Tennessee Valley Authority, Post Office Box 2000, Soddy Daisy, Tennessee 37379-2000

Masoud Bajestani
Site Vice President
Sequoyah Nuclear Plant

June 16, 2000

TVA-SQN-TS-98-10 10 CFR 50.90

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

Gentlemen:

In the Matter of	)	Docket Nos. 50-327
Tennessee Valley Authority	)	50-328

SEQUOYAH NUCLEAR PLANT (SQN) - UNITS 1 AND 2 - TECHNICAL SPECIFICATION (TS) CHANGE NO. 98-10, REVISION 1 "ENHANCEMENT OF REACTOR COOLANT LEAKAGE DETECTION AND OPERATIONAL LEAKAGE CONSISTENT WITH STANDARD TECHNICAL SPECIFICATIONS" (NUREG-1431)

In accordance with the provisions of 10 CFR 50.4 and 50.90, TVA submitted a request for an amendment to SQN's licenses DPR-77 and 79 to change the TSs for Units 1 and 2. The proposed change updated the current TS requirements for reactor coolant system (RCS) leakage detection and RCS operational leakage specifications consistent with the recommended content of NUREG-1431. During a telephone conversation on June 6, 2000, with the NRC reviewer and NRC project manager for SQN, a concern with reducing the total number of RCS leakage detection monitors was discussed. This portion of the proposed revision was determined by NRC to be a reduction in the current licensing basis for SQN and required justification or revision. This letter serves to provide the necessary revisions to the original change request submitted on June 30, 1999.

DC3C

TVA has determined that the original no significant hazards considerations associated with the proposed change remains valid with the proposed revisions and that the change continues to be exempt from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter to the Tennessee State Department of Public Health.

Enclosure 1 to this letter provides the description and evaluation of the proposed revised change. Enclosure 2 contains copies of the appropriate TS pages for the leakage detection portion of the proposed revision from Units 1 and 2 marked up to show the proposed changes incorporated into the original request.

TVA requests that the revised TS be made effective within 45 days of NRC approval. If you have any questions about this change, please telephone me at (423) 843-7170 or J. D. Smith at (423) 843-6672.

Sincerely,

M. Bajestani

Masoud Bajestani

Subscribed and sworn to before me
on this 16th day of June

Peggy M. Billingsley

Notary Public

My Commission Expires October 9, 2002

Enclosures
cc: See Page 3

cc (Enclosures):
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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR PLANT (SQN)
UNITS 1 AND 2
DOCKET NOS. 327 AND 328

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE 98-10, REVISION 1
DESCRIPTION AND EVALUATION OF THE PROPOSED CHANGE

I. DESCRIPTION OF THE PROPOSED CHANGE, REVISION 1

TVA proposes a revision to the original TS change request for the reactor coolant system (RCS) leakage detection portion of TS Change 98-10. Revision 1 will increase the required functions for Specification 3.4.6.1, "Leakage Detection Instrumentation," from one lower containment atmosphere radioactivity monitor to two monitors that include both a gaseous and particulate monitor. In conjunction with this change is a revision to proposed Action b that will require entry into a 30-day provision to return both radiation monitors to operable status and perform additional containment monitoring if either the gaseous or particulate radiation monitor is inoperable. The Bases associated with Specification 3.4.6.1 have been revised accordingly to support these revisions to the original request. The remaining portions of Specification 3.4.6.1, as well as all other portions of the original TS Change 98-10 request, are unchanged and unaffected by the proposed revision. The pages attached in Enclosure 2 include only those pages associated with the RCS leakage detection instrumentation. Please note that most of the Bases pages have not been affected but have been included for completeness.

II. REASON FOR THE PROPOSED CHANGE

The original purpose of the proposed change to the SQN TSs was to provide requirements that are more consistent with the industry standard in accordance with NUREG-1431. TVA used the NUREG-1431 guidance to develop the original request and determined that the request was consistent with the intent of the NUREG. The request was not perceived as a reduction in the current licensing basis but as an attempt to conform more closely with the generic guidance provided in NUREG-1431. Discussions with NRC have resulted in an agreement that the proposed portions associated with

the RCS leakage detection instrumentation could result in such a reduction. Therefore, TVA is proposing a revision to the original change request to resolve this concern and ensure consistency with the current licensing basis of SQN and NUREG-1431.

