



DUKE POWER

April 10, 1991

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

Subject: McGuire Nuclear Station Unit 1 and 2  
Docket No. 50-369  
Voluntary Special Report

Gentlemen:

Attached is a Voluntary Special Report concerning the Unit 1 and Unit 2 Turbine Driven Auxiliary Feedwater pumps automatically starting. This report is being submitted as a Voluntary Special Report. This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

*T.L. McCormell*

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ADJ/NGA/cbl

Attachment

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## McGUIRE SAFETY REVIEW GROUP INPLANT REVIEW REPORT

1. REPORT NUMBER: 91-11
2. DATE OF REVIEW: February, 1991
3. SUBJECT DESCRIPTION: On February 15, 1991, Instrument and Electrical (IAE) personnel were performing Preventative Maintenance (PM) work request 08068C on inverter SKSS. In the process of performing this work, IAE Specialist A discovered a frequency detector board that had malfunctioned. This prevented the inverter from being returned to normal operation. After consultation with IAE Supervision, it was decided to replace the defective frequency board on February 21, 1991. To replace this board requires that SKSS be completely de-energized. At approximately 1230, a Nuclear Operations (OPS) Specialist (NLO) was dispatched to de-energize SKSS. The NLO opened the alternate feeder breaker to SKSS, located on Motor Control Center (MCC) SMXG at approximately 1250. This action resulted in a loss of power to power panel board KXS which supplies control power to the Standby Shutdown Facility (SSF) control panel. When the SSF control panel was de-energized, it caused all eight (four per unit) steam generator (S/G) level indications to fail in the low direction. Units 1 and 2 Turbine Driven (T/D) Auxiliary Feedwater (CA) pumps automatically started on a one of one low level signal in two of four Steam Generator (S/G) logic from the SSF (see page 9). OPS personnel took action to stop the Unit 1 cooldown and injection of CA to the Unit 2 S/Gs by reducing pump speed and closing the CA to S/G discharge valves. IAE personnel finished replacing the frequency board and OPS personnel restored power to KXS at approximately 1405. OPS personnel notified the NRC of an Engineered Safeguards Feature Actuation (ESFAS) and returned the CA system to standby readiness.

## 4. EVALUATION AND COMMENT:

Background

The CA system is provided as a backup for the Main Feedwater System (CF). It is designed as a means to remove heat from the Reactor Coolant System (NC) when CF is not available. The CA system contains two motor driven (M/D) pumps, one T/D pump and their associated piping, valves and controls. The T/D CA pump is capable of supplying auxiliary feedwater to all four S/Gs.

The SSF is a separate building located within the Protected Area. This facility houses the equipment and controls necessary for OPS personnel to achieve and maintain one or both units in a Hot Standby condition. This facility is used only as a last resort when the preferred controls (the Control Room controls and the Auxiliary Shutdown Panel controls) have been rendered inoperable due to a severe fire or sabotage event. Equipment and controls within the SSF are referred to as the Standby Shutdown System (SSS). The function of the SSF is not considered nuclear safety related and is not seismically qualified. All SSS interfaces with Safety Related (Quality Assurance (QA) condition 1) control loops and equipment are isolated from the SSF by QA condition 1 isolation devices. The SSF also houses the 250/125 VDC Standby Shutdown Facility Auxiliary Power System which supplies power to various security components and the SSF control panel.

Description of Events

On February 14, 1991, at approximately 1051, OPS personnel removed security inverter SKSS from service for IAE personnel to perform work request 08068C PM. OPS personnel removed inverter SKSS from service by procedure OP/0/B/6350/07, 250/125 VDC Standby Shutdown Facility Auxiliary Power, Enclosure 4.20. This action placed all inverter loads on the alternate power supply, MCC SMXG. Power to inverter SKSS from distribution center SDSP was red tagged open in accordance with Removal and Restoration (R&R) sheet 01-146.

