Duke Power
A Duke Energy Company

D.M. JAMIL
Vice President

Duke Power
Catawba Nuclear Station
4800 Concord Rd. / CN01VP
York, SC 29745-9635

803 831 4251
803 831 3221 fax

October 22, 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
TAC Nos. MB8106, MB8107, MB8109, MB8110
Response to Request for Additional Information (RAI) for Proposed Technical Specification Amendment
TS 3.4.3 - Reactor Coolant System (RCS) Pressure and Temperature (P/T) Limits
TS 3.4.6, RCS Loops - MODE 4
TS 3.4.7, RCS Loops - MODE 5, Loops Filled
TS 3.4.10, Pressurizer Safety Valves
TS 3.4.11, Pressurizer Power Operated Relief Valves (PORVs)
TS 3.4.12, Low Temperature Overpressure Protection (LTOP) System

Reference: 1) Letter from G. R. Peterson to U.S. Nuclear Regulatory Commission dated March 24, 2003

The purpose of this letter is to docket Catawba's response to your request for additional information (RAI) dated September 30, 2003, related to the subject submittal.

In Reference 1, Duke Energy Corporation requested an amendment to the Catawba Nuclear Station Facility Operating License and Technical Specifications (TS). The proposed amendment revises various TS that are affected by the revised heatup, cooldown, critically, and inservice test pressure and temperature (P/T) limits for the reactor coolant system (RCS) of each unit.

The NRC provided a request for additional information concerning this LAR via a letter dated September 30, 2003. The purpose of this letter is to respond to that request.

A001

This response addresses items 1, 2, 3, and 4 of the request for additional information.

The items discussed in this letter and in the attachments have been reviewed against the No Significant Hazards Evaluation submitted in Reference 1. Duke has determined that the previous No Significant Hazards Evaluation still remains valid and has not been affected by any of these changes. There are no commitments contained within this letter.

Pursuant to 10 CFR 50.91, a copy of this RAI response is being sent to the appropriate State of South Carolina official.

Inquiries on this matter should be directed to R. D. Hart at (803) 831-3622.

Very truly yours,

Dhiaa M. Jamil

RDH/s

Attachments

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

Dhiaa M. Jamil, Site Vice President

Subscribed and sworn to me: 10-22-2003
Date

Notary Public

My commission expires: 7-10-2012
Date

SEAL

xc (with attachments):

L.A. Reyes
U.S. Nuclear Regulatory Commission
Regional Administrator, Region II
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, GA 30303

E.F. Guthrie
Senior Resident Inspector (CNS)
U.S. Nuclear Regulatory Commission
Catawba Nuclear Station

R.E. Martin (addressee only)
NRC Senior Project Manager (CNS)
U.S. Nuclear Regulatory Commission
Mail Stop O8-G9
Washington, D.C. 20555-0001

H.J. Porter
Assistant Director
Department of Health and Environmental Control
2600 Bull St.
Columbia, SC 29201

ATTACHMENT A

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

(Throughout this attachment, the NRC request for additional information is highlighted in **bold type** and Catawba's response is shown in normal type.)

The Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittal dated March 20, 2003, regarding proposed changes to the low temperature overpressure (LTOP) Technical Specifications (TS). The NRC staff has identified the following information that is needed to enable the continuation of its review.

NRC Question:

1. **The Surveillance Requirement (SR) 3.4.12.3 NOTE is proposed to state "Only required to be performed when complying with Required Action G.2." The proposed format is not correct. SRs verify that the limiting condition for operation (LCO) is being met and do not refer to required actions. Since LCO 3.4.12.d (reactor coolant system (RCS) vent) is proposed to be deleted, the proposed revision to SR 3.4.12.3 NOTE is not acceptable and needs to be revised.**

Catawba Response:

Catawba has relocated SR 3.4.12.3 to Required Action G.2 to comply with the format requirements of standard technical specifications. The revised pages are in Attachment B of this letter.

NRC Question:

2. **NUREG-1431, "Standard Technical Specifications (STS) for Westinghouse Plants," has two surveillance requirements that relate to LCO 3.4.12.b (two residual heat removal suction relief valves) that have the following requirements:**

SR 3.4.12.4	**Verify [residual heat removal] RHR suction valve is open for each required RHR suction relief valve. Frequency is 12 hours.**
SR 3.4.12.7	**Verify associated RHR suction isolation valve is locked open with operator power removed for each required RHR suction relief valve. Frequency is 31 days.**

In its submittal dated March 20, 2003, the licensee proposed to add the following surveillance requirement to the Catawba TS:

SR 3.4.12.7	**Verify both associated RHR suction isolation**

valves are open with operator power removed for each required RHR suction relief valve. Frequency is 12 hours.

