PSE&G Public Service Electric and Gas Company

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Robert L. Mittl General Manager
Nuclear Assurance and Regulation

February 28, 1985

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Bethesda, Maryland 20814

Attention: Mr. Albert Schwencer, Chief
Licensing Branch 2
Division of Licensing

Gentlemen:

EQUIPMENT QUALIFICATION
HOPE CREEK GENERATING STATION
DOCKET NO. 50-354

Pursuant to Public Service Electric and Gas Company's letter of February 1, 1985, (from R. L. Mittl to A. Schwencer) regarding equipment qualification, attached is PSE&G's response to Item No. 3 of Enclosure 2, "Performance Testing of BWR Safety/Relief Valves." This completes PSE&G's response to the Request for Additional Information - Equipment Qualification dated November 21, 1984.

Should you have any questions in this regard, please contact us.

Very truly yours,

R L Mittl

Attachment

C D. H. Wagner
USNRC Licensing Project Manager (w/attach.)

A. R. Blough
USNRC Senior Resident Inspector (w/attach.)

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ENCLOSURE 2
REQUEST FOR ADDITIONAL INFORMATION BY
THE EQUIPMENT QUALIFICATION BRANCH
TMI ACTION II.D.1

Question #3

The purpose of the test program was to determine valve performance under conditions anticipated to be encountered in the plants. Describe the events and anticipated conditions at the plant for which the valves are required to operate and compare these plant conditions to the conditions in the test program. Describe the plant features assumed in the event evaluations used to scope the test program and compare them to the features at your plant. For example, describe high level trips to prevent water from entering the steam lines under high pressure operating conditions as assumed in the test event and compare them to trips used at your plant.

Response

The purpose of the S/RV test program was to demonstrate that the Safety Relief Valve (S/RV) will open and reclose under all expected flow conditions. The expected valve operating conditions were determined through the use of analyses of accidents and anticipated operational occurrences referenced in Regulatory Guide 1.70, Revision 2. Single failures were applied to these analyses so that the dynamic forces on the safety and relief valves would be maximized. Test pressures were the highest predicted by conventional safety analysis procedures. The BWR Owners Group, in their enclosure to the September 17, 1980, letter from D. B. Waters to R. H. Vollmer, identified 13 events which may result in liquid or two-phase S/RV inlet flow that would maximize the dynamic forces on the safety and relief valve. These events were identified by evaluating the initial events described in Regulatory Guide 1.70, Revision 2, with and without the additional conservatism of a single active component failure or operator error postulated in the event sequence. It was concluded from this evaluation that the alternate shutdown cooling mode is the only expected event which will result in liquid at the valve inlet. Consequently, this was the event simulated in the S/RV test program. This conclusion and the test results applicable to HCGS are discussed below.

Response (Cont'd)

The S/RV inlet fluid conditions tested in the BWR Owners Group S/RV test program, as documented in NEDE-24988-P, are 15° to 50° subcooled liquid at 20 psig to 250 psig. These fluid conditions envelope the conditions expected to occur at HCGS in the alternate cooling mode of operation.

The BWR Owners Group identified 13 events by evaluating the initiating events described in Regulatory Guide 1.70, Revision 2, with the additional conservatism of a single active component failure or operator error postulated in the events sequence. These events and the plant-specific features that mitigate these events, are summarized in Table 1. Of these 13 events, only 10 are applicable to the HCGS plant because of its design and specific plant configuration. Three events, namely 5, 6, and 10 are not applicable to the HCGS plant for the reasons listed below:

1. Events 5 and 10 are not applicable because HCGS does not have an HPCS System.

2. Event 6 is not applicable because HCGS does not have RCIC head sprays.

For the 10 remaining events, the HCGS specific features, such as trip logic, power supplies, instrument line configuration, alarms and operator actions, have been compared to the base case analysis presented in the BWR Owners Group submittal of September 17, 1980. The comparison has demonstrated that in each case, the base case analysis is applicable to HCGS because the base case analysis does not include any plant features which are not already present in the HCGS design. For these events, Table 1 demonstrates that the HCGS specific features are included in the base analyses presented in the BWR Owners Group submittal of September 17, 1980. It is seen from Table 1, that all plant features assumed in the event evaluation are also existing features in the HCGS plant. All features included in this base case analysis are similar to plant features in the HCGS design. Furthermore, the time available for operator action is expected to be longer in the HCGS plant than in the base case analysis for each case where operator action is required.

Response (Cont'd)

Event 7, the alternate shutdown cooling mode of operation, is the only expected event which will result in liquid or two-phase fluid at the S/RV inlet. Consequently, this event was simulated in the BWR S/RV test program. In HCGS, this event involves flow of subcooled water (approximately 20°F subcooled) at a pressure of approximately 50 psig. The test conditions clearly envelope these plant conditions.

