Bradley J. Sawatzke
Columbia Generating Station
P.O. Box 968, PE08
Richland, WA 99352-0968
Ph. 509.377.4300 | F. 509.377.4150
bjsawatzke@energy-northwest.com

April 11, 2011
GO2-11-077

10 CFR 50.90

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

Subject: **COLUMBIA GENERATING STATION, DOCKET NO. 50-397 LICENSE AMENDMENT REQUEST FOR ADOPTION OF TECHNICAL SPECIFICATION TASK FORCE TRAVELER TSTF-514, REVISION 3, "REVISE BWR OPERABILITY REQUIREMENTS AND ACTIONS FOR RCS LEAKAGE INSTRUMENTATION"**

Dear Sir or Madam:

In accordance with the provisions of Section 50.90 of Title 10 of the *Code of Federal Regulations* (10 CFR), Energy Northwest is submitting a request for an amendment to the Technical Specifications (TS) for Columbia Generating Station.

The proposed amendment would revise the TS to define a new time limit for restoring inoperable Reactor Coolant System (RCS) leakage detection instrumentation to operable status; establish alternate methods of monitoring RCS leakage when one or more required monitors are inoperable; and make TS Bases changes which reflect the proposed changes and more accurately reflect the contents of the facility design basis related to operability of the RCS leakage detection instrumentation. These changes are consistent with NRC-approved Revision 3 to TSTF Improved Standard Technical Specification (STS) Change Traveler TSTF-514, "Revise BWR Operability Requirements and Actions for RCS Leakage Instrumentation." The availability of this TS improvement was announced in the *Federal Register* on December 17, 2010 (75 FR 79048) as part of the consolidated line item improvement process (CLIIP).

- Attachment 1 provides an evaluation of the proposed changes.
- Attachment 2 provides the markup pages of the existing TS to show the proposed changes.
- Attachment 3 provides the markup pages of the existing TS Bases to show the proposed changes.
- Attachment 4 provides revised (clean) TS pages.

A001
NRR

Once approved, the amendment will be implemented within 60 days.

This letter and its enclosure contain no regulatory commitments.

In accordance with 10 CFR 50.91(a)(1), "Notice for Public Comment," the analysis about the issue of no significant hazards consideration using the standards in 10 CFR 50.92 is being provided to the Commission in accordance with the distribution requirements in 10 CFR 50.4.

In accordance with 10 CFR 50.91(b)(1), "State Consultation," a copy of this application and its reasoned analysis about no significant hazards considerations is being provided to the designated Washington State Official.

If you should have any questions regarding this submittal, please contact Mr. K. D. Christianson, Acting Licensing Supervisor, at (509) 377-4315.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the date of this letter.

Respectfully,

B. J. Sawatzke
Vice President, Nuclear Generation & Chief Nuclear Officer

Attachments: As stated

cc: NRC Region IV Administrator
NRC NRR Project Manager
NRC Senior Resident Inspector/988C
RN Sherman – BPA/1399
WA Horin – Winston & Strawn
JO Luce - EFSEC
RR Cowley - WDOH

EVALUATION OF PROPOSED CHANGES

1.0 DESCRIPTION

The proposed amendment would revise the Technical Specifications (TS) to define a new time limit for restoring inoperable Reactor Coolant System (RCS) leakage detection instrumentation to operable status; establish alternate methods of monitoring RCS leakage when one or more required monitors are inoperable and make conforming TS Bases changes. These changes are consistent with NRC-approved Revision 3 to Technical Specification Task Force (TSTF) Standard Technical Specification (STS) Change Traveler TSTF-514, "Revise BWR Operability Requirements and Actions for RCS Leakage Instrumentation." The availability of this TS improvement was announced in the *Federal Register* on December 17, 2010 (75 FR 79048) as part of the consolidated line item improvement process (CLIIP).

2.0 PROPOSED CHANGES

The proposed changes revise and add a new Condition C to TS 3.4.7, "RCS Leakage Detection Instrumentation," and revise the associated bases. New Condition C is applicable when the drywell atmosphere gaseous radiation monitor is the only operable TS-required instrument monitoring RCS leakage, i.e., TS-required particulate and drywell floor drain sump flow monitors are inoperable. New Condition C Required Actions require monitoring RCS leakage by obtaining and analyzing grab samples of the drywell atmosphere every 12 hours; monitoring RCS leakage using administrative means every 12 hours; and taking action to restore monitoring capability using another monitor within 7 days.

