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October 15, 2007

U.S. Nuclear Regulatory Commission
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Washington, DC 20555-0001

Subject: Duke Power Company LLC d/b/a Duke Energy Carolinas, LLC
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 and submitted on a frequency consistent with 10 CFR 50.71(e).

Any questions regarding this information should be directed to Allison Jones-Young, Regulatory Compliance, at (803) 831-3051.

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.

James R Morris

James R. Morris

Attachment

A001

NRR

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bxc: w/o attachment
NCMPA-1
NCEMC
SREC
PMPA

w/attachment

Electronic Licensing Library	EC050
RGC File	CN01RC
Master File CN-801.01	CN04DM

Technical Specification Bases 3.4.15
Reactor Coolant System Leakage Detection Instrumentation

Replace the following pages of Technical Specification Bases 3.4.15 with the revised pages. The revised pages contain marginal lines indicating the areas of change.

<u>**Remove**</u>	<u>**Insert**</u>
LIST OF EFFECTIVE PAGES	
Page 22	Page 22
TAB 3.4	
B 3.4.15-1 through B 3.4.15-9	B 3.4.15-1 through B 3.4.15-10

DUKE ENERGY CORPORATION
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September 24, 2007

Re: Catawba Nuclear Station
Technical Specifications Bases

Please replace the corresponding pages in your copy of the Catawba Technical Specifications Manual as follows:

<u>REMOVE THESE PAGES</u>		<u>INSERT THESE PAGES</u>
	LIST OF EFFECTIVE PAGES	
Page 22		Page 22
	TAB 3.4	
B 3.4.15-1 thru **B** 3.4.15-9		**B** 3.4.15-1 thru **B** 3.4.15-10

If you have any questions concerning the contents of this Technical Specification update, contact Betty Aldridge at (803)831-3758.

FOR

Randy Hart
Manager, Regulatory Compliance

Page Number	Amendment	Revision Date
B 3.4.7-2	Revision 1	7/29/03
B 3.4.7-3	Revision 4	1/13/05
B 3.4.7-4	Revision 2	7/29/03
B 3.4.7-5	Revision 2	7/29/03
B 3.4.8-1	Revision 1	7/29/03
B 3.4.8-2	Revision 2	7/29/03
B 3.4.8-3	Revision 2	7/29/03
B 3.4.9-1	Revision 0	9/30/98
B 3.4.9-2	Revision 0	9/30/98
B 3.4.9-3	Revision 0	9/30/98
B 3.4.9-4	Revision 1	4/27/99
B 3.4.10-1	Revision 1	3/4/04
B 3.4.10-2	Revision 0	9/30/98
B 3.4.10-3	Revision 1	3/4/04
B 3.4.10-4	Revision 1	3/4/04
B 3.4.11-1	Revision 0	9/30/98
B 3.4.11-2	Revision 1	11/5/03
B 3.4.11-3	Revision 3	4/29/04
B 3.4.11-4	Revision 1	11/5/03
B 3.4.11-5	Revision 0	9/30/98
B 3.4.11-6	Revision 0	9/30/98
B 3.4.11-7	Revision 0	9/30/98
B 3.4.12-1	Revision 1	3/4/04
B 3.4.12-2	Revision 1	3/4/04
B 3.4.12-3	Revision 1	3/4/04
B 3.4.12-4	Revision 1	3/4/04
B 3.4.12-5	Revision 1	3/4/04
B 3.4.12-6	Revision 1	3/4/04
B 3.4.12-7	Revision 1	3/4/04
B 3.4.12-8	Revision 2	4/29/04
B 3.4.12-9	Revision 2	4/29/04
B 3.4.12-10	Revision 2	4/29/04

