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January 7, 1991

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

Subject: McGuire Nuclear Station Unit 1
Docket No. 50-369
Licensee Event Report 369/90-33

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 369/90-33 concerning a daily surveillance requirement for the Power Range Detectors that was not completed within the required time frame. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Tony D. McConnell

T.L. McConnell

DVE/ADJ/cbl

Attachment

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NRC Form 366
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U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES 5/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
McGuire Nuclear Station,	0 5 0 0 0	1 OF 8

TITLE (4) The Daily Surveillance Requirement For The Power Range Detectors Was Not Completed Within The Required Time Frame Due To Procedure Deficiencies

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)
									N/A	0 5 0 0 0
1 2	0 6	9 0	9 0	0 3 3	0 0	0 1	0 7	9 1		0 5 0 0 0

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)	1 0 0	20.402(b)	20.405(c)	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 Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	X 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
Alan Sipe, Chairman, McGuire Safety Review Group	7 0 4 8 7 5 - 4 1 8 3

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 December 6, 1990, at 0700, Operations personnel entered Technical Specification (TS) 3.0.3. Operations personnel were unable to verify the readings from the Power Range Detectors to the Thermal Power Best Estimate (TPBE) value in accordance with Technical Specification 4.3.1.1.(2). Operations personnel could not verify the readings from the Power Range Detectors because of the TPBE value being invalid. This was due to a partial loss of the Operator Aid Computer (OAC). Performance personnel were called in to perform a manual calculation of Primary Power to verify the readings from the Power Range Detectors. Performance personnel initiated procedure PT/0/A/4150/03, Thermal Power Output Measurement, for calculating Primary Power at approximately 0600 on December 6, 1990; however, the results were not obtained until approximately 0750 on December 6, 1990. This event is assigned causes of Procedure Deficiencies on the Loss of OAC procedure and the Thermal Power Output Measurement procedure. This event is also assigned a cause of a Possible Manufacturing Deficiency because the partial loss of the OAC was due to inadequate soldering. A contributory cause of a Management Deficiency is also assigned due to inadequate communications between groups. Unit 1 was in Mode 1 (Power Operation) at 100 percent power at the time of this event. The solder was repaired on the OAC and the appropriate procedures will be reviewed and evaluated for changes to enhance the procedures.

EVALUATION:

Background

The purpcse of the Excore Instrumentation System [EIIS:IG] is to monitor Reactor [EIIS:RCT] core leakage neutron flux and generate appropriate trips and alarms [EIIS:ALM] for various phases of Reactor Operation. The outputs of the three range (source, intermediate, and power) detectors [EIIS:DET] are used to limit the maximum power output of the Reactor within their respective ranges and are used as inputs to monitor neutron flux from a completed shutdown condition up to 118 percent of full power. There are four dual section uncompensated ionization chamber assemblies for the Power Range Detectors. Each Power Range Detector provides two signals corresponding to the neutron flux in the upper and in the lower sections of a core quadrant. The two signal paths are summed and amplified to form one channel [EIIS:CHA] of ion chamber current which is proportional to the Reactor power level. The summed power level signal provides level trip signals for Reactor protection, alarms to warn of abnormal conditions, and signals for remote recording, indicating, and computing [EIIS:CPU] equipment.

TS 4.3.1.1 requires that a channel calibration be performed daily on the Power Rang Neutron Flux High Setpoint. This is to be performed when the unit is above 15 percent Rated Thermal Power by comparison of the TPBE (based on secondary and/or primary heat balances) to excore power (based upon nuclear power levels from the Power Range Detectors).

Procedure PT/1/A/4600/03B, Daily Surveillance Items, is a verification of various instruments and/or systems which are required to be operable. This procedure is to be performed once per 24 hours, between 0100 and 0700. This procedure requires the Power Range Neutron Flux Calculation to be within plus or minus 2 percent of the heat balance calculation (TPBE).

The OAC [EIIS:ID] perform Thermal Output Calculations (TOP). These TOP calculations perform necessary heat balance calculations around the Reactor Coolant (NC) [EIIS:AB] loops to determine loop flows, core power, and core burn-up. One of the calculations performed by the OAC is the TPBE value. This value is based on the calculations for Primary Power or Secondary Power or a combination of the two, depending on the power level of the unit. Above a 50 percent power level, the TPBE value is entirely based on Secondary Power.

