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A Duke Energy Company

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July 27, 2005

U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
ATTENTION: Document Control Desk

Subject: Duke Energy Corporation

McGuire Nuclear Station, Units 1 and 2
Docket Nos. 50-369 and 50-370

Catawba Nuclear Station, Units 1 and 2
Docket Nos. 50-413 and 50-414

License Amendment Request for
McGuire and Catawba Technical Specification
3.4.15, RCS Leakage Detection Instrumentation,
and Associated Bases, and Applicable Sections of
the Updated Final Safety Analysis Reports

In accordance with the provisions of 10 CFR 50.90, Duke Energy Corporation (Duke) is hereby submitting a license amendment request (LAR) for Facility Operating Licenses NPF-9 and NPF-17 for McGuire Nuclear Station, Units 1 and 2, respectively; and NPF-35 and NPF-52 for Catawba Nuclear Station, Units 1 and 2, respectively. The proposed amendment would change TS 3.4.15 and its associated Bases, and the Updated Final Safety Analysis Reports (UFSAR) Sections 1.7, 5.2.7, and 11.4.2 for McGuire; and Sections 1.7, 5.2.5, and 11.5.1 for Catawba. The changes proposed in this LAR address the incore instrument sump level instrumentation and the containment atmosphere radioactivity monitors and their compliance with Regulatory Guide 1.45.

The contents of this submittal package are as follows:

- An Affidavit is included within the cover letter.

A053

- Attachment 1a provides a marked copy of the existing McGuire TS and Bases. The marked copy shows the proposed changes.

- Attachment 1b provides a marked copy of the existing Catawba TS and Bases. The marked copy shows the proposed changes.

- Attachment 2 provides a Description of the Proposed Changes and Technical Justification.

- Pursuant to 10 CFR 50.92, Attachment 3 documents Duke's determination that this LAR contains No Significant Hazards Consideration.

- Pursuant to 10 CFR 51.22(c)(9), Attachment 4 provides the basis for the categorical exclusion of this LAR from the requirement to perform an environmental assessment or environmental impact statement.

Reprinted (clean) TS and Bases pages will be provided to the NRC prior to issuance of the approved amendments. The UFSAR changes, as identified above and discussed in detail in Attachment 2, will be implemented and provided to the NRC in accordance with 10 CFR 50.71(e).

Duke is requesting NRC review and approval of this LAR by August 1, 2006, and a 60-day implementation grace period is requested. The new SR 3.4.15.6 will be initially performed during the first refueling outage following implementation of the approved amendment.

In accordance with Duke administrative procedures and the Quality Assurance Program Topical Report, the changes contained in this LAR have been reviewed and approved by the McGuire and Catawba Plant Operations Review Committees and the Duke Nuclear Safety Review Board. Pursuant to 10 CFR 50.91, a copy of this LAR is being sent to the designated official of the State of North Carolina and the designated official of the State of South Carolina.

Inquiries on this request should be directed to J. S. Warren at (704) 875-5171.

Very truly yours,

G. R. Peterson

xc (with attachments):

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G. R. Peterson, being duly sworn, affirms that he is the person who subscribed his name to the foregoing statement, and that all matters and facts set forth herein are true and correct to the best of his knowledge.

G. R. Peterson

G. R. Peterson, Site Vice President

Subscribed and sworn to me: July 27, 2005

Freda K. Crump, Notary Public

My commission expires: August 17, 2006

SEAL

Attachment 1a

McGuire Units 1 and 2

Proposed Technical Specifications and Bases (Mark-up)

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.15 RCS Leakage Detection Instrumentation

(consisting of both containment floor and equipment sump level monitors and the incore instrument sump level alarm)

LCO 3.4.15 The following RCS leakage detection instrumentation shall be OPERABLE:

a. The containment ~~floor and equipment~~ sump level monitoring system;

b. One containment atmosphere ~~gaseous~~ particulate radioactivity monitor; and

c. One ~~Either the~~ containment ventilation unit condensate drain tank level monitor ~~or the containment atmosphere particulate radioactivity monitor~~.

------NOTE---------
Not required until 12 hours after establishment of steady state operation.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Containment ~~floor and equipment~~ sump level monitoring system inoperable.	A.1 Perform SR 3.4.13.1. ~~AND~~ OR A.2 ~~Restore containment floor and equipment sump level monitoring system to OPERABLE status.~~ Analyze grab samples of the containment atmosphere. OR A.3 Perform SR 3.4.15.1	Once per 24 hours ~~30 days~~ Once per 24 hours Once per 8 hours

(continued)

------ NOTE ------
Not required until 12 hours after establishment of steady state operation.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Containment atmosphere ~~gaseous~~ particulate radioactivity monitor inoperable. INSERT M1	B.1 Analyze grab samples of the containment atmosphere. OR B.2 Perform SR 3.4.13.1.	Once per 24 hours Once per 24 hours
~~C. Containment atmosphere particulate radioactivity monitor inoperable.~~ ~~AND~~ ~~Containment ventilation condensate drain tank level monitor inoperable.~~	~~C.1 Restore containment atmosphere particulate radioactivity monitor to OPERABLE status.~~ ~~OR~~ ~~C.2 Restore containment ventilation condensate drain tank level monitor to OPERABLE status.~~	~~30 days~~ ~~30 days~~ INSERT M2
~~D~~ E. Required Action and associated Completion Time not met.	~~D~~ E.1 Be in MODE 3. AND ~~D~~ E.2 Be in MODE 5.	6 hours 36 hours
~~E~~ F. All required monitors inoperable.	~~E~~ F.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.15.1	Perform CHANNEL CHECK of the ~~required~~ containment atmosphere radioactivity monitor. particulate	12 hours
SR 3.4.15.2	Perform COT of the ~~required~~ containment atmosphere radioactivity monitor. particulate	92 days
SR 3.4.15.3	Perform CHANNEL CALIBRATION of the ~~required~~ containment floor and equipment sump level ~~monitoring system.~~ monitors.	18 months
SR 3.4.15.4	Perform CHANNEL CALIBRATION of the ~~required~~ containment atmosphere radioactivity monitor. particulate	18 months
SR 3.4.15.5	Perform CHANNEL CALIBRATION of the ~~required~~ containment ventilation condensate drain tank level monitor.	18 months
SR 3.4.15.6	Perform CHANNEL CALIBRATION of the incore instrument sump level alarm.	18 months

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.

Replace with INSERT M3

~~The primary method of detecting leakage into the Containment is measurement of the Containment floor and equipment sump level. There are small sumps located on either side of the containment outside the crane wall. Any leakage would fall to the floor inside the crane wall and run by a sump drain line to one of the two sumps. Any leakage outside the crane wall would fall into the floor and gravity drain to these sumps. The sump level rate of change, as calculated by the plant computer, would indicate the leakage rate. This method of detection would indicate in the Control Room a water leak from either the Reactor Coolant System or the Main Steam and Feedwater Systems. A 1 gpm leak (cumulative in both sump A and B) is detectable in 1 hour.~~

INSERT M4

The containment ventilation unit condensate drain tank (CVCDT) level u ~~change~~ 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. ~~When the CVCDT is used as a leakage detection method, manual hourly logging of the CVCDT level and calculation of reactor coolant leakage (if CVCDT level shows > 1 gpm increase) are required to satisfy the LCO requirements.~~

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. Reactor coolant radioactivity levels will be low during initial reactor startup and for a few weeks thereafter, until activated corrosion products have been formed and fission products appear from fuel element cladding contamination or cladding defects. Instrument sensitivities of 10^{-9} μCi/cc radioactivity for particulate monitoring and of 10^{-6} μCi/cc radioactivity for~~

Replace with INSERT M5

BASES

BACKGROUND (continued)

Replace with INSERT M5 (Cont.)

