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October 15, 2003

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

Subject: Duke Energy Corporation
Catawba Nuclear Station, Units 1 and 2
Docket Numbers 50-413 and 50-414
Proposed Technical Specifications Amendments for
3.9.2, Nuclear Instrumentation
3.9.7, Unborated Water Source Isolation Valves

In accordance with the provisions of 10 CFR 50.90, Duke Energy Corporation proposes to revise the Catawba Nuclear Station Facility Operating Licenses and Technical Specifications (TS) as follows:

1. Add a new specification 3.9.7, Unborated Water Source Isolation Valves.

2. Revise specification 3.9.2 to delete the requirement for Boron Dilution Mitigation System (BDMS) automatic valve actuations and makeup water pump trip during Mode 6.

3. Revise specification 3.9.2 to agree with the wording of NUREG-1431, Standard Technical Specifications Westinghouse Plants Revision 2 dated April 30, 2001.

Please note that no changes are being proposed to the specification 3.3.9, Boron Dilution Mitigation System, during Modes 3, 4, and 5. The BDMS automatic swapover feature will continue to be required for Modes 3, 4, and 5 to mitigate the consequences of boron dilution events.

The purposes of the proposed changes are to (a) provide configuration control of the dilution valves during Mode 6 to preclude the possibility of a boron dilution event and (b) provide an opportunity to conduct preventive and corrective maintenance on the volume control tank valves, refueling water storage tank valves, and their respective power supplies. With

A001

the current specifications, these valves are required to be operable in the following Modes:

1. Modes 1, 2, 3, and 4 for specifications 3.5.2 and 3.5.3, Emergency Core Cooling Systems.

2. Modes 3, 4, and 5 for specification 3.3.9, Boron Dilution Mitigation System.

3. Mode 6 for specification 3.9.2, Nuclear Instrumentation.

The volume control tank valves and refueling water storage tank valves are important for plant operations for Emergency Core Cooling and an assured source of borated water. However, the overlapping specifications for Modes 1 to 6 do not provide many opportunities to remove these valves from service for maintenance activities. Approval of this amendment request will assist in the outage planning and coordination of the valve maintenance activities during Mode 6.

Industry precedents for similar changes have been approved by the staff. References to similar license amendment requests and safety evaluation reports are included in the attached technical justification. Additionally, the Catawba proposed changes are consistent with the NUREG 1431, Standard Technical Specifications revision 2.

Implementation of this amendment to the Catawba Facility Operating Licenses and TS will require a revision to the Catawba Updated Final Safety Analysis Report (UFSAR) section 15.4.6. The UFSAR currently states, "During Mode 6 an inadvertent dilution from the Reactor Makeup Water System is prevented by administrative controls which isolate the RCS from potential sources of unborated water." The subsequent text of the UFSAR section discusses BDMS during Modes 3 - 6. While the BDMS automatic valve operation may be available during Mode 6, the UFSAR description should clarify the BDMS requirement for Mode 6 is different from Modes 3-5. The changes to the affected UFSAR will be made in accordance with 10 CFR 50.71(e).

Duke Energy Corporation requests approval of the proposed changes prior to May 2004 to support the 2EOC13 refueling outage. Duke Energy Corporation will implement the proposed changes within 120 days following NRC approval.

The contents of this amendment request package are as follows:

1. Attachment 1 provides marked copies of the affected TS and Bases pages for Catawba, showing the proposed changes.

2. Attachment 2 provides a description of the proposed change and technical justification.

3. Pursuant to 10 CFR 50.92, Attachment 3 documents the determination that the amendment contains No Significant Hazards Considerations.

4. Pursuant to 10 CFR 51.22(c)(9), Attachment 4 provides the basis for the categorical exclusion from performing an Environmental Assessment/Impact Statement.

The reprinted pages of the affected TS and Bases pages will be provided to the NRC upon issuance of the proposed amendment.

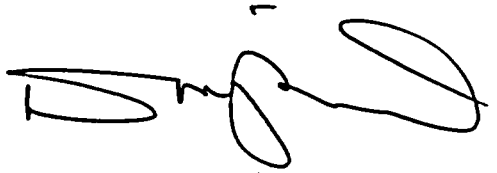
This letter and attachments do not contain any regulatory commitments.