As discussed above, the BWR Owners Group evaluated transients including single active failures that would maximize the dynamic forces on the safety relief valves. As a result of this evaluation, the alternate shutdown cooling mode is the only expected event involving liquid or two-phase flow. Consequently this event was tested in the BWR S/RV test program. The fluid conditions and flow conditions tested in the BWR Owners Group test program conservatively envelope the HCGS plant specific fluid conditions expected for the alternate shudown cooling mode of operation.

TABLE 1 - EVENTS EVALUATED

Plant Features	#1 FW Cont. Fail., FW L8 Trip Failure	#2 Press. Reg. Fail.	#3 Transient HPCI, HPCI L8 Trip Failure	#4 Transient RCIC, RCIC L8 Trip Failure	#5 Transient HPCS, HPCS L8 Trip Failure	#6 Transient RCIC Hd. Spr.	#7 Alt. Shutdown Cooling, Shutdown Suction Unavailable	#8 MSL Brk OSC	#9 SBA, RCIC RCIC L8 Trip Failure	#10 SBA, HPCS, HPCS L8 Trip Failure	#11 SBA, HPCI, HPCI L8 Trip Failure	#12 SBA, Depress. & ECCS Over., Operator Error	#13 LBA, ECCS Overf. Brk Isol.
High Water Level 7 Alarm	X/S		X/S	X/S					X/S		X/S	X/S	X/S
High Drywell Pressure Alarm													
FW Level 8 Trip	X/S	X/S											
RCIC Level 8 Trip			X/S	X/S					X/S		X/S		X/S
HPCS Level 8 Trip				X/NA	NOT APPLICABLE	NOT APPLICABLE			X/NA	NOT APPLICABLE			X/NA
HPCI Level 8 Trip			X/S	X/S					X/S		X/S		X/S
HPCI/S and RCIC Initiation on Low Water Level	X/S	X/S	X/S	X/S				X/S	X/S				X/S
HPCI/S initiation on High Drywell Pressure			X/S	X/S					X/S		X/S	X/S	X/S
RCIC Initiation on High Drywell Pressure													X/NA

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TABLE 1 - EVENTS EVALUATED

Plant Features	#1 FW Cont. Fail., FW L8 Trip Failure	#2 Press. Reg. Fail.	#3 Transient HPCI, HPCI L8 Trip Failure	#4 Transient RCIC, RCIC L8 Trip Failure	#5 Transient HPCS, HPCS L8 Trip Failure	#6 Transient RCIC Hd. Spr.	#7 Alt. Shutdown Cooling, Shutdown Suction Unavailable	#8 MSL Brk OSC	#9 SBA, RCIC RCIC L8 Trip Failure	#10 SBA, HPCS, HPCS L8 Trip Failure	#11 SBA, HPCI, HPCI L8 Trip Failure	#12 SBA, Depress. & ECCS Over., Operator Error	#13 LBA, ECCS Overf. Brk Isol.
Low Pressure ECCS Initiation on High Drywell Pressure												X/S	X/S
Low Pressure, ECCS Initiation on Low Water Level													X/S
FW Pumps Trip on Low Suction Pressure	X/S												
Trip on High Backpressure According to Appendix B - should be HPCI			X/S								X/S		
RCIC Trip on High Backpressure				X/S	NOT APPLICABLE	NOT APPLICABLE			X/S	NOT APPLICABLE			
Turbine Trip on Vessel High Level	X/S	X/S											
MSIVs Closure on Low Turbine Inlet Pressure	X/S	X/S						X/S					
MSIVs Closure on High Steam FLow		X/S						X/S					
MSIVs Closure on High Steam Tunnel Temperature								X/S					

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TABLE 1 - EVENTS EVALUATED

Plant Features	#1 FW Cont. Fail., FW L8 Trip Failure	#2 Press. Reg. Fail.	#3 Transient HPCI, HPCI L8 Trip Failure	#4 Transient RCIC, RCIC L8 Trip Failure	#5 Transient HPCS, HPCS L8 Trip Failure	#6 Transient RCIC Hd. Spr.	#7 Alt. Shutdown Cooling, Shutdown Suction Unavailable	#8 MSL Brk OSC	#9 SBA, RCIC RCIC L8 Trip Failure	#10 SBA, HPCS, HPCS L8 Trip Failure	#11 SBA, HPCI, HPCI L8 Trip Failure	#12 SBA, Depress. & ECCS Over., Operator Error	#13 LBA, ECCS Overf. Brk Isol.
MSIV Closure on High Radiation								X/S					
Reactor Scram on Turbine Trip	X/S	X/S											
Reactor Scram on Neutron Flux Monitor		X/S			NOT APPLICABLE	NOT APPLICABLE				NOT APPLICABLE			
Reactor Scram on MSIVs Closure		X/S											
Reactor Scram on High Radiation								X/S					
Reactor Scram on High Drywell Pressure									X/S		X/S	X/S	X/S
Reactor Scram on Low Water Level													X/S
Reactor Isolation on Low Water Level - Assuming Level 2 - Isolation with exception of MSIVs Level 1 - Isolation of MSIVs													X/S

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