TSTF
TECHNICAL SPECIFICATIONS TASK FORCE
A JOINT OWNERS GROUP ACTIVITY

August 6, 2010

TSTF-10-14
PROJ0753

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

SUBJECT: Submittal of TSTF-513, Revision 3 and TSTF-514, Revision 2

REFERENCES:
1. Letter from J. E. Dyer (NRC) to TSTF dated March 27, 2009.
2. RIS 2009-02, "Use of Containment Atmosphere Gaseous Radioactivity Monitors for Reactor Coolant System Leakage Detection Equipment at Nuclear Power Reactors," January 29, 2009.
3. Letter from TSTF to NRC, "Change in Fee Exemption for TSTF-513 and TSTF-514, "dated June 21, 2010.
4. Memorandum to NRC Regional Administrators, Eric J. Leeds, Michael R. Johnson, Charles L. Miller, Michael F. Weber, Roy P. Zimmerman, from Cynthia A. Carpenter, "Enforcement Guidance Memorandum - Dispositioning Violations of NRC Requirements for Operability of Gaseous Monitors for Reactor Coolant System Leakage Detection," January 30, 2009.

The Notices for Comment for TSTF-513, "Revise PWR Operability Requirements and Actions for RCS Leakage Instrumentation," and TSTF-514, "Revise BWR Operability Requirements and Actions for RCS Leakage Instrumentation," were published in the Federal Register on October 9, 2009 and April 13, 2010, respectively. The TSTF had requested and been granted a fee exemption for NRC review of the TSTF Travelers (Reference 1). The fee waiver request and approval were based on supporting the resolution of containment atmosphere gaseous radioactivity monitor operability concerns described in Reference 2.

On June 11, the NRC informed the TSTF that one proposed change in TSTF-513 and TSTF-514 should not have been included in the fee exemption. TSTF-513 and TSTF-514 proposed to revise the actions taken when there are no operable Reactor Coolant System (RCS) leakage detection instruments. The TSTF included this change in order to address "inoperable containment atmosphere gaseous radioactivity monitoring systems in an integrated fashion," as stated in Reference 2. However, the NRC has concluded these changes are not necessary.

In Reference 3, the TSTF stated that the industry agrees that the proposed changes to address no operable RCS leakage detection instruments should not fall under the fee waiver and stated that

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6014
NRR

the industry would pay review fees for the review associated with those changes. At the July 15, 2010 public meeting between the TSTF and the NRC, the NRC did not accept the TSTF's proposed resolution and requested that the TSTF revise TSTF-513 and TSTF-514 to not include the proposed changes to address the condition of no operable RCS leakage detection instruments.

Attached for NRC review is TSTF-513, Revision 3, and TSTF-514, Revision 2. The review of TSTF-513 and TSTF-514 was granted a waiver of NRC review fees in Reference 1.

Issuance of the Notices of Availability for TSTF-513 and TSTF-514 is a milestone in the NRC's Enforcement Guidance Memorandum (EGM) regarding the containment atmosphere gaseous radioactivity monitoring system (Reference 4). In order to ensure there are no misunderstandings which would prevent rapid adoption of the Travelers by licensees as anticipated by the EGM, we request the opportunity to review the Notices prior to publication.

Should you have any questions, please do not hesitate to contact us.

Kenneth J. Schrader (PWROG/W)

Donald W. Gregoire (BWROG)

Thomas W. Raidy (PWROG/CE)

Reene' Gambrell (PWROG/B&W)

cc: Frederick Brown, Director, Division of Inspection and Regional Support
Robert Elliott, Technical Specifications Branch, NRC
Barry Miller, Licensing Processes Branch, NRC

Technical Specification Task Force
Improved Standard Technical Specifications Change Traveler

Revise PWR Operability Requirements and Actions for RCS Leakage Instrumentation

NUREGs Affected: ☑ 1430 ☑ 1431 ☑ 1432 ☐ 1433 ☐ 1434

Classification 1) Technical Change

Recommended for CLIIP?: Yes

Correction or Improvement: Improvement

NRC Fee Status: Exempt

Benefit: Avoids Future Amendments

See attached.

Revision History

OG Revision 0 Revision Status: Closed

Revision Proposed by: PWROG

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 13-Oct-08

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 31-Oct-08

TSTF Review Information

TSTF Received Date: 07-Nov-08 Date Distributed for Review 07-Nov-08

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 14-Nov-08

NRC Review Information

NRC Received Date: 14-Nov-08

NRC Comments:

1/8/09 - The NRC requested that the TSTF revise TSTF-513 to clarify the Bases description of the Operability requirements. In addition, a Condition Note was added to new Condition D to clarify the applicability of the Condition.

Final Resolution: NRC Requests Changes: TSTF Will Revise Final Resolution Date: 08-Jan-09

TSTF Revision 1 Revision Status: Closed

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TSTF Revision 1 Revision Status: Closed

Revision Proposed by: NRC

Revision Description:
TSTF-513 was revised to address NRC comments and to clarify the application of the specifications.
* Clarified the Bases description of the Operability requirements.
* A Condition Note was added to new Condition D (NUREG-1431 & -1432, Condition C in NUREG-1430) to clarify the applicability of the Condition.
* Incorrect usage of the word "required" was eliminated.
* Consistent use of brackets for plant-specific designs was applied.

Owners Group Review Information

Date Originated by OG: 14-Jan-09

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 28-Jan-09

TSTF Review Information

TSTF Received Date: 14-Jan-09 Date Distributed for Review 06-Feb-09

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 28-Feb-09

NRC Review Information

NRC Received Date: 18-Feb-09

NRC Comments:
Fee exemption granted on 3/30/09.

NRC provided an RAI on 5/6/09. TSTF-513 was revised to address the RAI questions.

Final Resolution: Superceded by Revision

TSTF Revision 2 Revision Status: Closed

Revision Proposed by: NRC

Revision Description:
TSTF-513 is revised in response to the NRC's May 6, 2009 RAI.

The Background Bases are revised to state that the RCS leakage detection monitor setpoints are typically set to be as sensitive as practicable while minimizing spurious alarms. The statement is bracketed as not all plants have alarmed RCS leakage instrumentation.

The LCO Bases of the containment sump are revised to provide additional provisions to describe plant-specific designs.

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TSTF Revision 2 Revision Status: Closed

Owners Group Review Information

Date Originated by OG: 30-May-09

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 18-Jun-09

TSTF Review Information

TSTF Received Date: 30-May-09 Date Distributed for Review 30-May-09

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

TSTF Comments:

(No Comments)

TSTF Resolution: Approved Date: 18-Jun-09

NRC Review Information

NRC Received Date: 26-Jun-09

NRC Comments:

The NRC issued the Notice for Comment on 10/9/2009.

The NRC requested that the TSTF revise the Traveler to remove the change associated with no operable RCS leakage monitoring instrumentation, as that change was not seen as being directly related to the issue described in Regulatory Issue Summary 2009-02, Rev. 1, "Use of Containment Atmosphere Gaseous Radioactivity Monitors as Reactor Coolant System Leakage Detection Equipment at Nuclear Power Reactors," which was the basis for the TSTF's fee waiver request. In a letter dated June 21, 2010, the TSTF volunteered to pay for the NRC review of the change associated with no Operable RCS leakage monitoring instrumentation. At the July 15, 2010 TSTF/NRC public meeting, the NRC did not accept the TSTF's offer and requested that the TSTF revise the Traveler to remove the changes. The TSTF agreed to revise the Traveler as requested.

Final Resolution: Superceded by Revision

TSTF Revision 3 Revision Status: Active

Revision Proposed by: NRC

Revision Description:
The NRC requested that the TSTF revise the Traveler to remove the change associated with no operable RCS leakage monitoring instrumentation, as that change was not seen as being directly related to the issue described in Regulatory Issue Summary 2009-02, Rev. 1, "Use of Containment Atmosphere Gaseous Radioactivity Monitors as Reactor Coolant System Leakage Detection Equipment at Nuclear Power Reactors," which was the basis for the TSTF's fee waiver request. In a letter dated June 21, 2010, the TSTF volunteered to pay for the NRC review of the change associated with no Operable RCS leakage monitoring instrumentation. At the July 15, 2010 TSTF/NRC public meeting, the NRC did not accept the TSTF's offer and requested that the TSTF revise the Traveler to remove the changes. The TSTF agreed to revise the Traveler as requested.

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TSTF Revision 3 Revision Status: Active

The revision removes the changes to Condition F (Condition D in NUREG-1430) and the associated change to move Condition E to Condition G (Condition C to Condition E for NUREG-1430). The associated changes to the Bases are removed, as well as the discussion of the removed changes from the justification.

Owners Group Review Information

Date Originated by OG: 23-Jul-10

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 04-Aug-10

TSTF Review Information

TSTF Received Date: 23-Jul-10 Date Distributed for Review 23-Jul-10

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 04-Aug-10

NRC Review Information

NRC Received Date: 06-Aug-10

Affected Technical Specifications

Bkgnd 3.4.13 Bases	RCS Leakage Detection Instrumentation	
LCO 3.4.13 Bases	RCS Leakage Detection Instrumentation	
Action 3.4.13.C	RCS Leakage Detection Instrumentation Change Description: New Condition	NUREG(s)- 1430 Only
Action 3.4.13.C Bases	RCS Leakage Detection Instrumentation Change Description: New Condition	NUREG(s)- 1430 Only
Action 3.4.13.D	RCS Leakage Detection Instrumentation Change Description: Renamed D	NUREG(s)- 1430 Only
Action 3.4.13.D Bases	RCS Leakage Detection Instrumentation Change Description: Renamed D	NUREG(s)- 1430 Only
Action 3.4.13.D	RCS Leakage Detection Instrumentation Change Description: New Condition	NUREG(s)- 1431 1432 Only

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Action 3.4.13.D	RCS Leakage Detection Instrumentation Change Description: Relabeled E	NUREG(s)- 1431 1432 Only
Action 3.4.13.D Bases	RCS Leakage Detection Instrumentation Change Description: New Condition	NUREG(s)- 1431 1432 Only
Action 3.4.13.D Bases	RCS Leakage Detection Instrumentation Change Description: Relabeled E	NUREG(s)- 1431 1432 Only
Action 3.4.13.E	RCS Leakage Detection Instrumentation Change Description: Relabeled F	NUREG(s)- 1431 1432 Only
Action 3.4.13.E Bases	RCS Leakage Detection Instrumentation Change Description: Relabeled F	NUREG(s)- 1431 1432 Only
Action 3.4.13.F	RCS Leakage Detection Instrumentation Change Description: Relabeled G	NUREG(s)- 1431 1432 Only
Action 3.4.13.F Bases	RCS Leakage Detection Instrumentation Change Description: Relabeled G	NUREG(s)- 1431 1432 Only

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1.0 Description

Specification 3.4.15, "RCS Leakage Detection Instrumentation," requires instrumentation 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. The Improved Standard Technical Specifications (ISTS) require one containment sump monitor (for Westinghouse plants, level or discharge flow), one containment atmosphere radioactivity monitor (gaseous or particulate), and (optionally for Westinghouse and Combustion Engineering plants) one containment air cooler condensate flow rate monitor.

Questions have been raised regarding the Operability requirements for these instruments. In particular, improvements in plant fuel integrity have resulted in a reduction of the Reactor Coolant System (RCS) activity. As a result, the containment atmosphere radioactivity monitors may not be capable of promptly detecting an increase in RCS leakage.

The proposed change revises the Bases to clearly define the RCS leakage detection instrumentation Operability requirements and to modify the Actions to be taken when the containment atmosphere gaseous radioactivity monitor is the only Operable monitor to require additional, more frequent monitoring of other indications of RCS leakage and to shorten the time allowed to restore another monitor to Operable status.

