

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8705190612 DOC. DATE: 87/05/13 NOTARIZED: NO DOCKET #
 FACIL: 50-400 Shearon Harris Nuclear Power Plant, Unit 1, Carolina 05000400
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 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 87-020-00: on 870413, reactor trip setpoints on all three
 overtemperature delta temp bistables incorrectly set. Caused
 by apparent design oversight in OTAT circuit design & vendor
 testing methodology. Test procedures revised. W/870513 ltr.

DISTRIBUTION CODE: 1E22D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 5
 TITLE: 50.73 Licensee Event Report (LER), Incident Rpt, etc.

NOTES: Application for permit renewal filed. 05000400

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	AEOD/DOA	1 1		AEOD/DSP/ROAB	2 2
	AEOD/DSP/TPAB	1 1		DEORO	1 1
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	NRR/DEST/MTB	1 1		NRR/DEST/PSB	1 1
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	NRR/DOEA/EAB	1 1		NRR/DREP/EPB	1 1
	NRR/DREP/RAB	1 1		NRR/DREP/RPB	2 2
	NRR/PMAS/ILRB	1 1		NRR/PMAS/PTSB	1 1
	REG FILE 02	1 1		RES DEPY GI	1 1
	RGNE FILE 01	1 1			
EXTERNAL:	EG&G GROH, M	5 5		H ST LOBBY WARD	1 1
	LPDR	1 1		NRC PDR	1 1
	NSIC HARRIS, J	1 1		NSIC MAYS, G	1 1

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) SHEARON HARRIS UNIT 1										DOCKET NUMBER (2) 0 5 0 0 0 4 0 0 1 OF 0 4										PAGE (3) 1 OF 4						
TITLE (4) OVERTEMPERATURE DELTA TEMPERATURE REACTOR TRIP DESIGN DEFICIENCY																										
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	3	8	7	8	7	0	2	0	0	0	5	1	3	8	7	0 5 0 0 0								
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)																								
1		20.402(b)					20.405(c)					50.73(a)(2)(iv)					73.71(b)									
POWER LEVEL (10)		16 3					20.406(a)(1)(i)					50.38(c)(1)					50.73(a)(2)(v)					73.71(c)				
		20.406(a)(1)(ii)					50.38(c)(2)					50.73(a)(2)(vii)					OTHER (Specify in Abstract below and in Text, NRC Form 366A)									
		20.406(a)(1)(iii)					X 50.73(a)(2)(ii)					50.73(a)(2)(viii)(A)														
		20.406(a)(1)(iv)					50.73(a)(2)(iii)					50.73(a)(2)(viii)(B)														
		20.406(a)(1)(v)					50.73(a)(2)(iii)					50.73(a)(2)(ix)														
LICENSEE CONTACT FOR THIS LER (12)																										
NAME ANDREW HOWE - REGULATORY COMPLIANCE										TELEPHONE NUMBER AREA CODE 9 1 9 3 6 2 - 2 7 1 8																
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																										
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC																
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)

Abstract:

At 0930 on April 13, 1987, it was discovered that the reactor trip setpoints on all three Overtemperature Delta Temperature bistables were incorrectly set. This situation was caused by a design deficiency affecting the calibration of the differential neutron flux input to the channel, such that the setpoint for reactor trip would not begin to decrease when the dq signal reached -34% as required, but instead would be delayed until approximately -37.5%.

The channels were declared inoperable, Technical Specification 3.0.3 was applied, and preparations for plant shutdown were begun. By 1040, two of the three channels were adjusted using actual NI signals so that the OTΔT setpoint would be reduced properly. Reactor operation was continued as allowed by Technical Specifications. All three channels were restored to operable status at 1541 on April 14, 1987.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
SHEARON HARRIS UNIT 1	0500040087	—0	20	—0	0	2	OF 04

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

Description:

During a review of surveillance test procedures against the requirements of the Westinghouse Startup Manual procedures, it was noted that the differential neutron flux (dq) input to the Overtemperature Delta Temperature (OTAT) reactor trip channel was not adjusted using inputs directly from the Nuclear Instrumentation (NIS) cabinets. Instead, a simulated NI signal was used to calibrate the OTAT channel.

Test data was obtained on April 8, and a review of this data revealed a conservative shift of the dq input required to cause a penalty decrease in the OTAT setpoint for a positive differential. With an input of +9% differential flux, a setpoint shift was observed although no shift is required by Technical Specifications until +10%. No data was available for the negative dq input to the OTAT channel since the surveillance test used a -30% dq test signal for calibration, and the setpoint shift is not required until -34%.

