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The Northeast Utilities System

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November 29, 1995

United States Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Reference: Facility Operating License No. NPF-86, Docket No. 50-443

Subject: Licensee Event Report (LER) No. 95-006-00, "Reactor Thermal Power Exceedances"

Gentlemen:

Enclosed please find Licensee Event Report (LER) No. 95-006-00 for Seabrook Station. This submittal documents two events that were discovered on October 30, 1995. This event is being reported pursuant to Section 2.C. of the Seabrook Station Operating License, NPF-86.

Should you require further information regarding this matter, please contact Mr. James M. Peschel, Regulatory Compliance Manager, at (603) 474-9521, extension 3772.

Very truly yours,

Ted C. Feigenbaum

TCF:JES/sm

Enclosures: NRC Forms 366/366A

IE22

cc: Mr. Thomas T. Martin
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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)

Reactor Thermal Power Exceedances

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
10	30	95	95	006	00	11	29	95		05000
									FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)	1
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		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)	X	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)
Mr. James M. Peschel, Regulatory Compliance Manager	603-474-9521 extension 3772

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 October 30, 1995 North Atlantic identified that on two separate occasions the unit had operated above the maximum thermal power level (3411 MWt) specified in Operating License NPF-86, Section 2.C. The first exceedance occurred following a calibration of a Steam Generator steam flow transmitter, which invalidated normalization constants utilized in the calorimetric to calculate reactor thermal power. This event resulted in the unit being operated at a maximum of 3418 MWt (100.2% of rated thermal power) and an eight-hour average of 3413 MWt (100.06% of rated thermal power).

The second exceedance occurred following a cold start of the Main Plant Computer System (MPCS), which reset the calorimetric to the steam flow mode. The calorimetric had been relying on the feed flow mode as a corrective action from the first event. This resulted in the unit being operated at 3413 MWt (100.06% of rated thermal power).

The primary cause of the first event was an inadequate procedure that did not ensure that re-normalization was considered following transmitter recalibration. The primary cause of the second event was inadequate procedural controls that did not ensure the MPCS parameters are the same following a cold start as they were prior to the cold start.

There were no adverse safety consequences as a result of these events.

Corrective actions for the first event include revising appropriate procedures to ensure that the need to normalize calorimetric inputs is considered following recalibration of the steam flow transmitters. Corrective actions for the second event include developing a procedure to formalize actions when the MPCS is restored from a cold start. Additionally, the MPCS will be revised to ensure that upon a cold start, that the calorimetric defaults to the mode prior to restart.

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

On October 30, 1995 North Atlantic identified that on two separate occasions the unit had operated above the maximum thermal power level (3411 MWt) specified in Operating License NPF-86, Section 2.C. These two events were reported to the NRC as a 24-hour report on October 30, 1995.

Description of Event 1

On October 19, 1995 with the plant at 100% power, calibrations were completed on FW-FT-513, one of the "A" Steam Generator [SB] steam flow transmitters, in accordance with I&C Procedure IN1640.140, "F-511 Steam Generator A Feedwater Flow and Steam Flow Calibration." The transmitter "as-found" output data had been found approximately 50mV or 1% high, but still within the tolerance specified in the procedure. The transmitter was subsequently adjusted down to zero as specified in the procedure and placed back in service.

Approximately 5 to 10 minutes after returning the loop back to service, the indicated reactor thermal power level measurement dropped from approximately 3411 MWt to 3408 MWt as indicated on the main control board thermal power one-hour average meter. Tavg was also observed to be decreasing slightly. The operators believed that these indications collectively meant that a slight unintended boron addition had occurred as a result of other in progress evolutions, such as recirculating the Refueling Water Storage Tank using a Containment Building Spray pump and a Boric Acid Tank pump surveillance. As a result, operators diluted to achieve 3411 MWt indicated thermal power to counter the apparent boration. The operators then reviewed the potential evolutions that could have caused such a down-power excursion. This included checking the valve lineup for the Boric Acid Tank pump and evaluating and comparing dilution water usage from the prior day. The latter indicated that water usage was only slightly higher (by approximately 100 gallons) than the prior days, up to that point in the day.