2.0 Proposed Change

Specification 3.4.15, "RCS Leakage Detection Instrumentation," is revised to add a new Condition. New Condition D (Condition C in NUREG-1430) is applicable when the containment atmosphere gaseous radioactivity monitor is the only Operable monitor (i.e., all other monitors are inoperable). The Required Actions require analyzing grab samples of the containment atmosphere every 12 hours and restoring another monitor within 7 days. The subsequent Conditions are renumbered to reflect in addition of the new Condition.

The Bases are revised to clearly define the RCS leakage detection instrumentation Operability requirements in the LCO Bases and to eliminate discussion from the Bases that could be erroneously construed as Operability requirements. The Bases are also revised to reflect the changes to the Technical Specifications and to more accurately reflect the existing Technical Specifications.

Three corrections are made:

- In several locations in all three NUREGs, the specifications incorrectly refer to a "required" containment sump monitor or "required" containment air cooler flow rate monitor when the LCO does not provide for more than one monitor. The term "required" is reserved for situations in which there are multiple ways to meet the LCO, such as the requirement for either a gaseous or particulate radiation monitor. The incorrect use of the term "required" is removed.

- The Note, "Not required until 12 hours after establishment of steady state operation," is currently incorrectly placed on Required Action C.1 (Perform SR 3.4.15.1, Channel Check) instead of Required Action C.2 (Perform SR 3.4.13.1, RCS mass balance) as in the other ISTS NUREGs. The Note is moved to Required Action C.2. The Bases correctly state that the Note applies to performance of SR 3.4.13.1.

- In NUREG-1431 and NUREG-1432, the containment air cooler condensate flow rate monitor is plant-specific, and therefore bracketed in the NUREG. The specifications and Bases are revised to consistently bracket references to this monitor.

3.0 Background

General Design Criterion (GDC) 30 of Appendix A to 10 CFR 50 requires means for detecting and, to the extent practical, identifying the location of the source of RCS Leakage. Regulatory Guide (RG) 1.45, Revision 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973, describes acceptable methods for selecting leakage detection systems. Revision 1 of RG 1.45 was issued in May 2008. However, operating nuclear power plants are not committed to Revision 1 of RG 1.45.

NRC Information Notice (IN) 2005-24, "Non-conservatism in Leakage Detection Sensitivity," (ADAMS Accession No. ML051780073) pointed out that the reactor coolant activity assumptions used for designing the containment radiation gaseous radiation monitor may be greater than the RCS radioactivity level present during normal operation. As a result, the containment gas channel may not be able to detect a 1 gpm leak within 1 hour at the current RCS radioactivity level.

RG 1.45, Rev. 0, Regulatory Position C.2 states that "Leakage to the primary reactor containment from unidentified sources should be collected and the flow rate monitored with an accuracy of one gallon per minute (gpm) or better." Regulatory Position C.3 states, "At least three separate detection methods should be employed and two of these methods should be (1) sump level and flow monitoring and (2) airborne particulate radioactivity monitoring. The third method may be selected from the following: a. monitoring of condensate flow rate from air coolers, b. monitoring of airborne gaseous radioactivity. Humidity, temperature, or pressure monitoring of the containment atmosphere should be considered as alarms or indirect indication of leakage to the containment." Regulatory Position C.5 states, "The sensitivity and response time of each leakage detection system in regulatory position [C.]3. above employed for unidentified leakage should be adequate to detect a leakage rate, or its equivalent, of one gpm in less than one hour." RG 1.45, Rev. 0, states, "In analyzing the sensitivity of leak detection systems using airborne particulate or gaseous radioactivity, a realistic primary coolant radioactivity concentration assumption should be used. The expected values used in the plant environmental report would be acceptable." Many plants pre-date the issuance of RG 1.45 and their plant-specific licensing basis is described in their UFSAR. In either case, the appropriate sensitivity of the atmospheric radiation monitors is dependent on the design assumptions and the plant licensing basis of each licensee.

The ISTS Specification 3.4.15 Bases do not clearly define the basis for Operability for the RCS Leakage Instrumentation. Operability requirements should be defined in the LCO section of the Bases. However, the current Bases contain information that could be construed as Operability requirements in the Background, Applicable Safety Analysis, and LCO sections. In addition, the current Bases do not accurately describe the Operability of a detector as being based on the design assumptions and licensing basis for the plant.

Because the containment atmosphere gaseous radiation monitor cannot always detect an RCS leak at a rate of 1 gpm within 1 hour, some plants have removed the monitor from the Technical Specification list of required monitors. However, experience has shown that the containment atmosphere gaseous radiation monitor is useful to detect an increase in RCS leak rate and provides a diverse means to confirm an RCS leak exists when other monitors detect an increase in RCS leak rate. Therefore, the preferred solution is to retain the containment atmosphere gaseous radiation monitor in the LCO 3.4.15 list of required equipment, and to revise the Actions to require additional monitoring and to provide less time before a plant shutdown is required when the containment atmosphere gaseous radiation monitor is the only Operable monitor.

4.0 Technical Analysis

This change will reduce the number of unnecessary MODE changes and requests for enforcement discretion by clarifying the Operability requirements for the RCS leakage detection instrumentation and by allowing a limited time to repair one or more of the inoperable monitors. A plant shut down solely as a result of the loss of the preferred TS monitoring capability could be avoided. The use of alternate leakage detection monitoring for a limited time is an appropriate response to this condition.

The proposed Bases changes will clarify the Operability requirements of the RCS leakage detection instrumentation. Phrases that are not consistent with RG 1.45, Rev. 0, such as "a high degree of confidence" and "extremely small leaks" are eliminated or replaced with terminology that accurately describes the design assumptions of the system. All reference to RG 1.45 are revised to reference Revision 0 of the RG. Information in the Background and Applicable Safety Analysis sections of the Bases that could be construed as Operability requirements is deleted. The LCO section of the Bases is expanded to provide a detailed discussion of the Operability requirements for each of the required instruments. For the containment atmosphere radioactivity monitors, the Bases clearly relate Operability to the design assumptions and licensing basis for the plant and a reference to the Final Safety Analysis Report description of the design basis of the monitors is included.

As described in 10 CFR 50.36(c)(2)(i), the Limiting Condition for Operation and associated Operability requirements represent the lowest functional capability or performance levels of equipment required for safe operation of the facility. In practice, the leakage monitoring instrumentation is typically set to provide the most sensitive response without distracting the reactor operators with unnecessary alarms.

When the containment atmosphere gaseous radiation monitor is the only Operable monitor, the current Technical Specifications require performance of SR 3.4.13.1 (mass balance) once per 24 hours and restoration of the inoperable sump monitor within 30 days. The proposed change requires analyzing grab samples from the containment atmosphere and restoration of at least one additional monitor within 7 days. The RCS mass balance is sensitive enough to detect a one gpm leak rate in one hour and is the primary method used to verify compliance with the RCS leakage limits. However, an RCS mass balance calculation requires a relatively lengthy period of steady state operation to provide accurate results. The ability to perform grab sampling during periods of power change is desirable and provides an additional compensatory method to the currently required RCS mass balance. A containment grab sample is comparable to the containment particulate radiation monitor with respect to the ability to detect RCS leakage. Due to the time to take and analyze the grab sample, this is not a continuous monitoring method. However, by reducing the time between grab samples there will be no significant loss of monitoring capability during the limited time period allowed by the proposed change. The 12 hour (once per shift) performance of containment grab samples is reasonable given the availability of the containment atmosphere gaseous radiation monitor. The 7 day Completion Time to restore another monitor is reasonable given the diverse methods available to detect an RCS leak and the low probability of a large RCS leak during this period.

Most licensees have been licensed for Leak-Before-Break (LBB). The basic concept of leak-before-break (LBB) is that certain piping material has sufficient fracture toughness (i.e., ductility) to resist rapid flaw propagation. A postulated flaw in such piping would not lead to pipe rupture and potential damage to adjacent safety related systems, structures and components before the plant could be placed in a safe, shutdown condition. Before pipe rupture, the postulated flaw would lead to limited but detectable leakage which would be identified by the leak detection systems in time for the operator to take action. The NRC staff reviews the application of LBB methodology to primary system piping to ensure that certain safety margins are satisfied to assure the structural integrity of the pipe. There is significant conservatism in this evaluation. SRP Section 3.6.3 specifies a margin of the square-root of 2 be applied to the loads to assure that leakage-size flaws are stable at the normal load plus safe-shutdown earthquake load. A margin of 10 is to be applied to leakage so that detection of leakage from the postulated flaw size is ensured when the pipe is subjected to normal operational loads. In addition, the critical flaw size should be twice as large as the leakage flaw size (i.e., a margin of 2 on leakage flaw size). The proposed actions for inoperable RCS leakage detection instrumentation maintain sufficient continuity and diversity of RCS leakage detection capability that an extremely low probability of undetected RCS leakage leading to pipe rupture is maintained.

5.0 Regulatory Analysis

5.1 No Significant Hazards Consideration

The Technical Specification Task Force (TSTF) has evaluated whether or not a significant hazards consideration is involved with the proposed generic change by

focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The proposed change clarifies the Operability requirements for the Reactor Coolant System (RCS) leakage detection instrumentation and reduces the time allowed for the plant to operate when the only Operable RCS leakage instrumentation monitor is the containment atmosphere gaseous radiation monitor. The monitoring of RCS leakage is not a precursor to any accident previously evaluated. The monitoring of RCS leakage is not used to mitigate the consequences of any accident previously evaluated.

   Therefore, it is concluded that this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   The proposed change clarifies the Operability requirements for the Reactor Coolant System (RCS) leakage detection instrumentation and reduces the time allowed for the plant to operate when the only Operable RCS leakage instrumentation monitor is the containment atmosphere gaseous radiation monitor. The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or a change in the methods governing normal plant operation.

   Therefore, it is concluded that this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No.

   The proposed change clarifies the Operability requirements for the Reactor Coolant System (RCS) leakage detection instrumentation and reduces the time allowed for the plant to operate when the only Operable RCS leakage instrumentation monitor is the containment atmosphere gaseous radiation monitor. Reducing the amount of time the plant is allowed to operate with only the containment atmosphere gaseous radiation monitor Operable increases the margin of safety by increasing the likelihood that an increase in RCS leakage will be detected before it potentially results in gross failure.

Therefore, it is concluded that this change does not involve a significant reduction in a margin of safety.

Based on the above, the TSTF concludes that the proposed change presents no significant hazards considerations under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

10 CFR 50, Appendix A, "General Design Criteria for Nuclear Power Plants," Criterion 30, "Quality of reactor coolant pressure boundary," requires that means be provided for detecting and, to the extent practical, identifying the location of the source of reactor coolant leakage. The specific attributes of the reactor coolant leakage detection systems are outlined in Regulatory Positions 1 through 9 of Regulatory Guide 1.45, Rev. 0.

10 CFR 50, Appendix A, "General Design Criteria for Nuclear Power Plants," Criterion 4, "Environmental and Dynamic Effects Design Bases," requires components to be designed to accommodate dynamic effects associated with postulated pipe ruptures. However, these dynamic effects may be excluded if the Commission approves analyses demonstrating that the probability of fluid system piping rupture is extremely low under conditions consistent with the design basis for the piping. Most licensees have been licensed for Leak-Before-Break (LBB). The NRC staff reviews the application of LBB methodology to primary system piping to ensure that certain safety margins are satisfied to assure the structural integrity of the pipe. The proposed actions for inoperable RCS leakage detection instrumentation maintain sufficient continuity and diversity of RCS leakage detection capability that an extremely low probability of undetected RCS leakage leading to pipe rupture is maintained.

10 CFR 50.36, "Technical Specifications," paragraph (c)(2)(ii)(A), specifies that a Limiting Condition for Operation be established for installed instrumentation that is used to detect and indicate in the control room a significant abnormal degradation of the reactor coolant pressure boundary. This instrumentation is required by Specification 3.4.15, "RCS Leakage Detection Instrumentation." The modification of the Actions in Specification 3.4.15 is not in conflict with the 10 CFR 50.36 requirements. The proposed changes do not adversely impact the ability of the Reactor Coolant System leakage detection system to function as designed and do not impact conformance to the applicable GDCs. Therefore, the proposed changes are consistent with all applicable regulatory requirements or criteria.

