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10 CFR 50.90

RS-03-116

August 15, 2003

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

Braidwood Station, Units 1 and 2
Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: Request for Technical Specifications Change
Revision to Technical Specification 3.4.15, "RCS Leakage Detection Instrumentation"

In accordance with 10 CFR 50.90, "Application for amendment of license or construction permit," Exelon Generation Company, LLC (EGC) is requesting an amendment to Appendix A, Technical Specifications, of Facility Operating License Nos. NPF-72, NPF-77, NPF-37, and NPF-66 for Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, respectively. The proposed amendment revises Technical Specification (TS) 3.4.15, "RCS Leakage Detection Instrumentation," to require one containment sump monitor and one containment atmosphere particulate radioactivity monitor to be operable in Modes 1, 2, 3 and 4.

The current TS 3.4.15 requires one containment sump monitor and one containment atmosphere radioactivity monitor (gaseous or particulate) to be operable. It has been identified that the level of radioactivity in the Byron/Braidwood Stations reactor coolant has become much lower than what was assumed in the Byron/Braidwood Stations Updated Final Safety Analysis Report. As a result, the gaseous channel of the containment atmosphere radioactivity monitor can no longer promptly detect a small reactor coolant system (RCS) leak. However, the particulate channel sensitivity continues to support the Leak Before Break licensing basis. Therefore, the proposed amendment eliminates the gaseous channel from Limiting Condition for Operation (LCO) 3.4.15 and restricts the LCO for the containment atmosphere radioactivity monitor to the particulate channel.

In light of the proposed change, the Braidwood Station and Byron Station RCS leakage detection system continues to provide a diverse means of promptly detecting an RCS leak. Additionally, as demonstrated in the attached evaluation, the leak-before-break licensing basis

for Braidwood and Byron Stations continues to be supported by the containment sump monitor and containment atmosphere particulate radioactivity monitor leakage detection capabilities. The attached amendment request is subdivided as shown below.

Attachment 1 provides an evaluation of the proposed change and contains the following sections:

1.0 Description

2.0 Proposed Change

3.0 Background

4.0 Technical Analysis

5.0 Regulatory Analysis

5.1 No Significant Hazards Consideration

This section describes our evaluation performed using the criteria in 10 CFR 50.91(a), "Notice for public comment," paragraph (1), which provides information supporting a finding of no significant hazards consideration using the standards in 10 CFR 50.92, "Issuance of amendment," paragraph (c).

5.2 Applicable Regulatory Requirements/Criteria

6.0 Environmental Consideration

This section provides information supporting an environmental assessment. We have determined that the proposed change meets the criteria for a categorical exclusion set forth in paragraph (c)(10) of 10 CFR 51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review."

7.0 References

Attachments 2A and 2B include the marked-up TS pages with the proposed change indicated for Braidwood Station and Byron Station, respectively.

Attachments 3A and 3B include the associated typed TS pages with the proposed changes incorporated for Braidwood Station and Byron Station, respectively. Also, included in Attachments 3A and 3B are the associated typed TS Bases pages for Braidwood Station and Byron Station. The Bases pages are included for information only.

We request approval of the proposed amendment by August 2, 2004. Once approved, the amendment will be implemented within 30 days.

The proposed amendment has been reviewed by the Braidwood Station and the Byron Station Plant Operations Review Committees and approved by their respective Nuclear Safety Review Boards in accordance with the requirements of the Exelon Quality Assurance Program.

EGC is notifying the State of Illinois of this application for a change to the TS by sending a copy of this letter and its attachments to the designated State Official.

Should you have any questions concerning this letter, please contact Jose Dubon at (630) 657-2805.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on August 15, 2003

Kenneth A. Ainger
Manager – Licensing

Attachments:
Attachment 1: Evaluation of Proposed Change
Attachment 2A: Mark-up of Proposed Technical Specifications Page Change for Braidwood Station
Attachment 2B: Mark-up of Proposed Technical Specifications Page Change for Byron Station
Attachment 3A: Typed Page for Technical Specifications Change and Bases Changes (for information only) for Braidwood Station
Attachment 3B: Typed Page for Technical Specifications Change and Bases Changes (for information only) for Byron Station

bcc: Project Manager, NRR - Byron Station
Project Manager, NRR - Braidwood Station
Office of Nuclear Facility Safety – Illinois Department of Nuclear Safety
Manager of Energy Practice - Winston & Strawn
Site Vice President - Byron Station
Site Vice President - Braidwood Station
Vice President - Licensing and Regulatory Affairs
Regulatory Assurance Manager - Byron Station
Regulatory Assurance Manager - Braidwood Station
Director, Licensing – Mid-west Regional Operating Group
Manager, Licensing - Braidwood and Byron Stations
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ATTACHMENT 1

EVALUATION OF PROPOSED CHANGE

INDEX

1.0 DESCRIPTION

In accordance with 10 CFR 50.90, "Application for amendment of license or construction permit," Exelon Generation Company, LLC (EGC) is requesting an amendment to Appendix A, Technical Specifications, of Facility Operating License Nos. NPF-72, NPF-77, NPF-37, and NPF-66 for Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, respectively. The proposed amendment revises Technical Specification (TS) 3.4.15, "RCS Leakage Detection Instrumentation," to require one containment sump monitor and one containment atmosphere particulate radioactivity monitor to be operable in Modes 1, 2, 3 and 4. The proposed amendment eliminates the gaseous channel from Limiting Condition for Operation (LCO) 3.4.15 and restricts the LCO for the containment atmosphere radioactivity monitor to the particulate channel.