~~gaseous monitoring are practical for these leakage detection systems. Radioactivity detection systems are included for monitoring both particulate and gaseous activities because of their sensitivities and rapid responses to RCS LEAKAGE. When either the particulate or gaseous radioactivity monitor is out of service for maintenance or failure, both monitors may be affected because they share common sample tubing and pump and flow instrumentation.~~

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. Ref. 7

CFAE

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 ~~containment floor and equipment~~ sump 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.

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.

INSERT M6

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~~). 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.

Refs. 3 and 8

BASES

APPLICABLE SAFETY ANALYSES (continued)

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).

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 particulate radioactivity monitor, and the CVUCDT

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the containment ~~floor and equipment~~ sump level monitoring system and a gaseous radioactivity monitor, ~~in combination with a containment ventilation condensate drain tank~~ level monitor ~~or particulate radioactivity monitor~~, provides 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.

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.1, ~~and~~ A.2, and A.3

and CVUCDT level monitor

With the containment ~~floor and equipment~~ sump level monitoring system inoperable, ~~no other form of sampling can provide the equivalent information; however,~~ the containment atmosphere radioactivity monitor particulate 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;

INSERT M7

ACTIONS (continued)

Replace with INSERT M7 (cont.)

~~Restoration of the containment floor and equipment sump level monitoring system 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

particulate

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

or

Replace with INSERT M8

~~With a sample obtained and analyzed or water inventory balance performed every 24 hours, continued operation is allowed since diverse indications of RCS LEAKAGE remain OPERABLE.~~

~~The 24 hour interval provides periodic information that is adequate to detect leakage.~~

D.1

~~C.1 and C.2~~

With two of the three RCS leakage detection instrumentation subsystems inoperable,

~~With the containment atmosphere particulate radioactivity monitor and the containment ventilation condensate drain tank level monitor inoperable, the only means of detecting leakage is the containment floor and equipment sump level monitoring system or the containment atmosphere gaseous monitor.~~ This Condition does not provide the required diverse means of leakage detection. The Required Action is to restore either of the inoperable 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.

is not available

E.1 and E.2 (~~D.1 and D.2~~)

, or D

If a Required Action of Condition A, B, ~~or~~ C 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)

F

~~E~~.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.

SURVEILLANCE REQUIREMENTS

SR 3.4.15.1

particulate

SR 3.4.15.1 requires the performance of a CHANNEL CHECK of the ~~required~~ containment atmosphere 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

particulate

SR 3.4.15.2 requires the performance of a COT on the ~~required~~ containment atmosphere radioactivity monitor. The test ensures that the monitor can perform its function in the desired manner. The test verifies the alarm setpoint and relative accuracy of the instrument string. 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, ~~and~~ 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.

REFERENCES

1. 10 CFR 50, Appendix A, Section IV, GDC 30.
2. Regulatory Guide 1.45.
3. UFSAR, Section 5.2.7.
4. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).
5. UFSAR, Table 18-1.
6. McGuire License Renewal Commitments MCS-1274.00-00-0016, Section 4.29, RCS Operational Leakage Monitoring Program.

INSERT M9

McGuire INSERTS

INSERT M1

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Containment ventilation unit condensate drain tank level monitor inoperable.	C.1 -------------NOTE-------------- Not required until 12 hours after establishment of steady state operation. ----------------------------------	
	Perform SR 3.4.13.1	Once per 24 hours
	OR	
	C.2 Analyze grab samples of the containment atmosphere.	Once per 24 hours
	OR	
	C.3 Perform SR 3.4.15.1.	Once per 8 hours.

INSERT M2

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Two of the three RCS leakage detection instrumentation subsystems inoperable.	D.1 Restore at least two of the three RCS leakage detection instrumentation subsystems to OPERABLE status.	30 days

McGuire INSERTS

INSERT M3

One method of detecting leakage into the containment is the containment sump level monitoring system. This system includes the level instrumentation in containment floor and equipment (CFAE) sump A and CFAE sump B (Refs 3 and 7) 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 that falls to the floor will drain through crane wall penetrations at floor level to one of the two 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 (Ref 8). The incore instrument sump level alarm offers another means of detecting leakage into the containment (Ref 3). The incore instrument sump level instrumentation provides a control room alarm and 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 (Ref 8).

INSERT M4

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.

McGuire INSERTS

INSERT M5

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 McGuire meets or exceeds this accepted sensitivity.

RG 1.45 also states that detector systems should be able to respond to a one gpm leak, or its equivalent, in one hour or less. The particulate monitor at McGuire has demonstrated capabilities 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 monitors meet the specified 10^{-9} μCi/cc sensitivity, they are designed in accordance with RG 1.45. The actual alarm setpoints are set as low as practicable, considering the actual concentration of radioactivity in the RCS and the containment background radiation concentration.

The operability of the particulate monitor 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, and a Channel Calibration performed at a frequency of every 18 months.

INSERT M6

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."

McGuire INSERTS

INSERT M7

or grab samples of the containment atmosphere must be taken and analyzed at a frequency of 24 hours; or SR 3.4.15.1, CHANNEL CHECK, of the containment atmosphere particulate radioactivity monitor performed at a frequency of 8 hours.

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.

With a water inventory balance performed or a sample obtained and analyzed every 24 hours, or a CHANNEL CHECK performed every 8 hours, continued operation is allowed since diverse indications of RCS LEAKAGE remain OPERABLE.

INSERT M8

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 remain OPERABLE. The 24 hour interval provides periodic information that is adequate to detect leakage.

C.1, C.2, and C.3

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 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

McGuire INSERTS

INSERT M8 (Continued)

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.

INSERT M9

7. McGuire SER, Section 5.2.5

8. UFSAR, Table 5-30

Attachment 1b

Catawba Units 1 and 2

Proposed Technical Specifications and Bases (Mark-up)

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.15 RCS Leakage Detection Instrumentation

LCO 3.4.15 The following RCS leakage detection instrumentation shall be OPERABLE:

a. ~~One~~ *The* containment sump ~~floor and equipment sump~~ level ~~monitor~~ *monitoring system (consisting of both containment floor and equipment sump level monitors and the incore instrument sump level alarm)*;

b. One containment atmosphere *particulate* radioactivity monitor; ~~(gaseous or particulate);~~ and

c. One containment ventilation unit condensate drain tank level monitor.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Containment sump ~~Required containment floor and equipment sump~~ level ~~monitor~~ *monitoring system* inoperable.	A.1 -------------------------------- *- NOTE -* *Not required until 12 hours after establishment of steady state operation.* -------------------------------- Perform SR 3.4.13.1.	Once per 24 hours
	~~AND~~ *OR*	
	A.2 Analyze grab samples of the containment atmosphere. ~~Restore required containment floor and equipment sump level monitor to OPERABLE status.~~	*Once per 24 hours* ~~30 days~~
	OR	
	A.3 Perform SR 3.4.15.1.	*Once per 8 hours*

