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U. S. Nuclear Regulatory Commission
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Washington, DC 20555-0001

Ref 10 CFR 50.90
10 CFR 50.91(b)

11/07/2019

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT
DOCKET NOS. 50-445 AND 50-446
LICENSE AMENDMENT REQUEST (LAR) 19-001
APPLICATION TO ADOPT TSTF-513-A, REVISION 3, "PWR OPERABILITY REQUIREMENTS AND ACTIONS FOR RCS LEAKAGE INSTRUMENTATION"

Dear Sir or Madam:

Pursuant to 10CFR50.90, Vistra Operations Company LLC (Vistra OpCo) hereby requests an amendment to the Comanche Peak Nuclear Power Plant (CPNPP) Unit 1 Operating License (NPF-87) and CPNPP Unit 2 Operating License (NPF-89) by incorporating the attached change into the CPNPP Units 1 and 2 Technical Specifications. This change request applies to both units.

Vistra OpCo requests adoption of TSTF-513-A, Revision 3, "PWR Operability Requirements and Actions for RCS Leakage Instrumentation." TSTF-513-A, Revision 3 revises Technical Specification 3.4.15, "RCS Leakage Detection Instrumentation," to add a new Condition. New Condition D (Condition C in NUREG-1430) is applicable when the containment atmosphere gaseous radioactivity monitor is the only Operable monitor (i.e., all other monitors are inoperable). The Required Actions require analyzing grab samples of the containment atmosphere every 12 hours and restoring another monitor within 7 days The subsequent Conditions are renumbered to reflect in addition of the new Condition.

Attachment 1 provides a description and assessment of the proposed changes.
Attachment 2 provides the existing TS pages marked to show the proposed changes.
Attachment 3 provides revised (clean) TS pages.

Approval of the proposed amendment is requested within one year of the NRC acceptance date. Once approved, the amendment shall be implemented within 60 days.

A001
NRR

In accordance with 10CFR50.91(b), Vistra OpCo is providing the State of Texas with a copy of this proposed amendment

This communication contains no new commitments regarding CPNPP Units 1 and 2.

Should you have any questions, please contact Garry Struble at (254) 897-6628 or garry.struble@luminant.com.

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

Executed on 11/07/2019

Sincerely,

Thomas P. McCool

Attachments.

1. DESCRIPTION AND ASSESSMENT
2. PROPOSED TECHNICAL SPECIFICATION CHANGES (MARK-UP)
3. REVISED TECHNICAL SPECIFICATION CHANGES

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Dennis Galvin, NRR
Resident Inspectors, Comanche Peak

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Attachment 1 to TXX-19067

LAR 19-001

Comanche Peak Technical Specifications, LCO 3.4.15, RCS Leakage Detection Instrumentation

DESCRIPTION AND ASSESSMENT

LAR 19-001, LCO 3.4.15, RCS Leakage Detection Instrumentation
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1.0 SUMMARY DESCRIPTION

Proposed change LAR 19-001 is to revise Technical Specifications 3.4.15, RCS Leakage Detection Instrumentation for Comanche Peak Nuclear Power Plant (CPNPP) Units 1 and 2.

Vistra OpCo is requesting this change to align the CPNPP Technical Specifications (TS) with the Standard Technical Specifications (STS) for Westinghouse Plants and to incorporate the changes made by TSTF-513-A, Revision 3. Revising CPNPP Technical Specification, LCO 3.4.15, RCS Leakage Detection Instrumentation and associated Bases will clarify OPERABILITY requirements and allow a limited time to repair one or more of the inoperable monitors.

No changes to the Comanche Peak Nuclear Power Plant Final Safety Analysis Report are anticipated as a result of this License Amendment Request.

2.0 DETAILED DESCRIPTION

RCS Leakage Detection Instrumentation uses diverse monitors to assist the operators in timely determination of unidentified leakage. Currently CPNPP TS list the following monitors;

- One Containment Sump Level and Flow Monitoring System;
- One containment atmosphere particulate radioactivity monitor; and
- One containment air cooler flow rate monitor or one containment atmosphere radioactivity monitor (gaseous).

The Westinghouse STS and TSTF-513-A, Revision 3 list the following monitors;

- One containment sump (level or discharge flow) monitor,
- One containment atmosphere radioactivity monitor (gaseous or particulate), and
- One containment air cooler condensate flow rate monitor.

Current CPNPP Technical Specifications do not align with Westinghouse STS or TSTF-513-A, Revision 3.

Specification 3.4.15, RCS Leakage Detection Instrumentation, requires instrumentation to detect significant reactor coolant pressure boundary (RCPB) degradation as soon after occurrence as practical to minimize the potential for propagation to a gross failure. The Improved Standard Technical Specifications (ISTS) require one containment sump monitor (for Westinghouse plants, level or discharge flow), one containment atmosphere radioactivity monitor (gaseous or particulate), and for Westinghouse plants; one containment air cooler condensate flow rate monitor.

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

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

2.1 System Design and Operation

The leakage-detection systems are intended to sense leakage from the reactor coolant and auxiliary systems into the Containment and to provide the means to locate such leakage.

The safety significance of leaks through the reactor coolant pressure boundary (RCPB) can vary widely depending on the source of the leak as well as the leakage rate and duration. Therefore, the detection and monitoring of reactor coolant leakage into the Containment is necessary.

The leakage-detection systems provide information which permits the plant operators to take immediate corrective action should a leak be evaluated as detrimental to the safety of the plant. Leakage-detection system design objectives are in accordance with the requirements of 10 CFR Part 50, GDC 30, and NRC Regulatory Guide 1.45, Revision 0.

RCPB leakage is classified as identified or unidentified and methods for physically separating the leakage into these classifications are provided to supply prompt and quantitative information about the leakage to the plant operators. Identified leakage is reactor coolant leakage into the containment area (i.e. into a closed system or containment atmosphere) that is specifically located, can be detected, collected and to the extent practical, isolated from the containment atmosphere so as not to mask any potentially serious leak should it occur.

Identified leakage is comprised of:

- Leakage, from reactor head flange leak-offs and valve packing leak-offs, that is captured and conducted to the reactor coolant drain tank (RCDT). All reactor coolant pressure boundary valves that use the compressed packing method of sealing the working fluid are equipped with piped leak-off connections and the potential leaks are classified as identified. Since the leakage detection system is closed, it is essentially isolated from the Containment atmosphere and cannot mask any potentially serious leakage to the atmosphere from unidentified sources including a flaw in the RCPB.

