <i>CMeng</i>	J. Julyk <i>J Julyk</i>	10/21/08



**RIVER PROTECTION PROJECT – WASTE TREATMENT PLANT**

**EQUIPMENT QUALIFICATION DATA SHEET**

FOR

**HLW High Efficiency Mist Eliminators (HEMEs)**

**Attachment 1**



**EQUIPMENT QUALIFICATION  
DATA SHEET (from 24590-HLW-UOD-  
W16T-00001 Rev. 0 and as noted)**

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24590-HLW-MVD-HOP-  
00007 Rev 5

**Equipment Identification**

Tag Numbers	24590-HLW-MV-HOP-HEME-00001 (A&B); 24590-HLW-MV-HOP-HEME-00002 (A&B)	Safety Classification	<input type="checkbox"/> SC <input type="checkbox"/> SDC <input checked="" type="checkbox"/> SS
Manufacturer	GE-Hitachi		<input type="checkbox"/> SDS <input type="checkbox"/> RRC <input type="checkbox"/> APC
Model	N/A		
Description	The High Efficiency Mist Eliminators (HEMEs) are particulate removal filters located at column lines J - 9 and J - 14 at El. 0' - 0".	Seismic Category	<input type="checkbox"/> SC-I <input type="checkbox"/> SC-II <input checked="" type="checkbox"/> SC-III <input type="checkbox"/> SC-IV
Safety Function(s)	The HEME is safety significant for confinement only (24590-WTP-PSAR-ESH-01-002-04 Rev. 4, page 4.4-7).		

Seismic Safety Function  Yes    No      Maintenance Accessible    Yes    No

Operability Requirements (DBE):    During DBE                       After DBE                       None

Passive Mechanical                            Active Mechanical                            Electrical                     

**Equipment Environmental Qualification (EEQ)**

(EEQ data is bounding for HEMEs located in Melter Cave No. 1 (Room No. H-0117) and Melter Cave No. 2 (Room No. H-0106))

Environment	<input checked="" type="checkbox"/> Mild <input type="checkbox"/> Harsh	<input checked="" type="checkbox"/> Accessible <input type="checkbox"/> Inaccessible	Design Life (yrs) <input checked="" type="checkbox"/> 40 <input type="checkbox"/> Other _____	
Parameter	Specified (BUYER)	Design (SELLER)	Report Number (SELLER)	WTP Document Number (BUYER)
<b>Normal (Design Life)</b>				
Normal High Temperature (°F)	113	200	24590-QL-POA-MV00-00005-04-00006 Rev. 00D	24590-WTP-DB-ENG-01-001 Rev. 01I
Normal Low Temperature (°F)	59	32	24590-QL-POA-MV00-00005-04-00006 Rev. 00D	24590-WTP-DB-ENG-01-001 Rev. 01I
Normal High Relative Humidity (%RH)	100	N/A	N/A	Note 1
Normal Low Relative Humidity (%RH)	5	N/A	N/A	Note 1
Normal High Pressure (in - w.c.) <sup>8</sup>	0	415.2	24590-QL-POA-MV00-00005-04-00006 Rev. 00D	24590-WTP-DB-ENG-01-001 Rev. 01I
Normal Low Pressure (in - w.c.) <sup>8</sup>	-1.4	FV	24590-QL-POA-MV00-00005-04-00006 Rev. 00D	24590-WTP-DB-ENG-01-001 Rev. 01I



## EQUIPMENT QUALIFICATION DATA SHEET

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00007 Rev 5

### Equipment Environmental Qualification (EEQ) (cont.)

Parameter	Specified (BUYER)	Design (SELLER)	Report Number (SELLER)	WTP Document Number (BUYER)
Normal Radiation Dose Rate (mRad/hr)	Note 4	4.54E+04	N/A	2X the dose rate at 20 ft. in Table 7-5 of 24590-HLW-ZOC-30-00011 Rev. C since there are two vessels.
Vibration Magnitude (g)	N/A	N/A	N/A	N/A
Vibration Frequency (Hz)	N/A	N/A	N/A	N/A
<b>Abnormal</b>				
Abnormal High Temperature (°F)	170	200	24590-QL-POA-MV00-00005-04-00006 Rev. 00D	24590-HLW-MAE-C5V-00001 Rev. N/A
Abnormal Low Temperature (°F)	40	32	24590-QL-POA-MV00-00005-04-00006 Rev. 00D	24590-HLW-MAE-C5V-00001 Rev. N/A
Duration Temperature (hr/yr)	8	Note 5	N/A	24590-HLW-ZOC-30-00016 Rev. 00B
Abnormal High Relative Humidity (%RH)	100	N/A	N/A	24590-HLW-MAE-C5V-00001 Rev. N/A
Abnormal Low Relative Humidity (%RH)	2	N/A	N/A	24590-HLW-MAE-C5V-00001 Rev. N/A
Duration Relative Humidity (hr/yr)	438	N/A	N/A	24590-HLW-ZOC-30-00016 Rev. 00B
Abnormal High Pressure (in - w.c.) <sup>8</sup> 	4	415.2	24590-QL-POA-MV00-00005-04-00006 Rev. 00D	24590-HLW-MAE-C5V-00001 Rev. N/A
Abnormal Low Pressure (in - w.c.) <sup>8</sup> 	-6.7	FV	24590-QL-POA-MV00-00005-04-00006 Rev. 00D	24590-HLW-MAE-C5V-00001 Rev. N/A
Duration Pressure (hr)	N/A	Note 6	N/A	N/A
Abnormal Radiation Dose Rate (mRad/hr)	Note 4	4.54E+04	N/A	2X the dose rate at 20 ft. in Table 7-5 of 24590-HLW-ZOC-30-00011 Rev. C since there are two vessels.
Duration Radiation Dose Rate (yr)	Note 4	40	N/A	24590-HLW-MVD-HOP-00007 Rev.3
Fire Sprinkler Exposure	Note 2	N/A	N/A	24590-WTP-SRD-ESH-01-001-02 Rev. 04K



