Duke Energy®

BRUCE H HAMILTON
Vice President
Oconee Nuclear Station

Duke Energy Corporation
ON01VP / 7800 Rochester Highway
Seneca, SC 29672

864 885 3487
864 885 4208 fax
bhhamilton@duke-energy.com

January 4, 2007

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555-0001

Subject: Duke Power Company LLC d/b/a Duke Energy Carolinas, LLC
Oconee Nuclear Site, Units 1, 2, and 3
Docket Numbers 50-269, 50-270, and 50-287
License Amendment Request for Removal of Gaseous Radioactivity Monitor from Technical Specifications (TSC 2006-03)

Duke Power Company LLC d/b/a Duke Energy Carolinas, LLC (Duke) hereby submits a license amendment request for the Oconee Nuclear Station (ONS) Renewed Facility Operating License (FOL) and Technical Specifications (TS) pursuant to 10 CFR 50.90. This request proposes to remove gaseous radioactivity monitoring from the Technical Specifications as an acceptable option for reactor coolant leakage detection.

The proposed change will not result in an undue risk to the health and safety of the public. There are no significant hazards considerations related to the proposed change. Also, no changes to the Updated Final Safety Analysis Report are required.

In accordance with Duke administrative procedures and the Quality Assurance Program Topical Report, these proposed changes have been reviewed and approved by the Plant Operations Review Committee and Nuclear Safety Review Board. Additionally, a copy of this license amendment request is being sent to the State of South Carolina in accordance with 10 CFR 50.91 requirements.

There are no commitments being made as a result of this amendment. Duke requests approval of this amendment by December 31, 2007. A 60 day implementation window is requested.

A001

Inquiries on this proposed amendment request should be directed to Russ Oakley of the Oconee Regulatory Compliance Group at (864) 885-3829.

Sincerely,

Bruce Hamilton

B. H. Hamilton, Vice President
Oconee Nuclear Site

Enclosures:

1. Oath and Affirmation
2. Evaluation of Proposed Change

Attachments:

1. Technical Specification – Mark Up
2. Technical Specification – Reprinted Pages
3. Technical Specifications Bases – Mark Ups
4. Technical Specifications Bases – Reprinted Pages

bc w/enclosures and attachments:

Mr. W. D. Travers, Regional Administrator
U. S. Nuclear Regulatory Commission - Region II
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, Georgia 30303

Mr. L. N. Olshan, Project Manager
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop O-14 H25
Washington, D. C. 20555

Mr. D. W. Rich
Senior Resident Inspector
Oconee Nuclear Site

Mr. Henry Porter, Director
Division of Radioactive Waste Management
Bureau of Land and Waste Management
Department of Health & Environmental Control
2600 Bull Street
Columbia, SC 29201

bcc w/enclosures and attachments:

B. G. Davenport
R. V. Gambrell
L. F. Vaughn
S. D. Capps
T. P. Gillespie
D. B. Coyle
J. A. Patterson
B. J. Acampora
P. A. Wells
R. L. Gill – NRI&IA
R. D. Hart – CNS
C. J. Thomas - MNS
NSRB, EC05N
ELL, EC050
File - T.S. Working
ONS Document Management

ENCLOSURE 1

AFFIDAVIT

AFFIDAVIT

Bruce H. Hamilton, being duly sworn, states that he is Vice President, Oconee Nuclear Site, Duke Power Company LLC d/b/a Duke Energy Carolinas, LLC, that he is authorized on the part of said Company to sign and file with the U. S. Nuclear Regulatory Commission this revision to the Renewed Facility Operating License Nos. DPR-38, DPR-47, and DPR-55; and that all statements and matters set forth herein are true and correct to the best of his knowledge.

