

Table 10.6-1

REACTOR BUILDING CLOSED COOLING WATER SYSTEM  
AND EQUIPMENT DATA

RBCCWS Design Pressure/Temperature		Piping - 150 psig/230°F Equipment - 150 psig/200°F
Raw Cooling Water		
Type		River Water
Normal Design Inlet Temperature		90°F
Maximum Inlet Temperature		95°F
RBCCWS Heat Exchangers		
Number Provided		2/unit - 1 common spare
Materials		
Tubes		Admiralty - SS for RBCCW HX1A and HX1B only
Tube Sheets		Carbon Steel - SS for RBCCW HX1A and HX1B only
Shell		Carbon Steel
RBCCWS Pumps		
Number Provided		2/unit - 1 common spare
Materials		
Casing		Cast Steel
Impeller		Bronze
Shaft		Heat Treated High Carbon or Alloy Steel

Table 10.6-2

## REACTOR BUILDING CLOSED COOLING WATER SYSTEM

## HEAT EXCHANGER OPERATING CONDITIONS

Heat Transfer (Btu/hr X 10 <sup>6</sup> )/HX		Number of HX's in operation per unit
Normal	15.65 (Pre-uprated)	2
	16.33 (Uprated)	2
Startup	15.80 (Pre-uprated)	2
	16.04 (Uprated)	2
Cooldown	11.10	2
Shutdown	3.18 (Pre-uprated)	2
	3.31 (Uprated)	2
Normal Flow (GPM)		
Shell Side	1685	
Tube Side	2550	
Fluid		
Tube Side (river water)	Additives to minimize corrosion	
Shell Side (demineralized water)		
	Additives to minimize corrosion	
Seismic Coefficients		
1.0g	horizontal	
0.07g	vertical	

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TABLE 10.6-3a  
REACTOR BUILDING CLOSED COOLING WATER SYSTEM HEAT LOADS  
(Pre-uprated)

MODE OF SERVICE	One Unit										AC POWER FAILURE			
	NORMAL OPERATION			COOLDOWN			SHUTDOWN			STARTUP			Total	
	No. of Units	$\Delta P(\text{Pal})$	$T_{in}^{\circ F} T_{out}^{\circ F}$	$\Delta P(\text{Pal})$	$T_{in}^{\circ F} T_{out}^{\circ F}$	$\Delta P(\text{Pal})$	$T_{in}^{\circ F} T_{out}^{\circ F}$	$\Delta P(\text{Pal})$	$T_{in}^{\circ F} T_{out}^{\circ F}$	$\Delta P(\text{Pal})$	$T_{in}^{\circ F} T_{out}^{\circ F}$	$\Delta P(\text{Pal})$	$T_{in}^{\circ F} T_{out}^{\circ F}$	$T_{in}^{\circ F} T_{out}^{\circ F}$
System Equipment		Total 10 <sup>6</sup> Btu/hr	Total GPM	Total 10 <sup>6</sup> Btu/hr	Total GPM	Total 10 <sup>6</sup> Btu/hr	Total GPM	Total 10 <sup>6</sup> Btu/hr	Total GPM	Total 10 <sup>6</sup> Btu/hr	Total GPM	Total 10 <sup>6</sup> Btu/hr	Total GPM	Total GPM
Fuel Pool Heat Exchange	2	9	100	112	0.1	100	112	0.1	100	112	9	100	112	-
		8.8	1500	1.0	167	1.0	167	1.0	167	8.8	1500	-	-	-
Reactor Recirculation Pump and Motor	2	10	100	115	10	100	115	-	-	10	100	115	100	115
		0.9	120	0.9	120	-	-	-	-	0.9	120	0.9	120	120
Drywell Atmosphere Cooler	8*	16.8	100	110	15.0	100	110	16.8	100	16.8	100	107	15.0	100
		5.19	1038	6.4	1274	5.19	1038	5.19	1038	3.62	1038	6.4	1274	1274
Reactor Bldg. Equipment Drain Tank Cooler	1	1.5	100	125	1.5	100	125	-	-	1.5	100	125	-	-
		0.5	40	0.5	40	-	-	-	-	0.5	40	-	-	-
Drywell Equipment Drain Sump Cooler	1	1.5	100	125	1.5	100	125	-	-	1.5	100	125	1.5	100
		0.5	40	0.5	40	-	-	-	-	0.5	40	0.5	40	40
Sample Cooler	4	3	100	111	3	100	111	-	-	3	100	111	-	-
		0.04	6.5	0.04	6.5	-	-	-	-	0.04	6.5	-	-	-
Cleanup Recirculating Pump Cooler	2	10	100	120	10	100	120	10	100	10	100	120	-	-
		0.17	15	0.17	15	0.17	15	0.17	15	0.17	15	-	-	-
Cleanup System Nonregenerative Heat Exchanger	1	8	100	150	7.5	100	143	-	-	5	100	171	-	-
		15.1	610	12.7	587	-	-	-	-	17.1	482	-	-	-
Closed Cooling Water Heat Exchanger	2	4	90	102.3	0.75	90	110.2	0.1	90	104.2	4	90	102.4	90
Raw Cooling Water Loop - Tube Side		31.3	5100	22.2	2200	6.36	900	31.6	900	7.8	5100	7.8	900	900
Closed Cooling Water Heat Exchanger CCW Loop - Shell Side	2	12	118.5	100	5	118.9	100	1.5	110.4	100	10	119.4	100	110.9
		31.30	3369.5	22.2	2249.5	6.36	1220	31.6	3241.5	7.8	1434	-	-	-

\*This number of drywell atmosphere coolers is the total number in operation which must provide cooling for heat loads listed with a 25 percent standby capability (two coolers and fans not in operation). Spare fans may be placed in service at operator discretion to provide additional margin.  
There is a total of ten drywell atmosphere coolers located in each unit's drywell.

