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U.S. Nuclear Regulatory Commission
Document Control Desk
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Subject: Duke Energy Corporation
Catawba Nuclear Station, Units 1 and 2
Docket Nos. 50-413 and 50-414
Technical Specification Bases Changes

Pursuant to 10CFR 50.4, please find attached changes to the Catawba Nuclear Station Technical Specification Bases. These Bases changes were made according to the provisions of 10CFR 50.59.

Any questions regarding this information should be directed to Margaret Chernoff, Regulatory Compliance, at (803) 831-3414.

I certify that I am a duly authorized officer of Duke Energy Corporation and that the information contained herein accurately represents changes made to the Technical Specification Bases since the previous submittal.

Gary R. Peterson

Attachment

A001

xc: L. A. Reyes, Regional Administrator
U. S. Nuclear Regulatory Commission, Region II

C. P. Patel, Project Manager
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation, Mail Stop 0-8 H12

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B 3.9 REFUELING OPERATIONS

B 3.9.2 Nuclear Instrumentation

BASES

BACKGROUND

The shutdown margin monitor portion of the Boron Dilution Mitigation System (BDMS) measures the count rate from a neutron counting instrument. It performs a statistical time average of the neutron count rate and displays this average in the source range (from 0.1 counts per second (cps) to 10^5 cps). It also provides an alarm output to indicate a decrease in reactor shutdown margin when the count rate increases by a calculated amount.

The shutdown monitor alarm setpoint is continuously recalculated and automatically reduced as the reactor is shutdown and the neutron flux is reduced. When the neutron count rate achieves a steady value and then eventually increases, the alarm setpoint remains at its lowest value unless it is manually reset. An alarm will occur when the time averaged neutron count rate increases due to a reactivity addition to a value determined by the BDMS. The response time for the alarm depends on the initial count rate and the rate of change of neutron flux. The alarm is chosen to ensure an early alarm will occur during an inadvertent boron dilution event (Ref. 1). There are two redundant alarm channels. In addition to providing an alarm on the main control boards, an alarm in either channel will automatically: 1) Close the respective train related valve, NV188A or NV189B (if valves NV252A or NV253B, respectively, have begun to open), in the charging pump suction line from the volume control tank thereby isolating the pumps from sources of water for boron dilution; 2) stop both reactor makeup water pumps to provide added assurance that unborated water is not introduced into dilution pathways; and 3) open the respective train related valve, NV252A or NV253B, in order to align the refueling water storage tank (a source of borated water) with the charging pumps.

BDMS is considered OPERABLE when a Safety Injection or Residual Heat Removal Pump is being used in the boration flow path and the refueling water storage tank is the source of borated water. This option requires the alarms and indications of BDMS to be OPERABLE also.

The source range neutron flux monitors are used as a backup to the BDMS during refueling operations to monitor the core reactivity condition. The installed source range neutron flux monitors are part of the Nuclear Instrumentation System (NIS) and the Wide Range Neutron Flux Monitoring System (Gamma-Metrics). Source range indication is provided via the NIS source range channels and the Gamma-Metrics shutdown monitors using detectors located external to the reactor vessel. These

BASES

BACKGROUND (continued)

detectors monitor neutrons leaking from the core. Neutron flux indication is provided in counts per second. The NIS source range channels and the Gamma-Metrics shutdown monitors provide continuous visible indication in the control room and an audible alarm to alert operators of a possible dilution accident. In addition, the NIS source range channels provide audible indication in the control room and in the containment.

APPLICABLE SAFETY ANALYSES

The BDMS senses abnormal increases in source range counts per minute (flux rate) and actuates CVCS and RWST valves to mitigate the consequences of an inadvertent boron dilution event (Ref. 1). The accident analyses rely on automatic BDMS actuation to mitigate the consequences of inadvertent boron dilution events.

The BDMS satisfies Criterion 3 of 10 CFR 50.36 (Ref. 2).

LCO

This LCO requires that two Boron Dilution Mitigation System trains be OPERABLE to ensure that appropriate monitoring capability is available to detect changes in core reactivity. They are required to be operating with Shutdown Margin Alarm Ratios set at less than or equal to 4 times the steady-state count rate, each with continuous indication in the control room.

The LCO is modified by a Note which allows the automatic actuation function of the BDMS to be blocked during core reloading until two fuel assemblies are loaded into the core. This provides an initial background count rate for setting the BDMS actuation setpoint and prevents unintentional actuations when the first two assemblies are loaded.

