PP&L Pennsylvania Power & Light Company
Two North Ninth Street • Allentown, PA 18101 • 215 / 770-5151

Norman W. Curtis
Vice President-Engineering & Construction-Nuclear
215/770-7501

MAR 0 2 1984

Dr. Thomas E. Murley
Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

SUSQUEHANNA STEAM ELECTRIC STATION
SECOND INTERIM REPORT ON A DEFICIENCY INVOLVING
IMPROPER RELIEF VALVE SETTINGS, DESIGN PRESSURES,
AND DESIGN TEMPERATURES FOR UNIT 2
ER 100508 FILE 821-10
PLA-2075 Docket No. 50-388

References:
(1) PLA-1972 dated Nov. 30, 1983
(2) PLA-1976 dated Dec. 5, 1983
(3) NRC Meeting Report No. 50-387/83-26; 50-388/83-27 dated Dec. 9, 1983
(4) PLA-2006 dated Dec. 20, 1983 (First Interim Report)

Dear Dr. Murley:

This letter serves to provide the Commission with a second interim report on a deficiency involving improper relief valve settings, design pressures, and design temperatures within several Unit 2 systems. This deficiency was reported under 10CFR50.55(e) as potentially reportable by telephone to Mr. E. C. McCabe of NRC Region I by Mr. J. Saranga and Mr. A. Sabol of PP&L on November 18, 1983.

Attachment 1 to this letter contains a description of the problem, the safety implications, the cause, and the correction actions. Attachment 2 is a list of discrepancies identified since the submittal of the first interim report (Reference (4)). Attachment 3 provides the status on hydrotesting for the lines listed under Reference (4).

Since the details of this report provide information relevant to the reporting requirements of 10CFR21 for Unit 2, this correspondence is considered to also discharge any formal responsibility PP&L may have for reporting in compliance thereto.

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We trust the Commission will find this report to be satisfactory. We expect to provide a final report prior to Unit 2 initial criticality.

Very truly yours,

N W Curtis

N. W. Curtis
Vice President-Engineering & Construction-Nuclear

Attachments

MAR 02 1984

Copy to:
Mr. Richard C. DeYoung (15)
Director-Office of Inspection & Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. G. McDonald, Director
Office of Management Information & Program Control
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. R. H. Jacobs
U.S. Nuclear Regulatory Commission
P.O. Box 52
Shickshinny, PA 18655

Mr. K. Manoly
U.S. Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, PA 19406

Records Center
Institute of Nuclear Power Operations
1100 Circle 75 Parkway, Suite 1500
Atlanta, GA 30339

ATTACHMENT 1

INTERIM REPORT

SUBJECT

Improper relief valve settings, design pressures, and design temperatures used for piping systems at Susquehanna.

DESCRIPTION

On October 9, 1983 as a result of the evaluation of an operational problem with a leaking check valve, it was discovered that over pressure protection devices had been installed within the high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) systems with set points higher than the system design pressures. Further investigation revealed additional discrepancies. Twelve (12) deficiencies were discussed in the first interim report (Reference (4)).

The design temperatures and pressures for Susquehanna Units 1 & 2 are listed in project specification M-199. The values for the design temperatures and pressures listed in M-199 are determined through standard engineering practices for system design. These practices include determining the most limiting operational conditions within a particular system. Once the most limiting operational conditions are determined, the pressure and temperature values corresponding to this condition are calculated. The process is an iterative one and the values are subject to change due to system alterations or enhancements.

To confirm the adequacy of safety related piping at Susquehanna, PP&L directed Bechtel to perform a complete review of all Q-listed piping in specification M-199. Lines which are not significantly different between Units 1 & 2 were reviewed only for one Unit. In addition, Teledyne Engineering Services was retained for an independent design review. Teledyne's investigation covers a review of the design temperatures, pressures, and relief valve settings for the following systems:

1. high pressure coolant injection (HPCI)
2. reactor core isolation cooling (RCIC)
3. residual heat removal (RHR)
4. core spray (CS)
5. emergency service water (ESW)
6. reactor building closed cooling water (RBCCW)
7. containment instrument gas

Attachment 2 is a list of discrepancies identified by Bechtel/Teledyne since the submittal of Reference (4).

A discrepancy in the ESW system was discussed in Reference (4). This deficiency arose in part because Bechtel failed to consider static head in some locations and therefore used an inadequate design pressure (the maximum service pressure is 177 psig but Bechtel chose 136 psig). The corrective action for these discrepancies was to re-hydro the system. Prior to the re-hydro, the ESW system was reviewed to insure that all components could withstand the new hydro pressure. During this review, it was discovered that

the cast iron RHR pump seal coolers experience pressures as high as 177 psig. It was also discovered that the coolers were not seismically qualified.