- Reactor coolant leakage through steam generators to the secondary system.
- Leakage through the closed pressurizer safety and relief valves.
- Leakage of the seal water through the reactor coolant pumps seal number 2 directed to the Reactor Coolant Drain Tank (reactor coolant pump seal leak-off number 2).
- Leakage of the seal water through the reactor coolant pumps seal number 3 directed to the Containment Sump (reactor coolant pump seal leak-off number 3).
- Leakage of the reactor coolant to the Component Cooling Water System (CCW) resulting from leakage from the Reactor Coolant Pumps thermal barrier.
- Intersystem leakage through Reactor Coolant System Pressure Isolation Valves.

All identified leakage (except primary-to-secondary leakage, intersystem leakage, RC pump seal No. 3 leakage and closed pressurizer safety and relief valves leakage) is collected in Reactor Coolant Drain Tank.

Unidentified leakage is all leakage which is not identified leakage or controlled leakage. It is impractical to completely eliminate unidentified leakage, but efforts are made to reduce this leakage to a small background flow rate permitting the leakage detection systems to detect positively and rapidly any small increase in unidentified leakage flow rate.

Controlled leakage is the seal water flow supplied to the reactor coolant pump seal number 1 (approximately 8-gpm per pump).

Leakage through the RCPB is limited to the following:

Identified leakage;

- 150 gpd through any one steam generator
- 10 gpm total leakage

Unidentified leakage

- 1 gpm

Unidentified Leakage Detection Methods

Primary detection of unidentified leakage to the Containment atmosphere is provided by air particulate monitors, containment sump flow monitors and condensate flow rate measuring system. In addition, containment dewpoint, indication of gross leakage and liquid inventory and radioactive gas monitor are other indications available to the operator for determination of unidentified leakage.

In normal operation, the primary monitors show a background level which is indicative of the normal magnitude of unidentified leakage inside the Containment. Variations in airborne reactor coolant corrosion products or condensate flow rate above the normal level signifies an increase in unidentified leakage rates and signals to the plant operators that corrective action may be required. Similarly, increases in Containment sump flow and radioactive gaseous concentration in the containment atmosphere signifies an increase in unidentified leakage.

Unidentified Leakage Monitors

- Containment Air Particulate Monitor

  Air particulate monitors take continuous air samples from the containment atmosphere and measure the particulate activity collected on a filter paper system. After passing through an iodine and noble gas monitor downstream of the particulate monitor, the air returns to the Containment. The sensitivity of the Containment air particulate monitor to an increase in reactor coolant leak rate is dependent upon the magnitude of the normal baseline leakage into the Containment. Sensitivity is greatest where baseline leakage is lowest.

- Radioactive Gas Monitor

  The radioactive gas monitor indicates the presence of containment gaseous activity originating from fuel-cladding defects. It measures the gaseous beta radioactivity by continuously sampling the containment atmosphere. The radioactive gas monitor is less sensitive to an increase in reactor coolant leak rate than the containment particulate monitor.

- Containment Sump Flow Monitoring

  After collection in containment sump 1, containment sump 2, or the reactor cavity sump, leakage is pumped via a common header to floor drain tank 1 or to the waste hold-up tank. In this common discharge header is a flow totalizer/indicator that measures flow and facilitates the recording of this total flow in the control room.

  The sumps also have several other features as follows:

  - Any one of the 6 pumps in these 3 sumps starting causes the "ANY CONT SUMP PUMP RUN" audible/visual alarm to actuate in the control room.

- Each of the 3 sumps has a separate high level audible/visual alarm in the control room.
- Sumps 1 and 2 have an additional level switch arranged with a time delay and the appropriate logic so that an increase by 1 gpm or greater flow into the sump will actuate a "CONT SUMP FILL RATE INCREASE" audible/visual alarm in the control room.

The sump discharge line may be sampled from outside of the Containment to provide additional aid in identifying the leakage source.

- Specific Humidity Monitors

Specific humidity monitors are sensitive to vapor originating from the reactor coolant, steam, feedwater, and auxiliary systems in the Containment. Therefore, these monitors provide a means of detecting unidentified leakage from both radioactive and non-radioactive sources. Humidity detection is accomplished either by measuring the condensate from the Containment air cooling coils or by monitoring the dewpoint temperature in the Containment.

- Condensate Flow Rate Measurement

  Humidity detection is accomplished by measuring the condensate flow rate from the Containment cooling coils. The containment specific humidity increases proportionately with time and leakage until the dewpoint is reached at the Containment recirculation unit cooling coils. If the specific humidity increases above this point, the heat removal needed to cool the air-steam mixture to its dewpoint temperature increases above this point.

  Therefore, since the cooling coils are designed to remove heat at a constant rate, an increase in specific humidity results in increased condensate flow. The condensate measuring system consists of a vertical standpipe with an internal self-siphoning device which empties the condensate in the standpipe to the sump when the standpipe is nearly full. The condensate measuring system permits measurement of the condensate flow rate from each Containment recirculation unit by means of a derivative unit which measures the rate of change in the standpipe level. Should the leakage inside the Containment increase, the condensate flow also increases, thereby increasing the rate of change of the standpipe level. The rate of level change in the standpipe is continuously recorded on strip chart recorders in the Control Room. An alarm for high rate of level change is provided to warn Control Room personnel of an increase in the condensate flow rate. An alarm is also provided if condensate flow is greater than the amount of flow that the siphon can discharge to the sump. Through accurate measurements of condensate flow, a reliable estimate of the total leakage rate to the Containment can be made.

- Containment Dewpoint Monitors

  The Containment humidity sensing system consists of dewpoint sensors, signal conditioning units, cabling, indicators, and plant process computer inputs, all packaged in a system capable of the continuous, unattended, automatic operation for remote monitoring of the dewpoint of the Containment atmosphere. Dewpoint sensors are strategically located in five representative areas of the Containment and are capable of detecting and reading out a change of 1°F in dewpoint. The signal conditioning units provide a linear output signal for transmission to a Control Room board-mounted analog indicator.

- Containment Temperature Monitors

  An increase in Containment temperature can indicate a leak of high temperature fluid from the RCPB or other high temperature systems.

- Containment Pressure Monitors

  An increase in Containment pressure can indicate a leak of high temperature fluid from the RCPB or other high temperature systems.

- Frequency and Duration of Operation of the Containment Sump Pumps

  Each pump is provided with a running time indicator which indicates in seconds the duration of pump operation. This indicator can be used to estimate gross leakage rates and can act as a backup to the discharge flow monitors.

