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ATTN: R.E. Martin

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12
LICENSE AMENDMENT REQUEST - LAR 09-00469

License Amendment Request for Adoption of Technical Specification Task Force (TSTF)-513, Revision 3, "Revise PWR Operability Requirements and Actions for RCS Leakage Instrumentation". The proposed amendment would revise VCSNS Technical Specification (TS) 3.4.6.1, "RCS Leakage Detection Systems".

References: TSTF-513, Revision 3, "Revise PWR Operability Requirements and Actions for RCS Leakage Instrumentation" [ML102360355]

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, South Carolina Electric & Gas Company (SCE&G), acting for itself and as agent for South Carolina Public Service Authority, hereby requests the following amendment: revise TS 3.4.6.1, "RCS Leakage Detection Systems", to

1) Define a new time limit for restoring inoperable Reactor Coolant System (RCS) leakage detection instrumentation to operable status;

2) Establish alternate methods of monitoring RCS leakage when one or more required monitors are inoperable; and

3) Make TS Bases changes which reflect the proposed changes and more accurately reflect the contents of the facility design basis related to operability of the RCS leakage detection instrumentation.

These changes are consistent with NRC-approved Revision 3 to TSTF Improved Standard Technical Specification (STS) Change Traveler TSTF-513, "Revise PWR Operability Requirements and Actions for RCS Leakage Instrumentation." SCE&G has evaluated the proposed changes to the Technical Specifications (TS) using the criteria in 10 CFR 50.92 and has determined that the proposed changes do not involve a significant hazards consideration.

A001
NRR

In accordance with 10 CFR 50.91, a copy of this application, with attachments, is being provided to the designated South Carolina Official.

SCE&G requests approval of the proposed amendment by April 30, 2012. Once approved, the amendment shall be implemented within 120 days.

If you should have any questions about this submittal, please contact Mr. Bruce L. Thompson at (803) 931-5042.

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

5/2/2011
Executed on

Thomas D. Gatlin

JMW/TDG/jg
Enclosures:

- Licensee's evaluation of the proposed changes.

Attachments:

1. Marked-up Technical Specification Changes
2. Revised Technical Specification Pages
3. Marked-up Technical Specification Bases Pages
4. Revised Technical Specification Bases Pages
5. List of Regulatory Commitments

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ENCLOSURE 1

EVALUATION OF PROPOSED CHANGES

License Amendment Request for Adoption of TSTF-513, Revision 3, "Revise PWR Operability Requirements and Actions for RCS Leakage Instrumentation"

1.0 DESCRIPTION

The proposed amendment would revise the Virgil C. Summer Nuclear Station (VCSNS) Technical Specifications (TS) to define a new time limit for restoring inoperable Reactor Coolant System (RCS) leakage detection instrumentation to operable status; establish alternate methods of monitoring RCS leakage when one or more required monitors are inoperable; and make conforming TS Bases changes. These changes are consistent with NRC-approved Revision 3 to Technical Specification Task Force (TSTF) Change Traveler TSTF-513, "Revise PWR Operability Requirements and Actions for RCS Leakage Instrumentation." The availability of this TS improvement was announced in the *Federal Register* on January 3, 2011 (76 FR 189) as part of the consolidated line item improvement process (CLIIP).

The applicable changes proposed in TSTF-513 for Westinghouse Plants are based on the Standard Technical Specifications (STS) contained in NUREG-1431, "Standard Technical Specifications - Westinghouse Plants." The VCSNS TS are based on the previous Westinghouse STS contained in NUREG-0452, "Standard Technical Specifications for Westinghouse Pressurized Water Reactors." Therefore, in order to implement the proposed changes in TSTF-513 in the proper context, additional changes to the VCSNS TS are necessary. The additional changes serve to make the affected VCSNS TS more consistent with the corresponding STS to allow for the proposed changes in TSTF-513 to be implemented as intended.

2.0 PROPOSED CHANGES

Minor variations and/or deviations from the STS terminology, and TSTF-513, Revision 3 are required because the VCSNS TS are based on the previous Westinghouse standard TS in NUREG-0452. Consequently, the VCSNS TS wording and format do not directly correspond to STS and TSTF-513, Revision 3 wording and format. Also, the VCSNS TS do not use the STS identified terms, such as CONDITION, REQUIRED ACTION, and COMPLETION TIME or their associated table format. However, the intent of the CLIIP wording has been maintained in the proposed TS change and has been used verbatim to the extent possible. The variations and/or deviations from the specific wording and format provided in the CLIIP do not change the meaning, intent, or applicability of the CLIIP.

The TSTF-513 proposed changes include adding a new Action "d" to VCSNS TS 3.4.6.1, "RCS Leakage Detection Systems," and revising the associated bases. New Action "d" is applicable when the reactor building sump level monitor and the reactor building cooling unit condensate flow rate monitor are inoperable and the reactor building atmosphere gaseous radioactivity monitor is the only leakage detection system monitor operable. New Action "d" requires

analyzing grab samples of the containment atmosphere every 12 hours and restoring another monitor to operable status within 7 days.

Although the VCSNS TS Bases, consistent with NUREG-0452, do not contain the same level of detail as the current STS Bases, the VCSNS TS Bases would be revised to clarify the specified safety function and operability requirements for each required instrument in a new Limiting Conditions for Operation (LCO) Bases section. In addition, the VCSNS TS Bases would be revised to include an explanation of each new proposed TS Action in a new Action section of the Bases and provide a brief Background Bases section as well. The proposed changes to the VCSNS Bases are consistent with the STS Bases, including the changes proposed in TSTF-513 and with the VCSNS plant specific RCS leakage detection systems, as described in the VCSNS UFSAR.

2.1 ADDITIONAL CHANGES TO VCSNS TS 3.4.6.1 TO CONFORM TO STS 3.4.15

In order to implement the change proposed in TSTF-513 (the addition of Action "d" described above) in the proper context, the LCO and Actions contained in VCSNS TS 3.4.6.1, "RCS Leakage Detection Systems," would be revised to conform more closely to the LCO and Action Conditions of STS 3.4.15, "RCS Leakage Detection Instrumentation."

As the change proposed in TSTF-513 is designed for implementation in the STS, the additional proposed changes to conform the VCSNS TS 3.4.6.1 to the STS 3.4.15, "RCS Leakage Detection Instrumentation," LCO requirements and Action Conditions (described below) are prudent to ensure the TSTF-513 proposed change is properly implemented.

2.1.1 CHANGES TO VCSNS TS 3.4.6.1 LCO

The STS 3.4.15 "RCS Leakage Detection Instrumentation" LCO requires the following leakage detection instrumentation 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 VCSNS TS 3.4.6.1, "RCS Leakage Detection Systems," currently require the following leakage detection systems to be operable:

a. A reactor building atmosphere particulate radioactivity monitoring system,
b. The reactor building sump level, and
c. Either the reactor building cooling unit condensate flow rate or a reactor building atmosphere gaseous radioactivity monitoring system.

The current VCSNS LCO requirement would be changed to require the following leakage detection systems to be operable:

a. One reactor building sump level,
b. One reactor building atmosphere radioactivity monitor (gaseous or particulate), and
c. One reactor building cooling unit condensate flow rate monitor.

The proposed change to the VCSNS LCO continues to specify the same leakage detection systems to be operable as currently required to be operable. However, the LCO requirements are re-organized to match the corresponding LCO requirements of STS 3.4.15 "RCS Leakage Detection Instrumentation." This results in a separate line item for the VCSNS reactor building cooling unit condensate flow rate monitor and the combination of the gaseous and particulate reactor building atmosphere radioactivity monitors into a single line item that allows either radioactivity monitor to be used to meet the LCO requirement.

The re-organization of the LCO requirements to be consistent with the STS will facilitate the implementation of the change proposed in TSTF-513 by allowing the associated VCSNS TS 3.4.6.1 Actions to be revised to conform more closely to the Action Conditions of the corresponding STS 3.4.15. As discussed in the following Section 2.1.2, "Changes to VCSNS TS 3.4.6.1 Actions," the VCSNS Actions must be revised in order to properly integrate the change proposed in TSTF-513.

The VCSNS plant specific terminology used in TS 3.4.6.1 is used in many other plant documents such as procedures and the UFSAR, therefore, no changes are proposed to the VCSNS names used to identify the leakage detection systems specified in TS 3.4.6.1.

2.1.2 CHANGES TO VCSNS TS 3.4.6.1 ACTIONS

The STS 3.4.15 "RCS Leakage Detection Instrumentation" Action Conditions consist of several Conditions identifying individual and combinations of inoperable leakage detection instrumentation. The change proposed by TSTF-513 adds an additional Condition ("D") that specifies a different combination of operable and inoperable leakage detection instrumentation. With the addition of the TSTF-513 Action Condition "D", STS 3.4.15 has a total of seven Action Conditions identifying various inoperable leakage detection systems and one Condition providing the common shutdown Actions.

The corresponding VCSNS TS 3.4.6.1, "RCS Leakage Detection Systems," contains the following single Action statement:

> "With only two of the above required leakage detection systems OPERABLE, operation may continue for up to 30 days provided grab samples of the containment atmosphere are obtained and analyzed at least once per 24 hours when the required gaseous or particulate radioactive monitoring system is inoperable; otherwise, be in at least HOT

STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours."

The simple addition of the change proposed in TSTF-513 to the single VCSNS Action above would not be consistent with the intent of TSTF-513 and STS 3.4.15. In order to fully comply with the intent of TSTF-513 and STS 3.4.15, additional Actions and compensatory Actions (i.e., RCS water inventory balance) are required to be specified for individual and combinations of inoperable leakage detection systems. Therefore, the changes proposed to the VCSNS TS 3.4.6.1 Action would replace the current single Action with multiple Actions containing more appropriate compensatory Actions and conform more closely to the Action Conditions in STS 3.4.15.

It should be noted that the proposed VCSNS TS 3.4.6.1 Actions are written and formatted to the NUREG-0452 style content consistent with the rest of the VCSNS TS. Although presented in a different format, the technical requirements are maintained consistent with the STS 3.4.15 Action Conditions as described below. One significant difference from the STS 3.4.15 presentation of Actions is that separate Actions containing common shutdown requirements are not used in NUREG-0452. Each Action in NUREG-0452 typically includes all the applicable actions including the shutdown actions. Therefore, STS 3.4.15 Action Condition "F" (as modified by TSTF-513) which applies when the Required Action and associated Completion Time are not met for any Action Condition in the TS is not used in the proposed VCSNS TS Actions. When the Required Action and associated Completion Time are not met, STS Action Condition "F" requires the plant to be placed in MODE 3 in 6 hours and MODE 5 in 36 hours. In NUREG-0452 the same Actions are contained separately in each Action statement as follows: "be in at least HOT STANDBY in 6 hours and COLD SHUTDOWN in the following 30 hours."