On February 15, 1991, IAE personnel requested that OPS personnel place SKSS inverter back to normal operation so they could functionally verify the work performed on SKSS inverter. OPS personnel attempted to place SKSS inverter in operation by procedure OP/O/B/6350/07, Enclosure 4.19. The alternate source off frequency indication light did not go out as expected. This prevented placing SKSS inverter in service. IAE Specialist A reported the problem to his supervision and after discussion with McGuire Engineering Services (MES) personnel, it was determined that the problem was caused by a bad frequency relay or circuit board. Repair of the alternate source off frequency indication would require that the SKSS inverter loads alternate power source be de-energized.

On February 18, 1991, IAE Specialist B informed Security personnel of the problem with SKSS inverter. Together, they researched the electrical one line drawings and a Design Engineering list to determine the effect de-energizing the SKSS inverter loads would have on Security.

On February 21, 1991, Unit 1 was in Mode 3 (Hot Standby) and OPS personnel were making preparations to perform a Reactor startup. Unit 2 was in Mode 1 (Power Operation) at 100 percent power.

At approximately 1130, IAE Specialist B contacted OPS Supervisor A and requested that the alternate power supply to SKSS inverter be de-energized. IAE Specialist B stated that at this time he informed OPS Supervisor A that the SSF would be affected when the alternate power supply to inverter SKSS was de-energized. OPS Supervisor A told IAE Specialist B that he did not know anything about the work to be performed on SKSS. OPS Supervisor A then contacted the OPS Shift Supervisor and the Control Room SRO and asked them if they knew anything about the work to be done on SKSS inverter. They did not know of any work to be performed on SKSS inverter. OPS Supervisor A then contacted Integrated Scheduling personnel A to see if he was aware of the work to be done on SKSS inverter. Integrated Scheduling personnel A stated that he was not aware of the work to be done but he would check into it and get back to OPS Supervisor A.

At about 1215, Integrated Scheduling personnel A saw IAE Specialist B in the Control Room and remembered that he was supposed to check on the SKSS work. He had forgotten about SKSS due to being preoccupied with the Unit 1 startup. At this time, IAE Specialist B stated that he informed Integrated Scheduling personnel A that it would affect the SSF control panel.

At approximately 1220, Integrated Scheduling Personnel A checked the weekly schedule for work to be performed. He saw that work request 08068C was on the schedule for that night. Integrated Scheduling Personnel A then contacted Security personnel to find out if they were aware of the work to be performed on inverter SKSS. Security personnel stated they were aware of the work to be performed. Integrated Scheduling Personnel A decided that the work on inverter SKSS could be performed at this time. At approximately 1225, Integrated Scheduling Personnel A contacted OPS Supervisor A and told him he could proceed with de-energizing inverter SKSS alternate power supply.

At about 1230, OPS Supervisor A dispatched an NLO to the SSF to open the alternate power supply to SKSS inverter loads and to standby as a human red tag until the work by IAE personnel was completed. The NLO was also instructed to phone IAE Specialist B in the Computer Room so the Security computer could be shutdown prior to de-energizing SKSS inverter loads.

At approximately 1250, the NLO called IAE Specialist B and informed him that he was ready to de-energize SKSS inverter loads. The NLO then opened the SKSS inverter loads alternate power supply located on MCC SMXG. This action resulted in a loss of power to power panel board KXS which supplies power to the SSF control panel. When the SSF control panel was de-energized, all eight (four per unit) S/G wide range level indications failed in the low direction due to the loss of power. Units 1 and 2 T/D CA pumps automatically started when the one of one low level signal from two of four S/G logic from the SSF was satisfied.



OPS Control Room Operators (CRO) reduced the speed on the T/D CA pumps and closed the CA discharge valves to the S/G to limit the Unit 1 cooldown and to stop CA flow to Unit 2.

At 1405, IAE personnel completed repairs to the SKSS inverter frequency indication and the NLO reclosed the SKSS inverter loads alternate power supply from MCC SMXG. OPS CROs stopped the T/D CA pumps and realigned Unit 1 and Unit 2 CA systems to standby readiness.