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B 3.4.12-11	Revision 2	4/29/04
B 3.4.12-12	Revision 1	4/29/04
B 3.4.12-13	Revision 1	4/29/04
B 3.4.13-1	Revision 0	9/30/98
B 3.4.13-2	Revision 1	1/13/05
B 3.4.13-3	Revision 1	1/13/05
B 3.4.13-4	Revision 1	1/13/05
B 3.4.13-5	Revision 3	1/13/05
B 3.4.13-6	Revision 3	5/10/05
B 3.4.14-1	Revision 0	9/30/98
B 3.4.14-2	Revision 1	2/26/99
B 3.4.14-3	Revision 0	9/30/98
B 3.4.14-4	Revision 0	9/30/98
B 3.4.14-5	Revision 0	9/30/98
B 3.4.14-6	Revision 1	2/26/99
B 3.4.15-1	Revision 2	7/25/07
B 3.4.15-2	Revision 2	7/25/07
B 3.4.15-3	Revision 3	7/25/07
B 3.4.15-4	Revision 2	7/25/07
B 3.4.15-5	Revision 2	7/25/07
B 3.4.15-6	Revision 4	7/25/07
B 3.4.15-7	Revision 1	7/25/07
B 3.4.15-8	Revision 1	7/25/07
B 3.4.15-9	Revision 1	7/25/07
B 3.4.15-10	Revision 0	7/25/07
B 3.4.16-1	Revision 0	9/30/98
B 3.4.16-2	Revision 0	9/30/98
B 3.4.16-3	Revision 1	4/29/04
B 3.4.16-4	Revision 1	4/29/04
B 3.4.16-5	Revision 1	1/28/03
B 3.4.16-6	Revision 0	1/28/03
B 3.4.17-1	Revision 0	9/30/98
B 3.4.17-2	Revision 0	9/30/98

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B 3.4.17-3	Revision 1	5/19/00
B 3.4.18-1	Revision 0	1/13/05
B 3.4.18-2	Revision 0	1/13/05
B 3.4.18-3	Revision 0	1/13/05
B 3.4.18-4	Revision 0	1/13/05
B 3.4.18-5	Revision 0	1/13/05
B 3.4.18-6	Revision 0	1/13/05
B 3.4.18-7	Revision 0	1/13/05
B 3.4.18-8	Revision 0	1/13/05
B 3.5.1-1	Revision 0	9/30/98
B 3.5.1-2	Revision 0	9/30/98
B 3.5.1-3	Revision 2	10/06/05
B 3.5.1-4	Revision 3	10/06/05
B 3.5.1-5	Revision 3	10/06/05
B 3.5.1-6	Revision 2	10/06/05
B 3.5.1-7	Revision 2	10/06/05
B 3.5.1-8	Revision 2	10/06/05
B 3.5.2-1	Revision 0	9/30/98
B 3.5.2-2	Revision 0	9/30/98
B 3.5.2-3	Revision 1	10/02/00
B 3.5.2-4	Revision 0	9/30/98
B 3.5.2-5	Revision 0	9/30/98
B 3.5.2-6	Revision 0	9/30/98
B 3.5.2-7	Revision 0	9/30/98
B 3.5.2-8	Revision 1	5/17/04
B 3.5.2-9	Revision 1	2/26/99
B 3.5.2-10	Revision 0	9/30/98
B 3.5.3-1	Revision 0	9/30/98
B 3.5.3-2	Revision 1	4/29/04
B 3.5.3-3	Revision 1	4/29/04
B 3.5.4-1	Revision 0	9/30/98
B 3.5.4-2	Revision 0	9/30/98
B 3.5.4-3	Revision 2	10/06/05

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.15 RCS Leakage Detection Instrumentation

BASES

BACKGROUND

GDC 30 of Appendix A to 10 CFR 50 (Ref. 1) requires means for detecting and, to the extent practical, identifying the location of the source of RCS LEAKAGE. Regulatory Guide 1.45 (Ref. 2) describes acceptable methods for selecting leakage detection systems.

Leakage detection systems must have the capability to detect significant reactor coolant pressure boundary (RCPB) degradation as soon after occurrence as practical to minimize the potential for propagation to a gross failure. Thus, an early indication or warning signal is necessary to permit proper evaluation of all unidentified LEAKAGE.

