



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

Nuclear Business Unit

JUN 11 1996

LR-N96163

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. 96-006-01

This Licensee Event Report entitled "Incorrect Installation of Backdraft Isolation Dampers Resulted in Plant Operation Outside of the Design Basis" is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(ii).

This supplement provides additional information obtained from our investigation into the event.

Sincerely,

Clay Warren  
Acting General Manager -  
Hope Creek Operations

Attachment

LMK  
SORC Mtg. 96-057

C Distribution  
LER File

170024

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PDR ADDCK 05000354  
S PDR

The power is in your hands.

## 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 (354/96-006-01). The commitments are as follows:

All hands meetings will be conducted by August 1, 1996 to discuss the backdraft issue and reiterate the importance of operation within the Design and Licensing Basis. The meeting will include a discussion of actions to be taken upon discovery of a condition contrary to the Design or Licensing Basis.

A Design and Licensing Basis Training Course which covers the contents, use of, and importance of Design Bases and Licensing Bases will be established and conducted for System Managers. The following recommendations will be presented to the Engineering Support Personnel Training Review Group by June 30, 1996:

- The backdraft damper event description will be included in continuing training for Engineering Support personnel, in addition to System Managers.
- Operability Determination training, specializing in the roles and responsibilities of the System Managers to support Operability Determinations, will be presented to System Managers and Design Engineers and will be included in continuing training.

The backdraft damper issue will be incorporated into the next Licensed Operator Requal cycle.

## LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)

Hope Creek Generating Station

DOCKET NUMBER (2)

05000354

PAGE (3)

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TITLE (4)

Incorrect Installation of Backdraft Isolation Dampers Resulted in Plant  
Operation Outside of the Design Basis.

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
01	20	92	96	-- 006	-- 01	05	29	96	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		5	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

Lisa Kepley, Licensing Engineer

TELEPHONE NUMBER (Include Area Code)

(609) 339-1106

## 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)

YES  
(If yes, complete EXPECTED SUBMISSION DATE).

X NO

EXPECTED  
SUBMISSION  
DATE (15)

MONTH

DAY

YEAR

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

On January 20, 1992, the Filtration Recirculation Ventilation System supply side backdraft isolation dampers were identified as being installed backwards. These dampers are installed in compartments with the potential to experience a high energy line break. From initial plant startup until March 1996, the misoriented backdraft isolation dampers resulted in plant operation outside of the design basis. This condition was not reported at that time under 10CFR50.72(b)(1)(ii)(B) or 10CFR50.73(a)(2)(ii)(B). As a result, a notification was made to the NRC on March 4, 1996. A multi-disciplinary team that was assembled to assess the root cause of the failure to resolve the incorrect installation of the backdraft isolation dampers concluded that the causes of the failure to resolve the deficiency include: non-conservative decision making, inadequate knowledge of Design and Licensing Basis requirements, lack of management commitment to program implementation, and an inadequate corrective action process. Corrective actions include restoring the backdraft isolation dampers to their design configuration, training and a review of selected systems for similar occurrences. Implementation of the existing Hope Creek IMPACT and Salem Restart Action Plans will preclude future occurrences.

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## PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor (BWR/4)  
Filtration Recirculation Ventilation System: GU, EIIS Identifier: BH

## IDENTIFICATION OF OCCURRENCE

Event Occurrence: January 20, 1992  
Discovery Date: March 4, 1996

## CONDITIONS PRIOR TO OCCURRENCE

Event Date: Plant in OPERATIONAL CONDITION 1 (Power Operation)  
Discovery Date: Plant in OPERATIONAL CONDITION 5 (Refueling)

## DESCRIPTION OF OCCURRENCE

On January 20, 1992, the Filtration Recirculation Ventilation System (FRVS) supply side backdraft isolation dampers for rooms within the reactor building with the potential to experience a high energy line break (HELB), were identified to be installed in the reverse direction. On January 21, 1992, a Discrepancy Evaluation Form (DEF) was initiated which documented the discrepancy between the Hope Creek Generating Station's Updated Final Safety Analysis Report (UFSAR) and the as-built configuration of the plant. On January 29, 1992, in accordance with the DEF process, a Probabilistic Risk Assessment (PRA) of the nonconformance was performed which concluded that the probability of an event that could cause steam to affect other rooms in the reactor building was approximately  $1 \times 10^{-6}$  per year. In addition, based on engineering judgment, it was concluded that steam released from a potential HELB would not adversely affect equipment in adjacent rooms. This assessment was based on the assumption of successful detection and isolation of the postulated HELB.

During the maintenance outage of March 1992, the supply side backdraft isolation dampers for the Main Steam Tunnel were restored to the proper configuration. The remaining backdraft isolation dampers were left as is. An engineering evaluation to document the effect of the misoriented backdraft isolation dampers was completed in August of 1992. The evaluation concluded that the ability to safely attain and maintain plant shutdown was not compromised by the misorientation of the supply side backdraft isolation dampers.

