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SUBJECT: LER 89-007-00:on 890410,potential for nonconservative delta temp setpoints.

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Robinson File No: 13510C

Serial: RNPD/89-1607
(10 CFR 50.73)

United States Nuclear Regulatory Commission
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H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261
LICENSE NO. DPR-23
LICENSEE EVENT REPORT 89-007-00

Gentlemen:

The enclosed Licensee Event Report (LER) is submitted in accordance with 10 CFR 50.73 and NUREG-1022 including Supplements No. 1 and 2. As agreed with Mr. Hugh Dance, NRC Region-II, an extension of seven days has been added to the 30-day report requirement.

Very truly yours,

R. E. Morgan
General Manager
H. B. Robinson S. E. Plant

CTB:lko

Enclosure

cc: Mr. S. D. Ebneter
Mr. L. W. Garner
INPO

IE22
1/1

Enclosure to Serial: RNPD/[redacted]-1607

NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2	0 5 0 0 0 2 6 1	1 OF 0 6

TITLE (4)
POTENTIAL FOR NONCONSERVATIVE DELTA TEMPERATURE SETPOINTS

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 NAMES	DOCKET NUMBER(S)
0 4	1 0	8 9	8 9	0 0 7	0 0	0 5	1 7	8 9		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	X OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	50.73(a)(2)(vi)
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
C. T. BAUCOM, SENIOR SPECIALIST	AREA CODE 8 0 3 — 3 8 3 - 1 2 5 3

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	
A	J C		W 1 2 0	Y							

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 fifteen single-space typewritten lines) (16)

On April 10, 1989, with the unit in cold shutdown for a forced outage, it was determined that inconsistencies existed within the Reactor Coolant System (RCS) core differential temperature (ΔT) process parameters used as inputs to reactor protection circuitry. The setpoints affected were the Overtemperature Delta Temperature (OTΔT) and the Overpower Delta Temperature (OPΔT) setpoints. It was determined that the inconsistencies introduced a degree of nonconservatism into the OTΔT and OPΔT setpoints with respect to the margin from full power value to trip actuation setpoint. These setpoints had existed since the plant refueling outage startup of February 25, 1989, and were corrected during a forced shutdown beginning April 3, 1989. The primary cause of the event was determined to be an internal miscommunication of a requested change to the base setting of ΔT as used in the setpoint derivation. Certain procedural weaknesses also contributed to the event. A plant modification to remove the RCS Resistance Temperature Detector (RTD) Bypass Manifold piping provided a further complicating element. Later evaluation of the as-found setpoints indicates that no degradation of the OTΔT or OPΔT Reactor Protection features occurred. A review of internal communication practices will be performed to ensure that future requests and proposals are properly addressed. Procedure revisions will be developed to correct the identified weaknesses. This event is reported pursuant to the requirements of 10CFR50.73(a)(2)(vi).

NRC Form 366A
(9-83)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

I. Description of Event

On April 10, 1989, with the unit shutdown due to indication of a foreign object in "C" Steam Generator, it was determined that potential nonconservatism might exist in reactor protection setpoints.[1] The setpoints of concern were the Overtemperature Delta Temperature (OTΔT) and Overpower Delta Temperature (OPΔT) setpoints.[2]

A. Background

The OTΔT and OPΔT setpoints perform their functions by comparing the "actual" Reactor Coolant System (RCS) hot leg and cold leg temperature difference (subsequently referred to as ΔT_A) to ΔT setpoint values. The "indicated" RCS hot leg and cold leg temperature difference at the rated thermal power of 2300 MWt (subsequently referred to as ΔT_0) is used as a base for electronically developing these setpoint values. This base ΔT_0 is then corrected by various constants and penalty factors to account for actual RCS pressure, temperature, and core power offset. Both ΔT_A and ΔT_0 are adjustable within a fixed range to allow for calibration, and to allow the inputs to be normalized to the comparable inputs from other loops. Historically, ΔT_0 has been adjusted to 57.5°F in accordance with plant procedures and to be consistent with the assumptions used within certain analyses. Following each refueling startup, the values of ΔT_A are evaluated and normalized, if needed, to agree with the value of ΔT_0 at full power. The evaluation for acceptability of ΔT_A is accomplished in accordance with EST-052, Operational Alignment of Process Temperature Instrumentation (Refueling Startup).

[1] H. B. Robinson Steam Electric Plant, Unit No. 2 is a Westinghouse 700 MW Pressurized Water Reactor in commercial operation since March 1971.
[2] EIIS Codes: System - JC; Component - Not available; Manufacturer - W120

NRC Form 366A (9-83)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

B. Description

In 1988, analyses were in progress by Carolina Power and Light Company (CP&L) to evaluate the planned removal of RCS Resistance Temperature Detector (RTD) Bypass Manifold piping and to determine the optimum value for the K_1 constant used in the OTΔT setpoint.[3,4] In order to maximize the value of K_1, CP&L Nuclear Fuel Section (NFS) proposed to plant personnel in July of 1988 that the value of ΔT_0 be revised from 57.5°F to approximately 55°F.

Later in 1988, during the plant refueling outage, the RTD Bypass Manifold piping was removed and associated changes were made in temperature sensing instrumentation and rack processing components. A startup (interim) calibration of these instruments was performed following completion of the refueling outage, and the unit returned to power operation on February 25, 1989. After achieving 100% power, it was noted that the interim calibration resulted in a ΔT_A of approximately 55°F. Although the interim calibration was apparently intended to produce a full power indication for ΔT_A of approximately 55°F, the value of ΔT_0 had not been adjusted and remained at 57.5°F.