Based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the approval of the proposed change will not be inimical to the common defense and security or to the health and safety of the public.

6.0 Environmental Consideration

A review has determined that the proposed change would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed change does not involve (i) a significant hazards consideration, (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 change meets 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 the proposed change.

7.0 References

None.

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 sump monitor and

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

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ~~Required~~ Containment sump monitor 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 monitor to OPERABLE status.	30 days
B. Required containment atmosphere radioactivity monitor inoperable.	B.1.1 Analyze grab samples of the containment atmosphere.	Once per 24 hours
	OR	

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
	B.1.2 ----------NOTE---------- Not required until 12 hours after establishment of steady state operation. ---------- Perform SR 3.4.13.1.	Once per 24 hours
	AND	
	B.2 Restore required containment atmosphere radioactivity monitor to OPERABLE status.	30 days
---------- NOTE ---------- Only applicable when the containment atmosphere gaseous radiation monitor is the only OPERABLE monitor. ---------- C Containment sump monitor inoperable.	C.1 Analyze grab samples of the containment atmosphere.	Once per 12 hours
	AND	
	C.2 Restore containment sump monitor to OPERABLE status.	7 days
D~~C~~. Required Action and associated Completion Time not met.	D~~C~~.1 Be in MODE 3.	6 hours
	AND	
	D~~C~~.2 Be in MODE 5.	36 hours
E~~D~~. Both required monitors inoperable.	E~~D~~.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY

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, Revision 0, (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. [In addition to meeting the OPERABILITY requirements, the monitors are typically set to provide the most sensitive response without causing an excessive number of spurious alarms.]

~~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 containment sump used to collect unidentified LEAKAGE is instrumented to alarm for increases above ~~of 0.5 to 1.0 gpm in~~ the normal flow rates. ~~This sensitivity is acceptable for detecting increases in unidentified LEAKAGE.~~

The reactor coolant contains radioactivity that, when released to the containment, may ~~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 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.

Other indications may be used to detect an increase in unidentified LEAKAGE; however, they are not required to be OPERABLE by this LCO. 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.~~

BASES

BACKGROUND (continued)

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 flow into or from the containment sump [and condensate flow 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 for 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~~ is 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 above-mentioned LEAKAGE detection methods or systems differ in sensitivity and response time. [Some of these systems could serve as early alarm systems signaling the operators that closer examination of other detection systems is necessary to determine the extent of any corrective action that may be required.]

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 FSAR (Ref. 3). Multiple instrument locations are utilized, if needed, to ensure 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 reactor coolant LEAKAGE into the containment area are necessary. Quickly 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(c)(2)(ii).

BASES

LCO

~~One method of protecting against large RCS LEAKAGE derives from the ability of instruments to rapidly detect extremely small leaks.~~ This LCO requires instruments of diverse monitoring principles to be OPERABLE to provide ~~a high degree of~~ confidence that small amounts of unidentified LEAKAGE ~~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 requires two instruments to be OPERABLE.

The containment sump is used to collect unidentified LEAKAGE. [The containment sump consists of the normal sump and the emergency sump. The LCO requirements apply to the total amount of unidentified LEAKAGE collected in [the][both] sump[s].] The monitor on the containment sump detects [level or flow rate or the operating frequency of a pump] and is instrumented to detect when there is [leakage of] [an increase above the normal value by] 1 gpm. The identification of [an increase in] unidentified LEAKAGE will be delayed by the time required for the unidentified LEAKAGE to travel to the containment sump and it may take longer than one hour to detect a 1 gpm increase in unidentified LEAKAGE, depending on the origin and magnitude of the LEAKAGE. This sensitivity is acceptable for containment sump monitor OPERABILITY.

The reactor coolant contains radioactivity that, when released to the containment, can be detected by the gaseous or particulate containment atmosphere radioactivity monitor. Only one of the two detectors is required to be OPERABLE. Radioactivity detection systems are included for monitoring both particulate and gaseous activities because of their sensitivities and rapid responses to RCS LEAKAGE, but have recognized limitations. 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. If there are few fuel element cladding defects and low levels of activation products, it may not be possible for the gaseous or particulate containment atmosphere radioactivity monitors to detect a 1 gpm increase within 1 hour during normal operation. However, the gaseous or particulate containment atmosphere radioactivity monitor is OPERABLE when it is capable of detecting a 1 gpm increase in unidentified LEAKAGE within 1 hour given an RCS activity equivalent to that assumed in the design calculations for the monitors (Reference 3).

The LCO requirements are satisfied when monitors of diverse measurement means are available. Thus, the containment sump monitor, in combination with a particulate or gaseous 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 ≤ 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.

ACTIONS

A.1 and A.2

With the ~~required~~ containment sump monitor 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 containment atmosphere radioactivity 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 establishing steady state operation (stable 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~~ sump monitor 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.

BASES

ACTIONS (continued)

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.

The 24 hour interval 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 establishing steady state operation (stable 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

With the containment sump monitor inoperable, the only means of detecting LEAKAGE is the required containment atmosphere radiation monitor. A Note clarifies that this Condition is applicable when the only OPERABLE monitor is the containment atmosphere gaseous radiation monitor. In addition, this configuration does not provide the required diverse means of leakage detection. Indirect methods of monitoring RCS leakage must be implemented. Grab samples of the containment atmosphere must be taken and analyzed to provide alternate periodic information. The 12 hour interval is sufficient to detect increasing RCS leakage. The Required Action provides 7 days to restore another RCS leakage monitor to OPERABLE status to regain the intended leakage detection diversity. The 7 day Completion Time ensures that the plant will not be operated in a degraded configuration for a lengthy time period.

D~~C~~.1 and D~~C~~.2

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

~~E~~D.1

With both required monitors inoperable, no automatic means of monitoring leakage are available, and immediate plant shutdown in accordance with LCO 3.0.3 is required.

BASES

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 channel is operating properly. The Frequency of 12 hours is based on instrument reliability and is reasonable for detecting off normal conditions.

SR 3.4.15.2

SR 3.4.15.2 requires the performance of a CHANNEL FUNCTIONAL TEST of the required containment atmosphere radioactivity monitor. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. 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 it proper for detecting degradation.

SR 3.4.15.3 and SR 3.4.15.4

These SRs require the performance of a CHANNEL CALIBRATION for each of the required 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 this Frequency is acceptable.

REFERENCES

1. 10 CFR 50, Appendix A, Section IV, GDC 30.

2. Regulatory Guide 1.45, Revision 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973.

3. FSAR, Section [ ].

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.15 RCS Leakage Detection Instrumentation

LCO 3.4.15 [Two of] the following RCS leakage detection instrumentation shall be OPERABLE:

a. One containment sump monitor,

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

[c. One containment air cooler condensate flow rate monitor.]

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ~~Required~~ Ccontainment sump monitor 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 containment sump monitor to OPERABLE status.	30 days

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required containment atmosphere radioactivity monitor inoperable.	B.1.1 Analyze grab samples of the containment atmosphere.	Once per 24 hours
	OR	
	B.1.2 ----------NOTE---------- Not required until 12 hours after establishment of steady state operation. ----------	
	Perform SR 3.4.13.1.	Once per 24 hours
	AND	
	B.2.1 Restore required containment atmosphere radioactivity monitor to OPERABLE status.	30 days
	OR	
	[B.2.2 ~~[~~Verify containment air cooler condensate flow rate monitor is OPERABLE.	30 days]
C. [~~Required~~ Ccontainment air cooler condensate flow rate monitor inoperable.	C.1 ~~----------NOTE---------- Not required until 12 hours after establishment of steady state operation. ----------~~	
	Perform SR 3.4.15.1.	Once per 8 hours
	OR	
	C.2 ----------NOTE---------- Not required until 12 hours after establishment of steady state operation. ----------	
	Perform SR 3.4.13.1.	Once per 24 hours]

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
---------- NOTE ---------- Only applicable when the containment atmosphere gaseous radiation monitor is the only OPERABLE monitor. ---------- D. Containment sump monitor inoperable. AND [Containment air cooler condensate flow rate monitor inoperable.]	D.1 Analyze grab samples of the containment atmosphere. AND D.2.1 Restore containment sump monitor to OPERABLE status. OR [D.2.2 Restore containment air cooler condensate flow rate monitor to OPERABLE status.	Once per 12 hours 7 days 7 days]
~~D~~E. [Required containment atmosphere radioactivity monitor inoperable. AND [~~Required~~ ~~C~~containment air cooler condensate flow rate monitor inoperable.]	ED.1 Restore required containment atmosphere radioactivity monitor to OPERABLE status. OR [E~~D~~.2 Restore ~~required~~ containment air cooler condensate flow rate monitor to OPERABLE status.]	30 days 30 days]
F~~E~~. Required Action and associated Completion Time not met.	F~~E~~.1 Be in MODE 3. AND F~~E~~.2 Be in MODE 5.	6 hours 36 hours
G~~F~~. All required monitors inoperable.	G~~F~~.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

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, Revision 0, (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. [In addition to meeting the OPERABILITY requirements, the monitors are typically set to provide the most sensitive response without causing an excessive number of spurious alarms.]

~~Industry practice has shown that water flow changes of 0.5 gpm 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 containment sump used to collect unidentified LEAKAGE [is] [(or) and the containment air cooler condensate flow rate monitor] [are] instrumented to alarm for increases ~~of 0.5 gpm to 1.0 gpm~~ above in the normal flow rates. ~~This sensitivity is acceptable for detecting increases in unidentified LEAKAGE.~~

The reactor coolant contains radioactivity that, when released to the containment, may ~~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 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.

Other indications may be used to detect an increase in unidentified LEAKAGE; however, they are not required to be OPERABLE by this LCO. 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.~~

BASES

BACKGROUND (continued)

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 flow into or from the containment sump [and condensate flow 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~~ is 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 above-mentioned LEAKAGE detection methods or systems differ in sensitivity and response time. [Some of these systems could serve as early alarm systems signaling the operators that closer examination of other detection systems is necessary to determine the extent of any corrective action that may be required.]

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 FSAR (Ref. 3). Multiple instrument locations are utilized, if needed, to ensure 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 are necessary. Quickly separating the identified LEAKAGE from the unidentified LEAKAGE provides quantitative information to the operators, allowing them to take corrective action should leakage occur detrimental to the safety of the facility and the public.

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

BASES

LCO

~~One method of protecting against large RCS LEAKAGE derives from the ability of instruments to rapidly detect extremely small leaks.~~ This LCO requires instruments of diverse monitoring principles to be OPERABLE to provide ~~a high degree of~~ confidence that small amounts of unidentified LEAKAGE ~~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 requires [three] instruments to be OPERABLE.

The containment sump is used to collect unidentified LEAKAGE. [The containment sump consists of the normal sump and the emergency sump. The LCO requirements apply to the total amount of unidentified LEAKAGE collected in [the][both] sump[s].] The monitor on the containment sump detects [level or flow rate or the operating frequency of a pump] and is instrumented to detect when there is [leakage of] [an increase above the normal value by] 1 gpm. The identification of [an increase in] unidentified LEAKAGE will be delayed by the time required for the unidentified LEAKAGE to travel to the containment sump and it may take longer than one hour to detect a 1 gpm increase in unidentified LEAKAGE, depending on the origin and magnitude of the LEAKAGE. This sensitivity is acceptable for containment sump monitor OPERABILITY.

