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DUKE POWER

March 15, 1994

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

Subject: McGuire Nuclear Station
Special Report No.: 94-01
Problem Investigation Process No.: 2-M94-0242

Gentlemen:

Attached for your information is Special Report No. 94-01 concerning a valid failure of Diesel Generator 2A due to low lube oil pressure indication. This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

A handwritten signature in cursive script, appearing to read 'T.C. McMeekin'.

T.C. McMeekin

RJD/bcb

Attachment

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DUKE POWER COMPANY
McGUIRE NUCLEAR STATION

Diesel Generator Special Report
PIP 2-M94-0242
March 15, 1994

On February 15, 1994, at 0919, diesel generator (DG) 2A tripped with a low lube oil pressure indication during a routine surveillance test (PT/2/A/4350/02A, Diesel Generator 2A Operability Test). The DG was being started with the Before and After Lube Oil Pump off (start #952) as required by Technical Specifications. DG 2A came up to speed normally but then tripped on a false low lube oil pressure signal about 24 seconds after the start signal. Low lube oil pressure is an emergency mode trip derived when both pressure switches 2LDPS5120 and 2LDPS5123 sense pressure below 28 psig (after a 15 second time delay after reaching 95% speed). The trip occurred because the pressure was too slow in building up in the sensing lines. Work Request 94006930 was initiated to investigate.

This was the first Valid Failure in the last 20 Valid Tests and the third Valid Failure in the last 100 Valid Tests for DG 2A. On a unit basis, this is the fourth valid Failure in the last 100 Valid Tests of DG 2A and 2B combined. Surveillance test frequency remains monthly per Technical Specification Table 4.8-1 (Diesel Generator Test Schedule).

A small amount of carbon was present in the oil bled from the tubing tee at the pressure switches (presence of carbon in the oil is normal). Also, the lube oil system keep warm temperature had been reduced from 150F to 115F (Sept. '93, Minor Mod. 3680). This reduction in DG room temperature caused a small change in the oil viscosity in the tubing; however, this effect is minor compared to the long tubing run (approx. 100 feet) to the pressure switches. The long, tortuous tubing run led to the slow buildup of pressure to the trip switches. Subsequent testing showed that the engine driven pump discharge pressure reached its steady state value after only 10 seconds, so the slow pressure buildup is assumed to be in the sensor tubing only. The tubing problem can only be corrected by a modification to the tubing/pressure switch arrangement.

Low lube oil pressure trips are a recurring problem with the Unit 2 Diesel Generators. Valid failures have occurred on DG 2A on 5/15/85, 5/21/85, 6/24/88, 12/31/91 and 2/15/94. Six invalid failures occurred on DG 2B on 6/14-17/87. These failures happened with the Before and After lube oil pump running prior to start. Corrective actions were taken to remove obstructions, increase tubing diameter, and develop a PM to blow out sensing lines. These corrective actions were effective in preventing trips while the B&A lube oil pump was running and prevented trips with the B&A pump off except for this event. The exact reason that the problem occurs primarily on DG 2A is not known; however, sand contamination was discovered in the Unit 2 Diesel Generators' lube oil in March 1985. Although the lube oil was replaced and sensing lines were flushed, grit was noted as a contributing factor in the previous failures. Full-flow lube oil filters were added in 1990 which are gradually cleaning up the engines.

Minor Modifications 5429 (Unit 2) and 5430 (Unit 1) were initiated to reset timing relay ARR from 15 to 30 seconds. This change causes a time interval of about 39 seconds after the DG start before the low lube oil trip permissive is armed. The Brunswick nuclear station which has the same model Nordberg DGs also made this timer setting change on their engine controls. The increased timer setting greatly reduces the chance of false low lube oil pressure trips on DG starts while only slightly increasing the chance of engine damage should an actual low lube oil pressure condition exist during an engine start (the engine will make about 130 extra revolutions before tripping with the additional time delay which will not be a problem with the tri-metal bearings and synthetic oil film). DG 2A was then retested successfully with the B&A lube oil pump off.

On 2/17/94, the other three emergency Diesel Generators were tested with the B&A lube oil pump off. All Diesel Generators started successfully. Pressure also built up slowly on these Diesel Generators but no trips occurred. The relay ARR timing change was made per Minor Modification on each of the other three Diesel Generators. The test was then satisfactorily repeated.

In conclusion, start times and other operational parameters were normal during the 2/15/94 event in which the low lube oil pressure trip occurred. DG 2A tripped due to a false low lube oil pressure signal derived because of the marginal design of the sensing line tubing and the non-conservative ARR timer setting. DG 2A has tested successfully 98+% of the time with this configuration back to the first trip in 1985. On 12/27/93 an actual blackout occurred and both Unit 2 Diesel Generators handled the plant emergency loads with no problems. The ARR timer setting change made to all four Diesel Generators will prevent future trips of this type.

Rodney M. Roberts

R.M. Roberts
DG System Engineer