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 2	0 5 0 0 0 3 7 0	1 OF 0 5

TITLE (4)
Reactor Trip on Inadvertent Control Bank Drop

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 5 0 0 0
1 0	2 3	8 4	8 4	— 0 2 6	— 0 0	1 1	2 6	8 4		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)	X 50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10) 1 0 0	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(e)
	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)	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
W. H. McDowell- Licensing	7 0 4 3 7 3 - 8 8 7 8

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 October 23, 1984, the Unit 2 reactor tripped due to a power range negative high flux rate. This occured when Instrument and Electrical (IAE) personnel caused Group One of Control Rod Bank B to fall into the core while troubleshooting the Full Length Rod Control System.

The cause of this event was attributed to a procedural deficiency because no procedure was available to give troubleshooting guidelines for the Rod Control System. A contributing cause was due to the IAE Specialist involved not having received available system training.

Unit 2 was in Mode 1 at 100% power when the event occured.

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1/1

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

INTRODUCTION: At 0446 on October 23, 1984, the unit two reactor tripped due to a power range negative high flux rate. This occurred when Instrument and Electrical (IAE) personnel caused group one of Control Rod Bank B to fall into the core while trouble-shooting the Full Length Rod Control System.

Causes of this event are administrative and procedural. A procedural deficiency occured because no procedure was available to give troubleshooting guidelines for the rod control system. An administrative deficiency occured as a contributing cause because available system training was not given to the IAE specialist involved.

EVALUATION: Every 31 days Operations is required to move each Control Rod Bank and Shutdown (S/D) Rod Bank ten steps per Technical Specification 4.1.3.2.1. Operations personnel were performing the test to satisfy this requirement when they found S/D Banks C and D could not be inserted using the manual control. Also S/D Bank B moved when Control Rod Bank B was selected.

Each control and shutdown rod is controlled by a mechanism as shown on Figure 1. If the rod is not being moved, the stationary gripper coil is energized and the moveable gripper coil is deenergized. If a Rod Control Urgent alarm exists, a reduced current is sent to the stationary and moveable gripper coils to maintain them in an energized position. The stationary gripper coils can also be maintained energized with a latching switch located in its associated power cabinet.

The Rod Control Urgent alarm was received after Operations personnel attempted to move S/D Bank C and S/D Bank D. The alarm was reset both times by Operations personnel. It has been Operations practice not to reset a Rod Control Urgent alarm a second time before IAE personnel troubleshoot the cause of the alarm, however in this case, the operators knew the reason for the alarms (S/D Banks C and D would not move). Although Control B did not move properly, an urgent alarm was not received, therefore no urgent alarm existed when the IAE specialist was called.

IAE Specialist A was troubleshooting the problem with Control Rod Bank B when a logic card (the firing circuit card) was disconnected which was associated with the stationary gripper coils of Group One of Control Rod Bank B. This caused the control rod stationary gripper coils to deenergize. Prior to pulling this card, IAE Specialist A failed to verify that either the control rod moveable gripper coils were energized or the stationary gripper coils were latched in an energized condition by the latching switch. The moveable gripper coils had been deenergized prior to troubleshooting. When the stationary gripper coils were deenergized, the control rods in Group One of Bank B (4 rods) dropped into the core.

IAE specialist A did not realize that pulling this logic card would release the rods into the core. The logic card had been pulled on previous occasions for troubleshooting without tripping the reactor. The Rod Control Urgent alarm was not in an alarm condition at the time of the event. Apparently the urgent alarm had existed on previous occasions when the card was pulled for troubleshooting, thus preventing a rod drop.

Several conditions were contributing factors to the event. Since the equipment being checked was not safety related, a troubleshooting procedure was not required and did not exist. The IAE specialist had all the available manuals and drawings. An available vendor manual included the following warning:

> "Before printed circuit cards, fuses or power components are replaced, the associated stationary gripper coils must be held on the D. C. hold supply cabinet to avoid dropping the rods."

