

**JAN 10 2002**



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U. S. Nuclear Regulatory Commission  
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SPECIAL REPORT 354/2001-009-00  
**HOPE CREEK GENERATING STATION**  
**FACILITY OPERATING LICENSE NO. NPF-57**  
**DOCKET NO. 50-354**

Gentlemen:

This Special Report entitled "Potential to Exceed Licensed Power Level Due to Inaccurate Feedwater Temperature Calibration" is being submitted pursuant to the requirements of License Conditions 2.C. (1) and 2.F. The attached Special Report contains no commitments.

Sincerely,

A handwritten signature in black ink, appearing to read "D. F. Garchow", written over the typed name.

D. F. Garchow  
Vice President - Operations

Attachment

/MGM

C      Distribution  
         LER File 3.7

IE22

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the

**LICENSEE EVENT REPORT (LER)**

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

<b>1. FACILITY NAME</b> Hope Creek Generating Station	<b>2. DOCKET NUMBER</b> 05000354	<b>3. PAGE</b> 1 OF 4
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**4. TITLE**  
Potential to Exceed Licensed Power Level Due to Inaccurate Feedwater Temperature Calibration

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
12	17	01	2001	009	00	01	10	02		05000
									FACILITY NAME	DOCKET NUMBER
										05000
<b>9. OPERATING MODE</b>		1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>							
<b>10. POWER LEVEL</b>		100	20.2201(b)			20.2203(a)(3)(ii)			50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
			20.2201(d)			20.2203(a)(4)			50.73(a)(2)(iii)	50.73(a)(2)(x)
			20.2203(a)(1)			50.36(c)(1)(i)(A)			50.73(a)(2)(iv)(A)	73.71(a)(4)
			20.2203(a)(2)(i)			50.36(c)(1)(ii)(A)			50.73(a)(2)(v)(A)	73.71(a)(5)
			20.2203(a)(2)(ii)			50.36(c)(2)			50.73(a)(2)(v)(B)	X OTHER
			20.2203(a)(2)(iii)			50.46(a)(3)(ii)			50.73(a)(2)(v)(C)	Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)			50.73(a)(2)(i)(A)			50.73(a)(2)(v)(D)	
			20.2203(a)(2)(v)			50.73(a)(2)(i)(B)			50.73(a)(2)(vii)	
			20.2203(a)(2)(vi)			50.73(a)(2)(i)(C)			50.73(a)(2)(viii)(A)	
			20.2203(a)(3)(i)			50.73(a)(2)(ii)(A)			50.73(a)(2)(viii)(B)	

**12. LICENSEE CONTACT FOR THIS LER**

<b>NAME</b> Michael G. Mosier, Senior Licensing Engineer	<b>TELEPHONE NUMBER (Include Area Code)</b> 856-339-5434
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

**14. SUPPLEMENTAL REPORT EXPECTED**

<b>YES (If yes, complete EXPECTED SUBMISSION DATE)</b>	<b>X</b>	<b>NO</b>	<b>15. EXPECTED SUBMISSION DATE</b>	<b>MONTH</b>	<b>DAY</b>	<b>YEAR</b>

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

After restart from refueling outage 10 (RF10), analysis of plant parameters indicated that changes occurred in the feedwater temperature as compared to the previous cycle of operation. A detailed Engineering review was initiated and resulted in identifying that the RTD loops were over-conservatively calibrated during RF10, and non-conservatively in preparation for the implementation of the Crossflow feedwater flow instrumentation during RF9. In October 2001, it was determined that a non-conservative moisture carryover fraction was used in the core thermal power calculation (Special Report 354/2001-003-00). Combining the errors resulted in a potential overpower condition of 0.06% core thermal power. This potential overpower condition existed between the time that the crossflow instrumentation was implemented and the start of RF10. This event is being reported as a Special Report in accordance with the requirements of License Condition 2.F. There were no safety consequences associated with this event since significant margins were available to all power distribution thermal limits.

The apparent cause for the feedwater temperature miscalibration can be attributed to misunderstanding as to the magnitude of the impact on the station heat balance by using three point calibration at selected temperatures rather than temperatures near the range of interest. The corrective action associated with the moisture carryover error was corrected during RF10. The feedwater RTD loops were properly calibrated during the November 2001 forced outage.

**LICENSEE EVENT REPORT (LER)**  
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**TEXT** (If more space is required, use additional copies of NRC Form 366A) (17)**PLANT AND SYSTEM IDENTIFICATION**

General Electric – Boiling Water Reactor (BWR/4)

- Energy Industry Identification System {EIS} codes and component function identifier codes appear as (SS/CCC)

**IDENTIFICATION OF OCCURRENCE**

Date determined to be reportable: December 17, 2001

**CONDITIONS PRIOR TO OCCURRENCE**

Mode 1 – 100% power. No structures, systems, or components were inoperable at the time of the occurrence that contributed to the event.

**DESCRIPTION OF OCCURRENCE**

After restart of Hope Creek from refueling outage 10 (RF10), analysis of plant parameters indicated that changes occurred in the final feedwater temperature when compared to the previous cycle of operation. The temperatures as indicated by feedwater temperature loops 1AETE-N041A/B/C/D, were approximately 3 degrees lower than when operating at 100 percent power prior to the outage. This condition indicated that actual power might have been below 100 percent following restart from RF10. A detailed engineering review was initiated and resulted in the following.

