



Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge, New Jersey 08038  
Hope Creek Generating Station

December 12, 1990

U. S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

Dear Sir:

HOPE CREEK GENERATING STATION  
DOCKET NO. 50-354  
UNIT NO. 1  
LICENSEE EVENT REPORT 90-026-00

This Licensee Event Report is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv).

Sincerely,

J.J. Hagan  
General Manager -  
Hope Creek Operations

RBC/

Attachment  
SORC Mtg. 90-113

C Distribution

The Energy People

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LICENSEE EVENT REPORT

FACILITY NAME (1)										DOCKET NUMBER (2)					PAGE (3)					
HOPE CREEK GENERATING STATION										0	5	0	0	0	3	5	4	1	OF	5

TITLE (4): HIGH PRESSURE COOLANT INJECTION (HPCI) SYSTEM DECLARED INOPERABLE DUE TO BROKEN PIPE SUPPORT ON HPCI STEAM SUPPLY LINE - SYSTEM DESIGN INADEQUACIES

EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)					
MONTH	DAY	YEAR	YEAR	**	NUMBER	**	REV	MONTH	DAY	YEAR	FACILITY NAME(S)			DOCKET NUMBER(S)	
1	1	1490	90	-	026	-	00	1	2	1290					

OPERATING MODE (9)		2	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR: (CHECK ONE OR MORE BELOW) (11)																							
POWER LEVEL	0	0	0	20.402(b)	20.405(a)(1)(i)	20.405(a)(1)(ii)	20.405(a)(1)(iii)	20.405(a)(1)(iv)	20.405(a)(1)(v)	20.405(a)(1)(v)	20.405(a)(1)(v)	20.405(c)	50.36(c)(1)	50.36(c)(2)	50.73(a)(2)(i)	50.73(a)(2)(ii)	50.73(a)(2)(iii)	50.73(a)(2)(iv)	50.73(a)(2)(v)	50.73(a)(2)(vii)	50.73(a)(2)(viii)(A)	50.73(a)(2)(viii)(B)	50.73(a)(2)(x)	73.71(b)	73.71(c)	OTHER (Specify in Abstract below and in Text)

LICENSEE CONTACT FOR THIS LER (12)																			
NAME										TELEPHONE NUMBER									
Richard Cowles, Senior Staff Engineer - Technical										6	0	9	3	3	9	3	4	3	1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE NOTED IN THIS REPORT (13)															
CAU.	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS?	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS?						
B	BJ	SPT	I207	Y											

SUPPLEMENTAL REPORT EXPECTED? (14)		YES	NO	XX	DATE EXPECTED (15)			MONTH	DAY	YEAR					

ABSTRACT (16)

On 11/14/90, in preparation for restart following a forced outage, a warmup of the High Pressure Coolant Injection (HPCI) system steam supply lines was conducted. Following completion of the warmup procedure, the HPCI System Engineer conducted a visual inspection of all HPCI system steam supply line pipe supports within the HPCI room. This inspection revealed that one of the pipe support struts on the steam supply line was bent. At 1600, the System Engineer informed the control room of these findings, and the Senior Nuclear Shift Supervisor (SNSS, SRO licensed) declared the HPCI system inoperable (HPCI is required to be operable in Operational Condition 2). A work request was initiated to repair the bent support strut, the support strut was repaired, and HPCI was declared operable at 0245 on 11/15/90. Evaluation subsequent to the discovery determined that deformation of the support strut occurred during the HPCI steam supply line warmup evolution due to pipe movement. The primary cause of this occurrence is a design inadequacy in the steam supply line drain path. The design of the steam supply line drainage path renders the line susceptible to condensation buildup and water hammer during the warmup process. Interim corrective actions include initiating a design change request to enhance pipe support on the affected steam supply line, evaluating the need for a startup drain path on the steam supply line, procedural enhancements to the HPCI system warmup procedure, and reviewing this event during licensed operator requalification training.

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PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor (BWR/4)  
 High Pressure Coolant Injection System (EIIS Designation: BJ)

IDENTIFICATION OF OCCURRENCE

High Pressure Coolant Injection (HPCI) System Inoperable Due to Broken Pipe Support on HPCI Steam Supply Line - System Design Inadequacy

Event Date: 11/14/90

Event Time: 1600

This LER was initiated by Incident Report No. 90-150

CONDITIONS PRIOR TO OCCURRENCE

Plant in OPERATIONAL CONDITION 2 (Startup), plant restart in progress, reactor subcritical.

DESCRIPTION OF OCCURRENCE

On 11/14/90 at 1600, the HPCI System Engineer informed the Senior Nuclear Shift Supervisor (SNSS, SRO licensed) that a HPCI system steam supply line support strut in the HPCI room was discovered bent during a visual inspection. The SNSS declared HPCI inoperable, and a work request was initiated to repair the support strut. The SNSS also initiated a four hour non-emergency phone report, per 10CFR50.72, due to the HPCI system (single train safety system) being inoperable when it was required to be operable.

