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April 19, 1991

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 370/91-01

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 370/91-01 concerning the failure to comply with Engineered Safety Features Actuation System Instrumentation Technical Specifications. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i)(B). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Tony L. McConnell

T.L. McConnell

ADJ/NGA/cbl

Attachment

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NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES 8/31/88

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

TITLE (4): Failure To Comply With Engineered Safety Features Actuation System Instrumentation Technical Specifications Because Of An Inappropriate Action And Defective Procedure

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
0 3	1 1	9 1	9 1	0 0 1	0 0	0 4	1 0	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 March 11, 1991, at approximately 1400, Instrument And Electrical (IAE) personnel were performing procedure PT/2/A/4201/05B, Unit 2 Containment Pressure Control Analog Channel Operational Test (Train B). While performing this test, Containment Pressure Control System (CPCS) channel 2NSPT5490 was found to be faulty. At 1430, the Operations Senior Reactor Operator (OPS SRO) declared channel 2NSPT5490 inoperable and logged channel 2NSPT5490 in the Technical Specification Action Item Log (TSAIL) book. IAE personnel were directed to place channel 2NSPT5490 in the start permissive mode within one hour to comply with Technical Specification (TS) 3.3.2. After consultation with IAE Supervision, IAE personnel decided to use procedure PT/2/A/4201/05B to place channel 2NSPT5490 in the start permissive mode as required by TS 3.3.2. IAE personnel proceeded to Containment Pressure Control Cabinet (CPCC) 4 and performed procedure PT/2/A/4201/05B, section 12.1 through step 12.4.8. This action had IAE personnel place the key-operated control switch for channel 2NSPT5490 in the test position. They thought this action placed the channel in the start permissive mode, satisfying TS 3.3.2. While troubleshooting channel 2NSPT5490, IAE personnel discovered the channel was not in the start permissive mode. At 2150, IAE personnel took the appropriate actions to place channel 2NSPT5490 in the start permissive mode. This event is assigned a cause of Inappropriate Action because IAE personnel improperly followed the correct procedure. A cause of Defective Procedure is also assigned because steps that would have prevented this event were not located within the body of procedure PT/2/A/4201/05B.

EVALUATION:

Background

The CPCS is part of the Engineered Safety Features Actuation System (ESFAS) [EIIS:JE] and is provided to prevent exceeding the negative design pressure of the Containment structure. The systems permissive and termination features are redundant and are accomplished by independent pressure switches [EIIS:PS] which provide interlocks [EIIS:IEL] to prohibit Containment Spray System (NS) [EIIS:BE], and the Containment Air Return Exchange and Hydrogen Skimmer System (VX) [EIIS:BB] operation when Containment pressure is below 0.35 psig. The system is designed such that no single failure can prevent proper NS or VX system initiation nor can it allow NS or VX system operation when not required. The 0.35 psig permissive termination feature is automatically reset such that under accident conditions, NS and VX system operation is automatically terminated upon pressure decay to 0.35 psig, thereby, controlling Containment pressure.

The NS system is designed to spray cool water into the Containment atmosphere when appropriate, in the event of a Loss Of Coolant Accident (LOCA) assuring that the Containment pressure does not exceed its design pressure of 15 psig. This protection is afforded for all pipe break sizes up to and including the double-ended rupture of the largest pipe in the Reactor Coolant System (NC) [EIIS:AB]. The NS system is made up of two redundant trains. Each train consists of one pump [EIIS:P], a heat exchanger [EIIS:HX] and associated piping, valves [EIIS:V], and a spray header. This system can be supplemented with the Residual Heat Removal System (ND) [EIIS:BP]. The NS system is actuated by a Phase B (Sp) signal initiated either manually or on a two out of four high high Containment pressure signal of 3.0 psig. Following the injection phase, the spray pumps are realigned to draw a suction from the Containment sump during the recirculation phase.

The VX system is designed to rapidly return air to lower Containment after initial loss of coolant blowdown. This is accomplished by the use of air return fans [EIIS:FAN]. A secondary function of this system is to prevent the build-up of hydrogen in dead ended compartments resulting from a LOCA. This is accomplished by continuously drawing air out of the dead ended compartments at a rate that limits the hydrogen concentration to less than 4 percent.