Bruce Hamilton

B. H. Hamilton, Vice President
Oconee Nuclear Site

Subscribed and sworn to before me this 4th day of January, 2007

Sheila A Smith

Notary Public

My Commission Expires:

6-12-2013

Date

SEAL

ENCLOSURE 2

EVALUATION OF PROPOSED CHANGE

Subject: License Amendment Request to Revise Technical Specifications 3.4.15 and Associated Bases

1. DESCRIPTION
2. PROPOSED CHANGE
3. BACKGROUND
4. TECHNICAL ANALYSIS
5. REGULATORY SAFETY ANALYSIS
6. ENVIRONMENTAL CONSIDERATION

1.0 DESCRIPTION

Duke Power Company LLC d/b/a Duke Energy Carolinas, LLC (Duke) is submitting this request for amendment to Oconee Nuclear Station Renewed Facility Operating License (FOL) and Technical Specifications (TS) pursuant to 10 CFR 50.90. This License Amendment Request (LAR) proposes to modify Technical Specification 3.4.15 and associated bases to remove the gaseous radioactivity monitor from the specification as an acceptable alternative to the particulate radioactivity monitor for detection of Reactor Coolant System (RCS) leakage.

2.0 PROPOSED CHANGE

Oconee Technical Specification 3.4.15 currently imposes a Limiting Condition for Operation (LCO) requiring operability of two instrument channels for detection of RCS leakage. The first channel is containment normal sump level instrumentation and the second is a containment atmosphere radioactivity monitor. The containment atmosphere radioactivity monitor may be either a particulate monitor or a gaseous monitor. The proposed change will remove the gaseous radioactivity monitor (RIA 49) as one of two acceptable means for meeting the specification. This change also involves revision of the TS Bases. Changes are described below.

TS 3.4.15

LCO 3.4.15 will be revised to read as follows:

"The following RCS leakage detection instrumentation shall be OPERABLE:

a. One containment normal sump level indication; and
b. One containment atmosphere particulate radioactivity monitor."

TS Bases 3.4.15

The BACKGROUND of the Bases will be revised to remove all reference to gaseous monitoring. The last two sentences in the third paragraph will read as follows:

"An instrument sensitivity of 10^{-9} μCi/cc radioactivity for particulate monitoring is practical for this leakage detection system. A radioactivity detection system is included for monitoring particulate activity because of its sensitivity and rapid response to RCS leakage."

The LCO section of the Bases will be revised to remove all references to gaseous radioactivity monitoring. Operability requirements for the RCS leak detection instrumentation will be clarified in this section as well. The second paragraph will read as follows:

> "The LCO requirements are satisfied when instruments of diverse measurement means are operable. Thus, the containment normal sump level indication, in combination with a particulate (RIA-47) radioactivity monitor, provides an acceptable minimum."

A new paragraph will be added to the LCO section of the Bases to read as follows:

> "Conditions for operability require only that these instruments are in service and have met the acceptance criteria of their respective calibration procedures within the specified test frequency."

The ACTIONS section of the Bases will be revised to remove all references to gaseous radioactivity monitoring. The second sentence in the first paragraph of this section will read as follows:

> "As a result, a MODE change is allowed when the normal sump level indication and the required radiation monitor are inoperable."

Under the subheading B.1.1, B.1.2, and B.2 in the Bases, the first paragraph will be reworded as follows:

> "With the particulate containment atmosphere radioactivity monitoring instrumentation channel 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. With a sample obtained and analyzed or a water inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of the radioactivity monitor (RIA-47)."

The SURVEILLANCE REQUIREMENTS of the Bases will be revised to reflect the presence of a single containment atmosphere radioactivity monitor. The wording in the second sentence under the subheading SR 3.4.15.1 will be changed as follows:

> "The check gives reasonable confidence that the channel is operating properly."

3.0 BACKGROUND

General Design Criterion 30, "Quality of Reactor Coolant Pressure Boundary" of Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants", requires that means be provided for detecting and, to the extent practical, identifying the location of the source of reactor coolant leakage. 10 CFR 50.36 (c)(2)(ii)(A) requires that licensees have a Technical Specification LCO for installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary. For purposes of redundancy and diversity, Oconee Nuclear Station (ONS) has three instruments installed to meet these requirements. There are two reactor building atmosphere radioactivity monitoring instruments (one particulate and one gaseous) and one reactor building normal sump level instrument.

