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DUKE POWER

February 12, 1993

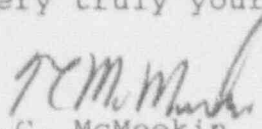
U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: McGuire Nuclear Station Unit 2
Safety Review Group Special Report No. 93-01

Gentlemen:

Pursuant to Selected Licensee Commitment, Section 16.9-7, Remedial Action (c), attached is Special Report 93-01 concerning the Standby Shutdown System being inoperable for more than 7 days due to an equipment failure. 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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Mr. P.K. Van Doorn
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MCGUIRE SAFETY REVIEW GROUP

STATION PROBLEM REPORT

1. REPORT NUMBER: 93-01
2. DATE OF REVIEW: January 13 - February 9, 1993
3. SUBJECT DESCRIPTION: This 30 day report is submitted as a special report pursuant to Selected Licensee Commitment (SLC) Section 16.9-7, Remedial Action c. The Standby Shutdown System (SSS) was determined inoperable for more than 7 days when a problem developed with Unit 2 Chemical Volume and Control (NV) system Standby Makeup pump (2MNVP0046) Discharge damper 2MNVAC0049. This report documents the related circumstances outlining the cause of inoperability, corrective actions taken, and the plan used to restore the system to operable status.
4. EVALUATION AND COMMENT:

Abstract

On January 6, 1993, the SSS was removed from service for performance of several maintenance activities. On January 8, 1993, Maintenance personnel were performing maintenance activities on Discharge damper 2MNVAC0049 associated with Standby Makeup pump 2MNVP0046. During the maintenance activities, a problem developed with disassembly of the damper. The damper housing threads galled to the connecting flange. This kept the damper from being further disassembled or reassembled using the threaded joint. The damper was then removed from the system by cutting the connected piping. The damper was subsequently taken to a machine shop for repair, however, the damper was not restored to operable status within the 7 day limit specified by SLC section 16.9-7 (c). Problem Investigation Process (PIP) 2-M93-0017 was initiated to document and determine the cause of the event, and corrective actions taken. Unit 2 was in Mode 1 (Power Operation) at 100 percent power at the time of the event. The cause of this event is equipment failure due to the galled threads on the discharge damper

housing. Subsequently, Discharge damper 2MNVAC0049 was repaired and re-installed in the system, and the SSS returned to operable status on January 15, 1993.

Background

The standby makeup subsystem of the NV system functions as part of the SSS to control reactor coolant volume should normal volume control be unavailable following a postulated fire or security event. The SSS serves as the last resort and is designed to be used when the preferred equipment has been rendered inoperable.

One standby makeup pump is located in the annulus of each Reactor building to supply makeup flow to the Reactor Coolant (NC) system. The pump provides a means of makeup to recover normal system leakage and NC pump seal leakage during SSS events. The pump is manually started within 10 minutes of the loss of preferred source to ensure the Reactor Coolant pump seals are not degraded. The pump should not be stopped until the NC system is at atmospheric pressure or until the NV system charging pumps and a source of borated water are available for seal injection. The design basis operating time for this pump is 72 hours, however, the most probable event scenarios would expect the pump to be used for no more than 30 hours.

The standby makeup pump is of the positive displacement (PD) design, reciprocating plunger type, and adds a constant quantity (26 gpm) of borated water to the NC system. The pump discharge is connected through a tee fitting to a discharge damper. The discharge damper is provided to absorb or minimize the discharge flow pulsation inherent with positive displacement reciprocating plunger type pumps. The discharge damper consists of a 29 inch long outer casing which is threaded to a tee assembly and contains an inner fluid chamber and a gas chamber separated by a bellows assembly. The fluid chamber is exposed to system fluid and pressure. The gas chamber is filled with nitrogen gas and maintained at approximately 1900 psi. The total volume of the Standby Makeup Pump Discharge damper is approximately 2 gallons and it has a dry weight of approximately 270 pounds.

SLC 16.9.7, SSS, requires that the SSS be operable during Modes 1, 2 (Startup), and 3 (Hot Standby). If any SSS components, such as a standby makeup pump or its associated water supply, are inoperable, the SSS shall be declared inoperable. Remedial Action paragraph c requires that with

the SSS inoperable for more than 7 days, submit a special report to the NRC within the next 30 days outlining the cause of the inoperability, corrective actions being taken, and plans for restoring the system to operable status.

Description Of Event

On August 27, 1992, Component Engineer A was reviewing preventative maintenance records of the Unit 2 Standby Makeup pump 2MNVPU0049 and associated equipment. He determined that the Unit 2 Standby Makeup Pump Discharge damper 2MNVAC0049 did not maintain its gas charge as required. He suspected that the bellows inside the Discharge damper was defective and subsequently originated work order 92039489 to replace the bellows on Discharge damper 2MNVAC0049. He also initiated activity to procure the necessary parts for the job from the vendor, Parker Metal Bellows Corporation.