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. ~~Required~~ Containment atmosphere *particulate* radioactivity monitor inoperable.	B.1 ---------------------------------- ***- NOTE -*** *Not required until 12 hours after establishment of steady state operation* -------------------------------- Perform SR 3.4.13.1 .	Once per 24 hours
	<u>OR</u>	
	B.2 Analyze grab samples of the containment atmosphere	Once per 24 hours
C. ~~Required containment~~ *Containment* ventilation unit condensate drain tank level monitor inoperable.	C.1 ---------------------------------- ***- NOTE -*** *Not required until 12 hours after establishment of steady state operation* -------------------------------- Perform SR 3.4.13.1.	Once per 24 hours
	<u>OR</u>	
	C.2 *Analyze grab samples of the containment atmosphere.*	*Once per 24 hours*
	<u>OR</u>	
	C.3 Perform SR 3.4.15.1.	Once per 8 hours

ACTIONS (continued)

D. *Two of the three RCS leakage detection instrumentation subsystems inoperable* ~~Required containment atmosphere radioactivity monitor inoperable.~~ ~~AND~~ ~~Required containment ventilation unit condensate drain tank level monitor inoperable.~~	D.1 *Restore at least two of the three RCS leakage detection instrumentation subsystems to OPERABLE status* ~~Restore required containment atmosphere radioactivity monitor to OPERABLE status.~~ ~~OR~~ ~~D.2 Restore required containment ventilation unit condensate drain tank level monitor to OPERABLE status.~~	30 days ~~30 days~~
E. Required Action and associated Completion Time not met.	E.1 Be in MODE 3. AND E.2 Be in MODE 5.	6 hours 36 hours
F. All required monitors inoperable.	F.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.15.1	Perform CHANNEL CHECK of the ~~required~~ containment atmosphere *particulate* radioactivity monitor.	12 hours
SR 3.4.15.2	Perform COT of the ~~required~~ containment atmosphere *particulate* radioactivity monitor.	92 days
SR 3.4.15.3	Perform CHANNEL CALIBRATION of the ~~required~~ containment floor and equipment sump level monitors.	18 months
SR 3.4.15.4	Perform CHANNEL CALIBRATION of the ~~required~~ containment atmosphere *particulate* radioactivity monitor.	18 months
SR 3.4.15.5	Perform CHANNEL CALIBRATION of the ~~required~~ containment ventilation unit condensate drain tank level monitor.	18 months
SR 3.4.15.6	*Perform CHANNEL CALIBRATION of the incore instrument sump level alarm.*	*18 months*

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.

~~The primary method of detecting leakage into the Containment is measurement of the Containment floor and equipment sump level. There are small sumps located on either side of the containment outside the crane wall. Any leakage would fall to the floor inside the crane wall and run by a sump drain line to one of the two 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 leakage rate. This method of detection would indicate in the Control Room a water leak from either the Reactor Coolant system or the Main Steam and Feedwater Systems. A 1 gpm leak (cumulative in both sump A and B) is detectable in 1 hour.~~

One method of detecting leakage into the containment is the containment sump level monitoring system. This system includes 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. 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

BASES

level. The incore instrument sump level instrumentation is capable of detecting 1 gpm input within four hours after leakage has reached the sump.

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 ~~change~~ *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 ~~leak~~ *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. ~~Reactor coolant radioactivity levels will be low during initial reactor startup and for a few weeks thereafter, until activated corrosion products have been formed and fission products appear from fuel element cladding contamination or cladding defects.~~ *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. The actual alarm setpoints are set as low as practicable, considering the actual concentration of radioactivity in the RCS and the containment background radiation concentration

The operability of the particulate monitor is based upon an instrument sensitivity ≥ 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, and a Channel Calibration performed at a frequency of every 18 months.

~~Instrument sensitivities of 10^{-10} μCi/cc radioactivity for particulate monitoring and of 10^{-7} μCi/cc radioactivity for gaseous monitoring are practical for these leakage detection systems. Radioactivity detection systems are included for monitoring both particulate and gaseous activities because of their sensitivities and rapid responses to RCS LEAKAGE.~~

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 ~~containment floor and equipment sump~~ *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.

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

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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

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APPLICABLE SAFETY ANALYSES (continued)

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).

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 ~~monitor~~ *monitoring system,* ~~in combination with a gaseous or particulate radioactivity monitor and a containment ventilation unit condensate drain tank level monitor, provides an acceptable minimum.~~ *the particulate radioactivity monitor, and the CVUCDT 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.

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.1, A.2, *and A.3*

With the ~~required~~ containment ~~floor and equipment~~ sump level ~~monitor~~ *monitoring system* inoperable, ~~no other form of sampling can provide the equivalent information; however,~~ the containment atmosphere *particulate* radioactivity monitor *and CVUCDT level monitor*

BASES

ACTIONS (continued)

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; *or grab samples of the containment atmosphere must be taken and analyzed at a frequency of every 24 hours; or SR 3.4.15.1, CHANNEL CHECK of the containment atmosphere particulate radioactivity monitor performed at a frequency of 8 hours.*

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.

With a water inventory balance performed, or a sample obtained and analyzed every 24 hours, or a CHANNEL CHECK every 8 hours, continued operation is allowed since diverse indication of RCS LEAKAGE remains OPERABLE.

~~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 ~~both gaseous and~~ the ~~particulate~~ containment atmosphere particulate radioactivity monitor ~~monitoring instrumentation channels~~ 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 ~~or water inventory balances, in accordance with SR 3.4.13.1 must be performed~~ 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

BASES

provides periodic information that is adequate to detect leakage.

~~With a sample obtained and analyzed or water inventory balance performed every 24 hours, continued operation is allowed if the containment ventilation unit condensate drain tank level monitor is OPERABLE.~~

~~The 24 hour interval provides periodic information that is adequate to detect leakage.~~

C.1, C.2, and C.3

~~With the required containment ventilation unit condensate drain tank level monitor inoperable, alternative action is again required. Either SR 3.4.15.1 must be performed or water inventory balances, in accordance with SR 3.4.13.1, must be performed to provide alternate periodic information. Provided a CHANNEL CHECK is performed every 8 hours or a water inventory balance is performed every 24 hours, reactor operation may continue while awaiting restoration of the containment ventilation unit condensate drain tank level monitor to OPERABLE status.~~

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 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.

~~The 24 hour interval provides periodic information that is adequate to detect RCS LEAKAGE.~~

BASES

ACTIONS (continued)

D.1 ~~and D.2~~

With two of the three RCS leakage detection instrumentation subsystems inoperable, ~~With the required containment atmosphere radioactivity monitor and the required containment ventilation unit condensate drain tank level monitor inoperable, the only means of detecting leakage is the containment floor and equipment sump level monitor. This Condition does not provide~~ the required diverse means of leakage detection *is not available.* 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 and E.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.

F.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.

SURVEILLANCE REQUIREMENTS

SR 3.4.15.1

SR 3.4.15.1 requires the performance of a CHANNEL CHECK of the ~~required~~ 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.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.15.2

~~SR 3.4.15.2 requires the performance of a COT on the required containment atmosphere radioactivity monitor. The test ensures that the monitor can perform its function in the desired manner. The test verifies the alarm setpoint and relative accuracy of the instrument string. The COT is relative to the detection of radioactivity indicative of a 1 gpm RCS leak, within one hour of leakage onset. The COT does not verify automatic actions associated with high radioactivity on the applicable channels. The Frequency of 92 days considers instrument reliability, and operating experience has shown that it is proper for detecting degradation.~~

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, ~~and~~ 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.