Regulatory Guide 1.45 states that the sensitivity and response time of each leakage detection system employed for unidentified leakage should be adequate to detect a leakage rate, or its equivalent, of one gpm in less than one hour. While not committed to RG 1.45 as part of the licensing basis, ONS has credited the capability to meet this leak detection performance criterion in analyses submitted and approved in support of a licensing position commonly referred to as "Leak Before Break (LBB)". The underlying premise of LBB is that piping systems are designed, constructed, and inspected such that any flaws in the piping welds would produce a detectable leak and result in plant shutdown long before the flaw could propagate to the extent that a catastrophic failure of the pressure boundary would occur. This position has, in turn, been used to support licensing actions related to various station activities such as Steam Generator Replacement modifications, Mark B Fuel design, Low Pressure Injection System modifications, and Reactor Building Emergency Sump modifications.

ONS, along with the rest of the nuclear industry, has implemented programs and activities to promote RCS cleanup and fuel leakage performance improvements over the life of the station which have greatly reduced the level of radioactivity in the RCS. At the low levels of radionuclides present in the RCS today, ONS has determined that the gaseous containment atmosphere radioactivity instrument currently installed does not meet the one gpm response time requirement discussed in the LBB submittals. This deficiency has been captured in the site's corrective action program. Immediate corrective action has been taken to ensure that RIA-49 is not credited as an acceptable alternative to RIA-47 to meet the Technical Specification LCO requirement for minimum number of RCS leakage detection channels.

The RCS leak detection capability assumed in the LBB analyses associated with the licensing bases noted above is not fully supported by the gaseous containment atmosphere

radioactivity instrument (RIA 49). Therefore, ONS is proposing to remove RIA-49 from the technical specifications as a credited instrument for meeting Technical Specification LCO 3.4.15. The instrument will remain in service and will be retained in the Maintenance Rule performance monitoring program.

4.0 TECHNICAL ANALYSIS

Technical Specification LCO 3.4.15 currently requires two "channels" of leakage detection instrumentation. One of those channels is required to be the containment normal sump level instrumentation. The second channel may be either the gaseous or particulate containment atmosphere radioactivity monitor. This proposed change to the Technical Specifications will remove the RIA 49 as an acceptable alternative to RIA 47 for satisfying the LCO. This change will retain the same number of required monitoring channels as before, since only one containment atmosphere monitor is currently required to be operable. After the change is implemented, the two required channels will continue to be met by the reactor building normal sump level instrumentation and RIA 47.

ONS has credited the capability to detect a one gpm RCS leak within one hour utilizing currently installed leak detection instrumentation as a basis for approval of several Leak Before Break (LBB) analyses. The LBB analyses have been used to support licensing actions on station modifications such as Mark B fuel design, Steam Generator replacements, Low Pressure Injection System cross-connect modifications, and Reactor Building Emergency Sump strainer replacements. RIA 49 does not have the required detection capability to meet this criterion. Removal of RIA 49 from the Technical Specification and the Bases will align the Technical Specification with other approved licensing bases for which LBB is credited.

The function of the existing leakage detection systems has not changed, nor has the ability of the installed instrumentation to perform that function. The leakage detection system instrumentation fully satisfies the requirements of 10 CFR 50 Appendix A, General Design Criterion 30, which does not delineate instrument sensitivity or response time requirements. The proposed change to Technical Specification LCO 3.4.15 fully satisfies the requirements of 10 CFR 50.36 (c) (2) (ii) (A), which requires only that the instrumentation be capable of detecting "a significant abnormal degradation of the reactor coolant pressure boundary".

The credited instrumentation after the change will have the capability to detect a leakage rate of one gpm in one hour in Mode 1. The particulate monitor is less sensitive to the effects of clean core operation than the gaseous monitor. The chemistry in the RCS during clean core operation is the primary reason for a gaseous detector's poor detection capability, since there is no gaseous release in the absence of failed fuel. On the other

hand, a clean RCS contains several corrosion products, including Co-58, Co-60, Na-24, Mn-56, and the activation product Fluorine – 18. F-18 accounts for most of the activity that the particulate monitor will see. Its concentration in the RCS is about two orders of magnitude higher than the highest concentration of corrosion products, and has similar beta energy, making it well within the detection capability of the particulate monitor.

Alarm response times are dependent on various factors, such as initial sump level and background radioactivity level in the reactor building. Control room alarms for the sump level instruments will actuate within 3 hours, and RIA-47 will alarm within several hours depending upon the setpoint. These alarm response times are sufficient to support LBB analyses, as flaw growth rates are slow, with growth time between leakage flaw size and critical flaw size typically measured in months or years.