Additionally, the TS Bases, which summarize the reasons for the specifications, are revised to clarify the specified safety function for each required instrument in Limiting Condition for Operation (LCO) Bases, delete discussion from the TS Bases that could be construed to alter the meaning of TS operability requirements, and reflect the changes made to TS 3.4.7.

Energy Northwest is not proposing variations or deviations from the TS changes described in TSTF-514, Revision 3. The suggested changes for the TS Bases are adopted with the only substantive deviation being the design capability of the drywell atmosphere gaseous monitor. The Columbia Generating Station (Columbia) specific licensing basis response time of this monitor to detect an increase in leakage of one gallon per minute (gpm) is reflected in lieu of the one hour response time listed in TSTF-514, Revision 3. This variation does not impact the NRC staff's model safety evaluation (SE) published in the *Federal Register* on December 17, 2010 (75 FR 79048) as part of the CLIIP Notice of Availability.

3.0 BACKGROUND

NRC Information Notice (IN) 2005-24, "Nonconservatism in Leakage Detection Sensitivity," dated August 3, 2005, informed addressees that the reactor coolant activity assumptions for primary containment atmosphere gaseous radioactivity monitors may be non-conservative. This means the monitors may not be able to detect a one gpm leak within one hour. Some licensees, in response to IN 2005-24, have taken action to remove the gaseous radioactivity monitor from the TS list of required monitors. However, industry experience has shown that the primary containment atmosphere gaseous radiation monitor is often the first monitor to indicate an increase in RCS leak rate. As a result, the TSTF and the NRC staff met on April 29, 2008, and April 14, 2009, to develop an alternative approach to address the issue identified in IN 2005-24. The agreed solution is to retain the primary containment atmosphere gaseous radiation monitor in the LCO list of required equipment, revise the specified safety function of the gas monitor to specify the required instrument sensitivity level, to revise the Actions requiring additional monitoring, and provide less time before a plant shutdown is required when the primary containment atmosphere gaseous radiation monitor is the only operable monitor.

4.0 TECHNICAL ANALYSIS

Energy Northwest has reviewed TSTF-514, Revision 3, and the model SE published on December 17, 2010 (75 FR 79048) as part of the CLIIP Notice of Availability. Energy Northwest has concluded that the technical bases presented in TSTF Traveler-514, Revision 3, and the model SE prepared by the NRC staff are applicable to Columbia.

The RCS leakage detection instrumentation required by the TS 3.4.7 includes the drywell floor drain sump flow monitoring system and either the drywell atmosphere particulate or gaseous monitoring system.

- The drywell floor drain sump flow monitoring system monitors the unidentified leakage collected in the drywell floor drain sump, which consists of leakage from the control rod drives, valve flanges or packing, floor drains, closed cooling water system drywell cooling unit drains, and leakage not collected in the drywell equipment drain sump. The drywell floor drain sump gravity drains to a reactor building floor drain sump. The drywell floor drain sump piping to the reactor building floor drain sump has a transmitter that supplies flow indication to the control room. If the sump drain flow increases to the high flow alarm setpoint, an alarm sounds in the control room.

- The drywell atmosphere monitoring system monitors the drywell atmosphere for airborne particulate and gaseous radioactivity. A sudden increase in radioactivity may be attributed to a reactor coolant pressure boundary (RCPB) steam or water leak. The system has two redundant subsystems, each having two detectors, individually monitoring particulates and noble gas activity. In each system the sample is drawn into the sample system by its vacuum pump. Flow control is provided to ensure proper sample flow. The sample flow path is from the sample point inside the primary containment, through the inlet isolation valve to the

particulate monitor chamber. The sample is passed through a fixed filter where the particulate matter is deposited while allowing the noble gases to pass through. After removal of any particulate matter, the gaseous sample passes into a volume chamber where noble gas activity is measured. Associated radiation readout modules and recorders are mounted in the main control room along with alarm annunciators.