In accordance with Duke Energy Corporation administrative procedures and the Quality Assurance Program Topical Report, this proposed amendment has been previously reviewed and approved by the Catawba Plant Operations Review Committee and the Corporate Nuclear Safety Review Board.

Pursuant to 10 CFR 50.91, a copy of this proposed amendment is being sent to the appropriate state official.

Inquiries on this matter should be directed to G.K. Strickland at (803) 831-3585.

Very truly yours,



Dhiaa M. Jamil

GKS/s

Attachments

Dhiaa M. Jamil, affirms that he is the person who subscribed his name to the foregoing statement, and that all the matters and facts set forth herein are true and correct to the best of his knowledge.

Dhiaa M. Jamil, Vice President

Subscribed and sworn to me: 10-15-2003
Date

Notary Public

My commission expires: 7-10-2012
Date

SEAL

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ATTACHMENT 1

MARKED COPIES OF THE
AFFECTED TS AND BASES PAGES

3.9 REFUELING OPERATIONS

3.9.2 Nuclear Instrumentation

Insert A

LCO 3.9.2 ~~Two Boron Dilution Mitigation System (BDMS) trains shall be OPERABLE.~~

~~NOTE~~
~~Automatic actuation of the BDMS may be blocked during core reloading until two assemblies are loaded into the core.~~

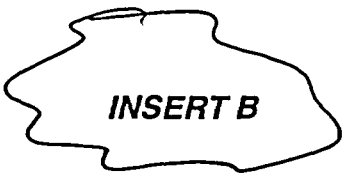
APPLICABILITY: MODE 6.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One ~~or both BDMS trains~~ inoperable.	A.1.~~1~~ Suspend CORE ALTERATIONS.	Immediately
	~~AND~~	
required neutron flux monitor	A.~~1~~.2 Suspend operations that would cause introduction of coolant into the RCS with boron concentration less than required to meet the boron concentration of LCO 3.9.1.	Immediately
	~~AND~~	
	~~A.1.3 Verify unborated water source isolation valve(s) are closed and secured.~~	~~1 hour~~
	~~AND~~	
	~~A.1.4 Perform SR 3.9.1.1.~~	~~Once per 12 hours~~
	~~OR~~	

(continued)

Two source range neutron flux monitors shall be OPERABLE.



B. Two required neutron flux monitors inoperable.	B.1 Initiate actions to restore one neutron flux monitor to OPERABLE status. AND B.2 Perform SR 3.9.1.1.	Immediately Once per 12 hours

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~A. (continued)~~	~~A.2.1 Verify two Source Range Neutron Flux Monitors are OPERABLE.~~ ~~AND~~ ~~A.2.2 Verify Reactor Makeup Water Pumps combined flow rates are within the limits specified in the COLR.~~	~~Immediately~~ ~~1 hour~~

Insert B

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.9.2.1	Perform CHANNEL CHECK.	12 hours
~~SR 3.9.2.2~~	~~Perform COT.~~	~~31 days~~
~~SR 3.9.2.3~~	~~Verify each automatic valve moves to the correct position and Reactor Makeup Water pumps stop upon receipt of an actual or simulated actuation signal.~~	~~18 months~~
~~SR 3.9.2.4~~	~~NOTE~~ ~~Only required to be performed when used to satisfy Required Action A.2.1.~~ ~~Perform CHANNEL CHECK on the Source Range Neutron Flux Monitors.~~	 ~~12 hours~~

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
~~SR 3.9.2.5~~ ~~NOTE~~ ~~Only required to be performed when used to satisfy Required Action A.2.1.~~ ~~Perform COT on the Source Range Neutron Flux Monitors.~~	~~7 days~~
~~SR 3.9.2.6~~ ~~NOTE~~ ~~Only required to be performed when used to satisfy Required Action A.2.2.~~ ~~Verify combined flowrates from both Reactor Makeup Water Pumps are ≤ the value in the COLR.~~	~~7 days~~
SR 3.9.2.2 NOTE Neutron detectors are excluded from CHANNEL CALIBRATION. Perform CHANNEL CALIBRATION.	18 months

3.9 REFUELING OPERATIONS

3.9.7 Unborated Water Source Isolation Valves

LCO 3.9.7 Each valve used to isolate unborated water sources shall be secured in the closed position.