One method of detecting leakage into the containment is the level instrumentation in containment floor and equipment (CFAE) sump A and CFAE sump B (Ref 3 and 5) and in the incore instrument sump (Ref 3). The CFAE sumps are small sumps located on opposite sides of the containment and outside of the crane wall. Any leakage in the lower containment inside the crane wall would fall to the floor and run via embedded floor drains to one of the two CFAE sumps. Any leakage outside the crane wall would fall to the floor and gravity drain to these sumps. The sump level rate of change, as calculated by the plant computer, would indicate the input rate. This method of detection would indicate in the Control Room a leak from any liquid system including the Reactor Coolant System and the Main Steam and Feedwater Systems. As leakage may go to either or both of the two CFAE sumps, a 1 gpm sump input (cumulative between sumps A and B) is detectable in 1 hour after leakage has reached the sumps. During periods of pump down of the CFAE sumps, the CFAE level instrumentation remains OPERABLE since operating experience has shown that this process typically takes only minutes to complete. The incore instrument sump level alarm offers another means of detecting leakage into the containment (Ref 3 and 5). The incore instrument sump level instrumentation provides an alarm on the plant computer when the sump level increases to the Hi level. The incore instrument sump level instrumentation is capable of detecting 1 gpm input within four hours after leakage has reached the sump.

BASES

BACKGROUND (continued)

The environmental conditions during plant power operations and the physical configuration of lower containment will delay the total reactor coolant system leakage (including steam) from directly entering the CFAE sump and subsequently, will lengthen the sump's level response time. Therefore, leakage detection by the CFAE sump will typically occur following other means of leakage detection. Operating experience with high enthalpy primary and secondary water leaks indicates that flashing of high temperature liquid produces steam and hot water mist that is readily absorbed in the containment air. Much of the hot water that initially hits the containment floor will evaporate in a low relative humidity environment as it migrates towards a sump. Local low points along the containment floor provide areas for water to form shallow pools that increase transport time to one or more building sumps. The net effect is that only a fraction of any high enthalpy water leakage will eventually collect in a sump and early leak detection may rely on alternate methods.

The containment ventilation unit condensate drain tank (CVUCDT) level monitor offers another means of detecting leakage into the containment. An abnormal level increase would indicate removal of moisture from the containment by the containment air coolers. The plant computer calculates the rate of change in level to detect a tank input of 1 gpm after condensate has reached the tank.

The reactor coolant contains radioactivity that, when released to the containment, can be detected by radiation monitoring instrumentation. U.S. NRC Regulatory Guide (RG) 1.45, "Reactor Coolant Pressure boundary Leakage Detection Systems," describes acceptable methods of implementing the requirements for leakage detection systems. Although RG 1.45 is not a license condition, it is generally accepted for use to support licensing basis. RG 1.45 states that instrument sensitivities of 10^{-9} μCi/cc radioactivity for air particulate monitoring are practical for leakage detection systems. The particulate monitor at Catawba meets or exceeds this accepted sensitivity.

RG 1.45 also states that detector systems should be able to respond to a one gpm, or its equivalent, leakage increase in one hour or less. The particulate monitor at Catawba has demonstrated the capability of detecting a 1.0 gpm leak within one hour at the sensitivity recommended in Regulatory Guide 1.45 using the RCS corrosion product activities from the UFSAR. Lower RCS activities will result in an increased detection time. Since the particulate monitor meets the specified 10^{-9} μCi/cc sensitivity, they are designed in accordance with RG 1.45.