- Gross Leakage Indications

  - Decrease in pressurizer level

  - Increase in the rate of supply of reactor coolant makeup water

  - Containment temperature monitors

- Containment pressure monitors
- Containment sump level high alarm

- Liquid inventory

  Reactor coolant volume can be indicative of system leakages. Net level changes in the pressurizer and volume control tank are functions of the system leakage because the Chemical Volume Control System is a closed loop system. Abnormal makeup requirements can be indicative of system leakage.

Sensitivity of Select Leakage Detection Monitors

- Containment Air Particulate Monitor

  The Containment air particulate monitor is the most sensitive instrument available for detection of reactor coolant leakage into the Containment. This instrument is capable of detecting particulate activity in concentrations as low as 5E-11 microcuries per cubic centimeter (µCi/cm3) in the Containment air sampled.

  Using this concentration, calculations show that the particulate monitor, for a reference nuclide of Cs-137, can conservatively detect a 1.0-gpm increase in unidentified leakage within the Containment in less than one hour after the leak begins. The sensitivity of the containment airborne particulate and gas monitors for detection of 1 gpm primary coolant leakage is dependent of both the primary coolant activity level and the background radiation level in containment which vary with Reactor Power.

  Conservative analysis indicates that the maximum pre-existing containment background levels that will not prevent reliable leak detection by the particulate monitor (without spurious alarms) will vary with changes in the primary coolant activity. The relation between failed fuel fraction, primary coolant activity and background levels for any specified condition may be derived from the general sensitivity equation in ANSI 13.10 and the time constants specified for the monitor used in this service. Operating experience has shown the particulate background radiation levels have remained low relative to the expected activity increase from 1gpm leak. Therefore, this monitor is expected to detect a 1gpm leak within one hour.

- Containment Radioactive Gas Monitor

  This system is less sensitive than the Containment air particulate monitor but gives a positive indication of leakage in the event that reactor coolant gaseous activity exists as a result of fuel-cladding defects. One gallon per minute leakage from the primary coolant pressure boundary in the containment can be detected in less than one hour provided the containment atmosphere activity is below the level that would mask the activity corresponding to the leakage. If this system is one of the two required monitors inoperable in MODES 1, 2, 3 and 4 operations may continue up to 30 days provided grab samples of the containment atmosphere are obtained and analyzed at least once per 24 hours.

Analysis also shows that the maximum pre-existing containment radioactive gaseous background levels for which reliable detection is possible will vary directly with the activity levels in the primary coolant. With primary coolant concentrations less than equilibrium levels, such as during startup, the increase in detector count rate due to leakage will be partially masked by the statistical variation of the minimum detector background count rate, rendering reliable detection of a 1 gpm leak uncertain.

Operating experience has shown elevated gaseous background radiation levels will partially mask the detection of a 1 gpm leak. However, the monitor is capable of qualitatively detecting an RCS to containment atmosphere leak.

In conclusion, reliable leak detection is possible, provided that the equilibrium activity of the containment atmosphere is below the level that would mask the change in activity corresponding to a 1 gpm leak in one hour. Given the above limitations, the intent of the leak detection requirements of Regulatory Guide 1.45, Revision 0 is met in the following manner. The monitors are seismically qualified as required in Section C of Regulatory Guide 1.45, Revision 0. The minimum sensitivities of the containment air particulate and the radioactive gas monitors are 5E-11 µCi/ml (reference nuclide Cs-137) and 1E-6 µCi/ml (reference nuclide Xe-133), respectively. These are the minimum detectable activities when situated in a 2.5 mR/hr, of 1 Mev Gamma background field, which is the normal maximum anticipated at the location of the monitors. These sensitivities meet or exceed the sensitivities required of these monitors by Section B of Regulatory Guide 1.45, Revision 0.

- Condensate Measuring System

The measurement of the condensate flow from containment recirculation unit cooling coils gives a sensitive indication of increases in unidentified leakage into the Containment. Condensate flow from approximately 0 gpm to 4.0 gpm can be measured with this system. In the event of very low reactor coolant activity levels, this system provides the most sensitive indication of unidentified leakage.

- Dewpoint Temperature Monitors

  These instruments are sensitive to an increase in dew point of 1°F or greater.

- Containment Sump Fill Rate Increased by ≥ 1 GPM Alarm

  All open floor areas and the equipment room floors are sloped toward floor drains with the drain piping routed to containment sumps 1 or 2. By design, flow to the sumps is unimpeded. This ensures that all liquid leakage will be routed to the sumps.

  The containment sumps are equipped with level switches and an alarm timer. A sump in leak increase of ≥ 1 gpm will activate the sump leak detection system by initiating the alarm timer which is set at an interval which allows detection of ≥ 1 gpm leak increase in less than one hour.

Differentiation Between Identified and Unidentified Leaks

Any increases above the background level of 1.0 gpm of unidentified leakage and 10 gpm identified leakage (other than primary-to-secondary leakage) are investigated and evaluated by the operator in order to locate the sources of leakage.

Examples of techniques which will be employed by the operator in locating the area of leakage are:

- Leakage occurring from the reactor vessel head to vessel closure joint is identifiable by an increase in temperature in the leak-off line provided at this joint.
- Leakage occurring from the main steam supply system, feedwater system, or CCW is identifiable by an increase in condensate monitor indication without associated increase in background radioactivity. The increased frequency of sump pump operation is also an indication as is the 1 gpm leak increase alarm in the Control Room.
- Leakage occurring from the RCPB is usually identifiable by a simultaneous increase in condensate and radioactivity monitor indications.
- Dewpoint temperature plant process computer data can assist operators in locating leakage points because of the various locations of the dew cells in the Containment.

- Steam generator primary-to-secondary leakage is detected by the Steam Generator Blowdown Process Sample (SGBPS) Monitor, the Steam Generator Leak Rate (SGLRM) Monitors, and the Condenser Off-Gas Monitor.

- Leakage of the reactor coolant to the CCW is detectable by means of the radiation monitor in the CCW system.

- Leakage of the reactor coolant outside Containment is detectable by plant vent gas monitors and the airborne radioactivity monitors of the Safeguards Building.

Adequacy of the Leakage Detection System

A normal level of 1 gpm or less in unidentified leakage is expected. The leakage detection systems are capable of detecting leakage as low as 0.1 gpm using the air particulate monitor and as low as 1 gpm using the condensate flow rate and the sump level alarm. The sensitivity is reasonably adequate to detect an increase in unidentified leakage rate. In addition, the capacity of the reactor coolant makeup system and containment water removal are well above the proposed leakage limits provided in the Technical Specifications.

