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

Subject: McGuire Nuclear Station, Unit 2
Docket No. 50-370
Licensee Event Report Number 370/00-02, Revision 1
Problem Investigation Process No. M-00-4645

Pursuant to 10 CFR 50.73 Sections (a) (2) (iv), attached is Licensee Event Report 370/00-02, Revision 1, concerning a McGuire Unit 2 event that resulted in an unplanned valid actuation of the Reactor Protection System (RPS) and an Engineered Safety Feature (ESF). An abstract of this event was previously submitted on December 12, 2000. This event was initially reported on November 15, 2000 per the requirements of 10 CFR 50.72 (b) (2) (ii). Additional information was reported on November 16, 2000 per the requirements of 10 CFR 50.72 (c) (2).

On November 15, 2000, McGuire Unit 2 experienced a turbine runback which resulted in plant operators manually tripping the reactor (RPS Actuation). The turbine runback was initiated by the opening of a circuit breaker which supplies power to non-safety related turbine runback logic circuitry. Following the reactor trip, the Unit 2 Auxiliary Feedwater Pumps started due to lo-lo steam generator levels (ESF Actuation). The cause of the open circuit breaker which initiated this event could not be determined. Therefore, the cause of this event is classified as unknown.

Reactor trips are analyzed in Chapter 15 of the McGuire Nuclear Station Final Safety Analysis Report. Those analyses demonstrate that, given the plant conditions and sequence of events associated with this event, the plant design and response was adequate. Therefore, this event is considered to be of no significance with respect to the health and safety of the public. This event report does not contain any regulatory commitments.

B W Pitt for

H. B. Barron

Attachment

IE22

cc: Mr. L. A. Reyes
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Mr. S. M. Shaeffer
NRC Resident Inspector
McGuire Nuclear Station

NRC FORM 366 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)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
McGuire Nuclear Station, Unit 2	05000 370	1 of 6

TITLE (4) McGuire Unit 2 Manual Reactor Trip Following an Invalid Main Turbine Runback.

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(S)
11	15	00	00	- 02	-	1	2	27	01	None	N/A

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (Check one or more of the following) (11)							
POWER LEVEL (10)	100%		20.402(b)		20.405(c)	X	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)		OTHER (Specify in
			20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		Abstract below and
			20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		in Text, NRC Form
			20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Julius W. Bryant	(704) 875-4162

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)

Unit Status: At the time of the RPS and ESF actuation, both Unit 1 and Unit 2 were in Mode 1 at 100% Power.

Event Description: On November 15, 2000, McGuire Unit 2 experienced a main turbine runback caused by actuation of over-power-delta-temperature (OPDT) and over-temperature-delta-temperature (OTDT) runback logic. The OPDT and OTDT channels actuated following the opening of electrical circuit breaker KXB-37 which supplies power to the logic circuitry. The channels were not actuated by a valid OPDT or OTDT condition. Subsequent to the runback, the Unit 2 reactor was manually tripped when the OPDT and OTDT runback signals did not clear. The manual trip of the Unit 2 reactor represented an actuation of the Reactor Protection System (RPS). Following the Unit 2 reactor trip, an Engineered Safety Feature (ESF) actuated when the 2A and 2B Motor Driven Auxiliary Feedwater (CA) Pumps and the Unit 2 Turbine Driven CA Pump auto-started due to Lo-Lo Steam Generator (SG) levels. Plant equipment necessary to safely shutdown the unit operated correctly.

Event Cause: This event was initiated by the opening of electrical circuit breaker KXB-37 which supplies power to the OPDT and OTDT circuitry. The cause of the open KXB-37 breaker could not be determined. Therefore, the cause of this event is classified as unknown.

Corrective Action: Circuit breaker KXB-37 was replaced.

NRC FORM 366 *NPRDS no longer exists, equipment failures will be reported through EPIX

BACKGROUND

The following summary descriptions of Unit 2 equipment and functions are relevant to discussion of the subject event.

120 VAC Auxiliary Control Power System Panelboard KXB

The 120 VAC Auxiliary Control Power System provides a regulated power source for the control and instrumentation of non-safety related loads. In addition, the system provides an alternate power source for the control and instrumentation of non-safety related loads requiring an uninterruptible source of power.

The system contains 120 VAC auxiliary control power panelboard KXB which supplies power to the OTDT and OPDT runback logic circuitry via circuit breaker KXB-37.

OTDT and OPDT Runback Logic Circuitry

The OTDT and OPDT runback logic is non-safety related circuitry which provides anticipatory protection against Departure from Nucleate Boiling (DNB) and excessive fuel centerline temperatures. The OTDT and OPDT setpoints are set such that a turbine runback occurs 2% below the respective reactor trip setpoint. A turbine runback is designed to reduce turbine power and reactor power and to alleviate the OTDT or OPDT condition and prevent a reactor trip.