BASES

BACKGROUND (continued)

The plant computer (Operator Aid Computer (OAC)) is used to provide the alarm for RCS Leakage Detection. The actual OAC alarm setpoints are set as low as practicable, considering the actual concentration of radioactivity in the RCS and the containment background radiation concentration. The OAC alarm setpoint (for detector OPERABILITY) will be less than or equal to the projected containment activity indication following a one gpm leak from steady state conditions. An OAC alarm setpoint administrative limit will be established based on RCS activity at 5% Reactor Power. The OAC setpoint is established as both a background threshold and a rate of change threshold. Both thresholds must be met to receive the OAC alarm. The administrative limit for background setting is 2000 counts per minute (cpm) and the administrative limit for rate of change setting is 20 counts per minute per minute (cmm). The administrative limit may be increased based on operating history and the number of spurious alarms but must be maintained less than the OPERABILITY limit. The OPERABILITY limit (i.e., highest allowable setting) of the OAC alarm setpoint is based on the present Reactor Power. The background setting limit is equal to 400 times Reactor Power (cpm setpoint). The rate of change setting limit is equal to 4 times Reactor Power (cmm setpoint). If both settings are equal to or less than the setting limit for the present Reactor Power, the OAC alarm should be considered OPERABLE.

The OPERABILITY of the particulate monitor and OAC alarm is based upon an instrument sensitivity $\geq 10^{-9}$ μCi/cc, a Channel Check performed at a frequency of every 12 hours, a Channel Operational Test performed at a frequency of every 92 days, a Channel Calibration performed at a frequency of every 18 months, and both settings of the OAC alarm equal to or less than the prescribed setting limit for the present Reactor Power.

An increase in humidity of the containment atmosphere would indicate release of water vapor to the containment. Dew point temperature measurements can thus be used to monitor humidity levels of the containment atmosphere as an indicator of potential RCS LEAKAGE. A 1°F increase in dew point is well within the sensitivity range of available instruments. Since the humidity level is influenced by several factors, a quantitative evaluation of an indicated leakage rate by this means may be questionable and should be compared to observed increases in liquid level into the CFAE and condensate level from air coolers. Humidity level monitoring is considered most useful as an indirect alarm or indication to alert the operator to a potential problem. Humidity monitors are not required by this LCO.

BACKGROUND (continued)

Air temperature and pressure monitoring methods may also be used to infer unidentified LEAKAGE to the containment. Containment temperature and pressure fluctuate slightly during plant operation, but a rise above the normally indicated range of values may indicate RCS leakage into the containment. The relevance of temperature and pressure measurements are affected by containment free volume and, for temperature, detector location. Alarm signals from these instruments can be valuable in recognizing rapid and sizable leakage to the containment. Temperature and pressure monitors are not required by this LCO.

The volume control tank (VCT) level change offers another means of detecting leakage into containment (Ref 3). This enhances the diversity of the leakage detection function as recommended in Regulatory Guide 1.45 (Ref 2). The VCT level instrumentation is not required by, nor can be credited for, this LCO.

Once any alarm or indication of leakage is received from the RCS leakage detection instrumentation, control room operators quickly evaluate all available system parameters to assess RCS pressure boundary integrity. These include VCT and pressurizer level indications and, if appropriate, the RCS mass balance calculation. Response to RCS leakage is addressed by LCO 3.4.13, "RCS Operational LEAKAGE."

APPLICABLE SAFETY ANALYSES

The need to evaluate the severity of an alarm or an indication is important to the operators, and the ability to compare and verify with indications from other systems is necessary. The system response times and sensitivities are described in the UFSAR (Ref. 3 and 6). Multiple instrument locations are utilized, if needed, to ensure that the transport delay time of the leakage from its source to an instrument location yields an acceptable overall response time.

The safety significance of RCS LEAKAGE varies widely depending on its source, rate, and duration. Therefore, detecting and monitoring RCS LEAKAGE into the containment area is necessary. Quickly separating the identified LEAKAGE from the unidentified LEAKAGE provides quantitative information to the operators, allowing them to take corrective action should a leakage occur detrimental to the safety of the unit and the public.

RCS leakage detection instrumentation satisfies Criterion 1 of 10 CFR 50.36 (Ref. 4).

BASES

LCO

One method of protecting against large RCS leakage derives from the ability of instruments to rapidly detect extremely small leaks. This LCO requires instruments of diverse monitoring principles to be OPERABLE to provide a high degree of confidence that extremely small leaks are detected in time to allow actions to place the plant in a safe condition, when RCS LEAKAGE indicates possible RCPB degradation.