The STS 3.4.15 Action Conditions require a compensatory Action consisting of the performance of SR 3.4.13.1 once per 24 hours. SR 3.4.13.1 requires that RCS operational LEAKAGE be verified within limits by performance of an RCS water inventory balance. The performance of SR 3.4.13.1 is modified by a note that allows 12 hours after establishment of steady state operation before the SR is required. The STS Note states; "Not required until 12 hours after establishment of steady state operation." The corresponding VCSNS compensatory Action consists of the performance of surveillance requirement 4.4.6.2.1.d (RCS water inventory balance) at least once per 24 hours. The requirement to perform surveillance requirement 4.4.6.2.1.d is modified by VCSNS specific note (1). The VCSNS Note (1) also allows 12 hours after establishment of steady state operation before the SR is required. The VCSNS specific note states; "Not required to be performed/completed until 12 hours after establishment of steady state operation." The proposed text for VCSNS Note (1) is consistent with the corresponding VCSNS note associated with surveillance requirement 4.4.6.2.1.d (RCS inventory balance) in TS 3.4.6.2 "Operational Leakage." The minor difference between the VCSNS note proposed in TS 3.4.6.1 and the STS note text is necessary to maintain internal consistency in the VCSNS TS (between TS 3.4.6.1 and TS 3.4.6.2).

The following discussions compare the STS 3.4.15 Action Conditions to the proposed changes to the VCSNS TS 3.4.6.1 Action.

1. STS 3.4.15 Action Condition "A" addresses an inoperable containment sump monitor and requires the performance of SR 3.4.13.1 once per 24 hours and that

the containment sump monitor be restored to operable status in 30 days. SR 3.4.13.1 requires that RCS operational LEAKAGE be verified within limits by performance of RCS water inventory balance. The performance of SR 3.4.13.1 is modified by a note that allows 12 hours after establishment of steady state operation before the SR is required.

Proposed VCSNS TS 3.4.6.1 Action "a" also addresses an inoperable reactor building sump level monitor. The proposed VCSNS Action "a" requires the performance of surveillance requirement 4.4.6.2.1.d (RCS water inventory balance) at least once per 24 hours and that the reactor building sump level monitor be restored to operable status within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. The requirement to perform surveillance requirement 4.4.6.2.1.d is modified by note (1) that allows 12 hours after establishment of steady state operation before the SR is required.

2. STS 3.4.15 Action Condition "B" addresses the required containment atmosphere radioactivity monitor inoperable (i.e., either the gaseous or the particulate). The STS Action Condition requires that grab samples of the containment atmosphere be analyzed once per 24 hours or that SR 3.4.13.1 be performed once per 24 hours. SR 3.4.13.1 requires that RCS operational LEAKAGE be verified within limits by performance of RCS water inventory balance. The performance of SR 3.4.13.1 is modified by a note that allows 12 hours after establishment of steady state operation before the SR is required. Additionally, STS Action Condition "B" requires that the required containment atmosphere radioactivity monitor be restored to operable status in 30 days. The STS Action Condition "B" also contains a bracketed (i.e., plant specific) action applicable in lieu of restoring the required radioactivity monitor to operable status. This alternate Action requires verification that the containment air cooler condensate flow rate monitor is operable within 30 days. The alternate action would be applicable for plants that have an LCO requirement for a containment air cooler condensate flow rate monitor to be operable.

   Proposed VCSNS TS 3.4.6.1 Action "b" also addresses the required containment atmosphere radioactivity monitor inoperable (i.e., either the gaseous or the particulate). The VCSNS Action "b" requires that grab samples of the containment atmosphere be analyzed at least once per 24 hours or that surveillance requirement 4.4.6.2.1.d (RCS water inventory balance) be performed at least once per 24 hours and that the reactor building atmosphere radioactivity monitor be restored to operable status within 30 days or verify that the reactor building cooling unit condensate flow rate monitor is operable within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. The requirement to perform surveillance requirement 4.4.6.2.1.d is modified by note (1) that allows 12 hours after establishment of steady state operation before the SR is required. The STS bracketed alternate Action which allows the verification of containment air cooler condensate flow rate monitor operability in lieu of restoring the required radioactivity monitor to operable status is included in the VCSNS TS 3.4.6.1

Action "b." As described above in Section 2.1.1 the change to the VCSNS LCO is proposed to revise the current LCO requirement for the reactor building cooling unit condensate flow rate or a reactor building atmosphere gaseous radioactivity monitoring system to be operable. The revised VCSNS LCO would require an operable reactor building cooling unit condensate flow rate monitor independent of any other monitor. Therefore, the bracketed STS alternate Action to verify the condensate flow monitor operable in lieu of restoring the radioactivity monitor to operable status applies to the proposed VCSNS TS 3.4.6.1 Actions.

3. STS 3.4.15 Action Condition "C" addresses an inoperable containment air cooler condensate flow rate monitor. The STS Action requires that SR 3.4.15.1 be performed once per 8 hours or that SR 3.4.13.1 be performed once per 24 hours. SR 3.4.15.1 requires a Channel Check of the required containment atmosphere radioactivity monitor (gaseous or particulate). SR 3.4.13.1 requires that RCS operational LEAKAGE be verified within limits by performance of RCS water inventory balance. The performance of SR 3.4.13.1 is modified by a note that allows 12 hours after establishment of steady state operation before the SR is required. STS Action Condition "C" is bracketed (i.e., plant specific) applicable to plants that have a separate requirement for an operable containment air cooler condensate flow rate monitor. This is consistent with the bracketed STS 3.4.15 LCO item "C."

   Proposed VCSNS TS 3.4.6.1 Action "c" also addresses an inoperable reactor building cooling unit condensate flow rate monitor. The TS 3.4.6.1 Actions require that a Channel Check of the required reactor building radioactivity monitor be performed at least every 8 hours or that surveillance requirement 4.4.6.2.1.d (RCS water inventory balance) be performed at least once per 24 hours; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. The requirement to perform surveillance requirement 4.4.6.2.1.d is modified by note (1) that allows 12 hours after establishment of steady state operation before the SR is required. VCSNS adopted this bracketed STS Action Condition based on the changes to the LCO requirements discussed above in Section 2.1.1. The changes to the LCO resulted in the VCSNS reactor building cooling unit condensate flow rate monitor being made a separate line item in the LCO. Therefore, this STS Action Condition is applicable to VCSNS. The TS 3.4.6.1 Action "c" directly specifies a Channel Check instead of referencing a surveillance number. This deviation from the STS is proposed to simplify the Action requirement as the applicable Channel Check surveillance requirement is part of a Table in the instrumentation section of the TS and is not as simple to reference as the STS in this Action.

4. STS 3.4.15 Action Condition "D" (added by TSTF-513) addresses an inoperable Containment sump monitor and an inoperable containment air cooler condensate flow rate monitor. The Action Condition is modified by a Note that states the Condition is only applicable when the containment atmosphere gaseous radiation monitor is the only operable monitor. The Actions require that grab samples of the containment atmosphere be analyzed once per 12 hours and that the containment sump monitor or the containment air cooler condensate flow rate

monitor be restored to operable status in 7 days. The references in this Action Condition to the containment air cooler condensate flow rate monitor are bracketed (i.e., plant specific).

Proposed VCSNS TS 3.4.6.1 Action "d" also addresses an inoperable reactor building sump level monitor and an inoperable reactor building cooling unit condensate flow rate monitor and with the reactor building atmosphere gaseous radioactivity monitor being the only operable monitor. The TS 3.4.6.1 Actions require that grab samples of the containment atmosphere be analyzed at least once per 12 hours and that the reactor building sump level monitor or the reactor building cooling unit condensate flow rate monitor be restored to operable status within 7 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. The STS Action bracketed reference to the condensate flow rate monitor is incorporated into the VCSNS Action "d." Due to the changes proposed to the VCSNS TS 3.4.6.1 LCO, described in Section 2.1.1 above, the reactor building cooling unit condensate flow rate monitor is listed as a separate line item in the LCO which allows it to be included as a restoration option in the proposed TS 3.4.6.1 Action "d." In addition, the STS Action Condition contains a Note specifying that the Condition is only applicable when the containment atmosphere gaseous radiation monitor is the only operable monitor. Consistent with the typical format of NUREG-0452 TS, a similar note is not used in the proposed VCSNS TS 3.4.6.1 Action. Instead the intent of the STS Note is written directly in the proposed VCSNS Action as one of the conditions of the Action.

5. STS Action Condition "E" addresses an inoperable required containment atmosphere radioactivity monitor and an inoperable containment air cooler condensate flow rate monitor. The STS Actions require that the required containment atmosphere radioactivity monitor or the containment air cooler condensate flow rate monitor be restored to operable status within 30 days. The entire STS Action Condition "E" is bracketed for plant specific adoption. This Action Condition would be applicable where both the containment air cooler condensate flow rate monitor and a containment atmosphere radioactivity monitor are required operable to meet the requirements of the LCO.

   Proposed VCSNS TS 3.4.6.1 Action "e" also addresses an inoperable required reactor building atmosphere radioactivity monitor and an inoperable reactor building cooling unit condensate flow rate monitor. The proposed VCSNS TS 3.4.6.1 Actions also require that the required reactor building atmosphere radioactivity monitor or the reactor building air cooler condensate flow rate monitor be restored to operable status within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. As the VCSNS TS 3.4.6.1 requires both these monitors to be operable, the bracketed STS Action Condition is applicable to VCSNS.

6. STS 3.4.15 Action Condition "F" provides the common shutdown requirements for all the above STS Actions. As previously discussed, each Action in TS based on NUREG-0452 typically includes the applicable shutdown Actions. The

VCSNS TS Actions are based on NUREG-0452 and contain the applicable shutdown requirements which are the same as the corresponding requirements of the STS. Therefore, in order to maintain internal consistency within the VCSNS TS, STS 3.4.15 Action Condition "F" is not used in the proposed VCSNS TS Actions.

7. STS Action Condition "G" addresses the condition when all required monitors are inoperable. This Action requires entry into LCO 3.0.3 immediately. This type Action is typically used in the STS when the combination of Actions, if applied concurrently, would allow for all LCO required equipment to be inoperable. STS Action Condition "G" is necessary as the STS 3.4.15 Actions, if applied concurrently, would allow all the required monitors to be inoperable. Therefore, STS Condition "G" is necessary to address the condition where a complete loss of monitoring function may exist. LCO 3.0.3 contains the appropriate shutdown requirements.

