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September 14, 1989

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

Subject: **McGuire Nuclear Station, Unit 2**
Docket No. 50-370
Diesel Generator Special Report

Gentlemen:

Pursuant to Technical Specification (T.S.) 6.9.2 as specified by T.S. 4.8.1.1.3, find attached a special report concerning Diesel Generator 2A.

If you have any questions, please contact S.E. LeRoy at (704) 373-6233.

Very truly yours,

Hal B. Tucker

SEL/459

Attachment

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Duke Power Company
McGuire Nuclear Station
Diesel Generator 2A Special Report

On August 14, 1989 at 1145 following normal outage periodic maintenance, Diesel Generator (DG) 2A rolled on starting air but failed to start (start attempt No. 705). The engine did not seem to fire and the generator field did not appear to flash. The fuel alignment was checked and found to be correct. The fuel oil headers were re-vented. The start circuit checked satisfactorily. The engine speed sensor which creates a pulse, each time a camshaft gear tooth passes it, was found to to be damaged from contact with the gear teeth. Without proper engine speed signal, the auxiliary relays that control starting air, field flash, governor and voltage did not function properly; therefore, the engine tripped because it did not reach 50% speed in 20 seconds. The speed sensor was replaced and the proper air gap was set. This start attempt was an invalid failure because it was the first troubleshooting run following extensive outage work. The apparent cause of this failure was due to the sensor being bumped sufficiently enough during the outage to reduce the air gap and cause contact with the gear teeth.

At 1509, the engine speed increased to approximately 50% and the engine tripped (start attempt No. 706). The timing block for relay 2TRC was checked because had the timing been out earlier, the engine may still be less than 50% speed which would cause a trip. However, the timer was checked and found to be satisfactory. All the contacts in the start circuit were then checked and the contact from relay 86D (generator differential lockout relay) was found open. This open relay would prevent the DG from starting. The DG breaker breaker was checked in the 2ETA switchgear room and flags were found on relays 86D and 87DG indicating they had been actuated. Transmissions Department (TRANS) personnel were consulted, and based on their input, it was decided to reset the relays and try again. Start attempt No. 707 at 1845 resulted in the same as start attempt 706. Both relays 86D and 87DG picked up at about the time the field flashed, and tripped the engine. TRANS personnel checked and found the relays to be satisfactory.

On August 15, 1989 at 0112, a start attempt (No. 708) was made with TRANS personnel monitoring the relays and generator. Again the result was the same. relays 86D and 87DG picked up and tripped the engine. During additional checks, Transmissions personnel discovered a ground strap had inadvertently been left connected after outage maintenance activities. This ground strap was removed, and at 0535 (start attempt No.709), the engine started satisfactorily. The engine was then stopped without loading to prepare for post maintenance break-in runs.

Start attempts Nos. 705 - 708 were invalid failures because they were trouble shooting attempts after outage maintenance. The problems identified were the broken speed sensor and the ground strap. Both occurred during the outage. Start attempt No. 709 was an invalid test because the DG was not loaded. Currently, there are 0 valid failures in the last 20 valid tests and 4 valid failures in the past 100 valid tests. DG 2A is currently tested monthly.

The cause of the speed sensor destruction appears to be a hard bump in its vicinity during outage work. There has been at least one other occasion of the speed sensor being destroyed. Mechanical Maintenance (MNT) will add a step periodic maintenance procedures, PT/0/A/4350/021 and PT/0/A/4350/030) to have Instrument and Electrical (IAE) personnel check the speed sensor air gap and mounting before starting the engine. IAE personnel will also review their procedure for mounting and setting the sensor air gap for any needed improvements. There are no immediate generic implications for the other DGs. The procedure change should prevent recurrence of this problem.

The cause of the ground strap problem was due to an inadequate procedure. TRANS procedure IP/0/A/2005/01, DG Inspection and Maintenance, had a step to install the ground strap, but did not have a step to remove the ground strap. This deficiency will be corrected. There is no immediate action needed for the other DGs with regard to this problem. This procedure change should prevent recurrence of this problem.