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DUKE POWER

August 15, 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
Licensee Event Report 369/91-08-01

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 369/91-08-01 containing an additional planned corrective action for LER 369/91-08 dated June 27, 1991. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i), (a)(2)(v) and (a)(2)(vii). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

T. L. McConnell
T. L. McConnell

ADJ/cbl

Attachment

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) McGuire Nuclear Station, Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 3 6 9										PAGE (3) 1 OF 7																					
TITLE (4) Under Certain Postulated Conditions, The Diesel Generators Could Be Rendered Inoperable Because Of A Design Deficiency																																									
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 McGuire, Unit 2						DOCKET NUMBER(S) 0 5 0 0 0 3 7 0								
0 5			1 4			9 1			9 1			0 0			8			0 1			0 6			2 7			9 1									0 5 0 0 0					
OPERATING MODE (9) 2						THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)																																			
POWER LEVEL (10) 0 0 0						20.402(b)						20.405(c)						50.73(a)(2)(iv)						73.71(b)																	
						20.405(a)(1)(i)						50.36(a)(1)						X 50.73(a)(2)(v)						73.71(c)																	
						20.405(a)(1)(ii)						50.36(a)(2)						X 50.73(a)(2)(vi)						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)(vii)(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)(ix)																													
LICENSEE CONTACT FOR THIS LER (12)																																									
NAME Alan Sipe, Chairman, McGuire Safety Review Group																TELEPHONE NUMBER 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 NRC		CAUSE		SYSTEM		COMPONENT		MANUFACTURER		REPORTABLE TO NRC																							
SUPPLEMENTAL REPORT EXPECTED (14)																EXPECTED SUBMISSION DATE (15)		MONTH		DAY		YEAR																			
YES (If yes, complete EXPECTED SUBMISSION DATE)																X NO																									

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

On May 14, 1991, Design Engineering (DE) personnel issued Problem Investigation Report (PIR) 0-M91-0088. The PIR addressed a concern regarding non-seismically qualified piping in the vicinity of the Diesel Generator (D/G) air intakes. The concern was raised during an NRC audit. The piping in question was the 2 inch Main Steam drain lines and the 4 inch Condensate Feedwater tempering flow lines. On May 17, 1991, DE personnel issued an Operability Evaluation stating the D/Gs on Units 1 and 2 were conditionally operable. On May 22, 1991, PIR 0-M91-0100 was issued to address the concern regarding the same Main Steam and Condensate Feedwater lines when subjected to tornado wind loadings and tornado generated missiles. After evaluating the PIRs, DE personnel determined it would be necessary to upgrade the Main Steam drain line piping to withstand a seismic event and wind loads of 180 miles per hour (mph). The upgrades were implemented under Nuclear Station Modifications (NSMs) MG-12391 and MG-22391. DE personnel determined the Condensate Feedwater tempering flow lines were seismically rugged and would withstand wind loads of 300 mph. Unit 1 was in Mode 2 (Startup) and Unit 2 was in Mode 1 (Power Operation) at 100 percent power at the time the initial concern was addressed. The event has been assigned a cause of Design Deficiency because of an unanticipated environmental interaction between the steam which could potentially be released and the D/Gs. DE personnel are evaluating long term corrective actions for the piping in question under NSMs MG-12393 and MG-22393.

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TEXT (If more space is required, use additional NRC Form 360A's) (17)

EVALUATION:

Background

The Main Steam (SM) system [EIIS:SB] provides the steam flow requirements for the Main Turbine [EIIS:TRB] and for auxiliary equipment. Steam is generated on the secondary/shell side of the Steam Generators (S/Gs) [EIIS:SG] (4/unit).

The SM system contains low point drains [EIIS:DRN] to drain condensate at low points in the system piping. The SM drain line level control valves [EIIS:LCV] are provided to automatically drain the condensate to the Condenser [EIIS:COND] Hotwell. They will also automatically open on a load rejection, turbine trip, high drain pot level, or at less than 20 percent load. To isolate the SM drain line level control valves when necessary, the SM drain lines have manual isolation valves [EIIS:ISV].

Each unit at McGuire Nuclear Station (MNS) has two independent D/Gs [EIIS:EK]. As part of the Essential Power System [EIIS:EB], they provide standby AC power to the equipment required to safely shutdown the Reactor [EIIS:RCT] in the event of a major accident and to maintain the facility in the shutdown or refueling condition for extended periods of time. The D/Gs are required for a Blackout (loss of normal power) condition as well as a Loss Of Coolant Accident (LOCA) condition.