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*

Attachment 2

Description of Proposed Changes and Technical Justification

CONTENTS

Attachment 2

Description of Proposed Changes and Technical Justification

1.0 DESCRPTION

1.1 Introduction

Duke Energy Corporation (Duke) is submitting a license amendment request (LAR) applicable to the Technical Specifications and Facility Operating Licenses NPF-9 and NPF-17 for McGuire Nuclear Station, Units 1 and 2, respectively; and NPF-35 and NPF-52 for Catawba Nuclear Station, Units 1 and 2, respectively.

For McGuire, this LAR revises TS 3.4.15, RCS Leakage Detection Instrumentation, and its associated Bases; and Updated Final Safety Analysis Reports (UFSAR) Sections 1.7, Division 1 Regulatory Guides; 5.2.7, Reactor Coolant Pressure Boundary Leakage Detection System (and Table 5-30); and 11.4.2.2.4, Containment Airborne Monitor, for McGuire.

For Catawba, this LAR revises TS 3.4.15, RCS Leakage Detection Instrumentation, and its associated Bases; and UFSAR Sections 1.7.1, Regulatory Guides, 5.2.5, Detection of Leakage Through Reactor Coolant Pressure Boundary (and Table 5-10); and 11.5.1.2.2.2, Containment Airborne Monitor, for Catawba.

1.2 McGuire and Catawba TS and Bases Changes

Currently McGuire LCO 3.4.15 contains the following:

"The following RCS leakage detection instrumentation shall be OPERABLE:

a. The containment floor and equipment sump level monitoring system;

b. One containment atmosphere gaseous radioactivity monitor; and

c. Either the containment ventilation condensate drain tank level monitor or the containment atmosphere particulate radioactivity monitor."

Attachment 2

Description of Proposed Changes and Technical Justification

This LAR revises McGuire LCO 3.4.15 to state:

"The following RCS leakage detection instrumentation shall be OPERABLE:

a. The containment sump level monitoring system (consisting of both the containment floor and equipment sump level monitors and the incore instrument sump level alarm);

b. One containment atmosphere particulate radioactivity monitor; and

c. One containment ventilation unit condensate drain tank level monitor."

Currently Catawba LCO 3.4.15 contains the following:

"The following RCS leakage detection instrumentation shall be OPERABLE:

a. One containment floor and equipment sump level monitor;

b. One containment atmosphere radioactivity monitor (gaseous or particulate); and

c. One containment ventilation unit condensate drain tank level monitor."

This LAR revises Catawba LCO 3.4.15 to state:

"The following RCS leakage detection instrumentation shall be OPERABLE:

a. The containment sump level monitoring system (consisting of both the containment floor and equipment sump level monitors and the incore instrument sump level alarm);|

b. One containment atmosphere particulate radioactivity monitor; and

c. One containment ventilation unit condensate drain tank level monitor.

Condition A for McGuire and Catawba is being changed to be applicable to the containment sump monitoring system (which is now defined to include the incore instrument sump alarm) and the Required Action and Completion Time is being revised to be consistent with Condition C for the containment ventilation unit condensate drain tank level monitor. That is: perform SR 3.4.13.1, an RCS water inventory balance, within a Completion Time of 24 hours; or analyze grab samples of the containment atmosphere within 24 hours; or perform SR 3.4.15.1, CHANNEL CHECK, of the containment atmosphere radioactivity monitor within a Completion Time of 8 hours. In Required Action A.1, a Note states that SR 3.4.13.1 is not required to be performed until 12 hours after establishment of steady state operation. This is because the RCS water inventory balance must be performed with the reactor at steady state operating conditions and near operating pressure. The allowance of the proposed Note is consistent with NUREG-1431, "Standard Technical Specifications Westinghouse Plants," (STS) and SR 3.4.13 itself. For clarification, the Bases states this Note allows exceeding the 24-hour completion time during non-steady state operation.

Condition B for McGuire and Catawba is being changed to be applicable to the containment atmosphere particulate monitor instead of the gaseous monitor which is being removed from the TS. The same Note for SR 3.4.13.1 is being added to Required Action B.1.

Condition C for Catawba is being changed to delete "required," since there is only one containment ventilation unit condensate drain tank monitor. The same Note for SR 3.4.13.1 is being added to Required Action C.1. For consistency at McGuire, this requires the addition of a new CONDITION C along with Required Actions and Completion Times, as shown below.

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Description of Proposed Changes and Technical Justification

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Containment ventilation unit condensate drain tank level monitor inoperable.	C.1 -------------NOTE-------------- Not required until 12 hours after establishment of steady state operation. ---------------------------------- Perform SR 3.4.13.1	Once per 24 hours
	<u>OR</u>	
	C.2 Analyze grab samples of the containment atmosphere.	Once per 24 hours
	<u>OR</u>	
	C.3 Perform SR 3.4.15.1.	Once per 8 hours.

Condition D for McGuire and Catawba is being changed to address the condition where two of the three RCS leakage detection instrumentation subsystems are inoperable. The proposed revision for Condition D, with Required Action, and Completion Time is shown below.

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Two of the three RCS leakage detection instrumentation subsystems inoperable.	D.1 Restore at least two of the three RCS leakage detection instrumentation subsystems to OPERABLE status.	30 days

Surveillance Requirements (SR) 3.4.15.1, 3.4.15.2, and 3.4.15.4 are being clarified to indicate that they now apply to the particulate monitor. SR 3.4.15.1, 3.4.15.2,

3.4.15.3, 3.4.15.4, and 3.4.15.5 are being revised to remove "required," since there is only one each of the applicable leakage detection instrumentation subsystems. A new SR 3.4.15.6, Channel Calibration, is being added to apply to the incore instrument sump level alarm. The associated Bases are being adjusted to conform with the above changes. The Catawba Bases for SR 3.4.15.2 is also being clarified to add a description of the test to demonstrate the alarm operability.

Following approval and implementation of the changes contained in this LAR, TS 3.4.15 will be consistent at McGuire and Catawba.

1.3 Discussion of Proposed Changes

The current McGuire and Catawba TS 3.4.15 do not include either the incore instrument sump level alarm or the volume control tank (VCT) level instrumentation as subsystems of the RCS Leakage Detection Instrumentation. In regard to RCS leakage detection, neither of these subsystems are discussed in the associated Bases for TS 3.4.15, nor is there a detailed discussion of the incore instrument sump in the UFSAR. This LAR adds these two subsystems to the TS 3.4.15 Bases as additional diverse means of detecting reactor coolant system leakage and addresses the compliance with the applicable regulatory document, Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems," (RG 1.45). Additionally, the incore instrument sump level alarm, is being added to the containment sump level monitoring system, along with the current containment floor and equipment sump level monitors, as part of LCO 3.4.15.a.

Specifically, within this LAR, Duke is proposing to address the design basis considerations listed below.

- Add the incore instrument sump level alarm to LCO 3.4.15.a with a new SR 3.4.15.6 and discuss these in the Bases. The surveillance frequency of 18 months is consistent with that for the containment floor and equipment (CFAE) sump level monitoring instrumentation. The Bases discussion and the

forthcoming UFSAR revisions include this subsystem's degree of compliance with RG 1.45 as a diverse means of leakage detection.

- Remove the option to use the containment atmosphere gaseous radioactivity monitor for RCS leakage detection instrumentation. These current TS requirements are being transferred to the particulate monitor. The Bases discussion and the forthcoming UFSAR revisions include this subsystem's degree of compliance with RG 1.45 as a diverse means of leakage detection.

- Add a new Condition D which applies when two of the three RCS leakage detection instrumentation subsystems are inoperable. The intent of this change is to emphasize the diverse means available for leakage detection and establish an appropriate Required Action and Completion time.

