

PUBLIC SERVICE ELECTRIC AND GAS COMPANY
HOPE CREEK PROJECT

SAFETY EVALUATION

No. PSE-SE-Z-019

TITLE: DELETION OF TEST NUMBER 28B, TWO PUMP RECIRCULATION
PUMP TRIP TEST AT TEST CONDITION 3

Date: OCT 01 1985

1.0 PURPOSE

The purpose of this Safety Evaluation is to document the results of the evaluation performed to ensure that deletion of Test Number 28B, Two Recirculation Pump Trip Test at Test Condition 3, from Hope Creek's Power Ascension Test Program, will not adversely affect reactor safety.

2.0 SCOPE

The area of concern for this proposed change is the adequacy of Hope Creek's Power Ascension Test Program.

3.0 REFERENCES

1. Regulatory Guide 1.68, Revision 2, August 1978
2. Hope Creek Final Safety Analysis Report (FSAR)
3. General Electric Startup Specification, 23A4137 Revision 0
4. Hope Creek Generating Station Draft Technical Specifications
5. General Electric Preoperational Test Program Specification 22A2271AZ, Revision 2

4.0 DISCUSSION

Regulatory Guide 1.68 (Revision 2, August 1978), Appendix A, paragraph 5.i.i requires that the dynamic response of the plant is in accordance with design for limiting reactor coolant pump trips. The method for initiating the pump trip should result in the fastest credible coastdown in flow for the system while operating at approximately 100% power. Hope Creek's Power Ascension Testing Program includes a two pump trip test at both Test Condition 3 (approximately 100% core flow and 50% power) by Test Number 28B and Test Condition 6

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(approximately 100% core flow and 100% power) in conjunction with the Generator Load Rejection Test, Test Number 25. Performance of the two pump trip test at Test Condition 6 will satisfy the intent of Regulatory Guide 1.68, Appendix A, paragraph 5.i.i. It is therefore proposed to delete performance of this test at Test Condition 3 (Test Number 28B).

The acceptance criteria for the two pump trip test requires drive coastdown transient parameters to be within those used in the transient analysis of the Hope Creek Final Safety Analysis Report (FSAR). This criteria is the sole acceptance criteria of the two pump trip test at Test Condition 3 (Test Number 28B) and is included in the acceptance criteria for the two pump trip which will result at Test Condition 6 due to the high power turbine generator trip test (Test Number 25).

Hope Creek's FSAR states that the two pump trip test at Test Condition 3 will verify the performance of the Recirculation Pump Trip (RPT) circuit and the recirculation pump flow coastdown prior to the high power turbine generator trip test (Test Condition 6). However, the performance of the RPT circuit is also verified by preoperational tests. In addition, the recirculation pump coastdown performance will be observed during single pump trip tests which will be performed with one pump at Test Condition 3 and the other pump at Test Condition 6. These tests are prerequisites to the two pump trip test. Furthermore, the characteristics of coastdown are well understood and have been demonstrated during power ascension testing at other plants. The margin to safety has always been maintained and no additional safety risk is incurred by not performing this test prior to Test Condition 6.

5.0 CONCLUSION

Performance of the Two Recirculation Pump Trip test at Test Condition 6 satisfies the intent of Regulatory Guide 1.68, Appendix A, paragraph 5.i.i. Deletion of this test at Test Condition 3 will not affect any safety related systems or safe operation of the plant and Technical Specification change is not required. Based on the above, deletion of this test does not involve an unreviewed safety question. Therefore, Test Number 28B, Two Recirculation Pump Trip, can be deleted from Hope Creek's Power Ascension Testing Program.

6.0 DOCUMENTS GENERATED

None

7.0 RECOMMENDATIONS

Revision to Hope Creek's FSAR and startup test procedures shall be made to delete the Two Pump Recirculation Pump Trip Test at Test Condition 3, Test Number 28B, from the Hope Creek Power Ascension Test Program.