Technical Specification operability requirements for these instruments (sump level as well as containment atmosphere monitors) is not defined by the sensitivity and response time requirements of RG 1.45 (ie, detection of 1gpm leakage in 1 hour). Rather, the instruments will be considered operable when they have met their respective calibration test acceptance criteria, regardless of operating mode.

The number of required channels of instrumentation presently required by Technical Specifications is not reduced by this proposed change. For this and other reasons discussed above, it is concluded that the proposed change will not increase the risk to the health and safety of the public.

5.0 REGULATORY SAFETY ANALYSIS

5.1 No Significant Hazards Consideration

Pursuant to 10 CFR 50.91, Duke has made the determination that this amendment request does not involve a significant hazards consideration by applying the standards established by the NRC regulations in 10 CFR 50.92. This ensures that operation of the facility in accordance with the proposed amendment would not:

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

   The removal of the gaseous containment atmosphere radioactivity monitor from TS as an acceptable alternative to the particulate containment atmosphere radioactivity monitor will not reduce the number of operable leak detection channels which the Technical Specification LCO currently provides.

The gaseous monitor which is being removed from Technical Specifications is the least sensitive and has the highest response time of the three available leakage monitors currently in the Technical Specification. The remaining particulate radioactivity monitor will provide greater leak detection capability by comparison. Therefore, removal of the gaseous radioactivity monitor from the Technical Specification LCO cannot increase the probability or consequence of an accident.

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

RCS leakage detection instrumentation functions to provide control room operators with information which is indicative of a degraded RCS pressure boundary. Removal of RIA 49 from TS will, in effect, remove the "weakest link" in the leakage detection system requirements of the LCO. It is important to note that RIA 49 will remain available. The change only removes it from the LCO, not from the plant. So, the result will be an enhanced capability for detecting RCS leakage in a timely manner. This enhancement, although small, could enable the operator to identify a precursor to a LOCA and take actions to safely shutdown the plant for repairs prior to actually experiencing a significant transient (LOCA). While the leakage detection system cannot prevent all LOCAs, these are accidents which have been evaluated in the UFSAR. In no case would this enhancement be capable of creating a new or different kind of accident than previously evaluated.

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

The proposed change does not reduce the number of instrument channels required by the LCO for the leakage detection system. The LCO will still ensure that both a normal sump level instrument and a containment atmosphere radioactivity instrument are operable as before. It only removes one available option for satisfying the requirement for a containment atmosphere radioactivity monitor. The remaining containment atmosphere radioactivity monitor has greater sensitivity and faster response time than the monitor that is being removed from the Technical Specification. No other plant equipment is affected by the proposed change. Thus, there is no adverse impact on the capability to detect an RCS leak. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

5.2 Applicable Regulatory Requirements/Criteria

The following statements are found in ONS licensing documentation and NRC regulations relative to reactor coolant system leakage detection by containment atmospheric monitoring:

5.2.1 Oconee Updated Final Safety Analysis Report (UFSAR) 3.1.16

"Reactor coolant pressure boundary integrity can be continuously monitored in the control room by surveillance of variation from normal conditions for the following:

1. Reactor Building temperature and sump level.
2. Reactor Building radioactivity levels."

5.2.2 Oconee Updated Final Safety Analysis Report (UFSAR) 5.2.3.10.3

"If the leak allows primary coolant into the containment atmosphere, additional leak detection is provided by the Reactor Building Process Monitoring System and the Reactor Building Area Monitoring System."

"Alarm indication for each sample point in these systems is in the control room."

5.2.3 Oconee Updated Final Safety Analysis Report (UFSAR) 5.2.3.10.5

"Leakage of reactor coolant into the reactor building during reactor operation will be detected by sump/tank levels, radioactivity, or both."

"Changes in the reactor coolant leakage rate in the reactor building may cause changes in the control room indication of the reactor building atmosphere particulate and gas radioactivities."