Given that the licensee is proposing to operate with a maximum of two pumps injecting into the RCS during MODES 4 and below, the licensee should either adopt STS SR 3.4.12.4 or explain why it is not necessary to verify that LCO 3.4.12.b is being met. In addition, the licensee should address why the RHR suction isolation valves are not locked open as described in STS 3.4.12.7.

Catawba Response:

Catawba has adopted STS SR 3.4.12.4. The revised TS pages are in Attachment B of this letter.

Catawba has reviewed STS SR 3.4.12.7 and has decided to adopt the SR with some modifications. Catawba proposes to not lock open the valves locally and instead lock open the breaker that provides power to each valve. The reason for this change is as follows. At Catawba the RHR system flow paths utilized during normal plant cooldown include two motor-operated gate valves in series, located inside the containment, powered by redundant sources on each of the two suction lines between the high pressure of the reactor coolant system (RCS) and the lower pressure of the RHR System. These valves are located in high dose areas inside containment which restricts access to the valves. If Catawba were to require these valves to be locally locked open, this would necessitate containment entries into high radiation dose areas each time RHR trains were swapped during an outage. This can occur several times during an outage. Locking the power supply breaker open for each valve will ensure positive control of the valve. This provides equivalent protection, reduces operator radiation exposure and facilitates equipment rotation. The indicating lights for these valves in the control room are powered from a source independent of valve power and are unaffected by removal of valve power. Therefore, the operators will have indication available in the control room and would be cognizant of any valve misalignment.

The revised TS SR would read as follows:

Verify the associated RHR suction isolation valves are open, with operator power removed and locked in removed position, for each required RHR suction relief valve. The Frequency is 31 days.

NRC Question:

3. Page 2-3 of Attachment 2, "Description of Proposed Changes and Technical Justification," of the licensee's submittal describes the RHR system. Specifically, the licensee's submittal states that "The two inlet isolation valves in each subsystem are separately and independently interlocked with pressure signals to prevent their being opened whenever the RCS pressure is greater than approximately 385 psig." The licensee has proposed a new LCO 3.4.12.b which would state

> **"Two residual heat removal (RHR) suction relief valves with lift settings $\geq$ 417 psig and $\leq$ 509 psig with an indicated RCS cold leg temperature $\geq$ 70°F; or."**

The STS bases for LCO 3.4.12.b state that autoclosure interlocks are not permitted to cause the RHR suction isolation valves to close. Since the proposed lift settings for the RHR suction relief valves are at a higher psig than the RHR interlock described on Page 2-3, it is not clear whether the interlock for the two inlet isolation valves is bypassed or disabled while two RHR suction relief valves are used to meet LCO 3.4.12.b. Provide a more detailed description of the RHR interlock and its interaction, if any, to the LTOP system operating in accordance with proposed LCO 3.4.1 2.b.

Catawba Response:

RHR suction isolation valves are motor operated gate valves located on the inlet to each RHR train from the RCS. There are two suction isolation valves on each independent RHR train. These valves are closed during normal unit operation to provide isolation between the RCS and RHR suction line, and thus protect the RHR system from overpressurization. These valves are opened when the RHR system is placed into operation during RCS cooldown. When the RCS is at higher pressure, the RHR suction valves are closed with operator power removed from at least one of the two valves in each RHR suction line (until RHR system is to be placed into operation) in order to preclude fire induced interaction which could lead to loss of coolant outside containment. Once an RHR train is placed into operation, power is removed from both its RHR suction isolation valves in the open position, to prevent inadvertent closure during cooldown and refueling operations and subsequent loss of RHR flow.

To ensure RHR suction isolation valves are not open while the RCS pressure is high, interlocks are provided such that the valves cannot be manually opened from the control room when RCS pressure is greater than approximately 385 psig. Additionally, an annunciator alarm is provided to alert the control room operator if any RHR suction isolation valve is open concurrent with high RCS pressure. At Catawba, there are no autoclosure interlocks for the RHR suction isolation valves.