APPLICABILITY: MODE 6.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each unborated water source isolation valve.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ----------NOTE---------- Required Action A.3 must be completed whenever Condition A is entered. ---------- One or more valves not secured in closed position.	A.1 Suspend CORE ALTERATIONS. AND A.2 Initiate actions to secure valve in closed position. AND A.3 Perform SR 3.9.1.1.	Immediately Immediately 4 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.9.7.1	Verify each valve that isolates unborated water sources is secured in the closed position.	31 days

Replace with new B 3.9.2

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

Replace with new B 3.9.2

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 introduction of coolant into the RCS with boron concentration less than required to meet the minimum boron concentration of LCO 3.9.1 must be suspended immediately. Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is

Replace with new B 3.9.2

BASES

ACTIONS (continued)

Required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than that which would be required in the RCS for minimum refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. 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 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.

Replace with new B 3.9.2

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

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

Replace with new B 3.9.2

BASES

SURVEILLANCE REQUIREMENTS (continued)

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.

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).

B 3.9 REFUELING OPERATIONS

B 3.9.2 Nuclear Instrumentation

BASES

BACKGROUND

The neutron flux monitors are used during refueling operations to monitor the core reactivity condition. The installed 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 detectors monitor neutrons leaking from the core. Neutron flux indication is provided in counts per second. The NIS source range channels have a range of 1 to 1E6 cps. The Wide Range channels have a range of 0.1 to 1E5 cps (in the startup range). The NIS source range channels and the Gamma-Metrics shutdown monitors provide continuous visible count rate indication in the control room. The NIS is designed in accordance with the criteria presented in Reference 1.

The shutdown monitors (Gamma-Metrics) automatic actuations and alarm are not required for OPERABILITY during refueling operations. The NIS source range audible indication and audible alarm are not required for OPERABILITY during refueling operations.

APPLICABLE SAFETY ANALYSES

Two OPERABLE neutron flux monitors are required to provide an indication to alert the operator to unexpected changes in core reactivity such as with a boron dilution accident (Ref. 2) or an improperly loaded fuel assembly.

The neutron flux monitors satisfy Criterion 3 of 10 CFR 50.36 (Ref. 3).

LCO

This LCO requires that two neutron flux monitors be OPERABLE to ensure that redundant monitoring capability is available to detect changes in core reactivity. To be OPERABLE, each monitor must provide visual indication.

APPLICABILITY

In MODE 6, the neutron flux monitors must be OPERABLE to determine changes in core reactivity. There are no other direct means available to check core reactivity levels. In MODES 2, 3,

BASES

APPLICABILITY (continued)

4, and 5, the NIS source range detectors and circuitry are also required to be OPERABLE by LCO 3.3.1, "Reactor Trip System (RTS) Instrumentation." The Gamma-Metrics shutdown monitors are required to be OPERABLE in MODES 3, 4 and 5 by LCO 3.3.9, "Boron Dilution Mitigation System (BDMS)".

ACTIONS

A.1 and A.2

With only one required neutron flux monitor OPERABLE, redundancy has been lost. Since these instruments are the only direct means of monitoring core reactivity conditions, CORE ALTERATIONS and introduction of coolant into the RCS with boron concentration less than required to meet the minimum boron concentration of LCO 3.9.1 must be suspended immediately. Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than that which would be required in the RCS for minimum refueling boron concentration. This may result in overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Performance of Required Action A.1 shall not preclude completion of movement of a component to a safe position.

B.1

With no required neutron flux monitor OPERABLE, action to restore a monitor to OPERABLE status shall be initiated immediately. Once initiated, action shall be continued until a neutron flux monitor is restored to OPERABLE status.

B.2

With no neutron flux monitor OPERABLE, there are no direct means of detecting changes in core reactivity. However, since CORE ALTERATIONS and introduction of coolant into the RCS with boron concentration less than required to meet the minimum boron concentration of LCO 3.9.1 must be suspended immediately, the core reactivity condition is stabilized until the neutron flux monitors are OPERABLE. This stabilized condition is

BASES

ACTIONS (continued)

determined by performing SR 3.9.1.1 to ensure that the required boron concentration exists.

The Completion Time of once per 12 hours is sufficient to obtain and analyze a reactor coolant sample for boron concentration and ensures that unplanned changes in boron concentration would be identified. The 12 hour Frequency is reasonable, considering the low probability of a change in core reactivity during this time period.

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 between source range channels, but each channel 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 3.3.1 and LCO 3.3.9.