5.2.4 Oconee Updated Final Safety Analysis Report (UFSAR) Table 11-7

Channel Number: RIA-47
Function: Reactor Building Particulate
Detector Type: Plastic Beta Scint. - 1 1/8" x 5/8" x 0.1" T – 2.5" Pb Shield

MDC (Background Equivalent Concentration) and Sensitivity: 2.5 mr/hr=7.0 x 10^{-12} μCi/ml (3 SCFM Flow) - 3.31 x 10^{10} cpm/μCi/ml
Range: (10 – 1E7 cpm)

Channel Number: RIA-49
Function: Reactor Building Gas
Detector Type: Plastic Beta Scint. - 2" D x 0.1" T – 3" Pb Shield
MDC (Background Equivalent Concentration) and Sensitivity: 2.5 mr/hr=5.5 x 10^{-7} μCi/ml – 1.41 x 10^{7} cpm/μCi/ml
Range: (10 – 1E7 cpm)

5.2.5 LPI Cross-Connect Modification Technical Specification Change Request Safety Evaluation Report dated 9/29/03

"In Section 5 of Attachment 8 to the March 20, 2003 letter, the licensee addressed the leakage detection system for the purpose of demonstrating the acceptability of using 1 gpm as the minimum detectable leakage rate.

The LBB analysis is based upon the minimum detectable through-wall leakage for the applicable piping systems. The licensee stated that the RCS pressure boundary leak detection system is consistent with the guidelines of RG 1.45 such that a leakage of 1 gpm can be detected in an hour. Therefore, the licensee's LBB analysis uses the 1 gpm limiting condition for operation as an upper limit for RCS leakage."

"As a result of issues raised by the NRC staff during a May 1, 2003 meeting with the licensee, the licensee, in Attachment 1 to the July 22, 2003 letter, provided additional information related to the sensitivities of the airborne radioactivity detectors. The July 22, 2003 letter stated that the licensee performed a more thorough evaluation of airborne radioactivity monitor leak detection capability. This evaluation established that the particulate monitor is capable of detecting 1 gpm within 1 hour based on the most conservative (Unit 3) RCS radioactivity levels during normal operation. The licensee also stated that the gaseous radioactivity monitor was not capable of detecting 1 gpm within 1 hour. However, the licensee noted that the reactor building normal sump level monitor is capable of identifying a 1 gpm leak rate within 10 minutes, which is well below the 1 hour recommended by RG 1.45 and is well below the sensitivity (1 gpm) necessary to support the LBB analysis. The licensee also identified that continuous RCS leak monitoring is performed by observation of makeup

flow and letdown storage tank level. Additionally, an inventory balance is performed every 24 hours to quantify RCS leakage."

"Based on the NRC staff's review of the information provided by the licensee, the NRC staff concluded that the RCS leakage detection system at Oconee is consistent with the guidelines of RG 1.45 and that the air particulate radioactivity monitor and the normal sump level monitor have the necessary sensitivity and response time to support the licensee's LBB analysis."

5.2.6 B&W Topical Report BAW 1847, Rev. 1, "Leak-Before-Break Evaluation of Margins Against Full Break for RCS Primary Piping of B&W Designed NSS", September, 1985

"The leak rate used for determining the leakage flaw size was 10 gpm to provide a margin to the actual plant leakage detection system capabilities designed to meet Regulatory Guide 1.45 requirements of 1 gpm."

"The 10 gpm leak rate chosen for the large RCS piping is conservative, since plant leakage detection systems can detect leak rates of 1 gpm as required by B&WOG plant Technical Specifications and Regulatory Guide 1.45."

5.2.7 Safety Evaluation of B&W Owners Group Reports Dealing With Elimination of Postulated Pipe Breaks In PWR Primary Main Loops, December 12, 1985

"B&WOG facilities have an RCS pressure boundary leak detection system which is consistent with the guidelines of Regulatory Guide 1.45 such that leakage of one (1) gpm in one hour can be detected."

5.2.8 10 CFR 50.36 (c)(2)(ii)(A)

This regulation requires that Technical Specifications include a limiting condition for operation for installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

5.2.9 10 CFR 50 Appendix A

Design Criterion 30 requires that means be provided for detecting and, to the extent practical, identifying the location of the source of reactor coolant leakage.