2.0 PROPOSED CHANGE

The current TS LCO 3.4.15 states the following:

> "The following RCS leakage detection instrumentation shall be OPERABLE:
>
> a. One containment sump monitor; and
>
> b. One containment atmosphere radioactivity monitor (gaseous or particulate)."

The proposed amendment would revise this LCO to state the following:

> "The following RCS leakage detection instrumentation shall be OPERABLE:
>
> a. One containment sump monitor; and
>
> b. One containment atmosphere particulate radioactivity monitor."

We request approval of the proposed amendment by August 2, 2004. Once approved, the amendment will be implemented within 30 days.

The proposed amendment is reflected on marked-up copies of the affected TS pages for Braidwood and Byron Stations in Attachments 2A and 2B, respectively. The typed TS pages, with the change incorporated, are provided in Attachments 3A and 3B along with the associated revised TS Bases pages (for information only). Following NRC approval of this request, the Braidwood Station and Byron Station TS Bases will be revised in accordance with the TS Bases Control Program described in TS Section 5.5.14, "Technical Specifications (TS) Bases Control Program."

3.0 BACKGROUND

System Description

Various methods of reactor coolant system (RCS) leakage detection are employed at Braidwood and Byron Stations. They include the monitoring of the containment sumps, the

monitoring of the containment atmosphere using radiation monitors, the monitoring of the level in the volume control tank (VCT) using level trend recorders, the surveillance of RCS mass balance on a periodic basis in accordance with TS surveillance requirements, and containment temperature and pressure instrumentation.

The containment sumps include the containment floor drain sump and the reactor cavity sump. The containment floor drain sump has a flow indicator (i.e., RF008) to monitor flow into the sump and level indicators (i.e., PC002 and PC003) to monitor the level in the sump. The containment floor drain sump flow indicator is capable of detecting a one gallon per minute (gpm) leak within one hour after leakage has reached the sump. The containment floor drain sump flow indicator is designed to remain functional after a safe shutdown earthquake (SSE). The containment floor drain sump level indicators are capable of detecting a one gpm leak within one hour provided the indicators are monitored at least once per hour. The containment floor drain sump level indicators are seismically qualified and powered from an engineered safety features bus.

The reactor cavity sump has a flow indicator (i.e., RF010) to monitor flow into the sump. The reactor cavity sump flow indicator is capable of detecting a one gpm leak within one hour after leakage has reached the sump. The reactor cavity sump flow indicator is designed to remain functional after an SSE. These leakage detection instruments are further described in the Byron/Braidwood Stations Updated Final Safety Analysis Report (UFSAR), Section 5.2.5.1.

The containment floor drain sump flow monitor (i.e., RF008) and the reactor cavity sump flow monitor (i.e., RF010) are normally utilized to fulfill the containment sump monitor requirement in LCO 3.4.15. Alarms are provided to alert the operator of leakages of one gpm. When the alarm function is not capable of detecting one gpm of unidentified leakage within one hour, the containment floor drain sump flow indication may be periodically monitored to ensure the capability of detecting one gpm of unidentified leakage within one hour.

In lieu of the containment floor drain sump flow monitor (i.e., RF008), either containment sump level monitor (i.e., PC002 or PC003) can be used by monitoring a change in sump level over a period of time in such a manner as to ensure the capability of detecting one gpm of unidentified leakage within one hour.

The containment atmosphere radiation monitor functions to continuously sample and monitor the containment atmosphere for airborne radioactivity. It includes a particulate detector (i.e., PR011A) and a gaseous activity low range detector (i.e., PR011B). The range of the particulate channel sensitivity is 10^{-11} to 10^{-5} microcuries per cubic centimeter (μCi/cc) and the low gas channel sensitivity is 10^{-6} to 10^{-2} μCi/cc. With the level of radioactivity in the reactor coolant assumed in UFSAR Table 11.1-4, "Realistic, Operational Basis Reactor Coolant Fission and Corrosion Product Activities," these detectors are capable of detecting a one gpm leak in one hour. However, the level of radioactivity in the reactor coolant has become much lower than what was assumed in the UFSAR and the gaseous channel can no longer promptly detect a small RCS leak. However, the particulate channel sensitivity continues to support the Leak Before Break (LBB) licensing basis. Although the containment radiation monitors are not seismically qualified, they are seismically mounted and can be powered from safety related buses, via the non-safety to safety cross-tie breakers, if necessary. The containment atmosphere radiation monitors are further described in UFSAR Sections 5.2.5.2, "Containment Radiation Monitoring," 11.5, "Process and Effluent Radiological Monitoring and Sampling Systems," and Appendix A.

The reactor makeup control system is used to maintain proper reactor coolant inventory. The VCT is part of the reactor makeup control system. The level in the VCT is continuously monitored from the control room with a level recorder. The level recorder is sensitive enough to be capable of recording a one gpm leak rate within one hour during steady state operations.

Another method of monitoring RCS leakage is by the RCS mass balance surveillance performed in accordance with TS 3.4.13, "RCS Operational Leakage," every 72 hours. The mass balance surveillance is also performed at intervals prescribed in TS 3.4.15 (i.e., once per 24 hours) when one RCS leakage detection monitor is declared inoperable. The mass balance calculated from performing the surveillance can provide licensed operators indication of a one gpm leak.

Containment air pressure is continuously monitored and is alarmed and indicated in the main control room. While this indication is not relied upon to quantify leakage rates, changes in this parameter may indirectly indicate reactor coolant leakage to the containment atmosphere.

