

BFN-16

Table 13.5-1  
CONTROL ROD DRIVE SYSTEM TESTS  
(Unit 1)

<u>Test Description</u>	Preop Tests	Reactor Pressure,psig (With Core Loaded)			
		0	600	800	1000
Position Indication	All	All			
Normal Insert/Withdraw Times	All	All			4*
Coupling	All	All			
Friction		All			4*
Scram Times (Normal Accumulated Pressure)	All	All	4*	4*	All
Scram Times (Minimum Accumulator Pressure)		4*			
Scram Times (Zero Accumulator Pressure)					4*
Scram Times (Scram Discharge Volume High Level)	All				
Scram Times, Rated Power (Normal Accumulator Pressure)					4**

\*Value refers to the four slowest drives as determined from the normal accumulator pressure scram test at ambient reactor pressure which are compatible with the Rod Worth Minimizer and withdrawal sequence requirements.

\*\*Scram times of the four slowest rods will be determined at 25, 50, and 100 percent of rated power during planned reactor scrams at these power levels.

Table 13.5-2  
MAJOR PLANT TRANSIENTS

<u>TEST TITLE</u>	TEST CONDITION				
	Nominal Power, Percent of Rated				
	25	50	75	80	100
	Nominal Core Flow, Percent of Rated				
	36	100	100	70	100
Feedwater Pump Trip			A		C
Main Steam Isolation Valves (One Valve)		C	A	C	
Main Steam Isolation Valves (All Valves)					C
Turbine-Generator Stop Valve Fast Close		B			A
Turbine-Generator Control Valve Fast Close	A		A	A	
Recirculation Pump Trip (One Pump)		C	B		C
Recirculation Pump Trip (Two Pumps)		C	C		C
Loss of Generator and Offsite Power	C				

A - Unit 1 B - Units 2, 3 C - Units 1, 2, 3

BFN-16

Table 13.5-3  
STABILITY TESTS

TEST TITLE	TEST CONDITION												
	Nominal Power, Percent of Rated												
	25	40	50	25	47	60	75	37	65	80	100	50	97
	Nominal Core Flow, Percent of Rated												
	47	70	100	NC	48	70	100	NC	48	70	100	NC	109
Flux Response to Rods	C	A	C		A	A	C	A	A	A	C	A	
Pressure Regulator Setpoint	C	A	C		A	A	C	A	C	C	C	A	
Pressure REgulator Backup Regulator	C		C				C				C		
Feedwater System Setpoint	C	A	C		A	A	C	A	C	C	C	A	B
Feedwater System Drop Heater											A		
Bypass Valve	C	A	C	B	A	A	C	A	C	C	C	C	B
Flow Control	C	C	C		C	C	C		C	C	C		

NC= Natural Circulation

A - unit 1 B - units 2, 3 C - units 1, 2, 3

## BFN-16

TABLE 13.5-4

## STARTUP TEST PROGRAM (UNIT 1)

TEST NO.	TEST CONDITION (See Figure 13.5-2)	OPEN VESS OR COLD TEST	HEAT UP	50% Flow Line				75% Flow Line				100% Flow Line				WARRANTY
				15-35	30-50	40-60	15-35	37-57	50-70	65-85	27-47	55-75	70-90	95-100	40-60	
				~48	70	~104	NC	48	70	~102	NC	~48	~70	100	NC	
				1	3	2	2A	5A	5	4	4A	7A	7	6	6A	8
1	Chemical & Radiochemical	X	X	X		X				X				X		
2	Radiation Measurements	X	X	X		X								X		
3	Fuel Loading	X														
4	Full Core Shutdown Margin	X														
5	Control Rod Drive System	X	X	X		X								X		
6	SRM Performance & Control Rod Sequence	X	X	X			X				X					
7	Not Applicable															
8	Not Applicable															
9	Not Applicable															
10	IRM Calibration	X	X	X												
11	LPRM Calibration			X		X				X				X		
12	APRM Calibration		X	X		X				X				X		X
13	Process Computer	X	X	X										X		
14	RCIC System		X	M												
15	HPCI System		X			M										
16	Reactor Vessel Temperature		X				X				X				X	
17	System Expansion	X	X	X												
18	Core Power Distribution			X		X				X				X		X
19	Core Performance			X	X	X	X	X	X	X	X	X	X	X	X	X
20	Elec. Output & Heat Rate															X
21	Flux Response to Rods			M	M	M	M	M	M	M	X	M	M	M	X	
22	Press. Reg.: Setpoint Changes			M	M	M	M	M	M	M	X	M	M	M	X	
	: Backup Regulator			M		M				M				M		
23	FW System: FW Pump Trip									M				M		
	: Water Level Stpt. Chg.			MA	M	MA	M	M	M	MA	X	MA	MA	MA	X	
	: Heater Loss													M*		
24	Bypass Valves			MA	MA	MA	M	MA	MA	MA	X	MA	MA	MA	X	
25	Main Steam Iso. Valves: Each Vlv.		X			M,SP				M,SP			M,SP			
	: Full Iso.													M,SE		
26	Relief Valves		X	M		M,SE				M				M,SE		
27	Turbine : Stop Valve Trip															
	: Control Valve Trip			M,SP						M,SE			A,SE			
29	Flow Control			LMA	MA	MA		MA	MA	MA		MA	MA	MA		
30	Recirc. System: One Pump Trip					M								M		
	: Two Pump Trip					M				M				M		
	: Flow Calibration			X		X	X			X				X		X
31	Loss of T-G & Offsite Power			M,SE										LSE		
32	Recirc. Loop Control	X	X		X	X										
35	Recirc. And Jet Pump Calibration	X														
36	Equalizer Open					M								M		
39	Water Level verification in Reactor Vessel		X			X								X		
70	Reactor Water Cleanup System		X													
71	Residual Heat Removal System**															
72	Drywell Atmosphere Cooling System		X			X										
73	Cooling Water Systems		X			X										
90	Vibration**	X	X	X		X				X				X		
92	Steam Separator and Dryer		X	X		XSP	X			XSP				X*,X		XSP
93	Not Applicable															