The purpose of the Performance procedure PT/0/A/4150/03, Thermal Power Output Measurement, is to verify the OAC calculation of Reactor Thermal Power level is consistent with off line computer calculations. In addition, on November 5, 1989, another purpose was added to verify Primary Power due to loss of the OAC. Enclosure 13.4 was added at this time to calculate Primary Power upon loss of the OAC. This additional purpose was added in this Thermal Power Output Measurement procedure because of the commonality between the required procedure steps.

TS 3.0.3 is required to be entered when the unit is operating in a condition that exists when a Limiting Condition for Operation is not met, except as provided in the associated Action Requirements. It requires that within one hour, action shall be initiated in which the specification does not apply by placing the unit, as applicable, in:

a. at least Hot Standby within the next 6 hours,

b. at least Hot Shutdown the following 6 hours, and

c. at least Cold Shutdown within the subsequent 24 hours.

Description of Event

On December 5, 1990, between 0100 and 0130, Operations personnel had completed procedure PT/1/A/4600/03B, Daily Surveillance Items.

On December 5, 1990, at 1505, the OAC was logged out of service. Operations personnel implemented procedure PT/1/A/4600/21, Loss of Operator Aid Computer. Instrumentation and Electrical (IAE) personnel were notified to work on the OAC. Process Computer Unit personnel were called in to work on the OAC as well. At 1624 on December 5, 1990, the OAC was returned to service. At 2239 on December 5, 1990, the OAC was logged out of service again for maintenance, and Operations personnel performed PT/1/A/4600/21, Loss of Operator Aid Computer. IAE and Process Computer Unit personnel continued working to get the OAC operational by replacing some circuit boards that were thought to be the problem.

At approximately 0224 on December 6, 1990, the OAC was returned to service; however, the TPBE was invalid and was indicating approximately 91 percent power. At approximately 0230 on December 6, 1990, Integrated Scheduling personnel and Operations personnel began discussing the possibility of locking out one of the invalid points in the OAC. While Operations personnel reviewed the OAC printout, received at approximately 0200, it appeared that if one computer point was locked out all the values would come back into line. Operations and IAE personnel then chose a computer point to be locked out. This did not work; in fact, every point chosen did not bring back a valid TPBE value. It then became apparent that too many computer points would have to be locked out to get a valid TPBE valve. At this time, approximately 0400 on December 6, 1990, Integrated Scheduling personnel contacted the Performance Reactor Unit person to come in and perform the required manual calculations to verify the TPBE value.

The Performance Reactor Unit person arrived at McGuire at approximately 0530 on December 6, 1990. At approximately 0600, after reviewing the situation and obtaining Performance procedure PT/0/A/4150/03, Thermal Output Measurement, Performance personnel initiated the manual calculation. The Reactor Unit Performance person obtained NC flow measurement values from Performance Test Unit personnel and together they performed the Thermal Output Measurement procedure. The first time this procedure was completed,

the Primary Power values obtained were high due to the use of the wide range T-HOT and T-COLD instruments in the Control Room [EIIS:NA]. Performance personnel realized that there was only a partial loss of the OAC and mostly for Secondary System values. Therefore, the T-HOT and T-COLD values from the OAC were valid and reflected more accurate temperatures than the recorders [EIIS:TR] in the Control Room. Performance personnel used the T-HOT and T-COLD values from the OAC in the Thermal Power Output Measurement calculations. An emergency procedure change was written by Performance personnel at approximately 0615 that allowed Performance personnel to use the valid computer point values necessary for Primary Power calculations.

At 0700 on December 6, 1990, Operations personnel entered TS 3.0.3 because the daily surveillance item for the Power Range Detectors was not complete and could not be completed until Performance personnel obtained the Primary Power values. This was obtained between 0730 and 0745, and at 0750 on December 6, 1990, Operations personnel were able to clear the TS 3.0.3 action requirement for Unit 1 based on the manual calculation for TPBE performed by Performance Reactor Unit personnel.

At 0852 on December 6, 1990, Operations personnel notified the Resident NRC personnel of this event and log entry of TS 3.0.3.