NRC Question:

4. Page 2-10 of Attachment 2 describes the results of the analyses of the reactor coolant pump (RCPs) operating restrictions for LTOP. Specifically, with the power operated relief valves (PORVs) providing overpressure protection, the number of RCPs is restricted to two RCPs on Unit 1 and one RCP on Unit 2 at RCS temperatures $\geq$ 70°F (with Instrument uncertainty). With the RHR relief valves providing overpressure protection, the number of RCPs is restricted to four RCPs on Units 1 and 2 at RCS temperature $\geq$ 126 °F and 140 °F (with instrument uncertainty), respectively. These values are presented on TS Table 3.4.12-1. However, there is no indication to the reader of TS Table 3.4.12-1 regarding those values that apply to each method of overpressure protection (PORV or RHR relief valves). Revise TS Table 3.4.12-1 appropriately or provide an explanation as to why further clarification of TS Table 3.4.12-1 is not necessary.

Catawba Response:

Table A and Table B provide peak pressure at the bottom of the reactor vessel beltline region during the postulated LTOP event. At temperatures below 126 °F on Unit 1 and 140 °F on Unit 2, a peak pressure limit of 621 psig is conservatively applied. This pressure limit is identified in Tables C and D as peak pressure limit for the closure head and vessel flange region.

For LTOP using pressurizer PORVs (Table A), operating restrictions on the reactor coolant pump ensure that peak system pressure does not exceed the 621 psig limit. To ensure against exceeding the 621 psig limit when operating below the predetermined temperature limits, the number of reactor coolant pumps (RCPs) in operation will be limited to two (2) pumps on Unit 1 and one (1) pump on Unit 2.

For LTOP using RHR suction relief valves (Table B), operating restrictions on the RCPs also apply. To ensure against

exceeding the 621 psig limit when operating below the predetermined temperature limits, the number of RCPs in operation will be limited to two (2) pumps on both Unit 1 and Unit 2. For conservatism, the operating restrictions supporting LTOP using pressurizer PORVs will be applied in the revised TS.

Above the temperature limits of 126 °F on Unit 1 and 140 °F on Unit 2, pressure limits associated with the reactor closure head and vessel flange region no longer apply. The peak pressure limits associated with the reactor vessel beltline region (steady state condition) permits operation of all four (4) RCPs.

For the revised TS, the overpressure protection provided by the LTOP system is:

	PORV System Peak Pressure	RHR Suction Relief Peak Pressure	Steady State Limit*
Unit 1:			
2 RCP (RCS $\leq$ 126 °F)	609.5 psig	605.3 psig	621 psig (< 116 °F)
4 RCP (RCS > 126 °F)	667.2 psig	663.0 psig	2220 psig (> 116 °F)
Unit 2:			
1 RCP (RCS $\leq$ 140 °F)	609.6 psig	586.9 psig	621 psig (< 130 °F)
4 RCP (RCS > 140 °F)	685.7 psig	663.0 psig	1062 psig (> 130 °F)

*Actual temperature without adjustment for instrument uncertainty.

ATTACHMENT B

MARKED-UP TECHNICAL SPECIFICATIONS PAGES FOR CATAWBA

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition C not met.	D.1 Increase RCS cold leg temperature to > 285°F. OR D.2 Depressurize affected accumulator to less than the maximum RCS pressure for existing cold leg temperature allowed by Specification 3.4.3.	12 hours 12 hours
E. One ~~PORV~~ inoperable in MODE 4.	E.1 Restore ~~PORV~~ to OPERABLE status.	7 days
F. One ~~PORV~~ inoperable in MODE 5 or 6.	F.1 Restore ~~PORV~~ to OPERABLE status.	24 hours
G. Two ~~PORVS~~ inoperable. OR Required Action and associated Completion Time of Condition A, D, E, or F, not met. OR LTOP System inoperable for any reason other than Condition A, C, D, E, or F.	G.~~1~~2 Depressurize RCS and establish RCS vent of ≥ 4.5 square inches. AND G.1 Initiate ACTION to ensure a maximum of one charging pump or one safety injection pump is capable of injecting into the RCS AND G.3 Verify RCS vent > 4.5 square inches Open	12 ~~8~~ hours Immediately Once per 12 hours for unlocked valves AND once per 31 days for locked open vent valve(s).