Need for the Amendment

During the period since startup of Byron and Braidwood Stations to the present, due to improved fuel integrity and the resultant reduced RCS radioactivity levels, the gaseous channel of the containment atmosphere radiation monitor has become less effective for RCS leakage detection. It has been determined that the capability of the gaseous channel of the containment atmosphere radiation monitor is not sufficient to support leak-before-break monitoring at Byron and Braidwood Stations. The gaseous channel was designed in accordance with the sensitivities specified in Regulatory Guide (RG) 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems," its alarm setpoint has been set as low as practicable, it is fully functioning in accordance with its design requirements, and is meeting the current TS surveillance requirements; however, it has been declared inoperable due to its inability to promptly detect RCS leakage with reduced radioactivity levels. Since TS LCO 3.4.15 allows use of either the gaseous or the particulate channel to satisfy the requirement for one containment atmosphere radioactivity monitor and the capability of the gaseous channel has been determined to be insufficient to support LBB monitoring, TS 3.4.15 is considered non-conservative. Operating with a non-conservative RCS Leakage Detection Instrumentation TS was entered into the corrective action program. In accordance with NRC Administrative Letter 98-10, "Dispositioning of Technical Specifications That Are Insufficient to Assure Plant Safety," the evaluation of compensatory measures, such as administrative controls, and prompt actions to correct the TS are required. Approval of this proposed amendment will eliminate the administrative inoperability placed on the gaseous channel and restrict the LCO for the containment atmosphere radioactivity monitor to the particulate channel.

4.0 TECHNICAL ANALYSIS

The detection of RCS leakage using radiation monitors is affected by the quantity of isotopes that are contained in the reactor coolant and the background level of radiation around the detectors. With the level of radioactivity in the reactor coolant assumed in UFSAR Table 11.1-4, the containment atmosphere particulate and gaseous radioactivity detectors are capable of detecting a one gpm leak in one hour. However, the level of radioactivity in the Byron/Braidwood Stations reactor coolant has become much lower than what was assumed in the UFSAR.

The containment atmosphere particulate radioactivity channel sensitivity has a range of 10^{-11} to 10^{-5} μCi/cc, which meets the sensitivity criteria specified in RG 1.45. Given the current normal level of radioactivity in the reactor coolant at Braidwood and Byron Stations, the containment atmosphere particulate radiation monitors would detect a one gpm leak in the range of 3.6 to 7.3 hours for the four Byron/Braidwood Stations units. Because the minimum detectable activity of the detector is in close tolerance to the desired setpoint, numerous false positive indications would be realized if the monitors were set to alarm a one gpm leak in one hour. Therefore, the alarm setpoints are set as low as practicable based on a statistical analysis of the monitors' trend. Varying detector background, RCS activity level and failed fuel conditions contribute to changes in the particulate monitors' detection capabilities. Using a source term based on representative real-time data, with no fuel defects, and varying ambient background level, the particulate channel detectors could have a setpoint at which the detectors are capable of detecting a one gpm leak in one hour. However, to minimize operator distractions due to false positive results, based on normal detector variance, the setpoints installed into the detectors resulted in the above timeframe (i.e., 3.6 to 7.3 hours to detect a one gpm leak).

The containment atmosphere gaseous radioactivity channel sensitivity has a range of 10^{-6} to 10^{-2} μCi/cc, which also meets the sensitivity criteria specified in RG 1.45. Given the current normal level of radioactivity (i.e., 0.005 to 0.01 μCi/cc) in the reactor coolant at Braidwood and Byron Stations the containment atmosphere gaseous radiation monitors would detect a one gpm leak in the range of 223 to 839 hours for the four Byron/Braidwood Stations units. This time range is based on the use of varying detector background level, with this typical RCS gaseous activity (i.e., 0.005 to 0.01 μCi/cc). As the detector background increases, either the time to detect a one gpm leak would increase or the detectable RCS leak rate would be greater than one gpm within the specified timeframe. At elevated RCS activity/failed fuel conditions, a one gpm leak would be detectable within one hour even with a much higher detector background. For lower RCS activity levels, as described above, a one gpm leak becomes more difficult to detect using the containment atmosphere gaseous radioactivity monitor.

In light of the RCS leakage detection capabilities of the containment atmosphere radioactivity monitors described above, the technical bases for applying LBB analyses to eliminate large primary loop pipe rupture from the structural design basis of Byron and Braidwood Stations was re-evaluated. The LBB approach is the application of fracture mechanics technology to demonstrate that high energy piping is very unlikely to experience catastrophic ruptures or failures. The NRC approved LBB methodology, as stated in NUREG-1061, "Report of the U.S. Nuclear Regulatory Commission Piping Review Committee," Volume 3, "Evaluation of Potential for Pipe Breaks," requires the following criteria to be satisfied: 1) the leakage flaw size should be large enough so that the leakage is assured of detection with at least a margin of 10 using the minimum installed leak detection capability when the pipe is subjected to normal operational loads; 2) under normal plus SSE loads there should be a margin of 2.0 between the leakage-size flaw and the critical-size flaw which could propagate to piping failure to account for the uncertainties inherent in the analyses and the leakage detection capability; and 3) flaw stability must be demonstrated. In addition, NUREG-1061, Volume 3, specifies that the RCS leakage detection capability should meet the criteria established in RG 1.45.

