

TABLE 10.4-1

MAIN CONDENSATE AND FEEDWATER SYSTEM COMPONENTS

<u>Condensate Pumps</u>	
Number of pumps	3
Design Capacity of each	8,000 gpm at 1,328 feet (575 psi)
Manufacturer	Ingersoll-Rand
Size and Type	32 APKD 9 stage vertical
Speed	1,170 rpm
Motor Size	4,000 hp
Shutoff Pressure	693 psig
<u>Condensate Pump Motors</u>	
Quantity	3
Manufacturer	Electric Machinery Co.
Horsepower	4,000
Current	498 amps
Voltage	4,160 V
Speed	1,190 rpm
Hertz	60
Upper BRG Cooling Water Space Heater	13 gpm 2 kW 240 V (for storage only)
<u>Steam Generator Feed Pumps</u>	
Number of Pumps	2
Design Capacity of each	18,613 gpm and 2,320 feet (884 psi) at 370°F
Manufacturer	Worthington
Size and Type	24 WGID-171 single stage Horizontal centrifugal
Number of Stages	1
Speed	5530
Maximum Discharge Pressure limited by trip for high discharge pressure	1,620 psig
<u>Steam Generator Feed Pump Turbines</u>	
Number of Drive Turbines	2
Rating	10,970 hp at 5530 rpm
Manufacturer	DeLaval
Number of Stages	9-double flow exhaust
Exhaust Pressure	2.0 inches hg. abs.
<u>Feedwater Heaters</u>	
<u>First Stage Feedwater Heaters</u> (Except 11C, 21A, 21B & 21C)	
Number of Shells	3
Flow Rate per Shell	3,792,475 lb/hr
Temperature, In	92.6°F
Temperature, Out	164°F
Flow is directed through tube side of exchanger	
Number of Passes	2
Pressure Drop	12 psi
Design Pressure	700 psig
Tube Channel Material	A-515-70

TABLE 10.4-1 (Cont)

Tubes:		
Material	304 SS A-249	
Number	1659	
O.D.	5/8 in.	
Gauge	0.035 Ave Wall	
Length	43 feet 0 in.	
<u>First Stage Feedwater Heater -11C, 21A, 21B & 21C</u>		
Number of Shells	3	1 (21B)
Flow Rate per Shell	3,792,475 lb/hr	
Temperature, In	92.6°F	
Temperature, Out	164°F	
Flow is directed through tube side of exchanger		
Number of Passes	2	
Pressure Drop	12 psi	
Design Pressure	800 psig	
Tube Channel Material	A-516-70	
Tubes:		
Material	304 SS SA-688	
Number	1570	
O.D.	5/8 in.	
Gauge	0.035 Ave Wall	
Length	41 feet 3-5/8 in. 41 feet 4 in. (21B)	
<u>Second Stage Feedwater Heaters</u>		
	<u>Unit 1</u>	<u>Unit 2</u>
Number of Shells	3	3
Flow Rate per Shell	3,548,026 lb/hr	3,792,475 lb/hr
Temperature, In	168.3°F	164°F
Temperature, Out	202.8°F	202°F
Number of Passes	2	2
Pressure Drop	19 psi	18.3 psi
Design Pressure	700 psig	800 psig
Tube Channel Material	A-515-70	A-516-70
Tubes:		
Material	304 S.S. A-249	304 S.S. SA-688
Number	1,119	1,090
O.D.	5/8 in.	5/8 in.
Gauge	0.035 Ave Wall	0.035 Ave Wall
Length	37 feet 11 in.	36 feet 7 in.
<u>Third Stage Feedwater Heaters</u>		
	<u>Unit 1</u>	<u>Unit 2</u>
Number of Shells	3	3
Flow Rate per Shell	3,548,026 lb/hr	3,611,136 lb/hr
Temperature, In	202.8°F	202°F
Temperature, Out	253.5°F	251.2°F
Flow is directed through tube side of exchanger		
Number of Tube Passes	2	2
Pressure Drop	12.8	13.5
Design Pressure	700 psig	800 psi
Tube Channel Material	A-515-70	SA-516-70

TABLE 10.4-1 (Cont)

