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DUKE POWER

April 4, 1992

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 370/92-02

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report 370/92-02 concerning an inadvertent ESF actuation on Unit 2 Train B. This report is being submitted in accordance with 10 CFR 50.73 (a) (2) (iv). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

T.C. McMeekin

TLP/bcb

Attachment

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NRC Resident Inspector  
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**LICENSEE EVENT REPORT (LER)**

|  |                                      |                          |
|--|--------------------------------------|--------------------------|
| <b>FACILITY NAME(1)</b><br>McGuire Nuclear Station, Unit 2 | <b>DOCKET NUMBER(2)</b><br>05000 370 | <b>PAGE(3)</b><br>1 OF 6 |
|--|--------------------------------------|--------------------------|

**TITLE(4)** Unit 2 Train B Experienced an Inadvertent Engineered Safety Features Actuation Resulting From a Defective Procedure and Inappropriate Actions.

| 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) |
| 03            | 05  | 92   | 92            | 02                | 0               | 04             | 03  | 92   |                              | 05000            |
|               |     |      |               |                   |                 |                |     |      |                              | 05000            |

|                          |                  |  |                 |                                     |                      |  |  |  |  |  |
|--------------------------|------------------|--|-----------------|-------------------------------------|----------------------|--|--|--|--|--|
| <b>OPERATING MODE(9)</b> | 5                | <b>THIS REPORT IS SUBMITTED PURSUANT TO REQUIREMENTS OF 10CFR (Check one or more of the following)(11)</b> |                 |                                     |                      |  |  |  |  |  |
| <b>POWER LEVEL(10)</b>   | 0 %              | 20.402(b)  | 20.405(c)       | <input checked="" type="checkbox"/> | 50.73(a)(2)(iv)      | 73.71(b)   |  |  |  |  |
|                          |                  | 20.405(a)(1)(i)  | 50.36(c)(1)     | <input type="checkbox"/>            | 50.73(a)(2)(v)       | 73.71(c)   |  |  |  |  |
|                          |                  | 20.405(a)(1)(ii)   | 50.36(c)(2)     | <input type="checkbox"/>            | 50.73(v)(2)(vii)     | OTHER<br>(Specify in Abstract below and in Text) |  |  |  |  |
|                          |                  | 20.405(a)(1)(iii)  | 50.73(a)(2)(i)  | <input type="checkbox"/>            | 50.73(a)(2)(viii)(A) |  |  |  |  |  |
|                          |                  | 20.405(a)(1)(iv)   | 50.73(a)(2)(ii) | <input type="checkbox"/>            | 50.73(a)(2)(viii)(B) |  |  |  |  |  |
| 20.405(a)(1)(v)          | 50.73(a)(2)(iii) | <input type="checkbox"/>   | 50.73(a)(2)(ix) |                                     |                      |  |  |  |  |  |

**LICENSEE CONTACT FOR THIS LER(12)**

|  |                         |                           |
|--|-------------------------|---------------------------|
| <b>NAME</b><br>T.L. Pedersen, Supervisor McGuire Safety Review Group | <b>TELEPHONE NUMBER</b> |                           |
|  | <b>AREA CODE</b><br>704 | <b>NUMBER</b><br>875-4487 |

**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT(13)**

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NFRDS | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NFRDS |
|-------|--------|-----------|--------------|---------------------|-------|--------|-----------|--------------|---------------------|
|       |        |           |              |                     |       |        |           |              |                     |
|       |        |           |              |                     |       |        |           |              |                     |

|  |                                     |              |            |             |
|--|-------------------------------------|--------------|------------|-------------|
| <b>SUPPLEMENTAL REPORT EXPECTED(14)</b>  | <b>EXPECTED SUBMISSION DATE(15)</b> | <b>MONTH</b> | <b>DAY</b> | <b>YEAR</b> |
| <input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> X <input type="checkbox"/> NO |                                     |              |            |             |