These requirements and criteria relative to the leakage detection system at ONS are unaffected by the proposed amendment and all will continue to be met. It is noted for clarification that the discussion of normal sump level instrumentation leak detection capability in section 5.2.5 above reflects only the response of the instrument and not the alarm received in the control room. Control room alarms for high level in the normal sump may take as long as 3 hours depending upon the sump level at the time the leak initiated.

6.0 ENVIRONMENTAL CONSIDERATION

Duke has evaluated this license amendment request against the criteria for identification of licensing and regulatory actions requiring environmental assessment in accordance with 10 CFR 51.21. Duke has determined that this license amendment request meets the criteria for a categorical exclusion set forth in 10 CFR 51.22(c)(9). This determination is based on the fact that this change is being proposed as an amendment to a license issued pursuant to 10 CFR 50 that changes a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or that changes an inspection or a surveillance requirement, and the amendment meets the following specific criteria.

(i) The amendment involves no significant hazards consideration.

As demonstrated in Section 5.1, this proposed amendment does not involve a significant hazards consideration.

(ii) There is no significant change in the types or significant increase in the amounts of any effluent that may be released offsite.

The proposed amendment simply enhances effectiveness of the leakage detection system by removing (from Technical Specifications) the instrument with the slowest response time. Therefore, there will be no significant change in the types or significant increase in the amounts of any effluents released offsite.

(iii) There is no significant increase in individual or cumulative occupational radiation exposure.

Allowable RCS leakage rates are not affected by the proposed amendment. The change will result in a slight improvement in the leak detection capability by allowing only the most sensitive and fastest responding containment atmosphere radioactivity monitoring instrument to be credited in meeting Technical Specification LCO 3.4.15. Therefore, there will be no significant increase in individual or cumulative occupational radiation exposure resulting from this change.

ATTACHMENT 1

TECHNICAL SPECIFICATION – 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 containment normal sump level indication; and

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

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

ACTIONS

NOTE
LCO 3.0.4 is not applicable.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Required containment sump level indication 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		
	A.2	Restore required containment sump level indication to OPERABLE status.	30 days

(continued)

ATTACHMENT 2

TECHNICAL SPECIFICATION – RETYPE

Remove page	Insert page
3.4.15-1	3.4.15-1

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 containment normal sump level indication; and

b. One containment atmosphere particulate radioactivity monitor.

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

ACTIONS

----------NOTE----------
LCO 3.0.4 is not applicable.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Required containment sump level indication 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		
	A.2	Restore required containment sump level indication to OPERABLE status.	30 days

(continued)

ATTACHMENT 3

TECHNICAL SPECIFICATION BASES – MARK-UP

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.15 RCS Leakage Detection Instrumentation

BASES

BACKGROUND

ONS Design Criteria (Ref. 1) requires means for detecting RCS LEAKAGE.

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.

Industry practice has shown that water flow changes of 0.5 to 1.0 gpm can readily be detected in contained volumes by monitoring changes in water level, in flow rate, or in the operating frequency of a pump.

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^{-5} 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.

Air temperature and pressure monitoring methods may also be used to infer unidentified LEAKAGE to the containment. Containment temperature and pressure fluctuate slightly during unit 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. 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.

BASES (continued)

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

RCS leakage detection instrumentation satisfies Criterion 1 of 10 CFR 50.36 (Ref. 2).

LCO

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

The LCO requirements are satisfied when instruments of diverse measurement means are ~~available~~ operable. Thus, the containment normal sump level indication, in combination with a particulate (RIA-47) ~~or gaseous~~ radioactivity monitor ~~(RIA-49),~~ 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 $\leq$ 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 is much smaller. Therefore, the requirements of this LCO are not applicable in MODES 5 and 6.

conditions for operability require only that these instruments are in service and have met the acceptance criteria of their respective calibration procedures within the specified test frequency.

BASES (continued)

ACTIONS

The Actions are modified by a Note indicating that the provisions of LCO 3.0.4 do not apply. As a result, a MODE change is allowed when the normal sump level indication and required radiation monitors are inoperable. This allowance is provided because other instrumentation is available to monitor RCS LEAKAGE.

A.1 and A.2

With the required containment normal sump level indication inoperable, no other form of sampling can provide the equivalent information.