required RCS relief valve

required RCS Relief valves

two pumps (charging, safety injection, or charging and safety injection) are

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.4.12.1	Verify a maximum of ~~one charging pump or safety injection pump is~~ capable of injecting into the RCS.	12 hours
SR 3.4.12.2	Verify each accumulator is isolated.	12 hours
SR 3.4.12.3	~~NOTE~~ ~~Only required to be performed when complying with LCO 3.4.12.b.~~ ~~Verify RCS vent ≥ 4.5 square inches open.~~ Verify RHR suction isolation valves are open for each required RHR suction relief valve.	12 hours ~~for unlocked open vent valve(s)~~ ~~AND~~ ~~31 days for locked open vent valve(s)~~
SR 3.4.12.4	Verify PORV block valve is open for each required PORV.	72 hours
SR 3.4.12.5	NOTE Not required to be met until 12 hours after decreasing RCS cold leg temperature to ≤ ~~285~~ 210 °F. Perform a COT on each required PORV, excluding actuation.	31 days
SR 3.4.12.6	Perform CHANNEL CALIBRATION for each required PORV actuation channel.	18 months
SR 3.4.12.7	Verify associated RHR suction isolation valves are open, with operator power removed and locked in removed position, for each required RHR suction relief valve.	31 days

BASES

ACTIONS (continued)

F.1

RCS relief valves

The consequences of operational events that will overpressurize the RCS are more severe at lower temperature (Ref. 7). Thus, with one of the two ~~PORVs~~ inoperable in MODE 5 or in MODE 6 with the head on Completion Time to restore two valves to OPERABLE status is 24 hours.

RCS relief valves

The Completion Time represents a reasonable time to investigate and repair several types of relief valve failures without exposure to a lengthy period with only one OPERABLE ~~PORV~~ to protect against overpressure events.

Steps must be taken immediately to limit potential mass input into the RCS, and

G.1 and G.2

The RCS must be depressurized and a vent must be established within ~~8~~ 12 hours when:

required RCS relief valves

a. Both ~~PORVs~~ are inoperable; or

b. A Required Action and associated Completion Time of Condition A, D, E, or F is not met; or

c. The LTOP System is inoperable for any reason other than Condition A, C, D, E, or F.

Insert 4 →

~~The vent must be sized ≥ 4.5 square inches to ensure that the flow capacity is greater than that required for the worst case mass input transient reasonable during the applicable MODES. This action is needed to protect the RCPB from a low temperature overpressure event and a possible brittle failure of the reactor vessel.~~

The Completion Time considers the time required to place the plant in this Condition and the relatively low probability of an overpressure event during this time period due to increased operator awareness of administrative control requirements.

Insert 5 →

SURVEILLANCE REQUIREMENTS

SR 3.4.12.1 and SR 3.4.12.2

To minimize the potential for a low temperature overpressure event by limiting the mass input capability, ~~all but one charging or safety injection pump is verified incapable~~ of injecting into the RCS and the accumulator discharge isolation valves are verified closed and power removed.

a maximum of two pumps (charging and/or safety injection) are verified capable

INSERT 4

The Reference 3 analyses demonstrate that with the mass input into the RCS reduced to that of one injection pump (charging or safety injection) an RCS vent of $\geq$ 4.5 square inches can maintain RCS pressure below limits. Therefore the Condition requires action to be taken immediately to reduce the input to that of one injection pump (charging or safety injection) prior to commencing RCS pressure reduction and establishing the required RCS vent. This action is needed to protect the RCPB from a low temperature overpressure event and a possible brittle fracture of the reactor vessel.

The capacity of a vent this size is greater than the flow of the limiting transient for the LTOP configuration, one charging pump or one safety injection pump OPERABLE, maintaining RCS pressure less than the maximum pressure on the P/T limit curve. The required vent capacity may be provided by one or more vent paths. The vent path(s) must be above the level of reactor coolant, so as not to drain the RCS when open.

The RCS vent size will be re-evaluated for compliance each time the P/T limit curves are revised based on the results of the vessel material surveillance.

The RCS vent is passive and is not subject to active failure.

INSERT 5

G.3

The RCS vent of $\geq$ 4.5 square inches is proven OPERABLE by verifying its open condition either:

a. Once every 12 hours for a valve that is not locked, (valves that are sealed or secured in the open position are considered "locked" in this context); or

b. Once every 31 days for other vent path(s) (e.g., a vent valve that is locked, sealed or secured in position or a removed pressurizer safety valve or open manway also fits this category).