APPLICABILITY

In MODE 6, the Boron Dilution Mitigation System must be OPERABLE to determine changes in core reactivity. In MODES 2, 3, 4, and 5, this same installed BDMS and associated circuitry is also required to be OPERABLE by LCO 3.3.9, "Boron Dilution Mitigation System (BDMS)".

ACTIONS

A.1.1, A.1.2, A.1.3, A.1.4, A.2.1, and A.2.2

With only one or no Boron Dilution Mitigation System trains available, the system is considered inoperable and CORE ALTERATIONS and positive reactivity additions must be suspended immediately. In addition, valve NV-230 must be closed and secured within 1 hour to isolate the unborated water source and RCS boron concentration must be verified once per 12

BASES

ACTIONS (continued)

hours. Performance of Required Actions A.1.1 and A.1.2 shall not preclude completion of movement of a component to a safe position.

An option to isolating the unborated water source is provided to allow alternate methods of monitoring core reactivity conditions and controlling boron dilution incidents. This includes the utilization of the two Source Range Neutron Flux Monitors. These monitors must be verified to operate with alarm setpoints less than or equal to one-half decade (square root of 10) above the steady-state count rate, each with continuous visual indication in the control room. In addition, the combined flowrate from both Reactor Makeup Water Pumps must be verified to be within the limits specified in the COLR in 1 hour. Once these options are verified, CORE ALTERATIONS and positive reactivity changes can continue.

SURVEILLANCE REQUIREMENTS

SR 3.9.2.1

SR 3.9.2.1 is the performance of a CHANNEL CHECK, which is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that the two indication channels should be consistent with core conditions. Changes in fuel loading and core geometry can result in significant differences, but each train should be consistent with its local conditions.

The Frequency of 12 hours is consistent with the CHANNEL CHECK Frequency specified similarly for the same instruments in LCO 3.3.9.

SR 3.9.2.2

SR 3.9.2.2 is the performance of the CHANNEL OPERATIONAL TEST for the Boron Dilution Mitigation System, which is the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify the OPERABILITY of required alarm, interlock, display, and trip functions. The COT also includes adjustments, as necessary, of the required alarm, interlock, and trip setpoints so that the setpoints are within the required range and accuracy.

This surveillance must be performed once per 31 days. The frequency is based on operating experience, which has shown to be adequate.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.9.2.3

SR 3.9.2.3 is performed on the Boron Dilution Mitigation System to verify the actuation signal actually causes the appropriate valves to move to their correct position and the Reactor Makeup Water Pumps to stop to mitigate a boron dilution accident.

The 18 month frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage. Operating experience has shown these components usually pass the Surveillance when performed at the 18 month Frequency.

SR 3.9.2.4

SR 3.9.2.4 is the performance of a CHANNEL CHECK, which is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that the two indication channels should be consistent with core conditions. Changes in fuel loading and core geometry can result in significant differences, but each channel should be consistent with its local conditions.

A note is provided to clarify that the CHANNEL CHECK only needs to be performed on the Source Range Neutron Flux Monitors when used to satisfy Required Action A.2.1.

The Frequency of 12 hours is consistent with the CHANNEL CHECK Frequency specified similarly for the same instruments in LCO 3.3.1.

SR 3.9.2.5

SR 3.9.2.5 is the performance of the CHANNEL OPERATIONAL TEST for the Source Range Neutron Flux Monitors, which is the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify the OPERABILITY of required alarm, interlock, display, and trip functions. The COT also includes adjustments, as necessary, of the required alarm, interlock, and trip setpoints so that the setpoints are within the required range and accuracy. These monitors must be verified to operate with alarm setpoints less than or equal to 0.5 decade above the steady state count rate. This SR is only required when the Source Range Neutron Flux Monitors are used to satisfy Required Action A.2.1. This surveillance must be performed prior to placing the monitors in service and once per 7 days thereafter. The 7 day Frequency is based on operating experience, which has been shown to be adequate.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.9.2.6

SR 3.9.2.6 verifies the combined flow rates from the both Reactor Makeup Water Pumps are ≤ the value in the COLR. This surveillance is only required when implementing Required Action A.2.2. It ensures the assumptions in the analysis for the boron dilution event under these conditions are satisfied.

This surveillance must be performed once per 7 days and is based on engineering judgement and the unlikely event that a boron dilution will occur during this time.

REFERENCES

1. UFSAR, Section 15.4.6

2. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).