The reactor coolant contains radioactivity that, when released to the containment, can be detected by the gaseous or particulate containment atmosphere radioactivity monitor. Only one of the two detectors is required to be OPERABLE. Radioactivity detection systems are included for monitoring both particulate and gaseous activities because of their sensitivities and rapid responses to RCS LEAKAGE, but have recognized limitations. 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. If there are few fuel element cladding defects and low levels of activation products, it may not be possible for the gaseous or particulate containment atmosphere radioactivity monitors to detect a 1 gpm increase within 1 hour during normal operation. However, the gaseous or particulate containment atmosphere radioactivity monitor is OPERABLE when it is capable of detecting a 1 gpm increase in unidentified LEAKAGE within 1 hour given an RCS activity equivalent to that assumed in the design calculations for the monitors (Reference 3).

[An increase in humidity of the containment atmosphere could indicate the release of water vapor to the containment. Condensate flow from air coolers is instrumented to detect when there is an increase above the normal value by 1 gpm. The time required to detect a 1 gpm increase above the normal value varies based on environmental and system

conditions and may take longer than 1 hour. This sensitivity is acceptable for containment air cooler condensate flow rate monitor OPERABILITY.]

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the containment sump monitor, in combination with a particulate or gaseous radioactivity monitor [and a containment air cooler condensate flow rate 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 ≤ 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.

ACTIONS

A.1 and A.2

If the containment sump monitor is inoperable, no other form of sampling can provide the equivalent information.

However, the containment atmosphere radioactivity monitor will provide indications of changes in leakage. Together with the containment atmosphere radioactivity 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. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after establishing steady state operation (stable 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 sump monitor 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.

BASES

ACTIONS (continued)

B.1.1, B.1.2, B.2.1, and B.2.2

With both gaseous and 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 an 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.

[Alternatively, continued operation is allowed if the air cooler condensate flow rate monitoring system is OPERABLE, provided grab samples are taken or water inventory balance performed every 24 hours.]

The 24 hour interval 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 establishing steady state operation (stable 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 leakage detection is available.

[C.1 and C.2

If the ~~required~~ containment air cooler condensate flow rate monitor is 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 an inventory balance is performed every 24 hours, reactor operation may continue while awaiting restoration of the containment air cooler condensate flow rate monitor to OPERABLE status.

The 24 hour interval provides periodic information that is adequate to detect RCS LEAKAGE. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after establishing steady state operation (stable 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.

BASES

ACTIONS (continued)

D.1, D.2.1, and D.2.2

With the containment sump monitor, [and the containment air cooler condensate flow rate monitor] inoperable, the only means of detecting LEAKAGE is the required containment atmosphere radiation monitor. A Note clarifies that this Condition is applicable when the only OPERABLE monitor is the containment atmosphere gaseous radiation monitor. The containment atmosphere gaseous radioactivity monitor typically cannot detect a 1 gpm leak within one hour when RCS activity is low. In addition, this configuration does not provide the required diverse means of leakage detection. Indirect methods of monitoring RCS leakage must be implemented. Grab samples of the containment atmosphere must be taken and analyzed must be performed every 12 hours to provide alternate periodic information. The 12 hour interval is sufficient to detect increasing RCS leakage. The Required Action provides 7 days to restore another RCS leakage monitor to OPERABLE status to regain the intended leakage detection diversity. The 7 day Completion Time ensures that the plant will not be operated in a degraded configuration for a lengthy time period.

~~E~~D.1 and ~~E~~D.2

If the required containment atmosphere radioactivity monitor [and the containment air cooler condensate flow rate monitor] are inoperable, the only means of detecting leakage is the containment sump 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 Times ensure that the plant will not be operated in a reduced configuration for a lengthy time period.]

F~~E~~.1 and F~~E~~.2

If any Required Action of Condition A, B, [C], [D] or [E~~D~~] cannot be met within the required Completion Time, the plant must be brought to a MODE in which the LCO 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~~G.1

If all required monitors 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 monitors. The check gives reasonable confidence 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 CHANNEL FUNCTIONAL TEST of the required containment atmosphere radioactivity monitors. 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. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. The Frequency of 92 days considers instrument reliability, and operating experience has shown it proper for detecting degradation.

SR 3.4.15.3, SR 3.4.15.4, and [SR 3.4.15.5]

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. Operating experience has shown this Frequency is acceptable.

REFERENCES

1. 10 CFR 50, Appendix A, Section IV, GDC 30.

2. Regulatory Guide 1.45, Revision 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973.

3. FSAR, Section [ ].

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 sump (level or discharge flow) monitor,

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

[c. One containment air cooler condensate flow rate monitor.]

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

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Required containment sump monitor 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 monitor to OPERABLE status.	30 days

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required containment atmosphere radioactivity monitor inoperable.	B.1.1 Analyze grab samples of the containment atmosphere.	Once per 24 hours
	OR	
	B.1.2 ----------NOTE---------- Not required until 12 hours after establishment of steady state operation. ----------	
	Perform SR 3.4.13.1.	Once per 24 hours
	[~~]~~AND	
	B.2.1 Restore required containment atmosphere radioactivity monitor to OPERABLE status.	30 days
	OR	
	[B.2.2 Verify containment air cooler condensate flow rate monitor is OPERABLE.	30 days]
C. [~~Required c~~Containment air cooler condensate flow rate monitor inoperable.	C.1 Perform SR 3.4.15.1.	Once per 8 hours
	OR	
	C.2 ----------NOTE---------- Not required until 12 hours after establishment of steady state operation. ----------	
	Perform SR 3.4.13.1.	Once per 24 hours]

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
---------- NOTE ---------- Only applicable when the containment atmosphere gaseous radiation monitor is the only OPERABLE monitor. ---------- D. Required containment sump monitor inoperable. AND [Containment air cooler condensate flow rate monitor inoperable.]	D.1 Analyze grab samples of the containment atmosphere. AND D.2.1 Restore required containment sump monitor to OPERABLE status. OR [D.2.2 Restore containment air cooler condensate flow rate monitor to OPERABLE status.	Once per 12 hours 7 days 7 days]
~~D~~E. [Required containment atmosphere radioactivity monitor inoperable. AND [~~Required c~~Containment air cooler condensate flow rate monitor inoperable.]	~~D~~E.1 Restore required containment atmosphere radioactivity monitor to OPERABLE status. OR [~~D~~E.2 Restore ~~required~~ containment air cooler condensate flow rate monitor to OPERABLE status.]	30 days 30 days]
F~~E~~. Required Action and associated Completion Time not met.	F~~E~~.1 Be in MODE 3. AND F~~E~~.2 Be in MODE 5.	6 hours 36 hours
G~~F~~. All required monitors inoperable.	G~~F~~.1 Enter LCO 3.0.3.	Immediately

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, Revision 0, (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. [In addition to meeting the OPERABILITY requirements, the monitors are typically set to provide the most sensitive response without causing an excessive number of spurious alarms.]

~~Industry practice has shown that water flow changes of 0.5 to 1.0 gpm can be readily detected in contained volumes by monitoring changes in water level, in flow rate, or in the operating frequency of a pump.~~ The containment sump used to collect unidentified LEAKAGE [is] [(or) and the containment air cooler condensate flow rate monitor] [are] instrumented to alarm for increases ~~of 0.5 to 1.0 gpm in~~above the normal flow rates. ~~This sensitivity is acceptable for detecting increases in unidentified LEAKAGE.~~

The reactor coolant contains radioactivity that, when released to the containment, ~~can~~ may 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 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.

Other indications may be used to detect an increase in unidentified LEAKAGE; however, they are not required to be OPERABLE by this LCO. 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.~~

BASES

BACKGROUND (continued)

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 flow into or from the containment sump [and condensate flow 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~~ is 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 above-mentioned LEAKAGE detection methods or systems differ in sensitivity and response time. [Some of these systems could serve as early alarm systems signaling the operators that closer examination of other detection systems is necessary to determine the extent of any corrective action that may be required.]

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 FSAR (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.~~

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(c)(2)(ii).

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 small amounts of unidentified LEAKAGE ~~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.

BASES

LCO (continued)

The LCO requires [three] instruments to be OPERABLE.

The containment sump is used to collect unidentified LEAKAGE. [The containment sump consists of the normal sump and the emergency sump. The LCO requirements apply to the total amount of unidentified LEAKAGE collected in [the][both] sump[s].] The monitor on the containment sump detects [level or flow rate or the operating frequency of a pump] and is instrumented to detect when there is [leakage of] [an increase above the normal value by] 1 gpm. The identification of [an increase in] unidentified LEAKAGE will be delayed by the time required for the unidentified LEAKAGE to travel to the containment sump and it may take longer than one hour to detect a 1 gpm increase in unidentified LEAKAGE, depending on the origin and magnitude of the LEAKAGE. This sensitivity is acceptable for containment sump monitor OPERABILITY.

The reactor coolant contains radioactivity that, when released to the containment, can be detected by the gaseous or particulate containment atmosphere radioactivity monitor. Only one of the two detectors is required to be OPERABLE. Radioactivity detection systems are included for monitoring both particulate and gaseous activities because of their sensitivities and rapid responses to RCS LEAKAGE, but have recognized limitations. 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. If there are few fuel element cladding defects and low levels of activation products, it may not be possible for the gaseous or particulate containment atmosphere radioactivity monitors to detect a 1 gpm increase within 1 hour during normal operation. However, the gaseous or particulate containment atmosphere radioactivity monitor is OPERABLE when it is capable of detecting a 1 gpm increase in unidentified LEAKAGE within 1 hour given an RCS activity equivalent to that assumed in the design calculations for the monitors (Reference 3).

[An increase in humidity of the containment atmosphere could indicate the release of water vapor to the containment. Condensate flow from air coolers is instrumented to detect when there is an increase above the normal value by 1 gpm. The time required to detect a 1 gpm increase above the normal value varies based on environmental and system conditions and may take longer than 1 hour. This sensitivity is acceptable for containment air cooler condensate flow rate monitor OPERABILITY.]

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the containment sump monitor, in combination with a

gaseous or particulate radioactivity monitor [and a containment air cooler condensate flow rate 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

With the required containment sump monitor inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere radioactivity monitor will provide indications of changes in leakage. Together with the containment atmosphere radioactivity 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. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after establishing steady state operation (stable 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 sump 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.

BASES

ACTIONS (continued)

B.1.1, B.1.2, B.2.1, and B.2.2

With both gaseous and 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 water inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of the required containment atmosphere radioactivity monitors. [Alternatively, continued operation is allowed if the air cooler condensate flow rate monitoring system is OPERABLE, provided grab samples are taken or water inventory balances performed every 24 hours.]

The 24 hour interval 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 establishing steady state operation (stable 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 leakage detection is available.

[C.1 and C.2

With the ~~required~~ containment air cooler condensate flow rate 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 air cooler condensate flow rate monitor to OPERABLE status.

The 24 hour interval provides periodic information that is adequate to detect RCS LEAKAGE. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after establishing steady state operation (stable 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.]

BASES

ACTIONS (continued)

D.1, D.2.1, and D.2.2

With the required containment sump monitor [and the containment air cooler condensate flow rate monitor] inoperable, the only means of detecting LEAKAGE is the required containment atmosphere radiation monitor. A Note clarifies that this Condition is applicable when the only OPERABLE monitor is the containment atmosphere gaseous radiation monitor. The containment atmosphere gaseous radioactivity monitor typically cannot detect a 1 gpm leak within one hour when RCS activity is low. In addition, this configuration does not provide the required diverse means of leakage detection. Indirect methods of monitoring RCS leakage must be implemented. Grab samples of the containment atmosphere must be taken to provide alternate periodic information. The 12 hour interval is sufficient to detect increasing RCS leakage. The Required Action provides 7 days to restore another RCS leakage monitor to OPERABLE status to regain the intended leakage detection diversity. The 7 day Completion Time ensures that the plant will not be operated in a degraded configuration for a lengthy time period.

