2.0 LIMITING CONDITIONS FOR OPERATION

2.1 Reactor Coolant System (Continued)

2.1.4 Reactor Coolant System Leakage Limits

Applicability

Applies to the leakage rates of the reactor coolant system whenever the reactor coolant temperature is greater than 210 °F.

Objective

To specify limiting conditions of the reactor coolant system leakage rates.

Specifications

To assure safe reactor operation, the following limiting conditions of the reactor coolant system leakage rates must be met:

(1) If the reactor coolant system leakage exceeds 1 gpm and the source of leakage is not identified within 12 hours, the reactor shall be placed in the hot shutdown condition. If the source leakage exceeds 1 gpm and is not identified within 24 hours, the reactor shall be placed in the cold shutdown condition.

(2) If leakage exceeds 10 gpm, the reactor shall be placed in the hot shutdown condition within 12 hours. If the leakage exceeds 10 gpm for 24 hours, the reactor shall be placed in the cold shutdown condition.

(3) Primary-to-secondary leakage through the steam generator tubes shall be limited to 1 gpm total for both steam generators. When primary-to-secondary leakage has been determined to be in excess of the limit, the leakage rate shall be reduced to within limits in 4 hours or the reactor shall be placed in the cold shutdown condition within the next 36 hours.

(4) To determine leakage to the containment, one of the following must be operable ~~at all times~~:

a. Containment ~~Dew Point Instrument~~ Atmosphere Particulate Radiation Monitor

b. Containment Atmosphere Gaseous Radiation Monitor

~~c. Containment Sump Level Instrument~~

~~d.~~ If neither of the above instruments is operable, then initiate hourly recording of the CVCS Volume Control Tank ~~Inventory Instrument~~ level.

(5) To determine leakage to the secondary system one of the following must be operable ~~at all times~~:

a. Steam Generator Blow Down Radiation Sample Instrument
b. Condenser Off Gas Radiation Monitor
c. Periodic Secondary Samples Analyzed for Activity

2.0 LIMITING CONDITIONS FOR OPERATION
2.1 Reactor Coolant System (Continued)
2.1.4 Reactor Coolant System Leakage Limits (Continued)

Basis

Leakage directly into the containment indicates the possibility of a breach in the reactor coolant envelope. The limit is held low to minimize the chance of a crack progressing to an unsafe condition without detection and proper evaluation.

When the source of leakage can be identified, the situation shall be evaluated to determine if operation can safely continue. This evaluation will be reviewed by the Plant Review Committee and will be documented in writing and approved by the Plant Manager. Under these conditions, a maximum allowable reactor coolant leakage rate of 10 gpm has been established. This does not include the reactor coolant pump seal leak off that is piped to the volume control tank, which is not considered "leakage" from the reactor coolant system. A reactor coolant leakage to the containment atmosphere greater than 10 gpm would be indicative of seal and packing failures of sufficient magnitude to warrant shutdown for repair.

The maximum reactor coolant leakage rate of 10 gpm is within the 40 gpm capacity of one charging pump which would be available even under a loss-of-off-site power condition. Leakage from the reactor coolant system can be detected by monitoring one or a combination of reactor coolant system inventory, containment building radiation level, condenser offgas, steam generator blowdown water, containment humidity, and containment sump level.[1,2] The containment atmosphere gaseous and particulate monitors are capable of detecting a one gpm leak from the reactor coolant system to containment within four hours of leak initiation. A one gpm leak is also detectable by evaluating changes in the CVCS volume control tank level. Monitoring of the level consists of documenting the level and evaluating changes once per hour. The capability to detect a one gpm RCS leak within 4 hours is required in order to credit leak-before-break methodology. If reactor coolant leakage is to another closed system, it can be detected by the plant radiation monitors or by inventory control.

Placing the reactor in hot shutdown within 12 hours provides adequate time to arrange for an orderly reduction of power on the plant. The hot shutdown condition allows personnel to enter the containment and to inspect the pressure boundary for leaks. The 24 hours allowed prior to going to a cold shutdown condition allows reasonable time to correct small deficiencies. If major repairs are needed, a cold shutdown condition would be in order.