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TABLE 10.6-3b  
REACTOR BUILDING CLOSED COOLING WATER SYSTEM HEAT LOADS  
(Updated)

MODE OF SERVICE	NORMAL OPERATION				COOLDOWN				One Unit		SHUTDOWN				STARTUP				AC POWER FAILURE				
	No. of Units	ΔP(Pal)	T <sub>in</sub> °F	T <sub>out</sub> °F	ΔP(Pal)	T <sub>in</sub> °F	T <sub>out</sub> °F	ΔP(Pal)	Total 10 <sup>6</sup> Btu/hr	T <sub>in</sub> °F	T <sub>out</sub> °F	ΔP(Pal)	Total 10 <sup>6</sup> Btu/hr	T <sub>in</sub> °F	T <sub>out</sub> °F	ΔP(Pal)	Total 10 <sup>6</sup> Btu/hr	T <sub>in</sub> °F	T <sub>out</sub> °F	ΔP(Pal)	Total 10 <sup>6</sup> Btu/hr		
System Equipment																							
Fuel Pool Heat Exchanger	2	9	100	112	0.1	100	112	0.1	100	100	112	9	9	100	112	-	-	-	-	-	-	-	-
		9.24	1500		1.0		167		1.0		167		9.24	1500			-	-					
Reactor Recirculation Pump and Motor	2	10	100	115	10	100	115	-	-	-	-	10	10	100	115	10	100	115	10	100	115	115	
		0.9	120		0.9	120		-	-	-	-	0.9	0.9	120		0.9	120		0.9	120		120	
Drywell Atmosphere Cooler	8*	16.8	100	110	15.0	100	110	16.8	16.8	100	110	16.8	3.62	1038	107	15.0	100	110	100	100	110	110	
		5.45	1038		6.4	1274		5.45	5.45	1038		1038		6.4	1038		6.4	1274		6.4	1274	1274	
Reactor Bldg. Equipment Drain Tank Cooler	1	1.5	100	125	1.5	100	125	-	-	-	-	1.5	1.5	100	125	-	-	125	-	-	-	-	
		0.5	40		0.5	40		-	-	-	-	0.5	0.5	40		-	-	40		-	-	-	
Drywell Equipment Drain Sump Cooler	1	1.5	100	125	1.5	100	125	-	-	-	-	1.5	1.5	100	125	1.5	100	125	1.5	100	125	125	
		0.5	40		0.5	40		-	-	-	-	0.5	0.5	40		0.5	40		0.5	40		40	
Sample Cooler	4	3	100	111	3	100	111	-	-	-	-	3	3	100	111	-	-	111	-	-	-	-	
		0.04	6.5		0.04	6.5		-	-	-	-	0.04	0.04	6.5		6.5	-	-	-	-	-	-	
Cleanup Recirculating Pump Cooler	2	10	100	120	10	100	120	10	10	100	120	10	10	100	120	-	-	120	-	-	-	-	
		0.17	15		0.17	15		0.17	0.17	15		0.17	0.17	15		15	-	-	-	-	-	-	
Cleanup System Nonregenerative Heat Exchanger	1	8	100	150	7.5	100	143	-	-	-	-	5	5	100	171	-	-	171	-	-	-	-	
		15.86**	610		12.7**	587		-	-	-	-	17.1**	482		482		-	-	-	-	-	-	
Closed Cooling Water Heat Exchanger Raw Cooling Water Loop - Tube Side	2	4	90	103.3	0.75	90	110.2	0.1	90	90	104.2	4	90	90	102.4	0.1	90	102.4	0.1	90	107.3	107.3	
		32.66	5100		22.2	2200		6.62	6.62	900		32.07	5100		5100		7.8	900		7.8	900	900	
Closed Cooling Water Heat Exchanger CCW Loop - Shell Side	2	12	118.5	100	5	118.9	100	1.5	110.4	100	110.4	10	119.4	100	100	2.1	110.9	100	2.1	110.9	100	100	
		32.66	3369.5		22.2	2249.5		6.62	6.62	1220		32.07	3241.5		3241.5		7.8	1434		7.8	1434	1434	

\*This number of drywell atmosphere coolers is the total number in operation which must provide cooling for heat loads listed with a 25 percent standby capability (two coolers and fans not in operation). Spare fans may be placed in service at operator discretion to provide additional margin.  
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\*\*Heat transfer rate corresponds to an RWCU flow of 270 gpm. Increasing the flow up to the maximum of 340 gpm results in an additional heat load of 7x10<sup>6</sup> Btu/hr. Operation of RWCU above 270 gpm depends upon the ability of RBCCW to accommodate the added heat load.