[~~D~~E.1 and ~~D~~E.2

With the required containment atmosphere radioactivity monitor [and the ~~required~~ containment air cooler condensate flow rate monitor] inoperable, the only means of detecting leakage is the containment sump monitor. This Condition does not provide the required diverse means of leakage detection. The Required Action is to restore either of the inoperable required monitors to OPERABLE status within 30 days to regain the intended leakage detection diversity. The 30 day Completion Time ensures that the plant will not be operated in a reduced configuration for a lengthy time period.]

F~~E~~.1 and F~~E~~.2

If a Required Action of Condition A, B, [C], [D] or [~~D~~E] 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.

G~~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 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. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable COT of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. 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]

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, Revision 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973.

3. FSAR, Section [ ].

Technical Specification Task Force
Improved Standard Technical Specifications Change Traveler

Revise BWR Operability Requirements and Actions for RCS Leakage Instrumentation

NUREGs Affected: ☐ 1430 ☐ 1431 ☐ 1432 ☑ 1433 ☑ 1434

Classification 1) Technical Change Recommended for CLIIP?: Yes

Correction or Improvement: Improvement NRC Fee Status: Exempt

Benefit: Avoids Future Amendments

See attached.

Revision History

OG Revision 0 Revision Status: Closed

Revision Proposed by: BWROG

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 14-Jan-09

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 18-Feb-09

TSTF Review Information

TSTF Received Date: 14-Jan-09 Date Distributed for Review 06-Feb-09

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 18-Feb-09

NRC Review Information

NRC Received Date: 18-Feb-09

NRC Comments:
Fee exemption granted on 3/30/09.

TSTF Revision 1 Revision Status: Closed

Revision Proposed by: NRC

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TSTF Revision 1 Revision Status: Closed

Revision Description:
TSTF-514 is revised to reflect the industry's response to the NRC's 6/11/2009 Request for Additional Information.

Specific changes are:

1. The Background section of the Bases is revised to include the optional statement, "[In addition to meeting the OPERABILITY requirements, the monitors are typically set to provide the most sensitive response without causing an excessive number of spurious alarms.]"

2. Proposed Required Action F.2 is revised from, "Monitor RCS leakage by administrative means" to "Verify no increase in RCS LEAKAGE over pre-established values."

3. The LCO Bases are revised to clarify that the drywell floor drain sump monitoring system is required to quanitify the leakage rate, not leakage.

The justification is revised to reflect these changes.

Owners Group Review Information

Date Originated by OG: 14-Aug-09

Owners Group Comments
(No Comments)

Owners Group Resolution: Date:

TSTF Review Information

TSTF Received Date: 14-Aug-09 Date Distributed for Review 14-Aug-09

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 08-Sep-09

NRC Review Information

NRC Received Date: 08-Sep-09

NRC Comments:

The NRC requested that the TSTF revise the Traveler to remove the change associated with no operable RCS leakage monitoring instrumentation, as that change was not seen as being directly related to the issue described in Regulatory Issue Summary 2009-02, Rev. 1, "Use of Containment Atmosphere Gaseous Radioactivity Monitors as Reactor Coolant System Leakage Detection Equipment at Nuclear Power Reactors," which was the basis for the TSTF's fee waiver request. In a letter dated June 21, 2010, the TSTF volunteered to pay for the NRC review of the change associated with no Operable RCS leakage monitoring instrumentation. At the July 15, 2010 TSTF/NRC public meeting, the NRC did not accept the TSTF's offer and requested that the TSTF revise the Traveler to remove the changes. The TSTF agreed to revise the Traveler as requested.

Final Resolution: Superceded by Revision

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TSTF Revision 1 Revision Status: Closed

TSTF Revision 2 Revision Status: Active

Revision Proposed by: NRC

Revision Description:
The NRC requested that the TSTF revise the Traveler to remove the change associated with no operable RCS leakage monitoring instrumentation, as that change was not seen as being directly related to the issue described in Regulatory Issue Summary 2009-02, Rev. 1, "Use of Containment Atmosphere Gaseous Radioactivity Monitors as Reactor Coolant System Leakage Detection Equipment at Nuclear Power Reactors," which was the basis for the TSTF's fee waiver request. In a letter dated June 21, 2010, the TSTF volunteered to pay for the NRC review of the change associated with no Operable RCS leakage monitoring instrumentation. At the July 15, 2010 TSTF/NRC public meeting, the NRC did not accept the TSTF's offer and requested that the TSTF revise the Traveler to remove the changes. The TSTF agreed to revise the Traveler as requested.

The revision removes the changes to Condition F and the associated change to move Condition E to Condition G. The associated changes to the Bases are removed, as well as the discussion of the removed changes from the justification.

Owners Group Review Information

Date Originated by OG: 23-Jul-10

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 04-Aug-10

TSTF Review Information

TSTF Received Date: 23-Jul-10 Date Distributed for Review 23-Jul-10

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 06-Aug-10

NRC Review Information

NRC Received Date: 06-Aug-10

Affected Technical Specifications

Bkgnd 3.4.6 Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1433 Only
S/A 3.4.6 Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1433 Only

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LCO 3.4.6 Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1433 Only
Ref. 3.4.6 Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1433 Only
Action 3.4.6.C Bases	RCS Leakage Detection Instrumentation Change Description: Corrected SR Reference	NUREG(s)- 1433 Only
Action 3.4.6.D	RCS Leakage Detection Instrumentation Change Description: New Action	NUREG(s)- 1433 Only
Action 3.4.6.D	RCS Leakage Detection Instrumentation Change Description: Relabeled E	NUREG(s)- 1433 Only
Action 3.4.6.D Bases	RCS Leakage Detection Instrumentation Change Description: Relabeled E	NUREG(s)- 1433 Only
Action 3.4.6.D Bases	RCS Leakage Detection Instrumentation Change Description: New Action	NUREG(s)- 1433 Only
Action 3.4.6.E	RCS Leakage Detection Instrumentation Change Description: Relabeled F	NUREG(s)- 1433 Only
Action 3.4.6.E Bases	RCS Leakage Detection Instrumentation Change Description: Relabeled F	NUREG(s)- 1433 Only
Action 3.4.6.F	RCS Leakage Detection Instrumentation Change Description: Relabeled G	NUREG(s)- 1433 Only
Bkgnd 3.4.7 Bases	RCS Leakage Detection Instrumentation Change Description: Relabeled G	NUREG(s)- 1434 Only
S/A 3.4.7 Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1434 Only
LCO 3.4.7 Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1434 Only
Ref. 3.4.7 Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1434 Only
Action 3.4.7.D	RCS Leakage Detection Instrumentation Change Description: Relabeled E	NUREG(s)- 1434 Only
Action 3.4.7.D	RCS Leakage Detection Instrumentation Change Description: New Action	NUREG(s)- 1434 Only
Action 3.4.7.D Bases	RCS Leakage Detection Instrumentation Change Description: Relabeled E	NUREG(s)- 1434 Only
Action 3.4.7.D Bases	RCS Leakage Detection Instrumentation Change Description: New Action	NUREG(s)- 1434 Only
Action 3.4.7.E	RCS Leakage Detection Instrumentation Change Description: Relabeled F	NUREG(s)- 1434 Only
Action 3.4.7.E Bases	RCS Leakage Detection Instrumentation Change Description: Relabeled F	NUREG(s)- 1434 Only

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Action 3.4.7.F	RCS Leakage Detection Instrumentation Change Description: Relabeled G	NUREG(s)- 1434 Only
Action 3.4.7.F Bases	RCS Leakage Detection Instrumentation Change Description: Relabeled G	NUREG(s)- 1434 Only

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1.0 Description

NUREG-1433 Specification 3.4.6, "RCS Leakage Detection Instrumentation," and NUREG-1434 Specification 3.4.7 of the same title require instrumentation 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. The Improved Standard Technical Specifications (ISTS) for BWR/4 plants (NUREG-1433) requires one drywell floor drain sump monitoring system, one channel of either primary containment atmospheric particulate or atmospheric gaseous monitoring system, and (optionally) a primary containment air cooler condensate flow rate monitoring system. The BWR/6 ISTS (NUREG-1434) requires one drywell floor drain sump monitoring system, one channel of either drywell atmospheric particulate or atmospheric gaseous monitoring system, and (optionally) a drywell air cooler condensate flow rate monitoring system.

Questions have been raised regarding the Operability requirements for these instruments. In particular, improvements in plant fuel integrity have resulted in a reduction of the Reactor Coolant System (RCS) activity. As a result, the atmospheric radioactivity monitors may not be capable of promptly detecting an increase in RCS leakage.

The proposed change revises the Bases to clearly define the RCS leakage detection instrumentation Operability requirements and to modify the Actions to be taken when the atmospheric gaseous radioactivity monitor is the only Operable monitor to require additional, more frequent monitoring of other indications of RCS leakage and to shorten the time allowed to restore another monitor to Operable status.

2.0 Proposed Change

The "RCS Leakage Detection Instrumentation," specification (BWR/4 LCO 3.4.6 and BWR/6 LCO 3.4.7) is revised to add a new Condition. New Condition D is applicable when the atmospheric gaseous radioactivity monitor is the only Operable monitor (i.e., all other monitors are inoperable). The Required Actions require analyzing grab samples of the primary containment (BWR/4) or drywell (BWR/6) atmosphere and monitoring RCS leakage using administrative means every 12 hours and restoring another monitor to Operable status within 7 days. The subsequent Conditions are renumbered to reflect in addition of the new Condition.

The Bases are revised to clearly define the RCS leakage detection instrumentation Operability requirements in the LCO Bases and to eliminate discussion from the Bases that could be erroneously construed as Operability requirements. The Bases are also revised to reflect the changes to the Technical Specifications and to more accurately reflect the existing Technical Specifications.

Also, the primary containment and drywell air cooler condensate flow rate monitor is plant-specific, and therefore bracketed in the NUREG. The specifications and Bases are revised to consistently bracket references to this monitor.

3.0 Background

General Design Criterion (GDC) 30 of Appendix A to 10 CFR 50 requires means for detecting and, to the extent practical, identifying the location of the source of RCS Leakage. Regulatory Guide (RG) 1.45, Revision 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973, describes acceptable methods for selecting leakage detection systems. Revision 1 of RG 1.45 was issued in May 2008. However, operating nuclear power plants are not committed to Revision 1 of RG 1.45.

NRC Information Notice (IN) 2005-24, "Non-conservatism in Leakage Detection Sensitivity," (ADAMS Accession No. ML051780073) pointed out that the reactor coolant activity assumptions used for designing the containment radiation gaseous radiation monitor may be greater than the RCS radioactivity level present during normal operation. As a result, the containment gas channel may not be able to detect a 1 gpm leak within 1 hour at the current RCS radioactivity level.

RG 1.45, Rev. 0, Regulatory Position C.2 states that "Leakage to the primary reactor containment from unidentified sources should be collected and the flow rate monitored with an accuracy of one gallon per minute (gpm) or better." Regulatory Position C.3 states, "At least three separate detection methods should be employed and two of these methods should be (1) sump level and flow monitoring and (2) airborne particulate radioactivity monitoring. The third method may be selected from the following: a. monitoring of condensate flow rate from air coolers, b. monitoring of airborne gaseous radioactivity. Humidity, temperature, or pressure monitoring of the containment atmosphere should be considered as alarms or indirect indication of leakage to the containment." Regulatory Position C.5 states, "The sensitivity and response time of each leakage detection system in regulatory position [C.]3. above employed for unidentified leakage should be adequate to detect a leakage rate, or its equivalent, of one gpm in less than one hour." RG 1.45, Rev. 0, states, "In analyzing the sensitivity of leak detection systems using airborne particulate or gaseous radioactivity, a realistic primary coolant radioactivity concentration assumption should be used. The expected values used in the plant environmental report would be acceptable." Many plants pre-date the issuance of RG 1.45 and their plant-specific licensing basis is described in their UFSAR. In either case, the appropriate sensitivity of the atmospheric radiation monitors is dependent on the design assumptions and the plant licensing basis of each licensee.