The system contains two 100 percent capacity air return fans, each with a capacity of 30,000 cubic feet per minute (cfm). Both fans are automatically started when Containment pressure reaches 3.0 psig and a CPCS start permissive signal is received. The fans force the air from upper to lower Containment, thereby, returning the air which was displaced by the blowdown. An isolation damper [EIIS:DMP] is provided on the discharge of each fan and acts as a barrier between upper and lower Containment to prevent the air flow from bypassing the ice condenser [EIIS:COND].

The system also contains two 100 percent capacity hydrogen skimmer [EIIS:SKR] fans, each with a capacity of 3,000 cfm. A normally closed, motor operated inlet valve on the hydrogen skimmer header prevents the air flow from bypassing the ice condenser during initial blowdown. It remains closed until the end of initial blowdown. After initial blowdown, a start permissive from CPCS and Sp signal open the inlet valve. After the inlet valve has fully opened, the hydrogen skimmer fan will start.

Description of Event

On March 11, 1991, at approximately 1400, IAE personnel obtained clearance to begin work from OPS SRO-A. IAE personnel were performing procedure PT/2/A/4201/05B as directed by Work Request (WR) 69785C PT. IAE Specialist A and IAE Specialist C proceeded to CPCC 4 located in the Auxiliary Building [EIIS:NF] at elevation 733', in the Electrical Penetration room. IAE Specialist B was stationed in the Control Room [EIIS:NA] to verify status light indications during the test.

At approximately 1420, two of the four CPCS channels [EIIS:CHA] had been tested successfully. IAE personnel began to test CPCS channel 2NSPT5490. When the test potentiometer (POT) for channel 2NSPT5490 was rotated to the fully clockwise position, the relays [EIIS:RLY] associated with channel 2NSPT5490 began to chatter. IAE Specialist A took corrective action to prevent damage to the relays by rotating the test POT counterclockwise. IAE Specialist A referred to the Limits and Precautions section of procedure PT/2/A/4201/05B for guidance on what action to take at this point. IAE Specialist A read Limits and Precautions steps 6.1 and 6.2 but omitted reading steps 6.3 and 6.4. IAE Specialist A called IAE Supervisor A and explained the problem, as directed by Limits and Precautions step 6.2.

IAE Supervisor A contacted the responsible McGuire Engineering Services (MES) Engineer and explained the problem with the CPCS channel. MES Engineer A contacted IAE Specialist A and after a brief discussion decided the Rochester Instrument System (RIS) module [EIIS:IMOD] associated with channel 2NSPT5490 had malfunctioned. MES Engineer A directed IAE Specialist A to replace the faulty RIS module. IAE Specialist A requested permission to complete testing of the fourth CPCS channel prior to replacing the faulty RIS module. MES Engineer A stated this would be acceptable. IAE Specialist A returned CPCS channel 2NSPT5490 to normal operation and then successfully completed testing the fourth CPCS channel. IAE Specialist A and IAE Specialist C returned to the Control Room at this time.

At 1430, IAE Specialist A proceeded to the warehouse to obtain replacement parts for CPCS. IAE Specialist B contacted OPS SRO A and explained the problem with CPCS channel 2NSPT5490. OPS SRO A declared CPCS channel 2NSPT5490 inoperable and made the appropriate entries in the TSAIL. OPS SRO A stated that he explained to IAE Specialist B that the inoperable channel must be placed in the start permissive mode within one hour to comply with TS 3.3.2.

At approximately 1430, IAE Specialist B and IAE Specialist C went to the IAE shop area to obtain a procedure for placing the faulty CPCS channel in the required state. IAE Specialist B stated that he thought placing the key-operated control switch to test would place the CPCS channel in the start permissive mode to satisfy TS 3.3.2. This assumption was based upon past experience with the Solid State Protection System (SSPS). When the SSPS channels are placed in test, the bistables are tripped to the required TS state. While in the shop area, IAE Specialist B talked to IAE Supervisor A and requested to use procedure PT/2/A/4201/05B to place the CPCS channel to test. IAE Supervisor A agreed this was a good idea because it would avoid confusion caused by using two procedures at one time. At this time, IAE Specialist B and IAE Specialist C went to CPCC 4 to place CPCS channel 2NSPT5490 in the start permissive mode. IAE Specialist B called the Unit 2 Control Room Operator (CRO) to verify an NS signal was not present as required by procedure. The Unit 2 CRO informed IAE Specialist B there was an NS Train B alarm on the Operator Aid Computer (OAC). IAE Specialist A called OPS SRO A and explained that he did not know what would happen if CPCS was placed in the test position with NS Train B in alarm on the OAC.