The LBB analysis for Byron and Braidwood Stations was approved by the NRC in Reference 1. In the safety evaluation, the NRC acknowledged that the installed RCS leakage detection systems met the intent of RG 1.45 such that leakage of one gpm in one hour can be detected. This criteria continues to be met by the containment sump monitor. It also acknowledged that our LBB analysis calculated a leak, through the postulated leakage flaw, to be 10 gpm and thus, is large relative to the sensitivity of the plant's leak detection systems and consistent with the

criteria in NUREG-1061, Volume 3. The NRC also confirmed by means of independent calculations that a margin greater than 2.0 between the critical flaw size to the leakage flaw size exists for the two critical locations and that flaw stability requirements are satisfied.

As stated in NUREG-1061, Volume 3, licensees and applicants have the option of requesting a decrease in leakage margin provided they can confirm that their leakage detection systems are sufficiently reliable, redundant, diverse, and sensitive. The basis for the NRC's approval of the LBB analysis for Byron and Braidwood Stations continues to be supported by the overall RCS leakage detection capability. The following leakage detection systems, as described in Section 3 above, will continue to be required by TS LCO 3.4.15. The containment sump monitors are capable of detecting a one gpm leak in one hour. Specifically, the containment floor drain sump flow indicator is capable of detecting a one gpm leak within one hour after leakage has reached the sump. Additionally, the containment floor drain sump level indicators are capable of detecting a one gpm leak within one hour provided the indicators are monitored at least once per hour. The containment atmosphere particulate radioactivity monitor, with its capability described above, also has a margin of detection that is large relative to the postulated 10 gpm leakage flaw. Furthermore, the flaw stability analysis demonstrates that ample margin exists in the material properties used to demonstrate end-of-service life stability of the critical flaws. Since flaw stability to the end-of-service life is demonstrated, the rate of leakage detection capability is less critical. That is, the capability of the containment atmosphere radioactivity monitor to detect a one gpm leak in 3.6 to 7.3 hours is adequate to ensure identification of a leak-before-break since flaw stability has been demonstrated. The leakage detection systems will continue to be required in TS LCO 3.4.15.

Additional diverse means of leakage detection are available as part of the overall Byron and Braidwood Stations leakage detection capability. For example, non-TS required VCT level is monitored in the control room with a level recorder (as described in Section 3 above). The level recorder is sensitive enough to be capable of recording a one gpm leak rate within one hour during steady state operations. TS required RCS mass balance surveillance is performed in accordance with TS 3.4.15 (i.e., once per 24 hours) with one inoperable RCS leakage detection monitor. The mass balance calculated from performing the surveillance can provide licensed operators indication of a one gpm leak. Finally, additional non-TS required containment temperature and pressure instrumentation are indicated in the main control room. These indicators may indirectly indicate reactor coolant leakage to the containment atmosphere.

It should be noted that EGC intends to maintain the containment atmosphere gaseous radioactivity monitor functional and available in accordance with normal non-TS equipment practices.

In summary, while the proposed amendment eliminates the gaseous channel from LCO 3.4.15, it results in a more restrictive requirement in the LCO for the containment atmosphere radioactivity monitor (i.e., the particulate channel). The proposed amendment continues to require, in the TS, diverse means of leakage detection equipment with capability to promptly detect RCS leakage consistent with the technical basis in the approved LBB analysis for Byron and Braidwood Stations.

5.0 REGULATORY ANALYSIS

5.1 NO SIGNIFICANT HAZARDS CONSIDERATION

Overview

In accordance with 10 CFR 50.90, "Application for amendment of license or construction permit," Exelon Generation Company, LLC (EGC) is requesting an amendment to Appendix A, Technical Specifications, of Facility Operating License Nos. NPF-72, NPF-77, NPF-37, and NPF-66 for Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, respectively. The proposed amendment revises Technical Specification (TS) 3.4.15, "RCS Leakage Detection Instrumentation," to require one containment sump monitor and one containment atmosphere particulate radioactivity monitor to be operable in Modes 1, 2, 3 and 4. The proposed amendment eliminates the gaseous channel from Limiting Condition for Operation (LCO) 3.4.15.

The current TS 3.4.15 requires one containment sump monitor and one containment atmosphere radioactivity monitor (gaseous or particulate) to be operable. It has been identified that the level of radioactivity in the Byron/Braidwood Stations reactor coolant has become much lower than what was assumed in the Byron/Braidwood Stations Updated Final Safety Analysis Report. As a result, the gaseous channel of the containment atmosphere radioactivity monitor can no longer promptly detect a small reactor coolant system (RCS) leak. However, the particulate channel sensitivity continues to support the Leak Before Break licensing basis. Therefore, the proposed amendment eliminates the gaseous channel from LCO 3.4.15 and restricts the LCO for the containment atmosphere radioactivity monitor to the particulate channel.

The containment sump monitor meets the requirements of RG 1.45 to detect RCS leakage of one gallon per minute (gpm) within one hour. The containment sump and particulate monitors both support the Braidwood and Byron Stations LBB assumptions.

Accordingly, the Braidwood and Byron RCS leakage detection system continues to provide a diverse means of promptly detecting an RCS leak. While the proposed amendment eliminates the gaseous channel from LCO 3.4.15, it results in a more restrictive requirement in the LCO for the containment atmosphere radioactivity monitor (i.e., the particulate channel). The proposed amendment continues to require, in the TS, diverse means of leakage detection equipment with capability to promptly detect RCS leakage consistent with the technical basis in the approved leak-before-break analysis for Byron and Braidwood Stations.