III. SAFETY ANALYSIS

The proposed revision to TS Change 98-10 provides more conservative requirements for the RCS leakage detection instrumentation. This revision requires both lower containment radiation monitors to be operable and the loss of either results in the need to take alternative action. These actions include increased monitoring and a 30-day interval to return the radiation monitors to operable status or commence a unit shutdown. The original request provided for the ability of one radiation monitor to be inoperable without requiring the entry into required actions. Since the proposed revision ensures the operability of three monitors, as opposed to the original request that only required two monitors, the level of nuclear safety is enhanced and this revision to the original request is acceptable.

Enclosure 2 provides the revised pages for the RCS leakage detection instrumentation and the associated Bases that have been revised by this revision to the original TS Change 98-10. The other portions of the original TS change request have not been affected and the justifications for these requirements, as well as the portions of Specification 3.4.6.1 that have not been altered, remain valid. Also, the original significant hazards consideration remains valid, as well as the environmental impact consideration, as a result of the more conservative requirements proposed by this revision. Therefore, the proposed revision to TS Change 98-10 is acceptable and will maintain the required safety functions to protect the health and safety of the public.

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
SEQUOYAH PLANT (SQN)
UNITS 1 AND 2

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE 98-10
MARKED PAGES

I. AFFECTED PAGE LIST

Unit 1	Unit 2
3/4 4-13	3/4 4-17
B 3/4 4-4a	B 3/4 4-4
B 3/4 4-4b	B 3/4 4-4a
B 3/4 4-4c	B 3/4 4-4b
B 3/4 4-4d	B 3/4 4-4c
B 3/4 4-4e	B 3/4 4-4d

II. MARKED PAGES

See attached.

Insert 1

ACTIONS:

a. With both containment pocket sump monitors inoperable, operation may continue for up to 30 days provided SR 4.4.6.2.1 is performed 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 provisions of Specification 3.0.4 are not applicable.

b. With either or both the gaseous or particulate lower containment atmosphere radioactivity monitors inoperable, operation may continue for up to 30 days provided grab samples of the lower containment atmosphere are analyzed once per 24 hours or SR 4.4.6.2.1 is performed 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 provisions of Specification 3.0.4 are not applicable.

c. With both containment pocket sump monitors and both lower containment atmosphere radioactivity monitors inoperable, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

REACTOR COOLANT SYSTEM

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

LEAKAGE DETECTION ~~SYSTEMS~~ INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

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

a. ~~The~~ TWO lower containment atmosphere ~~particulate~~ radioactivity monitor~~ing~~S ~~system~~, (GASEOUS AND PARTICULATE), AND

b. ~~The~~ ONE containment pocket sump level monitor~~ing~~ ~~system, and~~

~~c. The lower containment atmosphere gaseous radioactivity monitoring system.~~

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION/S: ← INSERT 1

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. DELETE R1

SURVEILLANCE REQUIREMENTS

4.4.6.1 The leakage detection ~~systems~~ INSTRUMENTATION shall be demonstrated OPERABLE by:

a. ~~Performance of~~ PERFORMANCE OF The lower containment atmosphere gaseous and particulate monitor~~ing~~ ~~systems performance of~~ CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST at the frequencies specified in Table 4.3-3, and

b. ~~Performance of~~ PERFORMANCE OF Containment pocket sump level monitor~~ing~~ ~~system performance of~~ CHANNEL CALIBRATION at least once per 18 months.

* SURVEILLANCE PERFORMANCE NOT REQUIRED UNTIL 12 HOURS AFTER ESTABLISHMENT OF STEADY STATE OPERATION.