The regulation in 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 30, "Quality of Reactor Coolant Pressure Boundary," 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 of implementing the GDC 30 requirements with regard to the selection of leakage detection systems for the RCPB. As documented in FSAR section 1.8.2, Columbia "is in compliance with the intent of this regulatory guide through the incorporation of the alternate approach cited." Conformance to RG 1.45 is also discussed in FSAR section 7.6.2.4. The NRC acceptance of the adequacy of the design of the leakage detection system is documented in NUREG-0892, Safety Evaluation Report Related to the Operation of Washington Public Power Supply System (WPPSS) Nuclear Project No. 2," dated March 1982.

RG 1.45, Revision 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." Columbia satisfies this position by collecting unidentified leakage to the drywell in the drywell floor drain sump. The flow rate is monitored with an accuracy of one gpm or better.

RG 1.45, Revision 0, 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." Columbia satisfies this position using the drywell floor drain sump flow monitor, airborne particulate radioactivity monitor, and airborne gaseous radioactivity monitor.

RG 1.45, Revision 0, Regulatory Position C.5 states, "The sensitivity and response time of each leakage detection system in regulatory position 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." The sensitivity and response time for the drywell floor drain sump flow monitoring system satisfies this position. RG 1.45, Revision 0, states, "Reactor coolant normally contains sources of radiation which, when released to the containment, can be detected by the monitoring systems. However, reactor coolant radioactivity should be low during initial reactor startup and for a few weeks thereafter until activated corrosion products have been formed and fission products become available from failed fuel elements; during this period, radioactivity monitoring instruments may be of limited value in providing an early warning of very small leaks in

the RCPB. Instrument sensitivities of 10^{-9} μCi/cc radioactivity for air particulate monitoring and of 10^{-6} μCi/cc radioactivity for radiogas monitoring are practical for these leakage detection systems. Radioactivity monitoring systems should be included for every plant (especially particulate activity monitoring) because of their sensitivity and rapid response to leaks from the RCPB." The drywell particulate and gaseous monitoring systems at Columbia were designed with sensitivities consistent with the recommendations of RG 1.45 but were not specifically designed to detect a leakage rate of one gpm in less than one hour.

During initial licensing, the NRC requested that Columbia provide a detailed discussion of the sensitivity and response times of the containment airborne radiation monitoring systems for a number of containment background activity levels resulting from both a "normal" and "maximum" background RCS leakage rate. Analyses using two different source terms were requested: one representative of relatively clean water in the reactor coolant and one representative of the maximum level of activity in the reactor coolant permitted by the TS.

The formal response to this question was documented in Amendment 21 of the FSAR. The source concentrations for the minimum activity reactor coolant were obtained from Table 5 of ANS-18.1, Source Term Specification N237, reduced by a factor of 100. The source concentrations utilized for the maximum activity case were consistent with those reported in FSAR section 11.1 and Tables 11.1-1, 11.1-3, and 11.1-5 (since the maximum activity level in the reactor coolant permitted by TS had not been developed at the time). These levels are based on measurements of boiling water reactor (BWR) reactor coolant and offgas at several stations through mid-1971 with emphasis placed on observations made at Kernkraftwerk RWE-Bayernwerk GmbH (KRB) and Dresden-2. The response time of each detector was taken to be that period of time that would result in a detector count rate which would be double that of the background, assuming that the leakage increased by one gpm above that of the background leakage rate.

The results of the evaluation demonstrated that the particulate monitor is capable of detecting an increase in leakage of one gpm within one hour. The noble gas monitor, however, even though its sensitivity is consistent with RG 1.45 requirements, is not capable of detecting the additional one gpm leakage within one hour utilizing the criterion of doubling the background count rate as positive indication. The following table provides the capability of the gaseous monitor as presented in the response to the NRC question assuming the background leakage rate had existed for at least one day and then an additional leak of one gpm occurred.