Limiting primary to secondary leakage is important to ensure steam generator tube integrity. The plant is expected to be operated in a manner such that the secondary coolant will be maintained within those chemistry limits found to result in negligible corrosion of the steam tubes. If the secondary coolant chemistry is not maintained

within these limits, localized corrosion may likely result in stress corrosion cracking. The extent of cracking during plant operation would be limited by the limitation of steam generator tube leakage between the primary coolant system and the secondary coolant system (primary-to-secondary leakage = 1 gallon per minute, total). Cracks having a primary-to-secondary leakage less than this limit during operation will have an adequate margin of safety to withstand the loads imposed during normal operation and by postulated accidents. Operating plants have demonstrated that primary-to-secondary leakage of 1 gallon per minute can readily be detected by radiation monitors. Leakage in excess of this limit will require

plant shutdown and an unscheduled inspection, during which the leaking tubes will be located and plugged.

References

(1) ~~FSAR~~ USAR, Section 11.2.3

(2) ~~FSAR~~ USAR, Page G.16-1~~, 2~~

TABLE 3-3 (Continued)

MINIMUM FREQUENCIES FOR CHECKS, CALIBRATIONS AND TESTING
OF MISCELLANEOUS INSTRUMENTATION AND CONTROLS

Channel Description	Surveillance Function	Frequency	Surveillance Method
8. Dropped CEA Indication	a. Test	R	a. Insert a negative rate of change power signal to all four Power Range Safety Channels to test alarm.
	b. Test	R	b. Insert CEA's below lower electrical limit to test dropped CEA alarm.
9. Calorimetric Instrumentation	a. Calibrate	R	a. Apply known d/p to feedwater flow sensors.
10. Control Room Ventilation	a. Test	R	a. Check damper operation for DBA mode.
	b. Test	R	b. Check control room for positive pressure.
11. ~~Containment Humidity Detector~~ Deleted	~~a. Test~~	~~R~~	~~a. Place sensor in a known high humidity atmosphere.~~
12. Interlocks-Isolation Valves on Shutdown Cooling Line	a. Test	R	a. Known pressure of 265 psia applied to pressure transmitter and pressure switch and operability of redundant interlock verified.
13. Control Room Thermometer	a. Test	R	a. Compare reading with calibrated thermometer. If not within $\pm$ 2°F, replace.

2.0 **LIMITING CONDITIONS FOR OPERATION**
2.1 Reactor Coolant System (Continued)

2.1.4 Reactor Coolant System Leakage Limits

Applicability

Applies to the leakage rates of the reactor coolant system whenever the reactor coolant temperature is greater than 210 °F.

Objective

To specify limiting conditions of the reactor coolant system leakage rates.

Specifications

To assure safe reactor operation, the following limiting conditions of the reactor coolant system leakage rates must be met:

(1) If the reactor coolant system leakage exceeds 1 gpm and the source of leakage is not identified within 12 hours, the reactor shall be placed in the hot shutdown condition. If the source leakage exceeds 1 gpm and is not identified within 24 hours, the reactor shall be placed in the cold shutdown condition.

(2) If leakage exceeds 10 gpm, the reactor shall be placed in the hot shutdown condition within 12 hours. If the leakage exceeds 10 gpm for 24 hours, the reactor shall be placed in the cold shutdown condition.

(3) Primary-to-secondary leakage through the steam generator tubes shall be limited to 1 gpm total for both steam generators. When primary-to-secondary leakage has been determined to be in excess of the limit, the leakage rate shall be reduced to within limits in 4 hours or the reactor shall be placed in the cold shutdown condition within the next 36 hours.

(4) To determine leakage to the containment, one of the following must be operable:

a. Containment Atmosphere Particulate Radiation Monitor
b. Containment Atmosphere Gaseous Radiation Monitor

If neither of the above instruments is operable, then initiate hourly recording of the CVCS Volume Control Tank level.