2.2 Current Technical Specification Requirements

The current CPNPP TS requirements are different than those found in NUREG-1431 Volume 1, Revision 3. The change accomplishes two things; it aligns the current CPNPP LCO 3.4.15, RCS Leakage Detection Instrumentation with NUREG-1431 Standard Technical Specifications for Westinghouse Plants and it incorporates TSTF-513-A, Revision 3, Operability Requirements and Actions for RCS Leakage Instrumentation. There will be no changes to the current Surveillance Requirements.

The current CPNPP LCO 3.4.15 is as follows;

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

a. One Containment Sump Level and Flow Monitoring System;

b. One containment atmosphere particulate radioactivity monitor; and

c. One containment air cooler condensate flow rate monitor or one containment atmosphere radioactivity monitor (gaseous).

The Standard Technical Specifications for Westinghouse Plants, NUREG-1431, prior to TSTF-513-A, Revision 3 for LCO 3.4.15 is as follows;

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

a. One containment sump (level or discharge flow) monitor,

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

c. One containment air cooler condensate flow rate monitor.

The CPNPP current LCO has Actions A through E which are different than Actions A through F found in NUREG-1431, Volume 1, Revision 3. The differences are largely due to the manner in which the CPNPP Technical Specification LCO 3.4.15 is aligned. When Improved Standard Technical Specifications were implemented at CPNPP the difference from the NUREG-1431 standard was only described as not adopting the standard due to LCO 3.4.15 prior to implementation of Improved Standard Technical Specifications and due to alignment with Regulatory Guide 1.45, Revision 0, position C.3. Based on TSTF-513-A, Revision 3, the deviation from the standard LCO 3.4.15 is no longer valid.

The current Technical Specification proposed to be changed is Limiting Condition for Operation (LCO), 3.4.15, RCS Leakage Detection Instrumentation. Following approval of this license amendment CPNPP will be aligned with other Westinghouse plants regarding LCO 3.4.15, RCS Leakage Detection Instrumentation.

2.3 Reason for Proposed Change

This change is requested to implement TSTF-513-A, Revision 3 to clarify LCO 3.4.15, RCS Leakage Detection Instrumentation OPERABILITY as found in the Bases, add a new Condition when the containment atmosphere gaseous radioactivity monitor is the only OPERABLE monitor, and correct usage of "required" with regard to containment air cooler condensate flow rate monitor.

This license amendment requires addressing the difference between CPNPP current LCO 3.4.15 and the NUREG-1431 LCO 3.4.15 plus the changes due to TSTF-513-A, Revision 3. The end goal is to have CPNPP LCO 3.4.15 final TS in full alignment with TSTF-513-A, Revision 3. TSTF-513-A, Revision 3 groups the instrumentation such that level <u>OR</u> flow may be used to ensure OPERABILITY for the containment sump monitor. It also groups monitors such that particulate <u>OR</u> gaseous channels may be used to ensure OPERABILITY for the containment atmosphere radioactivity monitor. And finally it has the containment air cooler condensate flow rate monitor as a stand-alone leakage detection monitor.

With changes to the applicable TS Bases it will clarify what is required to determine OPERABILITY for each of the three monitors. This will enable the operators to clearly determine the status of each monitor and identify any applicable actions.

This proposed technical specification change is acceptable because, it implements changes to LCO 3.4.15, RCS Leakage Detection Instrumentation that have been previously approved by the NRC in the implementation of ISTSs and in TSTF-513-A, Revision 3.

2.4 Description of Proposed Change

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

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

Three corrections are made:

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

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

- In NUREG-1431, the containment air cooler condensate flow rate monitor is plant-specific.

The proposed change will align CPNPP ISTS with NUREG-1431, Standard Technical Specification for Westinghouse Plants and TSTF-513-A, Revision 3.

The proposed change to Technical Specification Bases for LCO 3.4.15, RCS Leakage Detection Instrumentation is provided "For Information Only."

The retyped pages for the proposed change to Technical Specification, LCO 3.4.15, RCS Leakage Detection Instrumentation are provided for review.

The retyped pages for the proposed change to Technical Specification Bases, LCO 3.4.15 are provided "For Information Only."

3.0 TECHNICAL EVALUATION

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

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

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

When the containment atmosphere gaseous radiation monitor is the only Operable monitor, the current Technical Specifications require performance of

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

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

For these reasons, Vistra OpCo concludes that the proposed change will provide clarified information to the operators for determining monitor OPERABILITY and required actions bases on what monitor is inoperable.

In summary, the proposed technical specification change will eliminate confusion regarding what monitors are required for OPERABILITY and will provide better information to the operators regarding what is required for each monitor to be considered OPERABLE.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements

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

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

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

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

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

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

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

10 CFR 50.36, "Technical Specifications," paragraph (c)(2)(ii)(A), specifies that a Limiting Condition for Operation be established for installed instrumentation that is used to detect and indicate in the control room a significant abnormal degradation of the reactor coolant pressure

boundary. This instrumentation is required by Specification 3.4.15, "RCS Leakage Detection Instrumentation." The modification of the Actions in Specification 3.4.15 is not in conflict with the 10 CFR 50.36 requirements. The proposed changes do not adversely impact the ability of the Reactor Coolant System leakage detection system to function as designed and do not impact conformance to the applicable GDCs. Therefore, the proposed changes are consistent with all applicable regulatory requirements or criteria.

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

4.2 Precedent

Several operating facilities have implemented TSTF-513-A, Revision 3. These facilities include;

- Braidwood Units 1 and 2
- Byron Units 1 and 2
- Farley Units 1 and 2
- Seabrook Unit 1
- Arkansas Nuclear One Unit 1
- Vogtle Units 1 and 2
- North Anna Units 1 and 2
- D.C. Cook Units 1 and 2

4.3 No Significant Hazards Consideration Determination

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

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

   Response: No.

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

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

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

   Response: No.

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

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

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

Response: No.

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

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

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

4.4 Conclusions

The requirements of GDC 30, and GDC 4 continue to be met since no changes are being proposed which would affect the design capability, function, operation, or method of testing the RCS Leakage Detection Instrumentation. Therefore, the applicable guidance in IN 2005-24, and RG 1.45, Revision 0 continue to be met.

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

5.0 ENVIRONMENTAL CONSIDERATIONS

Vistra OpCo and the TSTF has determined that the proposed change would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed change does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed change.