Table 1 – Drywell Atmosphere Gaseous Monitor Capability

Case	Results
• Minimum Activity • Minimum Background Leakage	When the background of ~5 counts per minute (cpm) is added to the detector's noise level of ~25 cpm, the total cpm by the detector before the event is ~30. With the increase of 1 gpm leakage, the count rate would increase one hour after the event to ~32 cpm.
• Minimum Activity • Maximum Background Leakage	When the background of ~12 cpm is added to the detector's noise level of ~25 cpm, the total cpm by the detector before the event is ~37. With the increase of 1 gpm leakage, the count rate would increase one hour after the event to ~39 cpm.
• Maximum Activity • Minimum Background Leakage	When the background of ~81 cpm is added to the detector's noise level of ~25 cpm, the total cpm by the detector before the event is ~106. With the increase of 1 gpm leakage, the count rate would increase one hour after the event to ~136 cpm.
• Maximum Activity • Maximum Background Leakage	When the background of ~213 cpm is added to the detector's noise level of ~25 cpm, the total cpm by the detector before the event is ~238. With the increase of 1 gpm leakage, the count rate would increase one hour after the event to ~269 cpm.

The noble gas monitor results presented above are cited in terms of progress toward detection. Thus, given a background of 106 cpm, the instrument would detect 136 cpm during the first hour towards the eventual 2×106=212 cpm required for a valid detection signal. The corresponding time to achieve a valid detection signal (doubling of count rate) is ten hours. Thus, the gaseous monitor is capable of detecting an increase in leakage of one gpm in ten hours with maximum activity in the reactor coolant. The noble gas monitor does, however, provide the most reliable and fastest means of ascertaining increased activity within the drywell with unidentified leakages higher than one gpm.

The administrative means of monitoring include diverse alternative mechanisms from which appropriate indicators may be selected based on plant conditions. Energy Northwest will utilize the following method or methods considering the current plant conditions and historical or expected sources of unidentified leakage: drywell pressure, drywell temperature, reactor building floor drain sump level alarm and fill-up and pump-out rates, reactor building closed cooling water system differential temperatures, drywell cooling fan inlet and outlet temperatures, and/or safety relief valve tailpipe temperature.

There are diverse alternative methods for determining that RCS leakage has not increased, from which appropriate indicators may be selected based on plant conditions. Energy Northwest will utilize the following method or methods considering the current plant conditions and historical or expected sources of unidentified leakage:

drywell pressure, drywell temperature, reactor building floor drain sump level alarm and fill-up and pump-out rates, reactor building closed cooling water system differential temperatures, drywell cooling fan inlet and outlet temperatures, and/or safety relief valve tailpipe temperature. Actions to verify that these indications have not increased since the required monitors became inoperable and analyze drywell atmospheric grab samples are sufficient to alert the operating staff to an unexpected increase in RCS leakage.

5.0 REGULATORY SAFETY ANALYSIS

5.1 NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Energy Northwest has evaluated the proposed changes to the TS using the criteria in 10 CFR 50.92 and has determined that the proposed changes do not involve a significant hazards consideration. An analysis of the issue of no significant hazards consideration is presented below:

Description of Amendment Request: The proposed amendment would revise TS 3.4.7, "RCS Leakage Detection Instrumentation," Conditions and Required Actions and clarify the operability requirements for the drywell atmospheric particulate and gaseous radiation monitors, as well as make conforming TS Bases changes for TS 3.4.7.

Basis for proposed no significant hazards consideration determination: As required by 10 CFR 50.91(a), the Energy Northwest analysis of the issue of no significant hazards consideration using the standards in 10 CFR 50.92 is presented 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 RCS leakage detection instrumentation and reduces the time allowed for the plant to operate when the only TS-required operable RCS leakage detection instrumentation monitor is the drywell 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 RCS leakage detection instrumentation and reduces the time allowed for the plant to operate when the only TS-required operable RCS leakage detection instrumentation monitor is the drywell 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 the proposed change does not create the possibility of a new or different kind of accident from any 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 RCS leakage detection instrumentation and reduces the time allowed for the plant to operate when the only TS-required operable RCS leakage detection instrumentation monitor is the drywell atmospheric gaseous radiation monitor. Reducing the amount of time the plant is allowed to operate with only the drywell 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 the proposed change does not involve a significant reduction in a margin of safety.

Based upon the above analysis, Energy Northwest concludes that the requested change does not involve a significant hazards consideration, as set forth in 10 CFR 50.92(c), "Issuance of Amendment."

5.2 APPLICABLE REGULATORY REQUIREMENTS/CRITERIA

A description of the proposed TS change and its relationship to applicable regulatory requirements were published in the *Federal Register* Notice of Availability on December 17, 2010 (75 FR 79048). Energy Northwest has reviewed the NRC staff's model SE referenced in the CLIIP Notice of Availability and concluded that the regulatory evaluation section is applicable to Columbia.