8.0 ATTACHMENTS

None

9.0 SIGNATURES

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			Date
Verifier	<u>J.H. Hewitt</u>		<u>9/30/85</u>
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			Date

TEST NUMBER 28D - RECIRCULATION PUMP RUNBACK
IN CONJUNCTION WITH TEST NUMBER 21C

OBJECTIVE:

Regulatory Guide 1.68, (Revision 2, August 1978), Appendix A, paragraph 5.s requires that the recirculation flow control system be calibrated as necessary and its performance verified. One function of the recirculation flow control system is to provide a recirculation pump runback upon the coincident loss of one feedwater pump and low water level (Level 4) indication to avoid scram on low-low water level (Level 3). Test Number 28D, Recirculation Pump Runback, simulates a loss of feedwater pump at Test Condition 3 near rated recirculation flow to determine the adequacy of the recirculation pump runback feature in preventing a scram. It is proposed to perform this test in conjunction with Test Number 21C, Feedwater Pump Trip at Test Condition 6. This testing will demonstrate that Regulatory Guide 1.68, Appendix A, paragraph 5.s objectives are met for the recirculation pump runback feature of the recirculation flow control system.

DISCUSSION:

Response of the system during a feedwater pump trip with recirculation pump runback is determined by analyzing test data and comparing to acceptance criteria which define the required system performance. For the recirculation pump runback test, the recirculation pumps are required to runback upon a trip of the runback circuit. During Test Number 21C, Feedwater Pump Trip at Test Condition 6, a recirculation pump runback occurs as the result of the feedwater pump trip. This testing results in an actual demonstration of the recirculation pump runback circuit under real as opposed to simulated conditions.

CONCLUSION:

Testing of the recirculation pump runback feature in conjunction with the Feedwater Pump Trip test at Test Condition 6 demonstrates the actuation of the recirculation pump runback circuits and provides a demonstration of the adequacy of the runback feature to prevent scram. This proposed testing satisfies the objectives of Regulatory Guide 1.68, Appendix A, paragraph 5.s for the recirculation pump runback feature of the recirculation flow control system and will not affect any safety related systems or safe operation of the plant and therefore does not involve an unreviewed safety question. Therefore, Test Number 28D, Recirculation Pump Runback, can be performed in conjunction with Test Number 21D, Feedwater Pump Trip at Test Condition 6.

ATTACHMENT 2

TEST NO.	TEST NAME	OPEN VESSEL	HEAT UP	1	2	3	4	5	6	WARRANTY
1	Chemical and Radiochemical	X	X	X		X		X	X	
2	Radiation Measurement	X	X	X		X			X	
3	Fuel Loading	X								
4	Full Core Shutdown Margin	X								
5	Control Rod Drive	X	X	X ⁽²⁾	X ⁽²⁾	X ⁽²⁾			X ⁽²⁾	
6	SRM Performance	X								
8	IRM Performance		X	X						
9	LPRM Calibration		X	X		X			X	
10	APRM Calibration		X	X	X	X		X	X	
11	Process Computer	X	X	X ⁽³⁾		X		X		
12	RCIC		X	X						
13	HPCI		X			X				
14	Selected Process Temp		X			X	X ⁽⁴⁾		X ⁽⁴⁾	
14	Water Level Ref Lag Temp		X			X			X	
15	System Expansion	X	X	X		X			X	
16	TIP Uncertainty					X			X	
17	Core Performance			X	X	X	X	X	X	X
18	Steam Production									X
19	Core Pwr-Void Mode Response						X	X		
20	Pressure Regulator			X	X	X	X	X	X	
21	Feed Sys-Setpoint Changes		X	X	X	X	X	X	X	
21	Feed Sys-Loss FW Heating								X ⁽⁵⁾	
21	Feedwater Pump Trip								X ⁽⁶⁾	
21	Max FW Runout Capability								X ⁽⁷⁾	
22	Turbine Valve Surveillance					X ⁽⁸⁾		X ⁽⁹⁾	X ⁽¹⁰⁾	
23	MSIV Functional Test		X	X ⁽¹¹⁾	X ⁽¹²⁾			X ⁽¹³⁾		
23	MSIV Full Isolation								X	
24	Relief Valves		X	X ⁽²⁰⁾	X	X ⁽²⁰⁾			X ⁽²⁰⁾	
25	Turbine Trip & Load Rejection				X ⁽¹⁵⁾	X ⁽¹⁶⁾			X ⁽¹⁷⁾	
26	Shutdown Outside CRC				X					
27	Recirculation Flow Control				X ⁽¹⁴⁾			X ⁽¹⁸⁾		
28	Recirc-One Pump Trip					X			X	
28	Recirc Pump Runback					X ⁽¹⁹⁾				
28	Recirc System Performance				X	X	X		X	
28	Recirc Pump Runback					X				
28	Recirc Sys Cavitation					X				
30	Loss of Offsite Pwr			X						
31	Pipe Vibration		X	X	X	X			X	
29	Recirc Flow Calibration					X			X	
32	RMCU		X							
33	RHR				X				X ⁽²¹⁾	
34	Drywell & Steam Tunnel Cooling		X	X		X			X	
35	Gaseous Radwaste			X		X			X	
38	SACS Performance					X			X	
40	Confirmatory In-Plant Test				X					