SG Water Level Control System

The SG Water Level Control System maintains constant SG level as determined by a programmed level. The system consists of four redundant channels of SG narrow range level instrumentation per SG. Each channel supplies input to the RPS and the Engineered Safety Features Actuation System (ESFAS) to accomplish the following automatic functions:

- Reactor trip on Low-Low SG level (RPS function).
- ESF actuation on Low-Low SG level.
- ESF actuation on Hi-Hi SG level.

CA System:

The CA System supplies auxiliary feedwater to the SGs when the main feedwater system is unavailable to maintain SG water inventory. This ESF function provides a means of dissipating energy from the Reactor Coolant System. To accomplish this function, one turbine driven and two motor driven pumps are provided. The motor driven CA pumps will auto-start upon receipt of two out of four Lo-Lo narrow range level alarms in any one SG (ESF feature). The turbine driven CA pump will auto-start upon receipt of two out of four Lo-Lo narrow range level alarms in any two SGs (ESF feature).

DESCRIPTION OF EVENT

At the time of the event on November 15, 2000, Unit 2 was in Mode 1 at 100% power. The following is an approximate timeline of the event:

14:06 KXB-37 opened which caused a loss of power to the OTDT and OPDT logic circuitry. Loss of power to these logic circuits resulted in a false turbine runback signal and subsequent turbine runback.

14:22 Reactor power at approximately 18%. Reactor Trip Breakers manually opened after unsuccessful attempts to manually clear OTDT and OPDT runback signals (RPS Actuation). As per design, a turbine trip occurred following the reactor trip.

14:31 Steam Generators "A" and "C" Lo-Lo Level due to main feedwater pumps on roll back hold (expected SG level response). 2A and 2B motor driven CA pumps autostart, Unit 2 turbine driven CA pump autostart (ESF Actuation).

15:52 Main feedwater flow re-established to the SGs. Unit 2 turbine driven CA pump secured.

15:56 2A motor driven CA pump secured.

16:06 2B motor driven CA pump secured.

CAUSE OF EVENT

The post-event investigation identified the following:

- There were no valid OTDT or OPDT signals generated in the RPS cabinets and all OTDT and OPDT RPS bistables were in a non-trip condition. These signals and the subsequent bistable trips are designed to de-energize OTDT and OPDT related auxiliary and timer relays which would initiate a turbine runback.

- The normally energized OTDT and OPDT related auxiliary and timer relays were found to be de-energized, a state that would initiate a turbine runback. These auxiliary and timer relays are designed to be de-energized following a valid RPS OTDT or OPDT signal.

- Circuit breaker KXB-37 was found in the open position. This breaker supplies electrical power to the OTDT and OPDT logic channels. Interruption of power to this logic circuitry would de-energize the above OTDT and OPDT related auxiliary and timer relays, a state that would initiate a turbine runback.

The above information indicates that the November 15, 2000 Unit 2 turbine runback was not initiated by a valid OTDT and OPDT signal. Instead, the runback occurred when breaker KXB-37 opened. The resulting loss of power de-energized the OTDT and OPDT auxiliary and timer relays initiating a turbine runback and the subsequent manual reactor trip and automatic ESF actuation.

External and internal inspection of the KXB-37 circuit breaker, inspection and testing of the applicable electrical circuits, and evaluation of the circumstances associated with the event did not identify a cause for the open KXB-37 circuit breaker. Therefore, the cause of this event is classified as unknown.

CORRECTIVE ACTION

1. Replaced circuit breaker KXB-37.
2. Verified the proper operation of the Unit 2 OPDT and OTDT circuitry. No discrepancies were noted.

SAFETY ANALYSIS

Based on this analysis, this event is not considered to be significant. At no time were the safety or health of the public or plant personnel affected as a result of the event.

Reactor trips and turbine trips are analyzed in Chapter 15 of the McGuire Nuclear Station Final Safety Analysis Report. Those analyses demonstrate that, given the plant conditions and sequence of events associated with the November 15, 2000 event, the plant design and response was adequate. Therefore, this event presented no hazard to the integrity of the Reactor Coolant System or the reactor fuel/cladding.

During the event, the unit experienced a reactor trip from a low power level with no complications. Feedwater flow to the SGs was maintained by the CA System, ensuring adequate decay heat removal. Given this and the availability of other plant equipment needed for initiating and maintaining adequate decay heat removal, the Conditional Core Damage Probability (CCDP) of this event is considered insignificant (on the order of 3E-07). As per the MNS PRA analysis, the major contributor to Large Early Release Frequency (LERF) is Interfacing Systems LOCAs (approximately 99.8%). This event does not produce sequences that contribute significantly to the ISLOCA plant damage state. The impact on LERF is therefore very small.

Given the above, this event is considered to be of no significance with respect to the health and safety of the public.