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)

Engineering Safety Features Actuation Signal on Unit 2 Due to Unknown Causes

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 3	2 1	8 6	8 6	— 0 0 4	— 0 0	0 4	2 1	8 6		0 5 0 0 0
										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)			
5	20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10) 0 0 0	20.405(a)(1)(i)	50.38(c)(1)	50.73(a)(2)(v)	73.71(c)
	20.405(a)(1)(ii)	50.38(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
Julio G. Torre, Licensing	AREA CODE 7 0 4 3 7 3 - 8 1 2 9

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 March 21, 1986, at 1101, an Engineering Safety Features (ESF) actuation signal occurred on Unit 2. The actuation signal occurred immediately following an attempt to remove a broken drill bit from the Unit 2 control board. The bit had become lodged in the control board during work on a Nuclear Station Modification (NSM). Duke Power personnel were drilling a guide hole in the control board in close proximity to device 2NI-99 (Train B Pressurizer Low Pressure Safety Injection Block/Unblock Switch). The drill bit broke and became lodged in the control board. The bit could not be removed with pliers, and an electrician decided to try removing the bit with a hammer and punch. When the drill bit was struck, a Safety Injection signal actuated on train B. Plant safety systems responded as designed and Operations personnel were able to stabilize the unit without any water being injected into the reactor vessel.

Unit 2 was in Mode 5, Cold Shutdown, at atmospheric pressure and at 110 degrees F at the time of the incident.

The exact cause of the ESF actuation signal could not be determined. Duke Power will ensure that the correct contact block is installed on device 2NI-99, and training will be provided to all appropriate personnel.

All plant safety systems responded as designed to the ESF actuation signal.

IE22
1/1

U.S.GPO:1984-0-454-481/18759

On March 21, 1986, at 1101, an Engineering Safety Features (ESF) [EIIS:JE] actuation signal occurred on Unit 2. The actuation signal occurred immediately following an attempt to remove a broken drill bit from the Unit 2 control board. The bit had become lodged in the control board during work on a Nuclear Station Modification (NSM). Duke Power personnel were drilling a guide hole in the control board in close proximity to device 2NI-99 (Train B Pressurizer Low Pressure Safety Injection Block/Unblock Switch). The drill bit broke and became lodged in the control board. The bit could not be removed with pliers, and an electrician decided to try removing the bit with a hammer and punch. When the drill bit was struck, a Safety Injection signal actuated on train B. Plant safety systems responded as designed and Operations personnel were able to stabilize the unit without any water being injected into the reactor vessel.

Unit 2 was in Mode 5, Cold Shutdown, at the time of the incident.

BACKGROUND:

McGuire Nuclear Station is in the process of implementing a large number of control board modifications. The modifications are the result of a Duke Power study of human engineering deficiencies (HEDs) in nuclear power plant control rooms. The majority of the modifications are implemented during unit refueling outages to minimize the effect on plant operation and safety. Several control board devices in the Safety Injection (NI) [EIIS:BP] system are being rearranged during the current end of cycle 2 refueling outage. The modifications require that work be performed in close proximity to energized safety-related devices. The redundancy of safety-related devices separated into independent trains makes it possible to isolate one train at a time for modification work.

The Safety Injection System provides emergency core cooling in the event of a break in either the reactor coolant or steam system. Water containing a high boron concentration is initially introduced into the Reactor Coolant (NC) [EIIS:AB] system to counteract any reactivity increase resulting from a steam break. This is followed by the injection of water from the refueling water storage tank (RWST), with a lower boron content, in order to cool the core and to prevent the possibility of an uncontrolled return to criticality.

The Pressurizer Low Pressure Safety Injection signal is designed to actuate plant safety systems in the event of depressurization of the NC system below 1845 psig during plant operation in Modes 1, 2, and 3.

DESCRIPTION OF EVENT:

On March 21, 1986, at approximately 1045, a Duke Power electrician was drilling a hole approximately 6 inches from device 2NI-99, Train B Pressurizer Low Pressure Safety Injection Block/Unblock Switch, in the NI section of the control board. The drill bit broke and became lodged in the board. The electrician was unable to remove the broken bit with pliers and decided to remove the bit by tapping it with a hammer and punch. When the broken drill bit was struck, an

unplanned ESF actuation signal occurred at 1101. All personnel involved in the modification immediately evacuated the control board area making it accessible for Operations personnel.

Operations personnel implemented the ECCS Actuation During Plant Shutdown procedure. After unsuccessful attempts to reset the ESF actuation signal, it was discovered that device 2NI-99 was in the unblocked position. When the unit is in Mode 5, Cold Shutdown, this switch must be in the blocked position in order to reset the ESF actuation signal. The switch was placed in the blocked position and ESF actuation signal was then reset at 1108. Plant conditions were stabilized without any water being injected into the reactor vessel. The Nuclear Regulatory Commission was notified of this event at 1200.

After the plant was stabilized, Operations personnel and personnel involved in the subject modification discussed possible causes of the ESF actuation signal. Operations personnel stated they believed the vibration caused by the subject electrician tapping the broken drill bit, caused device 2NI-99 to change state long enough to give an ESF actuation signal.