5. CONCLUSION: This incident is assigned a cause of Deficient Communication And a Lack of Attention to Detail. Deficient Communication occurred because IAE Specialist B stated that he informed OPS Supervisor A the SSF would be affected. OPS Supervisor A stated he was not informed by IAE Specialist B that the SSF would be affected. Integrated Scheduling personnel A also failed to inform OPS Supervisor A the SSF would be affected. Lack of Attention to Detail occurred because IAE Specialist B failed to determine the effect de-energizing the SKSS inverter loads alternate power supply would have on the SSF Control Panel. OPS Supervisor A looked at the electrical one line drawing for SKSS inverter and knew SSF instrumentation would be de-energized. OPS Supervisor A failed to determine the instrumentation to be de-energized and the effect de-energizing this instrumentation would have on the T/D CA pumps.

A contributing cause of Deficient Documentation is also assigned because electrical one line drawing MC 1750-03.01 does not show a complete connection between Distribution Center SDSP, MCC SMXG, Inverter SKSS, and Power Panel Board KXS.

A mitigating circumstance is that SKSS and associated equipment is thought of as security equipment because the majority of the loads supplied by SKSS inverter are security components. This may have lead OPS and IAE personnel into a false confidence that no equipment of concern to OPS personnel would be affected when SKSS inverter loads alternate power supply was de-energized.

The incident did not cause any significant operational problems or difficulties. There was a slight cooling of the NC system on Unit 1 due to the injection of the colder CA water to the S/G but this was controlled by OPS personnel taking appropriate corrective actions.

A review of Problem Investigation Reports (PIRs) for the previous twenty-four months prior to this event revealed no incidents concerning an ESF actuation with a cause of Deficient Communications or a cause of Lack of Attention to Detail. However, the review did reveal two incidents in which CA pumps were automatically started due to Inappropriate Actions. These were documented on LER 369/89-09 and LER 370/89-25. These incidents were of a different nature; therefore, this incident is not considered to be recurring.

McGuire OPS personnel notified the NRC of this incident by procedure RP/O/A/5700/10, Immediate Notification Requirements. After discussion with the OPS Support Manager, McGuire Nuclear Station Management does not consider this incident to be an ESF Actuation based upon the following reasons:

- 1) The SSF and related components are not nuclear safety related.
- 2) The SSF components that interface with nuclear safety related components are isolated by means of QA condition 1 isolation devices.
- 3) Power supplies from the SSF are not nuclear safety related.
- 4) The signal that actuated the T/D CA pumps does not go through the SSPS.
- 5) An ESF component (T/D CA pump) was actuated by a non-ESF signal from the SSF. This is not a valid or spurious ESF signal.
- 6) The signal from the SSF actuated the T/D CA pump via solenoids that are not safety related.

- 7) The ESF logic for automatic start of the T/D CA pumps on S/G level is two out of four low-low level alarms in two S/G. The logic that actuates the T/D CA pumps from the SSF is one of one wide range level low alarm in two of four S/G.
- 8) The auto start signal from the SSF is not redundant as required for ESF signals.

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

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

5. CORRECTIVE ACTIONS:

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|-------------|---|
| Immediate:  | <ol style="list-style-type: none"><li>1) OPS personnel reduced T/D CA pump speed and closed CA discharge valves to the S/Gs.</li><li>2) OPS personnel implemented the NRC Immediate Notification Requirements procedure, RP/0/A/5700/10.</li></ol>  |
| Subsequent: | <ol style="list-style-type: none"><li>1) OPS personnel restored power to KXS power panel board.</li><li>2) OPS Supervisor A went to the SSF and verified that the NLO had opened the correct breaker.</li><li>3) OPS personnel stopped the T/D CA pumps and re-aligned Units 1 and 2 CA systems to standby readiness.</li></ol> |
| Planned:    | <ol style="list-style-type: none"><li>1) OPS Management will submit a Station Problem Report (SPR) and propose a change to electrical one line drawing MC 1705-03.01 to show connections between distribution center SPDP, MCC SMXG, Inverter SKSS, and power panel board KXS.</li></ol>  |