The passive vent valve arrangement must only be open to be OPERABLE. This Required Action is required to be performed if the vent is being used to satisfy the pressure relief requirements of REQUIRED ACTION G.2.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The pumps are rendered incapable of injecting into the RCS through removing the power from the pumps by racking the breakers out under administrative control. An alternate method of LTOP control may be employed using at least two independent means to prevent a pump start such that a single failure or single action will not result in an injection into the RCS. This may be accomplished through two valves in the discharge flow path being closed.

The Frequency of 12 hours is sufficient, considering other indications and alarms available to the operator in the control room, to verify the required status of the equipment.

SR 3.4.12.3

~~The RCS vent of ≥ 4.5 square inches is proven OPERABLE by verifying its open condition either:~~

Insert 6 →

~~a. Once every 12 hours for a valve that cannot be locked.~~

~~b. Once every 31 days for a valve that is locked, sealed, or secured in position. A removed pressurizer safety valve fits this category.~~

~~The passive vent arrangement must only be open to be OPERABLE. This Surveillance is required to be performed if the vent is being used to satisfy the pressure relief requirements of the LCO 3.4.12b.~~

SR 3.4.12.4

The PORV block valve must be verified open every 72 hours to provide the flow path for each required PORV to perform its function when actuated. The valve must be remotely verified open in the main control room. This Surveillance is performed if the PORV satisfies the LCO.

The block valve is a remotely controlled, motor operated valve. The power to the valve operator is not required removed, and the manual operator is not required locked in the inactive position. Thus, the block valve can be closed in the event the PORV develops excessive leakage or does not close (sticks open) after relieving an overpressure situation.

The 72 hour Frequency is considered adequate in view of other administrative controls available to the operator in the control room, such as valve position indication, that verify that the PORV block valve remains open.

INSERT 6

Each required RHR suction relief valve shall be demonstrated OPERABLE by verifying its RHR suction isolation valves are open and by testing it in accordance with the Inservice Testing Program. This Surveillance is only required to be performed if the RHR suction relief valve is being used to meet this LCO.

The RHR suction isolation valves are verified to be opened every 12 hours. The Frequency is considered adequate in view of other administrative controls such as valve status indications available to the operator in the control room that verify the RHR suction isolation valves remain open.

The ASME Code, Section XI (Ref. 9), test per Inservice Testing Program verifies OPERABILITY by proving relief valve mechanical motion and by measuring and, if required, adjusting the lift setpoint.

BASES

SURVEILLANCE REQUIREMENTS (continued)

210

SR 3.4.12.5

Performance of a COT is required within 12 hours after decreasing RCS temperature to ≤ ~~285~~ 210 °F and every 31 days on each required PORV to verify and, as necessary, adjust its lift setpoint. The COT will verify the setpoint is within the allowed maximum limits. PORV actuation could depressurize the RCS and is not required.

The 12 hour Frequency considers the unlikelihood of a low temperature overpressure event during this time.

A Note has been added indicating that this SR is required to be met 12 hours after decreasing RCS cold leg temperature to ≤ ~~285~~ 210 °F. The COT cannot be performed until in the LTOP MODES when the PORV lift setpoint can be reduced to the LTOP setting. The test must be performed within 12 hours after entering the LTOP MODES.

SR 3.4.12.6

Performance of a CHANNEL CALIBRATION on each required PORV actuation channel is required every 18 months to adjust the whole channel so that it responds and the valve opens within the required range and accuracy to known input.

Insert 7 →

REFERENCES

1. 10 CFR 50, Appendix G.
2. Generic Letter 88-11.
3. UFSAR, Section 5.2
4. 10 CFR 50, Section 50.46.
5. 10 CFR 50, Appendix K.
6. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).
7. Generic Letter 90-06.
8. ASME, Boiler and Pressure Vessel Code, Section III.
9. ASME, Boiler and Pressure Vessel Code, Section XI.

INSERT 7

SR 3.4.12.7

Each required RHR suction relief valve shall be demonstrated OPERABLE by verifying its RHR suction isolation valves are open and by testing it in accordance with the Inservice Testing Program. (Refer to SR 3.4.12.3 for the RHR suction isolation valves Surveillance and for a description of the Inservice Testing Program.) This Surveillance is only required to be performed if the RHR suction relief valve is being used to meet this LCO.

Each 31 days the RHR suction isolation valves are verified open, with power to the valve operator removed and locked in the removed position, to ensure that accidental closure will not occur. The "locked open in the removed position" power supply must be locally verified in its open position with the power supply to the valve locked in its inactive position. The 31 day Frequency is based on engineering judgment, is consistent with the procedural controls governing valve operation, and ensures correct valve position.