Another discrepancy discussed in Reference (4) involved the RHR drywell spray header. A stress analysis performed by Bechtel concluded that this line and its associated hangers are adequate to withstand containment post-LOCA environmental conditions.

ANALYSIS OF SAFETY IMPLICATIONS

With the exception of the RHR pump seal coolers, no discrepancy has been identified that would have affected the safe operation of the plant had it gone undiscovered. The RHR pump seal coolers are fabricated from cast iron. The new design pressure of 177 psig is near the bursting pressure of cast iron. In addition, it was discovered that the coolers were not seismically qualified. Consequently, a common mode failure of the seal coolers could cause flooding of the RHR pump rooms, thus disabling all RHR pumps. This deficiency is considered reportable under 10CFR50.55(e) for Unit 2 and was reported under 10CFR50.72 for Unit 1 on February 9, 1984.

CAUSE

The discrepancies identified in this report can be categorized similarly to those identified in Reference (4) as one of three types of deficiencies:

(1) Inadequate overpressure protection. These deficiencies arose from an apparent breakdown in internal communications within Bechtel. The relief valves were purchased and installed without considering refinements of system design pressures. Consequently, in some cases relief valves were installed with activating pressure setpoints higher than the design pressures of lines they were installed on.

(2) Improper design pressure. The problems involving improper design pressures stem from not identifying the most limiting operating occurrences. For example:

   (a) In the lines within the control structure chilled water system, it appears that the Bechtel design engineer failed to recognize the potential overpressurization of the system expansion tank due to leakage from the instrument air system.

   (b) In the containment atmospheric control system, the design pressure (44 psig) did not account for the diaphragm pump discharge pressure (85 psig) or the nitrogen supply maximum pressure (150 psig).

   (c) The fuel pool cooling and clean-up system discrepancy was a result of not considering the static head contribution of the water volume in the skimmer surge tank.

(3) Improper design temperatures. Deficiencies involving improper design temperatures were caused by not identifying the most limiting operating occurrences and in one case by not considering the effects of a system enhancement:

(a) The discrepancy in the diesel auxiliaries involving an improper design temperature arose from a failure on the part of the Bechtel design engineer to consider the exhaust temperature of the system air compressor. While it can be seen that not all of the listed piping would really be exposed to this temperature, in the absence of a detailed analysis to determine the actual system temperature profile, it was decided to re-analyze all of the listed piping for the conservative temperature of 150°F.

(b) In the containment atmospheric control system, heat tracing was added following the completion of the system design in order to minimize condensation in these lines. This heat tracing was added at the suggestion of an equipment vendor without consideration of the temperature effects upon the piping.

(c) The discrepancies listed under the HPCI system which involve improper design temperatures were caused by not considering the maximum water temperature which could reach HPCI post-LOCA.

CORRECTIVE ACTION

PP&L and Bechtel have now completed the review of Q-listed piping in specification M-199 and a review of connected equipment associated with lines where discrepancies were identified. Additionally, all audit findings generated to date as a result of Teledyne's independent review have been dispositioned. With the exception of the RHR pump seal cooler problem, no discrepancies were identified which would have affected the ability of the piping to function safely.

Attachment 2 provides a list of discrepancies which have been identified since the submittal of the first interim report (Reference (4)). The lines listed in Attachment 2 which require hydrotesting:

(1) Have completed this testing for the Unit 1 and common lines

(2) Will complete this testing for the Unit 2 lines prior to initial criticality

Attachment 3 provides the status of hydrotesting on the lines listed in Reference (4).

The RHR pump seal coolers will be replaced with coolers designed to withstand higher pressures. The installation configuration of the new coolers will be seismically qualified per FDDR KR1-5005 & FDDR KR2-428. The Unit 1 coolers were replaced under DCP 84-3014. The Unit 2 coolers will be replaced prior to initial criticality under DCP 84-3018. In the containment instrument gas system it was decided to replace the relief valve springs rather than re-hydro the system. The pipe in this system was capable of withstanding pressures at the old spring setting. The springs have been replaced on Unit 1 and will be replaced on Unit 2 prior to initial criticality. These replacements are tracked under NCR 84-172 (Unit 1) and NCR 84-173 (Unit 2).