OPS SRO A cleared the NS Train B alarm on the OAC and told IAE Specialist B to proceed with placing CPCS in test. IAE Specialist B completed procedure PT/2/A/4201/05B section 12.4, steps 12.4.1 through step 12.4.8 placing CPCS channel 2NSPT5490 in the test position. IAE Specialist B called OPS SRO A and told him CPCS channel 2NSPT5490 was in test.

At 1745, IAE Specialist A and IAE Specialist C went to CPCC 4 to install the new RIS module. After installation of the new RIS module, IAE Specialist A attempted to perform the remaining steps in procedure PT/2/A/4201/05B, section 12.4. When the test POT for channel 2NSPT5490 was rotated fully clockwise, the relays associated with 2NSPT5490 began to chatter again. IAE Specialist A returned the test POT to the fully counterclockwise position. Since it was close to time for shift relief, no further troubleshooting was performed on channel 2NSPT5490.

At 1930, IAE Specialist A, B, and C turned over procedure PT/2/A/4201/05B and WR 09785C PT to IAE Specialist D. IAE Specialist D was informed of the problem with CPCS channel 2NSPT5490 and the work performed thus far to fix the problem.

After the turnover process was completed, IAE Specialist D obtained additional electrical diagrams for CPCS and the required test equipment to troubleshoot the circuit. After a prejob briefing, IAE Specialist D and IAE Supervisor B began troubleshooting the CPCS circuit on the electrical diagrams to try and narrow down potential problem areas. IAE Supervisor B and IAE Specialist D decided to include the CPCS test circuit in the troubleshooting process to determine if the problem was in the test circuit or the RIS module.

At 2045, IAE Specialist D went to the Control Room and explained to OPS SRO B that the permissive for CPCS channel 2NSPT5490 would be in and out of the

start permissive mode during the troubleshooting process. OPS SRO B gave IAE Specialist D clearance to begin work.

At 2100, IAE Specialist D arrived at CPCC 4 to begin troubleshooting. IAE Specialist D noticed permissive lights "VX A/R DAMPER PERMIT AND H2 SKIM INLET VLV PERMIT" were not illuminated. IAE Specialist D opened the doors on CPCC 4 and verified the test POT was not rotated to the fully clockwise position as required by procedure. IAE Specialist D attempted to satisfy the permissive by rotating the test POT to the fully clockwise position.

Again, the relays associated with channel 2NSPT5490 began to chatter when the test POT was rotated fully clockwise. IAE Specialist D returned the test POT to the counterclockwise position. At this time, IAE Specialist D knew that CPCS channel 2NSPT5490 could not be placed in the start permissive mode by procedure PT/2/A/4201/05B. IAE Specialist D read Limits and Precautions of procedure PT/2/A/4201/05B and saw step 6.4 which states "IF time out of service for any transmitter is greater than one hour, the transmitter will be placed in trip condition per IP/0/A/3090/14." IAE Specialist D called IAE Supervisor B and informed him of the as found status of CPCS channel 2NSPT5490. Together, they decided it would be best to satisfy the permissive for CPCS as soon as possible; therefore, OPS personnel were not informed of the event at this time.

At 2115, IAE Specialist D went to the shop area to obtain procedure IP/0/A/3090/14, Tripping Inoperable Protective Channels. After reviewing procedure IP/0/A/3090/14, IAE Specialist D knew CPCS channel 2NSPT5490 could not be placed in the start permissive mode by procedure IP/0/A/3090/14 because it also required rotating the test POT fully clockwise.