2.0 LIMITING CONDITIONS FOR OPERATION

2.1 Reactor Coolant System (Continued)

2.1.4 Reactor Coolant System Leakage Limits (Continued)

(5) To determine leakage to the secondary system one of the following must be operable:

a. Steam Generator Blow Down Radiation Sample Instrument
b. Condenser Off Gas Radiation Monitor
c. Periodic Secondary Samples Analyzed for Activity

Basis

Leakage directly into the containment indicates the possibility of a breach in the reactor coolant envelope. The limit is held low to minimize the chance of a crack progressing to an unsafe condition without detection and proper evaluation.

When the source of leakage can be identified, the situation shall be evaluated to determine if operation can safely continue. This evaluation will be reviewed by the Plant Review Committee and will be documented in writing and approved by the Plant Manager. Under these conditions, a maximum allowable reactor coolant leakage rate of 10 gpm has been established. This does not include the reactor coolant pump seal leak off that is piped to the volume control tank, which is not considered "leakage" from the reactor coolant system. A reactor coolant leakage to the containment atmosphere greater than 10 gpm would be indicative of seal and packing failures of sufficient magnitude to warrant shutdown for repair.

The maximum reactor coolant leakage rate of 10 gpm is within the 40 gpm capacity of one charging pump which would be available even under a loss-of-off-site power condition. Leakage from the reactor coolant system can be detected by monitoring one or a combination of reactor coolant system inventory, containment building radiation level, condenser offgas, steam generator blowdown water, containment humidity, and containment sump level.[1,2] The containment atmosphere gaseous and particulate monitors are capable of detecting a one gpm leak from the reactor coolant system to containment within four hours of leak initiation. A one gpm leak is also detectable by evaluating changes in the CVCS volume control tank level. Monitoring of the level consists of documenting the level and evaluating changes once per hour. The capability to detect a one gpm RCS leak within 4 hours is required in order to credit leak-before-break methodology. If reactor coolant leakage is to another closed system, it can be detected by the plant radiation monitors or by inventory control.

Placing the reactor in hot shutdown within 12 hours provides adequate time to arrange for an orderly reduction of power on the plant. The hot shutdown condition allows personnel to enter the containment and to inspect the pressure boundary for leaks. The 24 hours allowed prior to going to a cold shutdown condition allows reasonable time to correct small deficiencies. If major repairs are needed, a cold shutdown condition would be in order.

Limiting primary to secondary leakage is important to ensure steam generator tube integrity. The plant is expected to be operated in a manner such that the secondary coolant will be maintained within those chemistry limits found to result in negligible corrosion of the steam tubes. If the secondary coolant chemistry is not maintained within these limits, localized corrosion may likely result in stress corrosion cracking. The extent of cracking during plant operation would be limited by the limitation of steam generator tube leakage between the primary coolant system and the secondary coolant system (primary-to-secondary leakage = 1 gallon per minute, total). Cracks having a primary-to-secondary leakage less than this limit during operation will have an adequate margin of safety to withstand the loads imposed during normal operation and by postulated accidents. Operating plants have demonstrated that primary-to-secondary leakage of 1 gallon per minute can readily be detected by radiation monitors. Leakage in excess of this limit will require plant shutdown and an unscheduled inspection, during which the leaking tubes will be located and plugged.

