NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Hope Creek Generating Station	05000354	1 OF 4

TITLE (4)
Potential Loss of Containment Integrity Due to Water Hammer in Drywell Cooler Piping

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
12	20	96	96	-- 028 --	00	1	20	97	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
POWER LEVEL (10)	100	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(viii)
		20.2203(a)(1)	20.2203(a)(3)(i)	50.73(a)(2)(ii)	50.73(a)(2)(x)
		20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
		20.2203(a)(2)(ii)	20.2203(a)(4)	50.73(a)(2)(iv)	OTHER
		20.2203(a)(2)(iii)	50.36(c)(1)	X 50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
James Priest, Lead Engineer - Licensing and Regulation	(609) 339-5434

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On 12/20/96, Engineering personnel completed evaluations of water hammer concerns discussed in Generic Letter 96-06, "Assurance of Equipment Operability and Containment." Based upon these evaluations, Engineering concluded that a potential exists for primary containment integrity to be adversely impacted when drywell cooler isolation interlocks are defeated in accordance with emergency operating procedures. Specifically, these actions could result in a water hammer when attempting to place the drywell coolers in service under specific post LOCA drywell conditions. Since the chilled water system containment penetration was not designed for the effects of a water hammer, containment integrity could be lost. This issue represented a condition alone which could have prevented the ability to control the release of radioactive materials, and in accordance with the requirements of 10 CFR 50.72(b)(2)(iii), a four hour report was made at 1606 hours. The cause of this event is attributed to an inadequate evaluation of the potential for creating water hammer loads in post LOCA scenarios as described in Generic Letter 96-06. Corrective actions include implementing administrative controls to prevent the defeating of the drywell cooler isolation interlocks in post LOCA conditions.

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor (BWR/4)

Drywell Cooler System - EIIS Identifier {VB}

IDENTIFICATION OF OCCURRENCE

Event date: 12/20/96
Discovery date: 12/20/96
Date determined to be reportable: 12/20/96

Problem Report 961220079

CONDITIONS PRIOR TO OCCURRENCE

Plant was in OPERATIONAL CONDITION 1 (POWER OPERATION).
Reactor was at 100% of rated thermal power.

There were no systems, structures or components that were inoperable at the time of the event that contributed to the event.

DESCRIPTION OF OCCURRENCE

On December 20, 1996, the Hope Creek Generating Station Engineering personnel completed evaluations of water hammer concerns discussed in Generic Letter 96-06, "Assurance of Equipment Operability and Containment." Based upon these evaluations, Engineering concluded that a potential exists for primary containment integrity to be adversely impacted when drywell cooler isolation interlocks are defeated in accordance with Emergency Operating Procedure HC.OP-EO.ZZ-0102A(B). Specifically, this Emergency Operating Procedure (EOP) directs the operator to place all drywell coolers in service (by defeating the containment isolation interlocks) when high drywell temperatures exist in post LOCA scenarios. However, this action could result in a water hammer when attempting to place the drywell coolers in service under specific post LOCA drywell conditions. Since the drywell cooler system containment penetration was not designed for the effects of a water hammer, implementation of the EOP could have resulted in the loss of containment integrity. Since this issue represented a condition alone which could have prevented the ability to control the release of radioactive materials, a four hour report was made at 1606 hours in accordance with the requirements of 10 CFR 50.72(b)(2)(iii).

On 12/20/96, administrative controls were implemented to prevent the defeating of the drywell cooler isolation interlocks during post LOCA conditions. Since the design and licensing bases of Hope Creek do not

DESCRIPTION OF OCCURRENCE (Continued)

require the use of the drywell coolers to mitigate the consequences of an accident, no Technical Specification actions or other compensatory measures were required to be taken in order to implement the administrative controls.

ANALYSIS OF OCCURRENCE

On 9/30/96, the NRC issued Generic Letter 96-06 to provide notification about safety-significant issues that could affect containment integrity and equipment operability during accident conditions. These issues concerned: 1) susceptibility of cooling water systems serving containment air coolers to the effects of water hammer and/or two phase flow; and 2) over-pressurization of isolated water-filled piping sections in containment during LOCA or Main Steam Line Break (MSLB) conditions.