However, the containment atmosphere activity monitor will provide indications of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS inventory balance, SR 3.4.13.1, water inventory balance, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after steady state operation (stable RCS pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and RCP seal injection and return flows). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.

Restoration of the required normal sump level indication to OPERABLE status is required to regain the function in a Completion Time of 30 days 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.1.1, B.1.2, and B.2

With ~~required gaseous or~~ particulate containment atmosphere radioactivity monitoring 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. With a sample obtained and analyzed or a water inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of ~~at least one of~~ the radioactivity monitors. (RIA-47)

BASES

ACTIONS

B.1.1, B.1.2, and B.2 (continued)

The 24 hour interval for SR 3.4.13.1 provides periodic information that is adequate to detect leakage. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after steady state operation (stable RCS pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and RCP seal injection and return flows). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established. The 30 day Completion Time recognizes at least one other form of leak detection is available.

C.1 and C.2

If a Required Action of Condition A or B cannot be met within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 12 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

D.1

If both required leakage detection instruments are 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 radioactivity monitor. The check gives reasonable confidence that ~~each~~ the channel is operating properly. The Frequency of 12 hours is based on instrument reliability and is reasonable for detecting off normal conditions.

ATTACHMENT 4

TECHNICAL SPECIFICATIONS BASES – RETYPE

Remove pages	Insert pages
B 3.4.15-1	B 3.4.15-1
B 3.4.15-2	B 3.4.15-2
B 3.4.15-3	B 3.4.15-3
B 3.4.15-4	B 3.4.15-4

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.15 RCS Leakage Detection Instrumentation

BASES

BACKGROUND

ONS Design Criteria (Ref. 1) requires means for detecting RCS LEAKAGE.

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.

Industry practice has shown that water flow changes of 0.5 to 1.0 gpm can readily be detected in contained volumes by monitoring changes in water level, in flow rate, or in the operating frequency of a pump.

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. An instrument sensitivity of 10^{-9} μCi/cc radioactivity for particulate monitoring is practical for this leakage detection system. A radioactivity detection system is included for monitoring particulate activity because of its sensitivity and rapid response to RCS LEAKAGE.

Air temperature and pressure monitoring methods may also be used to infer unidentified LEAKAGE to the containment. Containment temperature and pressure fluctuate slightly during unit 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. 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.

BASES (continued)

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

RCS leakage detection instrumentation satisfies Criterion 1 of 10 CFR 50.36 (Ref. 2).

LCO

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

The LCO requirements are satisfied when instruments of diverse measurement means are operable. Thus, the containment normal sump level indication, in combination with a particulate (RIA-47) radioactivity monitor, provides an acceptable minimum.

Conditions for operability require only that these instruments are in service and have met the acceptance criteria of their respective calibration procedures within the specified test frequency.

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 $\leq$ 200EF 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 is much smaller. Therefore, the requirements of this LCO are not applicable in MODES 5 and 6.

BASES (continued)

ACTIONS

The Actions are modified by a Note indicating that the provisions of LCO 3.0.4 do not apply. As a result, a MODE change is allowed when the normal sump level indication and required radiation monitor are inoperable. This allowance is provided because other instrumentation is available to monitor RCS LEAKAGE.

A.1 and A.2

With the required containment normal sump level indication inoperable, no other form of sampling can provide the equivalent information.

However, the containment atmosphere activity monitor will provide indications of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS inventory balance, SR 3.4.13.1, water inventory balance, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after steady state operation (stable RCS pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and RCP seal injection and return flows). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.

Restoration of the required normal sump level indication to OPERABLE status is required to regain the function in a Completion Time of 30 days 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.1.1, B.1.2, and B.2

With the particulate containment atmosphere radioactivity monitoring instrumentation channel 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. With a sample obtained and analyzed or a water inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of the radioactivity monitor. (RIA-47)

BASES (continued)

ACTIONS

B.1.1, B.1.2, and B.2 (continued)

The 24 hour interval for SR 3.4.13.1 provides periodic information that is adequate to detect leakage. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after steady state operation (stable RCS pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and RCP seal injection and return flows). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established. The 30 day Completion Time recognizes at least one other form of leak detection is available.

C.1 and C.2

If a Required Action of Condition A or B cannot be met within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 12 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

D.1

If both required leakage detection instruments are 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 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.