This warning is located within the paragraphs of a troubleshooting section and was not read by IAE Specialist A prior to troubleshooting. Under the circumstances of this event, it is unrealistic to expect that personnel would read through the vendor manuals prior to troubleshooting due to time involved. IAE Specialist A was under the impression that he was working under the Action Statement of T. S. 3.1.3.1. This action statement requires placing the unit in hot standby within six hours of declaring more than one full length rod inoperable. No rods were declared inoperable because they were still capable of being tripped. This misunderstanding created an unnecessary sense of urgency. If a procedure existed with the same warning as the vendor manual, this event may have been avoided.

IAE Specialist A has over five years of experience working with the Rod Control System but has not received formal training on the system. A two week training course on the rod control system has been available, and other IAE personnel have taken it. Since IAE Specialist A works primarily on this system, it would have been appropriate for him to have received the training.

The problems with Control Rod Bank B and S/D Banks C and D were determined after the unit trip. A faulty integrated circuit on the Bank Overlap Decoder Card in the logic cabinet caused S/D Bank B to move when Control Bank B was selected. With this faulty card, any signal to either Control Bank B or S/D Bank B would have been sent to S/D Bank B. The reason for S/D Banks C and D not moving is believed to have been faulty cable shielding. Thirty volts AC existed on a cable associated with the lift coils on S/D Bank E, rod M-8. This produced a false signal indicating this rod was moving. S/D Banks C,D, and E are interlocked such that only one bank can move at a time (except in the event of reactor trip). The signal on S/D Bank E prevented S/D Banks C and D from moving. The source of this voltage could not be determined. Normally, the cable shielding grounds any voltage induced from magnetic fields which the cable may experience. With faulty shielding, a voltage could have been induced on the cable. To resolve this problem IAE personnel bypassed the subject cable using a jumper.

CORRECTIVE ACTION: IAE personnel replaced the faulty bank overlap decoder card for Control Rod Bank B. All cards in the Rod Control System are currently scheduled to be functionally verified during every refueling outage. IAE personnel also used a jumper to bypass the bad cable associated with S/D Bank E.

A general troubleshooting procedure will be written for the Rod Control System. Also the IAE group will implement an employee training and qualification on systems program. This program will identify tasks performed by IAE personnel and ensure personnel meet qualification requirements prior to working on systems or equipment.

SAFETY ANALYSIS: Prior to the event McGuire Unit 2 was operating at 100% power. All four Reactor Coolant pumps and both feedwater pumps were in operation. The steam generators were being fed through the lower feedwater nozzles. The B centrifugal charging pump was in operation for Reactor Coolant makeup. The turbine load was ∿1195 MWe. The Rod Control station was in manual with Control Bank B selected. All other control stations were in automatic.