At approximately 0300 on December 7, 1990, Process Computer Unit and IAE personnel had jumpered the place of failure in the OAC and were working toward having the OAC back on line.

Conclusion

This event is assigned causes of Procedure Deficiencies because the surveillance for the Power Range Detectors could not be completed within the required time frame. This cause was due to erroneous and incomplete information for procedures PT/1/A/4600/21, Loss of OAC, and PT/0/A/4150/03, Thermal Power Output Measurement.

The purpose of Operations procedure PT/1/A/4600/21, Loss of OAC, is to satisfy and document TS requirements in the event that the Unit OAC is out of service. This procedure directs Operations personnel to notify Performance Reactor Unit personnel, if it is between the hours of 0400 and 0700, to perform the heat balance calculations for the Daily Surveillance Items procedure. The Daily Surveillance Items procedure is required to be performed daily between 0100 and 0700. The Loss of OAC procedure time frame for notifying the Performance Reactor Unit personnel should correspond to the required surveillance time frame. Operations personnel will evaluate and change the Unit 1 and Unit 2 Loss of OAC procedures to ensure Performance personnel are notified in an expeditious manner within the required surveillance time frame.

Performance procedure PT/0/A/4150/03, Thermal Power Output Measurement procedure is performed infrequently. The purpose of the procedure, in part, is to verify that the OAC calculation of Reactor Thermal Power level is

consistent with off line computer calculations. As an added enclosure, this procedure is used to verify Primary Power due to complete loss of OAC so that off line McGuire computer programs can be used for this calculation. This was added on November 5, 1989. The enclosure listed data to be acquired in the Control Room to calculate Primary Power. However, it did not list where to obtain this data in the Control Room, particularly T-HOT and T-COLD. To obtain accurate information for the Primary Power calculation, the narrow range T-HOT and T-COLD data needs to be used. Using the wide range T-HOT and T-COLD values led to an inaccurately high Primary Power value. This information was not listed in the procedure enclosure and led Performance personnel to obtain inaccurate results the first time that calculations were performed on December 6, 1990, at approximately 0600. The Performance personnel then had to process an emergency change request to the Thermal Output Measurement procedure to allow use of the OAC for valid points when there is only a partial loss of the OAC.

This enclosure had been performed only two times in the past and in both cases it was unnecessary to keep the completed procedure as a record because the OAC was returned to service allowing Operations personnel to complete the required surveillances using the OAC. On November 5, 1989, when the enclosure was added which provided verification of Primary Power due to a loss of OAC, the Performance personnel involved were able to obtain T-HOT and T-COLD narrow range values from IAE personnel measuring the current and/or voltages in certain 7300 System cabinets and then calculating the temperatures from there. This information was not supplied in the procedure on December 6, 1990. This information was to be added in the future. All Performance procedures undergo a two year review and update.

Mitigating circumstances were that the Performance personnel involved on December 6, 1990, had not had an opportunity to perform this procedure enclosure in the past. They were not familiar with the procedure enclosure and where the required data should be obtained. The next day after Performance personnel became familiar with the procedure enclosure, it only took a half hour to complete the procedure.

This event is also assigned a cause of a Possible Manufacturing Deficiency because the reason for the partial loss of the OAC was due to an inadequate solder installation for a wire wrap post to the 15 volt relay power supply. On December 11, 1990, while Process Computer Unit and IAE personnel were attempting to remove the jumper placed inside the OAC cabinet, it was discovered that one of the pin connections to a 15 volt relay power supply was inadequately soldered. This caused the partial loss of the OAC. Process Computer Unit personnel speculated that this situation could have existed since the time of installation of the OAC. There have been several problems with the OAC in the past but this event was described as a gradual loss of OAC capabilities. It completely lost capabilities later that day on December 6, 1990.

A contributory cause of Management Deficiency is also assigned to this event because of deficient communication between groups. The Performance personnel

were told to have the Primary Power calculations completed by 0700 on December 6, 1990, but were not told that a definite action would be required (e.g. entering TS 3.0.3) if that time frame was not met. Operations Management will cover this event with a representative from each Operations shift.