**ABSTRACT (Limit to 1400 spaces, i.e. approximately fifteen single-space typewritten lines (16))**

On March 5, 1992, at 1202, Performance and Operations personnel were performing the periodic Unit 2 Train B Engineered Safety Features Test. Unit 2 was in Mode 5 (Cold Shutdown) and Unit 1 was in Mode 1 (Power Operation) at 97 percent power at the time of the event. The first portion of the test incorporating a Safety Injection with Phase A and B isolation concurrent with a Blackout had been completed successfully. Due to a perceived malfunction of the Control Room Synchroscope, Operations personnel were attempting to parallel Diesel Generator 2b to the grid from the Diesel Generator local control panel in preparation for the next portion of the test. This would be accomplished, as procedurally directed, by matching generator volts and line volts. However, because Breakers 2TD-4 (7kV feeder to Transformer 2ATD) was inadvertently left open, an undervoltage signal was generated when the generator volts were lowered below the Blackout setpoint value. Diesel Generator Load Sequencer 2B actuated as designed. This event is assigned causes of a Defective Procedure and Inappropriate Actions. The governing procedure will be revised to clearly convey the necessity of ensuring that a power source is available from the 6900 volt feeder prior to paralleling the DG to the grid.

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EVALUATION

Background

The Diesel Generator Auxiliary Power (EPQ) system [EIIS:EJ] and Diesel Generator Load Sequencer [EIIS:EK] function to energize the necessary Engineered Safety Features (ESF) loads in a prescribed sequence and in such a manner that the Diesel Generator (DG) [EIIS:DG] or the Auxiliary Transformer [EIIS:TD] are not momentarily overloaded. This is accomplished by a number of timers [EIIS:TMR] which coordinate the load applications on the DG or Auxiliary Transformer as required. When normal power is lost to the Essential Auxiliary Power (EPC) system [EIIS:EB] bus, all loads and feeder [EIIS:FDR] breakers [EIIS:52] will be automatically disconnected and reconnected to their respective essential bus by the Sequencer.

The 4160 Volt EPC system distributes essential power, either directly at 4160 volts or transformed to lower voltages, to nuclear safety related auxiliary equipment required to maintain safe Reactor [EIIS:RCT] status during all modes of plant operations, including a Safety Injection concurrent with a Blackout, or Blackout Conditions.

Description of Event

On March 5, 1992, Performance (PRF) and Operations (OPS) personnel were performing the Engineered Safety Features Actuation Periodic Test for Unit 2 Train B components. The work was governed by procedure PT/2/A/4200/09A, ESF Actuation Periodic Test. Personnel had performed steps 12.3 through 12.3.46 of the test. This portion of the test demonstrates the ability of the DG to restart and load in response to a manually initiated Safety Injection, Phase A and B Isolation concurrent with a Blackout. The Blackout is simulated by the tripping of Breaker 2TD-4 (7 kV feeder to XFMR 2ATD). Breaker 2ETB-16 (2 ETB normal incoming feeder) is opened automatically by the DG Load Sequencer to prevent the DG from feeding a potential fault.

With the first portion of the test complete, the Performance Test Coordinator (PTC) requested the Reactor Operator at the Controls (ROATC), as directed by step 12.3.47 of the procedure, to parallel 2B DG to the normal offsite power source, and then unload 2B DG in accordance with procedure OP/2/A/6350/02, Diesel Generator. This action was taken in preparation for the next portion of the test in which 2B DG would be reloaded, a Safety Injection signal would be generated, and all safety loads would sequence back on the bus [EIIS:BU] followed by 2B DG separation from the bus. After making the request, the PTC handed procedure PT/2/A/4200/09A to the ROATC. The ROATC began the DG paralleling process by turning on the Control Room (CR) [EIIS:NA] Synchroscope [EIIS:SYN]; however, he did not notice the preceding note in the procedure which stated "Breakers 2TD-4 and 2ETB-16 must