- (1) Test conditions refer to plant conditions on Figure 14.2-4
- (2) Perform Test 5, timing of 4 slowest control rods, in conjunction with expected scrams
- (3) Dynamic System Test Case to be completed between test conditions 1 and 3
- (4) After recirculation pump trips (natural circulation)
- (5) Between 80 and 90 percent thermal power, and near 100 percent core flow
- (6) Max FW Runout Capability & Recirc Pump Runback must have already been completed
- (7) Reactor power between 80 and 90 percent
- (8) Reactor power between 45 and 65 percent
- (9) Reactor power between 75 and 90 percent
- (10) At maximum power that will not cause scram
- (11) Perform between test conditions 1 and 3
- (12) Reactor power between 40 and 55 percent
- (13) Reactor power between 60 and 85 percent
- (14) Between test conditions 2 and 3
- (15) Generator load rejection, within bypass valve capacity
- (16) Reactor power between 60 and 80 percent at core flow \geq 95 percent - turbine trip
- (17) Load rejection
- (18) Between test conditions 5 and 6
- ~~(19) >50% power and >95% core flow, and performed before Turbine Trip & Load Rejection~~
- (20) Check SRV set points during major scram tests
- (21) Performed during cooldown from test condition 6
- (22) The test number correlates to FSAR Section 14.2.12.3.x where x is the indicated test number.

HOPE CREEK
GENERATING STATION
FINAL SAFETY ANALYSIS REPORT

TEST SCHEDULE AND CONDITIONS

14.2.12.3.28 Recirculation System

a. Objectives

1. To determine transient responses and steady-state conditions following recirculation pump trips at selected power levels
2. To obtain recirculation system performance data
3. To verify that cavitation in the recirculation system does not occur in the operating region of the power/flow map.
4. To verify the adequacy of the recirculation runback to mitigate a scram upon loss of one feedwater pump.
5. To verify that the feedwater control system can control water level without causing a turbine trip/scram following a single recirculation pump trip.
6. To demonstrate the adequacy of the recirculation pump restart procedure at the highest possible power level.

b. Prerequisites

The reactor is operating at steady-state conditions at required power level.

c. Test Method

Single pump trips are performed at test condition 3 and

~~6. Dual pump trip is demonstrated at test condition 3.~~

The one-pump trip tests are to demonstrate that water level will not rise enough to threaten a high level trip of the main turbine or the feedwater pumps. ~~The~~

~~dual pump trip verifies the performance of the RPT~~

~~circuit and the recirculation pump flow coastdown prior to the high power turbine generator trip tests. Single pump trips are initiated by tripping the MG set generator output breaker. Adequate margins to scrams and capability of the feedwater system to prevent a high level trip will be monitored. The two pump trip will be initiated by simultaneously tripping both recirculation RPT breakers using a test switch. The recirculation pump restart demonstrates the adequacy of the restart operating procedure at the highest possible power level.~~

At several power and flow conditions, and in conjunction with single pump trip recoveries, recirculation system parameters are recorded.

~~At test condition 3 and at near rated recirculation flow, a loss of a feedwater pump is simulated. This is done prior to an actual feedwater pump trip to determine the adequacy of recirculation pump runback feature in preventing a scram.~~

While at test condition 3, it will be demonstrated that the cavitation interlocks which runback the recirculation pumps on decreased feedwater flow are adequate to prevent operation where recirculation pump or jet pump cavitation can occur.

d. Acceptance Criteria

Level 1:

1. During recovery from one pump-trip, the reactor shall not scram.

~~2. The two pump drive flow coastdown time following a dual recirculation pump trip is as specified in the GE startup test specification.~~

Level 2:

1. Neutron flux, heat flux, and reactor water level scram avoidance margins are as specified in the GE startup test specification.