   Proposed VCSNS TS 3.4.6.1 Action "f" also addresses the condition when all required monitors are inoperable and requires entry into LCO 3.0.3 immediately. The addition of this STS Action to the VCSNS TS is necessary as the revised Actions of VCSNS TS 3.4.6.1 will allow multiple leakage detection monitors to be inoperable concurrently. As in the STS, VCSNS LCO 3.0.3 provides the appropriate shutdown Actions for this condition.

2.1.3 SURVEILLANCE REQUIREMENTS

No changes are proposed to the VCSNS TS 3.4.6.1 surveillance requirements. The VCSNS TS 3.4.6.1 leakage detection monitor surveillance requirements are consistent with the requirements of STS 3.4.15 with the exception of the Analog Channel Operational Test requirement for the radiation monitors. The VCSNS surveillance requirements for the reactor building gaseous and particulate radiation monitors are contained in VCSNS TS 3/4.3.3, "Monitoring Instrumentation." The Analog Channel Operational Test requirement for the VCSNS reactor building atmosphere particulate and gaseous radioactivity monitor requires that the surveillance be performed monthly. The corresponding STS 3.4.15 Channel Operational Test is required to be performed Quarterly. Therefore, the current VCSNS radiation monitor surveillance requirements are more conservative than the STS. As the radiation monitor surveillance requirements are contained in a different TS, which is not within the scope of TSTF-513, no changes are proposed to the VCSNS surveillance requirements for the reactor building atmosphere particulate and gaseous radioactivity monitor at this time.

3.0 BACKGROUND

The primary purpose of this license amendment request is to implement the changes proposed in TSTF-513. Although this license amendment request contains other changes, the additional changes are made to conform more closely with the STS in order to better accommodate the proposed changes in TSTF-513. The following discussion provides the background for the changes proposed in TSTF-513.

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

As stated in TSTF-513, "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."

4.0 TECHNICAL ANALYSIS

4.1 TSTF-513 CHANGES

South Carolina Electric & Gas Company (SCE&G) has reviewed TSTF-513, Revision 3, and the model SE published on January 3, 2011 (76 FR 189) as part of the CLIIP Notice of Availability. SCE&G has concluded that the technical bases presented in TSTF Traveler-513, Revision 3, and the model SE prepared by the NRC staff are applicable to VCSNS with the exception of the proposed changes to conform with the STS (discussed below).

The proposed amendment also revises the language in the TS Bases that describes when the gaseous and particulate containment atmosphere radioactivity monitor is operable. The proposed amendment requires additional containment atmosphere grab samples or manual RCS leakage monitoring to be performed when the primary containment atmosphere gaseous radiation monitor is the only operable continuous or automatic monitor. These alternative methods provide an RCS leakage detection capability similar to the TS-required methods. The grab sample has an RCS leakage detection capability that is comparable to that of the containment particulate radiation monitor. The proposed Actions and times allowed for grab samples are adequate because the use of frequent grab samples provides additional assurance (in addition to the RCS water inventory balance required by proposed Actions "a", "b" and "c") that any significant RCS leakage will be detected prior to significant Reactor Coolant Pressure Boundary (RCPB) degradation.

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 1.45, Rev. 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973, describes acceptable methods for selecting leakage detection systems.

As discussed in the VCSNS UFSAR Appendix 3A, Section 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems," the VCSNS meets the technical recommendations of Regulatory Guide 1.45 (Revision 0, May 1973). Diverse methods for determination of RCS leakage are employed in the design of VCSNS which follows the recommendations of Regulatory Guide 1.45. The VCSNS RCS leakage detection systems are discussed in UFSAR Section 5.2.7, "Reactor Coolant Pressure Boundary Leakage Detection Systems."

As discussed in VCSNS UFSAR Section 5.2.7, Leakage detection system instrumentation sensitivity is 1 gpm or less. Response time of less than 1 hour is consistent with the requirements of General Design Criterion 30 as described in Regulatory Guide 1.45. Sufficient range overlap and multiple instruments ensure shorter overall response time for leakage detection.

The reactor building atmosphere radioactivity monitor monitors the particulate, iodine, and gaseous activity level of the air inside the reactor building. The RCS leakage reactor building atmosphere radioactivity detection monitor is discussed in VCSNS UFSAR Section 5.2.7.1.1, "Activity Detection." Detection of reactor coolant leakage though activity detection is based on the presence in the reactor building atmosphere of a normal background level resulting from very small reactor coolant pressure boundary leaks. The sensitivity of the radiation monitor is in accordance with Regulatory Guide 1.45. The reactor building air sample line radiation monitor is the most sensitive to reactor coolant leakage. The radiation monitor achieves this sensitivity with a response time of less than 60 minutes. The radiation monitor will detect a reactor building radioactivity level resulting from a reactor coolant leak greater than 1 gpm that contains the expected radioactivity levels above normal background conditions. The radiation monitor also provides an alarm. This radiation monitor satisfies the seismic requirements of Regulatory Guide 1.45.

The RCS leakage detection system reactor building cooling unit condensate flow rate monitor is discussed in VCSNS UFSAR Section 5.2.7.1.2, "Detection by Temperature, Pressure or Drain Flows." Reactor building temperature and pressure monitors provide indirect indication of gross reactor coolant pressure boundary leakage. However, the most sensitive leakage detection system, other than activity detection, is the reactor building cooling unit condensate drain flow alarm. A flow switch is located in each of the common condensate drain headers from the reactor building cooling units. Each flow switch is set to actuate an alarm in the control room, should a flow rate exceeding 0.5 gpm occur. The response time for this system to indicate a 1 gpm reactor coolant leak is approximately 15 minutes. The reactor building temperature and pressure monitors and the flow switches satisfy the seismic requirements of Regulatory Guide 1.45.

The RCS leakage detection system reactor building sump level monitor is discussed in VCSNS UFSAR Section 5.2.7.1.3, "Leak Detection Sumps." The reactor building sump

is used to collect and quantify leakage originating in the Reactor Building. Detection of leakage is accomplished by obtaining a flow rate into the sump from comparison of level changes over a specified time period. Whenever the measured flow rate into the sump from unidentified sources exceeds 1 gallon per minute, a "greater than 1 gpm" alarm is actuated. To ensure reliability, the level monitor for the RB sump is Seismic Category I. This detection method satisfies the requirements of Regulatory Guide 1.45 as one of the diverse methods for determination of reactor coolant leakage employed in the design of VCSNS.

4.2 CHANGES TO CONFORM TO THE STS

The Bases for STS 3.4.15, "RCS Leakage Detection Instrumentation," describes the STS RCS leakage detection instrumentation as meeting the requirements of GDC 30 of Appendix A to 10 CFR 50, which requires means for detecting and, to the extent practical, identifying the location of the source of RCS LEAKAGE. Furthermore, the STS Bases states that Regulatory Guide 1.45, Rev. 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973 describes acceptable methods for selecting leakage detection systems.

As discussed in Section 4.1 above, the Bases for the VCSNS TS 3.4.6.1, "RCS Leakage Detection Systems," as described in the VCSNS UFSAR, is also consistent with GDC 30 of Appendix A to 10 CFR 50 and the requirements of Regulatory Guide 1.45, Rev. 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973. In addition, the instrumentation specified in VCSNS TS 3.4.6.1, as described in Section 4.1 above, is similar to the instrumentation specified in STS 3.4.15. Both the STS 3.4.15 and VCSNS TS 3.4.6.1 meet the requirements of Regulatory Guide 1.45 for diverse indications of RCPB leakage in a similar manner.

The changes to the VCSNS TS 3.4.6.1 LCO requirements and Actions were necessary to facilitate the implementation of the changes proposed in TSTF-513. By aligning the VCSNS TS requirements more closely to the corresponding STS requirements, the appropriate context is established for integrating the changes proposed in TSTF-513. This allows a seamless incorporation of the TSTF change assuring proper interpretation and implementation. In addition, aligning the VCSNS TS more closely with the STS provides assurance of compatibility with any future changes to the STS.

The VCSNS TS 3.4.6.1 LCO requirements were revised to separate the operability requirements for the reactor building atmosphere gaseous radioactivity monitor from the reactor building cooling unit condensate flow rate monitor. This change ensures one of the most sensitive RCS leakage detectors, the reactor building condensate flow rate monitor, is required operable independent from the operability of the reactor building gaseous radioactivity monitor. Furthermore, consistent with the STS, the reactor building atmosphere gaseous and particulate monitors were linked in a single LCO requirement such that either the gaseous or the particulate monitor could meet the LCO requirement. The proposed change, by requiring the reactor building cooling unit condensate flow rate monitor to be operable independent of the gaseous monitor, results in an LCO with more diverse leakage detection requirements than before. In addition, the proposed change makes the VCSNS LCO requirement the same as the

corresponding STS requirement. Therefore, the proposed changes to the LCO are considered acceptable.

The current VCSNS TS 3.4.6.1 Actions consist of a single Action that allows one RCS leakage monitor to be inoperable for up to 30 days provided grab samples of the containment atmosphere are obtained and analyzed at least once per 24 hours when the required gaseous or particulate radioactive monitoring system is inoperable. The current VCSNS TS 3.4.6.1 Action also includes a shutdown requirement (be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours) if the conditions of the Action are not met.

The differences between the STS 3.4.15 Actions and the proposed VCSNS TS 3.4.6.1 Actions were discussed in Section 2.1.2 above. The changes to the VCSNS TS 3.4.6.1 Actions are evaluated below. The proposed changes to the VCSNS TS 3.4.6.1 include replacing the original single Action requirement with six separate Actions (a-f) from the corresponding STS. Each proposed new Action is evaluated separately in the following discussions.

The first three new Actions (a-c) provide an individual Action for each RCS leakage monitor.

- Proposed Action "a" addresses an inoperable reactor building sump level monitor and allows up to 30 days to restore the inoperable monitor (same as the current VCSNS TS Action) provided surveillance requirement 4.4.6.2.1.d (RCS water inventory balance) is performed at least once per 12 hours. Proposed Action "a" also includes the same shutdown requirements as the current Action, if the conditions of the Action are not met.