Criteria

According to 10 CFR 50.92, "Issuance of amendment," paragraph (c), a proposed amendment to an operating license involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not:

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

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

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

In support of this determination, an evaluation of each of the three criteria set forth in 10 CFR 50.92 is provided below regarding the proposed license amendment.

1. **The proposed TS change does not involve a significant increase in the probability or consequences of an accident previously evaluated.**

   The proposed change has been evaluated and determined to not increase the probability or consequences of an accident previously evaluated. The proposed change does not make any hardware changes and does not alter the configuration of any plant system, structure or component (SSC). The proposed change only removes the containment atmosphere gaseous radioactivity monitor as an option for meeting the operability requirement for TS LCO 3.4.15. The containment radiation monitors are not initiators of any accident; therefore, the probability of occurrence of an accident is not increased. The TS will continue to require diverse means of leakage detection equipment, thus ensuring that leakage due to cracks would continue to be identified prior to breakage and the plant shutdown accordingly. Therefore, the consequences of an accident are not increased.

2. **The proposed TS change does not create the possibility of a new or different kind of accident from any accident previously evaluated.**

   The proposed change does not involve the use or installation of new equipment and the currently installed equipment will not be operated in a new or different manner. No new or different system interactions are created and no new processes are introduced. The proposed changes will not introduce any new failure mechanisms, malfunctions, or accident initiators not already considered in the design and licensing bases. The proposed change does not affect any SSC associated with an accident initiator. Based on this evaluation, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. **The proposed TS change does not involve a significant reduction in a margin of safety.**

   The proposed change does not make any alteration to any RCS leakage detection components. The proposed change only removes the containment atmosphere gaseous radioactivity monitor as an option for meeting the operability requirement for TS LCO 3.4.15, since the level of radioactivity in the Byron/Braidwood Stations reactor coolant has become much lower than what was assumed in the Byron/Braidwood Stations UFSAR and the gaseous channel can no longer promptly detect a small RCS leak consistent with the technical basis in the approved leak-before-break analysis for Byron and Braidwood Stations. The proposed amendment continues to require, in the TS, diverse means of leakage detection equipment with capability to promptly detect RCS leakage. Although not required by TS, additional diverse means of leakage detection capability are available. Based on this evaluation, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above evaluation, EGC concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c).

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 various means for detecting reactor coolant leakage at Byron and Braidwood Stations were previously discussed in Section 3.0, "Background."

The Byron and Braidwood Stations design, with certain clarifications and exceptions, conforms to Regulatory Guide (RG) 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems," dated May 1973. RG 1.45 describes acceptable methods for implementing the requirement of Criterion 30 (above) with regard to the selection of leakage detection systems for the reactor coolant pressure boundary. The specific attributes of the reactor coolant leakage detection systems are outlined in Regulatory Position 1 through 9 of RG 1.45. Byron and Braidwood Stations conformance with RG 1.45 is described in UFSAR Appendix A, "Application of NRC Regulatory Guides." It should be noted that Regulatory Position 9 specifies that Technical Specifications (TS) should include the limiting conditions for identified and unidentified leakage and address the availability of various types of instruments to assure adequate coverage at all times; however, Position 9 does not specify how many instruments shall be contained in the TS. The containment sump monitor satisfies the RG 1.45 criteria of detecting RCS leakage of one gpm within one hour. Therefore, the removal of the gaseous channel of the containment radiation monitor from the TS is not in conflict with this Regulatory Position.

10 CFR 50.36, "Technical Specifications," paragraph (c)(2)(ii)(A), specifies that a TS limiting condition for operation of a nuclear reactor must be established for installed instrumentation that is used to detect, and indicated in the control room, a significant abnormal degradation of the reactor coolant pressure boundary. Currently, the instrumentation addressed in TS 3.4.15 satisfies this requirement. The current instrumentation addressed in TS 3.4.15, as previously noted, includes one containment sump monitor and one containment atmosphere radioactivity monitor (gaseous or particulate). The removal of the gaseous containment atmosphere radioactivity monitor from the TS is not in conflict with this requirement as the containment sump monitor and the containment atmosphere particulate radioactivity monitor will remain in the TS LCO.

6.0 ENVIRONMENTAL CONSIDERATION

Overview

EGC has evaluated this proposed operating license amendment consistent with the criteria for identification of licensing and regulatory actions requiring environmental assessment in accordance with 10 CFR 51.21, "Criteria for and identification of licensing and regulatory actions requiring environmental assessments." EGC has determined that the proposed change meets the criteria for a categorical exclusion set forth in paragraph (c)(9) of 10 CFR 51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review," and as such, has determined that no irreversible consequences exist in accordance with paragraph (b) of 10 CFR 50.92, "Issuance of

amendment." This determination is based on the fact that this change is being proposed as an amendment to a license issued pursuant to 10 CFR 50, "Domestic Licensing of Production and Utilization Facilities," which changes a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, "Standards for Protection Against Radiation," or which changes an inspection or a surveillance requirement, and the amendment meets the following specific criteria:

(i) The amendment involves no significant hazards consideration.

As demonstrated in Section 5.1, "No Significant Hazards Consideration," the proposed change does not involve any significant hazards consideration.

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

The proposed change to remove the gaseous radiation monitor from TS LCO 3.4.15 does not result in an increase in power level, does not increase the production nor alter the flow path or method of disposal of radioactive waste or byproducts; thus, there will be no change in the amounts of radiological effluents released offsite.

