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DUKE POWER

May 25, 1995

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

Subject: Catawba Nuclear Station, Unit 1
Docket No. 50-413
Special Report
Valid Failure of Diesel Generator 1A

Pursuant to Technical Specification 4.8.1.1.3 and 6.9.2, find attached a Special Report concerning the Unit 1 Diesel Generator (DG 1A) valid failure which occurred on April 25, 1995.

Sincerely,

Mark E. Patrick for

DL Rehn

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Attachment

xc: SD Ebnetter, Regional Administrator

RJ Freudenberg, SRI

RE Martin, ONRR

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SPECIAL REPORT

CATAWBA NUCLEAR STATION DOCKET NO. 50-413 DIESEL GENERATOR 1A VALID FAILURE DUE TO THERMOSTATIC CONTROL VALVE STICKING PIP 1-C95-0631

A **valid failure** of the Unit 1A Diesel Generator (DG 1A) occurred at 0945 on 04/25/95 due to the jacket water thermostatic control valve sticking in a position which reduced engine cooling water flow through the heat exchanger. This failure was caused by the valve o-ring pinching between the seat and disk which prevented the valve from moving. DG 1A was being run for its required monthly operability test when the failure occurred (Start # 1060). There have been 2 valid failures (VF) in the last 20 and 3 in the last 100 start attempts. The DG 1A is now on an accelerated weekly test frequency. DG 1A was successfully started, run, and declared operable at 0400 on 04/26/95 (Start # 1062). DG 1A was unavailable for 8.5 hours due to this failure.

The DG 1A failed during the monthly run on 04/25/95. This start was an emergency start; therefore, jumpers were placed by IAE to provide the emergency start signal. The engine started and was loaded to full load (5750 kW). Approximately 15 minutes after being loaded, the thermostatic control valve failed and stuck in a position which prevented the required flow from going through the heat exchanger. Engine temperatures rose to higher than normal levels at which time the engine was unloaded prior to reaching temperatures that could damage equipment.

Background Information

The DG 1A was being run per the required monthly operability procedure PT/1/A/4350/02A, when the jacket water (KD) thermostatic control valve failed, which prevented adequate flow through the heat exchanger to maintain normal operating temperatures. This start was classified as a valid failure since the operability run could not be completed due to the resulting higher than normal operating temperatures.

During this operability performance test, the engine temperatures did not reach the non-emergency trip setpoints even though the valve did not operate as designed. The temperatures did stabilize at higher than normal levels at full load.

Prior to shutdown of DG 1A, the thermostatic control valve was manually cycled by maintenance technicians. Following this mechanical cycling, the engine operating temperatures returned to normal and the valve began to control engine

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temperatures as designed. The engine was then reloaded to 5750 kW with the temperatures remaining in the normal band.

The valve is designed to maintain engine outlet temperature at 165° F by diverting the proper amount of flow through the jacket water heat exchanger. The valve is manufactured with a wax pellet device which positions the valve based on pellet expansion and contraction. Also included in the valve design is an o-ring that provides sealing between the disk and seat. After performance of the initial troubleshooting prior to the engine being shutdown, it was evident that this o-ring had pinched which prevented the valve from cycling. Once the valve was manually cycled, the o-ring seated, and it began to properly control engine temperatures.

The valve internals were removed and replaced. During this inspection/repair it was discovered, as expected, that the o-ring had pinched between the valve disk and seat preventing movement. The position of the failed valve was allowing partial flow through the jacket water heat exchanger as evidenced by the stabilization of higher than normal operating temperatures at full load. After inspection of the o-ring, it was evident where the pinching had occurred due to the presence of a small tear.

Evaluation

The DG 1A KD thermostatic control valve internals were removed and replaced. Upon inspection of the valve, it was discovered that o-ring damage had occurred due to pinching between the seat and disk. This pinching had prevented the valve from moving as expected. The overall condition of the o-ring was poor as evidenced by small circumferential cracks along the inside diameter. The manufacture was contacted to discuss this condition. Based on the condition of the o-ring, the manufacturer (AMOT Controls) believed that we may have received an o-ring which had a pre-existing fracture crack. Due to the material condition, a piece of the o-ring finally tore and pinched between the valve seat and disk. When the valve was mechanically opened, the torn piece was freed, which allowed the valve to properly control temperature. The valve was inspected for debris which could have also caused this failure and none was observed. The valve internals were clean upon removal.

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The valve was refurbished with new thermostatic elements and o-ring. The o-ring that was installed was inspected and determined to be in new condition. The valves on the remaining diesel generators will be inspected on an upcoming diesel day for the DG 1B and during the upcoming outage for Unit 2 DGs. To ensure the condition of the o-ring is acceptable, a note will be added to the valve rework procedure to require inspection of the o-ring for any fracture cracks prior to installation.

The root cause for this valid failure an isolated failure due to a bad o-ring. The current practice at Catawba will be to refurbish the valves every other outage per the Diesel Maintenance program.