  The proposed change is considered a more restrictive change to the VCSNS TS. The compensatory measure required by the current VCSNS TS Action (i.e., analyze a containment atmosphere grab sample) is only required when the required gaseous or particulate reactor building atmosphere monitor is also inoperable. The proposed change requires a more appropriate compensatory Action, for an inoperable reactor building sump level monitor, (i.e., performing an RCS inventory balance). The RCS inventory balance provides a compensatory measure that is more consistent with the function of the reactor building sump level monitor and is required whether a reactor building atmosphere radioactivity monitor is inoperable or not. The proposed change is acceptable as it requires a more appropriate compensatory measure to be performed whenever the reactor building sump level monitor is inoperable, independent of the required gaseous or particulate reactor building atmosphere monitor operability.

- Proposed Action "b" addresses an inoperable required gaseous and particulate reactor building atmosphere radioactivity monitor and allows up to 30 days to restore the inoperable monitor, similar to the current Action, or up to 30 days to verify the reactor building cooling unit condensate flow rate monitor is operable consistent with the STS. Proposed Action "b" includes the same shutdown requirements as the current VCSNS Action if the conditions of the Action are not

met. The proposed Action includes the current compensatory Action (i.e., analyze grab samples of the containment atmosphere every 24 hours) and provides an alternate compensatory Action to perform surveillance requirement 4.4.6.2.1.d (RCS water inventory balance) once per 24 hours.

The proposed change is considered a less restrictive change to the VCSNS TS. The proposed change would provide an allowance for continued operation with the required reactor building atmosphere radioactivity monitor inoperable (consistent with the STS). The proposed change is acceptable as the Action requires appropriate compensatory measures to be performed frequently enough to assure the continued ability to detect RCS leakage. In addition, the proposed change is acceptable because continued plant operation would be contingent on the proposed additional Action to verify that the reactor building cooling unit condensate flow rate monitor is operable within 30 days. The operability verification of the reactor building cooling unit condensate flow rate monitor provides assurance that a relatively sensitive means of RCS leakage detection remains available when the required reactor building atmosphere radioactivity monitor is not available to perform its leakage detection function. It should also be noted that continued operation with an inoperable reactor building atmosphere radioactivity monitor inoperable is also limited by proposed Actions "d" and "e" (described below). In addition, the proposed new Action provides a greater diversity of compensatory measures that may be used to satisfy the Action requirements.

- Proposed Action "c" addresses an inoperable reactor building cooling unit condensate flow rate monitor. The proposed Action includes a choice of diverse compensatory Actions including the performance of a Channel Check of the required reactor building radioactivity monitor every 8 hours or the performance of surveillance requirement 4.4.6.2.1.d (RCS water inventory balance) every 24 hours. If these compensatory Actions are not met, the proposed Action specifies the same shutdown requirements as the current VCSNS TS 3.4.6.1 TS Action. If the conditions of the Action are not met, the proposed Action includes the same shutdown requirements as the current Action.

  The proposed change is considered a less restrictive change to the VCSNS TS. The proposed Action "c," consistent with the corresponding STS Action Condition "C," does not specify a restoration time for the inoperable reactor building cooling unit condensate flow rate monitor. The allowance provided by the proposed Action (i.e., continued operation with an inoperable reactor building condensate flow monitor) is acceptable considering the more appropriate and frequent compensatory measures required to be performed by the proposed Action (i.e., performance of a Channel Check of the required reactor building radioactivity monitor every 8 hours or the performance of surveillance requirement 4.4.6.2.1.d (RCS water inventory balance) every 24 hours). It should be noted that the current VCSNS TS 3.4.6.1 would only require a compensatory measure (analyze containment atmosphere grab sample) if a required gaseous or particulate reactor building atmosphere monitor was also inoperable. Therefore, the proposed change includes appropriate compensatory measures to be performed frequently enough to assure the continued ability to detect RCS leakage in a timely manner. In addition, operation with an inoperable reactor building cooling

unit condensate flow rate monitor is acceptable, within the conditions of this Action, as the inoperability of this leakage detection monitor is also addressed and limited by proposed Action "e" and Action "d" (described below).

The following three proposed Actions (d-f) provide the appropriate Actions for combinations of inoperable RCS leakage monitors.

- Proposed Action "d" implements the change proposed in TSTF-513 by the addition of the new STS Action Condition "D." Proposed VCSNS Action "d" applies when the reactor building sump level monitor and the reactor building cooling unit condensate flow monitor are inoperable concurrently and the reactor building atmosphere gaseous radioactivity monitor is the only operable leakage detection monitor left. This new Action limits plant operation under these circumstances to 7 days instead of 30 days that might otherwise be applicable. The shutdown requirements applicable if the conditions of the Action are not met remain the same as the current VCSNS TS Action.

  Although the proposed change includes a more restrictive time allowed for operation (i.e., 7 days instead of 30 days) the net effect of this change is less restrictive than the current VCSNS TS. The current VCSNS TS Action does not allow for more than one of the three required RCS leakage monitors to be inoperable at a time. The proposed change allows continued operation with a single operable monitor consistent with the STS (as modified by TSTF-513). The proposed change is acceptable due to the required compensatory measures associated with the inoperable RCS leakage detection monitors. Proposed Action "d" would require a grab sample of the containment atmosphere be analyzed every 12 hours (instead of every 24 hours). Proposed Action "a" for an inoperable reactor building sump level monitor (which would be applicable when in Action "d") would require the performance of an RCS water inventory balance every 24 hours. In addition, proposed Action "c" for an inoperable reactor building cooling unit condensate flow rate monitor (which would also be applicable when in Action "d") would require a Channel Check be performed on the reactor building atmosphere radioactivity monitor every 8 hours or an RCS water inventory balance every 24 hours. Therefore, in addition to the operable reactor building atmosphere gaseous radioactivity monitor sufficient and frequent compensatory measures are required to provide additional assurance that unidentified RCS leakage will continue to be detected in a timely manner. This proposed Action is also acceptable as it addresses the concerns raised in TSTF-513 by assuring that the sole reliance on the reactor building atmosphere gaseous radioactivity monitor for RCS leakage detection is appropriately limited. The proposed change is consistent with the resolution recommended in TSTF-513.

- Proposed Action "e" is consistent with STS Action Condition "E" (as modified by TSTF-513). Proposed Action "e" applies when a required reactor building atmosphere radioactivity monitor and a reactor building cooling unit condensate flow rate monitor are inoperable concurrently. The proposed VCSNS TS 3.4.6.1 Actions also require that the required containment atmosphere radioactivity monitor or the containment air cooler condensate flow rate monitor be restored to operable status within 30 days. The shutdown requirements applicable if the

conditions of the Action are not met remain the same as the current VCSNS TS Action.

The proposed change is considered a less restrictive change to the VCSNS TS as the change allows two required leakage detection monitors to be inoperable. The proposed Action is acceptable because the compensatory measures required by proposed Action "b" for an inoperable required reactor building atmosphere radioactivity monitor and Action "c" for an inoperable reactor building cooling unit condensate flow rate monitor remain applicable when in proposed Action "e." These compensatory measures (analyze containment atmosphere grab samples and perform RCS water inventory balances) are appropriate and frequent enough to assure that RCS leakage will be detected in a timely manner. Furthermore, proposed Actions "b" and "c" would allow continued plant operation with the required reactor building atmosphere radioactivity monitor and the reactor building cooling unit condensate flow rate monitor inoperable, respectively. Therefore, proposed Action "e" is also acceptable and necessary as it assures plant operation is limited appropriately when both these relatively sensitive RCS leakage detection monitors are inoperable.

- Proposed Action "f" is consistent with STS Action Condition "G" (as modified by TSTF-513). This proposed Action applies when all the required RCS leakage detection monitors are inoperable and requires immediate entry into LCO 3.0.3. The addition of this STS Action to the VCSNS TS is necessary as the proposed VCSNS TS 3.4.6.1 Actions, if applied concurrently, would allow all three required leakage detection monitors to be inoperable. As in the STS, VCSNS LCO 3.0.3 provides the appropriate shutdown Actions for this condition.

  The proposed Action is considered an administrative change to the VCSNS TS necessary in order to implement the multiple STS type Actions that would otherwise allow all the required RCS leakage detection monitors to be inoperable. Therefore, the addition of this Action to the VCSNS TS 3.4.6.1 is acceptable as it prevents continued operation with a total loss of the RCS leakage detection function.

Note that the separate STS shutdown Action Condition "F" (as modified by TSTF-513) was not adopted by VCSNS due to the format differences between the STS and NUREG-0452, as described in Section 2.1.2 above.

5.0 REGULATORY SAFETY ANALYSIS

5.1 NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

SCE&G has evaluated the proposed changes to the Technical Specifications (TS) using the criteria in 10 CFR 50.92 and has determined that the proposed changes do not involve a significant hazards consideration. An analysis of the issue of no significant hazards consideration is presented below:

Description of Amendment Request:

1) The proposed amendment would revise TS 3.4.6.1, "Reactor Coolant System (RCS) Leakage Detection Systems" Actions, the licensing basis for the gaseous radiation monitor, as well as make associated TS Bases changes for TS 3.4.6.1 consistent with TSTF-513, and

2) The proposed amendment would also revise TS 3.4.6.1, "Reactor Coolant System (RCS) Leakage Detection Systems" LCO, Actions, and Bases to be more consistent with the corresponding requirements in the Standard Technical Specifications (STS) contained in NUREG-1431,Rev. 3.1, "Standard Technical Specifications - Westinghouse Plants."

Basis for proposed no significant hazards consideration determination: As required by 10 CFR 50.91(a), the SCE&G analysis of the issue of no significant hazards consideration using the standards in 10 CFR 50.92 is presented below:

1: Does the Proposed Change Involve a Significant Increase in the Probability or Consequences of an Accident Previously Evaluated?

Response: No

The proposed change clarifies the operability requirements for the RCS leakage detection instrumentation, provides appropriate allowed operating times and compensatory measures when RCS leakage detection monitors are inoperable, and revises the TS LCO, Actions, and Bases to conform more closely with the corresponding STS requirements. 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 the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2: Does the Proposed Change Create the Possibility of a New or Different Kind of Accident from any Accident Previously Evaluated?

Response: No

The proposed change clarifies the operability requirements for the RCS leakage detection instrumentation, provides appropriate allowed operating times and compensatory measures when RCS leakage detection monitors are inoperable, and revises the TS LCO, Actions, and Bases to conform more closely with the corresponding STS requirements. 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. The proposed change maintains sufficient continuity and diversity of leak detection capability that the probability of piping evaluated and approved for Leak-Before-Break progressing to pipe rupture remains extremely low. Therefore, it is concluded that the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3: Does the Proposed Change Involve a Significant Reduction in a Margin of Safety?