6.0 REFERENCES

6.1 CPNPP FSAR Section 5.2.5, " Detection of Leakage Through Reactor Coolant Pressure Boundary"

6.2 General Design Criteria (GDC) of 10 CFR 50 Appendix A, GDC 4 "Environmental and dynamic effects design bases"

6.3 General Design Criteria (GDC) of 10 CFR 50 Appendix A, GDC 30 "Quality of reactor coolant pressure boundary"

6.4 NRC Information Notice 2005-24 "Non-conservatism in Leakage Detection Sensitivity"

6.5 NRC Regulatory Guide 1.45, Revision 0, "Guidance on Monitoring and Responding to Reactor Coolant System Leakage"

Attachment 2 to TXX-19067

LAR 19-001

Comanche Peak Technical Specifications, LCO 3.4.15, RCS Leakage Detection Instrumentation

1. CPNPP TECHNICAL SPECIFICATIONS,
   LCO 3.4.15 – MARKUP

2. TSTF-513-A REV 3 TECHNICAL SPECIFICATIONS,
   LCO 3.4.15 – MARKUP

3. CPNPP TECHNICAL SPECIFICATIONS BASES,
   LCO 3.4.15 – MARKUP [FOR INFORMATION ONLY]

4. TSTF-513-A REV 3 TECHNICAL SPECIFICATIONS BASES,
   LCO 3.4.15 MARKUP [FOR INFORMATION ONLY]

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.15 RCS Leakage Detection Instrumentation

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

a. One containment sump (level or discharge flow) monitor, ~~One Containment Sump Level and Flow Monitoring System~~;

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

c. One containment air cooler condensate flow rate monitor ~~or one containment atmosphere radioactivity monitor (gaseous)~~.

APPLICABILITY: MODES 1, 2, 3, and 4

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ~~Required Containment Sump Level and Flow Monitoring System inoperable.~~ Required containment sump monitor inoperable.	A.1 -------------------NOTE------------------- Not required until 12 hours after establishment of steady state operation. --- Perform SR 3.4.13.1.	Once per 24 hours
	AND	
	A.2 ~~Restore Containment Sump Level and Flow Monitoring System to OPERABLE status.~~ Restore required containment sump monitor to OPERABLE status.	30 days

ACTIONS (continued)

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

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C ~~Required containment atmosphere gaseous radioactivity monitor inoperable.~~ ~~AND~~ Containment ~~Required containment~~ air cooler condensate flow rate monitor inoperable.	C.1 Perform SR 3.4.15.1 ~~C.1.1 Analyze grab samples of the containment atmosphere.~~ OR C.2 ~~C.1.2~~ -----------------NOTE----------------- Not required until 12 hours after establishment of steady state operation. --- Perform SR 3.4.13.1. ~~AND~~ ~~C.2.1 Restore required containment atmosphere gaseous radioactivity monitor to OPERABLE status.~~ ~~OR~~ ~~C.2.2 Restore required containment air cooler condensate flow rate monitor to OPERABLE status.~~	Once per 8 ~~24~~ hours Once per 24 hours ~~30 days~~ ~~30 days~~
~~D. Required Action and associated Completion Time not met.~~	~~D.1 Be in MODE 3.~~ ~~AND~~ ~~D.2 Be in MODE 5.~~	~~6 hours~~ ~~36 hours~~
~~E. All required monitors inoperable.~~	~~E.1 Enter LCO 3.0.3.~~	~~Immediately~~

Insert A here

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.15.1	Perform CHANNEL CHECK of the required containment atmosphere particulate and gaseous radioactivity monitors.	In accordance with the Surveillance Frequency Control Program.
SR 3.4.15.2	Perform COT of the required containment atmosphere particulate and gaseous radioactivity monitors.	In accordance with the Surveillance Frequency Control Program.
SR 3.4.15.3	Perform CHANNEL CALIBRATION of the required Containment Sump Level and Flow Monitoring System.	In accordance with the Surveillance Frequency Control Program.
SR 3.4.15.4	Perform CHANNEL CALIBRATION of the required containment atmosphere particulate and gaseous radioactivity monitors.	In accordance with the Surveillance Frequency Control Program.
SR 3.4.15.5	Perform CHANNEL CALIBRATION of the required containment air cooler condensate flow rate monitor.	In accordance with the Surveillance Frequency Control Program.

Insert A

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

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.15 RCS Leakage Detection Instrumentation

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

a. One containment sump (level or discharge flow) monitor,

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

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

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required containment sump monitor inoperable.	A.1 --------------NOTE-------------- Not required until 12 hours after establishment of steady state operation. ------------------------------------ Perform SR 3.4.13.1.	Once per 24 hours
	AND	
	A.2 Restore required containment sump monitor to OPERABLE status.	30 days

ACTIONS (continued)

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

ACTIONS (continued)

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

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.15 RCS Leakage Detection Instrumentation

BASES

BACKGROUND

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

Leakage detection systems must have the capability to detect significant reactor coolant pressure boundary (RCPB) degradation as soon after occurrence as practical to minimize the potential for propagation to a gross failure. Thus, an early indication or warning signal is necessary to permit proper evaluation of all unidentified LEAKAGE. In addition to meeting the OPERABILITY requirements, the monitors are typically set to provide the most sensitive response without causing an excessive number of spurious alarms.

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

The reactor coolant contains radioactivity that, when released to the containment, ~~can~~ may be detected by radiation monitoring instrumentation. ~~Reactor coolant radioactivity levels will be low during initial reactor startup and for a few weeks thereafter, until activated corrosion products have been formed and fission products appear from fuel element cladding contamination or cladding defects. Instrument sensitivities of 10^{-9} μCi/cc radioactivity for particulate monitoring and of 10^{-6} μCi/cc radioactivity for gaseous monitoring are practical for these leakage detection systems.~~ Radioactivity detection systems are included for monitoring both particulate and gaseous activities because of their sensitivities and rapid responses to RCS LEAKAGE.

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

An increase in humidity of the containment atmosphere would indicate release of water vapor to the containment. Dew point temperature measurements can thus be used to monitor humidity levels of the containment atmosphere as an indicator of potential RCS LEAKAGE. ~~A 1°F increase in dew point is well within the sensitivity range of available instruments.~~

Since the humidity level is influenced by several factors, a quantitative evaluation of an indicated leakage rate by this means may be questionable

(continued)

BASES

BACKGROUND (continued)

and should be compared to observed increases in liquid flow into or from the containment sump and condensate flow from air coolers. Humidity level monitoring is considered most useful as an indirect alarm or indication to alert the operator to a potential problem. Humidity monitors are not required by this LCO.

Air temperature and pressure monitoring methods may also be used to infer unidentified LEAKAGE to the containment. Containment temperature and pressure fluctuate slightly during plant operation, but a rise above the normally indicated range of values may indicate RCS leakage into the containment. The relevance of temperature and pressure measurements ~~are~~ is affected by containment free volume and, for temperature, detector location. Alarm signals from these instruments can be valuable in recognizing rapid and sizable leakage to the containment. Temperature and pressure monitors are not required by this LCO.