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be closed to parallel the DG to offsite power". Although, both breakers are referenced, the intent of this note was to ensure that a power source was properly aligned from the 6900 volt bus to the 4160 volt bus by closing Breaker 2TD-4 in order to parallel the DG to the grid. Normally upon activation, the Synchroscope indicator begins to rotate in either a clockwise or counterclockwise direction depending on current leading or lagging voltage; however, in this case, the indicator moved very slightly and stopped. ROATC notified the Senior Reactor Operator (SRO), the OPS Coordinator, and other CR personnel that the Synchroscope was not responding as expected. After consultation and discussion, OPS personnel decided that the Synchroscope was malfunctioning and the proper course of action was to parallel 2B DG locally from the DG control panel [E11S:PL].

The SRO contacted the OPS Non Licensed Operator (NLO) who was stationed at 2B DG and informed him to parallel 2B DG to the grid using procedure OP/2/A/6350/02. The NLO reviewed the procedure while in telephone contact with the SRO. Having no questions, the NLO began the process. The local Synchroscope was turned on. As procedurally directed, the NLO was to match DG volts and line volts using the "Volt Adjust" handle on the local control panel. At this point, his attention was focused on the voltage indicators that would be used to match the voltages and not on the position or movement of the local Synchroscope. The NLO noticed the gross mismatch between generator and line volts and attempted to match the voltages in several incremental changes. At approximately the third change, the generator voltage fell below the Blackout setpoint value and the 2B DG Load Sequencer received an undervoltage signal and actuated. This constituted an ESF actuation.

OPS personnel reset 2B DG Load Sequencer, closed Breaker 2TD-4, and paralleled 2B DG to the grid. The required four hour NRC notification was made by OPS personnel in accordance with procedure RP/0/A/5700/10, NRC Immediate Notification Requirements at 1507 on March 5, 1992.

Conclusion

The end result of this event was the inadvertent generation of an undervoltage signal which caused 2B DG Load Sequencer to actuate, shedding existing loads and sequencing on the applicable safety related equipment.

A cause of Defective Procedure is assigned to this event because the guidance to ensure that Breaker 2TD-4 was closed prior to attempting to parallel the DG to the grid was presented as a note in procedure PT/2/A/4200/09A as opposed to a procedural step with a signoff. Additionally, the actions necessary to accomplish the breaker closure are not defined in the supporting procedure OP/2/A/6350/02, Diesel Generator. With either Breaker



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2TD-4 or 2ETB-16 open, 2ETS bus is effectively isolated from the grid. This configuration is established for the initial phase of the testing by manually tripping Breaker 2TD-4. Breaker 2ETB-16 opens automatically to protect the DG. If Breaker 2TD-4 is not closed, the Synchroscope has no line voltage to compare to DG voltage and therefore, gives no lead/lag indication. This situation lead CR personnel to the incorrect conclusion that the Synchroscope had malfunctioned.

A cause of Defective Procedure is also assigned because the supporting procedure, OP/2/A/6350/02, does not detail the actions necessary to ensure that an alternate power source is capable of supporting the 4160 volt bus (when the DG is carrying the bus) as the DG is shutdown. Additionally, step 2.1.2 of procedure OP/2/A/6350/02 does not provide the Operator attempting to match voltages with expected results/indications stemming from the actions performed as suggested by Section 4.2.3.4 (i) of the Administrative Policy Manual. Instructions indicating that both voltage indicators (DG and line) should reflect some value would have alerted the NLO that an abnormal condition existed. This type of expected results is provided for step 2.1.3 of the procedure.

A cause of Inappropriate Action, is assigned to this event because the ROATC did not ensure that Breaker 2TD-4 was closed prior to beginning the DG paralleling process. Although the necessity to close Breaker 2TD-4 would have been more effectively conveyed as a procedural step as opposed to a note, the information was present in the controlling procedure and should have been noted by the ROATC.