During RF9 (May 2000), the performance of the main feedwater temperature RTDs was reviewed to support power uprate using the crossflow feedwater flow instrumentation. The method used to determine the RTDs calibration curve introduced a +0.8 degree F bias. This was a non-conservative bias such that the actual resultant power level was higher than the level calculated by the plant computer. In January 2001, the crossflow instrumentation was implemented to correct for fouling of the feedwater venturis. In October 2001, a non-conservative moisture carryover fraction was determined to have been used in the core thermal power calculation (Refer to Special Report 354/2001-003-00). Combining both the error in feedwater temperature and the error in the moisture carryover fraction resulted in a potential overpower condition of 0.06% core thermal power. This potential overpower condition existed between the time that the crossflow instrumentation was implemented and the start of RF10. On December 17, 2001, at 1600 hours, a twenty-four hour notification was made to report potential operation outside of License Condition 2.C (1), which authorizes PSEG Nuclear LLC to operate the facility at reactor core power levels not in excess of 3339 megawatts thermal (100 percent rated power). This event is being reported as a Special Report in accordance with the requirements of License Condition 2.F.

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

**ANALYSIS OF OCCURRENCE**

During RF9 (May 2000), the performance of the main feedwater temperature RTDs was reviewed to support power uprate. The method used to determine the RTDs calibration curve introduced a +0.8 F bias. This is non-conservative, in that power level was higher than calculated by the plant computer. In January of 2001, crossflow was implemented to correct for fouling of the venturis. In October 2001, it was discovered that a non-conservative moisture carryover fraction was used in the core thermal power calculation (SR 354/2001-003-00).

As a result of these conditions, Hope Creek Generating Station has potentially operated at power levels in excess of Operating License Condition 2.C (1), which requires that the facility be operated at reactor core power levels not in excess of 3339 MWt. The upper limit may have been exceeded by significantly less than 0.1%. This potential overpower condition existed between the time of crossflow implementation and RF10.

The moisture carryover fraction was corrected during RF10. During the recent forced outage, the 4 RTD's were checked and all four loops were calibrated, therefore, eliminating the miscalibration.

On December 17, 2001, at 1600 hours, a twenty-four hour notification was made to report potential operation outside of License Condition 2.C (1), which authorizes PSEG Nuclear LLC to operate the facility at reactor core power levels not in excess of 100 percent rated power. This event is being reported as a Special Report in accordance with the requirements of License Condition 2.F.

**CAUSE OF OCCURRENCE**

The apparent causes for the feedwater temperature miscalibration can be attributed to misunderstanding to the magnitude of the impact on the station heat balance of performing the three point calibration of the RTDs at the temperatures selected rather than temperatures near the range of interest.

**PRIOR SIMILAR OCCURRENCES**

Prior Hope Creek and Salem LERs and SRs were reviewed for similar potential overpower events. SR 354/2001-003-00, "Potential to Exceed Licensed Power Level Due to Reactor Heat Balance Calculation Error." The apparent cause, as described in the GE report, is that a non-conservative assumption for moisture carryover fraction was used in the calculation of core thermal power. The design specification for the steam separator/steam dryer of 0.1% carryover was assumed to be correct and was used in the plant process computer for many BWR units. Both the moisture carryover fraction and final feedwater temperature affected the heat balance

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**TEXT** (If more space is required, use additional copies of NRC Form 366A) (17)**PRIOR SIMILAR OCCURRENCES (Cont'd)**

calculation, therefore, the combination resulted in a 0.06% potential overpower condition. The corrective actions for the moisture carryover fraction occurrence would not have prevented this event.

**SAFETY CONSEQUENCES AND IMPLICATIONS**

The error introduced by miscalibration of the feedwater RTDs into the calorimetric calculation could have resulted in a potential overpower condition of 0.06%. A review of the Cycle 10 Core Follow Reports for the time period of the potential overpower condition indicated that a significant margin was available to all power distribution fuel thermal limits. Therefore, since adequate margin to all power distribution fuel thermal limits remained during the time period, there was no safety significance associated with the potential overpower condition due to miscalculation of feedwater temperature. Based on the above this event did not present an undue risk to the health and safety of the public.

A review of this condition determined that a Safety System Functional Failure (SSFF) has not occurred as defined in Nuclear Energy Institute (NEI) 99-02.

**CORRECTIVE ACTIONS:**

1. During the November 2001 forced outage the RTD calibration was performed to more accurately reflect operation in the range of interest.
2. Revise procedure HC.IC-LC.AE-0012, "HC-Feedwater Temperature Loop Optimization", to require design engineering to evaluate the loop calibration if it deviates from pre-established limits, to be implemented in the procedure. This will be tracked by the corrective action program.
3. Conduct Management Review of miscalibration and perform lessons learned sessions. This will be tracked by the corrective action program.
4. Issue Operating Experience (OE) to the industry through INPO.

**COMMITMENTS**

The corrective actions cited in this Special Report do not constitute commitments.