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

APPLICABLE SAFETY ANALYSES

~~The asymmetric loads produced by postulated breaks are the result of assumed pressure imbalance, both internal and external to the RCS. The internal asymmetric loads result from a rapid decompression that causes large transient pressure differentials across the core barrel and fuel assemblies. The external asymmetric loads result from the rapid depressurization of the annulus regions, such as the annulus between the reactor vessel and the shield wall, and cause large transient pressure differentials to act on the vessel. These differential pressure loads could damage RCS supports, core cooling equipment or core internals. This concern was first identified as Multiplant Action (MPA) D-10 and subsequently as Unresolved Safety Issue (USI) 2, "Asymmetric LOCA Loads" (Ref. 4).~~

~~The resolution of USI-2 for Westinghouse PWRs was the use of fracture mechanics technology for RCS piping >10 inches diameter (Ref. 5). This technology became known as leak-before-break (LBB). Included within the LBB methodology was the requirement to have leak detection systems capable of detecting a 1.0 gpm leak within four hours. This leakage rate is designed to ensure that adequate margins exist to detect leaks in a timely manner during normal operating conditions. The use of the LBB methodology is described in Reference 6.~~

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~~

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

~~described in the FSAR (Ref. 3). Multiple instrument locations are utilized, if needed, to ensure that the transport delay time of the leakage from its source to an instrument location yields an acceptable overall response time.~~

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

RCS leakage detection instrumentation satisfies Criterion 1 of 10CFR50.36(c)(2)(ii).

LCO

small amounts of unidentified LEAKAGE

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

Insert B

~~The LCO is satisfied when monitors of diverse measurement means are available. Thus, the Containment Sump Level and Flow Monitoring System, particulate radioactivity monitor and either a containment air cooler condensate flow rate monitor or a gaseous radioactivity monitor provide an acceptable minimum.~~

Insert C

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

containment sump monitor

With the required ~~Containment Sump Level and Flow Monitoring System~~ inoperable, no other form of sampling can provide the equivalent information;

(continued)

BASES

containment atmosphere radioactivity monitor,

ACTIONS

A.1 and A.2 (continued)

however, the containment 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~~ Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after establishing steady state operation (as defined in the Bases of SR 3.4.13.1). The 12 hour allowance provides sufficient time to collect and process necessary data after stable plant conditions are established.

Restoration of the required ~~Containment Sump Level and Flow Monitoring System~~ containment 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.

~~B.1.1, B.1.2, and B.2~~ B.1.1, B.1.2, B.2.1, and B.2.2

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

Insert D

~~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 (as defined in the Bases of SR 3.4.13.1). The 12 hour allowance provides sufficient time to collect and process necessary data after stable plant conditions are established. The 30 day Completion Time recognizes at least one other form of leakage detection is available.~~

~~C.1.1, C.1.2, C.2.1 and C.2.2~~

Insert E

~~With the required containment atmosphere gaseous radioactivity monitor and the required containment air cooler condensate flow rate monitor inoperable, the means of detecting leakage are the Containment Sump Level and Flow Monitoring System and the containment atmosphere particulate~~

(continued)

BASES

ACTIONS

C.1.1, C.1.2, C.2.1 and C.2.2 (continued)

radioactive monitor. This Condition does not provide all the required diverse means of leakage detection. With both gaseous containment atmosphere radioactivity monitoring and containment air cooler condensate flow rate monitoring instrumentation channels inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed or water inventory balances, in accordance with SR 3.4.13.1, must be performed to provide alternate periodic information.

The followup Required Action is to restore either of the inoperable required monitors to OPERABLE status within 30 days to regain the intended leakage detection diversity. The 30 day Completion Time ensures that the plant will not be operated in a reduced configuration for a lengthy time period.

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 necessary data after stable plant conditions are established.

~~D.1 and D.2~~

Insert F

If a Required Action of Condition A, B or C cannot be met, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

~~E.1~~

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

SURVEILLANCE REQUIREMENTS

SR 3.4.15.1

SR 3.4.15.1 requires the performance of a CHANNEL CHECK of the required containment atmosphere radioactivity monitor. The check gives reasonable confidence that the channel is operating properly. The

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.15.1 (continued)

Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.4.15.2

SR 3.4.15.2 requires the performance of a COT on the required containment atmosphere radioactivity monitor. The test ensures that the monitor can perform its function in the desired manner. The test verifies the alarm setpoint and relative accuracy of the instrument string. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.4.15.3, SR 3.4.15.4, and SR 3.4.15.5

These SRs require the performance of a CHANNEL CALIBRATION for each of the RCS leakage detection instrumentation channels. The calibration verifies the accuracy of the instrument string, including the instruments located inside containment. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. 10 CFR 50, Appendix A, Section IV, GDC 30.
2. ~~Regulatory Guide 1.45~~. Regulatory Guide 1.45, Revision 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973.
3. FSAR, Section 5.2.
~~4. NUREG-609, "Asymmetric Blowdown Loads on PWR Primary Systems," 1981.~~
~~5. Generic Letter 84-04, "Safety Evaluation of Westinghouse Topical Reports Dealing with Elimination of Postulated Pipe Breaks in PWR Primary Main Loops."~~
~~6. FSAR, Section 3.6B.~~

Insert B

The LCO requires three instruments to be OPERABLE.

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

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

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

Insert C

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

Insert D

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

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

The 24 hour interval provides periodic information that is adequate to detect leakage. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after establishing steady state operation (as defined in the Bases of SR 3.4.13.1). 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.

Insert E

<u>C.1 and C.2</u>

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

The 24 hour interval provides periodic information that is adequate to detect RCS LEAKAGE. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after establishing steady state operation (as defined in the Bases of SR 3.4.13.1). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.

Insert F

<u>D.1, D.2.1, and D.2.2</u>

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

Insert F (continued)

E.1 and E.2

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

F.1 and F.2

If a Required Action of Condition A, B, C, D or E cannot be met, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

G.1

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

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.15 RCS Leakage Detection Instrumentation

BASES

BACKGROUND

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

Leakage detection systems must have the capability to detect significant reactor coolant pressure boundary (RCPB) degradation as soon after occurrence as practical to minimize the potential for propagation to a gross failure. Thus, an early indication or warning signal is necessary to permit proper evaluation of all unidentified LEAKAGE. [In addition to meeting the OPERABILITY requirements, the monitors are typically set to provide the most sensitive response without causing an excessive number of spurious alarms.]