In April of 1989, with the unit shutdown in a forced outage, a further review of the proposed change to ΔT_0 (from 57.5°F to 55°F) was in progress. This review revealed that the proposed adjustments had not been performed. With ΔT_0 set at 57.5°F and ΔT_A adjusted to 55°F at 100% power, a nonconservatism was introduced into the OTΔT and OPΔT setpoints. This nonconservatism and the potential for incorrect setpoint values was identified on April 10, 1989. In order to address this issue prior to plant startup, channel adjustments were made to provide a value for ΔT_A of approximately 57.5°F. With this issue apparently resolved, and other unrelated outage activities completed, the unit was returned to service on April 15, 1989.

Therefore, for the period of operation from February 25 to the April 3 forced shutdown, a potential nonconservatism was introduced into the OPΔT and OTΔT setpoints as listed in Technical Specification 2.3.1.2.d. and e. This is a result of having ΔT_A set at approximately 55°F while ΔT_0 was set at 57.5°F.

3 Plant Modification, MOD-959, "RCS Bypass RTDs."
4 For additional information reference Licensee Event Report LER, 88-002, "Potential Nonconservative Reactor Protection Setpoint Due To Incorrect Analysis."

*U.S.GPO:1988-0-624-538/455

NRC Form 366A
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

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

II. Cause of Event

The primary cause of this event has been attributed to the internal miscommunication of the proposed reduction of ΔT_0 from 57.5°F to 55°F. Due to this miscommunication, the proposal was only partially implemented. This resulted in the process instrumentation (i.e., ΔT_A) being compared to a value less conservative than desired. Also, this miscommunication prevented the proposal from reaching the proper plant personnel, so that the responsibility for implementing this proposal was not clearly established.

During the investigation of this event, certain previously identified procedural weaknesses were highlighted. Plant procedure EST-052 requires an evaluation of this instrumentation, however, this evaluation is not specifically addressed with respect to the time of performance after achieving 100% power. No evaluations are required to be made during the approach to full power. Also, there are no specific instructions or criteria for comparison of ΔT_A to ΔT_0, or for performing any required normalizations.

The relationship between the proposed ΔT_0 change and the RTD Bypass Manifold piping removal provided a further contribution to this event. This modification created conditions which were atypical from that of previous startups. Although EST-052 requires evaluation of the affected instrumentation, adjustments had rarely, if ever, been required. The values of ΔT_A obtained during performance of EST-052 (which were the result of the interim/startup calibration) were compared to the proposed ΔT_0 setting of 55°F. The minor differences noted were similar to those observed during previous refueling startups, thereby masking the actual inconsistency between ΔT_0 and ΔT_A.

No apparent connection has been identified between the proposal of July 1988 and the value of ΔT_A used in the interim/startup calibration of the ΔT settings. It is apparently coincidental that both of these values were 55°F.

NRC Form 366A (9-83)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

III. Analysis of Event

The more important of the two delta temperature setpoints is the OTΔT setpoint. This setpoint is assumed within the accident analyses to provide protection against Departure from Nucleate Boiling (DNB) for certain FSAR accidents. A review was performed to establish the effect on the OTΔT setpoint due to the inconsistency between ΔT_A and ΔT_0. As noted earlier, for the duration of plant operation identified, a very conservative value of K_1 was in effect. Evaluation has shown that this conservative value of K_1 (when compared to the allowed Technical Specification value of K_1), compensated for the inconsistency between ΔT_A and ΔT_0. As such, the OTΔT setpoint and its protective functions were not degraded during this period of plant operation.

The OPΔT setpoint, although referenced in the plant Technical Specifications, is not used in the accident analyses. The OPΔT setpoint is only applicable to slow transients and is slow in comparison to the overpower nuclear flux reactor trip which is assumed in the safety analyses. The OPΔT trip provides only backup protection for this overpower nuclear flux trip. An evaluation has been performed to determine whether the nonconservative settings to ΔT_0 and ΔT_A resulted in a degraded OPΔT function. This evaluation essentially balanced the tolerances and conservatisms incorporated into the setpoint against the nonconservatism introduced by the ΔT settings. This evaluation determined that the OPΔT trip function was "operable" and able to perform its function as a backup protective feature during the period of operation in question.

This event is being reported pursuant to the requirements of 10CFR50.73(a)(2)(vi) as a procedural inadequacy which could have prevented the fulfillment of a safety function needed to mitigate the consequences of an accident.

IV. Corrective Action

Following the April 10 confirmation that ΔT_A and ΔT_0 were not set to similar values, adjustments were made to correct the inconsistency. A review of data has been performed to ensure that the OTΔT setpoint was not degraded by the inconsistency between ΔT_A and ΔT_0. Also, an evaluation of the OPΔT setpoint has established that the ΔT settings did not render this backup protective feature unable to perform its intended function.

To address the mishandling of the proposed reduction to ΔT_0, the lines of internal communication will be reviewed and clarified or formalized, as appropriate. The objective of this review will be to ensure that proposed changes which affect the assumptions and criteria of Fuel Cycle analyses are properly incorporated into the plant protective features. This review will be handled under the plant Corrective Action Program.

*U.S. GPO: 1988-520-589/00070

NRC Form 366A
(9-83)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

To address certain procedural weaknesses which were highlighted as a result of this event, a revision to EST-052 will be performed. This revision will provide a specific reference to the ΔT_0 setting and will include instructions to project the response of the ΔT_A setting during the approach to full power. The settings of ΔT_A and ΔT_0 will then be evaluated and compared, and will be properly normalized, if needed, prior to or immediately after achieving 100% power.

V. Additional Information

A. Failed Component Identification

None

B. Previous Similar Events

Licensee Event Report, LER-88-002, provided information regarding nonconservatisms in the OTΔT setpoint due to incorrect analysis.

*U.S.GPO:1988-0-624-538/455