MAR 25 1982

March 25, 1982

Insert 1

ACTIONS:

a. With both containment pocket sump monitors inoperable, operation may continue for up to 30 days provided SR 4.4.6.2.1 is performed 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 provisions of Specification 3.0.4 are not applicable.

b. With either or both the gaseous or particulate lower containment atmosphere radioactivity monitors inoperable, operation may continue for up to 30 days provided grab samples of the lower containment atmosphere are analyzed once per 24 hours or SR 4.4.6.2.1 is performed 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 provisions of Specification 3.0.4 are not applicable.

c. With both containment pocket sump monitors and both lower containment atmosphere radioactivity monitors inoperable, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

3/4.4.6.1 LEAKAGE DETECTION INSTRUMENTATION

BACKGROUND

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

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

Industry practice has shown that water flow changes of 0.5 to 1.0 gpm can be readily detected in contained volumes by monitoring changes in water level, in flow rate, or in the operating frequency of a pump. The containment pocket sump used to collect UNIDENTIFIED LEAKAGE is instrumented to alarm for increases of 1.0 gpm in the normal flow rates within one hour. This sensitivity is acceptable for detecting increases in UNIDENTIFIED LEAKAGE.

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

An increase in humidity of the containment atmosphere would indicate release of water vapor to the containment. Dew point temperature measurements can thus be used to monitor humidity levels of the containment atmosphere as an indicator of potential RCS leakage.

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

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

APPLICABLE SAFETY ANALYSES

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

The safety significance of RCS leakage varies widely depending on its source, rate, and duration. Therefore, detecting and monitoring RCS leakage into the containment area is necessary. Quickly separating the IDENTIFIED LEAKAGE from the UNIDENTIFIED LEAKAGE provides quantitative information to the operators, allowing them to take corrective action should a leakage occur detrimental to the safety of the unit and the public. Exclusions to the requirements of General Design Criteria 4, for the dynamic effects of the RCS piping, have been utilized based on the leak detection capability to identify leaks before a pipe break would occur.

RCS leakage detection instrumentation satisfies Criterion 1 of the NRC Policy Statement.

LCO

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

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

BASES

APPLICABILITY

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

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

ACTIONS

Action a:

With both containment pocket sump monitors inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere radioactivity monitor will provide indications of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS water inventory balance, Surveillance 4.4.6.2.1, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage. A footnote is added allowing that SR 4.4.6.2.1 is not required to be performed until 12 hours after establishing steady state operation (stable pressure, temperature, power level, pressurizer and makeup tank levels, makeup, 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 pocket sump monitor to OPERABLE status within a Completion Time of 30 days is required to regain the function after the monitor's failure. This time is acceptable, considering the frequency and adequacy of the RCS water inventory balance required by Action a.

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

If the requirements of Action a cannot be met, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within the following 30 hours. The allowed completion times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

Action b:

With either the gaseous or particulate containment atmosphere radioactivity monitoring instrumentation channels inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed or water inventory balances, in accordance with Surveillance 4.4.6.2.1, must be performed to provide alternate periodic information.

With a sample obtained and analyzed or water inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of the containment atmosphere radioactivity monitors.

The 24 hour interval provides periodic information that is adequate to detect leakage. A footnote is added allowing that SR 4.4.6.2.1 is not required to be performed until 12 hours after establishing steady state operation (stable pressure, temperature, power level, pressurizer and makeup tank levels, makeup, letdown, and RCP seal injection and return flows). The 12-hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established. The 30 day Completion Time recognizes at least one other form of leakage detection is available.

Action b is modified by a note that indicates that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when the gaseous and particulate containment atmosphere radioactivity monitor channels are inoperable. This allowance is provided because other instrumentation is available to monitor for RCS leakage.

If the requirements of Action b cannot be met, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within the following 30 hours. The allowed completion times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

Action c:

With all required monitors inoperable, no automatic means of monitoring leakage are available, and immediate plant shutdown to a MODE in which the requirement does not apply is required. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within the following 30 hours.

SURVEILLANCE REQUIREMENTS

Surveillance 4.4.6.1.a

This surveillance requires the performance of a CHANNEL CHECK of the required containment atmosphere radioactivity monitors. The check gives reasonable confidence that the monitors are operating properly. The frequency of 12 hours is based on instrument reliability and is reasonable for detecting off normal conditions.