APPARENT CAUSE OF OCCURRENCE

Engineering evaluation subsequent to the discovery determined that deformation of the support strut occurred during a HPCI steam supply line warmup evolution conducted on 11/14/90. During this evolution, movement of the piping occurred, causing the support strut to bend. The primary cause of the bent pipe support strut is a design inadequacy of the HPCI steam supply line drain path. The design of the steam supply line drainage path, while adequate during normal (standby) operation, renders the line susceptible to condensation buildup and water hammer during the warmup process at lower system temperatures and pressures.

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ANALYSIS OF OCCURRENCE

On 11/14/90, in preparation for restart following a forced outage, a warmup of the HPCI system steam supply lines was conducted. Prior to conducting the warmup evolution, the HPCI System Engineer inspected all associated pipe supports in the HPCI room because of past problems with the subject support strut. No discrepancies were noted during this inspection. Following the warmup evolution, the pipe supports were again inspected, and the subject support strut was discovered bent.

A long term engineering resolution to the problems described above has been ongoing since the first of two previous occurrences (one in 1987, one in March of 1990). In 1987, extensive engineering evaluation determined that pipe deflection was occurring due to a combination of temperature stratification during initial steam admission to the supply line and water hammer due to entrained condensate in the line.

The primary solution to the temperature stratification concerns was ensuring that all warmups of the HPCI steam supply line were conducted very slowly. In this manner, line temperatures would increase more uniformly, resulting in less bowing of the piping, and thus, less stress on the support strut. Procedure changes were instituted to modify the steam supply line warming evolution.

In addition, the engineering evaluation identified the source of entrained condensate to be a backup of HPCI steam supply line condensate during warming. The design of the steam supply line drain path is not adequate to ensure complete draining of the steam supply line during warmup. This condition results in condensate backup in the steam supply line during warmup, and leads to water hammer until system pressure overcomes the static head in the drain path, and condensate begins to drain from the line. A design change was initiated in 1987 to install a HPCI steam supply line startup drain path, however, the design change was subsequently cancelled because it was felt that the above described procedure enhancements would alleviate condensate buildup.

Additionally, the design of the subject pipe support strut, while adequate during normal system operation (standby mode) may not be adequate to dampen steam supply line movement during the warmup process. Systems Engineering has requested that the Nuclear Engineering Department re-evaluate the acceptability of the current pipe support strut.



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PREVIOUS OCCURRENCES

As noted earlier in this report, the subject pipe support strut has been discovered damaged on two occasions in the past. In 1987, the support strut was discovered damaged during an ISI inspection. As HPCI was already inoperable for maintenance at the time of discovery, it was not necessary to declare HPCI inoperable. In response to this event, procedural changes were made, and an inspection of all HPCI room pipe supports was initiated following all warmups of the HPCI steam supply line. In March of 1990, the support strut was again discovered damaged, with the plant in Operational Condition 4 (cold shutdown). Per Technical Specifications, HPCI is not required to be operable in Operational Condition 4. Corrective actions included an engineering evaluation of the strut to determine its adequacy in supporting the HPCI steam supply line during warmup evolutions.

SAFETY SIGNIFICANCE

Evaluation of potential additional pipe support stresses induced as a result of a postulated complete failure of the subject support strut indicates that minimal additional loading of adjacent pipe supports would occur. The HPCI system would have been able to perform its intended function if required at the time the bent strut was discovered. The required inspection of HPCI room pipe supports and snubbers preceding and following any warmup of the HPCI line ensures that any nonconforming pipe support will be discovered as soon as possible following warmup of the system.

Additionally, at the time of this occurrence, all other required ECCS systems (Core Spray system, Low Pressure Coolant Injection mode of Residual Heat Removal, and Automatic Depressurization System) were operable and capable of performing ECCS functions if needed.

CORRECTIVE ACTIONS

1. A design change request will be initiated to provide a startup drain path for the HPCI steam supply line. This change will prevent condensate buildup in the line during system warmup evolutions, and eliminate the potential for water hammer in the line.

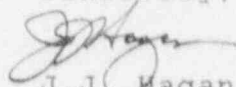
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CORRECTIVE ACTIONS, CONT'D

2. In the interim, the HPCI system operating procedure will be revised to include instructions for draining the HPCI steam supply line, during warmup evolutions, via a temporary hose to be connected between the HPCI steam supply line drain pot and steam trap.
3. A design change request has been initiated to modify the the pipe support strut to accommodate HPCI steam supply line movement during system warmup evolutions.
4. This report will be reviewed with all licensed operating personnel during the next requalification training cycle, stressing the procedurally required HPCI system warmup process and the need for ensuring adequate drainage of the steam supply line prior to and during the warmup process.

Sincerely,



J.J. Hagan  
General Manager -  
Hope Creek Operations

RBC/

SORC Mtg. 90-113