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the containment floor and equipment sump level monitors and the incore instrument sump level alarm, the particulate radioactivity monitor, and the CVUCDT level monitor provide an acceptable minimum.

APPLICABILITY

Because of elevated RCS temperature and pressure in MODES 1, 2, 3, and 4, RCS leakage detection instrumentation is required to be OPERABLE.

Since RCS radioactivity level is significantly lower in MODES 2, 3, and 4, the containment atmosphere particulate monitor is not a reliable means of detecting RCS leakage in these MODES. Thus the LCO applies to this monitor in MODE 1 only and leakage detection capability in MODES 2, 3, and 4 is accomplished by the diverse means provided by the CFAE sump level monitors, the incore instrument sump level alarm, and the CVUCDT level monitor.

In MODE 5 or 6, the temperature is to be ≤ 200°F and pressure is maintained low or at atmospheric pressure. Since the temperatures and pressures are far lower than those for MODES 1, 2, 3, and 4, the likelihood of leakage and crack propagation are much smaller. Therefore, the requirements of this LCO are not applicable in MODES 5 and 6.

ACTIONS

A Note has been added to the ACTIONS to clarify the application of Completion Time rules. Separate Condition entry is allowed for each instrument. The Completion Time of the inoperable instrument will be tracked separately for each instrument starting from the time the Condition was entered for that instrument.

ACTIONS (continued)

A.1 and A.2

With the required containment floor and equipment sump level monitor inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere particulate radioactivity monitor will provide indications of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS water inventory balance, SR 3.4.13.1, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage.

Required Action A.1 is modified by a Note that states the RCS water inventory balance is not required to be performed until 12 hours after establishment of steady state operation in accordance with SR 3.4.13.1. This Note allows exceeding the 24-hour completion time during non-steady state operation.

Restoration of the required containment floor and equipment sump level monitor to OPERABLE status within a Completion Time of 30 days is required to regain the function after the monitor's failure. This time is acceptable, considering the Frequency and adequacy of the RCS water inventory balance required by Required Action A.1.

B.1 and B.2

With the containment atmosphere particulate radioactivity monitor inoperable, alternative action is required. Either water inventory balances, in accordance with SR 3.4.13.1, must be performed or grab samples of the containment atmosphere must be taken and analyzed to provide alternate periodic information.

Required Action B.1 is modified by a Note that states the RCS water inventory balance is not required to be performed until 12 hours after establishment of steady state operation in accordance with SR 3.4.13.1. This Note allows exceeding the 24 hour Completion Time during non-steady state operation.

With a water inventory balance performed or grab samples obtained and analyzed every 24 hours, continued operation is allowed since diverse indications of RCS LEAKAGE remains OPERABLE. The 24 hour interval provides periodic information that is adequate to detect leakage.

BASES

ACTIONS (continued)

C.1.1, C.1.2, C.1.3, and C.2

With the CVUCDT level monitor inoperable, alternative action is again required. Either a water inventory balance, in accordance with SR 3.4.13.1; or grab samples obtained and analyzed at a frequency of 24 hours; or SR 3.4.15.1, CHANNEL CHECK, of the containment atmosphere particulate radioactivity monitor at 8-hour intervals, must be performed to provide alternate periodic information. Required Action C.1.1 is modified by a Note that states the RCS water inventory balance is not required to be performed until 12 hours after establishment of steady state operation in accordance with SR 3.4.13.1. This Note allows exceeding the 24-hour completion time during non-steady state operation.

Provided a water inventory balance is performed every 24 hours; or grab samples taken and analyzed every 24 hours; or a CHANNEL CHECK of the containment atmosphere particulate radioactivity monitor is performed every 8 hours, reactor operation may continue while awaiting restoration of the CVUCDT level monitor to OPERABLE status. The 24 and 8 hour intervals provide periodic information that is adequate to detect RCS LEAKAGE.