At 2145, IAE Specialist D went back to CPCC 4. The signal wire on terminal 3 on RIS module HB was removed and a transmation installed. A transmation is a device used by IAE personnel to inject an electrical signal into a circuit. IAE Specialist D injected a voltage equivalent to a 0.35 psig signal to CPCS channel 2NSPT5490.

The start permissive for CPCS channel 2NSPT5490 was satisfied at 2150. IAE Specialist D verified permissive lights "VX A/R DAMPER AND H2 SKIM INLET VLV PERMIT" were illuminated.

At 2152, IAE Specialist D informed OPS SRO B of the as found condition of 2NSPT5490, and the channel had been placed in the start permissive mode at 2150. IAE Specialist D contacted MES Engineer A and explained the method used to place CPCS channel 2NSPT5490 in the start permissive mode. MES Engineer A stated the method used by IAE Specialist D was acceptable and to continue to troubleshoot the CPCS circuit.

At 2200, IAE Specialist D arrived in the Control Room to consult with OPS SRO B, the Shift Supervisor, and the Shift Manager. IAE Specialist D explained that CPCS channel 2NSPT5490 had not been placed in the start permissive mode

within one hour of being declared inoperable. OPS personnel notified the appropriate Station Management of the event.

At approximately 0100 on March 12, 1991, IAE Specialist D arrived in the Control Room and requested permission to troubleshoot CPCS channel 2NSPT5490 again. OPS SRO B granted IAE Specialist D clearance to begin work on 2NSPT5490. After extensive troubleshooting, IAE Specialist D found a cracked solder joint on resistor R3. IAE Specialist D attempted to obtain a replacement, from the Quality Assurance (QA) warehouse, but the part was not in stock. IAE Specialist D then cleaned and re-soldered the cracked joint on resistor R3. IAE Specialist D completed procedure PT/2/A/4201/05B, through step 12.4.15, but was unable to complete WR 09785C PT because of required QA and Performance (PERF) documentation.

At 0500, IAE Specialist D informed OPS SRO B that procedure PT/2/A/4150/05B was completed through step 12.4.15, but CPCS channel 2NSPT5490 was left in the start permissive mode. OPS SRO B was also informed that WR 09785C PT could not be completed until a QA inspection and an engineering evaluation had been performed to determine acceptability of re-soldering resistor R3.

At 0730, IAE Specialist D turned over WR 09785C PT and procedure PT/2/A/4201/05B to IAE Specialist A. IAE Specialist D explained the current status of CPCS channel 2NSPT5490 and the work remaining to be performed to complete WR 09785C PT.

At 1140, IAE Specialist A obtained the required QA and PERF documentation on WR 09785C PT and returned CPCS channel 2NSPT5490 to normal operation by completing procedure PT/2/A/4201/05B step 12.4.16 through step 12.4.19.

At 1455, OPS SRO A reviewed procedure PT/2/A/4201/05B and WR 09785C PT. CPCS channel NSPT5420 was declared operable and TSAIL item 16812 cleared.

Conclusion

This event is assigned a cause of Inappropriate Action because IAE personnel improperly followed procedure PT/2/A/4201/05B. When the relays on CPCS channel 2NSPT5490 began to chatter, IAE personnel took appropriate action to prevent relay damage. IAE personnel correctly referred to the Limits and Precautions section of procedure PT/2/A/4201/05B. However, IAE personnel omitted step 6.4 which states; "IF time out of service for any transmitter is greater than one hour, then transmitter will be placed in trip condition per IP/0/A/3090/14." Self checking was not applied by the IAE personnel to ensure the intended action was correct and the omission of step 6.4 caused IAE personnel to follow the wrong procedure for placing CPCS channel 2NSPT5490 in the start permissive mode.