Technical Specification (TS) 3/4.8.1 requires both independent D/Gs to be operable in Mode 1, Mode 2, Mode 3 (Hot Standby), and Mode 4 (Hot Shutdown).

Description Of Events

In May of 1991, while MNS was involved in an NRC Electrical Distribution System Functional Inspection (EDSFI) audit, a concern was raised by an inspection team member of the effect on D/G operability in the event of an SM or Condensate Feedwater (CF) [EIIS:SJ] line break in vicinity of the D/G air intakes. DE personnel explained that these lines were specifically designed with low stresses to preclude breaks in this area. DE personnel then reviewed other lines in the area. The review identified the 2 inch SM drain lines and the 4 inch CF tempering flow lines that might pose a problem to the D/G operability. Subsequently, on May 14, 1991, PIR 0-M91-0088 was initiated by DE personnel. The PIR stated that there were non-seismically qualified lines in the vicinity of the D/G air intakes, specifically, the 2 inch SM drains lines and the 4 inch CF tempering flow lines. It further stated that the lines should be evaluated for their potential failure and subsequent impact on D/G operability. After evaluating the concern, DE personnel determined the 4 inch CF tempering flow lines to be seismically rugged and the lines did not exceed the postulated pipe rupture criteria stress levels. Therefore, the CF tempering flow lines did not affect D/G operability. However, DE personnel could not assure seismic pressure boundary integrity or eliminate the potential pipe rupture concerns on the 2 inch SM drain lines. Therefore, DE personnel issued an Operability Evaluation (OE) on May 17,

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

1991, stating the D/Gs on Units 1 and 2 were conditionally operable based on isolating the SM drain lines in the Doghouses.

The revised conditions of operation to ensure the D/Gs remained operable required all Unit 1 and 2 inch SM drain line isolation valves from the Interior and Exterior Doghouses to the Condenser Hotwell, to be mechanically gagged in the closed position in all modes of plant operation. Additionally, when it became necessary to drain the SM drain lines during plant operation, the drains could remain open for a maximum of one minute. This was put into effect immediately by OPS Management. These revised conditions of operation were to remain in effect until the SM drain line piping supports were seismically upgraded. NSMs MG-12391 and MG-22391 were generated by Projects personnel to seismically upgrade the SM drain line piping.

On May 22, 1991, PIR 0-M91-100 was initiated to address the effects of a rupture of the SM drain lines and CF tempering flow lines, caused by tornado wind loads and tornado generated missiles, on the operability of the D/Gs. After reviewing MNS Licensing documents and correspondence with NRC personnel, Nuclear Production Department (NPD) personnel determined this concern was beyond the limits of the MNS Licensing Basis. Even though not required by MNS Licensing Basis, DE personnel evaluated the lines for wind speeds as noted below. Tornado generated missiles were not evaluated further since Probabilistic Risk Assessment (PRA) evaluation shows the probability of a tornado missile strike is low, which is consistent with the NRC Safety Evaluation Report (SER) conclusion (1978, section 3.5.1, pg.3-7) of a low tornado missile hazard. A DE review determined the CF tempering flow lines were able to withstand a wind load of approximately 300 mph while the SM drain lines were able to withstand a wind load of 180 mph, with pipe support upgrades. Therefore, DE personnel incorporated additional support upgrades into the scope of the ongoing work associated with MG-12391 and MG-22391. The concern with the SM drain lines and CF tempering flow lines was not determined to be reportable until May 28, 1991 following the EDSFI team exit.

The NSMs were completed by Construction and Maintenance Department (CMD) personnel on June 14, 1991. DE personnel will be evaluating a long term corrective action for the SM and CF piping under NSMs MG-12393 and MG-22393.

Also on May 22, 1991, the OE for PIR 0-M91-0088 was revised by DE personnel for the drain line associated with Unit 1 S/G B to allow continuous draining through the orifice [E11S:OR] downstream of valve 1SM-85 (Steam Line Doghouse Drain Orifice Inlet), as a result of the inability to gag valve 1SM-89 (B SM Line Drain Valve). Continuous draining of the line through the orifice was evaluated by DE personnel and found to have no impact on D/G operability. The revision also added that the D/Gs would also be conditionally operable until PIR 0-M91-0100 regarding tornado concerns had been evaluated.