During Modes 2, 3, and 4, restoration of the CVUCDT level monitor to OPERABLE status within a Completion Time of 30 days is required to regain the function after the monitor's failure. This time is acceptable, considering the Frequency and adequacy of the alternative actions required by Actions C.1.1, C.1.2, or C.1.3.

During Modes 2, 3, and 4, the two required leakage detection instrumentation systems are the CVUCDT level monitor and the CFAE sump level monitors. When the CVUCDT level monitor is inoperable, a plant shutdown after 30 days will ensure the plant will not operate with less than two leakage detection systems OPERABLE for an extended period of time. During Mode 1, the addition of the third leakage monitoring system from the containment atmosphere particulate radioactivity monitor provides additional leakage detection capability and no longer requires plant shutdown except as described in Condition D.

BASES

ACTIONS (continued)

D.1 and D.2

With the containment atmosphere particulate radioactivity monitor inoperable in MODE 1 and the containment ventilation unit condensate drain tank level monitor inoperable in MODE 1, the only means of detecting leakage is the containment floor and equipment sump level monitor and incore instrument sump level alarm. This Condition does not provide the required diverse means of leakage detection. The Required Action is to restore either of the inoperable required monitors to OPERABLE status within 30 days to regain the intended leakage detection diversity. The 30 day Completion Time ensures that the plant will not be operated in a reduced configuration for a lengthy time period.

E.1

With the incore sump level alarm inoperable, a water inventory balance, in accordance with SR 3.4.13.1, must be performed at an increased frequency of 24 hours to provide alternate periodic information that is adequate to detect leakage. Required Action E.1 is modified by a Note that states the RCS water inventory balance is not required to be performed until 12 hours after establishment of steady state operation in accordance with SR 3.4.13.1. This Note allows exceeding the 24-hour completion time during non-steady state operation.

F.1 and F.2

If a Required Action of Condition A, B, C, or D cannot be met, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

BASES

ACTIONS (continued)

G.1

With all required monitors inoperable, no automatic means of monitoring leakage are available, and immediate plant shutdown in accordance with LCO 3.0.3 is required. The required monitors during MODE 1 for LCO 3.0.3 entry are defined as the simultaneous inoperability of one CFAE level monitor, the containment atmosphere particulate radioactivity monitor, and the CVUCDT level monitor. The required monitors during MODES 2, 3, and 4 for LCO 3.0.3 entry are defined as the simultaneous inoperability of one CFAE level monitor and the CVUCDT level monitor. This condition does not apply to the incore instrument sump level alarm.

SURVEILLANCE REQUIREMENTS

SR 3.4.15.1

SR 3.4.15.1 requires the performance of a CHANNEL CHECK of the containment atmosphere particulate radioactivity monitor. The check gives reasonable confidence that the channel is operating properly. The Frequency of 12 hours is based on instrument reliability and is reasonable for detecting off normal conditions.

SR 3.4.15.2

SR 3.4.15.2 requires the performance of a COT on the containment atmosphere particulate radioactivity monitor. The test ensures that a signal from the monitor can generate the appropriate alarm associated with the detection of a minimum 1 gpm RCS leak. The desired alarm is derived from a digital database. Database manipulation concurrent with a signal supplied from the detector verifies the OPERABILITY of the required alarm. The Frequency of 92 days considers instrument reliability, and operating experience has shown that it is proper for detecting degradation.

SR 3.4.15.3, SR 3.4.15.4, SR 3.4.15.5, and SR 3.4.15.6

These SRs require the performance of a CHANNEL CALIBRATION for each of the RCS leakage detection instrumentation channels. The calibration verifies the accuracy of the instrument string, including the instruments located inside containment. The Frequency of 18 months is a typical refueling cycle and considers channel reliability. Again, operating experience has proven that this Frequency is acceptable.

BASES

REFERENCES

1. 10 CFR 50, Appendix A, Section IV, GDC 30.
2. Regulatory Guide 1.45.
3. UFSAR, Section 5.2.5.
4. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).
5. Catawba Safety Evaluation Report, Section 5.2.5.
6. UFSAR, Table 5-10.