- Add a VCT level change subsystem description to the Bases, with a statement that this system enhances the diversity of the leakage detection function as recommended in RG 1.45. This subsystem is not to be required by the LCO, similar to the current status of instrumentation for containment humidity, temperature, and pressure.

- Add to the Bases, a discussion of the containment environmental conditions during plant power operations and the physical configuration of lower containment in regard to the total reactor coolant system leakage (including steam) flow into the CFAE and incore instrument sumps, since this phenomenon lengthens the leakage detection response time. Also clarify that these conditions mean that reactor coolant system pressure boundary leakage detection by the CFAE and incore instrument sumps will typically occur following other means of leakage detection.

- Add to the Bases, a discussion of control room operator actions following an alarm or indication of RCS leakage.

2.0 TECHNICAL JUSTIFICATION

2.1 Background

Current TS 3.4.15 requires that the CFAE sump level monitoring instrumentation be operable to meet the TS requirements for the RCS leakage detection instrumentation. The Bases for this TS states that measurement of CFAE sump level serves as the primary method of detecting leakage into the containment. Additionally for McGuire, the current TS 3.4.15 requires that one containment atmosphere gaseous radioactivity monitor and either the containment ventilation condensate drain tank level monitor or the containment atmosphere particulate radioactivity monitor be operable as well. For Catawba, this LCO requires that one containment atmosphere radioactivity monitor (gaseous or particulate) and one containment ventilation unit condensate drain tank (CVUCDT) level monitor be operable as well. This LAR proposes changes to the current McGuire and Catawba TS requirements for each of the RCS leakage detection instrumentation subsystems. The revised TS places emphasis on providing diverse means to detect leakage rather than identifying a primary means as is currently the case with the CFAE sump monitoring system. Also, this LAR clarifies the role of additional diverse means (beyond the LCO requirements) that are available to the plant operators to detect RCS leakage.

The incore instrument sump level alarm has not been considered part of the operability requirements for TS 3.4.15. The McGuire UFSAR Section 5.2.7 and Catawba UFSAR Section 5.2.5 identify design features for detecting leakage inside containment. However, in describing the leakage detection systems, the UFSARs do not discuss the incore instrument area in detail, since leakage into the area is not expected under normal operating conditions- and actual operating experience confirms this. This LAR enhances the McGuire and Catawba licensing basis by adding

the incore sump level instrumentation to each plant's TS and Bases.

In 1973, the NRC provided guidance in Regulatory Guide 1.45 for detecting RCS leakage using containment atmosphere radiation monitors. Subsequent to the RG 1.45 guidance, the NRC has published clarification that instruments with a sensitivity of 10^{-9} μCi/cc for air particulate monitoring are designed in accordance with RG 1.45 position even for situations wherein the monitor's response exceeds the RG 1.45 position C.5 for a response time of 1 gpm within 1 hour (reference NRC enclosure dated July 18, 2002 ML021750004). Both McGuire and Catawba radiation particulate monitors meet or exceed the RG 1.45 sensitivity recommendation of 10^{-9} μCi/cc and, therefore, an exception is requested to the RG 1.45 recommendation to respond to a 1 gpm leak within 1 hour. This LAR revises the TS, Bases, and UFSARs to accurately reflect the capabilities of the atmosphere radioactivity monitors in regard to RG 1.45, and emphasize this subsystem's role in providing diverse means to detect RCS leakage.

2.2 Containment Sump Level Monitoring System

Several references are in this document that use the term "incore." For the purpose of this amendment, the incore instrument sump is in the corner of the incore instrument area and is located under the reactor vessel. This sump contains the incore instrument sump level instrumentation. The incore instrument room is outside the crane wall at the seal table. The incore instrument tunnel is the sloped space between the incore instrument area and the incore instrument room.

One method of detecting leakage into the containment is by measurement of the CFAE sump level. Sumps (A and B) are located on opposite sides of the containment outside the crane wall. Any leakage that falls to the floor inside the crane wall will drain through crane wall penetrations at floor level (at McGuire) or run through embedded floor drains (at Catawba) to one of the two sumps. Any leakage outside the crane wall that falls onto the floor will gravity drain to these sumps. The sump level rate of

change, as calculated by the operator aid computer (OAC), would indicate the leakage rate. This method of detection would indicate in the control room and may represent a water leak from either the Reactor Coolant System or the Main Steam and Feedwater Systems. A 1 gpm leak (cumulative in both sump A and B) is detectable within a time period of one hour after leakage has reached the sump.

Duke has determined that the existing level instrumentation in the incore instrument sump would not detect a 1 gpm leak within a one hour time period. Thus, the current incore instrument sump level alarm does not meet the requirements of RG 1.45, Position C.5. Neither does the instrumentation meet Position C.7 for indication in the control room, Position C.8 for testing during plant operation, nor prior to approval of this LAR, Position C.9 for inclusion in the plants' Technical Specifications. These exceptions are discussed further below. However, the existing instrumentation does provide detection of leakage as discussed in Position C.3. This LAR addresses these issues by adding the incore instrument sump level alarm to LCO 3.4.15.a, adding a discussion of the incore instrument sump level alarm to the TS 3.4.15 Bases, and by revising McGuire UFSAR Section 5.2.7 and Table 5-30 and Catawba UFSAR Section 5.2.5 and Table 5-10 to agree with the license bases changes contained in this LAR. The TS and Bases changes are included within this LAR submittal package. Appropriate changes to the plants' UFSARs will be submitted to the NRC in accordance with 10 CFR 50.71(e) and these changes will note the exceptions being taken to RG 1.45.

The Bases for TS 3.4.15 specifically discusses level instruments associated with the two CFAE sumps. RG 1.45 permits the use of various instrumentation to detect RCS leakage, with a sensitivity equivalent to 1 gpm within a one hour period. This is true for the CFAE sump level instrumentation, but not for the incore instrument sump level alarm. Although the incore instrument sump level alarm is not as sensitive as that of the CFAE sumps, a 1 gpm leak detection capability within less than three hours (once leakage has reached the sump) is available. In order to provide some margin, the McGuire and Catawba licensing bases are being changed to state a four-hour response time.

Attachment 2

Description of Proposed Changes and Technical Justification

The ability of the incore instrument sump subsystem to detect a primary system pressure boundary leak is not a current TS requirement. This LAR adds it to LCO 3.4.15.a and the Bases and forthcoming UFSAR revisions will discuss the exceptions in its capabilities to meet the RG 1.45 criteria. These exceptions are also identified within this LAR submittal document. The incore instrument sump alarm subsystem enhances the diversity of the RCS leakage detection function as permitted by RG 1.45.

For both McGuire and Catawba, the incore instrument sump level will alarm at a level of approximately 11" above the sump floor, and thus is capable of detecting a leak of approximately 170 gallons or a sump input rate of 1 gpm in approximately 2 hours 50 minutes, once leakage has reached the. The incore instrument sump level alarm provides a level indication alarm in the control room. Although leakage in this area is not typical, there are potential reactor coolant leak locations that would be indicated by the incore sump level. The alarm response for this leakage refers operators to TS 3.4.13, RCS Operational Leakage, for limiting conditions for operations with unidentified leakage. This sump level instrumentation will now be required by TS and will provide a means of detecting leakage into the incore instrument sump and an additional means of detecting reactor coolant system leakage. When accumulated liquid volume in the sump reaches the alarm level, leakage would be detectable by means of the level instrumentation as described above.