6.0 ENVIRONMENTAL CONSIDERATION

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 Part 20, and 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 effluents 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

1. TSTF-514-A Revision 3 "Revise BWR Operability Requirements and Actions for RCS Leakage Instrumentation"

2. Notice of Availability of the Models for Plant-Specific Adoption of Technical Specifications Task Force Traveler TSTF-514, Revision 3, "Revise BWR Operability Requirements and Actions for RCS Leakage Instrumentation" (75 FR 79048)

3. NRC Information Notice 2005-24 "Nonconservatism in Leakage Detection Sensitivity"

4. Final Safety Analysis Report
   - Section 1.8.2 "Conformance to NRC Regulatory Guides"
     - Regulatory Guide 1.45, Revision 0, May 1973
   - Section 3.1 "Conformance with NRC General Design Criteria"
     - 3.1.2.4.1 "Criterion 30 – Quality of Reactor Coolant Pressure Boundary"
   - Section 5.2.5 "Detection of Leakage Through Reactor Coolant Pressure Boundary"
   - Section 7.6.1.3 "Leak Detection System"
   - Section 7.6.2.4 "Conformance to Regulatory Guides"
     - Regulatory Guide 1.45 (May 1973)
   - Section 9.3.3 "Equipment and Floor Drainage Systems"
   - Section 9.4.11 "Primary Containment"
   - Section 11.1 "Source Terms"
   - Section 11.5.2.2.3 "Primary Containment Radiation Monitoring System"
     - 11.5.2.2.3.1 "Leak Detection Monitors"

5. Responses to NRC Questions
   - Q010.049 (FSAR 5.2.5, 7.6.2, 12.3.4)
   - Q010.050 (FSAR 5.2.5)
   - Q010.052 (FSAR 5.2.5)
   - Q010.053 (FSAR 5.2.5)
   - Q031.124 (FSAR 7.6.1)
   - Q211.002 (FSAR 5.2.5, 7.6.1, 9.3.3)
   - Q211.005 (FSAR 5.2.5)

6. NUREG-0892, "Safety Evaluation Report Related to the Operation of WPPSS Nuclear Project No. 2," dated March 1982

7. ANS-18.1, Source Term Specification N237, "Radioactive Materials in Principal Fluid Streams of Light-Water-Cooled Nuclear Power Plants," 1976

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 flow monitoring system; and

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

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

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

(continued)

Insert A

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. ~~C.~~ Required Action and associated Completion Time of Condition ~~A or B~~ A, B, or C not met.	D.1 ~~C.1~~ Be in MODE 3. AND D.2 ~~C.2~~ Be in MODE 4.	12 hours 36 hours
E. ~~D.~~ All required leakage detection systems inoperable.	E.1 ~~D.1~~ Enter LCO 3.0.3.	Immediately

Insert A

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
---------- NOTE ---------- Only applicable when the drywell atmospheric gaseous monitoring system is the only OPERABLE monitor. ---------- C. Drywell floor drain sump flow monitoring system inoperable.	C.1 Analyze grab samples of the drywell atmosphere. <u>AND</u> C.2 Monitor RCS LEAKAGE by administrative means. <u>AND</u> C.3 Restore drywell floor drain sump flow monitoring system to OPERABLE status.	Once per 12 hours Once per 12 hours 7 days

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 (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. 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 independently monitored variables, such as sump drain flow changes and drywell gaseous and particulate radioactivity levels. The primary means of quantifying LEAKAGE in the drywell is the drywell floor drain sump flow monitoring system.

The drywell floor drain sump flow 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 Reactor Building 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 gravity drains to a reactor building floor drain sump. The drywell floor drain sump piping to the reactor building floor drain sump has a transmitter that supplies flow indication in the main control room. If the

(continued)

BASES

BACKGROUND (continued)

sump drain flow increases to the high flow alarm setpoint, an alarm sounds in the main control room, indicating a LEAKAGE rate from the sump in excess of a preset limit.