Specification M-199 will be revised to reflect all new design conditions, and all code data reports will be amended following the completion of hydrotesting. PP&L will provide a final report on this deficiency after we receive final reports from Bechtel and Teledyne regarding their respective reviews. These reports are scheduled for release by the end of March. Based on that schedule, PP&L anticipates providing a final report on this deficiency prior to Unit 2 initial criticality.

System/P&ID	Line No.	Problem	Problem Resolution	Field Action Required
Containment Atmos Control/ M-157 & M-2157	HCB-208	Design Temp = 200°F Levels are heat traced to 285°F	1. Reanalyze line to 285°F 2. Revise Spec. M-199 3. Revise Code Data Report	None
	HCB-209	"	"	"
	HCB-226	"	"	"
	HCB-227	"	"	"
	HCB-108	"	"	"
	HCB-109	"	"	"
	HCB-126	"	"	"
	HCB-127	"	"	"
	HCB-225	Design Pressure = 44 psig Diaphragm pmp discharge = 85 psig N_2 Supply Design Press.=150 psig	1. Rehydro piping to 190 psig 2. Revise Spec. M-199 to show design of 150 psig 3. Revise Code Data Report	Rehydro piping
	HCB-226	"	"	"
	HCB-125	"	"	"
	HCB-126	"	"	"
	HCB-254	Design Pressure = 44 psig Diaphragm Pump Discharge = 85 psig	1. Reset pump bypass valve to reduce discharge pressure or rehydrotest to 107 psig. 2. Revise Spec. M-199 to show design of 85 psig (only if hydrotest performed). 3. Revise Code Data Report (only if hydrotest performed).	Reset pump bypass valve or rehydrotest
	HCB-255	"	"	"
	HCB-154	"	"	"
	HCB-155	"	"	"

Attachment 2 pg 1 of 6

System/P&ID	Line No.	Problem	Problem Resolution	Field Action Required
Containment Atmos Control/ M-157 & M-2157	HBB-218	Design Pressure = 44 psig N_2 Supply Pressure = 150 psig	1. Rehydrotest piping to 190 psig 2. Revise Spec. M-199 to show design of 150 psig 3. Revise Code Data Report	Rehydrotest piping
	HBB-118	"	"	"
	HCB-215	Design pressure = 30 psig System Max. Pressure = 39 psig	1. Rehydrotest piping to 50 psig 2. Revise Spec. M-199 to show design = 39 psig 3. Revise Code Data Reports	Rehydrotest piping
	HCB-115	"	"	"
	HCB-219	"	"	"
	HCB-119	"	"	"
Containment Instrument Gas/ M-126 & M-2126	CCC-201	Design Pressure = 2200 psig Relief Valve Setting = 2500 psig	1. Reset Relief Valve to 2200 psig (New spring to be purchased by NPE)	Reset Relief Valve
	CCC-202	"	"	"
	CCC-101	"	"	"
	CCC-102	"	"	"
RCIC/ M-126 & M-2126	HBB-201	Design temperature = 267°F Actual Operating Max temp = 297°F	1. Reanalyze piping for 297°F 2. Revise Code Data Reports (M-199 has already been revised)	None
	HBB-101	"	"	"
	HBD-2138	Design Pressure = 75 psig This line connects to HBB-215 which has a design pressure = 150 psig	1. Perform Initial Service Leak test 2. Revise Spec. M-199 to show design = 150 psig	Perform Leak Test
	HBD-1138	"	"	"

System/P&ID	Line No.	Problem	Problem Resolution	Field Action Required
HPCI/ M-156 & M-2156	HBD-2135	Design Pressure = 50 psig This line connects to HBB-235 and HBB-208 which are designed for 175 psig	1. Perform initial service leak test 2. Revise Spec. M-199 to show design = 175 psig	Perform Leak Test
	HBD-1135	"	"	"
	HBB-234	Design temp. = 140°F Process temp. may reach 170°F	1. Reanalyze piping for 170°F 2. Revise Spec M-199 to show design temp = 170°F 3. Revise Code Data Reports	None
	HBB-2133	Design temp = 140°F Process temp. may reach 170°F	1. Reanalyze piping for 170°F 2. Revise Spec. M-199 to show design temp = 170°F 3. Revise Code Data Reports	None
	HBB-134	"	"	"
	HBB-1133	"	"	"
Diesel/Aux. M-134	GBC-2	Design pressure = 260 psig Relief Valve Settings = 265 psig Design Temp = ambient Exhaust temp. of compressor = 150°F	1. Revise Spec. M-199 to show design = 265 psig (Due to small change in pressure, the original hydrotest is still considered valid). 2. Revise Code Data Reports 3. Reanalyze piping for 150°F 4. Revise Spec. M-199 to show design temp. = 150°F 5. Revise Code Data Reports	None
	GBC-3	"	"	"
	GBC-4	"	"	"
	GBC-5	"	"	"
	GBC-6	"	"	"
	GBC-7	"	"	"
	GBC-8	"	"	"