Response: No

The proposed change clarifies the operability requirements for the RCS leakage detection instrumentation, provides appropriate allowed operating times and compensatory measures when RCS leakage detection monitors are inoperable, and revises the TS LCO, Actions, and Bases to conform more closely with the corresponding STS requirements. The proposed change maintains sufficient continuity and diversity of leak detection capability (consistent with the STS) that an increase in RCS leakage will be detected before it potentially results in gross failure.

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

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

5.2 APPLICABLE REGULATORY REQUIREMENTS/CRITERIA

A description of the proposed TS change and its relationship to applicable regulatory requirements were published in the *Federal Register* Notice of Availability on January 3, 2011 (76 FR 189). SCE&G has reviewed the NRC staff's model SE referenced in the CLIIP Notice of Availability and concluded that the regulatory evaluation section is applicable to Virgil C. Summer Nuclear Station (VCSNS) for the purpose of implementing the changes proposed in TSTF-513.

In addition to the changes proposed in TSTF-513, VCSNS proposed changes in this license amendment request to conform more closely to the Standard TS 3.4.15, "RCS Leakage Detection Instrumentation." These additional changes are consistent with the guidance provided in NUREG-1431, "Standard Technical Specifications - Westinghouse Plants."

6.0 ENVIRONMENTAL CONSIDERATION

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

ATTACHMENT 1

MARKED-UP TECHNICAL SPECIFICATION PAGES

REACTOR COOLANT SYSTEM

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

LEAKAGE DETECTION SYSTEMS

REPLACE WITH INSERT 1

LIMITING CONDITION FOR OPERATION

3.4.6.1 The following Reactor Coolant System leakage detection systems shall be OPERABLE:

a. ~~A reactor building atmosphere particulate radioactivity monitoring system,~~

b. The reactor building sump ~~level, and~~

c. ~~Either the reactor building cooling unit condensate flow rate or a reactor building atmosphere gaseous radioactivity monitoring system.~~

APPLICABILITY: MODES 1, 2, 3 and 4.

REPLACE WITH INSERT 2

ACTION:

~~With only two of the above required leakage detection systems OPERABLE, operation may continue for up to 30 days provided grab samples of the containment atmosphere are obtained and analyzed at least once per 24 hours when the required gaseous or particulate radioactive monitoring system is inoperable; otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.~~

SURVEILLANCE REQUIREMENTS

4.4.6.1 The leakage detection systems shall be demonstrated OPERABLE by:

a. Reactor building atmosphere particulate monitoring system-performance of CHANNEL CHECK, CHANNEL CALIBRATION and ANALOG CHANNEL OPERATIONAL TEST at the frequencies specified in Table 4.3-3,

b. Reactor building sump level-performance of CHANNEL CALIBRATION at least once per 18 months,

c. Reactor building atmosphere gaseous radioactivity monitoring system-performance of CHANNEL CHECK, CHANNEL CALIBRATION, AND ANALOG CHANNEL OPERATIONAL TEST at the frequencies specified is Table 4.3-3

d. Reactor building cooling unit condensate flow detector-performance of CHANNEL CALIBRATION at least once per 18 months.

TS MARKUP INSERTS

INSERT 1

a. One reactor building sump level,

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

c. One reactor building cooling unit condensate flow rate monitor.

INSERT 2

a. With the reactor building sump level monitor inoperable, perform surveillance requirement 4.4.6.2.1.d (Reactor Coolant System water inventory balance) at least once per 24 hours(1) and restore the required reactor building sump level monitor to OPERABLE status within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With the required reactor building atmosphere radioactivity monitor inoperable, analyze grab samples of the containment atmosphere at least once per 24 hours or perform surveillance requirement 4.4.6.2.1.d (Reactor Coolant System water inventory balance) at least once per 24 hours(1) and restore the required reactor building atmosphere radioactivity monitor to OPERABLE status or verify the reactor building cooling unit condensate flow rate monitor is OPERABLE within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With the reactor building cooling unit condensate flow rate monitor inoperable, perform a CHANNEL CHECK of the required reactor building atmosphere radioactivity monitor at least once per 8 hours or perform surveillance requirement 4.4.6.2.1.d (Reactor Coolant System water inventory balance) at least once per 24 hours(1); otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

d. With the reactor building sump level monitor and the reactor building cooling unit condensate flow rate monitor inoperable and with the reactor building atmosphere gaseous radioactivity monitor being the only remaining OPERABLE leakage detection monitor, analyze grab samples of the containment atmosphere at least once per 12 hours and restore the required reactor building sump level monitor or the reactor building cooling unit condensate flow rate monitor to OPERABLE status within 7 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

e. With the required reactor building atmosphere radioactivity monitor and the reactor building cooling unit condensate flow rate monitor inoperable, restore the required reactor building atmosphere radioactivity monitor or the reactor building air cooler condensate flow rate monitor to OPERABLE status within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

f. With all required monitoring systems inoperable, enter LCO 3.0.3 immediately.

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(1) Not required to be performed/completed until 12 hours after establishment of steady state operation.

ATTACHMENT 2

REVISED TECHNICAL SPECIFICATION PAGES

Replace the following pages of the Appendix A to Operating License Number NPF-12, Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove Pages	Insert Pages
3/4 4-18	3/4 4-18
3/4 4-18a	3/4 4-18a

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

LEAKAGE DETECTION SYSTEMS

LIMITING CONDITION FOR OPERATION

3.4.6.1 The following Reactor Coolant System leakage detection systems shall be OPERABLE:

a. One reactor building sump level,

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

c. One reactor building cooling unit condensate flow rate monitor.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With the reactor building sump level monitor inoperable, perform surveillance requirement 4.4.6.2.1.d (Reactor Coolant System water inventory balance) at least once per 24 hours(1) and restore the required reactor building sump level monitor to OPERABLE status within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With the required reactor building atmosphere radioactivity monitor inoperable, analyze grab samples of the containment atmosphere at least once per 24 hours or perform surveillance requirement 4.4.6.2.1.d (Reactor Coolant System water inventory balance) at least once per 24 hours(1) and restore the required reactor building atmosphere radioactivity monitor to OPERABLE status or verify the reactor building cooling unit condensate flow rate monitor is OPERABLE within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With the reactor building cooling unit condensate flow rate monitor inoperable, perform a CHANNEL CHECK of the required reactor building atmosphere radioactivity monitor at least once per 8 hours or perform surveillance requirement 4.4.6.2.1.d (Reactor Coolant System water inventory balance) at least once per 24 hours (1); otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

d. With the reactor building sump level monitor and the reactor building cooling unit condensate flow rate monitor inoperable and with the reactor building atmosphere gaseous radioactivity monitor being the only remaining OPERABLE leakage

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(1) Not required to be performed/completed until 12 hours after establishment of steady state operation.

LIMITING CONDITION FOR OPERATION

ACTION: (Continued)

detection monitor, analyze grab samples of the containment atmosphere at least once per 12 hours and restore the required reactor building sump level monitor or the reactor building cooling unit condensate flow rate monitor to OPERABLE status within 7 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

e. With the required reactor building atmosphere radioactivity monitor and the reactor building cooling unit condensate flow rate monitor inoperable, restore the required reactor building atmosphere radioactivity monitor or the reactor building air cooler condensate flow rate monitor to OPERABLE status within 30 days; otherwise be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

f. With all required monitoring systems inoperable, enter LCO 3.0.3 immediately.

SURVEILLANCE REQUIREMENTS

4.4.6.1 The leakage detection systems shall be demonstrated OPERABLE by:

a. Reactor building atmosphere particulate monitoring system-performance of CHANNEL CHECK, CHANNEL CALIBRATION and ANALOG CHANNEL OPERATIONAL TEST at the frequencies specified in Table 4.3-3,

b. Reactor building sump level-performance of CHANNEL CALIBRATION at least once per 18 months,

c. Reactor building atmosphere gaseous radioactivity monitoring system-performance of CHANNEL CHECK, CHANNEL CALIBRATION, AND ANALOG CHANNEL OPERATIONAL TEST at the frequencies specified is Table 4.3-3,

d. Reactor building cooling unit condensate flow detector-performance of CHANNEL CALIBRATION at least once per 18 months.

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(1) Not required to be performed/completed until 12 hours after establishment of steady state operation.

ATTACHMENT 3

MARKED-UP TECHNICAL SPECIFICATION BASES PAGES

BASES

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

3/4.4.6.1 LEAKAGE ~~DETECTION~~ SYSTEMS

BACKGROUND

The RCS leakage detection systems required by this specification are provided to monitor and detect leakage from the Reactor Coolant Pressure Boundary. These detection systems are consistent with the recommendations of Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973.

3/4.4.6.2 OPERATIONAL LEAKAGE

Background

INSERT 1

Components that contain or transport the coolant to or from the reactor core make up the RCS. Component joints are made by welding, bolting, rolling, or pressure loading, and valves isolate connecting systems from the RCS.

During plant life, the joint and valve interfaces can produce varying amounts of reactor coolant leakage, through either normal operational wear or mechanical deterioration. The purpose of the RCS Operational Leakage LCO is to limit system operation in the presence of leakage from these sources to amounts that do not compromise safety. This LCO specifies the types and amounts of leakage.

10 CFR 50, Appendix A, GDC 30, "Quality of Reactor Coolant Pressure Boundary," requires means for detecting and, to the extent practical, identifying the source of reactor coolant leakage. Regulatory Guide 1.45 describes acceptable methods for selecting leakage detection systems.

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

A limited amount of leakage inside containment is expected from auxiliary systems that cannot be made 100% leak tight. Leakage from these systems should be detected, located, and isolated from the containment atmosphere, if possible, to not interfere with RCS leakage detection.

This LCO deals with protection of the reactor coolant pressure boundary (RCPB) from degradation and the core from inadequate cooling, in addition to preventing the accident analyses radiation release assumptions from being exceeded. The consequences of violating this LCO include the possibility of a loss of coolant accident (LOCA).

BASES INSERT

INSERT 1

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 described below, the monitors are typically set to provide the most sensitive response without causing an excessive number of spurious alarms.

Limiting Condition for Operation (LCO)

The 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 Reactor Coolant Pressure Boundary (RCPB) degradation.

The LCO requires three instruments to be OPERABLE.