Tubes:	<u>Unit 1</u>	<u>Unit 2</u>
Material	304 S.S. A-249	SA-688-TP316L
Number	896	840
O.D.	3/4 in.	3/4 in.
Gauge	0.035 Avg Wall	0.035 in. Avg. Wall
Length	43 feet 5 inches	43 feet 8 inches
<u>Fourth Stage Feedwater Heaters</u>	<u>Unit 1</u>	<u>Unit 2</u>
Number of Shells	3	3
Flow Rate per Shell	3,548,026 lb/hr	3,611,136 lb/hr.
Temperature, In	253.5°F	251.2°F
Temperature, Out	307.2°F	303.7°F
Flow is directed through tube side of exchanger		
Number of Tube Passes	2	2
Pressure Drop	16.0 psig	17 psig
Design Pressure	700 psig	800 psig
Tube Channel Material	A-515-70	SA-516-70
Tubes:		
Material	304 SS A-249	SA688 TP 316L
Number	782	726
O.D.	3/4 in.	3/4 in.
Gauge	0.035 Ave Wall	0.035 Avg. Wall
Length	43 feet 3 inches	43 feet 11 inches
<u>Fifth Stage Feedwater Heaters</u>	<u>Unit 1</u>	<u>Unit 2 (25B, 25C)</u>
Number of Shells	3	2
Flow Rate per Shell	3,548,026 lb/hr	3,611,136 lb/hr
Temperature, In	307.2°F	303.7°F
Temperature, Out	365°F	364.5°F
Flow is directed through tube side of Exchanger		
Number of Tube Passes	2	2
Pressure Drop	13.6 psig	13.6 psig
Design Pressure	700 psig	700 psig
Tube Channel Material	A-515-70	A-515-70
Tubes:		
Material	304 SS A-249	304 SS A-249
Number	845	845
O.D.	3/4 in.	3/4 in.
Gauge	0.035 Ave Wall	0.035 Ave Wall
Length	43 feet 7 inches	43 feet 7 inches

TABLE 10.4-1 (Cont)

<u>Fifth Stage Feedwater Heaters</u>		<u>Unit 2 (25A)</u>	
Number of Shells		1	
Flow Rate per Shell		3,792,475 lb/hr	
Temperature, In		309.3°F	
Temperature, Out		369.4°F	
Flow is directed through tube side of Exchanger			
Number of Tube Passes		2	
Pressure Drop		13.5 psig	
Design Pressure		800 psig	
Tube Channel Material		A-515-70	
Tubes:			
Material		SA-688 Type 304	
Number		789	
O.D.		3/4 in.	
Gauge		0.035 Ave Wall	
Length		42 feet 4 inches	
<u>Sixth Stage Feedwater Heaters</u>		<u>Unit 1</u>	<u>Unit 2</u>
Number of Shells		3	3
Flow Rate per Shell		4,995,701 lb/hr	4,982,149 lb/hr
Temperature, In		368.1°F	368.5°F
Temperature, Out		427.5°F	427°F
Flow is directed through tube side of exchanger			
Number of Tube Passes		2	2
Pressure Drop		20.7 psig	20.7 psig
Design Pressure		2100 psig	2100 psig
Tube Channel Material		A-516-70 FB	A-516-70 FB
Tubes:			
Material	304	SS A-249304	SS A-249
Number		1805	1805
O.D.		3/8 in.	3/8 in.
Gauge		0.055 Ave Wall	0.055 Ave Wall
Length		39 feet 2 in.	39 feet 2 in.

TABLE 10.4-2

TOTAL AUXILIARY FEEDWATER FLOW

Transient Scenario (1)	No Single Failure In AFW System	Failure of Turbine AFW Pump	Failure of 1 Motor AFW Pump
Loss of Main FW	≥1600 gpm (2)	≥700 gpm (2)	≥1120 gpm (2)
Loss of Offsite Power	≥1600 gpm (2)	≥700 gpm (2)	≥1120 gpm (2)
Plant Cooldown	≥1600 gpm (2)	≥880 gpm (2)	≥1120 gpm (2)

NOTES:

1. AFW flows during steam line break transients (both inside and outside Containment) and feed line break transients vary considerably during the event and are summarized in Reference 2 but not included in this table.
2. Flows represent bounding values for steam generator pressures of 1117 PSIA or less.

TABLE 10.4-3

ASSUMPTIONS USED IN BLOWDOWN WATER TRANSIT TIME CALCULATIONS

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TABLE 10.4-4
BLOWDOWN TRANSIT TIMES

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TABLE 10.4-5

POSTULATED RELEASE OF LIQUID ACTIVITY THROUGH BLOWDOWN SYSTEM

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TABLE 10.4-6
POSTULATED RELEASE OF GASEOUS ACTIVITY THROUGH CONDENSER AIR REMOVAL SYSTEM

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