A cause of Inappropriate Action, is assigned because OPS personnel assumed that the lack of response from the Synchroscope was due to a malfunction of the instrument and no other possibilities were explored. Had personnel analyzed the situation more closely and considered information from various CR instruments such as line voltage or breaker position indicators, the correct diagnosis of the Synchroscope non-response would have been determined.

A cause of Inappropriate Action, is additionally assigned because the NLO at the DG Control Panel stated that he did not associate the zero line voltage indication with Breaker 2TD-4 not being closed.

A review of the Operating Experience Program Data Base for the twenty-four months prior to this event revealed one McGuire License Event Report (LER) involving an ESF actuation with a cause of Defective Procedure. This event is documented in LER 370/91-11. The LER describes an ESF actuation resulting from a manual start of the Auxiliary Feedwater [EIIS:BA] Pumps [EIIS:P]. The review also identified four events in the interval involving ESF actuation with a cause of Inappropriate Action. The first event was documented on LER 369/90-09 and involved a Unit 1 Feedwater Isolation resulting from Steam

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Generator 1B reaching its Hi-Hi level. LER 369/91-01 details a Unit 1 Reactor Trip due to a loss of offsite power. LER 369/91-15 was generated in response to a Unit 1 inadvertent ESF actuation when Train A 4160 volt bus was de-energized for maintenance activities. LER 370/91-05 describes the inoperability of both trains of the Unit 1 Annulus Ventilation system because both lower Annulus doors were opened for maintenance without implementation of adequate compensatory measures. Based on the results of the search, this event is considered recurring. The corrective actions developed for these LERs were unique to the specific events and would not have precluded this event.

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

There were no personnel injuries, radioactive overexposures, or uncontrolled radioactive releases resulting from this event.

**CORRECTIVE ACTIONS:**

**Immediate:** 1) OPS personnel reset 2B DG Load Sequencer.

2) OPS personnel closed breaker 2TD-4, paralleled 2B DG to the grid, and completed the remaining portion of the ESF test.

**Subsequent:** 1) OPS personnel involved have discussed the circumstances leading to the event.

2) OPS personnel made the required notification to the NRC in accordance with procedure RF/O/A/5700/10, NRC Immediate Notification Requirements.

**Planned:** 1) PRF personnel will revise procedure PT/2/A/4200/09A to include the information concerning closure of the normal supply breaker(s) in the form of a procedural step with signoff.

2) OPS personnel will revise procedure OP/2/A/6350/02 to include expected voltage indication values and procedural guidance to ensure that alternate power source(s) are capable of supplying the 4160 volt bus

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prior to matching DG and line volts while separating the DG from the bus.

- 3) The decision to parallel the DG locally and to regard the Synchroscope as malfunctioning will be discussed with all operators by a member of Operations Management. The need to thoroughly evaluate any unexplained information or indications prior to proceeding will be addressed specifically. This action will be performed during Operator requalification training.
- 4) The various station groups will review their respective procedures to ensure that actions statements are not included in procedural notes and / or cautions.

**SAFETY ANALYSIS:**

Unit 2 was in Mode 5 (Cold Shutdown) at the time of the inadvertent ESF actuation. The ESF equipment does not serve to mitigate the consequences of an accident with the unit in Mode 5 or below; therefore, the ESF actuation system [EIIS:JE] was not required to be operable. Some ESF equipment (Auxiliary Feedwater, Turbine [EIIS:TRB] Driven Pumps, Safety Injection [EIIS:BQ] Pump, Centrifugal Charging [EIIS:CB] Pump, etc.) is intentionally removed from service in Mode 5 to preclude damage to the equipment or the unit because the ESF equipment is not designed to operate in Mode 5 or below. There were no operational problems, disturbances, or damage to Unit 2 as a result of this event.

2A Diesel Generator and its associated bus were operable and available for service if needed.

OPS personnel took immediate action to reset 2B DG Sequencer, close breaker 2TD-4, and parallel 2B DG to the grid.

The unexpected ESF actuation did not affect the health and safety of the public.