The reactor building sump is used to collect UNIDENTIFIED LEAKAGE. The LCO requirements apply to the total amount of UNIDENTIFIED LEAKAGE collected in the sump. Detection of leakage is accomplished by obtaining a flow rate into the sump from comparison of level changes over a specified time period. Whenever the measured flow rate into the sump from unidentified sources exceeds 1 gallon per minute, a "greater than 1 gpm" alarm is actuated. The identification of UNIDENTIFIED LEAKAGE will be delayed by the time required for the UNIDENTIFIED LEAKAGE to travel to the reactor building 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 reactor building sump level 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 as discussed in UFSAR Section 12.2.4.2.2, "Reactor Building Air Sample Line, Channel RM-A2."

An increase in humidity of the containment atmosphere could indicate the release of water vapor to the containment. A flow switch is located in each of the common condensate drain headers from the reactor building cooling units. Each flow switch is set to actuate an alarm in the control room, should a flow rate exceeding 0.5 gpm occur. The time required to detect an increase above the normal value varies based on environmental and system conditions and may take longer than 1 hour. This sensitivity is acceptable for reactor building cooling unit condensate flow rate monitor OPERABILITY.

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

ACTIONS

a. With the required reactor building sump level monitor inoperable, no other form of sampling can provide the equivalent information; however, the reactor building atmosphere radioactivity monitor will provide indications of changes in leakage. Together with the reactor building atmosphere radioactivity monitor, the periodic surveillance for RCS water inventory balance, surveillance requirement 4.4.6.2.1.d, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage. Note 1 is added allowing that surveillance requirement 4.4.6.2.1.d 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 level 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 the ACTION.

b. With both gaseous and particulate reactor building atmosphere radioactivity monitors inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed or RCS water inventory balance, in accordance with surveillance requirement 4.4.6.2.1.d, 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 reactor building cooling unit condensate flow rate monitor 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 1 is added allowing that surveillance requirement 4.4.6.2.1.d 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 allowed outage time recognizes at least one other form of leakage detection is available.

c. With the reactor building cooling unit condensate flow rate monitor inoperable, alternative action is again required. Either a CHANNEL CHECK for the required reactor building atmosphere radioactivity monitor or RCS water inventory balance, in accordance with surveillance requirement 4.4.6.2.1.d, must be performed to provide alternate periodic information. Provided a CHANNEL CHECK is performed every 8 hours or an RCS water inventory balance is performed every 24 hours, reactor operation may continue while awaiting restoration of the reactor building cooling unit condensate flow rate monitor to OPERABLE status. The 24 hour interval provides periodic information that is adequate to detect RCS leakage. Note 1 is added allowing that surveillance requirement 4.4.6.2.1.d 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.

d. With the required reactor building sump level monitor and the reactor building cooling unit condensate flow rate monitor inoperable, the only means of detecting leakage is the required reactor building atmosphere radioactivity monitor. Note that this ACTION is applicable when the only OPERABLE monitor is the reactor building atmosphere gaseous radioactivity monitor. The reactor building 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 ACTION provides 7 days to restore another RCS leakage monitor to OPERABLE status to regain the intended leakage detection diversity. The 7 day allowed outage time ensures that the plant will not be operated in a degraded configuration for a lengthy time period.

e. With the required reactor building atmosphere radioactivity monitor and the reactor building cooling unit condensate flow rate monitor inoperable, the only means of detecting leakage is the reactor building sump level monitor. This condition does not provide the required diverse means of leakage detection. The 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 allowed outage time ensures that the plant will not be operated in a reduced configuration for a lengthy time period.

f. 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.

OPERATIONAL LEAKAGE (Continued)

Applicable Safety Analyses

Except for primary-to-secondary leakage, the safety analyses do not address operational leakage. However, other operational leakage is related to the safety analyses for a LOCA; the amount of leakage can affect the probability of such an event. The safety analysis for an event resulting in steam discharge to the atmosphere assumes that primary-to-secondary leakage from all steam generators is 1 gpm or increases to 1 gpm as a result of accident induced conditions. The LCO requirement to limit primary-to-secondary leakage through any one steam generator to less than or equal to 150 gallons per day is significantly less than the conditions assumed in the safety analysis.

Primary-to-secondary leakage is a factor in the dose releases outside containment resulting from a steam line break (SLB) accident. To a lesser extent, other accidents or transients involve secondary steam release to the atmosphere, such as a steam generator tube rupture (SGTR). The leakage contaminates the secondary fluid.

The FSAR analysis for SGTR accounts for a bounding primary-to-secondary leakage rate equal to 1 gpm and the leakage rate associated with a double-ended rupture of a single tube. Leakage through the ruptured tube is the dominate contributor to dose releases. Since contaminated fluid in the ruptured steam generator is only briefly released to the atmosphere as steam via the main steam safety valves, the entire 1 gpm primary-to-secondary leakage is assumed to occur in the intact steam generators where it can be released during the subsequent cooldown of the plant. Overall, this pathway is a small contributor to dose releases.

The SLB is more limiting for site radiation releases. The safety analysis for the SLB accident assumes the entire 1 gpm primary-to-secondary leakage is through the effected steam generator as an initial condition. The dose consequences resulting from the SLB accident are well within the limits defined in 10 CFR 50.67 or the staff approved licensing basis (i.e., a small fraction of these limits).

The RCS operational leakage satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

Limiting Condition for Operation (LCO)

Reactor Coolant System operational leakage shall be limited to:

a. PRESSURE BOUNDARY LEAKAGE

No PRESSURE BOUNDARY LEAKAGE is allowed, being indicative of material deterioration. Leakage of this type is unacceptable as the leak itself could cause further deterioration, resulting in higher leakage. Violation of this LCO could result in continued degradation of the Reactor Coolant Pressure Boundary. Leakage past seals and gaskets is not PRESSURE BOUNDARY LEAKAGE.

OPERATIONAL LEAKAGE (Continued)

b. UNIDENTIFED LEAKAGE

One gallon per minute (gpm) of UNIDENTIFED LEAKAGE is allowed as a reasonable minimum detectable amount that the containment air monitoring and containment sump level monitoring equipment can detect within a reasonable time period. Violation of this LCO could result in continued degradation of the Reactor Coolant Pressure Boundary, if the leakage is from the pressure boundary.

c. Primary-to-Secondary Leakage Through Any One Steam Generator

The limit of 150 gallons per day (gpd) per steam generator is based on the operational leakage performance criterion in NEI 97-06, Steam Generator Program Guidelines (Reference 1). The Steam Generator Program operational leakage performance criterion in NEI 97-06 states, "The RCS operational primary-to-secondary leakage through any one steam generator shall be limited to 150 gpd." The limit is based on operating experience with steam generator tube degradation mechanisms that result in tube leakage. The operational leakage rate criterion in conjunction with the implementation of the Steam Generator Program is an effective measure for minimizing the frequency of steam generator tube ruptures.

d. IDENTIFIED LEAKAGE

Up to 10 gpm of IDENTIFIED LEAKAGE is considered allowable because leakage is from known sources that do not interfere with detection of UNIDENTIFED LEAKAGE and is well with the capability of the Reactor Coolant System Makeup System. IDENTIFIED LEAKAGE includes leakage to the containment from specifically known and located sources, but does not include PRESSURE BOUNDARY LEAKAGE or CONTROLLED LEAKAGE. Violation of this LCO could result in continued degradation of a component or system.

e. CONTROLLED LEAKAGE

The CONTROLLED LEAKAGE limitation restricts operation when the total flow supplied to the reactor coolant pump seals exceeds 33 gpm with the modulating valve in the supply line fully open at a nominal RCS reassure of 2235 psig. This limitation ensures that in the event of a LOCA, the safety injection flow will not be less than assumed in the accident analysis.

f. Reactor Coolant System Pressure Isolation Valve Leakage

10CFR50.2, 10CFR50.55a(c), and GDC 55 of 10CFR50, Appendix A define RCS PIVs as any two normally closed valves in series within the reactor coolant pressure boundary (RCPB) which separate the high pressure RCS from an attached low pressure system. During their service lives, these valves can produce varying amounts of reactor coolant leakage through either normal operational wear or mechanical deterioration. The RCS PIV leakage LCO allows leakage through these valves in amounts that do not compromise safety.

OPERATIONAL LEAKAGE (Continued)

The Reactor Coolant System Pressure Isolation Valve (PIV) Leakage limit applies to each individual valve. Leakage through both series PIVs in a line must be included as part of IDENTIFIED LEAKAGE governed by LCO 3.4.6.2, "Reactor Coolant System Operational Leakage." This is true during operation only when the loss of RCS mass through two series valves is determined by water inventory balance (SR 4.4.6.2.1.d). A known component of the identified leakage before operation begins is the least of the two individual leak rates determined for leaking series PIVs during the required surveillance testing. Leakage measured through one PIV in a line is not RCS operational LEAKAGE if the other PIV is leaktight.

Although this specification provides a limit on allowable PIV leakage rate, its main purpose is to prevent overpressure failure of the low-pressure portions of connecting systems. The leakage limit is an indication that the PIVs between the RCS and the connecting system are degraded or degrading. Excessive PIV leakage could lead to overpressure of the low-pressure piping or components, potentially resulting in a loss of coolant accident (LOCA) outside of containment.

The PIV leakage limit is 0.5 gpm per nominal inch of valve size with a maximum limit of 5 gpm. The NRC, through NUREG-1431, has endorsed this PIV leakage rate limit.

The surveillance requirements for RCS Pressure Isolation Valves provide added assurance of valve integrity thereby reducing the probability of gross valve failure and consequent intersystem LOCA. Leakage from the RCS Pressure Isolation Valves is IDENTIFIED LEAKAGE and will be considered as a portion of the allowed limit.

Leakage from the RCS Pressure Isolation Valves may be identified by surveillance testing performed during plant heatup or cooldown above 2000 psig and may be adjusted to obtain the leakage value at 2235 ± 20 psig using calculation guidance provided by the ASME OM Code.

Applicability

In MODES 1, 2, 3, and 4, the potential for Reactor Coolant Pressure Boundary leakage is greatest when the Reactor Coolant System is pressurized.

In MODES 5 and 6, leakage limits are not required because the reactor coolant pressure is far lower, resulting in lower stresses and reduced potentials for leakage.

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OPERATIONAL LEAKAGE (Continued)

Actions

a. If any PRESSURE BOUNDARY LEAKAGE exists, or primary-to-secondary leakage is not within limit, the reactor must be brought to MODE 3 within 6 hours and MODE 5 within the next 30 hours. This ACTION reduces the leakage and also reduces the factors that tend to degrade the pressure boundary.