System/P&ID	Line No.	Problem	Problem Resolution	Field Action Required
Diesel Aux./ M-134	GBC-22	Design temp = ambient Exhaust temp of compressor = 150°F	1. Reanalyze piping for 150°F 2. Revise Spec. M-199 to show design temp = 150°F 3. Revise Code Data Reports	None
	GBC-23	"	"	"
	GBC-24	"	"	"
	GBC-25	"	"	"
	GBC-26	"	"	"
	GBC-27	"	"	"
	GBC-28	Design Temp = ambient Exhaust temp of compressor = 150°F	1. Reanalyze piping for 150°F 2. Revise Spec. M-199 to show design temp = 150°F 3. Revise Code Data Reports	None
	GBC-29	"	"	"
Control Str. Chilled Water/ M-186	HBD-58	Design pressure = 50 psig System may see 130 psig with over pressurization of expansion tank	1. Perform initial Service Leak Test 2. Revise Spec. M-199 to show design = 130 psig	Perform Leak Test
	HBD-59	"	"	"
	HBD-98	"	"	"
	HBD-99	"	"	"
	HBD-61	"	"	"
	HBD-67	"	"	"
	HBD-3002	"	"	"
	HBD-3004	"	"	"

System/P&ID	Line No.	Problem	Problem Resolution	Field Action Required
Control Str. Chilled Water/ M-186	HBD-68	Design pressure = 50 psig Relief Valve setting = 60 psig	1. Perform initial Service Leak Test 2. Revise Spec. M-199 to show design = 60 psig	Perform Leak Test
	HBD-69	"	"	"
	HBD-3011	"	"	"
	HBD-3005	"	"	"
	HBD-60	Design pressure = 65 psig System may see 130 psig with over pressurization of expansion tank	1. Perform initial Service Leak Test 2. Revise Spec. M-199 to show design = 130 psig	Perform Leak Test
	HBD-62	Design pressure = 75 psig "	"	"
	HBD-3001	Design pressure - 65 psig "	"	"
	HBD-3003	Design pressure - 75 psig "	"	"
	HBD-1147	Design pressure = 65 psig "	"	"
	HBD-1148	"	"	"
	HBD-1149	"	"	"
	HBD-1150	"	"	"
	HBD-2147	"	"	"
	HBD-2148	"	"	"
	HBD-2149	"	"	"
	HBD-2150	"	"	"

Attachment 2 Pg 5 of 6

System/P&ID	Line No.	Problem	Problem Resolution	Field Action Required
Fuel Pool Cooling & Cleanup/M-153 & M-2153	HBC-217	Design pressure = 30 psig Static head not considered, should be 55 psig	1. Perform hydrotest to 70 psig 2. Revise Spec. M-199 to show design = 55 psig 3. Revise Code Data Report	Perform hydrotest
	HBC-117	"	"	"

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Attachment 2 pg 6 of 6

ATTACHMENT 3

Hydrotesting status on lines listed in PLA-2006 dated 12/20/83.

Hydrotesting Complete

RCIC Turbine Exhaust	HBB-101, HBB-201
HPCI Pump Suction	HBB-107, HBB-207
Core Spray Pumps Suction	HBB-104, HBB-204
RCIC Discharge to Barometric Condenser	HBB-115, HBB-215
HPCI Turbine Drains to Turbine Exhaust	HBB-135, HBB-235

Hydrotesting Exempt - previous hydro sufficient to cover new design pressure.

RCIC Pump Suction	HBB-103, HBB-203
RCIC Vacuum Pump Discharge to Pump Suction	HBB-139, HBB-239
RHR Steam Relief to Suppression Pool	HBB-120, HBB-220

Hydrotesting Incomplete

Hydrotesting on various instrument lines off the lines listed under Hydrotesting Complete has not been done on Unit 1. These lines will be tested after Unit 1 startup. Postponing this testing until after Unit 1 startup is justified for the following reasons:

1. These lines have been operated at design pressures and temperatures for over a year without any difficulties.

2. The weakest components in these instrument lines are flexible hose connections which have a working pressure of 1610 psig and a burst pressure of 6440 psig while the highest design pressure is 1480 psig. Therefore, it can be seen that a sizable safety margin exists.

3. There has never been a case at Susquehanna where a line has failed to pass a hydrotest.