NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
McGuire Nuclear Station, Unit 1	0 5 0 0 0 3 6 9	1 OF 0 4

TITLE (4)

Power Range, Neutron Flux, High Negative Rate Setpoint

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 2	0 1	8 5	8 5	0 0 5	0 0	0 3	0 1	8 5	Catawba, Unit 1	0 5 0 0 0 4 1 3
									McGuire, Unit 2	0 5 0 0 0 3 7 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)	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
1 0 0	20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	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)	X 50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
	20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Scott Gewehr - Licensing	7 0 4 3 7 3 - 7 5 8 1

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 fifteen single-space typewritten lines) (16)

On February 1, 1985, the Westinghouse response to a Duke Power Company inquiry concerning the Negative Flux Rate Trip setpoint led to the conclusion and subsequent report to the NRC, that McGuire N. S. was in a condition outside the design analyses assumptions. A Westinghouse analysis demonstrated that conservatisms in the dropped rod analysis for assumptions other than the flux rate setpoint are adequate to ensure safe operation with the bistable setpoint equal to 5.0% Rated Thermal Power (RTP) and the rate function time constant equal to 2.0 seconds. In order to satisfy the licensing basis analysis and the most conservative interpretation of the Technical Specifications, the bistable setpoint was reduced to 2.5% RTP.

This incident is reportable pursuant to 10 CFR 50.73 (a)(2)(ii)(C).

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McGuire Nuclear Station personnel calibrated the negative flux rate trip function in a manner consistent with the instructions provided by the NSSS vendor, Westinghouse. The setpoint procedure and corresponding bistable and rate function setpoints are provided in the following vendor supplied documents:

1. NSSS Startup Manual
2. NSSS General Operating Instructions
3. NSSS Precautions, Limitations, and Setpoints
4. Nuclear Instrumentation System Technical Manual
5. MNS Setpoint Study

The Technical Specifications state that the Negative Flux Rate Setpoint should be less than or equal to 5% of Rated Thermal Power (RTP) with a time constant greater than or equal to 2 seconds. This was interpreted to require that the bistable setpoint should be set less than or equal to 5% RTP and the rate function time constant should be set greater than or equal to 2 seconds. This interpretation is consistent with the calibration instructions provided by Westinghouse and other specifications which involve bistables and lead/lag circuitry.

Westinghouse expressed a concern in regard to the procedure used at another utility and the possibility that the safety analyses assumptions were not adequately reflected in the negative flux rate setpoint as implemented. The assumption upon which the setpoint was to be based is that a reactivity insertion resulting in a flux change in the form of a ramp of 5% RTP per 2 seconds should initiate a trip due to the negative flux rate protection function. This assumption was written in various references as a setpoint of 5% RTP with a time constant of 2 seconds (analyses value of 6.9% RTP/ 2 seconds). Subsequently, Westinghouse and utility personnel involved with implementation of trip functions and related setpoints interpreted the phrase, setpoint of 5% RTP with a time constant of 2 seconds, as discussed previously involving the bistable and rate function setpoints.

The safety analyses assume a reactor trip signal results from a decrease in the neutron flux of 5% RTP per 2 seconds within 2 seconds of ramp initiation. (This safety analyses assumption corresponds to a bistable setpoint of 3.3% RTP and a rate function time constant of 2 seconds.) The negative flux rate trip function is required to ensure adequate response to the dropped control rod(s) transient. The dropped rod analyses for McGuire are performed as described in WCAP 10297-P-A, Dropped Rod Methodology for Negative Flux Rate Trip Plants. In addition to the flux ramps which result in reactor trips, other assumptions involving parameters such as rod worths, reactivity coefficients, control system behavior, rod drop times, and core peaking factors are important in the determination of plant response to a dropped rod event.

Westinghouse performed an analyses in which the ramp corresponding to trip was raised to 10% RTP per seconds and decreased the rod drop time from 3.3 seconds to 1.7 seconds. The analyses show that although the maximum undetected (no trip initiation) rod worth increases, it is within the range of dropped rod worths considered in the generic DNB setpoint analysis. The dropped rod analyses for McGuire included the generic range of rod worths, thus including in the analyses the additional dropped worths that would not result in a trip due to the higher than intended setpoint. Confirmation was made from plant test procedures to ensure the measured rod drop times were less than 1.7 seconds. After adjusting for uncertainties, the assumed 10% RTP/ 2 second ramp is adequate to justify a bistable setpoint of 5% RTP with a rate function time constant of 2 seconds.

Although continued operation of the units maintaining the 5% RTP bistable setpoint could be justified based upon the Westinghouse evaluation, Duke accepted the Westinghouse recommendation and reduced the bistable setpoint to 2.5% RTP while the rate function time constant remained 2 seconds. This change was made to ensure the most conservative interpretation of the Technical Specification was made and the intent of the licensing basis safety analyses could be satisfied.

CORRECTIVE ACTION

Immediate - The revised bistable setpoint of 3.3% RTP was determined to satisfy safety analysis assumptions. Bistable recalibration to a setpoint of 2.5% RTP was performed.

Planned - Perform dropped rod analysis with revised assumptions in order to return bistable setpoint to a value close to the original value of 5% RTP.

SAFETY ANALYSIS

Westinghouse performed an evaluation in which the assumptions concerning the negative flux rate setpoint and the rod drop time were revised. The evaluation assumed a ramp of 10% RTP per 2 seconds would result in a reactor trip. Upon adjusting for various uncertainties, in the same manner and magnitude as the original analyses, the 10% RTP/2 second ramp assumption corresponds to a bistable setpoint of 5% RTP, and a rate function time constant of 2.0 seconds. The drop time assumption was revised from 3.3 seconds to 1.7 seconds.

The effect of the change in setpoint assumption is to increase the dropped rod worth required to result in a reactor trip. This effect is partially offset by the reduced rod drop time of 1.7 seconds, which acts to decrease the dropped rod worth required to initiate a reactor trip. The net effect of the revised assumption is an increase in the dropped rod worth required to result in a reactor trip. However, the maximum undetected rod worth remains within the range of rod worths considered in the generic DNB statepoint analyses.

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

The dropped rod analyses for McGuire include the entire range of dropped rod worths considered in the generic analysis. So long as the rod drop times are less than 1.7 seconds, only the generic aspects of the dropped rod analysis is impacted. The measured rod drop times were confirmed to be less than 1.7 seconds at McGuire. Thus, the plant specific portion of the dropped rod analyses has been shown to remain valid for the required range of rod worths when the reduced rod drop time assumption is used to offset the higher bistable setpoint used.

Although it was demonstrated that the existing plant specific dropped rod analysis was adequate to cover the required range of rod worths, Duke decided to implement a revised setpoint consistent with the intent of the original dropped rod analysis assumptions. The bistable setpoint was reduced to 2.5% RTP (3.3% RTP would be allowable under original analysis assumptions) and the rate function time constant was maintained at 2.0 seconds. The revised setpoints satisfy the intent of the original dropped rod analysis and also ensure the most conservative interpretation of the Technical Specification.

The health and safety of the public were not affected by this incident.

DUKE POWER COMPANY
P.O. BOX 33189
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HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

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March 1, 1985

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: McGuire Nuclear Station, Units 1 & 2
Docket No. 50-369/370

Gentlemen:

Pursuant to 10 CFR 50.73 Section (a)(1) and (d), attached is Licensee Event Report 369/85-05 concerning the Power Range, Neutron Flux, High Negative Rate setpoint. This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

H.B. Tucker/BS

Hal B. Tucker

SAG/mjf

Attachment

cc: Dr. J. Nelson Grace, Regional Administrator
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