Duke Power Company
Nuclear Production Dept.
P.O. Box 1007
Charlotte, N.C. 28201-1007

M.S. Tuckman
Vice President
Nuclear Operations
(704)373-3851

DUKE POWER

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

Subject: Catawba Nuclear Station, Unit 1
Docket No. 50-413
Special Report
Invalid 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 A (D/G 1A) invalid failure that occurred on April 25, 1991.

Very truly yours,

M. S. Tuckman

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CRL/SR52391

Attachment

xc: S. D. Ebneter
Regional Administrator, Region II

R. E. Martin, ONRR

W. T. Orders
Senior Resident Inspector

IE22 1/1

SPECIAL REPORT

CATAWBA NUCLEAR STATION

DIESEL GENERATOR 1A INVALID FAILURE DURING
OPERABILITY TESTING OF ENGINE

An invalid failure (start # 929) of Diesel Generator (D/G) 1A occurred on April 25, 1991 at 1545 hours. The invalid failure occurred during the Operability Performance Test (PT/1/A/4350/02A) following successful completion of 1EOC5 Maintenance Breakin and Performance runs. D/G 1A was on a 31 day operability test schedule at the time of this invalid failure. There have been 0 valid failures in the past 20 valid starts and 0 valid failures in the past 100 valid starts for D/G 1A. The D/G remains on a 31 day operability schedule per Technical Specification 4.8.1.1.2 Table 4.8-1.

The D/G was available during this period because the low left bank turbocharger oil pressure trip is bypassed on an emergency start.

The start, warm-up, and loading of 1A diesel generator in performance of the Operability PT were normal. Approximately 20 minutes into the full load run, the diesel generator shutdown on low left bank turbocharger oil pressure. High temperature jacket water and high temperature lube oil annunciators were also received.

IAE inspected and tested the pneumatic shutdown sensors for a fault that would have caused the engine to shutdown. Neither IAE nor Mechanical maintenance found an obvious cause for the shutdown.

A test start was done and indicated that the thermostatic control valve was not functioning properly, but by manually overriding the valve, the jacket water and oil temperature could be brought down.

To verify that the thermostatic control valve was the problem, test instrumentation was installed and the engine was restarted. The test verified that the thermostatic control valve was the problem. During this test, automatic temperature control was unsuccessfully attempted. Manual control of the thermostatic control valve was taken and the engine temperatures, jacket water and lube oil, were controlled in their normal ranges for about an hour.

The thermostatic control valve was disassembled and the elements were removed and examined. One of the power elements was missing a 3/4 inch long piece of the stem housing retaining metal. This is the part of the housing that is rolled over to clamp the

valve stem and guide to the power element. The active medium was visible in this location. All 4 power assemblies showed different amounts of hair line cracking on the rolled over edge. Tests performed on the 3 original power elements showed that they met all of the manufactures static and active dimensional specifications. The element missing the piece was not tested.

New elements from spares were drawn, inspected, tested and installed. The diesel generator was again tested several times following maintenance to verify proper operation and maintenance of the temperatures. The final test was a one hour full power run. The temperatures were maintained automatically and satisfactorily by the thermostatic control valve. The Operability test was satisfactorily performed and the diesel generator declared operable.

During the beginning of the loaded portion of the Breakin run, high temperature jacket water and high temperature lube oil annunciator alarms came on. A quick check of the support systems found the cooler outlet valve 1RN236 shut. That valve was reopened and temperatures returned to normal. The valve had been removed and reinstalled during the outage by the valve crew. The valve had been installed "seatless" and shut. The shut valve being "seatless" had allowed enough water to provide cooling as long as there was no sustained load. When the loaded portion of the Breakin run was conducted, there was not enough cooling water and the high temperature alarms were received. This overheating damaged to the power elements.

A PIR has been initiated by Operations to investigate the mispositioned RN valve.

No other abnormal system configurations were found. The Breakin runs and the Performance testing were successfully completed. Following testing, flow balance of the RN System reset 1RN236 to its proper flow balance position. The engine was then turned over to Operations for testing that ultimately resulted in shutting down the diesel generator.

The Breakin runs and Performance testing were successful even though the thermostatic control valve contained damaged power elements. This was because the power elements, despite being damaged, could still control the temperature as long as the load increases were gradual. The load increases are done gradually in the Breakin runs and Performance testing. The load increase in the Operability test is faster, which resulted in temperature increases that the thermostatic control valve could not control. This caused the D/G to trip.

This invalid failure is considered an isolated incident. AMOT, the power elements manufacturer, stated that the power elements do not catastrophically fail unless overheated. The increase in jacket water and lube oil temperatures is gradual. Trending will provide ample warning of diminishing control.

Work Request 55505OPS was written to inspect the thermostatic control valve for 1B diesel generator during this 1EOC5 outage.

Additionally, Work Requests 4438MES and 4439MES were written to inspect and replace, as necessary, both D/G 2A and 2B thermostatic control valves in the upcoming Unit 2 Outage in October/November of this year.

Finally, at least one power element will be sent to the Applied Science Center for a metallurgical failure analysis study.