At 1000 on January 6, 1993, the SSS was removed from service for performance of several maintenance tasks associated with SSS subsystems. One of the jobs scheduled to be performed during the time the SSS was out of service was replacement of the bellows assembly in Discharge damper 2MNVAC0049.

On the morning of January 7, 1993, repair activities, as directed by work order 92039489, were initiated on Discharge damper 2MNVAC0049. Maintenance Technicians A and B were assigned to repair the damper. They proceeded to the Unit 2 Reactor building annulus where Discharge damper 2MNVAC0049 is located and after verification of prerequisite conditions, began to disassemble the discharge damper. Maintenance Technician A started to unscrew the damper housing. After several turns, the housing froze in place and could not be screwed off the remaining threads on the connected flange. Subsequent attempts were made to remove the discharge damper housing by Maintenance Technicians A and B. They tried tapping the housing with a hammer and heating the housing but were unable to successfully remove it as planned. The Maintenance Technicians then consulted Component Engineers A and B for direction on how to proceed with the removal of the damper. The Engineers and Maintenance Technicians determined that the threads had galled and further attempts to unscrew the housing would destroy the threads. It was then decided the best approach was to cut the Discharge Damper piping to remove the damper.

By late that afternoon, the damper piping was cut and Discharge damper 2MNVAC0049 was removed to a machine shop for further disassembly and repair of the threaded portion of the damper housing.

Maintenance and Engineering personnel determined a replacement housing was needed. Parker Metal Bellows was contacted; however, no replacement housings were available. Catawba Nuclear Station was also contacted for replacement parts; however, it was determined that they did not have an identical replacement housing. Maintenance and Engineering personnel then determined that a portion of the original housing could be used if a new threaded ring was replaced in the housing. This approach was determined to be the most cost effective and expeditious for returning Discharge damper 2MNVAC0049 to service. Component Engineer A contacted the vendor for drawings to fabricate the replacement threaded ring to the original manufacturers specifications.

During the evening of January 8, 1993, Materials personnel began to search for a source for the SA36 material needed to fabricate the threaded ring. Maintenance personnel were also busy during this time machining the old housing to prepare it for the new threaded ring.

At 0100, on January 10, 1993, the SA36 material arrived on site. Maintenance personnel started machining the SA36 material as specified by Component Engineering personnel.

At 1000, on January 13, 1993, while recovery efforts were underway, the grace period for returning the SSS to operability expired.

At 1615, on January 13, 1993, Component Engineer A originated PIP 2-M93-007 to document the problem with the discharge damper housing and that the 7 day grace period for repairing it had been exceeded.

The discharge damper was subsequently repaired by addition of the fabricated ring and replacement of the new bellows assembly, re-installed in the system, and functionally tested. By 1339, January 15, 1993, the SSS was returned to operable status.

Conclusion

This event is assigned a cause of Equipment Failure because the threads on the discharge damper housing galled when the

Maintenance Technicians tried to unscrew it. The galled threads resulted from localized seizing. Once this phenomena occurs, further attempts to rotate the threaded portion will only result in additional damage to the threads. Engineering personnel have stated that it is difficult to prevent galled threads from occurring. The most effective way to prevent galled threads is to apply a lubricant to the thread surfaces during assembly of the joint. A work history search of Discharge damper 2MNVAC0049 revealed that this component has not been disassembled since initial installation, which occurred prior to 1985. The investigation could not determine whether the threads for Discharge damper 2MNVAC0049 housing were initially lubricated. However, the environment the discharge damper is installed in and the long time the component remained assembled would tend to negate the anti-galling effects contributed by any lubricant initially used. Current Maintenance practice is to apply lubricants, as appropriate, to threaded surfaces when assembling components.

Once the Maintenance Technicians recognized that the threads on the discharge damper had galled, they discontinued further disassembly efforts until more knowledgeable personnel could be consulted. After consultation with Engineering personnel, it was decided that the most prudent course of action was to remove the entire assembly from the system and machine the housing off the threaded flange. This approach kept the flange portion of the discharge damper intact and allowed the housing portion to be repaired by first fabricating a replacement threaded ring, then welding the ring to the housing. The replacement bellows assembly was subsequently installed and the entire discharge damper assembly was returned to the system.

Had the problem with the galled threads not existed, the original task to replace the bellows assembly inside the discharge damper could have been completed well within the 7 day window. However, when the problem occurred, it was not possible to return the discharge damper to the original position and reschedule the task of replacing the bellows to a time when a longer repair window was available. Therefore, recovery efforts were expeditiously undertaken by Maintenance and Engineering personnel. However, the overall recovery effort exceeded the SLC requirement by 51 hours, 39 minutes.

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

Corrective Actions

Immediate	PIP 2-M93-0017 was initiated to document and correct the problem.
Subsequent	<ol style="list-style-type: none">1. A new threaded ring was fabricated and welded to the original discharge damper housing.2. The repaired discharge damper was returned to the system.
Planned	None