At the same time, the operators contacted Technical Support for assistance in evaluating the apparent down-power excursion. Technical Support recognized that the secondary chest pressure had increased slightly and told the operators that the excursion was induced by the secondary side of the plant, and not from an inadvertent boration as was previously thought. The operators then recognized that the excursion was caused by the calibration adjustment to the steam flow transmitter. They concluded that the calibration adjusted for instrument drift and allowed a slight power increase. Operators continued to maintain indicated thermal power below 3411 MWt for the eight-hour average.

A shift turnover occurred in the Control Room and the oncoming Shift Superintendent questioned the power increase. At the same time, Reactor Engineering was informed of the calibration and power excursion by Technical Support. Reactor Engineering then reviewed the hourly steam flows and noticed a drop of 60K pounds per hour on FW-FT-513 at the time the transmitter was calibrated. Reactor Engineering questioned the reliability of the transmitter and realized that the calibration invalidated the Main Plant Computer System [ID] normalization constants used for the calorimetric. These constants adjust the steam flow measurements to be equal to the feedwater [SJ] flow measurements since the latter are considered to be an accurate baseline. This allows the steam flow instruments to be used as an input to the calorimetric. They provide a smoother signal and thus are easier for the operators to use to control power. Reactor Engineering then contacted the Control Room and stated that they believed that the steam flow calorimetric was invalid. Reactor Engineering recommended that the feed flow calorimetric be utilized until all the questions regarding the transmitter calibrations could be answered and additional data was available. The Shift Superintendent questioned Reactor Engineering whether a power exceedance had occurred and was informed that it did not look like the limit was exceeded. The Shift Superintendent subsequently wrote a night order to ensure that the calorimetric remained in the feed flow mode. No remedial actions were taken to reduce power because when the calorimetric was swapped to the feed flow mode, indicated thermal power was less than the limit of 3411 MWt.

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

In this event, based on the feedwater flow measurement, reactor thermal power was subsequently determined to be as high as 3418 MWt (100.20% of rated thermal power) between the time that power was increased until the time the calorimetric was placed in the manual feed mode of operation. The rolling eight-hour average of reactor thermal power for this time period was subsequently calculated to be a maximum of 3413 MWt (100.06% of rated thermal power).

Description of Event 2

On October 26, 1995, at approximately 1235, Computer Engineering conducted a Main Plant Computer System (MPCS) outage for a software modification to the Circulating Water Delta Temperature Monitor application. This modification involved taking both the HOST A and HOST B computers out of service, and was typical of maintenance work normally performed on the computer while at power. At approximately 1253, the MPCS was restarted. As a result of actions taken in response to the first event, the calorimetric had been computing core thermal power using the feedwater flow values. However, by design, when the MPCS was brought up from a cold start, the calorimetric reinitialized to the default mode of Auto Feed. This in turn switched to Auto Steam, or the steam flow calorimetric, since the reactor was operating above 90% power.

Although the steam flow transmitters had not yet been re-normalized, the calibrated steam flows produced a calculated thermal power that was approximately 2 MWt lower than the feed flow based calorimetric. This slight reduction in indicated thermal power went unnoticed by the operators for two reasons. First, this is a relatively small change that is typical of normal power changes during operation. Second, the operators did not have an indication for core thermal power during the 13 minutes that changes were being made to the MPCS software. Hence, they were unable to see any small changes that may have been gleaned from the four minute averages of thermal power during this time frame. For approximately the next 19 hours, the operators maintained the indicated thermal power at less than 3411 MWt, which actually equated to approximately 3413 MWt (100.06% of rated thermal power).

On October 27, 1995, Reactor Engineering reviewed the secondary calorimetric computer display and noted that the specified calorimetric mode was "Auto/Steam." Reactor Engineering apprised the Control Room and the calorimetric was placed back in the feed flow mode immediately. No remedial actions were taken at that time to reduce power because when the calorimetric was placed back in the feed flow mode, indicated thermal power was less than the limit of 3411 MWt.

Safety Consequencas

There are no adverse safety consequences as a result of these events. At all times reactor thermal power was less than 3479 MWt (102% of rated thermal power), which is the value assumed in the UFSAR Chapter 15 accident analyses and provides a 2% allowance for calorimetric error.

Discussion of Causes of Event 1

The primary cause of this event was an inadequate procedure. The calibration of the steam flow transmitters is accomplished via I&C procedure IN1640.140, "F-511 Steam Generator A Feedwater Flow and Steam Flow Calibration." This procedure states that this calibration can be conducted while in any mode. It does not contain any guidance to ensure that Reactor Engineering evaluates whether it is necessary to re-normalize the steam flows to the feed flows following the calibration and before the transmitters are returned to service. Similarly, no Reactor Engineering procedures specify their involvement following a calibration.