<sup>1</sup>Power is in percent of rated power, 3293Mwt.<sup>2</sup>Flow is in percent of rated flow, 102.5x10<sup>5</sup> lbs/hr

\* = 90% rated power

\*\* = Actual test condition to be determined

M=Master Manual Control Mode

A=Automatic Control Mode

L=Local Manual Control Mode

X=Test independent of flow control mode.

SP=Scram Possibility

NC=Natural Circulation

SE=Scram Expected

TABLE 13.5-5

STARTUP TEST PROGRAM (UNIT 2)

	Power, %1 Flow, %2	OPEN VESSEL OR COLD TEST	HEAT UP	50% Flow Control Line				75% Flow Control Line				100% Flow Control Line			
				15-35 -47	30-50 -70	40-50 -104	-53 NC	37-57 -48	50-70 -70	55-75 -48	37 NC	70-90 -70	85-100 -102	95-100 -100	
TEST CONDITION (See Figure 2)															
1	Chemical & Radiochemical	X	X	X	X	X	2A	3C	3D	3E	3A	4C	4D	4E	4A
2	Radiation Measurements	X	X	X	X	X				X				X	
3	Fuel Loading	X	X	X	X	X				X				X	
4	Full Core Shutdown Margin	X	X	X	X	X								X	
5	CRD	X	X	X	X	X								X	
6	SIRM Perf. & Control Rod Seq.	X	X	X	X	X								X	
9	Water Level Measurement	X	X	X	X	X								X	
10	IRM Calibration	X	X	X	X	X								X	
11	LPRM Calibration	X	X	X	X	X								X	
12	APRM Calibration	X	X	X	X	X								X	
13	Process Computer	X	X	X	X	X								X	
14	RCIC	X	X	M	X	X								X	
15	HPCI	X	X	X	X	X								X	
16	Selected Process Temperatures	X	X	X	X	X								X	
17	System Expansion	X	X	X	X	X								X	
18	Core Power Distribution	X	X	X	X	X								X	
19	Core Performance	X	X	X	X	X								X	
20	Steam Production	X	X	X	X	X								X	
21	Full Response to Rods	M	M	M	M	M								M	
22	Press. Reg. Subpoint Changes	M	M	M	M	M								M	
22	Press. Reg. Backup Regulator	M	M	M	M	M								M	
23	FW System: FW Pump Trip														
	: Water Level Spnt. Chg.														
24	Bypass Valves														
25	Main Steam Iso. Valves: Each Viv.														
	: Full Iso.														
26	Relief Valve Capacity														
	: Actuation														
27	Turbine Trip and														
	Generator Load Rejection														
29	Flow Control														
30	Recirc System: Trip One Pump														
	Trip Both Pumps														
	Sys. Performance														
	Non-Cavit. Verif.														
31	Loss of T-G & Offsite Power														
32	Recirc MG Set Speed Control														
33	Turbine Stop Valve Surv. Test														
34	Vibration Measurements														
35	Recirc System Flow Calibration														
70	Reactor Water Cleanup System														
71	Essential Heat Exchanger**														
72	Drywell Atmosphere Cooling System <sup>iv</sup>														
73	Cooling Water Systems <sup>v</sup>														
74	Offgases System <sup>v</sup>														

2 Percent of rated power, 3293 MW  
3 Percent of rated flow, 102.5 x 10<sup>3</sup> l/hr  
4 Also obtain data with tests 25, Full Iso & Test 27  
5 Perform Test 5, timing of 4 slowest control rods in conjunction with these scrams  
6 Perform the Dynamic System Test Case  
7 Not required if 50% power testing will be done within about 2 months  
8 Included only to meet Test 34 Requirements  
9 Trip the Generator Field Breaker  
10 Heat up tests of MSIVs & Relief Valves are Unit 1 only (cf. Page 36)  
11 Determine Maximum power without scram  
12 Determine Maximum power without scram  
13 From Test Condition 2E to 5  
14 Not required if 50% power testing will be done within about 2 months

\*Applies to unit 3 and, subsequent to equipment installation, to unit 2.