## EQUIPMENT QUALIFICATION DATA SHEET

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Design Basis Events (DBE)				
DBE High Temperature (°F)	165	200	24590-QL-POA-MV00-00005-04-00006 Rev.	24590-HLW-MAE-C5V-00001 Rev. N/A
DBE Low Temperature (°F)	40	32	24590-QL-POA-MV00-00005-04-00006 Rev.	24590-HLW-MAE-C5V-00001 Rev. N/A
Duration Temperature (hr)	1,000	Note 5	N/A	24590-SE-ENS-07-0113 Rev. 0
DBE High Relative Humidity (%RH)	100	N/A	N/A	24590-HLW-MAE-C5V-00001 Rev. N/A
DBE Low Relative Humidity (%RH)	2	N/A	N/A	24590-HLW-MAE-C5V-00001 Rev. N/A
Duration Relative Humidity (hr)	1,000	N/A	N/A	24590-SE-ENS-07-0113 Rev. 0
DBE High Pressure (in - w.c.) <sup>8</sup> 	4	415.2	24590-QL-POA-MV00-00005-04-00006 Rev. 00D	24590-HLW-MAE-C5V-00001 Rev. N/A
DBE Low Pressure (in - w.c.) <sup>8</sup> 	-6.7	FV	24590-QL-POA-MV00-00005-04-00006 Rev. 00D	24590-HLW-MAE-C5V-00001 Rev. N/A
Duration Pressure (hr)	1,000	Note 6	N/A	24590-SE-ENS-07-0113 Rev. 0
DBE Duration Radiation Dose Rate (mR/hr)	Note 4	4.54E+04	N/A	2X the dose rate at 20 ft. in Table 7-5 of 24590-HLW-ZOC-30-00011 Rev. C since there are two vessels.
Submergence Depth (ft)	1.8	N/A	N/A	24590-HLW-M0C-30-00023 Rev. A
Spray Exposure	Note 3	N/A	N/A	N/A
Chemical Exposure Details				
Chemicals and Concentration	<ul style="list-style-type: none"> <li>o Nitric line used for maintenance only and normally inactive.</li> <li>o HEMEs unaffected by glass formers since they are 20 ft. from feed vessel.</li> </ul>			
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)	N/A			
Mounting Method (bolts, welds, etc.)	Anchor bolts.			
Auxiliary Devices	N/A			



**EQUIPMENT QUALIFICATION  
DATA SHEET**

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**Equipment Seismic Qualification (ESQ)**

Parameter	Title	Version	Reference	Remarks
WTP Seismic Design Specification (BUYER)	Engineering Specification for Seismic Qualification Criteria for Pressure Vessels	Rev. 2	24590-WTP-3PS-MV00-T0002	
Specified Seismic Load (BUYER)	Structural Design Loads for Seismic Category III & IV Equipment & Tanks	Rev. 2	24590-WTP-3PS-FB01-T0001	
Design Seismic Load (SELLER)	$W_{total} = -37415 \text{ lbs. (max. down)}$ $= +1344 \text{ lbs. (max. up)}$ $M_{tipping} \text{ (total)} = 3.722 \times 10^6 \text{ in.-lbs}$	N/A	24590-QL-POA-MV00-00005-06-01 Rev. 00E	See p. 22.
Qualification Method (SELLER)	Uniform Building Code	UBC-97	N/A	
Qualification Report Number (SELLER)	1.) HEME Pressure Vessel Seismic Data Report 2.) Structural Integrity Calculation for HEME Mounting Base	1.) Rev. 00C 2.) Rev. 00E	1.) 24590-QL-POA-MV00-00005-04-02 2.) 24590-QL-POA-MV00-00005-06-01	

**Notes and Additional Information**

- Note 1: Normal relative humidity not controlled.
- Note 2: App. K. Automatic fire suppression not required.
- Note 3: There is no spray source present normally.
- Note 4: The vessel components and fiberglass media must be compatible with the dose rate. The EPDM gaskets may be replaced as needed on a maintenance plan basis.
- Note 5: The temperature duration for the abnormal temperature is bounded by the vessel design temperature (200°F).
- Note 6: The pressure duration for the abnormal pressure is bounded by the vessel design pressure (415.2 in-wc).
- Note 7: BNI (BUYER) shall perform Equipment Environmental Qualification in accordance with 24590-WTP-DC-ENG-06-001, Design Criteria for Equipment Seismic and Environmental Qualification.
- Note 8: 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.).