SR 3.9.2.2

SR 3.9.2.2 is the performance of a CHANNEL CALIBRATION every 18 months. This SR is modified by a Note stating that neutron detector sensors (NIS and BDMS) are excluded from the CHANNEL CALIBRATION.

The CHANNEL CALIBRATION for the source range neutron flux monitors (NIS) consists of obtaining the detector plateau and pulse height discriminator curves, evaluating those curves, and comparing the curves to the manufacturer's data.

The CHANNEL CALIBRATION for the source range neutron flux monitors (Gamma-Metrics) consists of verifying that the channels respond correctly to test inputs with the necessary range and accuracy.

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.

BASES

REFERENCES

1. 10 CFR 50, Appendix A, GDC 13, GDC 26, GDC 28, and GDC 29.

2. UFSAR, Sections 4.2, 15.4.6.

3. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).

B 3.9 REFUELING OPERATIONS

B 3.9.7 Unborated Water Source Isolation Valves

BASES

BACKGROUND

During MODE 6 operations, isolation valves for reactor makeup water sources containing unborated water that are connected to the Reactor Coolant System (RCS) must be closed to prevent unplanned boron dilution of the reactor coolant. The isolation valves must be secured in the closed position. One of the following groups of valves is required to be closed:

1) NV-230,

2) NV-181A, NV-187, NV-231, and NV-244

3) NV-175, NV-187, NV-231, and NV-244

The Chemical and Volume Control System is capable of supplying borated and unborated water to the RCS through various flow paths. Since a positive reactivity addition made by reducing the boron concentration is inappropriate during MODE 6, isolation of unborated water sources prevents an unplanned boron dilution.

APPLICABLE SAFETY ANALYSES

The possibility of an inadvertent boron dilution event (Ref. 1) occurring during MODE 6 refueling operations is precluded by adherence to this LCO, which requires that potential dilution sources be isolated. Closing the required valves during refueling operations prevents the flow of unborated water to the filled portion of the RCS. The valves are used to isolate unborated water sources. These valves have the potential to indirectly allow dilution of the RCS boron concentration in MODE 6. By isolating unborated water sources, a safety analysis for an uncontrolled boron dilution accident in accordance with the Standard Review Plan (Ref. 2) is not required for MODE 6.

The RCS boron concentration satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

This LCO requires that flow paths to the RCS from unborated water sources be isolated to prevent unplanned boron dilution during MODE 6 and thus avoid a reduction in SDM.

BASES

APPLICABILITY

In MODE 6, this LCO is applicable to prevent an inadvertent boron dilution event by ensuring isolation of all sources of unborated water to the RCS.

For all other MODES, the boron dilution accident was analyzed and was found to be capable of being mitigated.

ACTIONS

The ACTIONS Table has been modified by a Note that allows separate Condition entry for each unborated water source isolation valve.

A.1

Continuation of CORE ALTERATIONS is contingent upon maintaining the unit in compliance with this LCO. With any valve used to isolate unborated water sources not secured in the closed position, all operations involving CORE ALTERATIONS must be suspended immediately. The Completion Time of "immediately" for performance of Required Action A.1 shall not preclude completion of movement of a component to a safe position.

Condition A has been modified by a Note to require that Required Action A.3 be completed whenever Condition A is entered.

A.2

Preventing inadvertent dilution of the reactor coolant boron concentration is dependent on maintaining the unborated water isolation valves secured closed. Securing the valves in the closed position ensures that the valves cannot be inadvertently opened. The Completion Time of "immediately" requires an operator to initiate actions to close an open valve and secure the isolation valve in the closed position immediately. Once actions are initiated, they must be continued until the valves are secured in the closed position.

A.3

Due to the potential of having diluted the boron concentration of the reactor coolant, SR 3.9.1.1 (verification of boron concentration) must be performed whenever Condition A is entered to demonstrate that the required boron concentration

BASES

ACTIONS (continued)

exists. The Completion Time of 4 hours is sufficient to obtain and analyze a reactor coolant sample for boron concentration.

SURVEILLANCE REQUIREMENTS

SR 3.9.7.1

These valves are to be secured closed to isolate possible dilution paths. The likelihood of a significant reduction in the boron concentration during MODE 6 operations is remote due to the large mass of borated water in the refueling cavity and the fact that all unborated water sources are isolated, precluding a dilution. The boron concentration is checked every 72 hours during MODE 6 under SR 3.9.1.1. This Surveillance demonstrates that the valves are closed through a system walkdown. The 31 day Frequency is based on engineering judgment and is considered reasonable in view of other administrative controls that will ensure that the valve opening is an unlikely possibility.