   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. In MODE 5, the pressure stresses acting on the Reactor Coolant Pressure Boundary are much lower, and further deterioration is much less likely.

b. Any operational leakage, excluding PRESSURE BOUNDARY LEAKAGE and primary-to-secondary leakage, in excess of the LCO limits must be reduced to within the limits within 4 hours. This allows time to verify leakage rates and either identify UNIDENTIFIED LEAKAGE or reduce leakage to within limits before the reactor must be shut down. This ACTION is necessary to prevent further deterioration of the Reactor Coolant Pressure Boundary.

c. With PIV leakage in excess of the limit, the high pressure portion of the affected system must be isolated within 4 hours, or be in at least hot standby within the next 6 hours, and cold shutdown within the following 30 hours. This ACTION is necessary to prevent over pressurization of low pressure systems, and the potential for intersystem LOCA.

Surveillance Requirements

4.4.6.2.1 Verifying Reactor Coolant System leakage to be within the LCO limits ensures the integrity of the Reactor Coolant Pressure Boundary is maintained.

PRESSURE BOUNDARY LEAKAGE would at first appear as UNIDENTIFIED LEAKAGE and can only be positively identified by inspection. It should be noted that leakage past seals and gaskets is not PRESSURE BOUNDARY LEAKAGE. UNIDENTIFIED LEAKAGE and IDENTIFIED LEAKAGE are determined by performance of a Reactor Coolant System water inventory balance.

The RCS water inventory balance must be met with the reactor at steady state operating conditions and near operating pressure. Therefore, the Surveillance is modified by a note. The note states that this Surveillance Requirement is not required to be performed until 12 hours after establishment of steady state operation.

For RCS operational leakage determination by water inventory balance, steady state is defined as stable RCS pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and Reactor Coolant Pump seal injection and return flows.

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OPERATIONAL LEAKAGE (Continued)

Surveillance Requirements (Continued)

An early warning of PRESSURE BOUNDARY LEAKAGE or UNIDENTIFIED LEAKAGE is provided by the automatic systems that monitor containment atmosphere radioactivity and containment sump level. It should be noted that leakage past seals and gaskets is not PRESSURE BOUNDARY LEAKAGE. These leakage detection systems are specified in LCO 3.4.6.1, "Reactor Coolant System, Leakage Detection Systems."

Part (d) notes that this SR is not applicable to primary-to-secondary leakage because leakage of 150 gallons per day cannot be measured accurately by an RCS water inventory balance.

The 72-hour frequency is a reasonable interval to trend leakage and recognizes the importance of early leakage detection in the prevention of accidents.

4.4.6.2.2 This Surveillance Requirement verifies RCS Pressure Isolation Valve integrity thereby reducing the probability of gross valve failure and consequent intersystem LOCA.

4.4.6.2.3 This Surveillance Requirement verifies that primary-to-secondary leakage is less than or equal to 150 gpd through any one steam generator. Satisfying the primary-to-secondary leakage limit ensures that the operational leakage performance criterion in the Steam Generator Program is met. If this Surveillance Requirement is not met, compliance with LCO 3.4.5 should be evaluated. The 150-gpd limit is measured at room temperature as described in Reference 2. The operational leakage rate limit applies to leakage through any one steam generator. If it is not practical to assign the leakage to an individual steam generator, all the primary-to-secondary leakage should be conservatively assumed to be from one steam generator.

The Surveillance Requirement is modified by a note, which states that the Surveillance is not required to be performed until 12 hours after establishment of steady state operation. For Reactor Coolant System primary-to-secondary leakage determination, steady state is defined as stable Reactor Coolant System pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and reactor coolant pump seal injection and return flows.

The frequency of 72 hours is a reasonable interval to trend primary-to-secondary leakage and recognizes the importance of early leakage detection in the prevention of accidents. The primary-to-secondary leakage is determined using continuous process radiation monitors or radiochemical grab sampling in accordance with the EPRI guidelines (Reference 2).

References

1. NEI 97-06, "Steam Generator Program Guidelines"

2. EPRI TR-104788, "Pressurized Water Reactor Primary-to-Secondary Leak Guidelines"

ATTACHMENT 4

REVISED TECHNICAL SPECIFICATION BASES PAGES

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

3/4.4.6.1 LEAKAGE DETECTION SYSTEMS

Background

The RCS leakage detection systems required by this specification are provided to monitor and detect leakage from the Reactor Coolant Pressure Boundary. These detection systems are consistent with the recommendations of Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973.

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 described below, the monitors are typically set to provide the most sensitive response without causing an excessive number of spurious alarms.

Limiting Condition for Operation (LCO)

The 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 Reactor Coolant Pressure Boundary (RCPB) degradation.

The LCO requires three instruments to be OPERABLE.

The reactor building sump is used to collect UNIDENTIFIED LEAKAGE. The LCO requirements apply to the total amount of UNIDENTIFIED LEAKAGE collected in the sump. Detection of leakage is accomplished by obtaining a flow rate into the sump from comparison of level changes over a specified time period. Whenever the measured flow rate into the sump from unidentified sources exceeds 1 gallon per minute, a "greater than 1 gpm" alarm is actuated. The identification of UNIDENTIFIED LEAKAGE will be delayed by the time required for the UNIDENTIFIED LEAKAGE to travel to the reactor building 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 reactor building sump level 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

LEAKAGE DETECTION SYSTEMS (Continued)

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 as discussed in UFSAR Section 12.2.4.2.2, "Reactor Building Air Sample Line, Channel RM-A2."

An increase in humidity of the containment atmosphere could indicate the release of water vapor to the containment. A flow switch is located in each of the common condensate drain headers from the reactor building cooling units. Each flow switch is set to actuate an alarm in the control room, should a flow rate exceeding 0.5 gpm occur. The time required to detect an increase above the normal value varies based on environmental and system conditions and may take longer than 1 hour. This sensitivity is acceptable for reactor building cooling unit condensate flow rate monitor OPERABILITY.

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

Actions

a. With the required reactor building sump level monitor inoperable, no other form of sampling can provide the equivalent information; however, the reactor building atmosphere radioactivity monitor will provide indications of changes in leakage. Together with the reactor building atmosphere radioactivity monitor, the periodic surveillance for RCS water inventory balance, surveillance requirement 4.4.6.2.1.d, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage. Note 1 is added allowing that surveillance requirement 4.4.6.2.1.d 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 level 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 the ACTION.

b. With both gaseous and particulate reactor building atmosphere radioactivity monitors inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed or RCS water inventory balance, in accordance with surveillance requirement 4.4.6.2.1.d, must be performed to provide alternate periodic information.

LEAKAGE DETECTION SYSTEMS (Continued)

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 reactor building cooling unit condensate flow rate monitor 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 1 is added allowing that surveillance requirement 4.4.6.2.1.d 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 allowed outage time recognizes at least one other form of leakage detection is available.

c. With the reactor building cooling unit condensate flow rate monitor inoperable, alternative action is again required. Either a CHANNEL CHECK for the required reactor building atmosphere radioactivity monitor or RCS water inventory balance, in accordance with surveillance requirement 4.4.6.2.1.d, must be performed to provide alternate periodic information. Provided a CHANNEL CHECK is performed every 8 hours or an RCS water inventory balance is performed every 24 hours, reactor operation may continue while awaiting restoration of the reactor building cooling unit condensate flow rate monitor to OPERABLE status. The 24 hour interval provides periodic information that is adequate to detect RCS leakage. Note 1 is added allowing that surveillance requirement 4.4.6.2.1.d 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.

d. With the required reactor building sump level monitor and the reactor building cooling unit condensate flow rate monitor inoperable, the only means of detecting leakage is the required reactor building atmosphere radioactivity monitor. Note that this ACTION is applicable when the only OPERABLE monitor is the reactor building atmosphere gaseous radioactivity monitor. The reactor building 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 ACTION provides 7 days to restore another RCS leakage monitor to OPERABLE status to regain the intended leakage detection diversity. The 7 day allowed outage time ensures that the plant will not be operated in a degraded configuration for a lengthy time period.

LEAKAGE DETECTION SYSTEMS (Continued)

e. With the required reactor building atmosphere radioactivity monitor and the reactor building cooling unit condensate flow rate monitor inoperable, the only means of detecting leakage is the reactor building sump level monitor. This condition does not provide the required diverse means of leakage detection. The 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 allowed outage time ensures that the plant will not be operated in a reduced configuration for a lengthy time period.

f. 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.

3/4.4.6.2 OPERATIONAL LEAKAGE

Background

Components that contain or transport the coolant to or from the reactor core make up the RCS. Component joints are made by welding, bolting, rolling, or pressure loading, and valves isolate connecting systems from the RCS.

During plant life, the joint and valve interfaces can produce varying amounts of reactor coolant leakage, through either normal operational wear or mechanical deterioration. The purpose of the RCS Operational Leakage LCO is to limit system operation in the presence of leakage from these sources to amounts that do not compromise safety. This LCO specifies the types and amounts of leakage.

10 CFR 50, Appendix A, GDC 30, "Quality of Reactor Coolant Pressure Boundary," requires means for detecting and, to the extent practical, identifying the source of reactor coolant leakage. Regulatory Guide 1.45 describes acceptable methods for selecting leakage detection systems.

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

A limited amount of leakage inside containment is expected from auxiliary systems that cannot be made 100% leak tight. Leakage from these systems should be detected, located, and isolated from the containment atmosphere, if possible, to not interfere with RCS leakage detection.

This LCO deals with protection of the reactor coolant pressure boundary (RCPB) from degradation and the core from inadequate cooling, in addition to preventing the accident analyses radiation release assumptions from being exceeded. The consequences of violating this LCO include the possibility of a loss of coolant accident (LOCA).

OPERATIONAL LEAKAGE (Continued)

Applicable Safety Analyses

Except for primary-to-secondary leakage, the safety analyses do not address operational leakage. However, other operational leakage is related to the safety analyses for a LOCA; the amount of leakage can affect the probability of such an event. The safety analysis for an event resulting in steam discharge to the atmosphere assumes that primary-to-secondary leakage from all steam generators is 1 gpm or increases to 1 gpm as a result of accident induced conditions. The LCO requirement to limit primary-to-secondary leakage through any one steam generator to less than or equal to 150 gallons per day is significantly less than the conditions assumed in the safety analysis.

Primary-to-secondary leakage is a factor in the dose releases outside containment resulting from a steam line break (SLB) accident. To a lesser extent, other accidents or transients involve secondary steam release to the atmosphere, such as a steam generator tube rupture (SGTR). The leakage contaminates the secondary fluid.