On March 1, 1996, prior to the completion of Hope Creek Generating Station's sixth refueling outage, the misoriented supply side backdraft isolation damper issue was re-reviewed. As a result, it was determined

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## DESCRIPTION OF OCCURRENCE (continued)

that from initial plant startup until March 1996 the misoriented supply side backdraft isolation dampers resulted in Hope Creek Generating Station being operated outside of its design basis. During the investigation of the 1992 event, it was determined that the condition had not been reported to the NRC per the requirements of either 10CFR50.72(b)(1)(ii)(B) or 10CFR50.73(a)(2)(ii)(B). The 10CFR50.72 notification was made to the NRC on March 4, 1996 and a Licensee Event Report was issued on March 29, 1996, in accordance with 10CFR50.73.

## ANALYSIS OF OCCURRENCE

Redundant backdraft isolation dampers are installed in the supply and exhaust ductwork for compartments containing high energy lines. The design basis of the backdraft isolation dampers is to provide a means to isolate supply and exhaust ducts of compartments containing high energy pipes after a pipe break. In the event of a HELB, the backdraft isolation dampers close to prevent the exposure of equipment in connected rooms to abnormal conditions resulting from the break which could potentially degrade the capability of that equipment to perform its intended safety function.

Our investigation has determined that circa 1984/1985, the misorientation of the supply side backdraft isolation dampers was identified by a contractor during plant construction. Investigation revealed that this same individual, now a Public Service Electric & Gas employee, discovered on January 20, 1992, that the supply side backdraft isolation dampers were still installed backwards and formally documented the deficiency. The employee did not document the problem in 1984/1985 but does recall the concern. This revelation has not been substantiated any further.

Following the January 20, 1992 identification, the condition was evaluated pursuant to 10CFR50.72 and determined not to be reportable. The probabilistic risk assessment of the deficiency, completed on January 23, 1992, concluded that, assuming the break is successfully isolated, the steam that would escape into other areas of the reactor building from the room with the pipe break would not adversely affect equipment in other areas. Based upon engineering judgment that the issue was not risk significant, and confusion with respect to design and licensing basis requirements, the condition was not properly reported.



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## ANALYSIS OF OCCURRENCE (cont'd)

A decision was made to correct the main steam tunnel dampers during the forced outage in March, 1992 due to the in depth analysis that would need to be performed on potentially effected equipment. The other dampers were determined to be less risk significant and were not corrected at that time. An engineering evaluation for the remaining dampers was completed in August 1992, which concluded that, assuming the break is successfully detected and isolated, the ability to safely attain and maintain plant shutd wn was not compromised by the misorientation of the dampers. This engineering evaluation was used to justify continued operation without a review by the Operations Department.

The correction of the condition was deferred because a decision had not been made as to whether the design basis documentation should be changed or the orientation of the dampers corrected. Management believed that the engineering evaluation provided reasonable assurance of operability of the equipment in the affected rooms and that there was no safety significance with the misoriented dampers. Therefore corrective actions were delayed. The root cause investigation into this event has determined that the concepts of safety significance versus compliance with the design basis were not clearly understood. This lack of understanding resulted in the design basis implications of this condition not being considered and therefore not being corrected.

During Hope Creek's sixth refueling outage, an Outage Review Committee (ORC) was established to review issues for inclusion in the outage. On November 14, 1995, the backdraft damper condition was presented to ORC as a problem with minimal safety significance. The backdraft isolation damper issue was not presented as a condition outside of the design basis of the plant. As a result, resolution of the issue was again deferred until the seventh refueling outage. On November 17, 1995, the System Readiness Review (SRR), another tool to determine activities that were necessary to be completed during RFO6, also did not identify the backdraft damper issue for inclusion. This decision was based ORC's deferral of work until RFO7. The guidance used to perform the SRR was not strictly followed due to time restrictions.

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## CAUSE OF OCCURRENCE

The initial installation orientation problem was a construction error that was not discovered during testing. The causes of the failure to implement timely corrective actions were determined to be non-conservative decision making; failure of management to ensure adequate appreciation for the importance of and knowledge of the Design and Licensing Basis; conflicting organizational goals; lack of management commitment to corrective action program implementation within the NBU in that we failed to adequately challenge conditions adverse to quality; and an inadequate corrective action program.

## ASSESSMENT OF SAFETY CONSEQUENCES

An assessment of the safety consequences of this condition determined that the safety significance of this condition was minimal. An engineering evaluation to assess the effect of the misoriented backdraft isolation dampers on equipment operability had been completed in August of 1992.