- 2) OPS Management will conduct lessons learned training to inform all Operations personnel of lessons learned from the incident.
  - 3) IAE Management will add a special instruction to work request 08008C PM to alert IAE personnel to the danger of de-energizing normal and alternate power supply to SKSS inverter.
  - 4) IAE Management will review this incident with IAE personnel.
6. SAFETY ANALYSIS: Unit 1 was in Mode 3 (Hot Standby) preparing for Reactor startup at the time of this incident. OPS personnel took appropriate corrective action by closing the T/D CA pump discharge valves to the S/G thereby limiting the NC system cooldown.

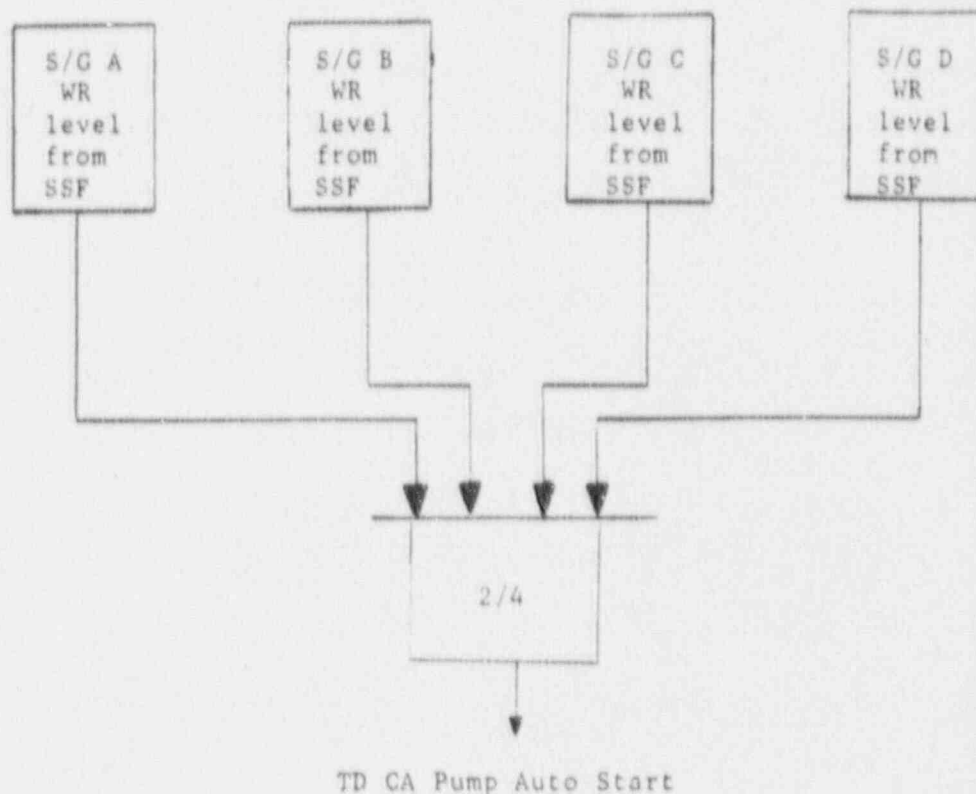
Unit 2 was in Mode 1 at 100 percent power at the time of this incident. OPS personnel took appropriate corrective action by reducing T/D CA pump speed, thereby placing the pump in the recirculation mode.

During the time period of this incident both T/D CA pumps ran for approximately 1 hour and 15 minutes. No other ESF equipment was affected. At no time was the Unit 1 and 2 T/D CA pump inoperable or incapable of performing the design function of the pump.

Unit 1 and Unit 2 M/D CA pumps were operable and capable of performing their design function for the duration of this incident. Therefore, during this incident, the operation of the T/D CA pumps did not adversely affect any of the Unit 1 or Unit 2 equipment or systems.

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

Turbine Driven Auxiliary Feedwater Auto Start  
Logic From The Standby Shutdown Facility



NOTE: This drawing represents the TD CA pump auto start from one unit only.