The system which supports the drywell coolers at Hope Creek is a closed-loop system supplying cooling water to various non-safety related air handling units. In the event of a LOCA, power to the drywell coolers will be tripped automatically and the containment isolation valves will close. As required by the Generic Letter, Engineering personnel have evaluated the above issues for impact on this system.

From this evaluation, Engineering concluded that the water hammer concern had the potential to adversely impact containment integrity under specific post LOCA/MSLB conditions when the drywell coolers are placed into service in accordance with Hope Creek's EOPs. Engineering personnel determined that a water hammer could occur: 1) anytime the water in the drywell coolers is greater than 250 degrees F and the isolation interlocks are defeated; or 2) if water in the drywell coolers, which initially is less than 250 degrees F, is heated then cooled prior to defeating the containment isolation interlocks. Due to the presence of relief valves on the piping in the drywell, water inventory would be lost as the temperature rises, and when the water cools, pressure may decrease below the saturation pressure. These conditions would enable the formation of voids in the piping, which would result in a water hammer when the drywell coolers are placed into service. Since the system containment penetration was not designed for these water hammer loads, containment integrity could be challenged during specific post LOCA scenarios.

APPARENT CAUSE OF OCCURRENCE

Hope Creek EOP HC.OP-EO.ZZ-0102 directs the operator to defeat the chilled water system isolation interlocks to place the drywell coolers into service during post LOCA conditions. This action was formally incorporated into the EOPs through revisions made in the late 1980s. This EOP revision represented an opportunity to identify this problem, but the capability

to utilize this isolation interlock design feature had existed since plant startup. Justification for this EOP revision utilized information from the approved BWR Owners Group Emergency Procedures Guidelines; however, the potential for creating water hammer loads in post LOCA scenarios was not adequately evaluated when the plant was designed. The failure to properly perform an evaluation of the effects of water hammer loads is attributed as the cause of this event.

ASSESSMENT OF SAFETY CONSEQUENCES

In accordance with 10 CFR 50, Appendix A, Criterion 16, the containment design requires the containment and associated systems to establish an essentially leak-tight barrier against the uncontrolled release of radioactivity to the environment and to assure that the containment design conditions important to safety are not exceeded for as long as postulated accident conditions require. Since the postulated water hammer could have resulted in the loss of this required containment integrity, there were adverse potential safety consequences associated with this event. The postulated water hammer does not impact other systems designed to mitigate the consequences of an accident.

PREVIOUS OCCURRENCES

There have been no similar occurrences previously reported by Hope Creek.

CORRECTIVE ACTIONS

On 12/20/96, administrative controls were implemented to prevent the defeating of the drywell cooler isolation interlocks in post LOCA conditions. To address the water hammer issue, either: 1) revisions to the Hope Creek EOPs will be made to address overriding of the containment isolation interlocks of the chilled water system; or 2) the affected containment penetrations will be reanalyzed or modified to accommodate the water hammer loads. Final implementation of corrective actions to resolve this issue will be completed by the end of the next refueling outage (RFO7).

Engineering evaluations of the impact on Hope Creek of the water hammer, two-phase flow and over-pressurization issues discussed in Generic Letter 96-06 have been completed and the results will be transmitted to the NRC (in the response to Generic Letter 96-06) by 1/28/97.

PSEG

Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge, New Jersey 08038-0236

Nuclear Business Unit

JAN 20 1997

LR-N97023

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 NO. 96-028-00

This Licensee Event Report entitled, "Potential Loss of Containment Integrity Due to Water Hammer in Drywell Cooler Piping," is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(v).

Sincerely,

for HCO

Mark Bezilla
General Manager -
Hope Creek Operations

Attachment

JPP
SORC Mtg. 97-003

C Distribution
LER File

9701240300

Attachment A

The following items represent commitments that Public Service Electric & Gas (PSE&G) made to the Nuclear Regulatory Commission (NRC) relative to this LER (354/96-028-00). The commitments are as follows:

On 12/20/96, administrative controls were implemented to prevent the defeating of the drywell cooler isolation interlocks in post LOCA conditions. To address the water hammer issue, either: 1) revisions to the Hope Creek EOPs will be made to address overriding of the containment isolation interlocks of the chilled water system; or 2) the affected containment penetrations will be reanalyzed or modified to accommodate the water hammer loads. Final implementation of corrective actions to resolve this issue will be completed by the end of the next refueling outage (RFO7).

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