REFERENCES

1. UFSAR, Section 15.4.6.

2. NUREG-0800, Section 15.4.6.

ATTACHMENT 2

DESCRIPTION OF PROPOSED CHANGES AND TECHNICAL JUSTIFICATION

Description of Proposed Changes

Duke Energy proposes to add a new specification 3.9.7, Unborated Water Source Isolation Valves, and delete the BDMS automatic actuation requirements (valve operation and reactor makeup water pump trip) during Mode 6. This change will place the plant in a configuration to preclude inadvertent boron dilution events and, therefore, not rely on automatic equipment operation for the accident mitigation. This change will also delete the requirement for an audible alarm for source range monitors during Mode 6.

With the addition of specification 3.9.7, Duke Energy also proposes to revise specification 3.9.2, Nuclear Instrumentation, to technically agree with NUREG-1431, Standard Technical Specifications Westinghouse Plants Revision 2 dated April 30, 2001. The NUREG wording was changed slightly to agree with approved wording from Catawba TS 3.9.2 Action A.2 Amendments 207 / 201.

Background

Because BDMS has been installed in a limited number of plants, a general system description is included below. BDMS information is also provided in UFSAR sections 7.6.23 and 15.4.6.

The BDMS system consists of two U-235 fission chambers located at 90 and 270 degrees around the reactor vessel. In each fission chamber, detection of leakage neutrons is by the fission of the detector U-235 and ionization of the chamber Argon fill gas. The chamber output pulses are amplified for control board indication and input to the Shutdown Margin Monitor. The Shutdown Margin Monitor provides a display of the neutron count rate and calculates the high flux alarm setpoint. If the flux indication reaches the alarm setpoint, the valves aligning the charging pump suction to the refueling water storage tank (RWST) will open, the volume control tank (VCT) discharge valves will close, the reactor water makeup pumps will trip, and an alarm will annunciate in the control room. During planned positive reactivity additions, the control room operator manually resets the alarm setpoint to prevent inadvertent system actuation. The fission chambers are also

part of the Post Accident Monitoring Instrumentation for wide range neutron flux indication.

The Source Range Neutron Flux Monitors (N31 and N32) are part of the standard Westinghouse Nuclear Instrumentation System and are independent from BDMS. The Source Range Neutron Flux Monitors are Boron Trifluoride (BF3) filled detectors located at 0 and 180 degrees around the reactor vessel. The Source Range Neutron Flux Monitors also provide an input into the Reactor Protection System.

Licensing History / Licensing Basis

The following is a brief summary of licensing history of BDMS. Some of the correspondences are included for completeness and are not applicable to this specific change request.

1. February 1983, NUREG-0954, Catawba Safety Evaluation Report, section 15.2.4.2 states:

> Section 15.4.6 of the SRP (Standard Review Plan) requires that at least 15 min is available from the time the operator is made aware of the unplanned boron dilution event to the time a loss of shutdown margin occurs during power operation, startup, hot standby, hot shutdown, and cold shutdown. A 30-min warning is required during refueling. The staff has requested that control room alarms be available to alert the operating staff to boron dilution events in all modes of operation. The staff requires that the applicant provide an analysis for all possible boron dilution events in each of the six operations modes and confirm that the time when the core would go critical are available. Also, Technical Specification should be established to restrict the time when alarms can be taken out of service. Furthermore, the staff requires that the applicant show that equipment used to mitigate this event meets single-failure criteria. The staff also asked that the applicant describe the model used in the analysis of boron dilution events and discuss any conservatism incorporated into this model. The staff will report its

evaluation of this issue in a supplement to this SER.

2. July 1984, NUREG-0954 Supplement No. 3, Catawba Safety Evaluation Report, section 15.2.4.2 discusses the inadvertent boron dilution analysis. The review addresses the commitment to install BDMS and addition of the BDMS technical specifications. The text includes the following passage, "Until the above commitment is carried out the plant is afforded the following protection for an inadvertent boron dilution event mitigation. While in Mode 6 and prior to entering Mode 5, the plant's Technical Specifications require lock-out of the dilution water sources and, therefore, preclude an inadvertent boron dilution event. … "

3. January 31, 1985, the NRC issued Generic Letter 85-05, Inadvertent Boron Dilution Events. The letter stated that plants currently undergoing licensing review would be reviewed to the criteria in Section 15.4.6 of the Standard Review Plan. Operating plants were encouraged, but not required, to backfit for boron dilution events.