This surveillance requires the performance of a CHANNEL CALIBRATION for the required containment atmosphere radioactivity monitors. The calibration verifies the accuracy of the instrument string, including the instruments located inside containment. The frequency of 18 months is a typical refueling cycle and considers channel reliability. Operating experience has proven that this frequency is acceptable.

This surveillance requires the performance of a CHANNEL FUNCTIONAL TEST on the required containment atmosphere radioactivity monitors. The test ensures that the monitors can perform their functions in the desired manner. The test verifies the alarm setpoint and relative accuracy of the instrument string. The frequency of 92 days considers instrument reliability, and operating experience has shown that it is proper for detecting degradation.

The surveillance frequencies for these tests are specified in Table 4.3-3.

Surveillance 4.4.6.1.b

This surveillance requires the performance of a CHANNEL CALIBRATION for the required containment pocket sump monitors. The calibration verifies the accuracy of the instrument string, including the instruments located inside containment. The frequency of 18 months is a typical refueling cycle and considers channel reliability. Again, operating experience has proven that this frequency is acceptable.

REFERENCES

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

2. Regulatory Guide 1.45.

3. FSAR, Sections 5.2.7 "RCBP Leakage Detection Systems" and 12.2.4 "Airborne Radioactivity Monitoring."

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

LEAKAGE DETECTION ~~SYSTEMS~~ INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

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

a. ~~The~~ TWO lower containment atmosphere ~~particulate~~ radioactivity monitoring~~s system~~ (GASEOUS AND PARTICULATE), AND

b. ~~The~~ ONE containment pocket sump level monitoring ~~system, and~~

~~c. The lower containment atmosphere gaseous radioactivity monitoring system.~~

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION/S: ← INSERT 1

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.

DELETE

SURVEILLANCE REQUIREMENTS

4.4.6.1 The leakage detection ~~systems~~ INSTRUMENTATION shall be demonstrated OPERABLE by:

a. ~~The~~ PERFORMANCE OF lower containment atmosphere gaseous and particulate monitoring ~~system performance of~~ CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST at the frequencies specified in Table 4.3-3, and

b. ~~The~~ PERFORMANCE OF containment pocket sump level monitoring ~~system performance of~~ CHANNEL CALIBRATION at least once per 18 months.

* SURVEILLANCE PERFORMANCE NOT REQUIRED UNTIL 12 HOURS AFTER ESTABLISHMENT OF STEADY STATE OPERATION.

Insert 1

ACTIONS:

a. With both containment pocket sump monitors inoperable, operation may continue for up to 30 days provided SR 4.4.6.2.1 is performed 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 provisions of Specification 3.0.4 are not applicable.

b. With either or both the gaseous or particulate lower containment atmosphere radioactivity monitors inoperable, operation may continue for up to 30 days provided grab samples of the lower containment atmosphere are analyzed once per 24 hours or SR 4.4.6.2.1 is performed 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 provisions of Specification 3.0.4 are not applicable.

c. With both containment pocket sump monitors and both lower containment atmosphere radioactivity monitors inoperable, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

3/4.4.6.1 LEAKAGE DETECTION INSTRUMENTATION

BACKGROUND

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

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

Industry practice has shown that water flow changes of 0.5 to 1.0 gpm can be readily detected in contained volumes by monitoring changes in water level, in flow rate, or in the operating frequency of a pump. The containment pocket sump used to collect UNIDENTIFIED LEAKAGE is instrumented to alarm for increases of 1.0 gpm in the normal flow rates within one hour. This sensitivity is acceptable for detecting increases in UNIDENTIFIED LEAKAGE.

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

An increase in humidity of the containment atmosphere would indicate release of water vapor to the containment. Dew point temperature measurements can thus be used to monitor humidity levels of the containment atmosphere as an indicator of potential RCS leakage.