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In connection with the SM drain line concern and the resulting OE, on May 29, 1991, at approximately 1800 hours, Non Licensed Operator (NLO) A inadvertently left valve 2SM-95 ungagged after draining the line. Since the conditions of operability required the SM drain line isolation valves gagged closed during all modes of plant operation, this rendered the Unit 2 D/Gs technically inoperable per the original operability evaluation. Twelve hours later, at approximately 0600 hours, on May 30, 1991, the NLO performing Attachment 3 of the Operations Management Procedure (OMP) 2-8 "Service Building/Outside NLO Surveillance Checklist", discovered valve 2SM-95 was not gagged closed. After draining the line, the NLO gagged closed valve 2SM-95. Notification was made to the NRC.

Conclusion

Under certain postulated conditions, the D/Gs on Units 1 and 2 could have been rendered inoperable. The postulated conditions include an event in which the SM drain line valves were open, or failed open, concurrent with a loss of offsite power and a high energy pipe break of the SM drain lines in the vicinity of the D/G air intakes, as a result of a damaging earthquake or a severe tornado. Losing offsite power would require the start up of the D/G. In the event of a concurrent rupture of a high energy pipe, the resulting release of steam can not be precluded from entering into the air intake of the D/G due to the general piping arrangement.

The resulting increase in temperature in the D/G room could interfere with the operation of the D/G controls as the D/G room was designed for a mild environment. Additionally, the resulting water/steam mixture introduced into the D/G intake, along with the air, could interfere with the combustion process, and taken to the extreme, could possibly shut down the D/G. Therefore this event has been assigned a cause of Design Deficiency because of an unanticipated environmental interaction between the steam which could potentially be released and the D/Gs.

This event has also been assigned a cause of an Inappropriate Action because of a lack of attention to detail. Prior to leaving valve 2SM-95 ungagged on May 29, 1991, NLO A had gone on rounds the previous day, May 28, 1991, with NLO B. NLO A would be working in place of NLO B on May 29, 1991, and wanted to be familiar with what needed to be done. When the NLOs arrived at the Unit 2 Interior Doghouse to drain the SM drain lines, NLO B cautioned NLO A to be very careful when isolating the air on valve 2SM-95 because the possibility existed of jamming the valve in either the closed or opened position if the air was isolated too quickly. Air had to be isolated from the valve to open it because it could not be opened from the Control Room due to a faulty control switch. NLO B allowed NLO A to ungag valve 2SM-95, isolate the air, drain the line, unisolate the air, and regag the valve. NLO A performed the task without incident. NLO A felt comfortable with the ability to perform the task the following day. During the next shift, an NLO received a burn to his arm while draining the SM drain lines in the Unit 1 Interior Doghouse.

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On May 29, 1991, NLO A entered the Unit 2 Interior Doghouse to drain the SM drain lines. NLO A approached valve 2SM-95, ungagged the valve and started to very carefully isolate the air so the valve would open. NLO A was conscious of the caution received from NLO B the previous day and was concerned about not damaging the valve. Once the line drained, NLO A started unisolating the air to valve 2SM-95 to close it. While performing the task, NLO A was looking around to see how the NLO from the previous shift could have burned himself. NLO A then realized that the incident had occurred in the Unit 1 Interior Doghouse, not the Unit 2 Interior Doghouse. NLO A then, completed the work in the Doghouse and did not remember placing the gag back on the valve. The valve was discovered ungagged twelve hours later on the next shift. No other Operations personnel entered the Unit 2 Interior Doghouse during the twelve hour interval.

After this event, Operations Management issued an Addendum to Attachment 3 of OMP 2-8, "Unit 1 and 2 Service Building/Outside NLO Surveillance Checklist" requiring independent verification of the gags placed on the SM drain line valves associated with the OE evaluation issued by DE personnel.

A review of the Operating Experience Program (OEP) Data Base for twenty-four months prior to this event revealed no events relating to a Design Deficiency as a result of unanticipated environmental interaction. However, it did reveal two LERs involving TS violations because of a lack of attention to detail within the Operations Department. LER 369/90-19 involved missed channel checks on the Contaminated Parts Warehouse ventilation radiation monitor. LER 370/90-05 involved the failure to properly declare Train B, Containment Spray (NS) system [EIIS:BE] inoperable due to being unaware of the new status of heat exchanger [EIIS:HX] flow instrumentation following NSM implementation. The equipment and activities involved in these events were not the same and the corrective actions for these events were not applicable to this event. However, these events involved the same group. Therefore, TS violations because of a lack of attention to detail is a recurring problem. Additionally, a search conducted for equipment mispositioning revealed several examples, therefore, equipment mispositioning is considered to be a recurring problem.