As described above, the incore instrument sump level alarm cannot detect a one gpm leak within one hour and is an exception to position C.5 of Regulatory Guide 1.45. The incore instrument sump level alarm does not provide indication to control room for converting to a common leakage equivalent, and is likewise an exception to position C.7. The incore instrument sump level alarm is located under the reactor vessel where radiation levels restrict all personnel access for testing of operability and calibration during plant operation, and thereby is an exception to position C.8. Based on the latter limitation, the surveillance frequency for the incore instrument sump alarm is being proposed as 18 months, coinciding with

refueling outages and consistent with that for the CFAE sump level monitoring instrumentation. In that leakage into the incore instrument area under the reactor vessel is not expected during normal plant operation, and that TS-controlled diverse means remain available for detection of leakage by means of the CFAE sump level monitor, the CVUCDT level monitor, and the containment atmosphere particulate radioactivity monitor, plus additional non-TS diverse means, these exceptions to the recommendations of Regulatory Guide 1.45 do not prevent the timely identification of any postulated reactor coolant pressure boundary leakage.

2.3 Containment Atmosphere Radioactivity Monitors

TS LCO 3.4.15 allows use of either the gaseous or the particulate monitor to satisfy the requirements for one containment atmosphere radioactivity monitor. Due to improved fuel integrity and resulting reduced RCS radioactivity levels, the gaseous channel of the containment atmosphere radiation monitor has become less effective for RCS leakage detection. Therefore, the gaseous monitor is being proposed for deletion from the TS. Following approval of this LAR, the containment atmosphere radioactivity monitoring requirement of LCO 3.4.15 will be fulfilled by the particulate channel. The containment atmosphere gaseous monitor will continue to be maintained and available at both McGuire and Catawba in accordance with normal non-TS equipment practices and procedures to provide additional diverse means of detecting a RCS leak to containment.

Regulatory Guide 1.45 states that instrument sensitivities of 10^{-9} μCi/cc radioactivity for air particulate monitoring are practical for leakage detection systems. As both McGuire and Catawba meet or exceed this accepted sensitivity, Duke proposes the operability of the

particulate monitors to be based upon the following conditions:

- Instrument sensitivity $\geq 10^{-9}$ μCi/cc
- Channel Check frequency every 12 hours
- Channel Operational Test frequency every 92 days
- Channel Calibration frequency every 18 months

RG 1.45 also states that detector systems should respond to a one gpm, or its equivalent, leakage increase in one hour or less. The particulate monitors at both McGuire and Catawba have demonstrated capabilities 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 as provided in the UFSAR. However, recently measured RCS activities are significantly lower than those provided in the USFAR. Lower RCS activities will result in an increased detection time. This LAR requests an exemption from the 1 gpm in one hour detection capability recommendation for the particulate monitors as stated in RG 1.45. Analyses based on measured RCS radioactivity concentrations from February 2005, current background levels in containment, and conservative particulate transmission assumptions, have been conducted. Based on probable operating conditions, the estimated time it would take for the containment atmosphere particulate monitor to detect a 1 gpm leak ranges from 1 to 10 hours, which corresponds to 100% power and hot zero power operating conditions. The 100% power condition is the most probable power level based on operating history.

Industry operating experience has shown particulate monitors to be effective in detecting primary system leakage and the current particulate monitors at McGuire and Catawba meet or exceed the accepted 10^{-9} μCi/cc sensitivity as stated in RG 1.45. Since the monitors meet the specified 10^{-9} μCi/cc sensitivity, they are designed in accordance with RG 1.45. Therefore, Duke requests an exemption from the response time objective of 1 gpm in 1 hour as stated in RG 1.45 and proposes that the instrument operability requirements be based on the conditions discussed above.

Description of Proposed Changes and Technical Justification

Following deletion of the gaseous channel from the LCO, as discussed above, additional diverse means of leakage detection will continue to be available to provide RCS leakage detection capability at both McGuire and Catawba.

2.4 Diverse Means of Detecting Reactor Coolant Leakage

The proposed changes to TS LCO 3.4.15 specify three diverse means of detecting RCS leakage: 1) the containment sump monitoring system (which will now include both the CFAE sumps and the incore instrument sump), 2) the containment atmosphere particulate radioactivity monitor, and 3) the CVUCDT. As itemized below, there are other existing considerations which contribute to the diverse capability the plant operators have to detect RCS leakage.

- McGuire and Catawba operating experience indicates that high temperature primary and secondary water leaks produce steam and hot water mist that is readily absorbed in the containment atmosphere. Much of the hot water that reaches the containment floor will evaporate in the low-humidity environment as it migrates to the containment sumps. The net effect is that any high enthalpy/high temperature system leakage is detectable in part by the containment atmosphere radioactivity monitor, the CVUCDT, and the CFAE and incore instrument sumps.

- Forced ventilation serves the incore instrument area under the reactor vessel for McGuire and Catawba. This ventilation is supplied to the area under the reactor vessel from the lower containment ventilation system. By maintaining forced ventilation, the air volume of the incore instrument area is replaced at a frequent rate. This provides for transportation of moisture and/or radioactivity with the return air to lower containment from any postulated reactor coolant system leak within this area, and the detection of leakage by either the CVUCDT monitor or the containment atmosphere radioactivity monitors.

- VCT level monitoring provides an additional diverse means for detection of reactor coolant pressure boundary leakage. A change in VCT level rate-of-change is detectable by control room operators as a potential leak in the reactor coolant pressure boundary.

The function of the CVUCDT in regard to RCS leakage detection is being clarified within this LAR to state that the leakage is detectable within the required response time after condensate has reached the tank, and for McGuire, strengthened by the addition of a new TS Condition, Required Actions, and Completion Time. Requirements for the containment atmosphere particulate radioactivity channel will remain in LCO 3.4.15 and these include the requirement to analyze grab samples or perform an RCS mass balance calculation (SR 3.4.13.1, which along with SR 3.4.15.1, Channel Check, will also now be required for an inoperable CVUCDT) once per 24 hours in case of inoperability. The proposed revisions to Condition A specifies Required Actions and Completion Times for the containment sump monitoring system that are consistent with these corresponding TS requirements for the other two RCS leakage detection subsystems. The mass balance calculation can provide the control room operators with indication of a 1 gpm leak. Further, there are other non-TS containment temperature and pressure instrumentation indications available in the control room and these contribute to the operators' ability to detect RCS leakage.

The changes proposed in this LAR emphasize a diverse approach to providing RCS leakage detection capability as encouraged by RG 1.45. Thus, the revised Condition A for the containment sump level monitoring system has a Required Action and Completion Time that does not require a plant shutdown. The proposed changes to TS 3.4.15 require that the 30-day shutdown requirement be invoked when two of the three leakage detection subsystems are inoperable (new Condition D). Duke considers the risk significance of the RCS leakage detection instrumentation to be low. The instrumentation systems covered by TS 3.4.15 are not modeled in either the McGuire or Catawba PRA, thus the proposed TS controls are considered to be appropriately

stringent based on the safety significance of these components.

2.5 Applicable Regulatory Criteria

General Design Criteria (GDC) 30, "Quality of Reactor Coolant Pressure Boundary", contained in Appendix A to 10 CFR 50, "General Design Criteria of Nuclear Power Plants", requires that a means be provided for detecting, and to the extent practical, identifying the location of the source of reactor coolant leakage. RG 1.45 describes acceptable methods of implementing this requirement with regard to the selection of leakage detection systems for the reactor coolant pressure boundary.