The ISTS "RCS Leakage Detection Instrumentation" Bases do not clearly define the basis for Operability for the RCS leakage detection instrumentation. Operability requirements should be defined in the LCO section of the Bases. However, the current Bases contain information that could be construed as Operability requirements in the Background, Applicable Safety Analysis, and LCO sections. In addition, the current Bases do not accurately describe the Operability of a detector as being based on the design assumptions and licensing basis for the plant.

Because the atmospheric gaseous radiation monitor cannot always detect an RCS leak at a rate of 1 gpm within 1 hour, some plants have removed the monitor from the Technical Specification list of required monitors. However, experience has shown that the

containment atmosphere gaseous radiation monitor is useful to detect an increase in RCS leak rate and provides a diverse means to confirm an RCS leak exists when other monitors detect an increase in RCS leak rate. Therefore, the preferred solution is to retain the atmospheric gaseous radiation monitor in the LCO list of required equipment, and to revise the Actions to require additional monitoring and to provide less time before a plant shutdown is required when the atmospheric gaseous radiation monitor is the only Operable monitor.

4.0 Technical Analysis

This change will reduce the number of unnecessary MODE changes and requests for enforcement discretion by clarifying the Operability requirements for the RCS leakage detection instrumentation and by allowing a limited time to repair one or more of the inoperable monitors. A plant shut down solely as a result of the loss of the preferred TS monitoring capability could be avoided. The use of alternate leakage detection monitoring for a limited time is an appropriate response to this condition.

The proposed Bases changes will clarify the Operability requirements of the RCS leakage detection instrumentation. All references to RG 1.45 are revised to reference Revision 0 of the RG. Information in the Background and Applicable Safety Analysis sections of the Bases that could be construed as Operability requirements is deleted. The LCO section of the Bases is expanded to provide a detailed discussion of the Operability requirements for each of the required instruments. For the atmospheric radioactivity monitors, the Bases clearly relate Operability to the design assumptions and licensing basis for the plant and a reference to the Final Safety Analysis Report description of the design basis of the monitors is included.

As described in 10 CFR 50.36(c)(2)(i), the Limiting Condition for Operation and associated Operability requirements represent the lowest functional capability or performance levels of equipment required for safe operation of the facility. In practice, the leakage monitoring instrumentation is typically set to provide the most sensitive response without distracting the reactor operators with unnecessary alarms.

When the atmospheric gaseous radiation monitor is the only Operable monitor, the current Technical Specifications require grab samples of the primary containment or drywell atmosphere once per 12 hours and restoration of the inoperable monitors within 30 days. The proposed change requires analyzing grab samples from the primary containment or drywell atmosphere and monitoring RCS leakage by administrative means once per 12 hours and restoration of at least one additional monitor within 7 days.

Administrative means of monitoring RCS leakage include monitoring and trending parameters that may indicate an increase in RCS leakage. There are diverse alternative mechanisms from which appropriate indicators may be selected based on plant conditions. It is not necessary to utilize all of these methods, but a method or methods should be selected considering the current plant conditions and historical or expected sources of unidentified leakage. The administrative methods include, but are not limited to, primary containment and drywell pressure, temperature, and humidity, Component Cooling Water

System outlet temperatures and makeup, Reactor Recirculation System pump seal pressure and temperature and motor cooler temperature indications, Drywell cooling fan outlet temperatures, Reactor Building Chiller amperage, Control Rod Drive System flange temperatures, and Safety Relief Valves tailpipe temperature, flow, or pressure. These indications, coupled with the atmospheric grab samples, are sufficient to alert the operating staff to an unexpected increase in unidentified LEAKAGE.

A primary containment or drywell grab sample is comparable to the atmospheric particulate radiation monitor with respect to the ability to detect RCS leakage. Due to the time to take and analyze the grab sample, this is not a continuous monitoring method. However, the frequent performance of the grab samples ensures there is no significant loss of monitoring capability during the limited time period allowed by the proposed change. The 12 hour (once per shift) performance of primary containment or drywell grab samples and monitoring by administrative means is reasonable given the availability of the atmospheric gaseous radiation monitor. The 7 day Completion Time to restore another monitor to Operable status is reasonable given the diverse methods employed in the Required Actions to detect an RCS leak and the low probability of a large RCS leak during this period.

5.0 Regulatory Analysis

5.1 No Significant Hazards Consideration

The Technical Specification Task Force (TSTF) has evaluated whether or not a significant hazards consideration is involved with the proposed generic change by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The proposed change clarifies the Operability requirements for the Reactor Coolant System (RCS) leakage detection instrumentation and reduces the time allowed for the plant to operate when the only Operable RCS leakage detection instrumentation monitor is the atmospheric gaseous radiation monitor. The monitoring of RCS leakage is not a precursor to any accident previously evaluated. The monitoring of RCS leakage is not used to mitigate the consequences of any accident previously evaluated.

   Therefore, it is concluded that this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

The proposed change clarifies the Operability requirements for the Reactor Coolant System (RCS) leakage detection instrumentation and reduces the time allowed for the plant to operate when the only Operable RCS leakage detection instrumentation monitor is the atmospheric gaseous radiation monitor. The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or a change in the methods governing normal plant operation.

Therefore, it is concluded that this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No.

   The proposed change clarifies the Operability requirements for the Reactor Coolant System (RCS) leakage detection instrumentation and reduces the time allowed for the plant to operate when the only Operable RCS leakage detection instrumentation monitor is the atmospheric gaseous radiation monitor. Reducing the amount of time the plant is allowed to operate with only the atmospheric gaseous radiation monitor Operable increases the margin of safety by increasing the likelihood that an increase in RCS leakage will be detected before it potentially results in gross failure.

   Therefore, it is concluded that this change does not involve a significant reduction in a margin of safety.

Based on the above, the TSTF concludes that the proposed change presents no significant hazards considerations under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

10 CFR 50, Appendix A, "General Design Criteria for Nuclear Power Plants," Criterion 30, "Quality of reactor coolant pressure boundary," requires that means be provided for detecting and, to the extent practical, identifying the location of the source of reactor coolant leakage. The specific attributes of the reactor coolant leakage detection systems are outlined in Regulatory Positions 1 through 9 of Regulatory Guide 1.45, Rev. 0.

10 CFR 50.36, "Technical Specifications," paragraph (c)(2)(ii)(A), specifies that a Limiting Condition for Operation be established for installed instrumentation that is used to detect and indicate in the control room a significant abnormal degradation of the reactor coolant pressure boundary. This instrumentation is required by the "RCS Leakage Detection Instrumentation" Specification. The modification of the Actions in the Specification is not in conflict with the 10 CFR 50.36 requirements. The proposed

changes do not adversely impact the ability of the Reactor Coolant System leakage detection system to function as designed and do not impact conformance to the applicable GDCs. Therefore, the proposed changes are consistent with all applicable regulatory requirements or criteria.

Based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the approval of the proposed change will not be inimical to the common defense and security or to the health and safety of the public.

6.0 Environmental Consideration

A review has determined that the proposed change would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed change does not involve (i) a significant hazards consideration, (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 change meets 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 the proposed change.

7.0 References

None.

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.6 RCS Leakage Detection Instrumentation

LCO 3.4.6 The following RCS leakage detection instrumentation shall be OPERABLE:

a. Drywell floor drain sump monitoring system, [and]

b. One channel of either primary containment atmospheric particulate or atmospheric gaseous monitoring system, and

[c. Primary containment air cooler condensate flow rate monitoring system.]

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Drywell floor drain sump monitoring system inoperable.	A.1 Restore drywell floor drain sump monitoring system to OPERABLE status.	30 days
B. Required primary containment atmospheric monitoring system inoperable.	B.1 Analyze grab samples of primary containment atmosphere.	Once per 12 hours
	AND	
	B.2 [Restore required primary containment atmospheric monitoring system to OPERABLE status.	30 days]

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. [Primary containment air cooler condensate flow rate monitoring system inoperable.	C.1 ----------NOTE---------- Not applicable when required primary containment atmospheric monitoring system is inoperable. ---------- Perform SR 3.4.6.1.	 Once per 8 hours]
---------- NOTE ---------- Only applicable when the primary containment atmospheric gaseous radiation monitor is the only OPERABLE monitor. ---------- D. Drywell floor drain sump monitoring system inoperable. AND [Primary containment air cooler condensate flow rate monitoring system inoperable.]	D.1 Analyze grab samples of the primary containment atmosphere. AND D.2 Monitor RCS LEAKAGE by administrative means. AND D.3.1 Restore drywell floor drain sump monitoring system to OPERABLE status. OR [D.3.2 Restore primary containment air cooler condensate flow rate monitoring system to OPERABLE status.	Once per 12 hours Once per 12 hours 7 days 7 days]
E~~D~~.[Required primary containment atmospheric monitoring system inoperable. AND Primary containment air cooler condensate flow rate monitoring system	E~~D~~.1 Restore required primary containment atmospheric monitoring system to OPERABLE status. OR E~~D~~.2 Restore primary containment air cooler condensate flow rate	30 days 30 days]

inoperable.		monitoring system to OPERABLE status.	
FE. Required Action and associated Completion Time of Condition A, B, [C, D, or ED] not met.	FE.1	Be in MODE 3.	12 hours
	AND		
	FE.2	Be in MODE 4.	36 hours
GF. All required leakage detection systems inoperable.	GF.1	Enter LCO 3.0.3.	Immediately

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.6 RCS Leakage Detection Instrumentation

BASES

BACKGROUND

GDC 30 of 10 CFR 50, Appendix A (Ref. 1), requires means for detecting and, to the extent practical, identifying the location of the source of RCS LEAKAGE. Regulatory Guide 1.45, Revision 0, (Ref. 2) describes acceptable methods for selecting leakage detection systems.

Limits on LEAKAGE from the reactor coolant pressure boundary (RCPB) are required so that appropriate action can be taken before the integrity of the RCPB is impaired (Ref. 2). Leakage detection systems for the RCS are provided to alert the operators when leakage rates above normal background levels are detected and also to supply quantitative measurement of leakage rates. [In addition to meeting the OPERABILITY requirements, the monitors are typically set to provide the most sensitive response without causing an excessive number of spurious alarms.] The Bases for LCO 3.4.4, "RCS Operational LEAKAGE," discuss the limits on RCS LEAKAGE rates.

Systems for separating the LEAKAGE of an identified source from an unidentified source are necessary to provide prompt and quantitative information to the operators to permit them to take immediate corrective action.

LEAKAGE from the RCPB inside the drywell is detected by at least one of two or three independently monitored variables, such as sump level changes and drywell gaseous and particulate radioactivity levels. The primary means of quantifying LEAKAGE in the drywell is the drywell floor drain sump monitoring system.

The drywell floor drain sump monitoring system monitors the LEAKAGE collected in the floor drain sump. This unidentified LEAKAGE consists of LEAKAGE from control rod drives, valve flanges or packings, floor drains, the Closed Cooling Water System, and drywell air cooling unit condensate drains, and any LEAKAGE not collected in the drywell equipment drain sump. The primary containment floor drain sump has transmitters that supply level indications in the main control room.

The floor drain sump level indicators have switches that start and stop the sump pumps when required. A timer starts each time the sump is pumped down to the low level setpoint. If the sump fills to the high level setpoint before the timer ends, an alarm sounds in the control room, indicating a LEAKAGE rate into the sump in excess of a preset limit.

A flow indicator in the discharge line of the drywell floor drain sump pumps provides flow indication in the control room. The pumps can also be started from the control room.