References

(1) USAR, Section 11.2.3

(2) USAR, Page G.16-1

TABLE 3-3 (Continued)

MINIMUM FREQUENCIES FOR CHECKS, CALIBRATIONS AND TESTING
OF MISCELLANEOUS INSTRUMENTATION AND CONTROLS

Channel Description	Surveillance Function	Frequency	Surveillance Method
8. Dropped CEA Indication	a. Test	R	a. Insert a negative rate of change power signal to all four Power Range Safety Channels to test alarm.
	b. Test	R	b. Insert CEA's below lower electrical limit to test dropped CEA alarm.
9. Calorimetric Instrumentation	a. Calibrate	R	a. Apply known d/p to feedwater flow sensors.
10. Control Room Ventilation	a. Test	R	a. Check damper operation for DBA mode.
	b. Test	R	b. Check control room for positive pressure.
11. Deleted			
12. Interlocks-Isolation Valves on Shutdown Cooling Line	a. Test	R	a. Known pressure of 265 psia applied to pressure transmitter and pressure switch and operability of redundant interlock verified.
13. Control Room Thermometer	a. Test	R	a. Compare reading with calibrated thermometer. If not within ± 2°F, replace.

ATTACHMENT B

DISCUSSION, JUSTIFICATION AND NO SIGNIFICANT HAZARDS ANALYSIS

DISCUSSION AND JUSTIFICATION OF AMENDMENT REQUEST:

Omaha Public Power District is proposing to revise the Fort Calhoun Station Unit No. 1 Technical Specification 2.1.4, "Reactor Coolant System Leakage Limits," and Table 3-3, "Minimum Frequencies for Checks, Calibrations and Testing of Miscellaneous Instrumentation and Controls," to implement the Reactor Coolant System (RCS) leak-before-break (LBB) methodology detection criteria. The Technical Specification is being modified to identify systems which are capable of detecting a one gpm RCS leak within four hours from the time of leak initiation in accordance with recommendations listed in Generic Letter 84-04.

The proposed revision to Technical Specification 2.1.4 is a result of OPPD's commitment to close Unresolved Safety Issue (USI) A-2, "Asymmetric Blowdown Loads on Reactor Primary Coolant Systems," through application of LBB methodology. The NRC concluded in Generic Letter 84-04 that an acceptable technical basis was provided so that USI A-2 issues need not be considered as part of the design basis for the Fort Calhoun Station since Fort Calhoun was included as part of the Westinghouse Owner's Group Analysis. The NRC indicated that an acceptable basis for eliminating asymmetrical loads from the design basis was to ensure leak detection systems were capable of detecting a one gpm leak within four hours of leak initiation.

OPPD informed the NRC in a letter dated August 13, 1990 (LIC-90-0591) that containment radiation monitors RM-050 and RM-051 were the primary means of detecting RCS leakage to containment within four hours of leak initiation. Each monitor is sensitive enough to detect a one gpm leak within four hours in accordance with the modified criteria of Regulatory Guide (RG) 1.45 specified in Generic Letter 84-04. The modified criteria states that the airborne particulate radiation monitor need not be seismically qualified. The proposed revisions reflect taking credit for containment radiation monitors RM-050 or RM-051 for RCS leak detection.

Regulatory Guide 1.45 indicates that RCS leakage to the containment atmosphere could also be indirectly monitored by changes in containment humidity, pressure, temperature and sump level. Initially, OPPD reported to the NRC in letter LIC-90-0591 that a backup leak detection system is provided through monitoring both containment sump level and dew point monitors. This letter stated that the backup system could meet the criteria to detect a one gpm leak within four hours, but had no means of differentiating water sources. However, subsequent calculations indicate that in some scenarios the narrow range containment sump level and the containment dew point monitors are not sensitive enough to detect, with certainty, a one gpm RCS leak within four hours of initiation. Timely detection could be accomplished in specific conditions, but not under all conditions.

Not crediting the dew point instrument as a RCS leak detection system is not contradictory to its primary function, which is to monitor performance of containment ventilation. Containment dew point indication is not listed as a PWR variable which requires monitoring per Table 2 of Regulatory Guide 1.97, Rev. 2, "Instrumentation for Light-Water-Cooled Nuclear Power Plant to Assess Plant and Environs Conditions During and Following an Accident." Per Regulatory Guide 1.97 requirements, this variable does not provide essential information to the operator during and following an accident. Thus, justification is provided to delete the requirement to have containment dew point indication operable as a RCS leak detection system per existing Technical Specification 2.1.4.