BFN-16

TABLE 13.5-6

STARTUP TEST PROGRAM (UNIT 3)

	TEST CONDITION (See Figure 2)	Power, %1	OPEN VESSEL OR COLD TEST	HEAT UP	15-35	50% Flow Control Line				75% Flow Control Line				100% Flow Control Line			
		Flow, %2			~47	30-50	40-60	~25	37-57	50-70	65-85	37	NC	55-75	70-90	95-100	~50
					1	2D	2E	2A	3C	3D	3E	3A	4C	4D	4E	4A	
1	Chemical & Radiochemical		X	X	X		X				X					X	
2	Radiation Measurement		X	X	X		X				X					X	
3	Fuel Loading		X														
4	Full Core Shutdown Margin		X														
5	CRD		X	X	X <sup>10</sup>											X	
6	SRM Perf. & Control Rod Seq.		X	X	X												
9	Water Level Measurement			X	X											X	
10	IRM Performance		X	X	X												
11	LPRM Calibration			X	X		X				X					X	
12	APRM Calibration			X	X		X				X					X	
13	Process Computer		X	X			X <sup>0</sup>									X	
14	RCIC			X	X												
15	HPCI			X			X										
16	Selected Process Temperature			X													X
17	System Expansion		X	X	X												
18	Core Power Distribution				X		X				X					X	
19	Core Performance				X	X	X	X	X	X	X		X	X	X	X	X
20	Steam Production															X	
21	Flux Response to Rods				X		X				X					X	
22	Press. Reg.: Setpoint Changes				X		X				X		X	X	X		
	: Backup Regulator				X		X				X					X	
23	FW System: FW Pump Trip															X	
	: Water Level Stpt. Chg.				X		X				X		X	X	X		
24	Bypass Valves				X		X	X			X		X	X	X		X
25	Main Steam Iso. Valves: Each Vlv.			X <sup>9</sup>			X,SP							X,SP			
	: Full Iso.															X,SP	
26	Relief Valve: Capacity				X												
	: Actuators <sup>5</sup>			X <sup>9</sup>	X						X						
27	Turbine Trip and															X,SE <sup>5</sup>	
	Generator Load Rejection				X,SP						X,SE <sup>5</sup>						
30	Recirc. System: Trip One Pump						X <sup>7</sup> ,X <sup>8</sup>				X <sup>7</sup> ,X <sup>7</sup>					X <sup>7</sup> ,X <sup>7</sup>	
	Trip Both Pumps						X				X					X	
	Sys. Performance						X <sup>12</sup>	X			X					X	X
	Non-Cavit. Verif.						X <sup>12</sup>										
31	Loss of T-G & Offsite Power				X,SE <sup>5</sup>												
32	Recirc. MG Set Speed Control				L,M	L,M	L,M		L,M	L,M	L,M		L,M	L,M	L,M		
33	Turbine Stop Valve Surv. Test				X		X				X					X,SP <sup>11</sup>	
34	Vibration Measurements <sup>4</sup>				X <sup>13</sup>	X	X	X	X	X	X		X	X	X	X	X
35	Recirc. System Flow Calibration						X				X					X	
70	Reactor Water Cleanup System			X													
71	Residual Heat Removal System				X												
72	Drywell Atmospheric Cooling System			X												X	
73	Cooling Water Systems			X												X	
74	Offgas System				X		X				X					X	
75	Reactor Shutdown From Outside Control Room				X <sup>14</sup>												

<sup>1</sup>Percent of rated power, 3293 MWt

<sup>2</sup>Percent of rated flow, 102.5 x 10<sup>6</sup> lb/hr

<sup>3</sup>Also obtain data with Tests 25, Full Iso & Test 27

<sup>4</sup>Obtain data with Test 30

<sup>5</sup>Perform Test 5, timing of 4 slowest control rods

in conjunction with these scrams

<sup>6</sup>Perform the Dynamic System Test Case

<sup>7</sup>Included only to meet Test 34 Requirements

<sup>8</sup>Trip the Generator Field Breaker

<sup>9</sup>Heat up tests of MSIVs & Relief Valves are

to check operation only

<sup>10</sup>RSCS cleared (40%)

<sup>11</sup>Determine maximum power without scram

<sup>12</sup>From Test Condition 2E to 5

<sup>13</sup>Not required if 50% power testing will be

done in about 2 months

<sup>14</sup>At greater than 10% generator output

L = Local Manual Flow Control Mode

M = Master Manual Flow Control Mode

A = Automatic Flow Control Mode

x = Test Independent of Flow Control Mode

SP = Scram Possibility

SE = Scram Expected

NC = Natural Circulation