A review of the Operating Experience Program (OEP) database for McGuire TS violations with a cause of Possible Manufacturing Deficiency for the previous 24 months revealed 2 events. These events involved the Control Room Ventilation system [EIIS:VI] and were not similar to the present event in any way. Also, an OEP database search was completed for the previous 24 months on McGuire TS violations with a cause of Procedure Deficiency. This search revealed 5 events involving incomplete information and/or inadequate format or presentation. Only one event, Licensee Event Report (LER) 370/89-04, documented an event where all four Power Range Detectors were declared inoperable, however, this was due to a Power Mismatch being exceeded. Another event, LER 369/89-13, documented an overpower event due to computer points being locked out. None of these five events involved the same procedures, programs, personnel, or equipment described in this event. Therefore, this is not considered to be a recurring problem.

Another OEP database search was completed for the previous 24 months on McGuire TS violations with a cause of Management Deficiency. This search revealed 3 reportable events and 2 Special Reports with a cause of deficient communications between groups. Only 3 events involved Operations personnel and another Station group. LER 369/88-39 documented an event where the wrong diesel generator [EIIS:DG] was started. LER 369/90-18 documented an event where a control rod [EIIS:ROD] was moved in the pool while the Fuel Pool Ventilation system [EIIS:VG] was inoperable. Special Report 2-M90-0067 documented an incident where computer points were locked out while Reactor power was being increased. Therefore, the problem of deficient communications is recurring; however, corrective actions were unique to these events and would not have prevented this incident from occurring.

This event is not Nuclear Plant Reliability Data System (NPRDS) reportable.

There were no personnel injuries, radiation overexposures, or uncontrolled releases of radioactive materials as a result of this event.

CORRECTIVE ACTIONS:

Immediate: Operations personnel logged unit 1 into TS 3.0.3 until completion of the surveillance on the Power Range Detectors could be attained.

Subsequent:

1) Performance personnel completed the Verification of Primary Pow[illegible] by using procedure PT/0/A/4150/03, Thermal Power Output Measurement.

2) Process Computer Unit and IAE personnel identified a specific failure location in the OAC cabinets and added a jumper until the OAC could be fixed.

3) Process Computer Unit and IAE personnel identified an inadequate solder connection and repaired it. This was the cause of the partial loss of the OAC.

Planned:

1) Performance personnel will evaluate and make required changes to Reactor Unit and Test Unit procedures to provide a more complete procedure for calculating Primary Power during a complete or partial loss of the OAC.

2) Operations personnel will evaluate and change the Unit 1 and Unit 2 Loss of OAC procedures, PT/1,2/A/4600/21 to ensure Performance personnel are notified in an expeditious manner within the required surveillance time frame.

3) This event will be covered with a representative from each Operations shift.

SAFETY ANALYSIS:

The Power Range Detectors are arranged and located such that one detector measures core leakage neutron flux for one quadrant. Each detector and its associated circuitry comprise one channel, for a total of four Power Range Nuclear Instrumentation System channels. The Power Range High Neutron Flux Trip (High Setpoint) function utilizes a 2 out of 4 logic.

McGuire TS 4.3.1.1 requires that channel calibration be performed daily on the Power Range Neutron Flux High Setpoint. This is to be performed by comparison of the TPBE to excore total power indication when the unit is above 15 percent Rated Thermal Power. Power Range Detector (excore total power) gains are to be adjusted to make indicated excore power consistent with indicated calorimetric power whenever this comparison reveals an absolute difference of more than 2 percent between the two.

During this event, the Power Range Detectors were not out of calibration as verified by the results of this surveillance. The OAC calculated Reactor TPBE was invalid due to the partial loss of the OAC. This was due to the invalid secondary values that are used to calculate secondary heat balances.

Operations personnel entered TS 3.0.3 because it could not be verified within the required time span that the Power Range Detectors were correctly measuring Reactor Power. This surveillance is important for ensuring accurate measurement of Reactor Power, because all of the overpower and fast rate of change in power alarms and trip setpoints are based on the Power Range Detectors measurements. Worst case would be no automatic actuation of a trip signal if indeed necessary. However, historically, these instruments

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

have proven to remain in calibration over a time frame significantly longer than the 24 hour surveillance window.

However, the Power Range Detectors were in calibration and remained so during the 50 minutes while Unit 1 was logged into TS 3.0.3. The Operators could have tripped the unit at any time had it been necessary.

This event did not affect the health and safety of the public.