RG 1.45 is a part of the McGuire and Catawba licensing bases. The TS Bases states that RG 1.45 describes acceptable methods for selecting leakage detection systems, and both of the McGuire and Catawba UFSARs state that RG 1.45 was adopted with comment, the comment being related to seismic qualification and unrelated to the issue of instrumentation sensitivity.

RG 1.45 emphasizes the importance of early leak detection in the prevention of accidents and encourages improvements in leak detection techniques. The RG describes various acceptable methods of detecting RCS leakage including sump level, tank level, and gaseous and particulate radiation monitors. Although the RG does not attempt to describe all possible floor drain/sump arrangements, it is reasonable to conclude that the RG intends for the sump level instrumentation to reflect the cumulative leakage to the floor throughout the Containment Building. This would include the area inside the crane wall, the pipe chase, and the incore instrument area.

RG 1.45 further recognizes that some methods, such as radiation monitors may be ineffective during certain periods of operation. The RG recognizes that other detection methods may be developed although it does not explicitly suggest substitution of alternate methods in lieu of the recommended methods.

10 CFR 50.36 is the NRC regulation that addresses the content of TS at nuclear power plants. Following review of this regulation, Duke has determined that the incore instrument sump level alarm should be included in the McGuire and Catawba TS LCO 3.4.15.a and discussed in the associated Bases, since it contributes to ensuring the integrity of the reactor coolant pressure boundary.

The applicable section of the NRC Safety Evaluation Report for McGuire and Catawba is Section 5.2.5, Reactor Coolant Pressure Boundary Leakage Detection System.

Appropriate discussions that reflect the changes contained in this LAR will be added to the McGuire and Catawba UFSARs in accordance with 10 CFR 50.71(e).

2.6 Leak-Before-Break

In light of the RCS leakage detection capabilities of the containment incore instrument sump level alarm and the containment atmosphere radioactivity monitors, the technical bases for applying the leak-before-break concept to McGuire and Catawba were reviewed.

The leak-before-break analysis (LBB) for large diameter primary piping for McGuire was submitted by Reference 1 and approved by the NRC in Reference 2, and submitted for Catawba in References 3 and 4 and approved by the NRC in References 5 and 6. Each of these analyses calculated a leak through a postulated leakage flaw that is large relative to the sensitivity of the plants' leak detection systems, consistent with RG 1.45. That is, the capability of the incore instrument sump level alarm to detect a 1 gpm leak in four hours and the capability of the atmosphere particulate radioactivity monitor, as described above, is adequate to ensure identification of a leak bounded by the LBB methodology, since sufficient margin in initial leakage and flaw stability has been demonstrated.

The current structural design basis for the McGuire reactor coolant system (RCS) primary loops requires that pipe breaks be postulated as defined in the approved Westinghouse WCAP-8082 (Reference 7). The postulated pipe

break locations for the main coolant loop are identified in UFSAR Table 3-21. The leak rate predictions of Enclosure A of Reference 1, WCAP-10585 (Reference 8), which is McGuire's LBB analysis, identifies a critical flaw size of 29.33 inches long in the hot leg piping (2.31 inches thick) and establishes a postulated leak rate of 96 gpm using an initial through wall crack of 7.5 inches long. This provides a margin of approximately 4 between the critical flaw size and the postulated leakage flaw size, and a margin of 96 between the postulated leak rate and the present leak detection capacity identified as McGuire's licensing basis (i.e., the ability to detect leakage of 1 gpm within 1 hour as recommended by RG 1.45).

The current structural design basis for the Catawba reactor coolant system (RCS) primary loops requires that pipe breaks be postulated as defined in the approved Westinghouse WCAP-8082 (Reference 7). The postulated pipe break locations for the main coolant loop are identified in UFSAR Table 3-20. The leak rate predictions of Enclosure A of Reference 4, Westinghouse Topical Report WCAP-10546 (Reference 9), which is Catawba's LBB analysis, identifies a critical flaw size of 32.5 inches long in the cross over piping (2.61 inches thick) and establishes a postulated leak rate of 10 gpm using an initial through wall crack of 7.5 inches long. This provides a margin of greater than 4 between the critical flaw size and the postulated leakage flaw size and a margin of approximately 10 between the postulated leak rate and the present leak detection capacity identified as Catawba's licensing basis (i.e., the ability to detect leakage of 1 gpm within 1 hour as recommended by RG 1.45).

The underlying technical basis for LBB is based on a leak rate alone. Extension of the 1 hour timeframe discussed in RG 1.45 and the McGuire and Catawba LBB analyses does not affect the technical basis for the fracture mechanics analyses demonstrating LBB. There is no credible failure mechanism associated with the RCS piping/components that would lead to crack propagation from the reference leakage crack size of 7.5 in. to the critical flaw size in a short period of time. Fatigue, intergranular stress corrosion cracking, and primary water stress corrosion cracking are

relatively slow failure mode processes. Therefore, a crack producing a leak rate as predicted by the LBB analyses would not grow measurably under any of these individual or collective failure modes in a short period of time. Furthermore, the LBB analyses indicate that given the leakage crack size associated with a referenced leak (based on RG 1.45 leak rate detection capability of 1 gpm multiplied by a safety factor of 10), the crack is stable under the worst case design load combination of deadweight, pressure, thermal expansion, and seismic (SSE) loads. As indicated above, there is a factor of safety of approximately 4 between the reference leakage crack size and the critical crack size.

2.7 Precedent Licensing Actions

The following table summarizes previous approvals for leak detection response times for radioactivity monitors.

Plant	Date	Monitor response	Assumption
Byron and Braidwood	January 14, 2005 SER	1 gpm detection in 7.3 hours (particulate)	realistic activity levels
NRC response to 3 questions ML021750004	July 18, 2002	10^{-9} μCi/cc sensitivity for RG 1.45 compliance (particulate)	N/A
Indian Point 3	January 30, 2002 SER and October 25, 2001 letter	1 gpm detection in 4 to 7 hours (particulate) and 70 hours (gaseous)	Realistic activity levels
Crystal River	June 14, 1999 SER	1 gpm detection in 1 hour (particulate) and 14 hours (gaseous)	0.1 % failed fuel from plant environmental report

Plant	Date	Monitor response	Assumption
St Lucie	May 27, 1999 Safety Assessment	1 gpm detection in 18.1 hours (particulate) and 15.1 hours (gaseous)	0.1% failed fuel
Turkey Point	May 27, 1999 Safety Assessment	1 gpm detection in 1 hour (particulate) and 4 hours (gaseous)	1% failed fuel

A random sample of other Technical Specifications within the industry identified several plants[1] that rely upon only two leakage detection subsystems, and consequently, permit continuous plant operation with two leakage detection subsystems operable; with shutdown being required when only one leakage detection system is operable. McGuire and Catawba similarly propose to limit the plant shutdown requirement to conditions where there is only one leakage detection subsystem operable (i.e., two of the three leakage detection subsystems are inoperable).

3.0 CONCLUSION

Based on the above discussion, an effective RCS leakage detection system must depend on diverse methods of detection and these diverse methods must be able to detect significant Reactor Coolant System pressure boundary degradation as soon after occurrence as practical to minimize the potential for gross boundary failure. This LAR clarifies the alternate and diverse means available for RCS leakage detection at McGuire and Catawba. RG 1.45 recommends that the sensitivity and response time of each leakage detection system be adequate to detect a leakage rate, or its equivalent, of 1 gpm in less than one hour.

[1] Plants identified include Calvert Cliffs, Hatch, San Onofre, Brunswick, Farley, Braidwood, Byron, and Oconee.

