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U.S. Nuclear Regulatory Commission  
Washington, DC 20555-001

Attention: Document Control Desk

Subject: Duke Energy Carolinas, LLC  
McGuire Nuclear Station Unit 2  
Docket No. 50-370

Technical Specification Reporting Requirement 5.6.6  
Ventilation System Heater Failure Report  
2B Annulus Ventilation System (AVS) Heater Failure  
Problem Investigation Process (PIP) M-11-09216

Technical Specification (TS) TS 3.6.10, "Annulus Ventilation System," requires a written report when an AVS Filter Train Heater remains inoperable for more than seven days. TS Reporting Requirement 5.6.6 requires this report to be submitted within 30 days.

The attached Report outlines the reason for the inoperability of the 2B AVS Filter Train Heater and the near-term corrective actions.

The submittal of this Report does not meet the 30 day time reporting requirement per TS 5.6.6 because the Heater inoperability was not recognized at the time of Heater failure. The details regarding the TS violation will be provided by the forthcoming License Event Report (370/2011-03).

This occurrence was determined to be of no significance to the health and safety of the public. There are no regulatory commitments contained in this Report.

Inquiries on this matter should be directed to Lee A. Hentz at 980-875-4187.

Sincerely,

Regis T. Repko

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cc w/ Attachment:

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## Attachment

### McGuire Nuclear Station TS 5.6.6 Heater Failure Report 2B AVS Filter Train Heater Failure PIP M-11-09216

#### Background:

The McGuire containment building has a secondary containment which is a concrete structure that surrounds the steel primary containment vessel. Between the containment vessel and the reactor building inner wall is an annulus that collects any containment leakage that may occur following a loss of coolant accident (LOCA) or rod ejection accident.

The Annulus Ventilation System (AVS) establishes a negative pressure in the annulus between the reactor building and the steel containment vessel. Filters in the system then control the release of radioactive contaminants to the environment.

The AVS consists of two separate and redundant trains. Each train includes a heater, mechanical demister, a pre-filter/ moisture separator, upstream and downstream high efficiency particulate air (HEPA) filter, an activated charcoal adsorber section for removal of radioiodine, and a fan. The heaters and mechanical demisters function to reduce the moisture content of the airstream to less than 70% relative humidity.

Per Technical Specification (TS) 3.6.10 Condition B, with one or more AVS heaters inoperable, the heater must be restored to operable status within 7 days. Alternatively, a report must be initiated within 7 days in accordance with TS Reporting Requirement 5.6.6, which details the reason for the heater's inoperability and the corrective action(s) required to return the heater to operable status. This Report shall be submitted within the following 30 days.

#### Description of Event:

On October 29, 2011, ten minutes after starting the 2B AVS Train Operability Test to satisfy Surveillance Requirement (SR) 3.6.10.1, the indicating lights for 2B AVS Heater 1 & 2 on the HVAC panel went dark. The Operability test operates the respective AVS fan for ten hours with the heaters energized. The light bulbs were inspected and it was found that all four bulbs had blown. The bulbs were replaced but the indicating lights failed to turn back on. An Operator was dispatched and reported that the "Heater On" and "Heater Power On" lights on the local panel were also off. It was then discovered that the incoming power breaker had tripped.

A Work Request was written to investigate the cause of the breaker trip. The AVS filter train has two matching 21.5 Kilowatt (KW) delta connected heaters which preheat the air before it reaches the carbon filters. Maintenance technicians took resistance readings on the heaters and found that one had values of 47.3, 95.2 and 48.2 ohms; while the other had values of 31.6, 32.1 and 32.2 ohms. The technicians suspected that one heating element may have partially burnt out. They checked the circuit for grounds and did not find any. On October 30 it was decided to close the power breaker and re-run the Operability test while the technicians took current readings of the entire unit panel; values were 33.9, 43.4 and 33.7 amps which appeared normal. The Operability test was completed successfully. Since the power breaker did not trip during the ten hour test, the work request was closed and the 2B AVS heater was declared operable.

## Attachment

On December 6, 2011, Engineering initiated a cause evaluation of the breaker trip due to a Maintenance Rule requirement. While researching the troubleshooting actions of October 29 and 30, Engineering determined that based on the data collected by the technicians, one leg of one of the two delta connected heaters was probably open as suspected by the technicians. Engineering realized that the work request had been closed without repair or replacement of the heater, thus the heater was still degraded and its operability was in question.

Engineering contacted the Operations Shift Manager, the 2B AVS heater was conservatively declared inoperable, and a new work request was written to re-test and repair the heater. The degraded heater was re-tested by applying the heater dissipation test per the Ventilation Filter Testing Program (VFTP). After reviewing the test results, Engineering determined the heater did not meet the dissipation test acceptance criteria for KW and had been past inoperable since October 29.

Engineering now suspects that one leg of the delta connected heater element faulted on October 29, ten minutes after starting the 2B AVS Operability Test. This fault caused some of the indicating lights to burn out and tripped open the breaker. The fault was self clearing such that when the event was over no short remained. One leg of the heater element was an open circuit the other two legs retained their designed resistance. When Operations returned the heater to service, the delta connected heater provided approximately two-thirds of the rated KW. This caused the unit to pull less current than designed, thus the breaker did not trip during the subsequent 10 hour run.

### Corrective Actions:

1. The 2B AVS heater was replaced on December 9, 2011 and successfully tested on December 10, 2011. Operability of the heater was restored at this time.
2. The AVS Train Operability Test procedures will be revised to clarify that this test does not demonstrate operability of the heaters and will provide a reference to the heater dissipation test procedure.
3. The submittal of this Report does not meet the 30 day time reporting requirement per TS 5.6.6 because the heater inoperability was not recognized at the time of heater failure on October 29, 2011. Further detail regarding this event will be provided by the forthcoming License Event Report 370/2011-003.

### Safety Significance:

The AVS heaters are not required or credited for the operability of the AVS filter trains because charcoal adsorber efficiency testing is performed at 30°C and 95% relative humidity as required by TS 5.5.11, VFTP. The accident analysis shows that site boundary radiation and Control Room doses are within 10 CFR 50.67 limits during a DBA LOCA under these conditions. As such, the 2B AVS Train was always capable of performing its safety function during this period of heater inoperability.