Additional data collected on April 10 (confirmed April 11), showed that when an OTAT channel received a signal from the actual NI isolation amplifier a gain of 0.8 existed for the upper neutron flux potentiometer, while the lower neutron flux potentiometer had a gain of 0.773. This was observed on all three channels. CP&L and Westinghouse personnel continued to investigate this discrepancy. On April 13, the data was independently reviewed by the scaling group and it was determined that a nonconservative setpoint existed in the OTAT reactor trip setpoints for the differential neutron flux input for negative differential. At 0930 on April 13, with the plant in Mode 1 at 63% thermal power level, the Shift Foreman declared all three OTAT protection channels inoperable.

Technical Specification 3.3.1 requires two of the three OTAT channels to be operable in Modes 1 and 2. With all three channels declared inoperable, Specification 3.0.3 is applicable. Immediate action was initiated to prepare for a plant shutdown to hot standby by 1630 that day. In addition, action was begun to conservatively calibrate the OTAT channels. At 1040, two of the three channels potentiometers were readjusted using the actual NI signal to obtain the correct gain of 0.8 and were declared operable. Plant operation was continued as permitted by Specification 3.3.1. The third channel was kept out of service to support troubleshooting performed to identify the problem. All three OTAT channels were returned to service at 1541 on April 14.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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)

Cause:

An apparent design oversight existed in the OTAT circuit design and the vendor testing methodology, which provides for the use of a test switch and simulated test signals to permit calibration of the instrument loop during shutdown conditions. The NIS test signal applied during calibration to simulate lower flux to the OTAT channel did not duplicate the actual signal input by the NIS cabinet. Troubleshooting of the C loop channel (T-432) revealed that the negative input signals for upper and lower neutron flux were grounded at the NIS cabinet. When the PIC loop was placed in test to inject a calibration signal, the negative lead was no longer grounded. Calibration with the ungrounded negative input changed the lower flux potentiometer gain from 0.8 during calibration to 0.773 when the system was returned to normal with a grounded negative lead. This situation existed only on the lower neutron flux channel due to the physical arrangement of the circuit. The result was that the negative dq penalty to the OTAT reactor trip setpoint would begin at approximately -37.5% instead of -34% as required by Table 2.2-1, Reactor Trip System Instrumentation Trip Setpoints, of the Technical Specifications.

Analysis:

The OTAT reactor trip provides core protection to prevent a departure from nucleate boiling (DNB) for all combinations of pressure, power, coolant temperature, and axial power distribution, provided the transient is slow with respect to Reactor Coolant System piping transit delays from the core to the temperature detectors. If axial power peaks are greater than design, as indicated by the difference between top and bottom power range nuclear detectors, the reactor trip setpoint is automatically reduced.

This event could have resulted in the reactor power level being higher than permitted by Technical Specifications, had an axial power imbalance occurred, reducing the allowed margin to DNB. At no time, however, did such an axial power imbalance occur. The plant was being operated only up to 75% thermal power level as part of power ascension testing, which provided a further margin to the OTAT trip setpoint of 109% (nominal without penalties). Operation of the plant with large negative axial power imbalances is prohibited by Technical Specification 3.2.1.

This situation was investigated for potential reportability under 10CFR21 and was determined by CP&L to be not reportable.

This event was initially reported under 10CFR50.72(b)(1)(ii) as a serious degradation of the nuclear plant principal safety barrier. Based on further evaluations, no substantial safety hazard existed and the event is reportable under 10CFR50.73(a)(2)(i)(B) as a violation of the Technical Specifications.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

Corrective Action:

1. Surveillance test procedures which calibrate the OTΔT channels have been revised to account for the grounded negative input for the neutron flux potentiometers.
2. Other PIC cards have been bench tested with grounded and ungrounded inputs and no further cases of this problem were observed.
3. Westinghouse has been advised of the situation and plans to issue a technical bulletin.



Carolina Power & Light Company

HARRIS NUCLEAR PROJECT
P.O. Box 165
New Hill, NC 27562

MAY 13 1987

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Letter Number: HO-870429 (O)

U.S. Nuclear Regulatory Commission
ATTN: NRC Document Control Desk
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT UNIT 1
DOCKET NO. 50-400
LICENSE NO. NPF-63
LICENSEE EVENT REPORT 87-020-00

Gentlemen:

In accordance with Title 10 to the Code of Federal Regulations, the enclosed Licensee Event Report is submitted. This report fulfills the requirement for a written report within thirty (30) days of a reportable occurrence and is in accordance with the format set forth in NUREG-1022, September, 1983.

Very truly yours,

R. A. Watson
Vice President
Harris Nuclear Project

RAW:sdg

Enclosure

cc: Dr. J. Nelson Grace (NRC - RII)
Mr. B. Buckley (NRR)
Mr. G. Maxwell (NRC - SHNPP)