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On June 2, 1986 during the performance of a surveillance test, it was discovered that two recirculation damper actuators [DMP] in the Diesel Generator Building Ventilation System (DGBVS) [VJ] were not operating properly. Further testing revealed a total of five recirculation dampers were inoperable due to seal failures. At the time of the discovery, the plant was in Operational Condition 5 (Refuel) reactor coolant temperature was approximately 85 degrees and reactor vessel pressure was atmospheric.

The five failed damper actuators affected both trains of the DGBVS for the Division 1 Standby Diesel Generator (DG) [EK], one train of the DGBVS for Division 2 DG and one train of the DGBVS for Division 3 DG. The five failed recirculation damper actuators failed to the open position as designed. The failed actuators were removed and the associated dampers were fixed in position for summer use of the DGBVS. The actuators in the DGBVS exhaust dampers were stroked to verify proper operation and inspected for any seal oil leakage. No seal oil leakage was identified. Until the seals and o-rings in these actuators are replaced, a procedure revision has been implemented to inspect the actuators for any seal oil leakage after each use to verify actuator operability.

An investigation identified actuators with the same manufacturer and model number series installed in six other systems. These systems were Annulus Exhaust Gas Treatment [BH], Emergency Service Water (ESW) [BI], ESW Pump House Ventilation, Control Room HVAC [VI], Plant Radiation Monitoring [IL], and Control Complex Chilled Water [KM]. The actuators on the ESW Pump House Ventilation will be removed and the dampers pinned to the conservative position until they can be reworked. An evaluation of possible actuator failures on the other affected systems found that failure of the actuators would not effect system operability.

An engineering evaluation was performed on the failed actuators which identified four possible causes for the seal failures. These were identified and addressed as follows:

1. Expiration of Seal Service Life Through conversations with the vendor of the actuators, the vendor's recommended service life of the presently installed seals is approximately three years. The five failed damper actuators were manufactured in 1980. At the time of the event there was no periodic maintenance tasks to replace the seals in the actuators. Repetitive maintenance tasks are being established to replace the seals in all the actuators in accordance with the vendor's recommended service life.

 Improper Storage and Maintenance The vendor's maintenance manual requires that actuators in storage must be cycled every three months.

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This cycling prevents the seal material from drying out and deteriorating. This was not being performed on actuators stored in the warehouse nor on those actuators installed but not in use on Unit 2 (under construction). Repetitive maintenance tasks are being established to cycle all actuators stored in the warehouse and installed in Unit 2, in accordance with the vendor's recommendation. A periodic test instruction is being prepared to ensure that those actuators installed in Unit 1 are periodically cycled. A preventive maintenance instruction is also being prepared to allow for the calibration and maintenance of the actuators.

- 3. Excessive Ambient Temperatures The vendor required ambient conditions are -40 to +140 degrees F. Maximum design temperature for the Diesel Generator Building rooms is below 140 degrees F. Since localized area temperatures may be higher, the seal material for the recirculation and outside air damper actuators used in the Diesel Generator Building is being upgraded to a material with a higher service temperature range.
- 4. Side Load Imposed on Actuator Shaft The failed actuators are mounted to a linear converter which transmits the force of the actuator to the damper arm. Excessive wear or misalignment of the shafts could impose a side force on the actuator shaft producing uneven wear on the bushings, seals and o-rings. One of the failed actuators will be dissassembled and inspected on site to address this possibility. Appropriate actions will be taken based on the results of the inspection.

The proper maintenance and storage of the actuators was specified in the vendor's manual for these actuators but had not been incorporated into the plant maintenance and storage programs. Activities were underway prior to this event to incorporate vendor maintenance requirements into the preventive maintenance program. This activity is ongoing but had not yet been performed for these actuators. The incorrect storage of the actuators in the warehouse and Unit 2 was caused by a failure to correctly identify the storage requirements from the vendor manual.

The actuators involved are electrohydraulic power devices in which the actuator stem is hydraulically positioned by an input signal. They are manufactured by International Telephone and Telegraph Corporation, General Controls. The failed actuators consisted only of Model Number NH91. Other ITT actuators in use in the plant are Model Numbers NH91, NH92, and NH95. A total of 71 actuators have been identified.

The DGBVS for each diesel generator room consists of two 100 percent capacity trains designed to remove heat generated by the diesel generator and auxiliary equipment. The DGBVS is designed to maintain the diesel generator rooms between 40 and 120 degrees F by automatically controlling the amounts of

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outside air and recirculated return air used for cooling. Both trains of DGBVS in each diesel generator room automatically start on the start of the associated diesel generator for that room. Due to fire protection concerns, the supply and exhaust dampers are designed to fail shut and the recirculation dampers fail open. During summer conditions, the failure of the recirculation dampers to the open position could allow the Diesel Generator Room to overheat beyond the design temperature. For this reason, this failure is considered safety significant. No previous similar events were identified.

Several actions are underway as a result of this event.

- The seal material is being changed for the actuators used in the DGBVS recirculation and outside air dampers.
- A failed actuator will be dissassembled and inspected for possible side loading on the actuator shaft.
- As replacement seal kits are received, all actuators of this type will be rebuilt.
- 4) The actuators on the ESW Pumphouse Ventilation will be removed and the dampers pinned to the conservative position until they can be reworked.
- Repetitive maintenance tasks and a periodic test instruction are being established to ensure that the maintenance and storage requirements for the actuators are maintained.
- A preventive maintenance instruction is also being written to allow for the calibration and maintenance of the actuators.
- 7) Activities have been ongoing to incorporate vendor maintenance requirements into the preventive maintenance program. These actions will be evaluated to determine the necessity to expedite the program.
- 8) The Nuclear Quality Assurance Department will further evaluate the implementation of the storage maintenance requirement program by performing a surveillance or other action as required.

Energy Industry Identification System Codes are identified in the text as [XX].