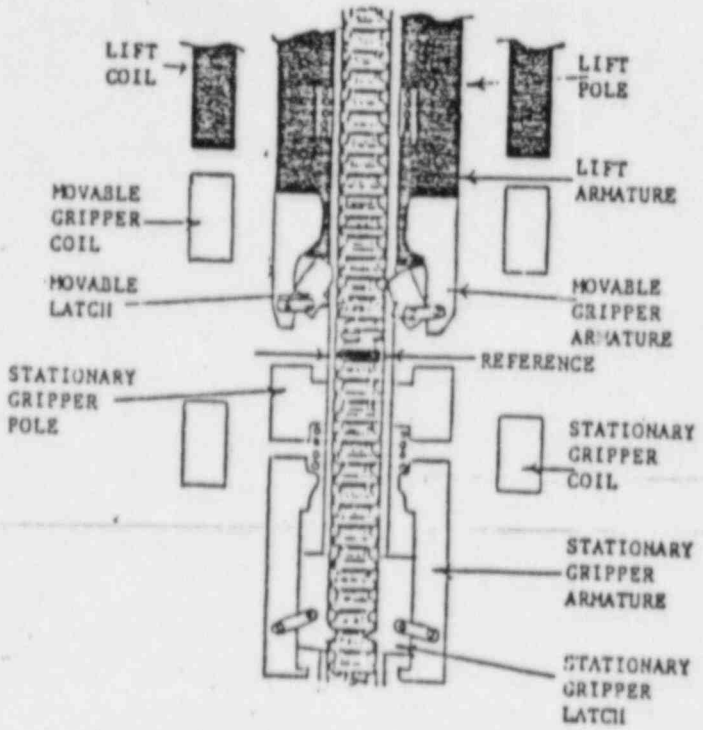
Reactivity was properly controlled by the reactor trip. Pressurizer pressure responded as expected, dropping to a minimum of 2209 psig before recovering and stabilizing at its reference value of 2235 psig. The pressurizer PORV's and Code Safety Valves were not challenged. Reactor coolant loop average temperatures responded as desired, dropping to ∿560°F. The temperature settled out at 558°F thirty minutes after the reactor trip. This is within one degree of the expected no-load value of 557°F. Wide range hot and cold leg temperatures also responded as designed. Pressurizer level control was normal. The level dropped immediately after the reactor trip to ∿37%, and slowly decreased toward its no-load value (25%). The pressurizer level stabilized at 24% about 30 minutes after the reactor tripped. Steam pressure peaked at 1127 psig in Steam Generator C, and stabilized at ∿1084 psig. The A Steam Generator PORV opened at 1111 psig decreasing and closed at 1086 psig decreasing. (The PORV setpoints are 1125±1% psig and 1092±1% psig for opening and closing respectively). The B Steam Generator PORV did not open. This response is acceptable as peak pressure was 1118 psig in this steam generator. The Steam Generator C PORV also did not open. The peak pressure of 1127 psig was within the tolerence of the valve. The Steam Generator D PORV opened at 1117 psig, within the setpoint tolerance of the valve.

Steam Generator level dropped immediately after the trip to the minimum level of ∿30%. All three Auxiliary Feedwater Pumps were initiated on indicated low-low level in two out of four steam generators. Actual level remained above the post trip low-low level setpoint (12%). Main Feedwater flow was isolated at 04:47:10 on reactor trip with coincident low average primary coolant temperature. Both main feedwater pumps tripped two seconds later on high pump discharge pressure. The operators reset the auxiliary feedwater control valves and adjusted the flows to each steam generator as the level had rapidly recovered to the no-load target value of 38%. Subsequently, the level remained stable at 38% ± 7%. The Turbine Driven Auxiliary Feedwater pump was secured at 04:51:46. The B Main Feedwater Pump was reset at 05:11:23, and the Motor Driven Auxiliary Feedwater Pumps were secured at 05:19:00. Main Feedwater was used to maintain Steam Generator level after the Auxiliary Feedwater pumps were secured. The levels were well controlled at all times. Minimum level post-trip was 30% in Steam Generator C, which is well above the post-trip low-low setpoint of 12%.

Safety Injection was not actuated during this event. The pressurizer PORVs and Code Safety Valves were not challenged. Indicated pressurizer and steam generator levels remained on scale. The primary cooldown rate was approximately 30°F per hour, well within the Technical Specification Limit of 100°F per hour. No abnormal release of radioactivity occurred during this event, and there was no abnormal primary leakage.

Figure 1

ROD CONTROL MECHANISM



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November 26, 1984

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

Subject: McGuire Nuclear Station, Unit 2
Docket No. 50-370
LER 370/84-26

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 370/84-26 concerning a reactor trip on Inadvertent Control Rod Bank Drop, which is submitted in accordance with §50.73 (a)(2)(iv). This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

H.B. Tucker 1/1/85

Hal B. Tucker

WHM/mjf

Attachment

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