Based on the above evaluation, the proposed change will not result in a significant change in the types or significant increase in the amounts of any effluent released offsite.

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

The proposed change to remove the gaseous radioactivity monitor from TS LCO 3.4.15 will not result in any changes to the previously analyzed configuration of the facility. There will be no change in the level of controls or methodology used for the monitoring of unidentified leakage in the containment, the processing of radioactive effluents or handling of solid radioactive waste, nor will the proposal result in any change in the normal radiation levels in the plant. Therefore, there will be no increase in individual or cumulative occupational radiation exposure resulting from this proposed change.

7.0 REFERENCES

1. Letter from R. R. Assa (NRC) to I. Johnson (Commonwealth Edison Company (now EGC)), "Safety Evaluation (SE) Regarding Leak-Before-Break Analysis – Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2 (TAC Nos. M95342, M95343, M95344 and M95345)," dated October 25, 1996

ATTACHMENT 2A

Proposed Technical Specifications Page Changes

BRAIDWOOD STATION

REVISED PAGES

3.4.15-1

3.4.15-2

3.4.15-3

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 PARTICULATE radioactivity monitor ~~(gaseous or particulate)~~.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required containment sump monitor inoperable.	----------NOTE---------- LCO 3.0.4 is not applicable. ----------	
	A.1 ---------NOTE--------- Not required to be performed 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

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. ~~Required~~ Containment atmosphere PARTICULATE radioactivity monitor inoperable.	----------NOTE---------- LCO 3.0.4 is not applicable. ----------		
	B.1.1	Analyze grab samples of the containment atmosphere.	Once per 24 hours
	OR		
	B.1.2	---------NOTE-------- Not required to be performed 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 PARTICULATE radioactivity monitor to OPERABLE status.	30 days
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours
	AND		
	C.2	Be in MODE 5.	36 hours
D. All required monitors inoperable.	D.1	Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.15.1	Perform CHANNEL CHECK of the ~~required~~ containment atmosphere radioactivity monitor. (PARTICULATE)	12 hours
SR 3.4.15.2	Perform COT of the ~~required~~ containment atmosphere radioactivity monitor. (PARTICULATE)	92 days
SR 3.4.15.3	Perform CHANNEL CALIBRATION of the required containment sump monitor.	18 months
SR 3.4.15.4	Perform CHANNEL CALIBRATION of the ~~required~~ containment atmosphere radioactivity monitor. (PARTICULATE)	18 months

ATTACHMENT 2B

Proposed Technical Specifications Page Changes

BYRON STATION

REVISED PAGES

3.4.15-1

3.4.15-2

3.4.15-3

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)~~ PARTICULATE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required containment sump monitor inoperable.	----------NOTE---------- LCO 3.0.4 is not applicable. ----------	
	A.1 ---------NOTE--------- Not required to be performed 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

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. ~~Required~~ Containment atmosphere PARTICULATE radioactivity monitor inoperable.	----------NOTE---------- LCO 3.0.4 is not applicable. ----------		
	B.1.1	Analyze grab samples of the containment atmosphere.	Once per 24 hours
	OR		
	B.1.2	---------NOTE-------- Not required to be performed 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 PARTICULATE radioactivity monitor to OPERABLE status.	30 days
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours
	AND		
	C.2	Be in MODE 5.	36 hours
D. All required monitors inoperable.	D.1	Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.15.1	Perform CHANNEL CHECK of the ~~required~~ containment atmosphere radioactivity monitor. (PARTICULATE)	12 hours
SR 3.4.15.2	Perform COT of the ~~required~~ containment atmosphere radioactivity monitor. (PARTICULATE)	92 days
SR 3.4.15.3	Perform CHANNEL CALIBRATION of the required containment sump monitor.	18 months
SR 3.4.15.4	Perform CHANNEL CALIBRATION of the ~~required~~ containment atmosphere radioactivity monitor. (PARTICULATE)	18 months

ATTACHMENT 3A

Typed Pages

for

Technical Specifications Changes

and

Bases Changes
(for information only)

BRAIDWOOD STATION

REVISED TS PAGES

3.4.15-1

3.4.15-2

3.4.15-3

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 particulate radioactivity monitor.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required containment sump monitor inoperable.	----------NOTE---------- LCO 3.0.4 is not applicable. ----------	
	A.1 ---------NOTE--------- Not required to be performed 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

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. Containment atmosphere particulate radioactivity monitor inoperable.	----------NOTE---------- LCO 3.0.4 is not applicable. ----------		
	B.1.1	Analyze grab samples of the containment atmosphere.	Once per 24 hours
	OR		
	B.1.2	---------NOTE-------- Not required to be performed until 12 hours after establishment of steady state operation. ----------	
		Perform SR 3.4.13.1.	Once per 24 hours
	AND		
	B.2	Restore containment atmosphere particulate radioactivity monitor to OPERABLE status.	30 days
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours
	AND		
	C.2	Be in MODE 5.	36 hours
D. All required monitors inoperable.	D.1	Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.15.1	Perform CHANNEL CHECK of the containment atmosphere particulate radioactivity monitor.	12 hours
SR 3.4.15.2	Perform COT of the containment atmosphere particulate radioactivity monitor.	92 days
SR 3.4.15.3	Perform CHANNEL CALIBRATION of the required containment sump monitor.	18 months
SR 3.4.15.4	Perform CHANNEL CALIBRATION of the containment atmosphere particulate radioactivity monitor.	18 months

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.15 RCS Leakage Detection Instrumentation

BASES

BACKGROUND

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

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

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 instrumented to identify leakages of 1.0 gpm within one hour. This sensitivity is acceptable for detecting increases in unidentified LEAKAGE.