BASES

BACKGROUND (continued)

The primary containment air monitoring systems continuously monitor the primary containment atmosphere for airborne particulate and gaseous radioactivity. A sudden increase of radioactivity, which may be attributed to RCPB steam or reactor water LEAKAGE, is annunciated in the control room. ~~The primary containment atmosphere particulate and gaseous radioactivity monitoring systems are not capable of quantifying LEAKAGE rates, but are sensitive enough to indicate increased LEAKAGE rates of 1 gpm within 1 hour. Larger changes in LEAKAGE rates are detected in proportionally shorter times (Ref. 3).~~

[Condensate from four of the six primary containment coolers is routed to the primary containment floor drain sump and is monitored by a flow transmitter that provides indication and alarms in the control room. This primary containment air cooler condensate flow rate monitoring system serves as an added indicator, but not quantifier, of RCS unidentified LEAKAGE.]

APPLICABLE SAFETY ANALYSES

A threat of significant compromise to the RCPB exists if the barrier contains a crack that is large enough to propagate rapidly. LEAKAGE rate limits are set low enough to detect the LEAKAGE emitted from a single crack in the RCPB (Refs. ~~4~~ 3 and ~~5~~4). ~~Each of the leakage detection systems inside the drywell is designed with the capability of detecting LEAKAGE less than the established LEAKAGE rate limits and providing appropriate alarm of excess LEAKAGE in the control room.~~

A control room alarm allows the operators to evaluate the significance of the indicated LEAKAGE and, if necessary, shut down the reactor for further investigation and corrective action. The allowed LEAKAGE rates are well below the rates predicted for critical crack sizes (Ref. ~~6~~5). Therefore, these actions provide adequate response before a significant break in the RCPB can occur.

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

LCO

This LCO requires instruments of diverse monitoring principles to be OPERABLE to provide confidence that small amounts of unidentified LEAKAGE are detected in time to allow actions to place the plant in a safe condition, when RCS LEAKAGE indicates possible RCPB degradation.

The LCO requires [three] instruments to be OPERABLE.

The drywell floor drain sump monitoring system is required to quantify the unidentified LEAKAGE rate from the RCS. Thus, for the system to be considered OPERABLE, either the flow monitoring or the sump level

monitoring portion of the system must be OPERABLE and capable of determining the leakage rate. The identification of an increase in unidentified LEAKAGE will be delayed by the time required for the unidentified LEAKAGE to travel to the drywell floor drain sump and it may take longer than one hour to detect a 1 gpm increase in unidentified LEAKAGE, depending on the origin and magnitude of the LEAKAGE. This sensitivity is acceptable for containment sump monitor OPERABILITY.

The reactor coolant contains radioactivity that, when released to the primary containment, can be detected by the gaseous or particulate primary containment atmospheric radioactivity monitor. Only one of the two detectors is required to be OPERABLE. Radioactivity detection systems are included for monitoring both particulate and gaseous activities because of their sensitivities and rapid responses to RCS LEAKAGE, but have recognized limitations. 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. If there are few fuel element cladding defects and low levels of activation products, it may not be possible for the gaseous or particulate primary containment atmospheric radioactivity monitors to detect a 1 gpm increase within 1 hour during normal operation. However, the gaseous or particulate containment primary atmospheric radioactivity monitor is OPERABLE when it is capable of detecting a 1 gpm increase in unidentified LEAKAGE within 1 hour given an RCS activity equivalent to that assumed in the design calculations for the monitors (Reference 6).

[An increase in humidity of the containment atmospheric could indicate the release of water vapor to the containment. Primary containment air cooler condensate flow rate is instrumented to detect when there is an increase above the normal value by 1 gpm. The time required to detect a 1 gpm increase above the normal value varies based on environmental and system conditions and may take longer than 1 hour. This sensitivity is acceptable for containment air cooler condensate flow rate monitor OPERABILITY.]

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the drywell floor drain sump monitoring system, in combination with a gaseous or particulate primary containment atmospheric radioactivity monitor [and a primary containment air cooler condensate flow rate monitoring system], provides an acceptable minimum.
~~The drywell floor drain sump monitoring system is required to quantify the unidentified LEAKAGE from the RCS. Thus, for the system to be considered OPERABLE, either the flow monitoring or the sump level monitoring portion of the system must be OPERABLE. The other monitoring systems provide early alarms to the operators so closer examination of other detection systems will be made to determine the extent of any corrective action that may be required. With the leakage~~

~~detection systems inoperable, monitoring for LEAKAGE in the RCPB is degraded.~~

BASES

APPLICABILITY

In MODES 1, 2, and 3, leakage detection systems are required to be OPERABLE to support LCO 3.4.4. This Applicability is consistent with that for LCO 3.4.4.

ACTIONS

A.1

With the drywell floor drain sump monitoring system inoperable, no other form of sampling can provide the equivalent information to quantify leakage. However, the primary containment atmospheric activity monitor [and the primary containment air cooler condensate flow rate monitor] will provide indication of changes in leakage.

With the drywell floor drain sump monitoring system inoperable, but with RCS unidentified and total LEAKAGE being determined every 8 hours (SR 3.4.4.1), operation may continue for 30 days. The 30 day Completion Time of Required Action A.1 is acceptable, based on operating experience, considering the multiple forms of leakage detection that are still available.

B.1 and B.2

With both gaseous and particulate primary containment atmospheric monitoring channels inoperable, grab samples of the primary containment atmosphere must be taken and analyzed to provide periodic leakage information. [Provided a sample is obtained and analyzed once every 12 hours, the plant may be operated for up to 30 days to allow restoration of at least one of the required monitors.] [Provided a sample is obtained and analyzed every 12 hours, the plant may continue operation since at least one other form of drywell leakage detection (i.e., air cooler condensate flow rate monitor) is available.]

The 12 hour interval provides periodic information that is adequate to detect LEAKAGE. The 30 day Completion Time for restoration recognizes that at least one other form of leakage detection is available.

BASES

ACTIONS (continued)

[C.1

With the required primary containment air cooler condensate flow rate monitoring system inoperable, SR 3.4.6.1 must be performed every 8 hours to provide periodic information of activity in the primary containment at a more frequent interval than the routine Frequency of SR 3.4.~~7~~6.1. The 8 hour interval provides periodic information that is adequate to detect LEAKAGE and recognizes that other forms of leakage detection are available. However, this Required Action is modified by a Note that allows this action to be not applicable if the required primary containment atmospheric monitoring system is inoperable. Consistent with SR 3.0.1, Surveillances are not required to be performed on inoperable equipment.]

D.1, D.2, D.3.1, and D.3.2

With the drywell floor drain sump monitoring system [and the primary containment air cooler condensate flow rate monitoring system] inoperable, the only means of detecting LEAKAGE is the primary containment atmospheric gaseous radiation monitor. A Note clarifies this applicability of the Condition. The primary containment atmospheric gaseous radiation monitor typically cannot detect a 1 gpm leak within one hour when RCS activity is low. In addition, this configuration does not provide the required diverse means of leakage detection. Indirect methods of monitoring RCS leakage must be implemented. Grab samples of the primary containment atmosphere must be taken and analyzed and monitoring of RCS leakage by administrative means must be performed every 12 hours to provide alternate periodic information.

Administrative means of monitoring RCS leakage include monitoring and trending parameters that may indicate an increase in RCS leakage. There are diverse alternative mechanisms from which appropriate indicators may be selected based on plant conditions. It is not necessary to utilize all of these methods, but a method or methods should be selected considering the current plant conditions and historical or expected sources of unidentified leakage. The administrative methods include, but are not limited to, primary containment and drywell pressure, temperature, and humidity, Component Cooling Water System outlet temperatures and makeup, Reactor Recirculation System pump seal pressure and temperature and motor cooler temperature indications, Drywell cooling fan outlet temperatures, Reactor Building Chiller amperage, Control Rod Drive System flange temperatures, and Safety Relief Valves tailpipe temperature, flow, or pressure. These indications, coupled with the atmospheric grab samples, are sufficient to alert the operating staff to an unexpected increase in unidentified LEAKAGE.

The 12 hour interval is sufficient to detect increasing RCS leakage. The Required Action provides 7 days to restore another RCS leakage monitor to OPERABLE status to regain the intended leakage detection diversity. The 7 day Completion Time ensures that the plant will not be operated in a degraded configuration for a lengthy time period.

[E~~D~~.1 and E~~D~~.2

With both the primary containment gaseous and particulate atmospheric monitor channels and the primary containment air cooler condensate flow rate monitor inoperable, the only means of detecting LEAKAGE is the drywell floor drain sump 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 degraded configuration for a lengthy time period.]

F~~E~~.1 and F~~E~~.2

If any Required Action of Condition A, B, [C, D or E ~~D~~] cannot be met within the associated Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to perform the actions in an orderly manner and without challenging plant systems.

G~~F~~.1

With all required monitors inoperable, no required automatic means of monitoring LEAKAGE are available, and immediate plant shutdown in accordance with LCO 3.0.3 is required.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.6.1

This SR is for the performance of a CHANNEL CHECK of the required primary containment atmospheric monitoring system. 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 3.4.6.2

This SR is for the performance of a CHANNEL FUNCTIONAL TEST of the required RCS leakage detection instrumentation. The test ensures that the monitors can perform their function in the desired manner. The test also verifies the alarm setpoint and relative accuracy of the instrument string. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. The Frequency of 31 days considers instrument reliability, and operating experience has shown it proper for detecting degradation.

SR 3.4.6.3

This SR is for the performance of a CHANNEL CALIBRATION of required 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. Operating experience has proven this Frequency is acceptable.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 30.

2. Regulatory Guide 1.45, Revision 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973.

~~3. FSAR, Section [5.2.7.2.1].~~

~~4~~3. GEAP-5620, April 1968.

~~5~~4 NUREG-75/067, October 1975.

~~6~~5. FSAR, Section [5.2.7.5.2].

6. FSAR, Section [5.2.7.2.1].

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.7 RCS Leakage Detection Instrumentation

LCO 3.4.7 The following RCS leakage detection instrumentation shall be OPERABLE:

a. Drywell floor drain sump monitoring system, [and]

b. One channel of either drywell atmospheric particulate or atmospheric gaseous monitoring system, [and

[c. Drywell air cooler condensate flow rate monitoring system.]

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Drywell floor drain sump monitoring system inoperable.	A.1 Restore drywell floor drain sump monitoring system to OPERABLE status.	30 days
B. Required drywell atmospheric monitoring system inoperable.	B.1 Analyze grab samples of drywell atmosphere. AND B.2 [Restore required drywell atmospheric monitoring system to OPERABLE status.	Once per 12 hours 30 days]

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. [Drywell air cooler condensate flow rate monitoring system inoperable.	----------NOTE---------- Not applicable when the required drywell atmospheric monitoring system is inoperable. ---------- C.1 Perform SR 3.4.7.1.	 Once per 8 hours]
---------- NOTE ---------- Only applicable when the drywell atmospheric gaseous monitoring system is the only OPERABLE monitor. ---------- D. Drywell floor drain sump monitoring system inoperable. AND [Drywell air cooler condensate flow rate monitoring system inoperable.]	D.1 Analyze grab samples of the drywell atmosphere. AND D.2 Monitor RCS LEAKAGE by administrative means. AND D.3.1 Restore drywell floor drain sump monitoring system to OPERABLE status. OR [D.3.2 Restore drywell air cooler condensate flow rate monitoring system to OPERABLE status.	Once per 12 hours Once per 12 hours

associated Completion Time of Condition A, B, [C, D, or E~~D~~] not met.	AND F~~E~~.2 Be in MODE 4.	36 hours
G~~F~~. All required leakage detection systems inoperable.	G~~F~~.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.7.1	Perform CHANNEL CHECK of required drywell atmospheric monitoring system.	12 hours

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.7 RCS Leakage Detection Instrumentation

BASES

BACKGROUND

GDC 30 of 10 CFR 50, Appendix A (Ref. 1), requires means for detecting and, to the extent practical, identifying the location of the source of RCS LEAKAGE. Regulatory Guide 1.45, Revision 0, (Ref. 2) describes acceptable methods for selecting leakage detection systems.