4. June 6, 1986, Duke Power submitted a license amendment request to add a BDMS specification for Unit 1 and committed to install BDMS for Unit 2 during the first refueling outage. Request was supplemented by Duke letter dated September 9, 1986.

5. October 24, 1986, NRC issued Amendment No. 17 / 7 for Unit 1 and 2. The amendments approved the June 6 and September 9 requests.

6. November 13, 1987, Duke Power submitted a license amendment request for the Unit 2 Reload Safety Evaluation. The request included the addition of the BDMS specifications for Unit 2. Request was supplemented with letters dated December 11, 1987, January 15, 1988, and January 20, 1988.

7. February 16, 1988, the NRC issued Amendment No. 39 / 31 for Unit 1 and 2. The amendments approved the November 13, 1987 and supplemental requests.

8. March 14 and May 15, 1991, Duke Power submitted boron dilution accident reevaluation.

9. August 6, 1991, Duke Power submitted a license amendment request to change the reactor makeup water pump flow limit with BDMS inoperable.

10. March 3, 1992, the NRC issued Amendment No. 94 / 88 for Unit 1 and 2. The amendments approved the August 6, 1991 request.

11. December 15, 1992, Duke Power submitted a license amendment request for the reactor makeup water pump flow limit with BDMS inoperable. Request was supplemented with letters dated February 5 and March 18, 1993.

12. March 23, 1993, the NRC issued Amendment No. 107 / 101 for Unit 1 and 2. The amendments approved the December 15, 1992 and supplemental requests.

Reason Specification Change is Being Requested

The volume control tank discharge valves and refueling water storage tank valves are required to operate as part of the Emergency Core Cooling System during Modes 1, 2, 3, and 4. During a safety injection signal, these valves automatically align the suction of the charging pumps to the refueling water storage tank to provide borated water to the reactor coolant system. During Modes 1, 2, and 3, specification 3.5.2 allows one train of Emergency Core Cooling to be out of service for a maximum of 72 hours. After 72 hours are exceeded, a plant shutdown is required.

The volume control tank discharge valves and refueling water storage tank valves are also required to be operable for BDMS. The actuation of BDMS will align the suction of the charging pumps to the refueling water storage tank. Specification 3.3.9 requires BDMS to be operable during Modes 3, 4, and 5 whereas specification 3.9.2 requires BDMS to be operable during Mode 6. When BDMS is inoperable, then both specifications provide contingency actions such as verifying source range monitors are operable, close unborated water sources isolation valves, and verify the reactor makeup water pump flow rate.

The volume control tank valves and refueling water storage tank valves are important for plant operations; however, the overlapping specifications for Modes 1 to 6 do not provide many opportunities to conduct preventive or corrective maintenance to these valves or their respective power supplies. This proposed change will provide Catawba an opportunity to remove the valves from service for maintenance while satisfying the licensing basis for boron dilution accidents.

Assessment of Proposed Changes

Industry Precedents for BDMS Automatic Actuation Requirement for Mode 6

Review of industry licensing documents and operating experiences identified five additional Westinghouse plants with BDMS specifications. The following peer amendment requests and corresponding staff safety evaluation report are applicable to Catawba.

1. November 22, 1995, Wolf Creek requested a license amendment request to replace the requirements associated with BDMS with alarms, indicators, procedures, and control for Modes 3, 4, and 5. On March 1, 1996, the staff safety evaluation for the amendment stated, "Since all sources of unborated water are locked out during refueling, the boron dilution event is not analyzed from Mode 6 initiation. …" The Wolf Creek specifications did not require BDMS to be operable in Mode 6.

2. June 8, 1992, the staff issued the amendment to Comanche Peak to replace the technical specification requirements associated with BDMS with alarms, indicators, procedures, and controls for Modes 3, 4, and 5. The safety evaluation stated, " … Since all sources of unborated water are locked out during refueling, the boron dilution event is not analyzed from Mode 6 initiation. …". Comanche Peak specifications did not require BDMS to be operable in Mode 6.