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

The reactor coolant contains radioactivity that, when released to the containment, ~~can~~ may be detected by radiation monitoring instrumentation. ~~Reactor coolant radioactivity levels will be low during initial reactor startup and for a few weeks thereafter, until activated corrosion products have been formed and fission products appear from fuel element cladding contamination or cladding defects. Instrument sensitivities of 10^{-9} µCi/cc radioactivity for particulate monitoring and of 10^{-6} µCi/cc radioactivity for gaseous monitoring are practical for these leakage detection systems.~~ Radioactivity detection systems are included for monitoring both particulate and gaseous activities because of their sensitivities and rapid responses to RCS LEAKAGE.

Other indications may be used to detect an increase in unidentified LEAKAGE; however, they are not required to be OPERABLE by this LCO. An increase in humidity of the containment atmosphere would indicate release of water vapor to the containment. Dew point temperature measurements can thus be used to monitor humidity levels of the containment atmosphere as an indicator of potential RCS LEAKAGE. ~~A 1°F increase in dew point is well within the sensitivity range of available instruments.~~

BASES

BACKGROUND (continued)

Since the humidity level is influenced by several factors, a quantitative evaluation of an indicated leakage rate by this means may be questionable and should be compared to observed increases in liquid flow into or from the containment sump [and condensate flow from air coolers]. Humidity level monitoring is considered most useful as an indirect alarm or indication to alert the operator to a potential problem. Humidity monitors are not required by this LCO.

Air temperature and pressure monitoring methods may also be used to infer unidentified LEAKAGE to the containment. Containment temperature and pressure fluctuate slightly during plant operation, but a rise above the normally indicated range of values may indicate RCS leakage into the containment. The relevance of temperature and pressure measurements ~~are~~ is affected by containment free volume and, for temperature, detector location. [Alarm signals from these instruments can be valuable in recognizing rapid and sizable leakage to the containment. Temperature and pressure monitors are not required by this LCO.]

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

APPLICABLE SAFETY ANALYSES

The need to evaluate the severity of an alarm or an indication is important to the operators, and the ability to compare and verify with indications from other systems is necessary. ~~The system response times and sensitivities are described in the FSAR (Ref. 3). Multiple instrument locations are utilized, if needed, to ensure that the transport delay time of the leakage from its source to an instrument location yields an acceptable overall response time.~~

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

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

LCO

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

BASES

LCO (continued)

The LCO requires [three] instruments to be OPERABLE.

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

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

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

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

APPLICABILITY

Because of elevated RCS temperature and pressure in MODES 1, 2, 3, and 4, RCS leakage detection instrumentation is required to be OPERABLE.

In MODE 5 or 6, the temperature is to be ≤ 200°F and pressure is maintained low or at atmospheric pressure. Since the temperatures and pressures are far lower than those for MODES 1, 2, 3, and 4, the likelihood of leakage and crack propagation are much smaller. Therefore, the requirements of this LCO are not applicable in MODES 5 and 6.

ACTIONS

A.1 and A.2

With the required containment sump monitor inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere radioactivity monitor will provide indications of changes in leakage. Together with the containment atmosphere radioactivity monitor, the periodic surveillance for RCS water inventory balance, SR 3.4.13.1, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after establishing steady state operation (stable temperature, power level, pressurizer and makeup tank levels, makeup and letdown, [and RCP seal injection and return flows]). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.

Restoration of the required sump monitor to OPERABLE status within a Completion Time of 30 days is required to regain the function after the monitor's failure. This time is acceptable, considering the Frequency and adequacy of the RCS water inventory balance required by Required Action A.1.

ACTIONS (continued)

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

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

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

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

[C.1 and C.2

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

The 24 hour interval provides periodic information that is adequate to detect RCS LEAKAGE. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after establishing steady state operation (stable temperature, power level, pressurizer and makeup tank levels, makeup and letdown, [and RCP seal injection and return flows]). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.]

BASES

ACTIONS (continued)

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

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

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

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

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

If a Required Action of Condition A, B, [C], [D] or [~~D~~E] cannot be met, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

G~~F~~.1

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

SURVEILLANCE REQUIREMENTS

SR 3.4.15.1

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

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.15.2

SR 3.4.15.2 requires the performance of a COT on the required containment atmosphere radioactivity monitor. The test ensures that the monitor can perform its function in the desired manner. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable COT of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. The test verifies the alarm setpoint and relative accuracy of the instrument string. The Frequency of 92 days considers instrument reliability, and operating experience has shown that it is proper for detecting degradation.

SR 3.4.15.3, [SR 3.4.15.4, and SR 3.4.15.5]

These SRs require the performance of a CHANNEL CALIBRATION for each of the RCS leakage detection instrumentation channels. The calibration verifies the accuracy of the instrument string, including the instruments located inside containment. The Frequency of [18] months is a typical refueling cycle and considers channel reliability. Again, operating experience has proven that this Frequency is acceptable.

REFERENCES

1. 10 CFR 50, Appendix A, Section IV, GDC 30.
2. Regulatory Guide 1.45, Revision 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973.
3. FSAR, Section [ ].

Attachment 3 to TXX-19067

LAR 19-001

Comanche Peak Technical Specifications, LCO 3.4.15, RCS Leakage Detection Instrumentation

1. CPNPP TECHNICAL SPECIFICATIONS, LCO 3.4.15 – RETYPE

2. CPNPP TECHNICAL SPECIFICATIONS BASES, LCO 3.4.15 – RETYPE [FOR INFORMATION ONLY]

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.15 RCS Leakage Detection Instrumentation

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

a One containment sump (level or discharge flow) monitor,

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

c. One containment air cooler condensate flow rate monitor.