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

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

CORRECTIVE ACTIONS:

A) Two inch SM Drain Lines and 4 inch CF Tempering Flow Lines.

Immediate: PIR 0-M91-0088 was initiated by DE personnel to evaluate seismic concerns and the effect on the D/G operability.

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- Subsequent:
- 1) An OE was issued by DE personnel with conditions of operability for the D/Gs on Units 1 and 2, since the SM drain lines were not seismically adequate.
 - 2) NSMs MG-12391 and MG-22391 were issued by DE personnel to seismically upgrade piping on SM drain lines.
 - 3) PIR 0-M91-0100 was issued by DE personnel to evaluate the effect of tornado wind loading and tornado generated missiles on the piping in question and the effect on the operability of the D/Gs.
 - 4) AN OE was issued by DE personnel determining that the CF tempering flow lines could withstand wind loads of 300 mph, and the SM drain lines could withstand wind loads of 180 mph with pipe support upgrades. NPD personnel also determined the CF tempering flow lines and the SM drain lines were beyond the MNS Licensing Basis in respect to tornado generated missiles.
 - 5) NSMs MG-12391 and MG-22391 were revised to include upgrading of the SM drain lines to withstand wind loads of 180 mph. The NSMs were completed by CMD personnel on June 14, 1991.
 - 6) DE personnel are evaluating changing power supplied to the SM drain line valves so the valves will fail closed as opposed to failing open as they do now.

- Planned:
- 1) Maintenance Engineering Services (MES) will conduct piping erosion measurements on the SM drain lines during the Unit 1 End of Cycle (EOC) 7.
 - 2) DE personnel are currently looking at long term corrective actions for the SM drain line and CF tempering flow line concern under NSMs MG-12393 and MG-22393.

B) Failure to Gag Closed Valve 2SM-95

Immediate: An NLO on the next shift gagged closed valve 2SM-95 when it was discovered ungagged.

- Subsequent:
- 1) An addendum was added to Attachment 3 of OMP 2-8, "Unit 1 and 2 Service Building/Outside NLO Surveillance Checklist" to independently verify the SM drain line valves were ungagged and regagged.

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

- 2) Operations Management personnel covered the event in detail with Shift Supervisors in a Shift Supervisors Meeting.
- 3) The event was covered with personnel involved.

Planned: None

SAFETY ANALYSIS:

The 2 inch SM drain lines and the 4 inch CF tempering flow lines in the vicinity of the of the Doghouse structures posed a potential adverse interaction for the D/G intake structure. The events of concern are seismic and tornado which could produce wind loadings or missiles threatening the integrity of these lines. It is difficult to predict the operating capability of the D/Gs with any significant quantity of steam in the vicinity of the air intakes.

Seismic events causing ruptures of piping are considered to be associated with extreme seismic accelerations. Generally, the offsite power components are more susceptible to seismic loadings than piping systems. Considering typical fragilities of plant piping and the offsite power system, the probability of a seismically induced loss of offsite power and a pipe rupture of interest is fairly small (less than 1.0 E-6 per year).

Tornado events have the potential for causing loss of offsite power and thereby placing a demand on the onsite power system. The piping in question is believed to have the ability to withstand a Design Basis wind load of 95 mph. The estimated frequency of tornadoes are in the range of 1.0 E-5 to 1.0 E-3 per year. Therefore, the possibility existed of compromising the operability of the D/Gs during severe tornado conditions.

The calculations of tornado induced missile strikes for the Doghouse structure indicate that the missile strike probability for such a structure is small. Considering the small target area posed by the piping in question and considering the shielding provided by nearby structures, the tornado missile hazard due to these pipes is negligible. Therefore, the unqualified SM and CF piping in the vicinity of the D/G air intakes represented somewhat reduced capability for the D/G to cope with certain external events.

Although not specifically designed for seismic and tornado events, the Safe Shutdown Facility (SSF) would be another means of providing safe shutdown of the plant. Thus, the overall risk of losing all the capability to maintain safe shutdown due to postulated seismic and tornado scenarios is considered small.

During the course of this event, there were no incidents such as those discussed that challenged the integrity of the D/Gs. Therefore, the health and safety of the public was not affected by this event.