3. April 6, 2001, the staff issued amendments to Byron and Braidwood for the boron dilution protection system (BDPS) for Modes 3, 4, and 5. The safety evaluation

stated, "The BDPS is also not required to be operable in Mode 6 (refueling) because a dilution event is precluded by administrative controls which require valves to be secured closed to isolate the reactor coolant system (RCS) from the potential source of unborated water." and "Since all sources of unborated water are locked out during refueling, the boron dilution event is not analyzed from Mode 6 initiation. ..."

4. Callaway specifications require BDMS for Modes 2, 3, 4, and 5. The Callaway specifications do not require BDMS to be operable in Mode 6.

No other Westinghouse plants were identified with BDMS specifications.

Discussion of Changes for Specification 3.9.7 and BDMS Automatic Actuation

The licensing basis for boron dilution accidents requires at least 30 minutes be available from the time the operator is made aware of the unplanned boron dilution event to the time a loss of shutdown margin occurs during Mode 6. Catawba has provided analysis of operator response times to the NRC in letters dated March 14, 1991, May 15, 1991, August 6, 1991, and December 15, 1992.

An acceptable alternative to analyzing operator response times for dilution events is to isolate all unborated water sources to the reactor coolant system. The proposed specification 3.9.7 is based on the NUREG-1431, Standard Technical Specifications Westinghouse Plants, Rev 2. The NUREG specification bases state:

> The possibility of an inadvertent boron dilution event (Ref. 1) occurring during MODE 6 refueling operations is precluded by adherence to this LCO, which requires that potential dilution sources be isolated. Closing the required valves during refueling operations prevents the flow of unborated water to the filled portion of the RCS. The valves are used to isolate unborated water sources. These valves have the potential to indirectly allow dilution of the RCS boron concentration in MODE 6. By isolating unborated water sources, a safety analysis for an uncontrolled

boron dilution accident in accordance with the Standard Review Plan (Ref. 2) is not required for MODE 6.

Valves to be used for isolation are either set of valves:

1. NV-230, reactor makeup water pump discharge to the chemical volume and control system

or

1. NV-181A, blender outlet to volume control tank inlet
2. NV-187, blender outlet to charging pump suction
3. NV-231, reactor makeup water pump discharge to charging pumps suction
4. NV-244, reactor makeup water supply to the chemical mixing tank

or

1. NV-175, volume control tank inlet
2. NV-187, blender outlet to charging pump suction
3. NV-231, reactor makeup water pump discharge to charging pumps suction
4. NV-244, reactor makeup water supply to the chemical mixing tank

Three different sets of valves are listed to provide operational flexibility and contingencies if one or more valves are unavailable for isolation. The first option has the advantage of fewer valves under administrative control and, therefore, easier to implement. The second and third series of valves will isolate the valves downstream of valve NV-230 and will allow the operators to provide makeup to the refueling water storage tank. The second option has the additional advantage of maintaining normal letdown in service while isolating dilution valves to the reactor coolant system. The valves are shown in UFSAR figures 9-90, 9-91, and 9-96.

With the addition of specification 3.9.7, the current Catawba specification 3.9.2 action statements A.1.3, A.1.4, A.2.1 and A.2.2 are not required. Also, specification 3.9.2 surveillance requirements 3.9.2.2, 3.9.2.3, 3.9.2.4, and 3.9.2.6 are not required.

Lastly, this change will delete the surveillance requirement 3.9.2.5 for a channel operational test for the source range neutron flux monitors every seven days. The NUREG Bases Review's Note for nuclear instrumentation states:

> Bracketed options are provided for source range OPERABILITY requirements to include audible alarm or count rate function. These options apply to plants that assume a boron dilution event is mitigated by operator response to an audible indication. For plants that isolate all boron dilution paths (per LCO 3.9.2), the source range OPERBILITY includes only a visual monitoring function.

These changes are in agreement with the Standard Technical Specifications Revision 2.

Industry Precedents to Revise Specification 3.9.2, Nuclear Instrumentation

Review of industry licensing documents and operating experiences identified the following similar licensing changes:

1. June 2, 1999, the staff issued the license amendment to Byron and Braidwood to permit the use of the Gamma-Metrics Post Accident Neutron Monitors source range neutron flux detectors in addition to the Westinghouse source range neutron flux monitors to satisfy the refueling specification for two source range neutron flux monitors.