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

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

APPLICABLE SAFETY ANALYSES

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

The safety significance of RCS leakage varies widely depending on its source, rate, and duration. Therefore, detecting and monitoring RCS leakage into the containment area is necessary. Quickly separating the IDENTIFIED LEAKAGE from the UNIDENTIFIED LEAKAGE provides quantitative information to the operators, allowing them to take corrective action should a leakage occur detrimental to the safety of the unit and the public. Exclusions to the requirements of General Design Criteria 4, for the dynamic effects of the RCS piping, have been utilized based on the leak detection capability to identify leaks before a pipe break would occur.

RCS leakage detection instrumentation satisfies Criterion 1 of the NRC Policy Statement.

LCO

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

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

APPLICABILITY

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

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

ACTIONS

Action a:

With both containment pocket sump monitors inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere radioactivity monitor will provide indications of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS water inventory balance, Surveillance 4.4.6.2.1, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage. A footnote is added allowing that SR 4.4.6.2.1 is not required to be performed until 12 hours after establishing steady state operation (stable pressure, temperature, power level, pressurizer and makeup tank levels, makeup, 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 pocket sump monitor to OPERABLE status within a Completion Time of 30 days is required to regain the function after the monitor's failure. This time is acceptable, considering the frequency and adequacy of the RCS water inventory balance required by Action a.

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

If the requirements of Action a cannot be met, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within the following 30 hours. The allowed completion times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

Action b:

With either the gaseous or particulate containment atmosphere radioactivity monitoring instrumentation channels inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed or water inventory balances, in accordance with Surveillance 4.4.6.2.1, must be performed to provide alternate periodic information.

With a sample obtained and analyzed or water inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of the containment atmosphere radioactivity monitors.

The 24 hour interval provides periodic information that is adequate to detect leakage. A footnote is added allowing that SR 4.4.6.2.1 is not required to be performed until 12 hours after establishing steady state operation (stable pressure, temperature, power level, pressurizer and makeup tank levels, makeup, letdown, and RCP seal injection and return flows). The 12-hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established. The 30 day Completion Time recognizes at least one other form of leakage detection is available.

Action b is modified by a note that indicates that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when the gaseous and particulate containment atmosphere radioactivity monitor channels are inoperable. This allowance is provided because other instrumentation is available to monitor for RCS leakage.

If the requirements of Action b cannot be met, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within the following 30 hours. The allowed completion times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

Action c:

With all required monitors inoperable, no automatic means of monitoring leakage are available, and immediate plant shutdown to a MODE in which the requirement does not apply is required. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within the following 30 hours.

SURVEILLANCE REQUIREMENTS

Surveillance 4.4.6.1.a

This surveillance requires the performance of a CHANNEL CHECK of the required containment atmosphere radioactivity monitors. The check gives reasonable confidence that the monitors are operating properly. The frequency of 12 hours is based on instrument reliability and is reasonable for detecting off normal conditions.

This surveillance requires the performance of a CHANNEL CALIBRATION for the required containment atmosphere radioactivity monitors. The calibration verifies the accuracy of the instrument string, including the instruments located inside containment. The frequency of 18 months is a typical refueling cycle and considers channel reliability. Operating experience has proven that this frequency is acceptable.

This surveillance requires the performance of a CHANNEL FUNCTIONAL TEST on the required containment atmosphere radioactivity monitors. The test ensures that the monitors can perform their functions in the desired manner. The test verifies the alarm setpoint and relative accuracy of the instrument string. The frequency of 92 days considers instrument reliability, and operating experience has shown that it is proper for detecting degradation.

The surveillance frequencies for these tests are specified in Table 4.3-3.

Surveillance 4.4.6.1.b

This surveillance requires the performance of a CHANNEL CALIBRATION for the required containment pocket sump monitors. The calibration verifies the accuracy of the instrument string, including the instruments located inside containment. The frequency of 18 months is a typical refueling cycle and considers channel reliability. Again, operating experience has proven that this frequency is acceptable.

REFERENCES

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

2. Regulatory Guide 1.45.

3. FSAR, Sections 5.2.7 "RCBP Leakage Detection Systems" and 12.2.4 "Airborne Radioactivity Monitoring."