The containment dew point monitor will not be credited for RCS LBB monitoring. However, this monitor can provide early RCS leak indication in specific conditions and would be a valuable input for trending RCS leakage in these circumstances. Therefore, to satisfy the primary function of the dew point instrument, which is to monitor ventilation performance, and in certain conditions provide RCS leakage information, this instrument will normally remain in service. Having the containment dew point instrumentation operating and available can provide the operators with additional input in determining the location of possible containment systems' leakage. Although the containment dew point instrumentation normally remains in service, it is proposed that the surveillance requirement contained in Item 11 in Table 3-3 be deleted, as there will no longer be a Limiting Condition for Operation associated with this instrumentation.

The containment sump level system is not credited for RCS LBB monitoring since it can not provide with certainty, indication of a one gpm leak within four hours from the time of crack initiation. The sump level monitor can however, provide early RCS leak indication in specific conditions. Containment sump level indication can provide information to the operators in the event of other leakage sources within containment such as component cooling water. This instrumentation is required to provide information per Regulatory Guide 1.97, Rev. 2, therefore, containment sump level instrumentation will remain in service per Technical Specification 2.21.

Regulatory Guide 1.45 indicates that another important method of obtaining indications of intersystem RCS leakage is through use of a water inventory balance, designed to provide appropriate information such as abnormal water levels in tanks and abnormal water flow rates. Fort Calhoun monitors several systems to provide indication of RCS intersystem leakage. One RCS leak monitoring method is through trending of the Volume Control Tank (VCT) level changes. VCT level alarms can be very effective in monitoring RCS leakage depending upon specific conditions. The proposed revision states that should both containment radiation monitors be inoperable, VCT level must be monitored until a radiation monitor is returned to operable status. Monitoring of the level can be accomplished by documenting level changes hourly. Documenting level changes hourly is considered adequate to meet the requirement to detect a one gpm leak within four hours and the Technical Specification requirement to identify a one gpm leak within 12 hours.

FCS effectively tracks RCS leakage through inventory calculations. Currently this calculation is performed once per 24 hours, as required by Technical Specification 3.2, Table 3-5. Should the control room operators receive an alarm via the radiation monitor's annunciator, they are instructed to check other indicators for RCS leakage in containment and perform an RCS leak rate calculation. If RCS leakage is confirmed, an Abnormal Operating Procedure is entered and this procedure provides direction and contingency actions to locate and isolate the leak.

An example of Fort Calhoun's response to a RCS leak is found in License Event Report 90-028 submitted January 14, 1991 (LIC-91-0003L) which provided information about an investigation of an unknown RCS leakage source in containment. Through an enhanced monitoring program the source of RCS leakage in containment was identified as the installed spare Control Element Drive Mechanism (CEDM) housing number 9. As indicated in the LER, the leak rate was verified by RCS inventory calculations. The leakrate had stabilized and was established to be approximately 0.4 gpm. Inspection of the head revealed a leak coming from the spare CEDM number 9 housing. RCS leakage from the spare CEDM housing did not cause radiation monitors RM-050 or RM-051 to go into an alert condition. The established monitor alert setpoints (indication only) in operation at the time of the CEDM housing leakage were arbitrarily set above containment equilibrium monitor readings. The high alert setpoint was not sensitive to a 0.4 gpm RCS leak rate. Recent calculations have been performed to establish the current alert setpoint sensitivity which identifies a one gpm RCS leak rate within four hours from leak initiation. Calculated alert setpoints are based upon radioisotopic inventories consistent with Regulatory Guide 1.45.