The evaluation considered potential exposure of equipment to conditions resulting from a postulated high energy line break. These resulting conditions were then evaluated against the equipment's environmental qualifications. Temperature was judged to be the most critical environmental parameter that potentially affected equipment operability and the calculations were based on temperatures in connected rooms.

The analysis concluded that the ability of the most limiting components to perform their intended function was not compromised by the postulated temperature that would result from a HELB with the backdraft isolation dampers in the reversed configuration. Therefore, the ability to safely attain and maintain plant shutdown was not compromised by the potential effects of a high energy line break.

The approach taken in 1992 appears to be in accordance with the guidelines of Generic Letter 88-07 and reasonable assurance of operability of the equipment within interconnected rooms was demonstrated at the time. However, proper reporting of the event and timely corrective action in accordance with 10CFR50 Appendix B Criterion XVI were not accomplished.

In addition, since re-discovery of this issue, selected engineering documents were reviewed for outstanding safety related design basis issues similar to the backdraft damper issue. Engineering documents reviewed included engineering evaluations, discrepancy evaluation forms, design change requests, and design change packages from a representative sample of safe shutdown and risk significant systems, including the Filtration, Recirculation, Ventilation System, of which the backdraft dampers are a part.

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The result of the review was a verification sampling resulting in no new items to be added to Hope Creek's sixth refueling outage, however several Action Requests were initiated to enhance, clarify or improve the design basis documentation.

#### PREVIOUS OCCURRENCES

Two previous occurrences that are similar in nature to the supply side backdraft isolation damper issue have been identified. Licensee Event Report (LER) 95-037-00, documented past operation of the Safety Auxiliary Cooling System (SACS) below the design basis temperature limit described in the UFSAR. The cause of this occurrence was determined to be ineffective and untimely implementation of the Corrective Action Program regarding the design of SACS during winter operations. The new Corrective Action Program, put into place in July of 1995, was credited as a corrective action to address the cause of the event.

LER 95-038-02 documented the failure of a snubber on the Residual Heat Removal (RHR) shutdown cooling line which had failed twice in the past. The new Corrective Action Program was also credited as a corrective action to address the cause of this event.

The corrective action program improvements referenced in the above similar events were not in place at the time this event was documented in 1992. Therefore, it was not possible for the corrective actions from those events to have precluded this condition. However, the current corrective action program will ensure adequate and timely corrective actions in the future.

#### CORRECTIVE ACTIONS

A multi-disciplinary team was assembled to assess the root cause of the failure to resolve the incorrect installation of the backdraft isolation dampers in a timely manner.

On March 4, 1996, notification was made to the NRC in accordance with 10CFR50.72(b)(1)(ii)(B) and an LER was submitted on March 29, 1996 in accordance with 10CFR50.73.

The orientation of the supply side backdraft isolation dampers has been corrected.

As part of an Engineering Self Assessment, a review of Engineering Evaluations, open Discrepancy Evaluation Forms (DEFs), open Design Change Requests (DCRs), open Design Change Packages (DCPs), and a sample of closed DEFs for selected safe shutdown and risk significant systems has



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#### CORRECTIVE ACTIONS

been performed. The result of the review was a verification sampling resulting in no new items to be added to Hope Creek's sixth refueling outage, however several Action Requests were initiated to enhance, clarify or improve the design basis documentation.

System Managers re-reviewed a sample of systems, including FRVS, in accordance with the guidance in the System Readiness Review procedure. No items were identified that should have been included in RFO6. Therefore, the review was not expanded.

All hands meetings will be conducted by August 1, 1996 to discuss the backdraft issue and reiterate the importance of operation within the Design and Licensing Basis. The meeting will include a discussion of actions to be taken upon discovery of a condition contrary to the Design or Licensing basis.

A Design and Licensing Basis Training Course which covers the contents, use of, and importance of Design Bases and Licensing Bases will be established and conducted for System Managers. The training recommendations contained in the root cause analysis will be presented to the Engineering Support Personnel Training Review Group by June 30, 1996.

The backdraft damper issue will be incorporated into Licensed Operator Requalification training to be completed by September 30, 1996.

To implement cultural change and to improve individual performance, corrective actions in the areas of Human Resources, Work Management, Self Assessment, and Corrective Actions will continue in accordance with the Salem Restart and Hope Creek IMPACT Plans. The Salem Restart Plan has been previously discussed with the NRC on December 11, 1995 at the NBU Salem Restart Meeting and documented in the NBU's response, date November 24, 1995 to Confirmatory Action Letter No. 1-95-009 for Salem Docket Nos. 50-272 and 50-311, dated June 9, 1995. The Hope Creek IMPACT Plan has been previously discussed with the NRC at a January 18, 1996 meeting on Hope Creek's Refueling Outage and Startup Program.