2. NUREG-1431 rev 2 Standard Technical Specification 3.9.3 requires two source range neutron flux monitors to be operable. The Action statements A and B include a bracketed "required" wording to recognize plants with more than the specifications required minimum number of source range neutron flux monitors.

Discussion of Revision to Specification 3.9.2, Nuclear Instrumentation

The option to use either the BDMS nuclear instrumentation or the standard Westinghouse nuclear instrumentation has

been approved by the NRC in NUREG-1431 revision 2. Catawba proposes to revise TS 3.9.2 to include this option.

Additional discussion on the acceptability of this change is included in the Byron / Braidwood Safety Evaluation:

> By letter dated March 22, 1999, Commonwealth Edison Company (ComEd, the licensee) requested Technical Specification (TS) changes to permit the use of Gamma-Metrics Post Accident Neutron Monitors (PANMs) source range neutron flux detectors in addition to the Westinghouse source range neutron flux monitors to satisfy the TS 3.9.3, Limiting Condition for Operation (LCO) which requires two source range neutron flux monitors to be operable during Mode 6 operations (refueling). Specifically, the proposed change would modify TS 3.9.3, "REFUELING OPERATIONS, Nuclear Instrumentation, "to insert the word "required" into Conditions A. and B. Condition A would now state: "One required source range neutron flux monitor inoperable." Condition B would now state: "two required source range neutron flux monitor inoperable."
>
> NUREG-1431, Revision 1, "Standard Technical Specifications Westinghouse Plants," dated April 1995, included use of the word "required" as an option for plants with more that the TS required minimum number of source range neutron flux monitors.

The Catawba neutron monitoring systems also consist of the Gamma-Metrics source range neutron flux detectors and the Westinghouse source range neutron flux monitors.

The changes to delete specification 3.9.2 action statements A.1.3 and A.2.2 and surveillance requirements 3.9.2.2, 3.9.2.3, 3.9.2.5, and 3.9.2.6 are discussed in the above technical discussion for the addition of specification 3.9.7.

The changes to the action statements and surveillance requirements are technically identical to the Standard Technical Specifications Rev 2.

ATTACHMENT 3

NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

No Significant Hazards Consideration Determination

The following discussion is a summary of the evaluation of the change contained in this proposed amendment against the 10 CFR 50.92 (c) requirements to demonstrate that all three standards are satisfied. A no significant hazards consideration is indicated if operation of the facility in accordance with the proposed amendment would not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated, or

2. Create the possibility of a new or different kind of accident from any accident previously evaluated, or

3. Involve a significant reduction in a margin of safety.

First Standard

Operation of the facilities in accordance with this amendment would not involve a significant increase in the probability or consequences of an accident previously evaluated. The BDMS system is designed to mitigate the consequences of an inadvertent boron dilution event. The probability of the dilution accident will be reduced by administratively isolating potential dilution flow paths. Thus, with the proposed changes, boron dilution is not considered a credible accident during refueling.

Second Standard

Operation of the facilities in accordance with this amendment would not create the possibility of a new or different kind of accident from any accident previously evaluated. No new accident causal mechanisms are created as a result of this proposed amendment. No changes are being made to any structure, system, or component which will introduce any new accident causal mechanisms. This amendment request does not impact any plant systems that are accident initiators and does not impact any safety analysis.

Third Standard

Operation of the facilities in accordance with this amendment would not involve a significant reduction in a margin of safety. The design criterion and margin of safety for the current BDMS is that the dilution event is terminated prior to the loss of all shutdown margin. The same criterion will be met following the isolation of dilution valves. Therefore, there is no reduction in the margin of safety.

Based on the preceding discussion, Duke Energy has concluded that the proposed amendment does not involve a significant hazard consideration.

ATTACHMENT 4

ENVIRONMENTAL ANALYSIS

Environmental Analysis

The proposed amendment has been reviewed against the criteria of 10 CFR 51.22 for environmental considerations. The proposed amendment does not involve a significant hazards consideration, nor increase the types and amounts of effluents that may be released offsite, nor increase individual or cumulative occupational radiation exposures. Therefore, the proposed amendment meets the criteria given in 10 CFR 51.22(c)(9) for a categorical exclusion from the requirement for an Environmental Impact Statement.