To assure safe reactor operation the RCS leakage limit from an unidentified source will be limited to one gpm by the proposed changes to Technical Specification 2.1.4. If the unidentified leakage exceeds one gpm, the reactor must be in hot shutdown within 12 hours and cold shutdown within 24 hours. This RCS leakage limitation is consistent with leak rates identified in the Westinghouse Owner's Group analysis referenced in Generic Letter 84-04. The basis for the low leakage limits is to minimize the chance of a crack progressing to an unsafe condition without detection and proper evaluation. When the source of leakage is unknown, placing the reactor in hot shutdown within 12 hours provides adequate time for an orderly reduction of plant power level. The hot shutdown condition also allows personnel to enter the containment and inspect the pressure boundary for leaks. The 24 hours allowed prior to going to cold shutdown allows reasonable time to correct small deficiencies. If major repairs are needed, a cold shutdown condition would be in order.

It is also proposed that the applicability statement for Specification 2.1.4 be revised to clearly state when this specification is applicable. Currently the applicability statement does not state mode applicability for the specification. The proposed change would require the specification to be applicable whenever the reactor coolant temperature is above 210 °F. This is similar to CE Standard Technical Specification 3.4.7. Specifications 2.1.4(4) and 2.1.4(5) are being revised to be consistent with the proposed change to the applicability statement. A detailed description and comparison of Specification 2.1.4 and CE Standard Technical Specification 3.4.7 was provided to the NRC in a letter dated November 15, 1991 (LIC-91-267R) and reviewed by the NRC in a letter dated December 3, 1991.

ADMINISTRATIVE CHANGES

It is proposed that the references to the FSAR be revised to reflect the current nomenclature for this document which is the USAR (Updated Safety Analysis Report), and that page G.16-2 be deleted as this page is not presently in the USAR due to formatting changes.

BASIS FOR NO SIGNIFICANT HAZARDS DETERMINATION:

The proposed change does not involve a significant hazards consideration because operation of the Fort Calhoun Station Unit No. 1 in accordance with the proposed amendment would not:

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

Establishing the containment radiation monitors as the primary monitoring indicator for LBB detection does not increase the probability or consequences of an accident since the safety function of the monitors is not altered. The high alarm setpoint will not be changed thus VIAS actuation will not be affected by the proposed Technical Specification.

The function of the radiation monitor(s) is to alert operators of potential RCS leakage or problems. The change proposed requires more stringent monitoring, and equally accurate indication, of the VCT level if radiation monitoring systems are inoperable.

The probability of leaks occurring due to thermal or normal fatigue is not affected as indicated in the fracture mechanics analysis referenced in Generic Letter 84-04. No changes are proposed to primary RCS piping systems or supports as a result of the proposed revision. Adjusting the radiation monitor setpoints consistent with detection capability of one gpm RCS leakage ensures that a potential significant failure does not go undetected within the Regulatory Guide 1.45 criteria as noted in Generic Letter 84-04.

No High Energy Line Break/Loss of Coolant Accident (HELB/LOCA) analysis will be impacted by the proposed change. The results of the current Fort Calhoun HELB/LOCA analyses cited in Section 14.15 of the Updated Safety Analysis Report (USAR) will not be impacted as a result of this change.

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

It has been determined that a new or different kind of accident will not be created due to the proposed changes since no new or different modes of operation are created by this change. The existing operating procedures were established to support an enhanced RCS leak detection program. Operation of either radiation monitor RM-050 or RM-051 shall not differ from existing conditions. Only the alert setpoint shall be altered, in a conservative direction, which does not initiate safeguards components. The alert setpoint has been set above containment equilibrium monitor readings.

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

The margin of safety as defined in the basis for the Technical Specifications is not changed or reduced by this proposed change. Defining adequate RCS LBB monitoring is required to meet recommendations provided in Generic Letter 84-04. The number of systems required to be operable to detect RCS leakage has not decreased. The proposed change implements requirements to ensure that systems capable of detecting a one gpm reactor coolant leak are required to be operable, and therefore the proposed changes are more conservative than the present specifications.

Therefore, based on the above considerations, it is OPPD's position that this proposed amendment does not involve a significant hazards consideration as defined in 10 CFR 50.92 and the proposed changes will not result in a condition which significantly alters the impact of the station on the environment. Thus, the proposed changes meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and pursuant to 10 CFR 51.22(b) no environmental assessment need be prepared.