PSEG

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

Nuclear Business Unit

APR 12 1996

LR-N96101

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. 96-009-00

This Licensee Event Report entitled "Operation In An Unanalyzed Condition Due To Inappropriate Service Water System/Safety Auxiliaries Cooling System Throttle Valve Settings" is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(ii).

Sincerely,

Mark E. Reddemann
General Manager -
Hope Creek Operations

JPP
SCRC Mtg. 96-045

C Distribution
LER File

190045

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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)

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TITLE (4)

Operation In An Unanalyzed Condition Due To Inappropriate Service Water System/Safety Auxiliaries Cooling System Throttle Valve Settings

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
3	17	96	96	-- 009 --	00	4	16	96	FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)	4	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
POWER LEVEL (10)	0	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)	X 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)	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, 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 3/17/96, during Hope Creek's sixth refueling outage, Engineering determined that the as-found positions of the Service Water to Safety Auxiliaries Cooling System (SSWS/SACS) heat exchanger throttle valves were inconsistent with assumptions used in calculations for SSWS/SACS operation. Engineering subsequently determined that this discrepancy would result in unaccounted flow resistance and non-conservative SSWS flow under worst case design basis conditions. The throttle valves were re-positioned on 3/17/96 to support SSWS/SACS operation under the worst case design basis conditions. The investigation into this event determined that SSWS/SACS performance would be degraded under coincident worst case design basis conditions, resulting SACS temperatures exceeding operational limits and in an increase in the time required for the plant to reach Cold Shutdown conditions. However, Hope Creek has never experienced these combined conditions, and as a result, SSWS/SACS could meet its required flows when the throttle valves were in their as-found condition. The cause of the event has been attributed to deficient engineering evaluation procedures, which do not require acceptance criteria for field verification of plant conditions against calculation assumptions. Corrective actions include the repositioning of these valves and a revision to appropriate procedures.

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor (BWR/4)

Station Service Water System (SSWS)/Safety Auxiliaries Cooling System (SACS) - EIIS Identifier {BI}

IDENTIFICATION OF OCCURRENCE

Discovery date: 3/17/96
Date determined to be reportable: 3/17/96

Problem Report 960317090

CONDITIONS PRIOR TO OCCURRENCE

Plant was in OPERATIONAL CONDITION 4 (COLD SHUTDOWN)

DESCRIPTION OF OCCURRENCE

In March 1996, during the Hope Creek Generating Station's sixth refueling outage, flow balancing of the SSWS was being performed in support of a design change being implemented for the SSWS backwash strainer valves. During the flow balancing, flow and pressure drop measurements were taken to evaluate SSWS/SACS performance. From these measurements, Engineering personnel determined that the SSWS/SACS heat exchanger throttle valves were in a position that restricted the SSWS from supplying sufficient flow through the SSWS/SACS heat exchangers for the most limiting design basis conditions. Specifically, the as-found positions of the throttle valves were such that the flow was inconsistent with assumptions (for river water level, pump degradation and temperatures) used in the design calculations for SSWS/SACS performance. However, the positioning of the backwash strainer valves (the DCP was placing the valves in the full open position) did not impact SSWS/SACS performance since the last flow balance was performed with these valves fully open.

On 3/17/96, the initial assessment of SSWS/SACS operability determined that there were no immediate concerns since SSWS/SACS was capable of providing adequate cooling for either shutdown or power operation conditions under the existing plant conditions. On the same day, the design change for the SSWS backwash strainers was installed and the SSWS flow balancing was completed. The flow balancing utilized acceptance criteria established in a system calculation to set the proper throttle valve position for design basis water temperatures, SSWS and SACS pump performance, SSWS/SACS heat exchanger efficiency, river water level and instrument inaccuracies. The new throttle valve positions ensure adequate SSWS/SACS performance under all design basis conditions.

ANALYSIS OF OCCURRENCE

The SSWS/SACS provides cooling to safety related equipment required for shutdown of the reactor during design basis events. Following SSWS/SACS throttle valve replacement during the fourth refueling outage (November 1992), the SSWS was flow balanced with the throttle valves set in their as-found position. The flow balance acceptance criteria at that time required measurements of SSWS/SACS heat exchanger pressure drop to ensure that minimum SSWS/SACS flows would be available during normal operation and design basis accidents. However, the acceptance criteria did not consider the effects of degraded SSWS/SACS pump performance or the additional head provided by river water levels above the Technical Specification minimum of 76 feet. The flow balance was not performed as part of the design change package (DCP) re-test section as stated in the DCP design analysis. Failure to perform the flow balance under a DCP test procedure contributed to the flow balance deficiencies since normal controls for re-test were not implemented.