Limits on LEAKAGE from the reactor coolant pressure boundary (RCPB) are required so that appropriate action can be taken before the integrity of the RCPB is impaired (Ref. 2). Leakage detection systems for the RCS are provided to alert the operators when leakage rates above normal background levels are detected and also to supply quantitative measurement of rates. [In addition to meeting the OPERABILITY requirements, the monitors are typically set to provide the most sensitive response without causing an excessive number of spurious alarms.] The Bases for LCO 3.4.5, "RCS Operational LEAKAGE," discuss the limits on RCS LEAKAGE rates.

Systems for separating the LEAKAGE of an identified source from an unidentified source are necessary to provide prompt and quantitative information to the operators to permit them to take immediate corrective action.

LEAKAGE from the RCPB inside the drywell is detected by at least one of two or three independently monitored variables, such as sump level changes and drywell gaseous and particulate radioactivity levels. The primary means of quantifying LEAKAGE in the drywell is the drywell floor drain sump monitoring system.

The drywell floor drain sump monitoring system monitors the LEAKAGE collected in the floor drain sump. This unidentified LEAKAGE consists of LEAKAGE from control rod drives, valve flanges or packings, floor drains, the Closed Cooling Water System, and drywell air cooling unit condensate drains, and any LEAKAGE not collected in the drywell equipment drain sump. The drywell floor drain sump has transmitters that supply level indications in the main control room.

The floor drain sump level indicators have switches that start and stop the sump pumps when required. A timer starts each time the sump is pumped down to the low level setpoint. If the sump fills to the high level setpoint before the timer ends, an alarm sounds in the control room, indicating a LEAKAGE rate into the sump in excess of a preset limit. A second timer starts when the sump pumps start on high level. Should this timer run out before the sump level reaches the low level setpoint, an alarm is sounded in the control room indicating a LEAKAGE rate into the

sump in excess of a preset limit. A flow indicator in the discharge line of the drywell floor drain sump pumps provides flow indication in the control room.

BASES

BACKGROUND (continued)

The drywell air monitoring systems continuously monitor the drywell atmosphere for airborne particulate and gaseous radioactivity. A sudden increase of radioactivity, which may be attributed to RCPB steam or reactor water LEAKAGE, is annunciated in the control room. ~~The drywell atmosphere particulate and gaseous radioactivity monitoring systems are not capable of quantifying leakage rates, but are sensitive enough to indicate increased LEAKAGE rates of 1 gpm within 1 hour. Larger changes in LEAKAGE rates are detected in proportionally shorter times (Ref. 3).~~

[Condensate from four of the six drywell coolers is routed to the drywell floor drain sump and is monitored by a flow transmitter that provides indication and alarms in the control room. This drywell air cooler condensate flow rate monitoring system serves as an added indicator, but not quantifier, of RCS unidentified LEAKAGE.]

APPLICABLE SAFETY ANALYSES

A threat of significant compromise to the RCPB exists if the barrier contains a crack that is large enough to propagate rapidly. LEAKAGE rate limits are set low enough to detect the LEAKAGE emitted from a single crack in the RCPB (Refs. 3~~4~~ and 4~~5~~). ~~Each of the leakage detection systems inside the drywell is designed with the capability of detecting LEAKAGE less than the established LEAKAGE rate limits and providing appropriate alarm of excess LEAKAGE in the control room.~~

A control room alarm allows the operators to evaluate the significance of the indicated LEAKAGE and, if necessary, shut down the reactor for further investigation and corrective action. The allowed LEAKAGE rates are well below the rates predicted for critical crack sizes (Ref. 5~~6~~). Therefore, these actions provide adequate response before a significant break in the RCPB can occur.

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

LCO

This LCO requires instruments of diverse monitoring principles to be OPERABLE to provide confidence that small amounts of unidentified LEAKAGE are detected in time to allow actions to place the plant in a safe condition, when RCS LEAKAGE indicates possible RCPB degradation.

The LCO requires [three] instruments to be OPERABLE.

The drywell floor drain sump monitoring system is required to quantify the unidentified LEAKAGE rate from the RCS. Thus, for the system to be considered OPERABLE, either the flow monitoring or the sump level monitoring portion of the system must be OPERABLE and capable of

determining the leakage rate. The identification of an increase in unidentified LEAKAGE will be delayed by the time required for the unidentified LEAKAGE to travel to the drywell floor drain sump and it may take longer than one hour to detect a 1 gpm increase in unidentified LEAKAGE, depending on the origin and magnitude of the LEAKAGE. This sensitivity is acceptable for containment sump monitor OPERABILITY.

The reactor coolant contains radioactivity that, when released to the drywell, can be detected by the gaseous or particulate drywell atmospheric radioactivity monitor. Only one of the two detectors is required to be OPERABLE. Radioactivity detection systems are included for monitoring both particulate and gaseous activities because of their sensitivities and rapid responses to RCS LEAKAGE, but have recognized limitations. 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. If there are few fuel element cladding defects and low levels of activation products, it may not be possible for the gaseous or particulate drywell atmospheric radioactivity monitors to detect a 1 gpm increase within 1 hour during normal operation. However, the gaseous or particulate drywell atmospheric radioactivity monitor is OPERABLE when it is capable of detecting a 1 gpm increase in unidentified LEAKAGE within 1 hour given an RCS activity equivalent to that assumed in the design calculations for the monitors (Reference 6).

[An increase in humidity of the drywell atmosphere could indicate the release of water vapor to the drywell. Drywell air cooler condensate flow rate is instrumented to detect when there is an increase above the normal value by 1 gpm. The time required to detect a 1 gpm increase above the normal value varies based on environmental and system conditions and may take longer than 1 hour. This sensitivity is acceptable for containment air cooler condensate flow rate monitor OPERABILITY.]

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the drywell floor drain sump monitoring system, in combination with a gaseous or particulate drywell atmospheric radioactivity monitor [and a drywell air cooler condensate flow rate monitoring system], provides an acceptable minimum.
~~The drywell floor drain sump monitoring system is required to quantify the unidentified LEAKAGE from the RCS. Thus, for the system to be considered OPERABLE, either the flow monitoring or the sump level monitoring portion of the system must be OPERABLE. The other monitoring systems provide early alarms to the operators so closer examination of other detection systems will be made to determine the extent of any corrective action that may be required. With the leakage detection systems inoperable, monitoring for LEAKAGE in the RCPB is degraded.~~

BASES

APPLICABILITY

In MODES 1, 2, and 3, leakage detection systems are required to be OPERABLE to support LCO 3.4.5. This Applicability is consistent with that for LCO 3.4.5.

ACTIONS

A.1

With the drywell floor drain sump monitoring system inoperable, no other form of sampling can provide the equivalent information to quantify leakage. However, the drywell atmospheric activity monitor [and the drywell air cooler condensate flow rate monitor] will provide indications of changes in leakage.

With the drywell floor drain sump monitoring system inoperable, but with RCS unidentified and total LEAKAGE being determined every 8 hours (SR 3.4.5.1), operation may continue for 30 days. The 30 day Completion Time of Required Action A.1 is acceptable, based on operating experience, considering the multiple forms of leakage detection that are still available.

B.1 and B.2

With both gaseous and particulate drywell atmospheric monitoring channels inoperable, grab samples of the drywell atmosphere shall be taken and analyzed to provide periodic leakage information. [Provided a sample is obtained and analyzed every 12 hours, the plant may be operated for up to 30 days to allow restoration of at least one of the required monitors.] [Provided a sample is obtained and analyzed every 12 hours, the plant may continue operation since at least one other form of drywell leakage detection (i.e., air cooler condensate flow rate monitor) is available.]

The 12 hour interval provides periodic information that is adequate to detect LEAKAGE. The 30 day Completion Time for restoration recognizes that at least one other form of leakage detection is available.

BASES

ACTIONS (continued)

[C.1

With the required drywell air cooler condensate flow rate monitoring system inoperable, SR 3.4.7.1 is performed every 8 hours to provide periodic information of activity in the drywell at a more frequent interval than the routine Frequency of SR 3.4.7.1. The 8 hour interval provides periodic information that is adequate to detect LEAKAGE and recognizes that other forms of leakage detection are available. However, this Required Action is modified by a Note that allows this action to be not applicable if the required drywell atmospheric monitoring system is inoperable. Consistent with SR 3.0.1, Surveillances are not required to be performed on inoperable equipment.]

D.1, D.2, D.3.1, and D.3.2

With the drywell floor drain sump monitoring system [and the drywell air cooler condensate flow rate monitoring system] inoperable, the only means of detecting LEAKAGE is the drywell atmospheric gaseous radiation monitor. A Note clarifies this applicability of the Condition. The drywell atmospheric gaseous radiation monitor typically cannot detect a 1 gpm leak within one hour when RCS activity is low. In addition, this configuration does not provide the required diverse means of leakage detection. Indirect methods of monitoring RCS leakage must be implemented. Grab samples of the drywell atmosphere must be taken and analyzed and monitoring of RCS leakage by administrative means must be performed every 12 hours to provide alternate periodic information.

Administrative means of monitoring RCS leakage include monitoring and trending parameters that may indicate an increase in RCS leakage. There are diverse alternative mechanisms from which appropriate indicators may be selected based on plant conditions. It is not necessary to utilize all of these methods, but a method or methods should be selected considering the current plant conditions and historical or expected sources of unidentified leakage. The administrative methods include, but are not limited to, primary containment and drywell pressure, temperature, and humidity, Component Cooling Water System outlet temperatures and makeup, Reactor Recirculation System pump seal pressure and temperature and motor cooler temperature indications, Drywell cooling fan outlet temperatures, Reactor Building Chiller amperage, Control Rod Drive System flange temperatures, and Safety Relief Valves tailpipe temperature, flow, or pressure. These indications, coupled with the atmospheric grab samples, are sufficient to alert the operating staff to an unexpected increase in unidentified LEAKAGE.

The 12 hour interval is sufficient to detect increasing RCS leakage. The Required Action provides 7 days to restore another RCS leakage monitor to OPERABLE status to regain the intended leakage detection diversity. The 7 day Completion Time ensures that the plant will not be operated in a degraded configuration for a lengthy time period.

[E~~D~~.1 and E~~D~~.2

With both the gaseous and particulate drywell atmospheric monitor channels and the drywell air cooler condensate flow rate monitor inoperable, the only means of detecting LEAKAGE is the drywell floor drain sump 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 degraded configuration for a lengthy time period.]

F~~E~~.1 and F~~E~~.2

If any Required Action of Condition A, B, [C, D or ~~D~~ E] cannot be met within the associated Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions in an orderly manner and without challenging plant systems.

G~~F~~.1

With all required monitors inoperable, no required automatic means of monitoring LEAKAGE are available, and immediate plant shutdown in accordance with LCO 3.0.3 is required.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.7.1

This SR requires the performance of a CHANNEL CHECK of the required drywell atmospheric monitoring system. 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 3.4.7.2

This SR requires the performance of a CHANNEL FUNCTIONAL TEST of the required RCS leakage detection instrumentation. The test ensures that the monitors can perform their function in the desired manner. The test also verifies the alarm setpoint and relative accuracy of the instrument string. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. The Frequency of 31 days considers instrument reliability, and operating experience has shown it proper for detecting degradation.

SR 3.4.7.3

This SR requires the performance of a CHANNEL CALIBRATION of the required RCS leakage detection instrumentation channels. The calibration verifies the accuracy of the instrument string, including the instruments located inside the drywell. The Frequency of [18] months is a typical refueling cycle and considers channel reliability. Operating experience has proven this Frequency is acceptable.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 30.

2. Regulatory Guide 1.45, Revision 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973.

~~3. FSAR, Section [5.2.5.2].~~

3~~4~~. GEAP-5620, April 1968.

4~~5~~. NUREG-75/067, October 1975.

5~~6~~. FSAR, Section [5.2.5.5.3].

6. FSAR, Section [5.2.5.2].