



# MECHANICAL SYSTEMS DATA SHEET: SBS

PLANT ITEM No. R10306118

24590-HLW-MK-HOP-SCB-00001  
24590-HLW-MK-HOP-SCB-00002

Project	<b>RPP-WTP</b>	P&ID.	<b>24590-HLW-M6-HOP-P0001</b>
Project No	<b>24590</b>	Process Data Sheet	<b>Deleted</b>
Project Site	<b>Hanford</b>	Vessel Drawing	<b>24590-HLW-MK-HOP-P0001001,1002,1003,1004</b>
Description	<b>HLW Submerged Bed Scrubber</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>

ISSUED BY  
RPP-WTP END  
4/21/04  
INT JDATE

### Design Data

Quality Level	<b>QL-2</b>	Fabrication Specs	<b>24590-WTP-3PS-MV00-TP001</b>		
Seismic Category	<b>SC-2 (Note 1)</b>	Design Code	<b>ASME VIII Div 1 (See Note 13)</b>		
Service/Contents	<b>Radioactive Liquid</b>	Code Stamp	<b>Yes</b>		
Design Specific Gravity	<b>1.1</b>	NB Registration	<b>Yes</b>		
Maximum Operating Volume	gal <b>3,249</b>	Weights (lbs)	Empty	Operating	Test
Total Volume	gal <b>4,516</b>	Estimated	<b>50,790</b>	<b>81,900</b>	<b>88,490</b>
		Actual *			

Inside Diameter	inch	<b>120</b>			Wind Design	<b>NIA</b>
Length/Height (TL-TL)	inch	<b>69</b>			Snow Design	<b>NIA</b>
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	<b>24590-WTP-3PS-MV00-TP002 24590-WTP-3PS-SS90-T0001</b>
Internal Pressure	psig	<b>ATM</b>	<b>15</b>	<b>65</b>	Seismic Base Moment *	ft*lb
External Pressure	psig	<b>3.6</b>	<b>3.6</b>	<b>-</b>	Postweld Heat Treat	<b>Per Code</b>
		<b>(Note 3)</b>	<b>(Note 4)</b>			
Temperature	°F	<b>212</b>	<b>237</b>	<b>237</b>	Corrosion Allowance	Inch <b>0.08 (Note 7)</b>
		<b>(Note 3)</b>	<b>(Note 4)</b>			
Min. Design Metal Temp	°F	<b>41</b>			Hydrostatic Test Pressure *	psig

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.



EXPIRES 12/10/04

This bound document contains a total of 4 sheets

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**Materials of Construction**

Component	Material	Minimum Thickness / Size	Containment
Top Head	<b>SB575 N06022</b>	<b>See Drawing</b>	<b>Auxiliary</b>
Shell	<b>SB575 N06022</b>	<b>See Drawing</b>	<b>Primary</b>
Bottom Head	<b>SB575 N06022</b>	<b>See Drawing</b>	<b>Primary</b>
Support	<b>SA240 304 (Note 5)</b>	<b>See Drawing</b>	<b>N/A</b>
Internal Coils/External Jacket	<b>SB622 N06022/ SA312 304 (Note 5)</b>	<b>See Drawing</b>	<b>N/A</b>
Internals	<b>SB575 N06022 / SB622 N06022 (Note 6)</b>	<b>See Drawing</b>	<b>Thermowell Primary</b>
Pipe	<b>SB622 N06022</b>	<b>See Drawing</b>	<b>Note 8</b>
Forgings/ Bar stock	<b>SB564 N06022</b>	<b>See Drawing</b>	<b>N/A</b>
Gaskets	<b>EPDM (Note 12)</b>	<b>N/A</b>	<b>N/A</b>
Bolting	<b>SA193 Grade B16</b>	<b>N/A</b>	<b>N/A</b>

**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>

**Notes**

\* To be determined by the vendor.