Attachment 2

Description of Proposed Changes and Technical Justification

The RG recognizes that variables exist that make some methods of leakage detection ineffective and untimely under certain operating conditions so that diverse detection methods and consideration of delay time are appropriate and required. The design of the McGuire and Catawba RCS leakage detection system incorporates diverse methods of detection as currently required by TS 3.4.15 and emphasized by this LAR. Additionally other diverse methods of leakage detection are available, such as containment humidity, air temperature, and pressure monitoring. Further, the current UFSARs describe an additional method for leakage detection via changes in the VCT level, which uses as its basis, the makeup demand for the RCS. The VCT level change trend is very useful to the control room operators but is not required by the TS LCO 3.4.15.

The incore instrument sump is not currently covered by the TS, nor discussed in detail in the UFSARs, in regard to reactor coolant leakage detection; but it is concluded that it should be controlled by TS and included in the McGuire and Catawba licensing bases since it serves as a diverse means of detecting RCS leakage and contributes to ensuring the integrity of the reactor coolant pressure boundary. The changes proposed in this LAR enhances the McGuire and Catawba TS and licensing bases.

While the proposed amendment eliminates the gaseous channel from LCO 3.4.15, it results in a more restrictive requirement in the LCO for the containment atmosphere particulate radioactivity monitor for the particulate channel.

This LAR proposes additions that strengthen the TS controls for the McGuire and Catawba RCS leakage detection instrumentation. Following implementation of this LAR, the TS will continue to require diverse means of leakage detection with the capability to detect RCS leakage such that adequate margin is maintained with the NRC-approved LBB analyses for both McGuire and Catawba.

Attachment 2

Description of Proposed Changes and Technical Justification

4.0 REFERENCES

1. Letter, H. B. Tucker, Duke Power Company to H. R. Denton, U. S. Nuclear Regulatory Commission, SUBJECT: McGuire Nuclear Station, Docket Nos. 50-369 and 50-370, Pipe Break Criteria Relief for Reactor Coolant Loop, Dated August 30, 1985.

2. Letter, B. J. Youngblood, U. S. Nuclear Regulatory Commission, to H. B. Tucker, Duke Power Company, SUBJECT: McGuire Nuclear Station - Elimination of Large Primary Loop Pipe Ruptures, Dated May 8, 1986.

3. Letter, H. B. Tucker, Duke Power Company, to H. R. Denton, U. S. Nuclear Regulatory Commission, SUBJECT: Catawba Nuclear Station, Docket Nos. 50-413 and 50-414, Dated May 11, 1984.

4. Letter, H. B. Tucker, Duke Power Company to H. R. Denton, U. S. Nuclear Regulatory Commission, SUBJECT: Catawba Nuclear Station, Unit 1, Docket No. 50-413, Pipe Break Criteria Relief for Reactor Coolant Loop, Dated November 27, 1985.

5. Letter, E. G. Adensam, U. S. Nuclear Regulatory Commission, to H. B. Tucker, Duke Power Company, SUBJECT: Request for Exemption from a Portion of General Design Criterion 4 of Appendix A to 10 CFR Part 50 Regarding the Need to Analyze Large Primary Loop Pipe Ruptures as a Structural Design Basis for Catawba Nuclear Station, Unit 2, Dated April 23, 1985.

6. Letter, K. H. Jabbour, U. S. Nuclear Regulatory Commission, to H. B. Tucker, Duke Power Company, SUBJECT: Catawba Nuclear Station - Elimination of Large Primary Loop Pipe Ruptures, Dated April 7, 1987.

7. WCAP-8082 P-A, "Pipe Breaks for the LOCA Analysis of the Westinghouse Primary Coolant Loop," Class 2, January 1975.

8. WCAP-10585, "Technical Bases for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis for McGuire Units 1 and 2," (Westinghouse Proprietary Class 2), June 1984.

Attachment 2

Description of Proposed Changes and Technical Justification

9. Westinghouse Topical Report, WCAP-10546, "Technical Bases for Eliminating Large Primary Loop Pipe Ruptures as the Structural Design Basis for Catawba Units 1 and 2," (Westinghouse Proprietary Class 2), April 1984.

Attachment 3

No Significant Hazards Consideration Determination

Duke Energy Corporation (Duke) has made the determination that this license amendment request (LAR) involves No Significant Hazards Consideration through the application of the standards established by the NRC's regulations in 10 CFR 50.92. These three standards are discussed below.

1. Would implementation of the changes proposed in this LAR involve a significant increase in the probability or consequences of an accident previously evaluated?

   No. The changes contained in this LAR have been evaluated and determined to not increase the probability or consequences of an accident previously evaluated. The proposed changes do not make any hardware changes and do not alter the configuration of any plant structure, system, or component. The proposed changes: 1) remove the containment atmosphere gaseous radioactivity monitor as an option for meeting the operability requirements of TS 3.4.15 and replaces it with the particulate radioactivity monitor, 2) adds the incore instrument sump and its level instrumentation to the McGuire and Catawba licensing basis contained in the TS, the Bases, and the Updated Final Safety Analysis Reports, and 3) makes other low risk changes to TS 3.4.15. None of the containment Reactor Coolant System (RCS) leakage detection instrumentation systems are initiators of any accident; therefore, the probability of occurrence of an accident is not increased. The McGuire and Catawba licensing bases will continue to require diverse means of detecting reactor coolant system (RCS) leakage, thus ensuring that leakage due to cracks would continue to be identified prior to breakage and the plant would be shutdown accordingly. Therefore the consequences of an accident are not increased.

2. Would implementation of the changes proposed in this LAR create the possibility of a new or different kind of accident from any accident previously evaluated?

   No. The changes proposed in this LAR do not involve the use or installation of any equipment that is less conservative than that already installed and in use. No new or different system interactions are created and no new processes are introduced. The proposed changes will not introduce any new failure mechanisms, malfunctions, or accident initiators not already considered in the

design and licensing basis. The proposed changes do not affect any structure, system, or component associated with an accident initiator. Based on these considerations, the proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Would implementation of the changes proposed in this LAR involve a significant reduction in a margin of safety?

   No. The changes proposed in this LAR do not make any alteration to any RCS leakage detection components. The proposed changes only remove the containment atmosphere gaseous radioactivity monitors as an option for meeting the operability requirements for TS 3.4.15 and replace it with the more responsive particulate radioactivity monitor. Since the level of radioactivity in the McGuire and Catawba reactor coolant has become much lower than what was assumed in the original licensing bases, the gaseous channel can no longer detect a small RCS leak consistent with the plants' leak-before-break (LBB) analyses. Conservative additions are being made to TS 3.4.15 in order to include controls for the incore instrument sump level instrumentation and to require a plant shutdown when two of the three leakage detection subsystems are inoperable. The changes contained in the LAR are not risk significant since the RCS leakage detection instrumentation is not credited in the McGuire and Catawba probabilistic risk assessments. The proposed amendment continues to require diverse means of leakage detection equipment with the capability to promptly detect RCS leakage well within the margin of the LBB analyses. Based on this evaluation, the proposed changes do not involve a significant reduction in a margin of safety.

Conclusion

Based upon the preceding discussion, Duke has concluded that this LAR does not involve a significant hazards consideration.

Attachment 4

Environmental Assessment/Impact Statement

A review of this license amendment request has determined it would change a requirement with respect to the installation or use of a facility component located within the restricted area, as defined in 10 CFR 20. However, the proposed changes do not involve: (i) a significant hazards consideration (see Attachment 3), (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed changes meet the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with this license amendment request.