The FSAR analysis for SGTR accounts for a bounding primary-to-secondary leakage rate equal to 1 gpm and the leakage rate associated with a double-ended rupture of a single tube. Leakage through the ruptured tube is the dominate contributor to dose releases. Since contaminated fluid in the ruptured steam generator is only briefly released to the atmosphere as steam via the main steam safety valves, the entire 1 gpm primary-to-secondary leakage is assumed to occur in the intact steam generators where it can be released during the subsequent cooldown of the plant. Overall, this pathway is a small contributor to dose releases.

The SLB is more limiting for site radiation releases. The safety analysis for the SLB accident assumes the entire 1 gpm primary-to-secondary leakage is through the effected steam generator as an initial condition. The dose consequences resulting from the SLB accident are well within the limits defined in 10 CFR 50.67 or the staff approved licensing basis (i.e., a small fraction of these limits).

The RCS operational leakage satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

Limiting Condition for Operation (LCO)

Reactor Coolant System operational leakage shall be limited to:

a. PRESSURE BOUNDARY LEAKAGE

No PRESSURE BOUNDARY LEAKAGE is allowed, being indicative of material deterioration. Leakage of this type is unacceptable as the leak itself could cause further deterioration, resulting in higher leakage. Violation of this LCO could result in continued degradation of the Reactor Coolant Pressure Boundary. Leakage past seals and gaskets is not PRESSURE BOUNDARY LEAKAGE.

OPERATIONAL LEAKAGE (Continued)

b. UNIDENTIFED LEAKAGE

One gallon per minute (gpm) of UNIDENTIFED LEAKAGE is allowed as a reasonable minimum detectable amount that the containment air monitoring and containment sump level monitoring equipment can detect within a reasonable time period. Violation of this LCO could result in continued degradation of the Reactor Coolant Pressure Boundary, if the leakage is from the pressure boundary.

c. Primary-to-Secondary Leakage Through Any One Steam Generator

The limit of 150 gallons per day (gpd) per steam generator is based on the operational leakage performance criterion in NEI 97-06, Steam Generator Program Guidelines (Reference 1). The Steam Generator Program operational leakage performance criterion in NEI 97-06 states, "The RCS operational primary-to-secondary leakage through any one steam generator shall be limited to 150 gpd." The limit is based on operating experience with steam generator tube degradation mechanisms that result in tube leakage. The operational leakage rate criterion in conjunction with the implementation of the Steam Generator Program is an effective measure for minimizing the frequency of steam generator tube ruptures.

d. IDENTIFIED LEAKAGE

Up to 10 gpm of IDENTIFIED LEAKAGE is considered allowable because leakage is from known sources that do not interfere with detection of UNIDENTIFED LEAKAGE and is well with the capability of the Reactor Coolant System Makeup System. IDENTIFIED LEAKAGE includes leakage to the containment from specifically known and located sources, but does not include PRESSURE BOUNDARY LEAKAGE or CONTROLLED LEAKAGE. Violation of this LCO could result in continued degradation of a component or system.

e. CONTROLLED LEAKAGE

The CONTROLLED LEAKAGE limitation restricts operation when the total flow supplied to the reactor coolant pump seals exceeds 33 gpm with the modulating valve in the supply line fully open at a nominal RCS reassure of 2235 psig. This limitation ensures that in the event of a LOCA, the safety injection flow will not be less than assumed in the accident analysis.

f. Reactor Coolant System Pressure Isolation Valve Leakage

10CFR50.2, 10CFR50.55a(c), and GDC 55 of 10CFR50, Appendix A define RCS PIVs as any two normally closed valves in series within the reactor coolant pressure boundary (RCPB) which separate the high pressure RCS from an attached low pressure system. During their service lives, these valves can produce varying amounts of reactor coolant leakage through either normal operational wear or mechanical deterioration. The RCS PIV leakage LCO allows leakage through these valves in amounts that do not compromise safety.

OPERATIONAL LEAKAGE (Continued)

The Reactor Coolant System Pressure Isolation Valve (PIV) Leakage limit applies to each individual valve. Leakage through both series PIVs in a line must be included as part of IDENTIFIED LEAKAGE governed by LCO 3.4.6.2, "Reactor Coolant System Operational Leakage." This is true during operation only when the loss of RCS mass through two series valves is determined by water inventory balance (SR 4.4.6.2.1.d). A known component of the identified leakage before operation begins is the least of the two individual leak rates determined for leaking series PIVs during the required surveillance testing. Leakage measured through one PIV in a line is not RCS operational LEAKAGE if the other PIV is leaktight.

Although this specification provides a limit on allowable PIV leakage rate, its main purpose is to prevent overpressure failure of the low-pressure portions of connecting systems. The leakage limit is an indication that the PIVs between the RCS and the connecting system are degraded or degrading. Excessive PIV leakage could lead to overpressure of the low-pressure piping or components, potentially resulting in a loss of coolant accident (LOCA) outside of containment.

The PIV leakage limit is 0.5 gpm per nominal inch of valve size with a maximum limit of 5 gpm. The NRC, through NUREG-1431, has endorsed this PIV leakage rate limit.

The surveillance requirements for RCS Pressure Isolation Valves provide added assurance of valve integrity thereby reducing the probability of gross valve failure and consequent intersystem LOCA. Leakage from the RCS Pressure Isolation Valves is IDENTIFIED LEAKAGE and will be considered as a portion of the allowed limit.

Leakage from the RCS Pressure Isolation Valves may be identified by surveillance testing performed during plant heatup or cooldown above 2000 psig and may be adjusted to obtain the leakage value at 2235 ± 20 psig using calculation guidance provided by the ASME OM Code.

Applicability

In MODES 1, 2, 3, and 4, the potential for Reactor Coolant Pressure Boundary leakage is greatest when the Reactor Coolant System is pressurized.

In MODES 5 and 6, leakage limits are not required because the reactor coolant pressure is far lower, resulting in lower stresses and reduced potentials for leakage.

OPERATIONAL LEAKAGE (Continued)

Actions

a. If any PRESSURE BOUNDARY LEAKAGE exists, or primary-to-secondary leakage is not within limit, the reactor must be brought to MODE 3 within 6 hours and MODE 5 within the next 30 hours. This ACTION reduces the leakage and also reduces the factors that tend to degrade the pressure boundary.

   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. In MODE 5, the pressure stresses acting on the Reactor Coolant Pressure Boundary are much lower, and further deterioration is much less likely.

b. Any operational leakage, excluding PRESSURE BOUNDARY LEAKAGE and primary-to-secondary leakage, in excess of the LCO limits must be reduced to within the limits within 4 hours. This allows time to verify leakage rates and either identify UNIDENTIFIED LEAKAGE or reduce leakage to within limits before the reactor must be shut down. This ACTION is necessary to prevent further deterioration of the Reactor Coolant Pressure Boundary.

c. With PIV leakage in excess of the limit, the high pressure portion of the affected system must be isolated within 4 hours, or be in at least hot standby within the next 6 hours, and cold shutdown within the following 30 hours. This ACTION is necessary to prevent over pressurization of low pressure systems, and the potential for intersystem LOCA.

Surveillance Requirements

4.4.6.2.1 Verifying Reactor Coolant System leakage to be within the LCO limits ensures the integrity of the Reactor Coolant Pressure Boundary is maintained.

PRESSURE BOUNDARY LEAKAGE would at first appear as UNIDENTIFIED LEAKAGE and can only be positively identified by inspection. It should be noted that leakage past seals and gaskets is not PRESSURE BOUNDARY LEAKAGE. UNIDENTIFIED LEAKAGE and IDENTIFIED LEAKAGE are determined by performance of a Reactor Coolant System water inventory balance.

The RCS water inventory balance must be met with the reactor at steady state operating conditions and near operating pressure. Therefore, the Surveillance is modified by a note. The note states that this Surveillance Requirement is not required to be performed until 12 hours after establishment of steady state operation.

For RCS operational leakage determination by water inventory balance, steady state is defined as stable RCS pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and Reactor Coolant Pump seal injection and return flows.

OPERATIONAL LEAKAGE (Continued)

Surveillance Requirements (Continued)

An early warning of PRESSURE BOUNDARY LEAKAGE or UNIDENTIFIED LEAKAGE is provided by the automatic systems that monitor containment atmosphere radioactivity and containment sump level. It should be noted that leakage past seals and gaskets is not PRESSURE BOUNDARY LEAKAGE. These leakage detection systems are specified in LCO 3.4.6.1, "Reactor Coolant System, Leakage Detection Systems."

Part (d) notes that this SR is not applicable to primary-to-secondary leakage because leakage of 150 gallons per day cannot be measured accurately by an RCS water inventory balance.

The 72-hour frequency is a reasonable interval to trend leakage and recognizes the importance of early leakage detection in the prevention of accidents.

4.4.6.2.2 This Surveillance Requirement verifies RCS Pressure Isolation Valve integrity thereby reducing the probability of gross valve failure and consequent intersystem LOCA.

4.4.6.2.3 This Surveillance Requirement verifies that primary-to-secondary leakage is less than or equal to 150 gpd through any one steam generator. Satisfying the primary-to-secondary leakage limit ensures that the operational leakage performance criterion in the Steam Generator Program is met. If this Surveillance Requirement is not met, compliance with LCO 3.4.5 should be evaluated. The 150-gpd limit is measured at room temperature as described in Reference 2. The operational leakage rate limit applies to leakage through any one steam generator. If it is not practical to assign the leakage to an individual steam generator, all the primary-to-secondary leakage should be conservatively assumed to be from one steam generator.

The Surveillance Requirement is modified by a note, which states that the Surveillance is not required to be performed until 12 hours after establishment of steady state operation. For Reactor Coolant System primary-to-secondary leakage determination, steady state is defined as stable Reactor Coolant System pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and reactor coolant pump seal injection and return flows.

The frequency of 72 hours is a reasonable interval to trend primary-to-secondary leakage and recognizes the importance of early leakage detection in the prevention of accidents. The primary-to-secondary leakage is determined using continuous process radiation monitors or radiochemical grab sampling in accordance with the EPRI guidelines (Reference 2).

References

1. NEI 97-06, "Steam Generator Program Guidelines"

2. EPRI TR-104788, "Pressurized Water Reactor Primary-to-Secondary Leak Guidelines"

ATTACHMENT 5

LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by the Virgil C. Summer Nuclear Station (VCSNS) in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments. Please direct questions regarding these commitments to Mr. Bruce L. Thompson at (803) 931-5042.

COMMITMENT	DUE DATE
Revise UFSAR to comply with TSTF-513.	120 Days after Issuance of Amendment.