As a result, the SSWS/SACS valves were set in a position (as-found in March 1996) that reflected the SSWS/SACS pump performance and river water level at that time and not in a position that would ensure adequate SSWS/SACS flow during worst case design basis conditions (coincident maximum pump degradation, lowest river water level and highest ultimate heat sink temperatures).

There were several missed opportunities prior to November 1992 to verify SSWS/SACS heat exchanger flow against assumptions in engineering evaluations performed to calculate the ultimate heat sink (UHS) temperature limit. Prior to November 1992, as discussed in LER 90-014-00 and its supplement, SSWS/SACS had operated in an unanalyzed condition due to non-conservative UHS temperature limits, which were calculated without allowing for pump degradation. In addition, a system calculation was performed to support the current Technical Specification UHS temperature limit of 88.6 degrees F, as approved in Amendment No. 68 in April 1994. The safety evaluation performed for this new limit did not provide acceptance criteria or require field verification of SSWS/SACS heat exchanger flow and no record of field verification could be found with this new UHS temperature limit.

Operation of the plant under the worst case SSWS/SACS design basis conditions would have resulted in degraded post-accident SSWS/SACS heat removal capability with the as-found throttle valve positions. Therefore, this event is being reported under the provisions of 10CFR50.73(a)(2)(ii).

APPARENT CAUSE OF OCCURRENCE

The apparent cause of this event is attributed to a deficiency in the procedures for performing engineering evaluations. The procedures used for the development of engineering evaluations for the UHS limits and flow balance did not provide acceptance criteria for field verification of the new conditions analyzed by the engineering evaluation.

As a contributing factor, the design change process was ineffectively implemented in November 1992, when a flow balance was not included as a DCP test procedure. However, the aforementioned March 1996, DCP for the SSWS backwash strainer valves appropriately followed the current DCP process requirements and included flow balance acceptance criteria. Since November 1992, increased awareness of the DCP requirements to test the performance of a system, even when single components are modified, has resulted in improved implementation of post modification test requirements for recent DCPs.

ASSESSMENT OF SAFETY CONSEQUENCES

An evaluation of SSWS/SACS performance with the as-found throttle valve positions was conducted using the worst case conditions. The results of that evaluation indicated that there was no time that Hope Creek operated under conditions where the plant could not meet the minimum required SSWS/SACS flows for LOCA and loss of offsite power scenarios with these throttle valve positions. Therefore, there were no adverse safety consequences associated with this event. However, if a LOCA/LOP were to occur during coincident worst case design basis conditions, SSWS/SACS performance would be degraded such that SACS and/or the suppression chamber operational limits would have been exceeded and the time required to reach Cold Shutdown conditions would have been increased.

PREVIOUS OCCURRENCES

To document an occurrence where the SACS was operated outside of its design basis, LER 95-037-00 was written. In that event, both loops of SACS were inoperable due to the inability of the piping stress analysis to support SACS operation below 65 degrees F. That event also involved a discrepancy between calculated system operation and actual plant conditions, but was caused by an ineffective corrective action program and not deficient engineering evaluation procedures.

As previously stated, LER 90-014-00 and its supplement also concerned plant operation outside of the design basis due to non-conservative UHS temperature limits. As previously described, that event represented a missed opportunity to verify SSWS/SACS throttle valve positions against assumptions in engineering evaluations to ensure adequate SSWS/SACS performance under worst case design basis conditions. The failure to verify these throttle valve positions contributed to the November 1992 mis-positioning of these valves.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

CORRECTIVE ACTIONS

On 3/17/96, the design change for the SSWS backwash strainers was installed and the SSWS flow balancing was completed. The flow balancing utilized acceptance criteria established in a system calculation generated to set proper throttle valve position for the following design basis parameters: water temperatures, maximum allowed SSWS and SACS pump performance degradation, SSWS/SACS heat exchanger efficiency, river water level and instrument inaccuracies. The new throttle valve positions ensure adequate SSWS/SACS performance under all design basis conditions.

Guidance for the development of engineering evaluations, which emphasizes the importance of establishing acceptance criteria for field verification of plant conditions against the assumptions in the completed engineering evaluation, will be provided by May 10, 1996, and later incorporated into procedure revisions by June 10, 1996.

A sample of other engineering evaluations will be reviewed to determine if appropriate acceptance criteria have been provided. Any deficiencies will be identified and tracked in the Corrective Action Program. This review will be completed by August 1, 1996.