APPLICABILITY. MODES 1, 2, 3, and 4

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required containment sump monitor inoperable.	A.1 ————NOTE———— Not required until 12 hours after establishment of steady state operation. ————————	
	Perform SR 3.4.13.1.	Once per 24 hours
	AND	
	A.2 Restore required containment sump monitor to OPERABLE status.	30 days

ACTIONS (continued)

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

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
---------NOTE--------- Only applicable when the containment atmosphere gaseous radiation monitor is the only OPERABLE monitor. ------------------------------ D. Required containment sump monitor inoperable. AND Containment air cooler condensate flow rate monitor inoperable.	D.1 Analyze grab samples of the containment atmosphere. AND D.2.1 Restore required containment sump monitor to OPERABLE status. OR D.2.2 Restore containment air cooler condensate flow rate monitor to OPERABLE status.	Once per 12 hours 7 days 7 days
E. Required containment atmosphere radioactivity monitor inoperable. AND Containment air cooler condensate flow rate monitor inoperable.	E.1 Restore required containment atmosphere radioactivity monitor to OPERABLE status. OR E.2 Restore containment air cooler condensate flow rate monitor to OPERABLE status.	30 days 30 days
F. Required Action and associated Completion Time not met.	F.1 Be in MODE 3. AND F.2 Be in MODE 5.	6 hours 36 hours
G All required monitors inoperable.	G.1 Enter LCO 3.0 3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.15.1	Perform CHANNEL CHECK of the required containment atmosphere particulate and gaseous radioactivity monitors.	In accordance with the Surveillance Frequency Control Program.
SR 3.4.15.2	Perform COT of the required containment atmosphere particulate and gaseous radioactivity monitors.	In accordance with the Surveillance Frequency Control Program.
SR 3.4.15.3	Perform CHANNEL CALIBRATION of the required Containment Sump Level and Flow Monitoring System.	In accordance with the Surveillance Frequency Control Program.
SR 3.4.15.4	Perform CHANNEL CALIBRATION of the required containment atmosphere particulate and gaseous radioactivity monitors.	In accordance with the Surveillance Frequency Control Program.
SR 3.4.15.5	Perform CHANNEL CALIBRATION of the required containment air cooler condensate flow rate monitor.	In accordance with the Surveillance Frequency Control Program.

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.15 RCS Leakage Detection Instrumentation

BASES

BACKGROUND

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

Leakage detection systems must have the capability to detect significant reactor coolant pressure boundary (RCPB) degradation as soon after occurrence as practical to minimize the potential for propagation to a gross failure. Thus, an early indication or warning signal is necessary to permit proper evaluation of all unidentified LEAKAGE. In addition to meeting the OPERABILITY requirements, the monitors are typically set to provide the most sensitive response without causing an excessive number of spurious alarms.

The containment sump used to collect unidentified LEAKAGE and the containment air cooler condensate flow rate monitor are instrumented to alarm for increases above normal flow rates.

The reactor coolant contains radioactivity that, when released to the containment, may be detected by radiation monitoring instrumentation. Radioactivity detection systems are included for monitoring both particulate and gaseous activities because of their sensitivities and rapid responses to RCS LEAKAGE.

Other indications may be used to detect an increase in unidentified LEAKAGE; however, they are not required to be OPERABLE by this LCO. An increase in humidity of the containment atmosphere would indicate release of water vapor to the containment. Dew point temperature measurements can thus be used to monitor humidity levels of the containment atmosphere as an indicator of potential RCS LEAKAGE.

Since the humidity level is influenced by several factors, a quantitative evaluation of an indicated leakage rate by this means may be questionable and should be compared to observed increases in liquid flow into or from the containment sump and condensate flow from air coolers. Humidity level monitoring is considered most useful as an indirect alarm or indication to alert the operator to a potential problem. Humidity monitors are not required by this LCO.

(continued)

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 plant operation, but a rise above the normally indicated range of values may indicate RCS leakage into the containment. The relevance of temperature and pressure measurements is affected by containment free volume and, for temperature, detector location. Alarm signals from these instruments can be valuable in recognizing rapid and sizable leakage to the containment. Temperature and pressure monitors are not required by this LCO.

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

APPLICABLE SAFETY ANALYSES

The need to evaluate the severity of an alarm or an indication is important to the operators, and the ability to compare and verify with indications from other systems is necessary.

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

RCS leakage detection instrumentation satisfies Criterion 1 of 10CFR50.36(c)(2)(ii).

LCO

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

The LCO requires three instruments to be OPERABLE.

The containment sump is used to collet unidentified LEAKAGE. The containment sump consists of the normal sump and emergency sump. The LCO requirements apply to the total amount of unidentified LEAKAGE collected in the sump. The monitor on the containment sump

(continued)

LCO (continued)

detects level or flow rate or the operating frequency of a pump and is instrumented to detect when there is an increase above the normal value by 1 gpm. The identification of an increase in unidentified LEAKAGE will be delayed by the time required for the unidentified LEAKAGE to travel to the containment sump and it may take longer than one hour to detect a 1 gpm increase in unidentified LEAKAGE, depending on the origin and magnitude of the LEAKAGE. This sensitivity is acceptable for containment sump monitor OPERABILITY.

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

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

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

(continued)

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 atmosphere radioactivity monitor will provide indications of changes in leakage. Together with the containment atmosphere radioactivity monitor, the periodic surveillance for RCS water inventory balance, SR 3.4.13.1, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after establishing steady state operation (as defined in the Bases of SR 3.4.13.1). The 12 hour allowance provides sufficient time to collect and process necessary data after stable plant conditions are established.

Restoration of the required containment 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.

B.1.1, B.1.2, B.21, and B.2.2

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

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

(continued)

BASES

ACTIONS

B.1.1, B.1.2, B.21, and B.2.2 (continued)

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 (as defined in the Bases of SR 3.4.13.1). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established. The 30 day Completion Time recognizes at least one other form of leakage detection is available.

C.1 and C.2

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

The 24 hour interval provides periodic information that is adequate to detect RCS LEAKAGE. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after establishing steady state operation (as defined in the Bases of SR 3.4.13.1). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.

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

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

(continued)

BASES

ACTIONS

D.1, D.2.1, and D.2.2 (continued)

monitor to OPERABLE status to regain the intended leakage detection diversity. The 7 day Completion Time ensures that the plant will not be operated in a degraded configuration for a lengthy time period.

E.1 and E.2

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

F.1 and F.2

If a Required Action of Condition A, B, C, D or E cannot be met, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

G.1

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

SURVEILLANCE REQUIREMENTS

SR 3.4.15.1

SR 3.4.15.1 requires the performance of a CHANNEL CHECK of the required containment atmosphere radioactivity monitor. The check gives reasonable confidence that the channel is operating properly. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.15.2

SR 3.4.15.2 requires the performance of a COT on the required containment atmosphere radioactivity monitor. The test ensures that the monitor can perform its function in the desired manner. The test verifies the alarm setpoint and relative accuracy of the instrument string. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.4.15.3, SR 3.4.15.4, and SR 3.4.15.5

These SRs require the performance of a CHANNEL CALIBRATION for each of the RCS leakage detection instrumentation channels. The calibration verifies the accuracy of the instrument string, including the instruments located inside containment. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. 10 CFR 50, Appendix A, Section IV, GDC 30.
2. Regulatory Guide 1.45, Revision 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973.
3. FSAR, Section 5.2