The drywell atmosphere monitoring systems (particulate and gaseous) 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. The sensitivity of the particulate radiation monitor is sufficient to indicate increased LEAKAGE rates within 1 hour when RCS boundary leakage is increased by 1 gpm under all operational conditions (Ref. 3). Larger changes in LEAKAGE rates are detected in proportionally shorter times.~~

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~~ and 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. 6). Therefore, these actions provide adequate response before a significant break in the RCPB can occur.

RCS leakage detection instrumentation satisfies Criterion 1 of Reference 7.

LCO

~~The drywell floor drain sump flow monitoring system is required to quantify the unidentified LEAKAGE from the RCS. The other monitoring systems (particulate or gaseous) provide early alarms to the operators so closer examination of other detection systems will be made to determine the~~

Insert A

(continued)

Insert A

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 two instruments to be OPERABLE.

The drywell floor drain sump flow monitoring system is required to quantify the unidentified LEAKAGE rate from the RCS. 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 1 hour to detect a 1 gpm increase in unidentified LEAKAGE, depending on the origin and magnitude of the LEAKAGE. This sensitivity is acceptable for drywell floor drain sump flow 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. The 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 calculation for the monitor. The gaseous drywell atmospheric radioactivity monitor is OPERABLE when it is capable of detecting a 1 gpm increase in unidentified LEAKAGE within 10 hours given an RCS activity equivalent to that assumed in the design calculations for the monitor (Ref. 8).

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the drywell floor drain sump flow monitor, in combination with a gaseous or particulate drywell atmospheric radioactivity monitor, provides an acceptable minimum.

BASES

LCO (continued)

~~extent of any corrective action that may be required. With the leakage detection systems inoperable, monitoring for LEAKAGE in the RCPB is degraded.~~

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 flow monitoring system inoperable, no other form of sampling can provide the equivalent information to quantify leakage. However, the drywell atmospheric activity monitor will provide indications of changes in leakage.

With the drywell floor drain sump flow monitoring system inoperable, but with RCS unidentified and total LEAKAGE being determined every 12 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 (i.e., the required drywell atmospheric monitoring system), 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.

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.

Insert B

(continued)

Insert B

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

With neither the drywell floor drain sump flow monitoring system nor the atmospheric particulate radiation monitor OPERABLE, 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 are drywell pressure and temperature, reactor building floor drain sump level alarm and fill-up and pump-out rates, reactor building closed cooling water system differential temperatures, drywell cooling fan inlet and outlet temperatures, and safety relief valves tailpipe temperature. 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 the drywell floor drain sump flow monitoring system 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.

BASES

ACTIONS (continued)

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

If any Required Action and associated Completion Time of Condition ~~A or B~~ A, B, or C cannot be met, 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.

~~D.1~~ E.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.

SURVEILLANCE REQUIREMENTS

The Surveillances are modified by a Note to indicate that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours, provided the other required instrumentation (either the drywell floor drain sump flow monitoring system or the drywell atmospheric monitoring channel, as applicable) is OPERABLE. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. The 6 hour testing allowance is acceptable since it does not significantly reduce the probability of properly monitoring drywell leakage.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

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. 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, May 1973.

Revision 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems,"

~~3. FSAR, Section 5.2.5.5.3.~~ Deleted.

4. GEAP-5620, "Failure Behavior in ASTM A106B Pipes Containing Axial Through-Wall Flaws," April 1968.

5. NUREG-75/067, "Investigation and Evaluation of Cracking in Austenitic Stainless Steel Piping of Boiling Water Reactors," October 1975.

(continued)

BASES

REFERENCES (continued)

6. FSAR, Section 5.2.5.5.

7. 10 CFR 50.36(c)(2)(ii).

8. FSAR, Section 7.6.2.4

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 flow monitoring system; and

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

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

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

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
---------- NOTE ---------- Only applicable when the drywell atmospheric gaseous monitoring system is the only OPERABLE monitor. ---------- C. Drywell floor drain sump flow monitoring system inoperable.	C.1 Analyze grab samples of the drywell atmosphere. AND C.2 Monitor RCS LEAKAGE by administrative means. AND C.3 Restore drywell floor drain sump flow monitoring system to OPERABLE status.	Once per 12 hours Once per 12 hours 7 days
D. Required Action and associated Completion Time of Condition A, B, or C not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 4.	12 hours 36 hours
E. All required leakage detection systems inoperable.	E.1 Enter LCO 3.0.3.	Immediately