A contributing cause was the limited scope of the current On-line Maintenance Policy. This calibration was not considered to be on-line maintenance as defined in the On-line Maintenance Policy. As a result, it did not receive any special reviews prior to being performed on-line. It was not identified during the routine work control process that this calibration had the potential to affect the calorimetric and that re-normalization following the calibration should be considered. Although Reactor Engineering and Technical Support were generally aware ahead of time that the calibrations were going to be performed while on-line, neither identified the need to consider re-normalization.

Another contributing cause for the first event was that the organization did not understand the sensitivity of the calorimetric to minor input changes. Neither Technical Support nor Reactor Engineering fully appreciated that minor changes to the inputs to the calorimetric could result in a thermal power exceedance. They intuitively reasoned that such a small deviation would not cause a thermal power exceedance. Additionally, when it was determined that the steam flow calorimetric was unreliable, these groups did not exhibit a questioning attitude in that there was no discussion regarding the need to reduce power, to ensure the real (versus indicated) eight-hour rolling average was maintained below 3411 MWt. The potential need for remedial action was transparent to the operators since the indicated thermal power had always remained below 3411 MWt even after the calorimetric was placed in the feed flow mode.

Discussion of Cause of Event 2

The primary cause for this event is lack of procedural controls. No procedural controls exist to initiate a review to ensure that MPCS parameters are the same following a failover or a cold start as they were prior to the failover or cold start.

Event 1 Immediate Corrective Actions Taken

1. Operators utilized the feed flow calorimetric upon determination that the steam flow calorimetric was unreliable. This placed the plant in a more conservative condition.

2. On October 19, 1995, Operations issued a Night Order to ensure that the calorimetric was maintained in the feed flow mode.

Event 1 Additional Corrective Actions

1. Reactor Engineering and I&C procedures will be revised to ensure that the need to normalize steam flows to feed flows is evaluated prior to placing a recalibrated steam flow transmitter back in service.

2. Other Reactor Engineering and I&C procedures that have normalization constants will be reviewed to ensure that they evaluate the need for re-normalization following instrument calibrations.

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3. The Adverse Condition Reports for these events will be reviewed with the appropriate Technical Support, Reactor Engineering, Operations, Planning and Scheduling, and I&C personnel.

4. Reactor Engineering procedures regarding maintenance of the calorimetric will be reviewed and revised. This will consider the need for more frequent reviews of steam and feed flows, and other inputs to the calorimetric and to define acceptable deviations and when re-normalization is required.

5. The definition of the On-line Maintenance Policy will be revised to include all activities being relocated from refueling outages as well as any other tasks new to at-power conditions.

Event 2 Immediate Corrective Actions Taken

1. On October 27, 1995, Operations issued Standing Operating Order 95-024, "Computer Generated Secondary Calorimetric." This order requires operators to verify the calorimetric is in the proper mode following a computer failover or cold start. This order also required that following any transmitter work, calibration, etc. of an instrument that feeds the calorimetric, that instrument response and calorimetric response should be verified to ensure it is functioning properly before any reactivity addition is made.

2. On November 2, 1995, Operations abnormal procedure OS1251.01, "Loss of the Plant Computer," was revised to ensure that when the Main Plant Computer is restored that the plant calorimetric mode is verified to be correct.

Event 2 Additional Corrective Actions

1. A Computer Engineering procedure will be developed to formalize actions taken, parameters/data to be reviewed, and interactions with other groups (i.e., Operations and Reactor Engineering, etc.), when the MPCS is restored from a failover or a cold start.

2. The MPCS will be revised to ensure that upon either a cold start or a restart from a failover, that the calorimetric defaults to the mode present prior to the restart.

3. The MPCS applications will be reviewed to determine if there are other computer restart/cold start default problems. These MPCS applications will be revised as required by the above action.

4. A multidisciplined table-top review of MPCS applications with regulatory significance will be performed to identify and resolve any remaining potential issues.

Previous Occurrences

This is the first LER involving an thermal power exceedance at Seabrook Station.

Plant Conditions

At the time of these events the plant was in MODE 1 at approximately 100% power, with the Reactor Coolant System (RCS) temperature at 563 degrees Fahrenheit and pressure at 2235 psig.