At a later date, the electrician in question stated he did not believe he tapped the broken drill bit hard enough to cause the ESF actuation signal. He stated that upon returning to work, he made a visual inspection of devices in the area of the control board where he had tapped the drill bit. He said a normally closed contact block on device 2NI-99 was found cracked. The electrician stated he did not notify Operations personnel of the cracked contact block. He stated that he replaced the cracked contact block on device 2NI-99 on March 25, 1986 while ESF train B was isolated for other HED modification work. The subject electrician stated he replaced the cracked contact block with one removed form another control board switch taken out of service. No work request or approved procedure was used to perform this work. Existing station procedures normally used for this type work are titled: 1) Controlling Procedure for Instrumentation and Electrical Safety-Related Maintenance and; 2) Implementation of Independent Verification and Temporary Modifications.

CONCLUSION:

The control room HED modifications are reviewed individually prior to making a decision on whether to implement the modification with the unit on-line or during an outage. Most control room HED modifications are implemented during unit outages. The risk of incidents such as the one described in this report is always present when working near energized operable circuits and devices.

Duke Power personnel familiar with device 2NI-99 stated that vibration caused by tapping the control board with a hammer and punch could possible have caused a normally closed contact block to open momentarily. If a contact block in device 2NI-99 was cracked the chances of vibration opening the contact would probably increase. It could not be determined if the contact block was cracked prior to personnel tapping the control board. All personnel contacted could not recall any past incidents involving contact block failures.

Concern was also expressed about the cracked contact block being replaced without a work request or an approved procedure. A supervisor familiar with control board devices stated that the subject contact block had gold plated contacts and replacement contact blocks were difficult to obtain. The subject supervisor suggested that a work request be written to verify the correct contact block was installed in device 2NI-99. Responsible Duke Power personnel will ensure that the correct contact block is installed on device 2NI-99 and provide documentation on the existing NSM work request.

The exact cause of the ESF actuation signal could not be determined. A review of previous reports reveals that ESF actuation signals have occurred 10 times. None of the previous incidents were due to an unknown cause. Because of the circumstances involved, this incident is not considered recurring.

There were no personnel injuries, radiation overexposures, or releases of radioactive material resulting from this event.

CORRECTIVE ACTIONS:

Immediate: Operations personnel implemented the ECCS Actuation During Plant Shutdown procedure.

Subsequent: The subject electrician replaced a cracked contact block on device 2NI-99.

Planned:

1) Operations personnel will ensure that the correct contact block is installed on device 2NI-99 and provide documentation on the NSM work request.

2) Duke Power management will ensure that appropriate personnel review this incident as a form of immediate training.

SAFETY ANALYSIS:

The Pressurizer Low Pressure Safety Injection Signal is designated to actuate plant safety systems in the event of depressurization of the NC system below 1845 psig during plant operation in Modes 1, 2, and 3. At the time of this incident, the unit was in Mode 5, Cold Shutdown, at atmospheric pressure and 110 degrees F, with end of cycle 2 refueling outage in progress.

Plant safety systems which were not tagged out for maintenance or because of procedural requirements when in Mode 5 responded as designed to the ESF actuation signal on train B. Safety injection pump 2-NI-B was tagged out per procedural requirement and did not start as it would usually do when operating in Modes 1, 2, and 3. Diesel Generator (D/G) 2B experienced a valid start on receipt of the safety injection signal and ran for 12 minutes before it was secured. Centrifugal charging pump 2-NV-B started as required on receipt of the safety injection signal and run without suction for six minutes. Pump suction

(from the RWST) valve 2-NV-222-B was closed to preclude water being injected into the NC system. Residual Heat Removal pump 2-ND-B also started as required and recirculated flow without injecting water into the NC system. It is significant that none of the pumps injected water into the NC system due to maintenance activities in progress at the time of the event. The NC system was open with work being performed on a NC pump. Plant personnel working on the pump could have been contaminated by radioactive borated water if water had been injected into the NC system.

NC system pressure and temperature remained unaffected throughout the event. The health and safety of the public were not affected by this incident.

DUKE POWER COMPANY
P.O. BOX 33189
CHARLOTTE, N.C. 28242

HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

TELEPHONE
(704) 373-4531

April 21, 1986

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

Subject: McGuire Nuclear Station, Unit 2
Docket No. 50-370
LER 370-86-04

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(2)(iv), attached is Licensee Event Report 370-86-04 concerning an Engineering Safety Features Actuation Signal on McGuire Unit 2 Due to Unknown Causes. This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

JGT/jgm

Attachment

xc: Dr. J. Nelson Grace
Regional Administrator
Region II
U.S. Nuclear Reg. Commission
101 Marietta St., NW, Suite 2900
Atlanta, Georgia 30323

INPO Records Center
Suite 1500
1100 Circle 75 Parkway
Atlanta, Georgia 30339

M&M Nuclear Consultants
1221 Avenue of the Americas
New York, New York 10020

Mr. W.T. Orders
NRC Resident Inspector
McGuire Nuclear Station

American Nuclear Insurers
c/o Dottie Sherman, ANI Library
The Exchange, Suite 245
270 Farmington Avenue
Farmington, CT 06032

Mr. Darl Hood
U.S. Nuclear Reg. Commission
Office of Nuclear Reactor Reg.
Washington, D.C. 20555

IE22
1/1