The reactor coolant contains radioactivity that, when released to the containment, can be detected by radiation monitoring instrumentation. An instrument sensitivity of 10^{-9} μCi/cc radioactivity for particulate monitoring is practical for leakage detection systems. Radioactivity detection is included for monitoring particulate activity because of its sensitivity to RCS LEAKAGE. The detection of RCS leakage using radiation monitors depends on the concentration of radioactivity in the RCS.

BASES

BACKGROUND (continued)

Air temperature and pressure monitoring methods may also be used to infer unidentified LEAKAGE to the containment. Containment temperature and pressure fluctuate slightly during unit operation, but a rise above the normally indicated range of values may indicate RCS leakage into the containment. The relevance of temperature and pressure measurements are affected by containment free volume and, for temperature, detector location. 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.

APPLICABLE SAFETY ANALYSES

The need to evaluate the severity of an alarm or an indication is important to the operators, and the ability to compare and verify with indications from other systems is necessary. The system response times and sensitivities are described in the UFSAR (Ref. 3).

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 leak occur detrimental to the safety of the plant 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 extremely small leaks are detected in time to allow actions to place the unit in a safe condition, when RCS LEAKAGE indicates possible RCPB degradation. The RCS leak detection instrumentation required by this TS supports the Leak-Before-Break licensing basis (Ref. 4).

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the containment sump monitor, in combination with a particulate radioactivity monitor, provides an acceptable minimum.

The containment floor drain sump flow monitor (RF008) and the reactor cavity sump flow monitor (RF010) are normally utilized to fulfill the containment sump monitor requirement. Alarms are provided to alert the operator of leakages of 1.0 gpm. When the alarm function is not capable of detecting 1.0 gpm of unidentified LEAKAGE within one hour, the containment floor drain sump flow indication may be periodically monitored to ensure the capability of detecting 1.0 gpm of unidentified LEAKAGE within one hour.

In lieu of the containment floor drain sump flow monitor (RF008), either containment sump level monitor (PC002 or PC003) can be used by monitoring a change in sump level over a period of time in such a manner as to ensure the capability of detecting 1.0 gpm of unidentified LEAKAGE within one hour.

For the containment atmosphere radioactivity monitor, the PR011A (particulate) monitor satisfies the LCO requirement. The monitor is capable of detecting a 1.0 gpm leak within one hour at the sensitivity recommended in Regulatory Guide 1.45 and using the expected RCS activities of UFSAR Table 11.1-4. The actual setpoints are set as low as practicable, considering the actual concentration of radioactivity in the RCS and the containment background radiation concentration.

BASES

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 particulate atmosphere radioactivity monitor will provide indications of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS water inventory balance, SR 3.4.13.1, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage. 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 RCS pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and RCP seal injection and return flows). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.

Restoration of the required 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.

Required Action A.1 and Required Action A.2 are modified by a Note that indicates that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when the containment sump monitor is inoperable. This allowance is provided because other instrumentation is available to monitor RCS leakage.

BASES

ACTIONS (continued)

B.1.1, B.1.2, and B.2

With the particulate containment atmosphere radioactivity monitoring instrumentation channel inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed for particulate radioactivity 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.

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 RCS pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and RCP seal injection and return flows). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established. The 30 day Completion Time recognizes at least one other form of leakage detection is available.

Required Action B.1 and Required Action B.2 are modified by a Note that indicates that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when the particulate containment atmosphere radioactivity channel is inoperable. This allowance is provided because other instrumentation is available to monitor RCS leakage.

BASES

ACTIONS (continued)

C.1 and C.2

If a Required Action and associated Completion Time of Condition A or B is not met, the unit must be brought to a MODE in which the requirement 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 unit conditions from full power conditions in an orderly manner and without challenging plant systems.

D.1

With all required monitors inoperable, no means of monitoring leakage are available, and immediate actions, in accordance with LCO 3.0.3, are required.

SURVEILLANCE REQUIREMENTS

SR 3.4.15.1

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

SR 3.4.15.2

SR 3.4.15.2 requires the performance of a COT on the containment atmosphere particulate radioactivity monitor. The test ensures that the monitor can perform its function in the desired manner. The test consists of exercising the digital computer hardware using data base manipulation and injecting simulated process data to verify OPERABILITY of alarm and trip functions. 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.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 that this Frequency is acceptable.

REFERENCES

1. 10 CFR 50, Appendix A, Section IV, GDC 30.
2. Regulatory Guide 1.45.
3. UFSAR, Section 5.2.5.
4. Safety Evaluation Regarding Leak-Before-Break Analysis - Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, dated October 25, 1996.