**Note 1 : Due to the close proximity of SBS Column & Jumpers to the Feed Vessels, SC-2 is assumed in order to protect the Hydrogen Mitigation System.**

**Note 2 : Design of shell & head under jacket is to be based on 65 psig internal jacket pressure plus 3.6 psi internal vacuum on main vessel.**

**Note 3 : The vessel normally operates at 140 °F, however, operating fluctuations can allow it to reach 212 °F.**

**Note 4 : To consider upset condition, the top head cover & top head flange shall be designed to 1250 °F & 945 °F respectively.**

**Note 5 : SA240 304 & SA312 304 stainless steel material shall have carbon content of 0.030% maximum. Non welded items are excluded from this requirement.**

**Note 6 : Internal fasteners shall be of alloy N06022 material.**

**Note 7 : Corrosion allowance of 0.01 inch shall be applied to external surfaces of shell & head exposed to cooling fluid of jacket.**

**Note 8 : Nozzle necks below the high operating liquid level are primary, the others are auxiliary.**

**Note 9 : This vessel has an internal removable bed or column. This bed has different operating characteristics than the vessel and is noted in the localized features section on sheet 3.**

**Note 10 : The internal coils operating pressure is 50 psig and maximum operating temperature is 94 °F.**

**Note 11 : The bed packing material is ceramic spheres 1" diameter and weigh 115 lb/ft<sup>3</sup>.**

**Note 12 : Gasket material to be confirmed at a later date.**

**Note 13: PUREX nozzles are excluded from the scope of ASME Code Section VIII, Division 1 in accordance with paragraph U-1 (e)(1).**



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**Equipment Cyclic Data Sheet**

Component Plant Item Number:	
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>SB575 N06022 (Hastelloy C -22)</b>
Design Life	<b>40 years</b>
Component Function and Life Cycle Description	<p><b>The SBS is a semi-passive device designed for aqueous scrubbing of entrained radioactive particulate from the melter offgas. It also serves to cool and condense the melter vapor emissions.</b></p> <p><b>Melter offgas is nominally cooled from 392 °F while feeding (from 752 °F when idled) to 122 °F. Operation within and between these two modes are the predominate conditions the vessel encounter.</b></p> <p><b>Design parameters for the cooling coils is to cool the offgas from 392 °F to a maximum of 140 °F.</b></p> <p><b>Occasional process upsets will direct undiluted offgas to the SBS at temperatures near 1250 °F, where the SBS will cool the gases to 140 °F.</b></p> <p><b>Non-routine maintenance is expected to occur annually. During this period the SBS will be allowed to cool and remain at ambient temperature, from 41 to 100 °F.</b></p>



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Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	<b>-3.6</b>	<b>15</b>	<b>8</b>	<b>Nominal assumption</b>
Operating Pressure	psig	<b>-2.2</b>	<b>0</b>	<b>40</b>	<b>Bed min. -.36, max. 0. Assume an annual shutdown (40 cycles/life time).</b>
Operating Temperature	°F	<b>104</b>	<b>140</b>	<b>Infinite</b>	<b>Normal operating range</b>
Contents Specific Gravity		<b>1</b>	<b>1.1</b>	<b>40</b>	<b>Nominal operating is 1.1, assume annual flush out and replace with clean water.</b>
Contents Level	inch	<b>Empty</b>	<b>57</b>	<b>120</b>	<b>Nominal operating is 57 inch, assume annual 3x flush out and replace with clean water.</b>
<b>Localized Features</b>					
Nozzle (N11) & Top Head Cover		<b>41   392   752   1250</b>		<p><b>Assume normal mode is feeding (392), with 40 cycles to upset (1250) and back to idle (752).</b></p> <p><b>Assume normal mode is feeding (392) with 2100 cycles to idle (752) and back to feeding.</b></p> <p><b>Assume mode is idle (752) with 40 cycle of trip to upset (1250), and return to idle (752).</b></p> <p><b>Assume mode is idle (752) with 40 cycle to off (41) and back to idle (752).</b></p>	
Nozzle (N13)		<b>41   70   1250</b>		<p><b>Assume normal mode is feeding (70), with 40 cycles to upset (1250) and back to idle (70). [Unplanned activations]</b></p> <p><b>Assume mode is idle (70) with 2100 cycle of trip to upset (1250), and return to idle (70). [Weekly surveillance tests]</b></p> <p><b>Assume mode is idle (70) with 40 cycle to off (41) and back to idle (70).</b></p>	
Cooling supply/returns		<b>41 in, 68 out</b>		<p><b>Nominally, temperature is 41 in, 68 out. Assume annual cooling outage, in=out=ambient=70 (40 cycles). Assume annual cooling supply failure/isolation during operation, in=out=212 (40 cycles).</b></p>	
Internal Bed		<b>41   140</b>		<p><b>Assume 40 cycles from running (140), to off (41), then resume (140).</b></p>	

**Remarks**

- **Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.**
- **The seller shall consider the conditions of nozzle N11 and N13 happening coincidentally.**
- **Vessel volumes are approximate and do not account for manufacturing tolerances, nozzles, and displacement of internals.**