There are three mitigating circumstances that may have caused IAE personnel to improperly follow the correct procedure and to use the wrong procedure for placing CPCS in the start permissive mode. First, step 6.2 of the Limits and Precautions section of procedure PT/2/A/4201/05B states; "IF conditions other

than those indicated by this procedure occur, STOP, AND notify IAE Supervisor OR responsible IAE Engineer." This statement implies that IAE personnel should not proceed with subsequent steps of procedure PT/2/A/4201/05B. Second, IAE Specialist B stated he thought placing CPCS channel 2NSPT5490 to test would place the channel in the correct status to comply with TS 3.3.2. He based this belief on past experience with SSPS. Bistables associated with SSPS are placed in a tripped condition when SSPS is placed in test. IAE Specialist B thought this was also the case for CPCS. This lead IAE Specialist B to assume procedure PT/2/A/4201/05B could be used to place CPCS channel 2NSPT5490 to the start permissive mode. Third, IAE personnel involved in this event had performed procedure PT/2/A/4201/05 numerous times in the past. This event was the first time they had experienced a problem while performing this test. All IAE personnel involved were qualified to perform procedure PT/2/A/4201/05 by the IAE Employee Training and Qualification System (ETQS). This event indicates a deficiency in the IAE ETQS program because the personnel involved did not demonstrate a clear understanding of how the CPCS system functions. The current IAE ETQS program requires personnel to qualify to procedures, but not the system the procedure affects. This problem had been previously identified by IAE Management personnel. Changes to the program have already been initiated. IAE Management is presently in the process of upgrading the IAE ETQS program to require personnel to be qualified to systems as well as procedures. IAE Management has committed to factoring events such as this into the new training program to prevent recurrence of similar events.

A cause of Defective Procedure is also assigned because steps in the Limits and Precautions section that would have prevented this event were not located within the body of procedure PT/2/A/4201/05B.

This event did not cause any significant operational problems or difficulties because all redundant Train A VX components were operable at the time of this event. The Train B VX components that were inoperable during this event are not normal operating components. The VX system only operates during accident conditions when Containment pressure is 3.0 psig or greater.

A review of the Operating Experience Program (OEP) data base for the previous twenty-four months prior to this event revealed seven LERs concerning TS violations with a cause of Inappropriate Action. All seven previous events were the result of improperly following the correct procedure. Therefore, this event is considered to be recurring.

LERs 369/90-03, 369/90-12, 370/89-08, and 370/89-13 involved missed surveillances required by TS. The causes for these four events were event specific and none of them involved IAE personnel or IAE procedures. Corrective actions included changes to the appropriate groups procedures. The corrective actions taken would not have prevented this event.

LERs 369/90-05, 369/90-08, and 369/89-16 involved failures to meet TS action statements. All three events involved Radiation Protection (RP) procedures. The corrective actions, as a result of the events, were changes to

appropriate RP procedures. None of these corrective actions would have prevented this event from occurring.

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

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

CORRECTIVE ACTIONS:

Immediate:

1) IAE personnel placed CPCS channel 2NSPT5490 in the start permissive mode by use of a transmation.

2) OPS personnel notified the appropriate Station Management of the event.

Subsequent: IAE personnel involved in this event have been counseled in the need to correctly follow procedures.

Planned:

1) IAE personnel will make appropriate revisions to Unit 1 and Unit 2 Containment Pressure Control Analog Channel Operational Test Train A and B procedures.

2) This event will be reviewed with all appropriate IAE personnel and procedural compliance will be re-emphasized.

3) OPS personnel will add instruction to procedures EP/1&2/A/5000/15, Containment, Section 1.0, on how to bypass CPCS interlocks for VX fans if the fans will not start because of CPCS failure.

SAFETY ANALYSIS:

During this event, Train B of the VX system was inoperable. CPCS channel 2NSPT5490 provides a 0.35 psig permissive for Train B of the VX system Air Return Fan Outlet Damper and Hydrogen Recombiner Inlet Valve to automatically open on an Sp signal of 3.0 psig in Containment. The Air Return Fans and Hydrogen Recombiners are interlocked with their respective outlet damper and inlet valve. The Air Return Fans and Hydrogen Recombiner will not automatically start unless their respective outlet dampers and inlet valves are open. Therefore, the Train B VX system would not have automatically started when required.

Train A of the VX system and Train A and B of the NS system were operable during this event. One train of the VX and the NS is sufficient to mitigate the consequences of a LOCA to maintain Containment pressure within design limits of 15.0 psig.

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

All other ESFAS components were operable during this event. Therefore, the inoperability of Train B of the VX system would not have adversely affected the ability of the ESFAS and OPS personnel to mitigate the consequences of an accident.

This incident did not affect the health and safety of the public or onsite personnel.