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ATTACHMENT 3B

Typed Pages

for

Technical Specifications Changes

and

Bases Changes
(for information only)

BYRON STATION

REVISED TS PAGES

3.4.15-1

3.4.15-2

3.4.15-3

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 particulate radioactivity monitor.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required containment sump monitor inoperable.	----------NOTE---------- LCO 3.0.4 is not applicable. ----------	
	A.1 ---------NOTE-------- Not required to be performed 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

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. Containment atmosphere particulate radioactivity monitor inoperable.	----------NOTE---------- LCO 3.0.4 is not applicable. ----------		
	B.1.1	Analyze grab samples of the containment atmosphere.	Once per 24 hours
	OR		
	B.1.2	---------NOTE--------- Not required to be performed until 12 hours after establishment of steady state operation. ----------	
		Perform SR 3.4.13.1.	Once per 24 hours
	AND		
	B.2	Restore containment atmosphere particulate radioactivity monitor to OPERABLE status.	30 days
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours
	AND		
	C.2	Be in MODE 5.	36 hours
D. All required monitors inoperable.	D.1	Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.15.1	Perform CHANNEL CHECK of the containment atmosphere particulate radioactivity monitor.	12 hours
SR 3.4.15.2	Perform COT of the containment atmosphere particulate radioactivity monitor.	92 days
SR 3.4.15.3	Perform CHANNEL CALIBRATION of the required containment sump monitor.	18 months
SR 3.4.15.4	Perform CHANNEL CALIBRATION of the containment atmosphere particulate radioactivity monitor.	18 months

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.15 RCS Leakage Detection Instrumentation

BASES

BACKGROUND

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

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

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 instrumented to identify leakages of 1.0 gpm within one hour. This sensitivity is acceptable for detecting increases in unidentified LEAKAGE.

The reactor coolant contains radioactivity that, when released to the containment, can be detected by radiation monitoring instrumentation. An instrument sensitivity of 10^{-9} μCi/cc radioactivity for particulate monitoring is practical for leakage detection systems. Radioactivity detection is included for monitoring particulate activity because of its sensitivity to RCS LEAKAGE. The detection of RCS leakage using radiation monitors depends on the concentration of radioactivity in the RCS.

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. 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 unit operation, but a rise above the normally indicated range of values may indicate RCS leakage into the containment. The relevance of temperature and pressure measurements are affected by containment free volume and, for temperature, detector location. 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.

APPLICABLE SAFETY ANALYSES

The need to evaluate the severity of an alarm or an indication is important to the operators, and the ability to compare and verify with indications from other systems is necessary. The system response times and sensitivities are described in the UFSAR (Ref. 3).

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 leak occur detrimental to the safety of the plant 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 extremely small leaks are detected in time to allow actions to place the unit in a safe condition, when RCS LEAKAGE indicates possible RCPB degradation. The RCS leak detection instrumentation required by this TS supports the Leak-Before-Break licensing basis (Ref. 4).

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the containment sump monitor, in combination with a particulate radioactivity monitor, provides an acceptable minimum.

The containment floor drain sump flow monitor (RF008) and the reactor cavity sump flow monitor (RF010) are normally utilized to fulfill the containment sump monitor requirement. Alarms are provided to alert the operator of leakages of 1.0 gpm. When the alarm function is not capable of detecting 1.0 gpm of unidentified LEAKAGE within one hour, the containment floor drain sump flow indication may be periodically monitored to ensure the capability of detecting 1.0 gpm of unidentified LEAKAGE within one hour.

In lieu of the containment floor drain sump flow monitor (RF008), either containment sump level monitor (PC002 or PC003) can be used by monitoring a change in sump level over a period of time in such a manner as to ensure the capability of detecting 1.0 gpm of unidentified LEAKAGE within one hour.

For the containment atmosphere radioactivity monitor, the PR011A (particulate) monitor satisfies the LCO requirement. The monitor is capable of detecting a 1.0 gpm leak within one hour at the sensitivity recommended in Regulatory Guide 1.45 and using the expected RCS activities of UFSAR Table 11.1-4. The actual setpoints are set as low as practicable, considering the actual concentration of radioactivity in the RCS and the containment background radiation concentration.

BASES

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 particulate atmosphere radioactivity monitor will provide indications of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS water inventory balance, SR 3.4.13.1, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage. 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 RCS pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and RCP seal injection and return flows). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.

Restoration of the required 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.

Required Action A.1 and Required Action A.2 are modified by a Note that indicates that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when the containment sump monitor is inoperable. This allowance is provided because other instrumentation is available to monitor RCS leakage.

BASES

ACTIONS (continued)

B.1.1, B.1.2, and B.2

With the particulate containment atmosphere radioactivity monitoring instrumentation channel inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed for particulate radioactivity 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 monitor.

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 RCS pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and RCP seal injection and return flows). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established. The 30 day Completion Time recognizes at least one other form of leakage detection is available.

Required Action B.1 and Required Action B.2 are modified by a Note that indicates that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when the particulate containment atmosphere radioactivity channel is inoperable. This allowance is provided because other instrumentation is available to monitor RCS leakage.

BASES

ACTIONS (continued)

C.1 and C.2

If a Required Action and associated Completion Time of Condition A or B is not met, the unit must be brought to a MODE in which the requirement 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 unit conditions from full power conditions in an orderly manner and without challenging plant systems.

D.1

With all required monitors inoperable, no means of monitoring leakage are available, and immediate actions, in accordance with LCO 3.0.3, are required.

SURVEILLANCE REQUIREMENTS

SR 3.4.15.1

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

SR 3.4.15.2

SR 3.4.15.2 requires the performance of a COT on the containment atmosphere particulate radioactivity monitor. The test ensures that the monitor can perform its function in the desired manner. The test consists of exercising the digital computer hardware using data base manipulation and injecting simulated process data to verify OPERABILITY of alarm and trip functions. 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.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 that this Frequency is acceptable.

REFERENCES

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

2. Regulatory Guide 1.45.

3. UFSAR, Section 5.2.5.

4. Safety Evaluation Regarding Leak-Before-Break Analysis - Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, dated October 25, 1996.

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